International Conference on Advanced Technology & Sciences

3rd International Conference, ICAT’16
Konya, Turkey, September 01-03, 2016

Abstracts

Editors
Ismail SARITAS
Omer Faruk BAY
Kemal TUTUNCU

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PREFACE

International Conference on Advanced Technology & Sciences (ICAT’16) has been organized in Konya, Turkey on 01-03 September, 2016.

The aim of International Conference on Advanced Technology & Sciences is to provide a platform for researchers and academics as well as practicing professionals from all over the world, to present their research and professional development activities in Computer, Electric and Electronics, Energy and Mechatronics. This conference provides opportunities for the different areas delegates to exchange new ideas and application experiences face to face, to establish business or research relations and to find global partners for future collaboration. We hope that the conference results constituted significant contribution to the knowledge in these up to date scientific fields.

All full paper submissions have been double blind and peer reviewed and evaluated based on originality, technical and/or research content/depth, correctness, relevance to conference, contributions, and readability. Selected papers presented in the conference that match with the topics of the journals will be published in the following journals:

- International Journal of Intelligent Systems and Applications in Engineering (IJISAE)
- International Journal of Applied Mathematics, Electronics and Computers (IJAMEC)
- International Journal of Energy Applications and technology (IJEAT)
- International Journal of Automotive Engineering and Technologies (IJAET)

At this conference, there are 700 paper submissions from 107 different universities. Each paper proposal was evaluated by two reviewers and 416 of these were accepted for presentation. And finally, 366 papers will be presented at our conference.

We are sure that, ICAT will be the flagship conference for researchers, students, and professionals in the areas of Electrical and Computer Engineering, Biomedical Engineering, Energy and Manufacturing Engineering and their applications from Turkey and around the world to disseminate their research advancements and discoveries, to network and exchange ideas in order to strengthen existing partnerships and foster new collaborations.

In particular we would like to thank Prof. Dr. Mustafa SAHIN, Rector of Selcuk University; Advanced Technology and Sciences, Academic Publisher; International Journal of Intelligent Systems and Applications in Engineering (IJISAE); International Journal of Applied Mathematics, Electronics and Computers (IJAMEC); Konya Metropolitan Municipality, Province of Konya Culture and Tourism Directorate, Konya Chamber of Industry, Konya Chamber of Commerce, Firdevs Patent and AYBIL Organization. They have made a crucial contribution towards the success of this conference. Our thanks also go to the colleagues in our conference office.

Looking forward to see you in next ICAT.

Ismail SARITAS - Omer Faruk BAY
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APPLICATIONS OF PRINCIPAL COMPONENT ANALYSIS (PCA) ON DATA OF FEMTOSECOND LASER MASS SPECTROMETRY (FLMS) FOR IDENTIFICATION OF HEXANE ISOMERS
YASEMIN GUNDOGDU, MEHMET TASER, ABDULLAH KEPECOGLU, HAMDI SUKUR KILIC

MOBILE ACCIDENT NOTIFICATIONS
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ABSTRACTS
COMPUTER
VIBRATION ANALYSIS FOR INDUCTION MOTORS WITH AN EXPERT SYSTEM

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ABSTRACT

This paper presents an expert system for induction motor fault detection based on vibration analysis by using Exsys Corvid expert system building tool. Vibration signals of induction motors on four different actuating mechanisms are collected with a specific vibration measuring device. The device evaluates the values with three harmonics in the frequency domain. The expert system provides recommendations as maintenance activity or the reason for the vibration by using vibration values. This system is tested and validated on four types of actuating mechanisms. Obtained results show that this system can detect faults in the early stages with a high accuracy and reliability. Thus, it provides malfunction and failure prevention and improves overall performance and efficiency of industrial systems.

KEYWORDS - fault detection, induction motor, vibration analysis, expert systems
COMPARISON OF IMAGE ROTATION AND FILTERING OPERATIONS IN TERMS OF IMAGE QUALITY FACTORS

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ABSTRACT

In this study, research was carried out in order to compare the effects of basic imaging applications such as image rotation and image filtering on a noisy image and determine whether image rotating application can be used instead of image filtering application. In the study, it was aimed to compare bilinear, bicubic and nearest methods, among commonly used interpolation methods of image rotating, with average, wiener and median filters, which are the linear filters among image filtering methods, in terms of image quality factors. PSNR (Peak to Signal Noise Ratio), MSE (Mean Square Error), SSIM (Structural Similarity Index) were determined as quality factors to be used in the study, and the processed image was a baboon image, an 8-bit gray-scale image of 512*512 dimension that is the most common image used in image processing.

KEYWORDS - Image rotating, Image filtering, PSNR, MSE, SSIM
A MODEL PROPOSAL FOR IMPROVING THE EFFICIENCY OF FACILITY LAYOUT IN EMERGENCY SERVICE IN FACULTY OF MEDICINE

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ABSTRACT

Facility layout which increases productivity and provides the most effective way to run the organization, is used both determine the location of departments, assistant services, facilities and edit this sections. There are numerous studies in the literature for the solution of facility layout’s problems. We have observed that the heuristics are preferred in some of these solutions. We used data mining in this study. Data mining continues to offer new horizons, perspectives and new methods in a new area every day. The basic objective of this study is to develop a model of the layout for the purpose of improving the emergency department's functionality, the quality of patient care, the satisfaction of patient and employee. Firstly in this study data warehouse was created by using data of the past year in the hospital information system. Data warehousing is the entry of the association analysis model. Then a system will be develop to solve the problem using association analysis with Apriori association analysis which is one of the methods of data mining. The application of the study is carried out in Kirikkale University Faculty of Medicine Hospital. The goal of this study to develop a model proposal through utilizing the method of Facility layout techniques for emergency department which will be designed according to way of intervention on patients.

KEYWORDS - Association Analysis, Emergency Department, Apriori Algorithm, Data Mining, Facility Layout Problem
A NEW SUBSPACE BASED SOLUTION TO BACKGROUND MODELLING AND CHANGE DETECTION

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ABSTRACT

Background subtraction, determining changes in the sequence of images, is an important and painful task in computer vision. One key problem in background detection is coping with dynamic backgrounds, which involve shadows, highlights, waving trees, camera jitter, camouflage, fountains and similar movements. The key idea is deriving a model that comprises the rich information about processed scene and taking difference between the model and current image in order to yield the foreground, which is usually called as change detection. Although utilizing this idea is convenient for static background, but for dynamic backgrounds, it is not easy applicable and promising. Until now, various methodologies are applied to alleviate problems encountered from dynamic backgrounds. The proposed methods can grouped in two ways; pixel or block based approaches. While in pixel approaches, a model is constructed for each pixel by considering the history of them, in other side, in block based approaches, the contribution of neighbour pixels are taking into account in case of modelling the background. The capacity of each of current method is limited when utilized to overcome challenges caused from dynamic backgrounds. For this reason, we have proposed a new nonparametric and subspace based background modelling technique, which relies on the concept of common vector approach. The ability of Common Vector Approach (CVA) [1] for background subtraction is firstly analysed in this work. The proposed background subtraction system involves two stages; (i) the background modelling by using training images and (ii) detecting foreground objects in test image sequence. To evaluate the system performance, an experiment is conducted on well-known Microsoft’s Wallflower dataset [2, 3]. The obtained good visual and statistical results implies that the CVA can be applied for background modelling and change detection.

REFERENCES


KEYWORDS - Background Subtraction, Foreground Detection, Common Vector Approach
ANT COLONY BASED DYNAMIC NAVIGATION FOR TRABZON CITY

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ABSTRACT

This study contains a simulation of dynamic road navigation system for intelligent transport system. The proposed system uses wireless sensor networks in roadsides. Through a vector map of Trabzon and ant colony algorithm, the optimum route is calculated in vehicles. Wireless sensor networks provide some coefficients such as traffic jams, road length, and average delay time for ant colony algorithm. A small area in Trabzon is considered for the proposed dynamic road navigation. In literature search, it has not found any realistic study that contains intelligent transportation system for Trabzon city.

ENERGY EFFICIENT RANDOM SELECTED CONSTANT CLUSTERING APPROACH FOR WIRELESS SENSOR NETWORKS

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ABSTRACT

Nowadays, extending the lifetime of WSNs through energy efficient mechanisms has become a challenging research area. Previous studies have shown that instead of implementing direct transmission or multi-hop routing, clustering is a kind of fundamental technique used to decrease energy consumption. Clustering can increase the scalability, decrease the energy consumption and prolong the lifetime of the network. In literature, LEACH and its variants aim to use clustering mechanisms to provide energy-efficiency. However, most of the LEACH variants aim to form clusters in each round by changing CHs randomly. These formations cause to consume large amount of energy and bring additional network costs. Also, in some rounds of LEACH variants none cluster formations may occur because of the probabilistic CH selection process of these protocols. In this paper, an energy-efficient random selected constant clustering approach is proposed to solve the problems of LEACH based protocols. The proposed approach uses constant clusters which are formed only once at the beginning of the algorithm. The formed clusters remain fixed until all nodes are dead in the network. Proposed approach aims to select CHs in each cluster randomly without changing the cluster formations. It aims to reduce cluster formation packet overhead in the network. In addition, proposed approach aims to provide energy-efficiency by using fixed clustering. The results of the simulations show that, constant clustering approach saves extra energy and prolongs lifetime of the WSN when compared to LEACH and ModLEACH.

A PRELIMINARY SURVEY ON THE SECURITY OF SOFTWARE DEFINED NETWORKS

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ABSTRACT

The number of devices connected to the Internet is increasing, data centers are growing continuously and computer networks are getting more complex. Traditional network management approach is becoming more difficult and insufficient. Software-Defined Networks (SDN) is a new generation networking approach which is expected to take place of the traditional computer networks. SDN architecture provides effective management of the large and complex networks. Although SDN have benefits from the network security perspective, it also brings new attack vectors. We believe that the network security problems in SDN architecture need more advanced solutions. In this work, a survey on the SDN security problems is presented, challenges are discussed. In this context, security threats and attack surfaces in SDN are described, the significant SDN security solution examples in the literature are given.

KEYWORDS - Software-Defined Networks, SDN, SDN Security
WAREHOUSE DESIGN APPLICATION WITH VIP PLANOPT IN A MANUFACTURING COMPANY

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ABSTRACT

If storage systems are well analyzed and if method of storage is well-known, we can save time, energy and money. Therefore, a successful warehouse management is significant for companies. Efficient warehouse management is possible with effective warehouse design applications. In this study, a warehouse design model is developed. In this model, a hybrid heuristic algorithm is used for solution of design problem. We use VIP-Planopt for application. It is a flexible software program that enables us to enter specific constraints. VIP-Planopt is optimization software that produces optimal or near-optimal layouts. In the application, we study with eight different structured big shelves in a manufacturing company warehouse. As a result of application, we found a new and better warehouse design minimizing total material flows. We discuss application results with algorithm outputs in detail in the study.

KEYWORDS - Plant layout, Warehouse management, VIP-Plant Optimization
PERFORMANCE EVALUATIONS FOR OPENMP ACCELERATED TRAINING OF SEPARABLE IMAGE FILTER

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ABSTRACT

One of the widespread image processing applications is image filtering with two dimensional convolution. Determining the coefficients of image filters are of importance for the success of filtering operation. Heuristic algorithms such as genetic algorithms provide an efficient way of training these types of filters. Due to the high computational cost of repetitive image filtering operations, this process may take hours to implement using single core computing. OpenMP provides an efficient library for utilizing the computing power of multicore processors. In this study, OpenMP accelerated training of separable filters that are a subclass of convolution filters has been implemented based on genetic algorithms. Comparative speed-up results for various sizes of images using various sizes of filtering kernels were presented. Also the effect of population size of genetic algorithm and the number of working cores have been investigated.

KEYWORDS - OpenMP accelerated training , separable filters , image processing applications, genetic algorithms
A MODIFIED CUCKOO SEARCH USING DIFFERENT SEARCH STRATEGIES

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ABSTRACT

Cuckoo search (CS) is one of the recent population-based algorithms used for solving continuous optimization problems. The most known problem for optimization techniques is balancing between exploration and exploitation. CS uses two search strategies to updating the nest: local and global search. Although cuckoo search are adequate for the exploration, it is not well enough the exploitation. Only one search equation is used for local search, this equation remains incapable and causes some deficiencies about the exploitation. To enhance the ability of exploitation and to balance between global search and local search, different search strategies were implemented in CS algorithm. The proposed method was compared with basic CS on well-known unimodal and multimodal benchmark functions. Experimental results show that the proposed method is more successful than the basic CS in terms of solution quality.

KEYWORDS - Cuckoo search, continuous optimization, search strategies
IMPLEMENTATION OF MAINLY USED EDGE DETECTION ALGORITHMS ON FPGA

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ABSTRACT

Edge detection has important applications area in image processing field. Today, it is a fact that the image processing used in many fields. Therefore, the applicability of edge detection process in the field is also has great importance. In this study, mainly used edge detection algorithms in the literature; İe. Sobel, Prewitt and Canny algorithms is provided using the verification and inspection on FPGA (Field Programmable Gate Arrays). Program files required for FPGA is prepared by Xilinx System Generator DSP blocks, which can work integrated with Matlab/Simulink. For this study; gray format images, which is stored on the computer has been sent to FPGA with USB configuration port interface on FPGA. Edge detection process is realized by moving subject images from the computer with the same connection to FPGA and then, Sobel, Prewitt and Canny algorithms are applied to the images on FPGA respectively. Edge detection process for the same images are performed by Simulink and FPGA bord at the same time and then, edge detected images obtained from these two environment are compared and also it has been observed on the FPGA resource usage.

KEYWORDS - FPGA (Field Programmable Gate Arrays), Sobel, Prewitt, Canny, Matlab/Simulink and Xilinx System Generator DSP (Digital Signal Processing)
KNOWLEDGE MINING APPROACH FOR HEALTHY MONITORING FROM PREGNANCY DATA WITH BIG VOLUMES

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ABSTRACT

The process for obtaining information that will create value on a large-scale data stack is called data mining by its general name. Data mining is commonly used in sales and marketing departments, in determining strategies and making critical decisions for the future in many sectors. Similarly, data mining is used in the determination of health policies, more effective implementation of health services and in the management of resources and institutions in the health sector. In this study, it was aimed to create a software architecture of data mining that will help the personal monitoring of the pregnancy process in a more effective way in the health sector. Many different types of data such as age, gender, location, education, physical characteristics, lifestyle habits and medical history of the people that could be used for this purpose are stored online by health institutions. The machine learning algorithms have been created to determine classification, clustering and association rule on these data. The software architecture of the proposed method, the block diagram of which is given in “Fig.1”, works in four stages. In the first step, a no-sql based database was created for storing data. In the second step, preprocessing was performed to extract information on data set. In the third step, classification, clustering and association rule were identified by running three separate data extraction algorithms. In the fourth and final step, estimation on new data, identifying the cluster to which it belongs and the process of finding the other data to which it is related were performed. Acknowledgment: This work was supported by the TUBITAK 1512 Programme (The Scientific and Technological Research Council of Turkey) under Grant No: 2150160.

KEYWORDS - Data Mining, Knowledge Mining, Classification, Clustering, Machine Learning, Healthy Monitoring, Association Rule
TEXTURE SEGMENTATION BASED ON GABOR FILTERS AND NEUTROSOOPHIC GRAPH CUT

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ABSTRACT

Image segmentation is the first step of image processing and image analysis. Texture segmentation is a challenging task in image segmentation applications. Neutrosophy has a natural ability to handle the indeterminate information. In this work, we investigate the texture image segmentation based on Gabor filters (GF) and neutrosophic graph cut (NGC). We used an image segmentation approach, which applies GF to gray level images to extract image features matrix, and it segments them into regions. First, color images are transformed to gray level images as input images. Then, input parameters of GF are adjusted, and GF is performed on input images to extract features. Two algorithms are employed for classification of input images. One is the NGC and the other is K-means. Finally, experiments are conducted on various natural images to evaluate the approach. Experimental results show that the used approach achieves desired performance of texture segmentation. However, it cannot segment the texture-free images as well as texture images. In future works, we will try to segment both texture images and texture-free images at the same time.

KEYWORDS - Texture segmentation, Gabor filters, Neutrosophic Graph Cut
A REVIEW OF AUTOMATIC AUTHOR IDENTIFICATION TASK

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ABSTRACT

Abstract — Nowadays, the author of the recognition process, the development of technology and is made to find solutions to some problems emerged with the spread of knowledge. Some of these problems, author unknown documents, e-mail the threat, and the author of the criminal investigation is to determine the author of the text can’t be sure who. Authors identification is the process of determining who is the author of a text written in any language. This document, based on the language made the last 15 years and regardless of the language, the author presents a review about the identification their work. The authors recognize the language-dependent work in the language of the syntax of specific words in the uses of the language by the author and the word of their arrangement with the order in which to do that by paying attention to the author of the text is the process of estimating different algorithms starting from here. The author of the independent study of the language of the unknown text with the character n-gram methods of machine learning is the process after the calculation of weight and estimating Based on the text of the previous authors using artificial neural networks. Authors frequently used in the identification, used in the selected article, methods have been investigated and their authors compared the accuracy of the identification. Authors alone can’t fully identification the many methods used to give accurate results and language used by the author using some combination of these methods and it was emphasized that the words have to look at trends in the author's writings.

KEYWORDS - Author Identification, Writer Identification, Language-Dependent Studies
A REVIEW OF MULTI-OBJECTIVE OPTIMIZATION

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ABSTRACT

Merging systems, enhancing inter-disciplinary relations and increasing needs require multi objectives rather than a single objective in the optimization problems nowadays. However, the objectives are frequently conflicting. When an objective is improved, the other objective(s) may deteriorate. In the multi-objective optimization problems (MOOPs), the aim is to come up with the best solutions that can be an alternative for each other in terms of objective function values under the constraints caused by various reasons. During the last two decades, MOOPs and solution methods have been studied with great interest. It is possible to come across a MOOP in almost every discipline in the literature. MOOPs have been modelled and solved not only in the fields with more applications such as production, management, business administration, marketing, transportation and finance but also in the basic sciences such as chemistry, maths and statistics. Solution of MOOPs requires the simultaneous optimization of conflicting multi objectives. In MOOPs, an optimal solution set on which a compromise is reached among the conflicting objectives is obtained. In this study, the articles on multi-objective optimization written in 2015 and later are analysed and 61 articles are chosen among them. The traditional and intuitive methods implemented for the solution of MOOPs presented in these articles are mentioned. The articles are classified according to their subject areas. The methodology used in each article is identified. According to their implementation areas, the multi-objective optimization methods and the areas they are implemented the most are discussed. The areas to be focused on in the future studies to obtain more robust results in the optimization are identified.

KEYWORDS - multi-objective, pareto ptimal, evaluation, genetic algorithm
EFFECTS OF SPECTRAL CLUSTERING ON DOCUMENT CATEGORIZATION USING DISTRIBUTED TOOLS

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ABSTRACT

Amount of text data being generated each day is so huge that it is impossible to keep track of. Clustering text documents is an important task to make use of information carried by plain text. In many text document collections, clusters do not form easily separable compact shapes. Spectral clustering is an efficient when clustering such datasets because algorithm considers connectedness of clusters rather than assuming a specific statistical model and optimizing parameters of that model. On the other hand, distributed data processing tools have been becoming more and more widespread. Running clustering algorithms with distributed tools is getting essential in big data environments. In this research, spectral clustering is executed on text data using big data analysis tools. Effects of algorithm on document clustering is discussed with respect to cluster quality measures. Moreover, existing works about scalability of spectral clustering is investigated. Results show that spectral clustering algorithm categorizes documents more accurately than k-means. In experiments, text documents in 20-newsgroups are used as dataset, Apache Mahout is used as distributed machine learning library, Rand Index and Mutual Information measures are used to evaluate clustering performance.

KEYWORDS - DOCUMENT CLUSTERING, TEXT MINING, SPECTRAL CLUSTERING, DISTRIBUTED SYSTEMS, BIG DATA
SPEED CONTROL OF DC MOTOR USING TYPE 2 FUZZY CONTROLLER

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ABSTRACT

In this study, a type-2 fuzzy controller is designed for the speed control of a DC motor. The type-2 fuzzy controller can handle the rules of which membership functions can not be fully determined or the rules which involve many uncertainties because the type-2 fuzzy controller contains type-2 fuzzy sets for its antecedent and consequent membership functions. The designed type-2 fuzzy controller serves the change in control signal as output according to the input values which are the error values and the error change values. The developed type-2 fuzzy logic controller has been simulated in MATLAB/SIMULINK. The simulation results show that the proposed type-2 fuzzy controller has a high performance for the speed control of a DC Motor.

KEYWORDS - DC Motor, fuzzy control, type-2 fuzzy, PI type fuzzy
LOCAL T0 APPROACH SPACES

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ABSTRACT

It is well-known that metric structures behave badly with respect to the formation of infinite products and coproducts. As a remedy to this defect, in 1989, Robert Lowen [3] introduced approach spaces which are a generalization of metric spaces, based on point-to-set distances, instead of point-to-point distances. There is another motivation for introducing approach spaces is to unify the theories of convergence, metric, uniformity and topological properties [3],[4]. Numerous applications of approach structures exist in many field of mathematics including probability theory [5], hyperspaces [6], group theory [7], vector spaces [8], convergence spaces [9], domain theory [10], functional analysis [11], [12] and theories of function spaces [13]. There are various ways to generalize the usual -axiom of topology to topological category [2], [14] and [15], and the relationship between different forms of generalized -axiom in topological category have been examined in [2] and [15]. In 1991, Baran [1] introduced local -axiom of topology to topological category and investigated the relationship between this notion and other forms of . In this paper, we characterize local approach spaces and compare with usual one given in [16]. ACKNOWLEDGEMENTS This research was supported by the Scientific and Technological Research Council of Turkey (TUBITAK) under Grant No: 114F299.

KEYWORDS - Topological category, approach spaces, metric spaces, local T0 spaces.
ROLE OF ETHICS IN INFORMATION SECURITY

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ABSTRACT

Information is power. Nowadays, main concern of cyber community is to protect this valuable asset. Technical and technological security measures are sometimes insufficient to protect an information system. Because there is a human factor in information system. Ethics are set of moral rules that guide people. With the help of ethics a better and robust security can be achieved. In this paper role of ethics in information security is discussed. First of all law, ethics and information security concepts are briefly introduced. Some ethical concerns and perspectives in information security are given. To emphasize role of ethics in information security, several studies are reviewed. Finally, mechanisms to make ethical rules effective in an organization/community are discussed with several case studies.

KEYWORDS - Ethics, Ethical Issues, Information Security, Cyber Security, Information Systems
ABSTRACT

In this study, we proposed a method for thermal to visible image matching. Object recognition and matching is most popular area using visible spectrum images. However, visible cameras don’t work in absence of illumination, therefore it is necessary to use cameras of different wavelengths. Thermal spectrum object recognition is a great advantage in low light condition since it is not affected from illumination. On the other hand, it is difficult to construction a database with a thermal camera for security applications. Thermal images and visible image of objects have a different phenomenology. This modality gap is caused difficult problem which is named heterogeneous image matching across thermal and visible image of objects. In our proposed method, first photometric preprocessing methods are applied to reduce modality gap. We used two methods, Difference of Gaussian (DoG) and Retina Model, in this step. The preprocessing is both applied to the thermal and visible images. The purpose of the preprocessing is to detect sharp changes and edges; and to reduce the noise in the images. Secondly, the features are extracted from the preprocessed images using Histogram of oriented gradients (HOG). Finally, the matching score between thermal and visible images are obtained from Partial Least Squares (PLS) regression. We used one-against-all scheme to construct PLS model. In the experimental study, a database is constructed from different objects and the images are captured by FLIR T650SC LWIR (7-14 µm band) camera. The database contains 206 thermal and 206 visible images of the different objects. In this study, we achieved rank-1 accuracy %79.13 with Retina Model and %80.10 with DoG. Thermal and visible spectrum images of objects can be matched by reducing modality gap and object recognition can be performed in low illumination.

KEYWORDS - heterogeneous image matching, visible image, thermal image
DESIGNING MOBILE APPLICATIONS FOR TEACHING PHYSICS COURSE

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ABSTRACT

Developments in information and communication technologies caused internet to advance further and become widespread. Internet has become an easier and faster way to access and share knowledge. These changes in technology also affect personal education requirements. Easier access to knowledge, easier knowledge generation and educational platforms for knowledge sharing should be equipped with proper tools. With the improvements in internet and web technologies, masses started to use mobile applications for research, education, entertainment, health, shopping, trade, banking, public services and etc. Although there are many applications for mobile devices, the numbers of educational applications are insufficient but educational application numbers are also increasing. An application is developed for physics education. Necessary criteria for both user interface development and content generation for this mobile application is considered. This application is developed for university vocational schools basic physics course usage. Physics course notes and relevant documents are gathered under a single roof. By this way, student’s reach of physics course related documents are eased.

KEYWORDS - Physics education, Mobile Application, Mobile Devices
A NEW CRYPTOSYSTEM WITH SOFT SETS

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ABSTRACT

Soft set theory, proposed by Molodtsov, has been regarded as an effective mathematical tool to deal with uncertainties. This paper is a continuation of the paper [6]. In this paper, the operations inverse and characteristic products of soft sets are redefined without using relation forms of soft sets. This leads to simplicity and brevity. We define soft cryptosystem which is a new cryptosystem method by using inverse and characteristic products of soft sets with symmetric groups and give some applications.

KEYWORDS - Cryptosystem, soft sets, symmetric groups
MOBILE APPLICATION OF DRUG FOLLOW UP INFORMATION SYSTEM WITH DATA MATRIX READER

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ABSTRACT

The number of products that simplify people's lives are increasing with the enormous development of the technology. Mobile devices have a great importance for the provision of communication which is one of the most significant need of human beings. Mobile devices have gone beyond to be used originally as a mobile phone purposes and they have begun to be used as smartphones by taking in charge of computers. They are not only used for communication but also they are used like camera, photo camera, notebook, television and reminder. Google's Android platform is a widely anticipated open source operating system for mobile phones. Google's Android Operating System (AOS) in mobile phones are still relatively new, however, AOS has been progressing quite rapidly. The increasing number of smartphone users has prepared the ground for the emergence of new ideas to make life easier. Recently, especially some applications in health sector reflect one of the most important samples for making life easier. Some of mobile applications in this field used by humans are about hearing test, vision test, diabetes, pregnancy, and doctor appointment. This paper focuses on following of drugs, taken by patients, through mobile phones. The application running on the AOS provides the use of drugs on time with the alarm system. In addition to this, the application gives information (time, dosage, name) about drugs by reading data matrix located on the medicine box. Thanks to visual and understandable interface and easy usage, many difficulties experienced in drug reception can be eliminated with this application. Finally, the percentage of reception of drugs on time can be increased in the future.

KEYWORDS - Android, data matrix, web service, drug alarm, prospectus, smartphones, mobile programming.
IMPORTANCE OF BUSINESS INTELLIGENCE SOLUTION ON DECISION-MAKING PROCESS OF COMPANY'S

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ABSTRACT

Nowadays, many companies meet the needs of data from different data sources in different formats in order to in line with changing business needs. Data is managed and stored in different parts of the system. Business intelligence is the most effective solution that allows to see big picture by integrating all of the distributed data within a storage. Business intelligence has emerged as a natural result of the previous system designed to support the decision-making process. Over time, visual deficiencies discovered in decision support systems, difficulties of usage and mismatch between applications, is one of the major factors in the rise of business intelligence technology. Such solutions are up to date and integrated view of business performance it offers the greatest benefits to decision makers., By increasing centralization of data quality, control and scheduling capabilities have allowed us to take quick and right decisions in the evolving competitive environment. The concept of business intelligence is an important element of taking strategic decisions and implementation point in globalized world. This study has designed by Oracle business intelligence tool and results have been a key element of evaluation in decision making processes of the companies.

KEYWORDS - Business intelligence, decision making, big data, data mining
BIG BANG-BIG CRUNCH OPTIMIZATION ALGORITHM FOR SOLVING THE UNCAPACITATED FACILITY LOCATION PROBLEM

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ABSTRACT

The big bang–big crunch (BB–BC) algorithm has been proposed as a new optimization method based on the big bang and big crunch theory, one of the theories of the evolution of the universe. The BB-BC algorithm has been firstly presented to solve the optimization problems with continuous solutions space. If the solution space of the problem is binary-structural, the algorithm must be modified to solve this kind of the problems. Therefore, in this study, the BB-BC method, one of the population-based optimization algorithms, is modified to deal with binary optimization problems. The performance of the proposed methods is analyzed on uncapacitated facility location problems (UFLPs) which are one of the binary problems used in literature. The well-known small and medium twelve instances of UFLPs are used to analyze the performances and the effects of the control parameter of the BB-BC algorithm. The obtained results are comparatively presented. According to the experimental results, the binary version of the BB-BC method achieves successful results in solving UFLP in terms of solution quality.

KEYWORDS - Big Bang-Big Crunch Algorithm, Population-based optimization algorithms, Binary optimization, UFLP, Modulo function
APPLICATIONS OF FUZZY LOGIC IN BUILDING PERFORMANCE EVALUATION

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ABSTRACT

The predictable and deterministic world of the past has been replaced by the uncertain, random, and disorderly world of today. Different attributes represent different dimensions of alternatives, which may not be easily represented on a quantitative scale, may not be directly measurable, and may be stochastic or fuzzy. Wide range applications of building performance evaluations are based on numerical expert grading, which have been conducted for comprehensive building analysis. However, expert evaluation, as a nature of human knowledge, tends to be vague or imprecise. Moreover, human decision-making needs a quick-response analysis based on the decision-maker’s intuition, judgement, and experience. In this study, in order to insert uncertainty and human knowledge to building performance evaluation systems, fuzzy logic method is proposed for vulnerability evaluation of building characteristics. For the first part of evaluation, fire safety performance evaluation model is proposed, and critical building components in terms of passive fire safety are identified including numerical and linguistic input variables.

KEYWORDS - fuzzy logic, fuzzy expert system, construction project evaluation
A COMPARATIVE STUDY OF STATISTICAL AND ARTIFICIAL INTELLIGENCE BASED CLASSIFICATION ALGORITHMS ON CENTRAL NERVOUS SYSTEM CANCER MICROARRAY GENE EXPRESSION DATA

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ABSTRACT

To classify cancer gene expression profiles based on microarray data is used a variety of methods. Especially, statistical methods such as Support Vector Machines (SVM), Decision Trees (DT) and Bayesian Networks are widely preferred to classify on microarray cancer data. However, the statistical methods can often be inadequate to solve problems which are based on particularly large-scale data such as microarray data. Therefore, artificial intelligence-based methods have been used to classify on microarray data lately. We are interested in classifying microarray cancer gene expression by using both artificial intelligence based methods and statistical methods. In this study, Multi-Layer Perceptron (MLP), Radial basis Function Network (RBFNetwork) and Ant Colony Optimization Algorithm (ACO) have been used including statistical methods. Performances of these classification methods have been tested with validation methods such as v-fold validation. To reduce dimension of DNA microarray gene expression has been used Correlation-based Feature Selection (CFS). According to the results obtained from experimental study, Artificial Intelligence-based classification methods exhibit better results than the statistical methods.

KEYWORDS - DNA microarray, Classification, V-fold Validation, Feature Selection
SEGMENTATION PROCESS ON VIDEOCAPILLAROSCOPIC IMAGES BY MATCHED FILTER

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ABSTRACT

The development in computer sciences and the paradigm changes in medical world causes that medical applications can’t be considered separately from computer applications. With the help of developments in computer aided visualisation and increase in calculation capacity monitoring internal situation without interfering to the organism and also related treatments can be implemented. In order to implement this monitoring reliable, robust and fast segmentation must be done. Segmentation is one of the preliminary operation that is necessary for image analysis and interpretation in image processing and specifically in medical image processing. Abilities of segmentations of images in reliable and fast way allow better and faster diagnosis and treatment in medical applications.

In this study matched filter is used for segmentation of 20 videocapillaroscopic images. These segmentation results were compared with ground truths of 20 images. The results showed that matched filter is compatible with previous methods in literature for videocapillaroscopic images.

KEYWORDS - Videocapillaroscopic image, Segmentation, Matched filter, Medical application.
DECISION TREE APPLICATION FOR RENAL CALCULI DIAGNOSIS

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ABSTRACT

Data mining is used for the extraction of secret, valuable and usable data from the big data and to provide strategic decision support. It created a new perspective for the use of the data in healthcare in addition to finding the answers of unexplored questions. It has gained wider usage as a method. The aim of this study is to develop a decision tree and a list of rules by data mining for the early diagnosis of renal calculi. A data set including blind and retrospective data for 150 people can diagnose with 6 attributes. A decision support system analysis was developed for the diagnosis of the patients with suspected renal calculi. Based on the results obtained and the analysis developed, a decision tree and list of rules were created to determine the factors that affect renal calculi. Weka program and J48 algorithm were used to create the decision tree and the list of rules and it was found to be 74.63% successful.

KEYWORDS - Data Mining, Decision Tree, Renal Calculi Diagnosis, J48.
PARALLELIZATION OF A HIERARCHICAL GRAPH BASED IMAGE SEGMENTATION USING OPENMP

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ABSTRACT

In many image-processing applications, image segmentation is an essential stage. In this stage, an image is partitioned into several regions according to the similarity of its pixels. In addition to the accuracy of the image segmentation, the speed is also very important for real-time image processing applications. Many computer applications take advantages of the multi-processor architecture to up to their running performance. However, to run an algorithm as parallel is very difficult in many cases. Due to using the same memory blocks, many conflicts might be happened between the processors. Moreover, each process of one processor may depend on those of another processor. For this reason, the algorithm to be parallelized must be suitable to parallel. In addition, the processing traffic that is pursued by the processors must be controlled within some parallel directives. In this paper, we provide a parallel implementation to a hierarchical graph-based image segmentation method by using its hierarchical processing steps. To achieve this goal, we utilize the OpenMP (Open Multi-Processing) Library to run the segmentation process as parallel on images of different sizes from the INRIA Holidays dataset. The experimental results show that the parallel implementation of the algorithm is more effective than the serial type according to processing time.

KEYWORDS - parallel programming, image segmentation, graph, openmp
COST EXPENDITURE MODEL FOR REHABILITATION AND MAINTENANCE OF BUILDINGS BASED ON FUZZY LOGIC

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ABSTRACT

This paper describes the development of a model for the running cost of maintenance of buildings based on fuzzy logic approach. Fuzzy logic as a soft computing method has been discussed in this paper in the aim to produce an accurate model for budgeting the cost expenditure for rehabilitation and maintainance of buildings during their life cycle. Analysis on the result obtained was conducted and show the precision of the model.

KEYWORDS - Fuzzy logic, Cost model, Accuracy, Rehabilitation and Maintenance
A HYBRID APPROACH FOR INDOOR POSITIONING

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ABSTRACT

Positioning systems have wide coverage with the developing technology. Global Positioning Systems (GPS) is an efficient solution for outdoor applications but it gives poor accuracy in indoor environment. For this purpose, various methods are proposed in the literature such as geometric-based, WiFi fingerprint-based, etc. In this study, a hybrid approach that uses both clustering and classification is applied in WiFi fingerprint-based method. Information-gain based feature selection method is used for selecting most appropriate features from the WiFi fingerprint dataset in initial step of this hybrid approach. Then, Expectation Maximization (EM) algorithm is applied for clustering purpose. After this step, information-gain based feature selection method is again applied for each cluster. In the last step, decision tree algorithm is used as a classification task for each cluster. Experimental results indicate that respectively applied algorithms lead to substantial improvement on localization accuracy.

KEYWORDS - WiFi fingerprint-based, indoor positioning, access point selection, clustering, classification, feature selection, expectation maximization, decision tree, received signal strength, WLAN
AN EFFICIENT RESOURCE MANAGEMENT IN CLOUD COMPUTING

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ABSTRACT

As cloud computing is gaining more recognition to the public, request for services to a given task within the virtual environment of the cloud also increases. This paper proposed a max-min algorithm liked technique with the aim of developing a new framework that tends to balance the load that may be experienced due to the high demand of resources by a set of task within the virtual environment of the cloud computing ecosystem.

KEYWORDS - load balancing, max-min algorithm, makespan, min-min algorithm, task scheduling, resource allocation
FORECASTING FUZZY TIME SERIES WITH ANN FOR BIST-100

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ABSTRACT

Fuzzy time series models have been applied to handle economic problems. Also, artificial neural networks especially Multilayer Perceptron and Radial Basis Function Neural Network become effective methods for researchers by forecasting economic time series. Hence, in this study we aimed to handle an economic time series to apply neural network-based fuzzy time series model by using Multilayer Perceptron and Radial Basis Function Neural Network. We also used these artificial neural network models directly without using fuzzy approach. To demonstrate comparison between these models we used a data set of Borsa İstanbul-100 index (Bist-100) for the years 2011-2015. Empirical results show that the multilayer perceptron is the best to forecast fuzzy time series in most commonly used artificial neural network models.

KEYWORDS - Fuzzy logic, Artificial neural networks, Forecasting, MLP, RBF
DEEP BELIEF NETWORK BASED BRAIN ACTIVITY CLASSIFICATION USING EEG FROM SLOW CORTICAL POTENTIALS IN STROKE

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ABSTRACT

Introduction: An electroencephalographic (EEG) is an electrical activity which is recorded from the scalp over the sensorimotor cortex during vigilance or sleeping conditions of subjects. It can be used to detect potential problems associated with brain disorders. The aim of this study is assessing the clinical usefulness of EEG which is recorded from slow cortical potentials (SCP) training in stroke patients using deep learning (DL) algorithms. Classifier: This study introduces a DL application on classification of the brain activities in stroke patients. Deep belief network (DBN) is an effective DL algorithm which has a greedy layer wise training using Restricted Boltzmann Machines based unsupervised weight and bias evaluation and neural network based supervised training. Database: EEGs are recorded during eight SCP neurofeedback sessions from two stroke patients with a sampling rate of 256 Hz. Brain activities are labeled successful as positivity, and success indicated to the participant as negativity, if brain activation was regulated as required by the task. Preprocessing: All EEGs are filtered with a low pass filter (10 Hz). 8000 trials (500 trials for each session and each patient) with 2400 data points were segmented from 2 EEGs. Methods: Hilbert-Huang Transform is applied to the trails and various numbers of Instinct Mode Functions (IMF) are obtained. High order statistics and standard statistics are extracted from IMFs to create the dataset. Dataset is normalized to a [0, 1] range. Results: The proposed DBN-based brain activity classification has discriminated positivity and negativity tasks in stroke patients and has achieved high rates of 90.30%, 96.58%, and 91.15%, for sensitivity, selectivity, and accuracy, respectively. The results show IMF-based statistical features and the DBN classifier have a clinically significant importance for EEGs from SCP training in stroke patients.

KEYWORDS - Deep belief network; DBN, Deep learning; EEG; Hilbert-Huang Transform, High Order statistics
A ROBUST HAND POSE CORRECTION METHOD FOR PALMPRINT RECOGNITION

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ABSTRACT

The selection of the appropriate pattern for palmprint recognition systems depends on the success of the segmentation techniques used. Segmentation can be difficult due to free movement of the hand in unrestricted environment. Also holding the hand at different angles causes perspective distortions. In order to correct these distortions, active scanning systems have been proposed to find the 3D position of the hand. However, as the cost of these systems is high, it seems that they are not possible to spread. In this study, a stereo camera system which is more cost effective, have been used. With the help of this system, 3D coordinates of the landmarks falling on hand are calculated. A new transformation is defined based on the main axis of the distribution of these points. Thus perspective distortions are substantially corrected. The success of the proposed approach has been tested on our dataset consisting of hand images taken from 138 people. As a result of the experiments, recognition rate even in the cases reached over 90%.

KEYWORDS - Palmprint Recognition, Stereo Camera, Pose Correction
ARRHYTHMIA CLASSIFICATION USING WAVEFORM ECG SIGNALS

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ABSTRACT

Introduction: An electrocardiogram (ECG) is a non-linear and non-stationary diagnostic signal that has a great importance for cardiac disorders. The computer-assisted analysis of biomedical signals has become an essential tool in recent years. Classifier: This study introduces a deep learning (DL) application on automatic arrhythmia classification. The proposed model consists of a multi-stage classification system on raw ECG using DL algorithms. Deep belief network (DBN) is one of the most effective DL algorithms which have a greedy layer wise training phase. The DBN is composed of both Restricted Boltzmann Machines (RBM) based layer-by-layer unsupervised pre-training procedure and neural network based supervised training. Database: The multistage DBN model classified the MIT-BIH Arrhythmia Database heartbeats into 5 main groups defined by ANSI/AAMI standard: normal beat (N), supraventricular ectopic heartbeat (S), ventricular ectopic heartbeat (V), fusion heartbeat (F), and unknown heartbeat (Q). Preprocessing: All ECGs are filtered with median filters to remove the baseline wander. 6077 of ECGs were segmented from long-term ECGs using a window with a length of 501 data points (R peak of the wave is located at the center of window). All data points are normalized to a [0, 1] range. And the normalized filtered raw ECGs are directly used as features in the DBN. Results: The proposed DBN-based multistage arrhythmia classification has discriminated five types of heartbeats with a high accuracy rate of 95.05%. The achievements prove the success and efficiency of the DBN algorithm on raw ECG signals.

KEYWORDS - Arrhythmia; AAMI; Raw ECG; Deep Belief Networks; DBN;
MODELING GOLD PRICE WITH ARTIFICIAL NEURAL NETWORKS AND ADAPTIVE NEURO-FUZZY INFERENCE SYSTEMS

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ABSTRACT

Adaptive neuro-fuzzy inference systems (ANFIS) consist of combination of fuzzy logic and artificial neural networks. ANFIS is commonly used to model economic data sets such as gold price. Simultaneously artificial neural networks such as Generalized Regression Neural Networks (GRNN), Linear Network, Multilayer Perceptron (MLP) and Radial Basis Function Neural Networks (RBF) are become alternative way to model economic data sets. Hence, the aim of this study is to determine the most suitable method between these models for modeling a data set of gold price during 2011-2015 years in Turkey. The improved models are performed and all empirical results are compared with each other according to root mean square error (RMSE) criterion.

KEYWORDS - Generalized Regression Neural Networks, Linear Network, Multilayer Perceptron, Radial Basis Function Neural Networks, Adaptive neuro-fuzzy inference systems
REAL TIME BLOOD TYPE DETERMINATION BY GEL TEST METHOD ON EMBEDDED SYSTEM

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ABSTRACT

Determination of a blood type has a crucial importance for blood transfusion. Therefore it is mandatory doing tests to determine blood type before the transfusion. In order to prevent the errors in determining blood type and to save time these tests are carried out by the automatic devices. However these devices are very expensive and it is necessary to develop cheaper alternative systems. In this study, we designed a basic device which will be a first step for a cheap and fast prototype. It utilizes the image processing techniques and gel test method for real time blood type determination on embedded system. During the tests, fifty gel test cards data were used and, it is found that the proposed system can process each gel test card in 2 seconds with 99% accuracy on average.

KEYWORDS - Image Processing, Blood Types, Embedded Systems, OpenCv, Gel Test Method
ECONOMIC ANALYSIS WITH MLP, RBF AND ANFIS

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ABSTRACT

Adaptive neuro-fuzzy inference system (ANFIS) is an approach in fuzzy set theory. Multilayer perceptron (MLP) and Radial basis function neural networks (RBF) are a powerful tool for economic analysis. So, it is important to use ANFIS, MLP and RBF to analyze economic data. In this study, we made a comparison between ANFIS, MLP and RBF models for modeling a data set of the exchange rate of Turkish Liras to Euro for the years between 2011 and 2015 and a data set of the exchange rate of Turkish Liras to United States Dollars during 2011-2015 years. All empirical results compared with each other.

KEYWORDS - Adaptive neuro fuzzy inference system, Artificial neural networks, Modeling, exchange rate, economic analysis
A HYBRID ALGORITHM FOR AUTOMATED GUIDED VEHICLE ROUTING PROBLEM

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ABSTRACT

Nowadays, automatic systems are become a crucial in many factories to achieve some tasks such as minimizing cost, maximizing efficiency, quality, and reliability. The planning is important for manufacturing systems to adopt changing conditions. Also, manufacturers want to obtain fast, reliable, qualified and economic products. Flexible Manufacturing Systems (FMSs) are used to meet this need. FMSs make production fast, qualified, reliable and economic by using computer-controlled structure that includes robots and transportation systems. Automated Guided Vehicle (AGV) and FMS are thought to be integrated because FMS uses AGV as a part of transportation in the factory. AGVs are used to carry loads, in other words products, in production areas, warehouses, factories that use magnets, landmarks, laser sensors, lines to know where they are. AGV scheduling and routing is NP-hard and open-ended problems. In the literature, there are many algorithms and methods are proposed to solve these problems. In this study, we present a hybrid algorithm that is composed of simulated annealing (SA) and Dijkstra algorithms to solve the routing problem. The hybrid algorithm is compared with SA algorithm in terms of cost using benchmark problems in the literature.

A REVIEW AND BIBLIOMETRIC ANALYSIS OF AUTOMATIC PATENT CLASSIFICATION

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ABSTRACT

Patent is one of the most important tools used worldwide in the monitoring, assessing, evaluating and forecasting of the development of technology. Patent applications are classified according to their technical contents. The patent classification is a system which discloses and groups the inventions in accordance with their technical characteristics. The patent office examiners or other people assign new patent application according to previously fixed classification system, such as International Patent Classification (IPC), The United States Patent Classification (USPC), The European Classification (ECLA), Cooperative Patent Classification (CPC) and etc. These classification systems are dynamic and having principal goals, including trustworthy and speedy retrieval of exactly defined subject and easy adapting to new technological developments - for example, opening new subclass. With the advances of computer technology, researchers seek and apply accurate and efficient automated patent classification systems to reduce human-induced classification errors. They generate new algorithms or implement previously used classification or clustering methods into patent documents. In this study, we focus on the automated patent classification and bibliometric analysis of related literature.

KEYWORDS - patent classification, automatic patent classification, algorithm, bibliometric
COMPARISON OF SIMULATED ANNEALING AND GENETIC ALGORITHM APPROACHES ON INTEGRATED PROCESS ROUTING AND SCHEDULING PROBLEM

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ABSTRACT

Today flexible manufacturing systems are highly popular due to their capability of quick response to customer needs. Although the advantages of flexible manufacturing systems cannot be denied, these systems also bring new issues on production planning side. Especially assigning machines to production operations and scheduling these operations with respect to machine constraints turn out to be an NP-Hard problem. In this study, the integrated process routing and scheduling problem is explained, and the performance of two different meta-heuristic techniques, which are genetic algorithms and simulated annealing, are compared in terms of solution time and quality.

KEYWORDS - Optimization, integrated process planning and scheduling, simulated annealing, genetic algorithms
TRAINING ANFIS USING GENETIC ALGORITHM FOR DYNAMIC SYSTEMS IDENTIFICATION

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ABSTRACT

In this study, the premise and consequent parameters of ANFIS are optimized using Genetic Algorithm (GA) based on a population algorithm. The proposed approach is applied to the nonlinear dynamic system identification problem. The simulation results of the method are compared with the Backpropagation (BP) algorithm and the results of other methods that are available in the literature. With this study it was observed that the optimisation of ANFIS parameters using GA is more successful than the other methods.

KEYWORDS - neuro-fuzzy; ANFIS; genetic algorithm; system identification
AN EVALUATION OF SOME INSTANT MESSAGING APPLICATIONS (SIGNAL, TELEGRAM, THREEMA) IN TERMS OF SECURITY

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ABSTRACT

With the development of technology, the usage of the internet via mobile devices are increasingly widespread. At the same time people generally use the internet to contact with their environment. So instant messaging applications operating with internet have became very popular, therefore they are in competition with each other. In this paper, Signal, Threema and Telegram among the most popular commercial instant messaging applications that allow users to messaging each other safely are handled in terms of security. Although these applications use telephone numbers as contact list, calls and messages use data connection, therefore both of the two users talking to each other must connect to internet. Thus, users can send messages without expose to fee of SMS or MMS. Although these applications are practice and fast, they have some security problems arising from the usage of the internet. So unauthorized users (attackers) can access user conversations by using fake identity. To prevent this situation, some authentication techniques are used in these applications. In this study, these authentication techniques are examined and when the user’s public key changed, what changes have occured in the application are tested. Also whether these applications have vulnerabilities against the MitM (Man in the Middle) attack or not is detected, and also the shortcomings of these applications are evaluated from an ordinary user perspective.

KEYWORDS - Instant messaging applications, Signal, Threema, Telegram, MitM, Authentication
A HYBRID GENETIC ALGORITHM FOR MOBILE ROBOT PATH PLANNING PROBLEM

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ABSTRACT

This paper proposes an algorithm to solve the problem of path planning for a mobile robot in a static environment with obstacles. The proposed algorithm is a Hybrid Genetic algorithm (HGA) which includes Genetic and Dijkstra algorithms together. The genetic algorithm (GA) is preferred since the structure of robot path planning problem is very convenient to apply genetic algorithm’s coding and operators such as permutation coding, crossover and mutation. GA provides diversification while searching possible global solutions, but Dijkstra algorithm makes more and more intensification in local solutions. The simulation results show that the mobile robot can plan a set of optimized path with an efficient algorithm.

KEYWORDS - genetic algorithm, Dijkstra algorithm, Robot path planning
A MODEL OF AUTOMATIC BLOCK REALLOCATION IN THE LAND CONSOLIDATION PROJECTS USING ARTIFICIAL BEE COLONY ALGORITHM

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ABSTRACT

Equitably reallocating of blocks among land owners has been one of the most important tasks in Land Consolidation studies. This task has to be fairly solved among landholdings for a land. This complicated problem is difficult to solve using linear methods. Therefore, a method is needed to solve this non-linear problem among land owners impartially. There are many applications employing optimization algorithms for solving the complicated and non-linear problems in literature. When we examine the literature, it is seen that Genetic Algorithm has been only used to overcome the block reallocation problem. Artificial Bee Colony (ABC) algorithm is one of the optimization algorithms that have been used to solve the non-linear and complicated problems in literature. Furthermore, this method has better performance when it is compared with the other optimization algorithms. In this study, we have aimed to fairly reallocate the landholding areas to blocks in a land by developing an algorithm using Artificial Bee Colony optimization method. When we develop the steps of the algorithm, we give priority to landholdings preferences and places of fixed installations. Data tables have been arranged by taking land consolidation data of DOT Village in Adiyaman, Turkey that into consideration. DOT Village land consolidation project includes 143 blocks and 225 landholders. Consequently, we have introduced the steps of an algorithm solving the block reallocation problem automatically using ABC for a sample land. Also, we have observed the applicability of the proposed method for automatic block reallocation problem in this study. This study is a preliminary study helping us to develop software providing to automatically solve complicated block reallocation problem in real time land consolidation process.

KEYWORDS - ABC Algorithm, Land Consolidation, Automatic Block Reallocation, Landholding, Optimization
ABSTRACT

Blind Source Separation (BSS) is one of the most important and challenging problem for the researchers in audio and speech processing area. In the literature, many different methods have been proposed to solve BSS problem. In this study, we have compared the performance of three popular BSS methods based on Independent Component Analysis (ICA) and Independent Vector Analysis Models, which are Fast-ICA, Kernel-ICA and Fast-IVA. We collected experimental data by recording speech from 13 people. Three different scenarios are proposed to compare the performance of BSS methods effectively. Experimental results show that the Fast-IVA has better performance than the ICA based methods according to performance metrics of Source-to-Artifact Ratio, Source-to-Distortion Ratio and Source-to-Noise Ratio. But ICA methods give better results than Fast-IVA according to the Source-to-Interference Ratio.

KEYWORDS - Speech Processing, Blind source separation , Independent Component Analysis, Independent Vector Analysis
A SOFT-CONFIGURED MANAGEMENT SYSTEM FOR MICROCONTROLLER TRAINING KIT

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ABSTRACT

There are many microcontroller training kits available on the market. Most of them are equipped with DIP-switched circuit connections that are configured mostly by students during the experiments. Intensive use of DIP-switch sockets, cables, and materials on the experimental kits leads to circuit breaks and faulty connections easily. Therefore, many institutions face undesired hurdles in maintenance and repairing procedures even though they have skilled technicians or instructors. In this paper, we have designed and implemented a software-configured microcontroller training set to overcome adverse conditions originated by conventional microcontroller kits such as time-consuming maintenance procedures and circuit faults caused by improper configurations. In doing so, an analog switch matrix board has been designed to perform connections between the microcontroller port pins and external peripherals. The system eliminates the possibility of the user errors or electrical faults caused by improper wiring along with mechanical damages caused by forceful interventions. Hence, the students can concentrate on the technical aspects of the experiment other than mechanical inconveniences. The software designed, which manages an analog matrix switch board, has many scenarios and configuration files for each experiment. The students decide the type of the experiment and he/she configures both the microcontroller and the CPLD using software interfaces provided. The CPLD configuration file is fixed for each scenario but the microcontroller hex file must be developed by the students. The CPLD and the 8051 development board are connected to the computer via a USB 2.0 port.

KEYWORDS - Microcontroller, Training Set, Experiments, CPLD, Matrix Switches
A NOTE ON BACKGROUND SUBTRACTION BY UTILIZING A NEW TENSOR APPROACH

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ABSTRACT

Moving object (or foreground) detection is a principal interest topic of computer vision based applications, such as intelligent visual surveillance, intelligent visual observation of animals and insects, optical motion capture, human-machine interaction, content based video coding, etc. The most extensively utilized areas can be named as road surveillance, airplane surveillance, maritime surveillance, boats and store surveillance systems, where security and safety are mostly the main points of interest. Major challenges associated with background subtraction can be noted as shadow, waving trees, foundations, intensity changes and camera jitter, which are called as dynamic or time-varying backgrounds. Although there exists no perfect solution to cope with these problems, an affirmed method should be capable to alleviate all dynamic problems. The general idea is actuating a mathematical model to represent all image sequence (carrying the processed background scene) with a physical background that is rich in information. Once the background model is accurately obtained, the difference between a current (test) frame and the model can be considered as foreground, which can later be analysed for further object detection. Because of different challenges in the concept of background dataset, the available methods do not meet all expectations. With an aim to provide a methodological alternative, a new tensor based background learning and change detection algorithm is presented for successful discrimination of foreground and background in video sequences. Specifically, the theory of Common Matrix Approach (CMA) is applied to decompose 3D dimensional data (tensor). In case of orthogonal decomposition, the motivation of Gram-Schmidt orthogonalization is adopted. After the algebraic projection stage, a common matrix that refers to the desired background model is determined. To report the statistical and visual results, the test stage is conducted on Wallflower dataset. By comparing the statistical results with some of other tensor based approaches, it is concluded that the proposed method provides plausible results.

KEYWORDS - Background Subtraction, Foreground Detection, Common Matrix Approach
A DETAILED ANALYSIS OF OPTICAL CHARACTER RECOGNITION (OCR) TECHNOLOGY

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ABSTRACT

In many different fields, there is a high demand for storing information to a computer storage disk from the data available in printed or handwritten documents or images to later re-utilize this information by means of computers. One simple way to store information to a computer system from these printed documents could be first to scan the documents and then store them as image files. But to re-utilize this information, it would very difficult to read or query text or other information from these image files. Therefore a technique to automatically retrieve and store information, in particular text, from image files is needed. Optical character recognition is an active research area that attempts to develop a computer system with the ability to extract and process text from images automatically. The objective of OCR is to achieve modification or conversion of any form of text or text-containing documents such as handwritten text, printed or scanned text images, into an editable digital format for deeper and further processing. Therefore, OCR enables a machine to automatically recognize text in such documents. Some major challenges need to be recognized and handled in order to achieve a successful automation. The font characteristics of the characters in paper documents and quality of images are only some of the recent challenges. Due to these challenges, characters sometimes may not be recognized correctly by computer system. In this paper we investigate OCR in three different ways. We first review the general phases of an OCR system such as preprocessing, segmentation, normalization, feature extraction, classification and post-processing. Then, we give a detailed overview of the challenges that might emerge in these OCR stages. Finally, we highlight development and main applications and uses of OCR. Therefore, this discussion provides a very comprehensive review of the state-of-the-art of the field.

KEYWORDS - OCR, Text Recognition, Handwriting Recognition
NETWORK TRAFFIC CLASSIFICATION BY KERNEL BASED EXTREME LEARNING MACHINE

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ABSTRACT

The classification of data on the internet in order to make internet use more efficient has an important place especially for network administrators managing corporate networks. Studies for the classification of internet traffic have increased recently. By these studies, it is aimed to increase the quality of service on the network, use the network efficiently, create the service packages and offer them to the users. The first classification method used for the classification of the internet traffic was the classification for the use of port numbers. This classification method has already lost its validity although it was an effective and quick method of classification for the first usage times of the internet. Another classification method used for the classification of network traffic is called as load-based classification or deep packet analysis. This approach is based on the principle of classification by identifying signatures on packets flowing on the network. Another method of classification of the internet traffic which is commonly used in our day and has been also selected for this study is the kernel based on extreme learning machine based approaches. In this study, over 95% was achieved accuracies using different activation functions.

KEYWORDS - machine learning, classification, extreme learning machine, network classification, kernel activation function
A NEW CONFERENCE SYSTEM WITH FULL AUTH AND AUTO MANAGEMENT

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ABSTRACT

With this new conference system, attenders and administrators will done everything automatically. There's no additional registration or attends for one conference. Just attenders will send the paper, and than wait for the acceptance. If their papers accepted, than he or she can register for conference and can make the payment. Payment system that's connected with the conference system is secured by SSL and joined with conference database system, so there's no mistake for payments. Conference management, paper management, payment management, user and user group management, conference due and file managements are included with webware. Just with a few new features, conference and paper managing is so easy. The system has a part that provides a simple, driver based solution for adding full-text search to models. Using model observers, this part will automatically keep search indexes in sync with query records. Running a queue worker will allow to queue all operations that sync the model information to the search indexes, providing much better response times for the application's web interface. This new conference system will facilitate the pursuit, management and publishing of academic studies. Thus, people will not spend labor again for their studies. Increase the intensity of academic work will be provided through the system.

KEYWORDS - conference system, conference management
AN ANALYSIS ON THE COMPARISON OF THE PERFORMANCE AND CONFIGURATION FEATURES OF BIG DATA TOOLS SOLR AND ELASTICSEARCH

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ABSTRACT

Today, every kind of text, audio and visual data, which are thought to be transformed into pieces of information, are stored for long periods of time for processing. The concept of Big Data is not only associated with the data stored, but also with the system involving hardware and software that collects, processes, stores, and analyzes the data. As the data grows bigger, their physical storage options must be provided in a distributed architecture. Solr and Elasticsearch are among the most preferred tools which makes this storage process easier. As a part of Apache Lucene project, Solr is a software which was started to be developed in 2004 with the searching features of full text, multiple search, dynamic clustering, database-integrated, open source and elasticity. Similarly, Elasticsearch is a new open-source tool for real-time, full-text and distributed search, which was launched in 2010 using the Lucene library. Although Solr and Elasticsearch have similar features, there are many parameters that differentiates one from the other such as intended use, type of use, and query and indexing performances. This study researches and analyzes the differences between Solr and Elasticsearch with regards to their query and indexing speeds, ease and difficulties of use, configuration forms, and architectures in light of the literature, and the results are discussed regarding these tools’ performances.

KEYWORDS - big data, elasticsearch,solr
WAVELET BASED MEDICAL IMAGE WATERMARKING SCHEME FOR PATIENT INFORMATION AUTHENTICITY

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ABSTRACT

Telemedicine is an important technique that permits transmission of medical and imaging data from one place to other, ensures the reliability of data and provides a convenient communications between patient and medical staff. In this study, Discrete Wavelet Transform (DWT) and Singular Value Decomposition (SVD) based medical image watermarking method that hides the patient information into medical image without affecting the image quality is proposed for the purpose of authentication. At the watermark (secret image containing patient information) embedding process, a chaotic map called as Arnold Cat Map (ACM) is applied to the watermark to improve the security of the method. So that the aim of the proposed watermarking scheme is personal authentication by ensuring the perceptual invisibility, PSNR (Peak Signal-to-Noise Ratio) values are calculated in the simulations. According to the experimental results, the proposed method provides higher PSNR values than compared current methods. Furthermore, in simulations DWT and SVD based watermarking scheme is implemented as chaotic and non-chaotic watermarking scheme to investigate the effect of chaotic map on the performance of the proposed algorithm.

KEYWORDS - Medical image watermarking, discrete wavelet transform, singular value decomposition, PSNR.
CUSTOMER SATISFACTION USING DATA MINING APPROACH

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ABSTRACT

Customers and products are the main assets for every business. Companies make their best to satisfy customers because of coming back to their companies. After sales service related to different steps that make customers are satisfied with the company service and products. After sales service covers different many activities to investigate whether the customer is satisfied with the service, products or not? Hence, after sales service is acting very crucial role for customer satisfaction, retention and loyalty. If the after sales service customer and services data is saved by companies, this data is the key for growing companies. Companies can add value their brand value with the managing of this data. In this study, we aim to investigate effect of 6 factors on customer churn prediction via data mining methods. After sale service software database is the source of our data. Our data source variables are Customer Type, Usage Type, Churn Reason, Subscriber Period and Tariff The data is examined by data mining program. Data are compared 8 classification algorithm and clustered by simple K means method. We will determine the most effective variables on customer churn prediction. As a result of this research we can extract knowledge from international firms marketing data.

KEYWORDS - Data Mining, Customer Satisfaction, Service Quality, Knowledge Discovery in Database, Customer Churn Prediction
HYBRID ASSESSMENT BY MODIFIED TRANSLATED MULTIPLICATIVE
AND MCCULLOCH-PITTS NEURONS MODELS FOR MONK’S PROBLEM

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ABSTRACT

In this study, a solution to the Monk’s problem (Monk’s 2- M2) employing a single neuron dependent on rules which use either modified translated multiplicative (πm) neuron or McCulloch-Pitts neuron model, is proposed. Since M2 problem is similar to N-bit parity problem, first N-bit parity problem is examined with translated multiplicative (πt) neuron. Then this architecture is modified for M2 problem. Also, McCulloch-Pitts neuron model is used to increase classification performance. When the result of proposed only one πm neuron model that is not required in any training stage and hidden layer is compared with the other approaches, it shows satisfactory performance.

KEYWORDS - Machine learning, Translated multiplicative neuron model, Modified translated multiplicative neuron model, N-bit parity problem, Monk’s problems
AUTOMATIC VOICE AND SPEECH RECOGNITION SYSTEM FOR THE GERMAN LANGUAGE WITH DEEP LEARNING METHODS

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ABSTRACT

In our age, technological developments are accompanied by certain problems associated with them. Security takes the first place amongst such kind of problems. In particular, such biometric systems as authentication constitute the significant fraction of the security matters. This is because sound recordings having connection with the various crimes are required to be analyzed for forensic purposes. Authentication systems necessitate transmission, design and classification of biometric data in a secure manner. In this study, analysis of German language employed in the economy, industry and trade in a wide spread manner, has been performed. In the same vein, the aim was to actualize automatic voice and speech recognition system using Mel Frequency Cepstral Coefficients (MFCC), MelFrequency Discrete Wavelet Coefficients (MFDWC) and Linear Prediction Cepstral Coefficient (LPCC) taking German sound forms and properties into consideration. Approximately 2658 German voice samples of words and clauses with differing lengths have been collected from 50 males and 50 females. Features of these voice samples have been obtained using wavelet transform. Feature vectors of the voice samples obtained have been trained with such methods as Boltzmann Machines and Deep Belief Networks. In the test phase, owner of a given voice sample has been identified taking the trained voice samples into consideration. Results and performances of the algorithms employed in the study for classification have been also demonstrated in a comparative manner.

KEYWORDS - Speaker Recognition System, Boltzmann Machines, Deep Belief Network.
SWITCHING ACCESS POINTS ON AND OFF FOR AN ENERGY EFFICIENT WIRELESS COMMUNICATION

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ABSTRACT

IEEE 802.11 wireless network standard has become one of the most used wireless networking technologies for smart devices as it offers mobility support and low cost deployment. However, these devices deeply rely on the energy provided by their batteries, which results in limited running time. In addition, condensed deployment of Access Points (APs), which is essential to handle increasing demand of performance and coverage, has also been causing rise of network-side power consumption. In this context, this paper proposes an energy-aware Access Point switching procedure for smart mobile devices to increase overall energy saving of both APs and smart devices. In the proposed method, each channel is investigated, in terms of channel utilization, signal quality, probability of collision and deployed traffic types, making use of local and IEEE 802.21-based management frames. With the help of reputation and context-aware computations, Access Points inform the stations that are associated with themselves to maintain their connection or to handover to another network. The aim of the proposed scheme is to maintain desired QoS with minimum number of APs and optimal energy consumption. Widespread simulations have been executed to validate the efficiency of the proposed method. The results demonstrate that the proposed method dramatically increases overall throughput and reduces power consumption of stations over IEEE 802.11 WLANs.

KEYWORDS - IEEE 802.11 WLANs, IEEE 802.21, Load Balancing, Energy efficiency, Handover
A NEW APPROACH BASED ON IMAGE PROCESSING FOR DETECTION OF WEAR OF GUIDE RAIL SURFACE IN ELEVATOR SYSTEMS

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ABSTRACT

In this study, a system based on image processing has been developed in order to prevent wear on guide-rail surface in elevators. In the proposed method, real-time condition monitoring is performed by cameras using built-in system. The images of elevator guide-rail surface are captured via four digital cameras fixed onto elevator cab. The image-processing methods are applied on the images captured by cameras and hence the wears on the surface of guide-rails are detected. The surface of guide-rail is firstly detected in the proposed method. Then, image segmentation and mathematical morphology are applied on the image of guide-rail surface and the wears on the surface of rail are detected. The failure extent of the wear failures detected are calculated. By processing the images captured by four cameras during movement of elevator, the results for surface of guide-rails are obtained. Using these results, reporting is performed. An elevator prototype has been created in order to carry out tests for development of the proposed method. The tests have been conducted by fixing the built-in system and cameras onto this elevator prototype. It is considerably advantageous to detect the failures on elevator guide-rails through image-processing methods. Following a literature review, it is seen that the proposed method is a new approach.

KEYWORDS - Elevator Systems, Fault Detection, Image Processing, Image Segmentation
WIND POWER FORECASTING FOR THE PROVINCE OF OSMANIYE USING ARTIFICIAL NEURAL NETWORK METHOD

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ABSTRACT

Although wind energy at certain intervals and random in nature, today it is one of the commonly utilized alternative energy source in the world. Because of sustainability and environmentally-friendly energy source, countries increasingly benefit from wind energy. Several estimation methods are applied in the determination of a region's wind energy potential. Today, one of the most commonly used prediction methods is artificial neural network (ANN) method. In this study, Estimation of wind power in Osmaniye district was investigated in method with artificial neural network (ANN) using data from meteorological measurement stations from the meteorological measurement device at the campus of Osmaniye Korkut ATA University. In order to give the best values of prediction results, several methods increasing the impact on output of different models for the input variables were investigated.

KEYWORDS - Artificial neural network, Wind Power, Prediction
MULTI-CORE COMPUTING APPLICATION FOR LYAPUNOV EXPONENTS ANALYSIS OF CHAOTIC SYSTEMS

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ABSTRACT

The Lyapunov exponents analysis is one of the stability analyses of nonlinear systems. In addition, this analysis method is also used for obtaining information about chaos that is a behavior of nonlinear systems. In this study, it is explained by an example application that the chaotic behavior analysis of a nonlinear chaotic system based on the Lyapunov exponents can be performed faster by a Multi-Core CPU. For this application, MATLAB parallel processing toolbox has been used and the parallel computing performance of the application has been analysed by using obtained results.

KEYWORDS - Chaotic systems, Parallel processing, Lyapunov exponents
APPROXIMATELY SEMIGROUPS ON DIGITAL IMAGES

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ABSTRACT

A relator is a nonvoid family of relations R on a nonempty set X. The pair (X,R) (also denoted X(R)) is called a relator space. It is obtained a proximal relator space (X,R_δ) (X(R_δ)) considering family of proximity relations on X. As in some articles of J. F. Peters, (R_δ) contains proximity relations, namely, Efremovic proximity, Lodato proximity, Wallman proximity, descriptive proximity. In the algebraic structures constructed on proximal relator spaces, the basic tool is consideration of descriptively upper approximations of the subsets of non-abstract points (e.g. pixels on digital images). In a groupoid A in proximal relator space, the binary operation "o" may be closed in descriptively upper approximation of A, i.e., for all a,b in A, "a o b" is in descriptively upper approximation of A. In this presentation, the aim is to present approximately semigroups on digital images endowed with proximity relations.

KEYWORDS - Approximately semigroups, relator spaces, descriptive homomorphisms, digital images
MONITORING OF ANXIETY LIKE BEHAVIORS ON RATS WITH VIDEO TRACKING TECHNOLOGY

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ABSTRACT

Artificial sweeteners like MSG (MonoSodium Glutamate) model has been used anxiety-like behaviors on rats. The tracking of rat’s movements has broad applicability to questions in anxiety-like behaviors with different doses MSG injections (50 mg/kg/day, 100 mg/kg/day and 200 mg/kg/day) to rats. In this paper, in order to measure three types locomotor activity (line crossing, rearing, grooming), a video tracking software is used. The advantage of this type of tracking software is that it provides to give locomotor activity of rats in real-time. The experimental results obtained in this study have shown that learning and memorial functions negatively affected in the brains of the rats an anxiety-like model. In addition, the visual tracking results demonstrate that video tracking system provides an accurate monitoring of rat’s behavior.

KEYWORDS - Rat, locomotor activity, anxiety-like behaviors, MSG, computerized video tracking, animal tracking
THE DETECTION OF GASTRIC CANCER WITH SEMI-AUTOMATIC IMAGE PROCESSING TECHNIQUES

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ABSTRACT

Gastric cancer is one of the most common and the most common fatal cancers in the world. In this study, our aims to detect the cancerous regions semi-automatically according to the endoscopy images obtained. In this process, semi-automatic diagnosis of cancer is done according to the endoscopic images received from the patients using image processing techniques and the results are compared with the cancerous region determined from the endoscopic images by specialized doctors. The Gastric cancerous region obtained semi automatically using image processing techniques and determined by the specialized doctors are compared. 96.1641% accuracy rate is determined from the comparison results. Considering the results obtained, it can be seen that the suspected region can be determined via software by the specialized doctors.

KEYWORDS - gastric cancer, image processing, Endoscopy Image
THE EFFECTS OF NEIGHBORHOOD STRATEGIES ON THE PERFORMANCE OF ARTIFICIAL BEE COLONY ALGORITHMS

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ABSTRACT

Neighborhood topologies are extensively used in Particle Swarm Optimization (PSO). The structure of the selected topology may affect the PSO algorithm behavior. Therefore, neighborhood topology plays a crucial role on the performance of PSO algorithms when the population moves with the guidance of the best particles. However, in Artificial Bee Colony (ABC) algorithms, new population members are generated based on information exchange between the base food source and a selected member among all population. From this point of view, ABC algorithms use fully-connected neighborhood topology defined as in PSO algorithms. In this paper, we will investigate the contributions of some well-known neighborhood topologies used in PSO on the performance of ABC algorithms. We have tested fully-connected, ring, four-cluster, square and random topologies on the original ABC and global-best ABC (GABC) algorithms on the 19 benchmark functions suite (SOCO) from a special issue of the Soft Computing journal. SOCO benchmark suite consists of 7 shifted unimodal and 4 shifted multi-modal and 8 shifted hybrid functions. Experimental results reveal that population neighborhood topologies influence the performance of ABC algorithms related to the tackling problem type.

KEYWORDS - artificial bee colony, swarm intelligence, single objective optimization, neighborhood topology, particle swarm optimization
ESTABLISHMENT OF FIBER OPTIC CABLING SYSTEM IN KIRKUK CITY BY USING ANT COLONY OPTIMIZATION AND GENETIC ALGORITHM

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ABSTRACT

Connection-oriented network routing (CONR) is one of the the NP-hard problems. In the recent years, to solve the problem of CONR it was using the heuristic methods such as minimum spanning tree methods (Kruskal and Prim Algorithms) and shortest path methods (A Star and Dijkstra Algorithms) and also metaheuristic methods (Ant Colony Optimization – ACO, Genetic Algorithm – GA and Artificial Bee Colony – ABC). But as the complexity of the problem increase, the guarantee to achieve the best results by heuristic algorithms decreases. Therefore, in large scale problems metaheuristic algorithms are preferred. In this study, it was applied CONR to provide internet and telephone lines for Kirkuk city and the near regions in Iraqi by using the fiber optical systems. Firstly, the locations of 57 fiber optic panels previously determined with particle swarm intelligence algorithm (PSO) are placed Kirkuk city. Then, it was aimed to wire all the panels by fiber optic cables in minimum cost, to raise the data transfer speed, to decrease the excavation process. As a result, two different metaheuristic algorithms (ACO and GA) were applied to achieve these targets and compared the results of them. After the experiments, the optimum distance between the panels were obtained with ACO and GA as 366100 km and 353400 km, respectively. The results show that GA is the best optimization algorithm for this problem.

KEYWORDS - Connection-oriented network routing, Ant Colony Optimization, Genetic Algorithm
CONDITION MONITORING APPROACH USING 3D MODELLING OF RAILWAY TRACKS WITH LASER CAMERAS

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ABSTRACT

Detecting the rail surface faults is one of the most important components of railway inspection process which should be performed periodically. Today, the railway inspection process is commonly performed using computer vision. Performing railway inspection based on image processing can lead to false-positive results. The fact that the oil and dust residues occurring on railway surfaces can be detected as an error by the image processing software can lead to loss of time and additional costs in the railway maintenance process. In this study, a hardware and software architecture are presented to perform railway surface inspection using three-dimensional laser cameras. In addition two-dimensional data that Ccd/cmOS cameras have on the x-y plane, laser cameras have three-dimensional input data as they include precise distance information on the z plane. Generally, three-dimensional data acquiring processing is very commonly used in machine vision applications such as mobile robots, image enhancement, medical and fault diagnosis. The use of three-dimensional laser cameras in railway inspection process provides high accuracy rates. The reading rate of laser cameras to read 10,000-30,000 profiles per second is another important advantage provided in real time railway inspection. Consequently, a computer vision-based approach in which three-dimensional laser cameras that could allow for contactless and fast detection of the railway surface defects such as fracture, scouring and wear with high accuracy are used in the railway inspection process was proposed in the study.

KEYWORDS - Railway Inspection, Anomaly Detect, Computer Vision, Laser Camera, Machine Learning
THE USE OF INTELLIGENT WATER DROPS IWD FOR B SPLINE CURVE FITTING

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ABSTRACT

The use of B-spline curves has spreaded too many fields such as computer aided design (CAD), data visualization, surface modeling, signal processing and statistics. The flexible and powerful mathematical properties of B-spline are the cause of being one of the most preferred curve in literature. They can represent a large variety of shapes efficiently. The curve behind of the model can be obtained by doing approximation of control points, approximation of knot points or parameterization. It is obvious that the selection of knot points in B-spline curve approximation has an important and considerable effect on the behavior of final approximation. In addition to this, an unreasonable knot vector may introduce unpredictable and unacceptable shape. Recently, in literature, there has been a considerable attention on the algorithms inspired from natural processes or events to solve optimization problems such as simulated annealing, ant colony optimization, particle swarm optimization, artificial bee colony optimization, and genetic algorithms. This paper implements and analyzes a solution to approximate B-spline curves using Intelligent Water Drops (IWD) algorithm. This algorithm is a swarm based optimization algorithm inspired from the processes that happen in the natural river systems. The algorithm is based on the actions and reactions that take place between water drops in the river and the changes that happen in the environment that the river is flowing. Some basic properties of natural water drops are adopted in the algorithm here to solve B-spline curve fitting problem. Optimal knots are selected through IWD algorithm. The IWD algorithm was experimented by some benchmark functions. The proposed algorithm convergences optimal solutions and finds good and promising results.

KEYWORDS - Intelligent water drops, natural water drops, evolutionary algorithms, B-Spline curves, knot points, optimization, reverse engineering.
IMAGE MOSAICING BASED CONDITION MONITORING APPROACH FOR MULTI ROBOTS AT PRODUCTION LINES IN INDUSTRIAL SYSTEMS

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ABSTRACT

Accuracy and security of cyber-physical systems become crucial with growing up cyber-physical systems in industry. In today industry, manufacturing become big and serial as it never been before thanks to the autonomy robots whose cyber and physical layers are diverse. Monitoring physical layer from cyber layer is necessary for link the layers and integrate them more tightly. Furthermore, it will ease the control of big facilities. In this study, it is aimed to obtain alive bird's eye view map of full system in order to monitor manufacturing robots at production facilities that are big and impossible to be monitored with only one camera. With the created alive map, it will be possible to monitor positions of all robots instant and extract more detailed information about the facility. It is need that locate cameras each of whose angel of vision contain the small piece of neighbor one's. Finding the similar scenes of input images, estimation of homography, warping and blending operations will be applied respectively in order to mosaic the images by twos. After all steps done, only one stitched image will be obtained from all these images taken by cameras at the same time. Thus the robots in the facility can be observed in one screen and machines which could lead to accidents can be noticed early. The stitched image can also be used for image processing in cyber layer. In conclusion, hitches on cyber-physical systems used in industrial production may cause production delaying. Furthermore, these hitches may cause damage in hardware which are not cheap. So observation of the system and determination of possible accident are required for deduction the cost of delay in production and repair. With processing the obtained image by algorithms in cyber layer, the cyber-physical system will be more integrated and secure.

KEYWORDS - Image mosaicing, Condition monitoring, Industrial systems
DETECTION AND CONDITION MONITORING APPROACH OF RAIL SWITCHES BASED ON IMAGE PROCESSING IN RAILWAYS

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ABSTRACT

Today, railway transportation is one of the transport modes commonly used. Compared to other transport modes, railway traffic is highly critical. Multiple railway vehicles run constantly on one or two lines. Rail switch passages are used to prevent locomotives from colliding with one another and avoid traffic disruptions. Through switch passages, locomotives pass from one line to another. Friction between rail and wheels on switch passages is considerably high. This friction leads to failures on switch passages. Unless these failures are diagnosed early and remedied, significant accidents emerge. In this study, a new approach based on image processing has been presented for detection of rail switch passages on railway lines. A test vehicle has been created in order to test the proposed approach and apply it on a real-time system. Railway line is monitored by digital cameras fixed on this test vehicle. Image-processing approach is developed on the real-time images captured from the railway line and the switch passages on the line are detected. The image-processing approach consists of three main parts including pre-processing, feature extraction and processing of the features obtained. At the pre-processing stage, the basic image processing methods are used. At the feature extraction stage, Canny edge extraction algorithm is used and hence the edges in the image are detected. Hough transform method is used at the stage of processing of the extracted features. Following Hough transform stage, straight lines and angles of these lines are obtained on the image. Taking into account the angle of each straight line, the junction points of the lines are calculated. Thus, rail switch passage and switch types are detected. The proposed image-processing approach is highly fast and real time-based. Compared to the existing studies in the literature, it is seen that the proposed method gives fast and successful results. This study intends to diagnose the failures on switch passages early and prevent potential accidents.

KEYWORDS - Railway, Condition Monitoring, Fault Detection, Image Processing, Railroad Switches
DESIGN OF AN INTERFACE FOR GENETIC ALGORITHM BASED OPTIMIZATION OF FUNCTIONS

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ABSTRACT

Many analytical solutions for linear and nonlinear mathematical equations and equation systems have been developed and still continues to being developed. However, in some cases, difficulties may be encountered to achieve the results by analytical solutions. Quantitative analysis gained importance and their use has increased in parallel to developments in quantitative electronics especially in computer sciences. In recent years, the use of intuitive/evolutionary algorithms has become very common. In this study, a user-friendly graphical interface programme that works genetic algorithm-based for optimization operations is designed. Optimization of many test functions is performed by genetic algorithms, the results and properties are presented to the user both quantitatively and graphically.

KEYWORDS - Genetic Algorithm, Optimization, Simulator.
INTERNET OF THINGS A SURVEY

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ABSTRACT

Internet of Things (IoT) is a global infrastructure worldwide which links objects and enables data generation and sharing of this data. IoT is considered as one of the most important areas of future technology and gets attention considerably by researchers and practitioners in recent years. Applications presented by IoT makes possible a large number of developments, but very few can be used currently. With rapid advances in this system technology, successful implementations will continue to emerge to improve the quality of life in many areas. In this study, IoT is examined in general terms and its applications, advantages and disadvantages are reviewed.

KEYWORDS - Internet of Things, RFID (radio frequency identification), Sensor, Smart objects.
AN EXPERT SYSTEM FOR BORING TOOLS USED FOR MACHINING HOLES

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ABSTRACT

Boring is a finish operation that widely used to machine the holes on the mechanical parts in manufacturing industry. The Boring also is a method that is usually preferred to size holes that can meet the appropriate tolerance. There are many tools for boring process in the world wide. Generally, Boring tools were parted two groups that are milling and turning. The boring tools especially for milling were packed in many set that include head, bars, etc. Decision of using any set in these packed is not easy exercise. For this reason, selection suitable head, bars, cutting tools and cutting conditions need long preparation time and good expertise for boring process in milling. Because of the quality of holes is depended by determining these parameters rightly. In this study, an expert system that is called BT_expert was developed for using the boring tools in milling. BT_expert was built up by using an expert system shell that is called Kappa PC. Kappa PC is preferred because of programming with C++. BT_expert has a friendly user interface that is designed visual objects. A lot of rules about 70 are written for BT_expert. The system asks a few simple questions to user about boring process. And, BT_expert can make a decision by using forward chaining mechanism. Finally, BT_expert system determines the boring bars, cutting tools and ideal cutting parameters automatically. As a result, BT_expert system makes easy to select boring and cutting tools, and cutting parameters correctly in many set without any expert. And, the system decrease the long preparation time of boring process.

KEYWORDS - Boring, Boring tools, Expert System, Kappa PC, Milling
DIFFERENT APPLE VARIETIES CLASSIFICATION USING KNN AND MLP ALGORITHMS

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ABSTRACT

In this study, three different apple varieties grown in Karaman province are classified using kNN and MLP algorithms. 90 apples in total, 30 Golden Delicious, 30 Granny Smith and 30 Starking Delicious have been used in the study. DFK 23U445 USB 3.0 (with Fujinon C Mount Lens) industrial camera has been used to capture apple images. 4 size properties (diameter, area, perimeter and fullness) and 3 color properties (red, green, blue) have been decided using image processing techniques through analysing each apple image. A data set which contains 7 physical features for each apple has been obtained. Classification success rates and error rates have been decided changing the neuron numbers in the hidden layers in the classification using MLP model and in different neighbour values in the classification made using kNN algorithm. It is seen that the classification using MLP model is much higher. While the success rate of classification made according to apple type is 98.8889%.

KEYWORDS - apple classification, data mining, kNN, MLP
CLASSIFICATION OF GENUINE AND COUNTERFEIT BANKNOTES BY USING DATA MINING ALGORITHMS

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ABSTRACT

In this study, the banknote authentication data set in the UCI machine learning repository was used as classification data set. Four features obtained from banknote images that were taken from genuine and counterfeit banknotes were used for classifying them as genuine or counterfeit. 906 of 1372 data in the dataset were assigned for training and rest of them were assigned for testing. Weka (Waikato Environment for Knowledge Analysis) software was used as classification environment. The classification success rates were calculated by using data mining algorithms like Multilayer Perceptron, RBFNetwork, RBFClassifier, kNN, J48, RandomForest, RandomTree, NaiveBayes, BayesNet, OneR, DecisionTable and Kstar. The best classification success rate was achieved by using Multilayer Perceptron model. The classification success rates for various number of neurons in the hidden layer were obtained in Multilayer Perceptron model. The best success rate was obtained as 100 % when the model has 4 neuron in the hidden layer.

KEYWORDS - Data mining, Weka, MLP, kNN
THE OPINIONS OF UNDERGRADUATE STUDENTS FOR INFORMATION SECURITY AND CYBER CRIMES IN SOCIAL NETWORKS

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ABSTRACT

The aim of this study is to reveal awareness of undergraduate students in social networks regarding security and cyber crimes. Data of the study were collected through questionnaire titled ‘Social Networks Security’ and ‘Cyber Crimes in the Social Networks’ prepared by the researchers. The sample of the study was established based on 752 Mevlana University undergraduate students (44% Male, 56% Female), studying in various faculties using the Convenience Sampling Method. According to the findings of the research, most of Mevlana University students use Facebook, followed by Twitter and Instagram respectively. It is seen that, despite statements that the participants are conscious users about the security of the social networks, they don’t have enough information about the issue. In addition, a low percentage of participants has been exposed to cyber crimes in the social networks, while majority of them think of asking for help when exposed to cyber crimes but are at a loss on where to apply. Safe use of social networking, cyber crimes, awareness and regulations as well as competent authorities are recommended to provide training to students on creating awareness.

KEYWORDS - Social Networks, Information Security, Cyber Crimes, Social Media
THE CLASSIFICATION OF WHITE WINE AND RED WINE ACCORDING TO THEIR PHYSICOCHEMICAL QUALITIES

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ABSTRACT

The main purpose of this study is to predict wine quality based on physicochemical data. In this study, two large separate data sets which were taken from UC Irvine Machine Learning Repository were used. These data sets contain 1599 instances for red wine and 4898 instances for white wine with 11 features of physicochemical data such as alcohol, chlorides, density, total sulfur dioxide, free sulfur dioxide, residual sugar, and pH. First, the instances were successfully classified as red wine and white wine with the accuracy of 99.5229% by using Random Forests Algorithm. Then, the following three different data mining algorithms were used to classify the quality of both red wine and white wine: k-nearest-neighbourhood, random forests and support vector machines. There are 6 quality classes of red wine and 7 quality classes of white wine. The most successful classification was obtained by using Random Forests Algorithm. In this study, it is also observed that the use of principal component analysis in the feature selection increases the success rate of classification in Random Forests Algorithm.

KEYWORDS - Classification, Random Forest, Support Vector Machine, k Nearest Neighborhood.
NOTE RECOGNITION FROM MONOPHONIC MUSICAL SIGNALS BY USING NEURAL NETWORK

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ABSTRACT

In this work, note recognition from monophonic musical signals is studied. It is aimed to achieve a musical note from the fundamental frequency. Artificial Neural Networks (ANN) is used in order to estimate the fundamental frequency. Firstly, around 6-10 seconds audio recordings for each musical notes are taken with the flute. Certain number of frames are taken from these audio recordings and used for training of the ANN. After training, any parts that are played on the flute are tested. The musical notes was found correctly on the tested parts that are played on the flute.

KEYWORDS - Artificial neural networks (ANN), Signal processing, Monophonic musical signals.
A NEW REAL TIME CONTROL APPROACH FOR TIME EFFICIENCY IN GROUP ELEVATOR CONTROL SYSTEM

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ABSTRACT

In parallel with the increase seen in the number of high-rise buildings, vertical transport systems are progressing. One of the results of this progress is the emergence of group elevator systems and their primary aim is to transport its passengers to the target floor the fastest way possible. Studies on this field are generally simulation and optimization based and they have an aim of minimizing the passengers’ waiting and traveling periods. In this study, a real time group elevator experimental setup was created and an optimization algorithm was applied on the setup. Genetic algorithm was chosen as optimization algorithm and this method was tested in an elevator prototype of 10 floors and 5 cabins. The results obtained revealed efficiency, performance and accuracy of proposed method.

KEYWORDS - group elevator systems, optimization, genetic algorithm, average waiting time, real time control
SILENT SIGNALS IN DIGITAL LIFE

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ABSTRACT

A report released in 2016 by examining the trends and digital statistics in the “We Are Social”. According to this report in our smartphone user are listed as 58%. Day by day this ratio, in the report it is observed all over the world that continues to grow. These technological devices makes our lives easier, sometimes it could leave you in a difficult situation. For example, meetings, courses, libraries or fulfilling our religious duty poses the problem that the ringtone is not closed. All around us is causing people to be distracted. To prevent this state Muterelax name has been developed a system. The system consists of two parts. The first part is software developed for smartphone, the second part includes the electronic circuit interfaced with these phones. It disseminates electronic circuit signal in the place to be quiet. The smart phone is set to slient mode by capturing the signal emitted. As long as it receive this signal is to keep the phone in silent mode. When the signal is interrupted, it automatically brings you to the previous state. So people forget to turn off the phone ring tones is prevented. Also in the environment will prevent the disintegration of people's attention.

KEYWORDS - Silent systems, signal processing, smart phone
ELEVATOR SYSTEM A CASE STUDY OF COLOURED PETRI NETS

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ABSTRACT

A fairly general model of the elevator system is presented. Coloured Petri Nets (CPN) and CPN tools are adopted as modeling tools. The elevator system is one of the software engineering benchmarks that are frequently used to test the expressive power, readability and convenience of various formal specification techniques. CPN are often used to model behaviours of large variety of complex systems. Nevertheless, the question whether or not CPN are an effective technique for modeling real world applications of interconnected communicating systems is still of interest for software developers and modelers. Various type of Petri nets have been used to model the elevator system before, however almost all the previous models are either static, or the concept of colour as a data type was not fully utilized, or other formalisms as UML were substantially involved. The model presented in this paper is independent on the number of floors and elevators, it covers in substantial detail different stages of the elevator system. We believe our model is flexible enough to be adapted to different algorithms and rules, and may eventually evolve in a 'standard' formal model of the elevator system. The model allows simulation-based analysis of different algorithms and rules which govern real elevator systems, including calculating serving time and waiting time. The results of various important tests (as different number of cars and different scheduling algorithms) are presented and they prove the compatibility and applicability of this model in various situations and demonstrate the impressive expressive power and convenience of CPN.

A FAST DETECTION APPROACH FOR ROAD DEFECTS USING IMAGE PROCESSING

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ABSTRACT

Road defect is one of the most important factor for traffic accident. Therefore, this defects should be corrected as soon as possible. It usually occurs cracks, rutting, and potholes in road surface. There are various methods in the literature for the road defect detection. Traditionally these defects is tried to detected by the human eye are performed using image processing in recent years. However, there are deficiencies such as inability of real time application, slow work, and inability to identify with high accuracy in addition to being shortage of studies using image processing. Aim of this study is defect detection at road by using image processing algorithm with images taken from a camera on a vehicle. In first step of this study, preprocessing is performed by utilizing median filter algorithm. Then, in second step essentially threshold values to detection process are obtained by performing feature extraction with mathematically morphological techniques. In final step whether road defect exist or not, and which level of defect are obtained by being classified in real time. To reveal the accuracy and performance of the proposed approach, comparative results are given by examining images obtained as experimentally.

KEYWORDS - Road Defect Detection, Image processing
INVESTIGATING THE EFFECTS OF FACIAL REGIONS TO AGE ESTIMATION

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ABSTRACT

Aging process causes evident alterations on human facial appearance. Real world age progression on human face is personalized and related with many factors such as, genetics, living style, eating habits, facial expressions, climate etc. The wide degree of variations on facial appearance of different individuals affects the age estimation performance. In accordance with these facts discovering the aging information contained in facial regions is an important issue in automatic age estimation. Thus the facial regions emphasizing the aging information can be used for more accurate age estimation. In this context, age estimation performances of facial regions (eye, nose, mouth and chin, cheeks and sides of mouth) are investigated in this paper. For this purpose, an age estimation method is designed to produce an estimate of the age of a subject by using the texture features extracted from facial regions. In this method the facial images are warped into the mean shape thus variations of head pose and scale are eliminated and the texture information of facial images are aligned. Then the holistic and spatial texture features are extracted from facial regions using Local Phase Quantization (LPQ) texture descriptor, robust to blur, illumination and expression variations. After the low dimensional representation of these features, a linear aging function is learned using multiple linear regression. In the experiments FGNET and PAL databases are used to evaluate the age estimation accuracies of facial regions i.e. eye, nose, mouth and chin, cheek and sides of mouth, separately. The results have shown that the eye region carries the most significant information for age estimation. Also the mouth and chin, cheek regions are effective in the prediction of age. The results also have shown that, using the spatial texture features enhances the discriminative power of the texture descriptor and thus increases the estimation accuracy.

KEYWORDS - Age estimation, Facial Regions, Local Phase Quantization
DEFINING CROWD MOVEMENT AS PARABOLA AND CLASSIFYING THESE DEFINITIONS

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ABSTRACT

Smart surveillance systems developed in recent years have made enormous contributions to providing safety and management of crowds. The aim of this study is to observe and try to understand how crowd movements presented in a video sequence show behaviour. For this end, the motion data at pixel level among the consecutive frames is obtained using optical flow initially. Then, this motion data is associated using the particle advection method and stable as well as moving areas in the image are obtained. After, the moving areas clustered using Mean-Shift method are described and classified as parabola, in addition to the studies in the literature. At the end of the study, the method developed was tested over UCF as well as Pets2009 datasets and the results are presented.

KEYWORDS - crowd analysis, particle advection, optical flow
TOPOLOGY CONTROL IN MOBILE WIRELESS SENSOR NETWORKS

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ABSTRACT

Topology control is a set of strategies and actions those aim to improve energy efficiency, lifetime and reliability of the networks. One of the most effective methodology is topology reduction, which is a part of the overall topology control process. Topology control process is usually considered under two phases: construction and maintenance. This hard work would even be harder for mobile ad-hoc sensor networks, those consist of devices with limited capabilities and continual independent movement. In this work, we made our efforts to find out effects of mobility of the nodes in an ad-hoc wireless sensor network on network parameters, by using different pre-defined topology control protocols. Thus, we made simulations using an experimental simulator, called Atarraya. Furthermore, we measured the performance of each protocol and compared the outcomes in order to find the best topology control strategy. Lastly, possible solutions to the uncovered problems are proposed.

KEYWORDS - Ad-hoc Wireless Sensor Networks, Mobility, Topology Control.
ROUTE PLANNING FOR MULTIPLE UNMANNED AERIAL VEHICLES UAVS WITH PARALLEL GENETIC ALGORITHM ON GPU USING CUDA

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ABSTRACT

Unmanned Aerial Vehicles (UAVs) are designed as alternative solutions to traditional aerial vehicles controlled by human on-board. Recent advances in robotic and communication technologies have enabled UAVs to become convenient platforms for various missions from aerial surveillance to combat operations. Today, most of the efforts on UAV technologies from scientific and industrial communities are focusing on autonomy to provide self-decision skills to UAVs particularly on their mobility. In order to execute a certain mission effectively in the shortest possible time, an optimal pre-defined route plan which regulate the mobility of UAVs is required. Moreover, for multi-UAV systems, which consist of more than one UAVs perform their tasks in collaboration, this pre-defined route plan should be updatable during the mission in order to make the system fault tolerant. Route planning for multi-UAV systems is NP-hard problem which is also known as multiple traveling salesman problem (mTSP). Given a set of waypoints, multi take-off points for all UAVs, and a cost metric, the objective of the problem is finding a set of routes for a given number of UAVs so as to minimize the total cost. It is obvious that increase in the number of waypoints or UAVs cause exponential increase in search space. In order to find a solution with good quality from this huge search space within a reasonable amount of time, evolutionary algorithms and parallel computing techniques can be used. In this study, it is aimed to find near-optimal route plans for multi-UAV systems. The objective function used in this study provides that all individual routes of UAVs to be close each other as possible. The algorithm is implemented on GPUs using NVIDIA’s parallel computing platform, Compute Unified Device Architecture (CUDA). The efficiency and the effectiveness of the proposed parallel GA approach are demonstrated through simulations under different scenarios.

KEYWORDS - mTSP, parallel genetic algorithm, CUDA, GPU, GPGPU, UAV, Unmanned aerial vehicles
HYBRID BIOMETRIC SYSTEM USING IRIS AND SPEAKER RECOGNITION

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ABSTRACT

In this study, a hybrid security system is proposed. The proposed system is composed of two subsystems namely iris recognition system (IRS) and speaker recognition system (SRS). Pre-processing, feature extraction and feature matching are the main steps of these systems. In IRS subsystem, Gaussian Filter, Canny edge detector, Hough transform, and histogram equalization is performed for pre-processing, respectively. After that, by applying 4-level Discrete Wavelet Transform (DWT) to pure iris image, the iris image is decomposed into four sub-bands (LL4, LH4, HL4 and HH4). In order to extract the feature vector from iris pattern, the LH4, HL4 and HH4 sub-bands (matrices) are merged into one matrix. Finally the matrix is transformed to obtain the feature vector of iris image. For SRS subsystem, the pre-processing step includes spectral arrangement, silence part removing and band limitation operations. After pre-processing, frame blocking and windowing are applied to the long-term speech samples and then Fast Fourier Transform (FFT) is performed for the each short-term speech segments (frames). Finally, the Mel Frequency Cepstral Coefficients (MFCC) technique is performed in order to obtain feature vector of the speech. The feature matching step of both IRS and SRS is implemented with Dynamic Time Warping (DTW) which is an efficient algorithm to measures the distance between two vectors. According to the DTW results, the false acceptance rate (FAR) is zero and false rejecting rate (FRR) is about 4 %.

KEYWORDS - Biometric systems, iris recognition, speaker recognition, security
CRACKED EGGS DETECTION WITH SOUND ANALYSIS METHODS

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ABSTRACT

This study designed to done an experimental study about detection of cracked eggs with sound analysis methods. Cracked eggs can not be distinguished from a normal view with the human eye, but can be easily identified with audio analysis. If an egg shell has been broken, micro organisms of outside will enter into the egg through the crack, so the egg quality is reduced and egg damaged. Cracked eggs analysis, will affect the quality of production and factory production factors that will be accelerated by providing the manpower win. The replies from the sound waves of different frequencies to be applied to the eggs are used in the determination. A knocking device was designed to knock every eggs in seconds. By this, the cracks of eggs can be detected by the signal responses. The pulses of time signals were acquired by using a microphone and sound card when knocking the eggs. Then, from the response, energy values of high frequency coefficients and low frequency coefficients were obtained by the wavelet decomposition. After analysis this data, it can be easily found that, the energy parameter values of the cracked egg is smaller than the energy parameter values of the sturdy egg. By result, found that the energy values of the two types of eggs had significant differences. So this can be used by determining normal and cracked eggs.

KEYWORDS - cracked eggs detection,sound analysis,eggs selection,eggs quality
DIFFERENT DUTY CYCLE RATIO AND BRIGHTNESS OF VISUAL STIMULI CHANGE TO STEADY STATE VISUAL EVOKED POTENTIAL RESPONSE

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ABSTRACT

Stimuli types are very crucial for the performance of electroencephalogram (EEG) based brain computer interface (BCI) systems. This study aims to investigate methods for obtaining higher information transfer rate (ITR) through duty cycle and brightness variation of visual stimuli which have high frequency for steady state visual evoked potential-based BCI. Although previous studies were concentrated on either duty cycle or brightness of stimuli separately, our study focused on the change of duty cycle ratio and brightness of stimuli at the same time. Duty cycle values of 40%, 50%, and 60% were used. During the experiment, 16 flickering stimuli were used on liquid crystal display. Participants gazed to the flicker which had frequency of 15 Hz. Canonical correlation analyses (CCA) was used for channel selection and frequency detection. According to the CCA, the maximum average accuracy of the experiment was 92.54% when the frequency of flicker was in beta band and its duty cycle was 40% with a brightness tuning wave. Under the same conditions stated above, average ITR was improved 16.1% according to the most commonly used flicker model which is square wave and has 50% duty cycle.

KEYWORDS - Human-Computer Interaction and Systems, Brain Computer Interface, Steady State Visual Evoked Potential, EEG
APPLICATION OF FUZZY LOGIC IN LAND CONSOLIDATION-
CLASSIFICATION STUDIES

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ABSTRACT

Land classification is one of the most important stages of consolidation projects. The success and timely completion of this project depends on that this classification is useful and fair and are accepted by landowners. Different methods have been developed for the classification. Effects on the success of the land consolidation of the results of these methods are being investigated. In this study, fuzzy logic method has been used for land classification according to Law No. 5403. In Mamdani Type Fuzzy Logic, Values of soil index, productivity index and the location index, which are used to determine the value of the parcel index, have been defined as input, whereas the value of parcel index have been defined as the output. Inputs and outputs have been converted to the linguistic terms (such as very efficient, inefficient, somewhat efficient, remote, near) by creating membership functions. Rule base has been created for calculating of the parcel index. As a result of fuzzy inference and defuzzification process, the model formed by Mamdani Type Fuzzy Logic gives the value of parcel index. By giving random input values to test generated model, results has been compared with results obtained manually.

KEYWORDS - fuzzy logic, land consolidation, land classification, fuzzy systems, soft computing
A VISION BASED DETECTION APPROACH FOR LEVEL CROSSING AND SWITCH IN RAILWAY

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ABSTRACT

Railroad transportation is considered one of the safest means of transportation. Important components of this transportation are tracks, level crossing, turnout, and so forth. Detection of these components is critical for realizing centralized supervision, comprehensive evaluation, and accident prevention. Safety of railroad can be developed using intelligent systems which supply additional information about the exact location of the train, its speed and upcoming obstacles. Level crossings in railroad are significant safety points. Because there is the risk of collisions between motor vehicles and trains. Therefore it is necessary first to detection level crossings for detection of obstacles in level crossings. In this paper a vision based approach is presented that detects to level crossings and turnouts in railway. In the images of a camera that observes the area in front of a railroad vehicle the rail tracks are detected in real-time. These images are converted to HSV color format in first step of the proposed method. Then image normalization and gradient computing are performed. In the next step, the effect of illumination on the appearance of the image is removed with ratio of gradient magnitude and gradient the average of the gradients of all pixels in the image. Then to suppress the effects of pixels with large gradients, and noisy pixels, during illumination normalization, weights are calculated. In the next step the computation of the weighted average of V values of the pixels inside the rectangular windows with varied sizes is time consuming. Therefore to speed up the computation, Integral image which is an elegant technique for efficiently carrying out an averaging operation is applied to result image in the final step. In this way turnout detection is realized. While preprocessing, feature extraction, and image processing techniques is used in level crossing detection process.

KEYWORDS - level crossing detection, turnout detection, image processing, integral image
USING K MEANS AND K MEDOIDS METHODS FOR MULTIVARIATE MAPPING

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ABSTRACT

Multivariate mapping is the visual exploration of multiple attributes using a map or data reduction technique. The simultaneous display of sometimes multiple features and their respective multivariate attributes allows for estimation of the degree or spatial pattern of cross-correlation between attributes. Multivariate mapping integrates computational, visual, and cartographic methods to develop a visual approach for exploring and understanding spatiotemporal and multivariate patterns. More than one attribute can be visually explored and symbolized using numerous statistical classification systems or data reduction techniques. In this sense, clustering analysis methods can be used for multivariate mapping. Cluster analysis is the process of grouping information in a data set according to specific proximity criteria. Similarity of element in the same cluster should be high and similarity between clusters should be low. K-Means and K-Medoids methods which are non-hierarchical clustering analysis methods were analyzed in this study. In these methods, n objects are divided into k clusters according k number (k<n) given before. These methods divide data in a way that there will be at least one object in each cluster and each object will be included at least in one cluster. In this study, classes and multivariate maps created with these methods from traffic accident data of two different years in Turkey were presented. In addition usability of such maps in risk management and planning was discussed.

KEYWORDS - multivariate mapping, data mining, cluster analysis, visualization
A PERFORMANCE COMPARISON OF GRAPH COLORING ALGORITHMS

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ABSTRACT

Graph coloring problem (GCP) is getting more popular to solve the problem of coloring the adjacent regions in a map with minimum different number of colors. It is used to solve a variety of real-world problems like map coloring, timetabling and scheduling. Graph coloring is associated with two types of coloring as vertex and edge coloring. The goal of the both types of coloring is to color the whole graph without conflicts. Therefore, adjacent vertices or adjacent edges must be colored with different colors. The number of the least possible colors to be used for GCP is called chromatic number. As the number of vertices or edges in a graph increases, the complexity of the problem also increases. Because of this, each algorithm can not find the chromatic number of the problems and may also be different in their executing times. Due to these constructions, GCP is known an NP-hard problem. Various heuristic and metaheuristic methods have been developed in order to solve the GCP. In this study, we described First Fit (FF), Largest Degree Ordering (LDO), Welsh and Powell (WP), Incidence Degree Ordering (IDO), Degrees of Saturation (DSATUR) and Recursive Largest First (RLF) algorithms which have been proposed in the literature for the vertex coloring problem and these algorithms were tested on benchmark graphs provided by DIMACS. The performances of the algorithms were compared as their solution qualities and executing times. Experimental results show that while RLF and DSATUR algorithms are sufficient for the GCP, FF algorithm is generally deficient. WP algorithm finds out the best solution in the shortest time on Register Allocation, CAR, Mycielski, Stanford Miles, Book and Game graphs. On the other hand, RLF algorithm is quite better than the other algorithms on Leighton, Flat, Random (DSJC) and Stanford Queen graphs.

KEYWORDS - Chromatic number, Graph coloring algorithms
MODELING OF COMpressive STRENGTH OF DIFFERENT SIZES WOOD MATERIALS BY REGRESSION ANALYSIS

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ABSTRACT

Timber is used widely in construction industry lately due to its some advantages such as neutrality, lightness, environmentally-friendly, resistant against earthquakes, manufacturing flexibility, and having a good compatibility with other construction materials like steel, concrete, and adobe-like materials. Fire retardant materials are used in order to protect wood from the fire. The main task of the fire retardant material is to protect timber against fire, besides it is very important to know whether the retardant material has any effect on the compressive strength of the material or not and it would help the designer to make a choice based on material sections. Today computer technology is widely used in the construction industry as well as in all sectors. Various mathematical and statistical methods are used for computer-aided models. In this study samples with different dimensions and different fire-retardant material has been prepared from most commonly used wood materials in the construction sector. The compressive strength test has been applied on the samples after certain operations. The data obtained from experiments have been used to apply regression analysis (RA) which is a statistical approach and regression models (RM) have been established to predict compressive strength (CS). Data like wood sample weight, cross-section, volume and breaking load were used to create regression equations for estimating the tension. The data obtained from the regression model developed by experimental data were statistically compared, it is seen that the outcome of the designed model is successful. When the correlation coefficient between predicted compressive strength values and generated models was calculated, it has been seen that the methods applied can be used safely. The data obtained from regression models is close to experimental data and such models can be used to estimate the compressive strength wood.

KEYWORDS - Regression analysis, Species of wood, Resistance of wood against pressure
PERFORMANCE ANALYSIS OF SPIRAL NEIGHBORHOOD TOPOLOGY BASED LOCAL BINARY PATTERNS IN TEXTURE RECOGNITION

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ABSTRACT

In many texture recognition problems, Local Binary Patterns (LBP) method is used for feature extraction. This method is based on comparison of each center pixel and its neighbor’s intensity value in image. Due to its simplicity of calculation, LBP has become one of the most popular feature extraction techniques. In literature, different neighborhood topologies of LBP structure are given such as circle, square, ellipse, parabola, hyperbola, and Archimedean spiral. This paper focuses on the use of uniform and basic LBP that have spiral topology in texture classification. We first derive basic and uniform LBP features based on spiral topology. Then the performances of several classification methods such as linear discriminant analysis (LDA), linear regression classifier (LRC), support vector machines (SVM), Chi-square test, and G-test are compared using these features in UIUC texture database.

KEYWORDS - classification methods, spiral topology, Local binary patterns, texture recognition, feature extraction
PREPARING DIET LIST SUGGESTION WITH FUZZY EXPERT SYSTEM

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ABSTRACT

Proportion of disease is growing due to the malnutrition and sedentary life. In this work, a diet list is proposed to the user by calculating the necessary amount of calorie according to gender, weight, height, age and activity level. Diet list are prepared for seven days of a week as divided by six meals. Parameter assessment of users and offering recommendations are made via fuzzy expert system. Prepared diet list are constituted considering calories of nutrients and based on the dieticians’ general diet list proposals. Developed software also includes some functions such as nutrition advices, calculation of ideal weight, information about benefits of several nutrients and calorie evaluation of some daily activities. Thus, nutrition suggestion software carried out against for growing obesity and healthy eating problems in order that people would educate themselves about wellness.

KEYWORDS - Fuzzy expert systems, nutrition, nutritional value, diet list
TRUST MODELS IN WIRELESS SENSOR NETWORKS

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ABSTRACT

Wireless sensor networks are used widely in daily life. With that increase the problems faced in WSN usage have become more interesting for the research community. The problems that outstanding the most are related to the trust and energy issues. As wireless sensor networks have limited energy and computing power, cryptographic algorithms are not suitable for these type of networks. Along with that line, in this work we explore trust models developed for wireless sensor networks.

KEYWORDS - wireless sensor networks, trust, trust models
TRANSMIT POWER CONTROL (TPC) ALGORITHM FOR LTE-A FEMTOCELL NETWORKS

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ABSTRACT

3GPP LTE-Advanced release-13 is now supporting the deployment of femtocells (HeNBs), which provide better connectivity to the users (UEs) at home, offices, shopping malls, and dense urban areas, where the macrocell (eNB) has weak signals strength or no signal. These femtocells cover short distance (10 ~ 20 m) with high throughput and increased capacity, while on the other hand the deployment of huge number of femtocells create co-tier and cross-tier interference issues. To mitigate the co-tier interference problem we propose a Transmit Power Control (TPC) Algorithm, which will establish and control the connection between femtocell and the users. In case of downlink and uplink scenarios the transmit power of femtocells and UEs will be monitored accordingly. As a result this data will help to manage the switching of users among femtocells, macrocells to femtocells and vice versa. In the end we show the simulation results to compare the SIR and Throughput of users.

KEYWORDS - 3GPP, LTE-A, Femtocell, Macrocell, RRM, UE, eNB, HeNB, SIR, Throughput
VIDEO STREAM WITH WEBSOCKET ON RASPBERRY PI 2

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ABSTRACT

Internet of Things (IOT) and communication between machines (M2M), has emerged as an important concept in conjunction with the use of Internet technology in embedded systems. Thus, programmable remote control and the need for people with microcontrollers, it becomes possible to use the system are minimized. Given this device"s web server hardware capabilities, also allows the use of technologies such as web sockets. In this study, a mini computer featuring Raspberry Pi 2 moving images received through the attached camera on, transmitting in real time with clients via the web browser and the ability to monitor the place where you have displayed to clients at the same time is designed as a system. The goal of this system, image processing and artificial intelligence methods using a remote place / region to create a hardware and software infrastructure for monitoring or monitoring. The target for the operating system that offers performance from the device with the use of minimal resources, non-graphical interface and development environment ARM-supported Debian Linux as the Node.js installation is preferred. Socket servers and HTTP server software made by users of a particular program without the need for mobile phone environment is installed the device in any environment with a computer or web browser to monitor in real-time, data retrieval, and has obtained the ability to check. Created this is the system to be monitored spaces regardless of the number of users, thanks to the web connector technology in the software encoded on the device in real time without requiring an additional operation in the browser monitoring displays alerts (voice, text, etc.) situation can be produced.

KEYWORDS - IoT, Raspberry Pi, Websocket, Node Js
CLASSIFICATION OF HEURISTIC INFORMATION BY USING MACHINE LEARNING ALGORITHMS

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ABSTRACT

The User Knowledge Modelling dataset in the UCI machine learning repository was used in this study. The students were classified into 4 class (very low, low, middle, and high) due to the 5 performance data in the dataset. 258 data of 403 data in the dataset were used for training and 145 of them were used for tests. The Weka (Waikato Environment for Knowledge Analysis) software was used for classification. In classification Multilayer Perceptron (MLP), k Nearest Neighbor (kNN), J48, Naïve Bayes, Bayes Net KStar, RBF Network and RBF Classifier machine learning algorithms were used and success rates and error rates were calculated. In this study 8 different data mining algorithm were used and the best classification success rate was obtained by MLP. With Multilayer perceptron neural network model the classification success rates was calculated when there are different number of neurons in the hidden layer of MLP. The best classification success rate was achieved as 97.2414% when there was 8 neurons in the hidden layer. MAE and RMSE values were obtained for this classification success rate as 0.0242 and 0.1094 respectively.

KEYWORDS - Classification, machine LEarning Algorithms
CLASSIFICATION OF CREDIT CARD CUSTOMERS PAYMENT STATUS BY USING KNN AND MLP ALGORITHMS

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ABSTRACT

The Default of Credit Card Clients dataset in the UCI machine learning repository was used in this study. The credit card customers were classified if they would do payment or not (yes=1 no=0) for next month by using 23 information about them. Totally 30000 data in the dataset’s 66% was used for training and rest of them as 33% was used for tests. The Weka (Waikato Environment for Knowledge Analysis) software was used for classification. In classification Multilayer Perceptron (MLP) and k Nearest Neighbor (kNN) machine learning algorithms was used and success rates and error rates were calculated. With kNN classification success rates for various number of neighborhood value was calculated one by one. The highest success rate was achieved as 80.6569% when the number of neighbor is 10. With Multilayer perceptron neural network model the classification success rates was calculated when there are different number of neurons in the hidden layer of MLP. The best classification success rate was achieved as 81.049% when there was only one neuron in the hidden layer. MAE and RMSE values were obtained for this classification success rate as 0.3237 and 0.388 respectively.

KEYWORDS - CLASSIFICATION, MLP ALGORITHMS, NN ALGORITHMS
ESTIMATION OF TURKEY ELECTRIC ENERGY DEMAND UNTIL YEAR 2035 USING TLBO ALGORITHM

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ABSTRACT

In this study, the estimation of Turkey primary electric energy demand until 2035 is tried to estimate by using Teaching-Learning Based Optimization (TLBO) Algorithm. Two models are proposed which are based on economic indicators TLBO algorithm linear energy demand (TLBOEDL) and TLBO algorithm quadratic energy demand (TLBOEDQ). In both of these two models the indicators used are Gross Domestic Product (GDP), population, importation and exportation. After a comparison of these two models with real values between 1979 and 2005 years, it is applied to the estimation of Turkey electric energy demand until 2035 by three different scenario. The estimation results are suitable with the estimation of Turkey total primary energy supply of 2013 Energy Report of World Energy Council Turkish National Committee (WEC-TNC ).

KEYWORDS - Teaching Learning Based Optimization (TLBO) Algorithm, Energy Demand Estimation, TLBOEDL Model, TLBOEDQ Model, Turkey Energy Report 2013
COMPARISON OF THE EFFECT OF UNSUPERVISED AND SUPERVISED DISCRETIZATION METHODS ON CLASSIFICATION PROCESS

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ABSTRACT

Most of the machine learning and data mining algorithms use discrete data for the classification process. But, most data in practice include continuous features. Therefore, a discretization preprocessing step is applied on these datasets before the classification. Discretization process converts continuous values to discrete values. In the literature, there are many methods used for discretization process. These methods are grouped as supervised and unsupervised methods according to whether class information is used or not. In this paper, we used two unsupervised methods: Equal Width interval (EWI), Equal Frequency (EF) and one supervised method: Entropy Based (EB) discretization. In the experiments, a well-known 10 dataset from UCI (Machine Learning Repository) is used in order to compare the effect of the discretization methods on the classification. The results show that, Naive Bayes (NB), C4.5 and ID3 classification algorithms obtain higher accuracy with EB discretization method.

KEYWORDS - Discretization, Unsupervised Discretization, Supervised Discretization, Continuous Features, Discrete Feature, classification algorithms.
MACHINE LEARNING TECHNIQUES FOR OCCUPATIONAL ACCIDENT CLASSIFICATION IN MINE INDUSTRY

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ABSTRACT

The mining industry is a sector that hosts on site many of occupational health and safety risks from the search phase to the production and shipping. In case of failure to prevent these risks it is encountered high occupational accidents and diseases. In mining, the main thing is to produce according to constantly changing environmental conditions that’s why it differs from other business branches. In this situation in mining sector in determination of risks and obtaining projective measures correctly, the statisticall evaluation of the previous accidents is very important. For this purpose there can be found many learning systems that learn from the past and make estimations for the future. Therefore in this paper a classification model is constructed that makes estimation of the sum of injured employees in the mines according to some attributes. In this estimation model the amount of production, total employee, explosive used, capsule used and the mast costs are used as the attributions. Thus with this model estimation of injured employees is performed according to these attributions using MATLAB platform. For this study the database is used obtained from Turkish Hard Coal Authority that belongs to the years between 2010-2014. As the classification algorithms different machine learning algorithms are used and the comparative results are evaluated.

KEYWORDS - Learning System, Classification Model, Mine Industry, Machine Learning Algorithms

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CLUSTERING OF MITOCHONDRIAL D-LOOP SEQUENCES USING SIMILARITY MATRIX, PCA AND K-MEANS ALGORITHM

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ABSTRACT

In this study, mitochondrial displacement-loop (D-loop) sequences isolated from different hominid species are clustered using similarity matrix, Principal Component Analysis (PCA) and K-means algorithm. Firstly, the mitochondrial D-loop sequence data are retrieved from the GenBank database and copied into MATLAB. Pairwise distances are computed using p-distance and Jukes-Cantor methods. A phylogenetic tree is created and then a similarity matrix is generated according to the pairwise distances. Furthermore, the clustering is performed using only K-means algorithm. After that PCA and K-means are used together in order to cluster mitochondrial D-loop sequences.

KEYWORDS - clustering; p-distance; PCA; Jukes-Cantor; K-means algorithm; similarity matrix
SIMULATION AND ANALYZES OF HETEROGENEOUS WSN CLUSTERING PROTOCOLS

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ABSTRACT

The restricted battery supply of a sensor node is one of the most important factors that limit the lifetime of the WSNs. As a consequence, prolonging the lifetime of WSNs through energy efficient mechanisms has become a challenging research area. Previous studies have shown that instead of implementing direct transmission or multi-hop routing, clustering is a kind of key technique used to reduce energy consumption. Clustering can increase the scalability, decrease the energy consumption and extend the lifetime of the network. Also, energy-efficient clustering protocols have been designed for the characteristic of heterogeneous wireless sensor networks to obtain additional energy savings. In heterogeneous wireless sensor networks, some of sensor nodes is equipped with additional energy resources. In this paper, comparison of stable election protocol (SEP), distributed energy-efficient clustering (DEEC) scheme with LEACH which has also advanced nodes is aimed. Same simulation parameters are used for comparison. The nodes in all algorithms are equipped with same total energy. The protocols are compared in terms of lifetime, energy-efficiency and throughput in MATLAB. The results of the simulations are discussed in details.

DEVELOPING TEST INFRASTRUCTURE FOR DISTRIBUTED COST EFFECTIVE NETWORK SECURITY SYSTEM USING LIMITED RESOURCES

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ABSTRACT

Network security has become a growing threat to most public and private institutions. Cyber attacks are getting serious mount of rise and complexity is constantly evolving. Government departments and organizations are being breached everyday and data compromised by these attacks. Therefore it has become mandatory to take actions for the protect information and ensure that the security of the information system will be inevitable. Detection of unknown attack vectors are difficult for traditional border systems. This paper based on an idea to help system administrator overcome that problem using real time, cost effective data analytics system infrastructure based on big data analytics software and embedded hardware technologies. During the research on that network security challenge main focus was on the analysis behaviours of attackers. Honeypots are known as security resources which trap malicious activities. It is a valuable tool to collect information about the behaviours of attackers. Collected data can be analyzed and monitored so that is provide early warning about new attack and exploitation trends. System administrators can use that captured information to implement better Intrusion detection system rules. There is another challenge for security professional is that large amount of collected data waiting for processing real time. And Hadoop is come to aid this problem for us. Hadoop is flexible architecture for large scale data processing and runs on inexpensive lower capacity hardware like Raspberry Pi. The Raspberry Pi is a low cost, credit-card sized computer. Recommended architecture is going to run on multiple distributed Raspberry Pi computer nodes. The goal of this paper describes the design stages and installation of the test infrastructure about described solution.

KEYWORDS - NETWORK SECURITY INFRASTRUCTURE, INFORMATION SECURITY, DISTRIBUTED DATA ANALYTICS
LONG RANGE WIRELESS POINT TO POINT LINK NETWORK ON 5 GHZ FREQUENCY BAND WITH VOIP

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ABSTRACT

802.11 Wi-Fi technology is commonly used for creating wireless access networks with a maximum range of one hundred meters. With careful planning and proper antennas, this same technology can be used to make point-to-point links up to several kilometers. Since, it is not always feasible and wise to run cables over long distances to connect different networks, therefore, wireless links may turn out to be cost effective alternative to their counterpart wired links while creating long distance networks and providing network scalability. Wi-Fi-based point to point links can thus be used to connect two local area network (LAN) segments, which besides being cost-effective, provides network scalability and other advantages such as high speed, centralized and easier management and high throughput for line of sight (LOS) applications. A Wi-Fi-based point to point link can extend the range of wireless LAN by a few hundred feet to few miles which can further be increased by using highly directional antennas for point to point links, while serving as a backup network in different organizations. So, we have designed a soft private branch exchange (PBX) system for a university campus or organization, facilitating voice over Internet protocol (VoIP) calls and instant messaging, employing the idea of Wi-Fi-based point to point link. Moreover, we have also analyzed the quality of service (QOS) of the given setup in terms of data rate and connectivity using bandwidth test and ping test respectively, for both transmission control protocol (TCP) and user datagram protocol (UDP) scenarios.

KEYWORDS - Wireless point to point link, Soft PBX, VoIP, QOS.
A REVIEW OF AUTOMATIC TEXT SUMMARIZATION

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ABSTRACT

ABSTRACT: Today, the giant information is available on the digital environments. Due to it has hard to get the information what you want to achieve it, fast and most efficiently. For example, if a researcher has a summary of the literature about a topic, this will be much shorter than the duration of the research. From this perspective, automatically occurring the summary of any text, it is very important for those who want to be informed. Text summarization technique is the compression of large document. This paper presents a review of automatic text summarizations’ approaches, studies, software, algorithms, and methods which is written by English, Turkish and some other language in the last decades. Automatic text summarization is generally divided into two systems. There are extraction based summarizations and abstraction based summarizations. Firstly, extractions summarization approach involves selecting sentences of high rank from the document based on word and sentence features. In short, finding the most important sentences from text is performed. Secondly, it is examined the semantic relationships between words and sentences in abstraction approaches. The most important difference from the first approach, made semantic analysis of words and sentences afterward new words are obtained. Mostly, optimization algorithms, genetic algorithms, fuzzy logic systems, machine learning, graph trees, statistics and probability techniques are used in automatic text summarization systems.

KEYWORDS - text summarization, abstraction, extraction
SECURITY EVALUATION OF IOS AND ANDROID

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ABSTRACT

In the race of smartphone operation systems, IOS and Android seems to have big part of pie. Both platforms have grown more enterprise-friendly since about one decade. Their adaptable functionalities make peoples’ life easy and give them a reputation in current competitive technology world. We all have our personal thought it comes to features, usability and design. However, what about security? Mobile devices, smartphone operation systems run on, hold valuable, sensitive and classified information or content. So, that increases their attractiveness as targets for cybercriminals. The security of these devices is a growing concern and focus for smartphone users. Eventually, the security technology of the smartphones becomes one of the prime research and these smartphone vendors have increasingly focused on security in their design efforts. In this paper, factors that influence security within IOS and Android are studied to promote discussion. Security technologies of IOS and Android are briefly presented. And, varies factors are considered such as methods of application distribution, reduced attack surface, privilege separation, permission-based access control, sandboxing, data encryption, data execution prevention and address space layout randomisation, geo-location and auto-erase. Then, brief information is given about malicious apps. Lastly, discussion is concluded to answer that tight question in the light of security models investigation and evidences collected from current life.

KEYWORDS - mobile security, mobile device, mobile OS, IOS, Android
CHEMICAL ANALYSIS PROGRAM FOR THE TIME OF FLIGHT MASS SPECTROMETRY SYSTEM

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ABSTRACT

In this work, we present a computer program that reads, manipulates, analyses and stores the mass spectra obtained by using Laser Time of Flight Mass Spectrometry (L-TOF-MS) system which described elsewhere [1]. This program allows users to record the characteristic parameters of experimental data such as vacuum pressure, voltages, laser power, sample name etc. both manually or automatically. Also, obtained MS spectra can be used to investigate chemical substances (NOx, SOx, organic molecules etc.) or can be used to real time identification of the sample differences for given material database (metal oxides, alloys, paintings, healthy and cancerous tissues etc.) by using different mathematical and statistical procedures (PCA, LDA, kNN etc.) [2]. We have recently presented a simple chemical analysis procedure by starting from reading raw MS data from oscilloscope using TCP/IP protocol and following data processing steps. We have got a great success to reduce the numbers of steps and time duration spend for the following procedure.

KEYWORDS - Mass Spectrometry, Data Acquisition, Data Processing
ROBOTICS EDUCATION BASED ON AUGMENTED REALITY IN PRIMARY SCHOOLS

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ABSTRACT

Robots are located at every stage of our lives with developing technologies. Interest in the field of robotics is increasing every day. There isn’t a course on robotics in primary school curriculum in Turkey. Facilities of educational institutions is limited and primary school teachers is inadequate in robotic. Therefore, many educational institutions aren’t given to students in robotics education. Shown in programming courses in private schools, Lego Mindstorm robot module constitutes awareness in children from early ages. This study aims to increase the interest of children in Turkey to robotics. To improve the students' creativity and motivation, a simple robot design supported with Augmented Reality education related notes have been prepared. A simple model for the implementation of robotics in primary education has been constituted.

KEYWORDS - Robotic, Education, Augmented Reality, Primary School
DS-MAC: DEADLINE SENSITIVE MEDIUM ACCESS CONTROL PROTOCOL FOR DELAY TOLERANT NETWORK BASED MULTIPLE UNMANNED AERIAL VEHICLE SYSTEMS

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ABSTRACT

Fast moving electro-mechanical and wireless communication technologies have made it possible to design and implement multiple unmanned aerial vehicle (multi-UAV) systems which promise more efficient and reliable ways to perform application-specific missions through their simultaneous execution capability and fault tolerant potential. In a typical surveillance-based multi-UAV application, each individual UAV collects required data from its area of interest and transfer it to a ground station (GS) through a shared communication link. In some challenging cases, e.g. in a hostile environment such as battlefield communication, which it is unable to establish and maintain a reliable end-to-end communication link between UAVs and the GS, Delay Tolerant Network (DTN) paradigm which is based on store-carry-forward data delivery technique can be applied. However, in such system, link layer packet collisions may occur because it is quite possible that multiple UAVs may arrive at communication range of the GS at overlapping times and need to transfer their data simultaneously. This paper presents deadline-sensitive medium access control (DSMAC) protocol designed for DTN based multi-UAV systems. The DSMAC protocol provides a non-preemptive medium access scheme in a centralized manner to make the medium free of collisions. The main objective is to enable UAVs to transfer their large amount of surveillance data as fast as possible to the GS by taking deadline-constrained data delivery requirement into consideration. Our protocol differs significantly from commercially available technologies such as 802.11, 3G or LTE in that deadline meeting rate is the main performance metric in our case rather than providing general connectivity and fair medium sharing among large number of UAVs. Simulation studies are conducted by using NS-2. Results show that DSMAC protocol provides considerable performance improvements in terms of average waiting time and deadline meeting rate when compared to PCF (Point Coordination Function) mode of widely used IEEE 802.11 technology.

KEYWORDS - medium access control, delay tolerant networks, multi-uav systems, deadline sensitive
SCRUM MODEL FOR DEVELOPMENT PROCESS OF THE E-UNIVERSITY PORTAL

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ABSTRACT

In this study, it is aimed to improve “e-University” portal by applying Scrum model that is one of the commonly used Agile software development methodologies. The e-University portal is a single system that brings together multiple services are provided by an university through the IT infrastructure, so users will be able to access all the services easily and quickly. The e-University portal infrastructure consists of fast and flexible web services that are based on the principles of the Service Oriented Architecture (SBA). As known, the services offered by an university contain a lot of comprehensive operations. Users of this system are classified as student, academic, officer and administrative staff and these groups are being authorized among themselves. The general and private services that are available to these user groups are gathered under five main headings: social and cultural works, administrative and managerial works, finances, student-oriented works, research and academic works. This study focuses on specifically adapting scrum techniques to the planning, analyzing and design process of developing of the e-University software instead of using heavyweight and long-time traditional software development methods like waterfall model. In essence, Scrum practices provide quick delivery of software parts due to dividing the overall project into small parts and being performed the short development cycle from the design to the test phrase for one small part in a simple, flexible and communication-oriented way. The concepts of Scrum method such as sprint, development team, scrum master, product owner, product backlog, sprint backlog are determined in a appropriate way for this study and all phrases are observed. Thus, developing process of the e-University portal is revealed, the outputs are evaluated and it is shown how Scrum practices could enhance the development of a service-based comprehensive system.

KEYWORDS - Scrum, Agile, e-University
REGRESSION ANALYSIS OF FIRE DOORS RESISTANCE AND COMPARATIVE WITH ARTIFICIAL NEURAL NETWORK APPLICATION

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ABSTRACT

Computer and technological developments are positive influences every aspect of life. Parallel to the developments in technology, artificial intelligence applications, mathematical and statistical models, are widely used in many other fields of the industry. Fire chemical is a dynamic event and does spread very quickly if there is no barrier. Today, fire doors are being used as required in all kinds of buildings. Therefore, it’s vital to determine the fire resistance of different doors for different buildings. This determination should be monitored by the experimental studies. In single and multiple regression equations there is a dependent variable which affects a single or multiple independent variables. Artificial Neural Networks (ANN) are intelligent computer software which mimics human brain’s neural networks, mainly connected through networks and has the ability to discover, creating and deriving new information by way of learning by making generalizations from samples. In this study experiments were conducted to determine the resistance of the fire door. After the experiments a regression analysis (RA) and an artificial neural network model have been developed by using data obtained from experiments. With this regression model (RM) the internal temperature of the fired room which plays an important role in the resistance of fire, doors have been evaluated. In the proposed system, the temperature values of the thermocouples above the door, Top Left, Top Right, Middle Left, Middle Right, Bottom Left, Bottom Right Temperature (°C) and Time (minute) have been taken as input and In-Room Temperature (°C) as output parameters. The results improved by these two approaches were evaluated in comparison with each other. Regression analysis and the results obtained by the artificial neural network have been compared with experimental data. Accuracy was determined as a percentage. Correlation and determination coefficients were calculated and the fire doors resistance determination ability of models have been compared. It has been observed that the developed model of this kind can be safely used in the determination of the fire door resistance.

KEYWORDS - Regression analysis, Artificial neural network, Fire doors, In-Room temperature
ELECTRIC AND ELECTRONICS
DESIGN OF AN AUTOMATED DEVICE PROGRAMMING SYSTEM

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ABSTRACT

The purpose of this study is to design a 3 axis automated programming machine for programming devices such as microcontrollers, EPROMs and CPLDs. While programming numerous devices, an automated system is needed. For his purpose, a prototype system is designed with 3 axis. The system consists of electronics, mechanics and vacuum parts. All of these are controlled by ATMELO's ATMEGA128 8 bit microcontroller using C language. In this study, microcontrollers are programmed which have 44 pins with TQFP package. With some modifications on hardware and software, the designed machine is able to program the devices which have different packages. Thanks to the user interface software, programming results (which of the devices are programmed and which are not) can be seen on PC.

KEYWORDS - Microcontroller, Robotic, Automated Programming
PETRI NETS MODELLING OF A SMART BUILDING AS A CYBER PHYSICAL SYSTEM

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ABSTRACT

In recent years, systems consist of both physical and computational elements, called Cyber Physical Systems (CPSs), have entered into our lives. These systems are becoming increasingly important because of their wide application area such as smart buildings, intelligent manufacturing processes, energy grids, healthcare devices, smart agriculture and etc. In this work, CPSs are considered with their smart building application. Firstly, CPSs are introduced and their features are explained. Then a smart building as a CPSs is considered for emphasizing and illustrating the importance of CPSs. In order to display working mechanism of computational and physical elements of the building, their models are developed via Petri net formalism, which is a mathematical and graphical tool for modelling and analysing discrete event systems. These models provide easy trace of the evaluation of the system. Finally, conclusion and the future work direction are given.

KEYWORDS - Cyber-Physical, Systems, Sensors, Smart, Building, Petri Nets
DEFECTED GROUND STRUCTURE-BASED ULTRA-WIDEBAND TRIANGULAR PATCH ANTENNA

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ABSTRACT

A design of ultra-wideband monopole patch antenna is presented in this study. The design consists of a radiating triangular patch antenna (TPA) fed through a 50 Ohm microstrip transmission line (MTL) and defected ground structure (DGS). The triangular monopole is matched to MTL with inserting a thin strip line. The performance of the proposed antenna is numerically investigated using method of moments (MoM) and verified through measurements. Based on the measured results, the antenna operates over large frequency range of 2.6-18.2 GHz at -10 dB. The proposed antenna has well characteristics in terms of radiation pattern, peak gain and total efficiency across the operating ultra-wideband frequency range. Furthermore, the antenna system is suitable for near-millimetre wave applications, since the operating band reaches to 18.2 GHz.

KEYWORDS - Antennas, patch antennas, antenna designing, ultra-wideband (UWB), defected ground structure (DGS)
REAL-TIME SPEED CONTROL OF BLDC MOTOR BASED ON FRACTIONAL SLIDING MODE CONTROLLER

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ABSTRACT

The design of the system used for brushless DC (BLDC) motor control in speed and position control is difficult due to the non-linear structure. Therefore, the designed controller is required to respond to these challenges and need high-efficiency operation. This paper presents the experimental validation of a robust speed control structure of a BLDC motor based on continuous sliding mode (CSM) and fractional sliding mode (FSM) controllers. The controllers have been tested for low and medium speed reference signals and amplitude values. Then, both controllers have been compared in term of tracking performance and error elimination and the results have been shown graphically. Experimental results prove that the FSM controller shows better trajectory tracking performance than CSM controller with high precision as well as good robustness against changes of references.

KEYWORDS - BLDC motor, continuous sliding mode control, Fractional sliding control, speed control
A COMPARISON OF DIFFERENT PATCH SHAPES EFFECTS ON BANDWIDTH

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ABSTRACT

In this study, a new microstrip patch shape, called Seljuk star, is proposed. The performance of the designed antenna is compared with the performance of square and circular microstrip antennas, which are two other popular patch shapes in literature. The design design procedure consists of two phases: First, the patch dimensions of circular and square are taken as the same with Seljuk star dimension. Then the patch surface areas of antennas are fixed to the area of Seljuk star antenna and patch dimensions are calculated for the new designs. The effect of different patch types on bandwidth are investigated. Rogers Duroid 6010 (h=3.175 mm, $\varepsilon_r=10.2$) is chosen as the substrate of the antennas which are expected to have a bandwidth center at 5800 MHz. All antenna designs are simulated in HFSS. Each individual antenna is intended to be working at a single frequency, but during the simulations multiple resonance are obtained for most of the designs. Therefore, the bandwidth and frequency comparisons are done for each time one by one. In comparison to the circular patch shape with the same surface area, bandwidth is improved 10.57 times. The shift between the theoretical calculations and simulations is % 1.38. Again, this is the smallest shifting between all results. Based on this, it is observed that Seljuk star shape microstrip patch antenna has a better performance than circular and square shape microstrip antennas which have the same dimensions or same surface areas with it. The new, proposed Seljuk star patch shape is believed to have a high potential to be used in future research.

KEYWORDS - Seljuk star, microstrip antenna, HFSS, bandwidth enhancement
REAL TIME APPLICATION OF SLIDING MODE CONTROLLER FOR COUPLED TANK LIQUID LEVEL SYSTEM

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ABSTRACT

In this paper, real time application of a sliding mode control (SMC) is used for level control of experimental setup of liquid level system due to its properties such as robustness against large parameter variation and disturbances rejection. A well-tuned conventional proportional integral (PI) controller is also applied to the two coupled tank system for comparison with the SMC controller. Experimentation of the coupled tank system is realized in two different configurations, namely configuration #1 and configuration #2 respectively. In configuration #1, the water level in the top tank is controlled by a pump. In configuration #2, the water level in the bottom tank is controlled by the water flow coming out of the top tank. The performance of controllers is analyzed according to their tracking performance and error elimination capability for different references applied to the system. Experimental results prove that the SMC shows better trajectory tracking performance than PI controller in that the plant transient responses to the desired output changes have shorter settling time and smaller magnitude overshoot/undershoot. Robustness of the SMC with respect to water level variation and capability to eliminate external disturbances are also achieved.

KEYWORDS - Liquid Level Control System, Sliding Mode Control, Process control, Nonlinear control
ADAPTİVE CONTROLLER DESIGN BASED ON FRACTIONAL ORDER MEMRISTORS

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ABSTRACT

After the memristor, which passive electrical component relating electrical charge and magnetic flux linkage and it was known as lost element since 1971, has been found by researchers in Hp Lab, it has been the focus of attention of researchers. For analysis of the memristor, analog circuit model of memristors is generally used. In this paper, using fractional order a memristor model, fractional order adaptive PI controller has been designed. For performance analysis of the controller, it has applied to control of nonlinear system, and compared classical PI controller.

KEYWORDS - Memristors, Fractional order systems, adaptive controller.
INTEGRATION OF SOFTWARE DEFINED RADIO AND ADD-ON BOARD FOR DIGITAL COMMUNICATION EDUCATION WITH HANDS-ON APPLICATIONS.

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ABSTRACT

Owing to the theory depend heavily on mathematical models in communication lessons, instructors find students lost in all the equations and notations that given. Setting a laboratory component for students to put together the theory with practical implementations is not very easy in many times because it may cost a large number of equipment that is not low-price. Yet there are still some solutions which reduce the cost in designing a real-life communication laboratory and effective in teaching. We present the comparison of NI-USRP Software Defined Radio (SDR) and Emona DATEx Add-on Board on digital modulation techniques that used in communication engineering education. Most commonly used digital modulation techniques Amplitude Shift Keying (ASK), Phase Shift Keying (PSK) and Frequency Shift Keying (FSK) are analyzed in both devices. Both modulations and demodulations of mentioned techniques are done by experimentally. Later, advantages and disadvantages of these two devices in education of communication engineering are stated clearly. Emona DATEx Add-on Board is used with NI ELVIS II+ modular engineering educational laboratory platform. Furthermore, the experiments done by NI-USRP 2922 SDR are realized with developed specific modulation software. By changing the software applications like carrier frequency, modulation index, desired features are monitored on computer screen. Using these experimental concepts with the help of NI-USRPs, Emona DATEx add-on boards and LabVIEW software, students can find the opportunity to experiment the real world signals in communications lessons. Additionally students will concentrate on real design of algorithms and real world communication problems.

KEYWORDS - Software Defined Radio, Communication Engineering Education, Digital Modulation Techniques, USRP, DATEx
WIFI CONTROL OF MOBILE ROBOT MOTION TYPES BASED ON DIFFERENTIAL DRIVE KINEMATICS MODELING APPROACH

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ABSTRACT

Recently, utilization of mobile robots has increased substantially. Accordingly, wireless communication is preferred in mobile robots. QBot 2 is an autonomous ground robot which is a new product of QUARC. The QBot 2 utilizes an onboard data acquisition card and a wireless embedded computer to measure the onboard sensors and drive motors. In this study, QBot 2 mobile robot is evaluated in terms of its ability to maneuver. In this way, controlling QBot 2 mobile robot in real time is planned while a command recognition system is developed. Connection with the QBot 2 is carried out in a wireless environment. A Simulink model is developed in MATLAB® environment. The created model is built with Quarc control software. Compiled model is downloaded with TCP/IP connection to QBot 2 and the application is carried out on an embedded computer. The QBot 2 mobile platform consists of two central drive wheels mounted on a common axis. This drive configuration is known as differential drive. The two drive wheels are independently driven forward and backward in order to actuate the robot. Motion of the wheels is realized using high performance DC motors. When the results are analyzed, 13 different motion types are observed in total. The observed motion types could be used as references in future works since many practical applications, such as the remote control of QBot 2 mobile robot via the human voice, require the availability of different motion types.

KEYWORDS - Intelligent robotic systems, Mobile robots; Wi-Fi based remote control.
RSSI AND FLOWER POLLINATION ALGORITHM BASED LOCATION ESTIMATION FOR WIRELESS SENSOR NETWORKS

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ABSTRACT

Wireless Sensor Networks (WSN’s) have been finding to itself new applications continuously. Many of these applications need location information of nodes. The localization of nodes can be made by range based or range free localization methods conventionally. Angle-of-Arrival (AoA), Time-Difference-of-Arrival (TDoA), Received Signal Strength Indicator (RSSI), Time-of-Arrival (ToA) are well known range based methods. AoA needs angle of received signal, time based methods; ToA needs exact synchronization between nodes, TDoA needs multiple receivers and synchronization between these receivers. Therefore AoA, ToA and TDoA have some hardware and software difficulties for nodes which have limited processing and power sources. However RSSI based localization doesn’t cost high processing resources or complex hardware modifications. Most of the WSN nodes already have RSSI measurement capability. However RSSI measurements is vulnerable to noise and environmental effects. Therefore error of RSSI based localization can be over to an acceptable level. Centroid, APIT, DV-Hop and Amorphous are some of the range free localization methods. Range free methods can only give location information approximately but they don’t need any extra hardware or high processing capability. In this study WSN nodes are assumed randomly or regularly distributed on a certain area. Some of the nodes are beacon nodes. The beacon nodes are assumed as having higher power resources and GPS receivers. The locations of nodes are assumed as fixed. The beacon nodes send their location information sequentially. Localization of nodes are made through RSSI and location information of beacon nodes. The mean of RSSI is calculated to reduce effect of noise on it. A rough location estimation made by weighted centroid. A probabilistic based location estimation is made by using rough estimation of the location. Flower pollination algorithm (FPA) is used to make final decision about the location. The previously estimated location is used to limit search area of flower pollination algorithm in order to reduce convergence time.

KEYWORDS - RSSI, FPA, WSN, Optimization, Probabilistic
CHAOTIC ENCRYPTION BASED DATA TRANSMISSION USING DELTA AND DELTA-SIGMA MODULATORS

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ABSTRACT

Delta and Sigma-Delta modulation methods have been getting a great interest recently due to the great progress in analog-digital very large scale integration technology. Since the outputs of these methods are digital, the data can be securely encrypted using very simple standard hardware. In this work, a chaotic random bit generator based approach for encrypting digital data of the delta and delta-sigma modulators is studied. The chaotic bit generation can easily be implemented in the digital hardware of the modulators due to simplicity of the chaotic dynamics. The randomness of the generated chaotic bits are proved with visual and statistical tests. The security of the proposed approach is evaluated via key space estimation based attacks. The efficiency of the methods is validated with simulations.

KEYWORDS - Chaos, delta modulation, delta-sigma modulation, random bits, cryptography, communication
ADAPTIVE FAULT TOLERANT CONTROL FOR A LIQUID TANK PROCESS

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ABSTRACT

Level control of liquids in coupled tanks is a basic requirement in many industrial processes. Liquid levels in tanks must be controlled accurately regardless of environmental circumstances. Minor faults in sensors, actuators or other system components that take place in processes where liquid level control is required can result in catastrophic consequences. In this case, a fault tolerant control system is needed. The controller must be either robust (passive) or in reconfigurable (active) type in order to compensate for the effect of actuator faults and maintain system reliability and performance. In this study, a water tank level control system and possible valve actuator faults are modelled. By designing different controllers and using modelled failures a simulation is constructed. To test the reconfigurable type controller performance against faults/failures, a model reference adaptive control system is implemented and compared with PI-controlled system.

KEYWORDS - actuator faults, fault tolerant control, fault modelling, model reference adaptive control, liquid tank
SPEECH DENOISING USING COMMON VECTOR ANALYSIS IN FREQUENCY DOMAIN

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ABSTRACT

Signal denoising approaches on data of any dimension largely relies on the assumption that data and the noise components and the noise itself are somewhat uncorrelated. However, any denoising process heavily depending on this assumption retreats when the signal component is adversely affected by the operation. Therefore, several proposed algorithms try to separate the data into two or more parts with varying noise levels so that denoising process can be applied on them with different parameters and constraints. In this paper, the proposed method separates the speech data into magnitude and phase where the magnitude part is further separated into common and difference parts using common vector analysis. It is assumed that the noise largely resides on difference part and therefore denoised by a known algorithm. The speech data is reconstructed by combining common, difference and phase parts. Using Linear Minimum Mean Square Error Estimation algorithm on the difference part, excellent denoising results are obtained. Results are compared with that of the state of the art in well-known speech quality measures.

KEYWORDS - speech, denoising, cva, subspace, frequency domain
DEVELOPMENT OF CASCADE H BRIDGE MULTI LEVEL INVERTER FOR PHOTOVOLTAIC PANELS

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ABSTRACT

In this paper an asymmetrical cascade H bridge based in PV system is proposed and the charge balance control method is used in this inverter in order to equalize the amount of power which drawn from each H bridge to increase the batteries life of the inverter which consider the most important component of the inverter. Also the magnitude of the DC sources is selected in such way that the ACHB MLI is produced more level than SCHB MLI, simulation result in MATLAB 2015 is supported the paper and experimental result of each H bridge is also presented.

KEYWORDS - MLI (multi level inverter), PV (photo voltage), ACHB (asymmetric cascade H bridge), SCHB (symmetric cascade H bridge)
DIRECT DIGITAL FREQUENCY SYNTHESIZER DESIGNS IN MATLAB

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ABSTRACT

This study presents the structure of the Direct Digital Frequency Synthesizers (DDFSs) which have several advantages compared to conventional synthesizers such as high frequency, fast switching speed and low power dissipations. In order to lessen the physical area and power dissipation, ROM compression techniques are applied in designs. Bipartite Table Method (BTM) and Multipartite Table Method (MTM) are utilized in this study because of the fact that they provide high compression rates. By using MTM, the compression rates of 157.54:1, 726.71:1 and 3463.29:1 are obtained at 58.40 dB, 75.30 dB and 84.66 dB SFDR levels, respectively.

KEYWORDS - DIRECT DIGITAL SYNTHESIS, DDFS, CORDIC, BTM, MTM, MATLAB
ANALYSIS AND DESIGN OF AN AXIAL FLUX CORELESS PERMANENT MAGNET SYNCHRONOUS GENERATOR WITH SINGLE STATORS AND DOUBLE ROTORS

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ABSTRACT

In this study, permanent magnet axial-flux coreless synchronous generator is designed as single stators and double rotors and its electromagnetic and structural characteristics are analyzed. Core is not been used in the stator of the machine intended to be designed. Aim of this study is to provide reduction of iron loss. Moreover, easiness in the production stage of the machine is provided. Three-dimensioned electromagnetic analysis of the designed machine has been done through the finite element method and transient solutions are suggested based on this. Within this study, arrangements have been made depending on certain standards in order that permanent magnets and coils obtain direct alternating current. The designed new axial-flux generator move as permanent speed of 500 rpm and so maximum voltage of approximately 100 V per phase is obtained. Furthermore, this machine does not need a gear system due to its design structure.

KEYWORDS - Axial-flux generator, Permanent magnet, Generator, Single stator, Double rotor
EKF BASED GENERALIZED PREDICTIVE CONTROL OF NONLINEAR SYSTEMS

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ABSTRACT

In this paper, Autoregressive with exogenous input (ARX) and dynamic neural network (DNN) based generalized predictive control (GPC) methods are designed to control of nonlinear systems. ARX and DNN models adaptively approximate the plant dynamics and predict the future behavior of the nonlinear system. While control process goes on, the poles of the ARX and DNN models are constrained in a stable region using a projection operator for structural stability. Simulation results are given to compare the tracking performances of the methods. ARX-GPC and DNN-GPC both yield good tracking performances while keeping the changes in control signal as low as possible. The simulation results show that even though ARX is a linear model, it provides acceptable tracking results as well as DNN model.

KEYWORDS - ARX, dynamic neural network, Kalman filter and extended Kalman filter, nonlinear systems and adaptive learning rate, generalized predictive control
SEPARATION OF WHEAT SEEDS FROM JUNK IN A DYNAMIC SYSTEM USING MORPHOLOGICAL PROPERTIES

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ABSTRACT

Wheat is the main food source of the humankind. After its harvest, it goes through many procedures from its separation from chaff to its packaging. With the development in technology, many of these procedures are realized with automatic systems which saves the manufacturer the cost of labour, time and provides the customer with more quality food. One of the main concerns of quality food production is to provide a customer with the product in its purest form which means the product must be separated from all foreign matters. In this study, type-1252 durum wheat seeds have been separated from junk using the morphological properties of wheat seeds through the uncompressed video image taken with the camera Prosilica GT2000c. The main references for the quality measurement of wheat seeds are the shape and the dimensions of a wheat seed. Aiming for high quality wheat grain storage with no junk, this article has adopted various image processing techniques from image preprocessing to feature extraction. The image processing has been realized in a computer environment and the results show that the image processing was successful and the detection of wheat seeds from junk was accurate. Keywords— Wheat Seed, Junk, Morphological Properties, Image Processing, Segmentation, Blob Analysis, Feature Extraction

KEYWORDS - Wheat Seed, Junk, Morphological Properties, Image Processing, Segmentation, Blob Analysis, Feature Extraction
PROPOSAL AND ANALYSIS OF A NEW SPECTRUM SENSING ALGORITHM FOR COGNITIVE RADIO DRIVEN HOSPITALS

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ABSTRACT

Wireless technology is the key technology to eliminate the dense wire ropes from hospitals and far access to medical devices. In order to overcome the problem of bandwidth scarcity, cognitive radio driven hospitals are introduced and devices are divided in two categories. The first category is primary devices and the second one is secondary devices. Primary devices has very high priority and their communication is vital for the hospital and patients, so that no interference should be made with such devices. Secondary devices are the ones which has lower priority and they can wait until the primary devices do their communication and then, they begin to use the allocated spectrum. One of the key functions to assure that there will be no interference is a reliable spectrum sensing method. This method should be a simple one to be able to implement it in the secondary devices. Among all of the sensing methods, energy detection (ED) based spectrum sensing is very popular. In order to improve the performance of ED, double threshold ED (DTED) method is introduced in literature. In this paper, a new algorithm is introduced for improving the performance of DTED considering previous sensing period results in detection procedure by using a memory stick. Memoryful DTED (MDTED) improves the performance of DTED considerably by only the cost of delay in secondary devices communication which has less value than the improvement of the detection method performance.

KEYWORDS - wireless technology hospitals, cognitive radio driven hospitals, spectrum sensing, energy detection, double threshold energy detection, memory.
LEAN SIX SIGMA APPLYING TO REDUCE THE MAINTENANCE TIME IN POWER PLANTS

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ABSTRACT

This paper aimed to illustrate the use of the Lean Six Sigma (LSS) methodology in power plants maintenance. LSS has become the indeed method for process performance improvement in many industrial companies and LSS has been gradually increasing its acceptance in electric power generating that confronts challenges, such as, how to decrease maintenance time, increase quality, better use resources etc. Consequently, the quality of any process may be enhanced by utilizing Lean Six Sigma in any climate and it has the potential to offer a useful approach in term of improving quality and reducing costs. Lean shows us an exclusive method that helps identify possible improvement areas. The study includes the plant maintenance cycle time from request writing to work finished. Improvement opportunities were identified from a high level value road map. The Define, Measure, Analyses, Improve and Control (DMAIC) approach was applied to treat the identified opportunities for improvement. The result shows that the maintenance time was reduced from 180 days to 95 days.

KEYWORDS - Lean Six Sigma, maintenance Time, DMAIC, CTQs, DPMO
COMPARISON OF PILOT BASED AND SEMI-BLIND CHANNEL ESTIMATION TECHNIQUES IN MULTIPLE INPUT MULTIPLE OUTPUT COMMUNICATION SYSTEMS

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ABSTRACT

Multiple input multiple output-orthogonal frequency division multiplexing (MIMO-OFDM) which has high spectral efficiency is the key technology of today’s wireless communication systems. In order to overcome the adverse effects of multipath fading in mobile communication channels, channel estimation must be performed. Channel estimation algorithms can be grouped into three categories as pilot based, blind and semi-blind. In pilot based channel estimation, some of data symbols are used to estimate channel. In blind channel estimation statistical properties of channel are used. In semi-blind channel estimation information from both data symbols and statistical properties is utilized. In this study, pilot and semi-blind channel estimation are used to estimate the channels with various frequency and time selectivity. Two dimensional pilot based channel estimation is performed using rectangular pilot placement. Semi-blind channel estimation is done by using independent component analysis (ICA). In simulations; 20MHz band width, ITU indoor and vehicular channels, 10 Hz and 200 Hz Doppler frequency, 2x2 MIMO structure and 1024 subcarriers are used. The results show that if the channel to be estimated is frequency selective and SNR>25dB, semi-blind channel estimation technique can be used instead of pilot based channel estimation technique which allows less pilot usage and consequently enhanced more bandwidth efficiency.

KEYWORDS - MIMO-OFDM, pilot based, semi-blind, channel estimation, ICA
SHORT CIRCUIT ANALYSIS IN ISLAND MODE USING ETAP

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ABSTRACT

The requirement of power is very much essential for the development of any country. The simulation and short circuit study of an electrical power system is performed on Electrical Transient Analyzer Program (ETAP). The output of short circuit studies are helpful in order to determine system configuration, protection equipment, system voltage levels, cables size, and switchgears, transformers and grounding. ETAP short circuit analysis software analyzes the effect of 3-phase, 1-phase, line-to-ground, line-to-line, and line-to-line-to-ground fault currents on electrical power systems. In this research, we selected a city where a national network connected with four distributed generation. This distributed generation was operated depending upon solar energy, wind power, waterpower and natural gas. In the normal case, the national network operates in parallel with the solar station and the wind station to feed all loads in the city. But, in the case of national network outage from city, we feed only task loads in the city in island mode through these four distributed generation. With priority given to the work of the stations, the stations operates at the least cost of operating condition. Short circuit analysis can be done for the two cases mentioned above.

KEYWORDS - Short circuit, ETAP, Distributed generation, Island mode, Gird.
SHORT TERM LOAD FORECASTING BASED ON ABC AND ANN FOR SMART GRIDS

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ABSTRACT

Short term load forecasting is a subject about estimating future electricity consumption for time interval from one hour to one week and it is vital importance for operating of a power system and smart grids. Especially in liberalized energy markets, this process is a mandatory for distribution companies and big electricity consumers. Electricity generation plans are made according to the amount of electricity consumption forecasts. If the forecast is overestimated, it leads to the start-up of too many units supplying an unnecessary level of reserve and therefore the production cost is increased. On the contrary if the forecast is underestimated, it may result in a risky operation and consequently power outages can occur at the power system. In this study, a hybrid method based on the combination of artificial bee colony (ABC) and artificial neural network (ANN) is developed for short term load forecasting. ABC algorithm is used in ANN learning process and it optimizes the neuron connections weights of ANN. Historical load, temperature difference and season are selected as model inputs. While three years hourly data is selected as training data, one year hourly data is selected as testing data. The results show that the application of this hybrid system produce forecast values close to the actual values.

KEYWORDS - Artificial bee colony algorithm, Artificial Neural Networks, Short-term load forecasting, hybrid method, smart grids
A COMPARISON OF THE PROGRAMMES USING FINITE ELEMENT SOFTWARE IN ELECTRICAL MACHINE DESIGN

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ABSTRACT

Electrical machines technology has become too dependent on finite element programs in our time. In this study, three programs that are sold commercially are compared over a 4-poles asynchronous machine of 1.1 kW. With this comparison, it is investigated how close the values obtained by convenience, appearance, integration and, in particular, torque calculations with the real values will be. For this, the mechanical torque value of the machine is obtained first by using the machine’s foreknown geometrical parameters and electrical parameters found by tests. Then, the magnetic flux line and density distribution and the obtained reluctance / real torque values are compared between FEM programs.

KEYWORDS - Finite element method (FEM), Ansoft /Maxwell, Cedrat /Preflu, Ansys, Ansys Workbench, Induction Machine
MEASUREMENT AND COMPARISON OF SIGNAL LEVELS OF GSM900, GSM1800 AND UMTS BANDS

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ABSTRACT

Signal levels of GSM900, GSM1800 and UMTS bands were measured as mobile on the main streets in the city center of Diyarbakır at the same time and route during a week. The measurements were performed by using high precision and portable spectrum analyzer with an isotropic electric field antenna and a laptop. The high precision spectrum analyzer is a device that measures the high frequency electromagnetic fields. The isotropic electric field antenna allows a three axis measurements. The laptop was used to record and analyze the measurement samples. Electric field strengths were measured as signal levels in this study. Some statistical parameters such as standard deviation and variance were calculated with 95% confidence interval for measurement samples. The highest signal levels were measured as 3.8580 V/m for GSM 900 band, 2.9440 V/m for GSM1800 band and 6.0900 V/m for UMTS band during a week. Similarly, mean electric field strength values as average signal levels were calculated as 0.4985 V/m for GSM 900 band, 0.2350 V/m for GSM1800 band and 0.6281 V/m for UMTS band. According to mean electric field strength values, the average signal levels of three bands were ranked as UMTS, GSM900 and GSM1800 from the largest to the smallest, respectively. The highest variation in standard deviation and variance was observed on Wednesday for GSM900 and UMTS bands and Thursday for GSM1800 band.

KEYWORDS - Signal level, Electric field strength, GSM, UMTS, Statistics
A COMPARISON STUDY ON PERFORMANCE INVESTIGATION OF SPEED ESTIMATION METHODS FOR THE SENSORLESS DTC BASED AC DRIVES

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ABSTRACT

This paper presents a practical comparison study on the speed estimation methods for induction motors by using Direct Torque Control in terms of their estimation performances especially at startup. Simulation and experimental test studies on various operations characteristics are achieved and presented together with the evaluations. The estimation techniques are compared in terms of their capabilities of speed tracking and sensitivities for each operation condition. It is concluded that at startup operation and in steady state behavior, dynamic performance of Model Reference Adaptive System (MRAS) is more stable and effective than sliding mode observers and open-loop estimators. However, open-loop speed estimation method has better performance than the others. Dynamic performance of the speed estimators in DTC control algorithm are tested in a laboratory setup. System configuration includes a low cost STM32F407VG Discovery board used for the implementation of the control algorithm, three-phase power inverter which is designed for this purpose and industrial type of 11 kW induction motor.

KEYWORDS - Speed Estimation, Sensorless Control, Direct Torque Control, AC Drives, Sliding Mode Estimator, MRAS, Open-Loop Estimator, Performance Investigation, Induction Motors
HIGH GAIN, DIRECTIONAL AND TRIPLE BAND RECTANGULAR MICROSTRIP ARRAY ANTENNA DESIGN

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ABSTRACT

In this study, used in GSM1800, Wi-Fi and WiMAX applications, high gain microstrip line feed 2 x 1 patch array antenna design work was done. Antenna simulation of this antenna design made using HFSS 3D gain and directivity characteristics were simulated. Since antenna impedance is greater than line impedance, impedance matching has been made with inset – fed microstrip line and the quarter-wavetransformer. The results show that the proposed antenna parameters are sufficient for GSM1800, Wi-Fi and WiMAX applications.

KEYWORDS - 2x1 linear array antenna, gain, directivity, microstrip antennas, GSM1800, Wi-Fi, WiMAX
DEVELOPING FUEL MEASUREMENT SYSTEM FOR LIQUID FUEL ENGINES

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ABSTRACT

For the off-road machines, earth movers, tractors and the other construction equipment in the activity areas such as transportation, construction, agriculture, etc., to be worked is performed by using the engines which works with liquid fuel. Fuel consumption is an important factor in operating this machines in an effective way. For this reason, the fuel consumption in thermic engines works with liquid fuel must be demonstrated to the consumers with a high accuracy and correct. For years, different measurement methods and systems with specific advantages for the determination of the fuel consumption value are being worked on to be developed. In this study, in both practically and scientific and innovative studies, a fuel consumption measurement system was developed to use in fuel consumption measurements of engines works with liquid fuel. The success of the measurement system was tested on the liquids with different properties and five different viscosities. In the result of the experiments the coefficients of determination (R2) were found bigger than 0.95 on all liquids. The system resulted so fast and accurate that there was no need for any complex calibration and adjustment processes. With the developed fuel measurement system, a continuous measurement was successfully done without any need to additional procedure. Developed system has the advantage of fast and accurate data transferring to the computer (evaluation environment) via RF (Radio Frequency) modules. Because of this advantage, the fuel measurement system can be used can be used in the lab tests and applications which are being done to determine the performance of engines works with liquid fuel.

KEYWORDS - Fuel Consumption, Liquid Fuel Engines, Microcontroller, RF Module, Flow meter
MONITORING THE SIGNAL STRENGTH OF CELLULAR SYSTEM OPERATORS ON A UNIVERSITY CAMPUSS

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ABSTRACT

Some recent customer surveys on cellular system (CS) operators show that a high level of satisfaction is strongly correlated with signal strength. Therefore CS operators must improve the provided signal quality in order to meet customers’ demands and fulfill the requirements determined by Information and Communication Technologies Authority of Turkey (ICTA). In this study, measuring the signal strengths of existing three operators (named as A,B,C) in Turkey for 2G, 3G and 4.5G systems on a specific route on OMU Kurupelit Campus, transferring them on a map, and having foresight on needed improvements/enhancements are aimed. For this reason, the synchronized measurements were performed using nine same brand and model smartphones with “Android” operating system and “Netmonitor” application. Drive test measurements were conducted the busiest times of a day, at a speed of 30km/h, during 25min. with 5sec. intervals. It is seen from the measurements that the received signal strength can change depending on the location, frequency, line of sight, and base stations’ output power. 2G signal strengths are significantly higher than 3G/4.5G. Considering all operators; the signal strengths vary from -51dBm to -87dBm for 2G, while from -51dBm to -103dBm, and from -67dBm to -130dBm for 3G and 4.5G respectively. The average signal strengths of 2G, 3G and 4.5G are -65.97dBm, -80.01dBm and -94.52dBm. The quality of signal is higher than the minimum limit (<-100dBm) determined by ICTA for 2G at all measurement locations. However, for 3G lower than the limit at 8.33% of all measurement locations for operator C while for 4.5G 69.71% for operator A. The main reasons of having that much lower signal strength for 4.5G are establishment on 01/04/2016 and inadequate base station. The lower/higher signal strength locations, and the regions required enhancement, and the operators to improve their signal quality are determined for 2G/3G/4.5G systems.

KEYWORDS - Cellular System; Signal Strength; Drive Test Measurement; Netmonitor.
LINE OF SIGHT LOS PROBABILITY PREDICTION FOR SATELLITE AND HAPS COMMUNICATION IN TRABZON TURKEY

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ABSTRACT

The knowledge of Line of Sight (LoS) probability is curicial to estimate signal attenuation correctly in mobile wireless communication. Especially in built-up areas, more accurate LoS probability determination helps to obtain more realistic propagation models or path loss models. Geographic Information Systems (GIS) and City Information Systems (CIS) are used to provide a necessary data to calculate the LoS probability. In this study, LoS analyses are made via Arcgis software for the most well-known streets in Trabzon, Turkey. For these analyses, the Earth's surface is accepted as flat and a simple geometrical approach is used for calculations in this paper. A Matlab algorithm was created to calculate LoS probability depending on the elevation angle which is an important parameter for satellite services. LoS probability vs. elevation angle is presented for interested streets. As a result, LoS probability for Trabzon dependent elevation angle is estimated and presented.

KEYWORDS - Line of Sight(LOS), LOS probability, Wireless Communication, ARCGIS, ARCMAP, GIS, CIS, Elevation angle, Matlab.
PERFORMANCE COMPARISON OF PSFB-PWM CONVERTER AND LLC RESONANT CONVERTER FOR ON-BOARD ELECTRICAL VEHICLE BATTERY CHARGER

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ABSTRACT

This work presents a performance comparison of PSFB converter and LLC resonant converter for on-board electrical vehicle (EV) battery charge applications. In the comparison, lithium-ion battery cells are taken into consideration to evaluate the design of converters because of their high power density. Performance comparison is discussed based on wide range output voltage regulation which is required for lithium-ion battery cells. The battery charge process has two operation modes which are constant current mode and constant voltage mode. Therefore, in the performance evaluation, the soft switching operation of the primary semiconductors for both converter is evaluated in detail based on that operation modes. The output voltage increases during the constant current mode and the output current decreases when the battery reaches its maximum voltage value. For the evaluation 14 series lithium-ion battery cells are assumed. Thus, with this assumption, the output of battery package is 43.4-53.9 V / 15 A. To provide output requirements, soft switching performance of both converter theoretically analyzed and also obtained results are validated experimentally by two prototypes, operating with 1 kW output power. Experimental results are obtained in good match with theoretical results. According to obtained results, in the constant current mode, PSFB converter works with soft switching from 50 V to 54 V output voltage at 200 kHz switching frequency. LLC resonant converter works with soft switching from 42 V to 54 V but with changing switching frequency between 150 kHz and 200 kHz. In the constant voltage mode, PSFB converter works with SS from 53% load to full load condition while LLC resonant converter works with SS for all load conditions.

KEYWORDS - Electrical Vehicle Battery Charge, PSFB Converter, LLC Resonant Converter
A SIMPLE AND EFFICIENT APPROACH TO COMPUTE THE OPERATING FREQUENCY OF ANNULAR RING PATCH ANTENNAS BY USING ANN WITH BAYESIAN REGULARIZATION LEARNING ALGORITHM

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ABSTRACT

An annular ring patch antenna (ARPA) constructed by loading a circular slot in the center of the circular patch antenna is a popular microstrip antenna due to its favourable properties. In this paper, an application of artificial neural network (ANN) using bayesian regularization (BR) learning algorithm based on multilayer perceptron (MLP) model is presented for computing the operating frequency of annular ring ARPAs in UHF band. Firstly, the operating frequencies of 80 ARPAs having varied dimensions and electrical parameters were simulated with IE3DTM packaged software based on method of moment (MoM) in order to generate the data set for training and testing processes of the ANN model. Then ANN model was built with data set and while 70 simulated ARPAs and remaining 10 simulated ARPAs were employed for ANN model training and testing respectively. The proposed ANN model were confirmed by comparing with the suggestions reported elsewhere via measurement data published earlier in the literature. These results show that ANN model with BR learning algorithm can be successfully used to compute the operating frequency of ARPAs.

KEYWORDS - Annular ring patch antenna, operating frequency, artificial neural network, bayesian regularization learning algorithm
CONTROL OF A THREE-PHASE BOOST RECTIFIER FOR HIGH-SPEED BLDC GENERATORS USED IN FLYWHEEL ENERGY STORAGE SYSTEM

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ABSTRACT

There are two regions in the orbital path of the satellite such as dark and bright region. The energy is provided by solar panels in the bright region and by flywheel energy storage system (FESS) in the dark region. Brushless dc motor (BLDC) are extensively used in satellite power system as motor and generator. Also, these motors are preferred in the FESS due to the low weight, high power density, high efficiency and high speed. The voltage is obtained by BLDC motor in the generator mode and generated voltage is must be constant a value. The FESS speed and the BLDC motor phase voltage are reduced in the dark region. Therefore the voltage regulation is provided by using the boost converter in the generator mode. Boost converter is designed by using the three phase inverter which used as BLDC motor driver in the bright region. Information of the hall-effect sensors are used to the voltage regulation of BLDC generator. In this paper, sensorless control method was proposed in order to regulate the voltage of the satellite power system. The performance of the proposed method has been demonstrated by using the Matlab/SimPowerSystem blocks.

KEYWORDS - BLDC generator, Flywheel, Energy storage, Three-phase boost rectifier
MEASUREMENT AND EVALUATION OF ELECTROMAGNETIC POLLUTION IN SAMSUN CITY CENTER BEFORE AND AFTER DEPLOYMENT OF 4.5G

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ABSTRACT

In parallel with technological developments, there has been a dramatic growth in the use of cellular systems which based on base stations. Because each base station is an electromagnetic radiation (EMR) source, exposed EMR levels have increased day by day. There are around 100,000 base stations in Turkey right now; it is estimated to be 130,000 with 4.5G systems established on 1 April 2016. Because there is a growing number of base stations being placed into crowded places; measuring, evaluating, the levels of EMR and controlling their compliance with limit values has become more crucial than before. In this study, to evaluate the effects of newly established 4.5G system on EMR levels, EMR measurements were performed in Samsun before and after 1 April 2016. The measurements were conducted at 67 different locations using PMM 8053 EMR meter. The total EMR in the band between 100 kHz - 3GHz was measured twice a month before/after 4.5G, and named as M1, M2, M3, and M4 respectively. For each measurement, the maximum and average electric field strengths (E_{max}, E_{avg}) were recorded. The measurements show that E_{max} is 6.32 V/m while the maximum E_{avg} is 1.64 V/m, which are both below the limits that are determined by ICNIRP and ICTA. In order to compare the strengths of relationship correlation coefficients are calculated as 0.6278 and 0.9056 between M3 and M4 for E_{max} and E_{avg} respectively which is considered as strong. The mean of E_{max} and E_{avg} are 1.2111V/m, 0.2632V/m before 4.5G, and 1.8449V/m, 0.2925 V/m after 4.5G respectively. As seen from the results the deployment of 4.5G yielded up to 52% increase in E_{max} while 11% in E_{avg} values. Because E levels are likely to increase over forthcoming years, and exceed the lower limits (4 V/m) applied by some countries e.g. Switzerland and Italy.

KEYWORDS - Electric field strength; electromagnetic (EM) measurement; EM pollution; statistical analysis.
CLASSIFICATION OF DIGITAL MODULATION SIGNALS WITH TIME-FREQUENCY TEXTURE FEATURES AND SUPPORT VECTOR MACHINES

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ABSTRACT

Abstract—Automatic Modulation Classification (AMC) is carried out as a basic structure between signal detection and demodulation types. Detection of modulation type of a received signal is a challenging task in communication environment. Recently, AMC has gained a paramount importance especially in cognitive radio applications. Most of the AMC methods assume that additive white Gaussian noise contaminates the received signal. There might be degradation in the performance of the traditional modulation classification methods in the impulsive noise condition. In this study, firstly the digital modulation signals are transformed into t-f domain by Short Time Fourier Transform (STFT) and then by the Spectrograms of STFT are used to obtain the t-f images of digital modulation signals. We then use Gray-Level Co-occurrence Matrix (GLCM) method which includes some statistical texture recognition techniques as a feature based AMC. Finally, we use the Support Vector Machines (SVMs) classification technique for classifying the digital modulation types. We use 0, 5 and 10 dB noise levels, respectively. We implement the proposed scheme on MATLAB. QAM, 16-QAM, 32-QAM, 64-QAM, BPSK and 8-PSK signals are considered in the experiments. The method we propose achieves the classification with having very little performance loss in impulsive noise condition compared to the Gaussian noise condition. Keywords—Automatic Modulation Classification, Statistical Texture Recognition, Support Vector Machines.

KEYWORDS - Digital modulation recognition, statistical texture features, Support Vector Machines
THE MINIMIZATION OF TORQUE RIPPLES OF SEGMENTAL SWITCHED RELUCTANCE MOTOR BY PARTICLE SWARM OPTIMIZATION

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ABSTRACT

In this study, we realized a controller design which can reduce torque ripple of 10/8 Switched Reluctance Motor (SRM). To perform the study, a Switched Reluctance Motor with 5 phase, U type segmental rotor was used. The control of the SRM was actualized by bipolar converter used H-bridge topology. The control signals of converter are obtained by control circuit designed by using dsPIC33EP512MU810. One of the reasons of the current ripples in the SRM is ON-OFF times in a period of the control signals. When the ripples of the current reduced, the oscillations of torque of the SRM also reduced. Therefore, in this study, the ON-OFF times in a period of phase control signals were determined by an algorithm used particle swarm optimization. When ARM was controlled by this algorithm developed, the decreasing of its torque ripples was determined.

KEYWORDS - Segmental Type Switched Reluctance Motor, H-Bridge Converter, dsPIC33, Torque Ripple, PSO
OBSERVER DESIGN FOR THE HODGKIN-HUXLEY NEURONAL MODEL

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ABSTRACT

Hodgkin-Huxley (HH) neuronal model has been widely accepted neuronal model in neuroscience. The variation of the ionic currents in neuron cell causes the variations in the membrane potential. The level of membrane potential indicates the activation and inactivation dynamics. In this paper, in order to observe the unmeasurable states and parameters of HH neuron accurately, Runge-Kutta discretization based nonlinear observer is designed. In numerical simulations, the membrane potential is measured and the ionic currents are estimated. The numerical results provide accurate estimation results that can be used both in monitoring and control of neuron dynamics.

KEYWORDS - Nonlinear observer design, Hodgkin-Huxley neuronal model, Sliding-mode observer, Discretization based gradient observer, Extended Kalman Filter
MICROPROCESSOR BASED ANTENNA RECONFIGURATION CONTROLLER FOR 5G COMMUNICATION SYSTEMS

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ABSTRACT

In order to cover wide spectrum with high antenna gain, the reconfiguration process may be proposed as an alternative solution instead of using several antennas which is not efficient considering the size restriction situation. In this study, a microprocessor based antenna reconfiguration controller circuit is designed and fabricated. Designed circuit can be used to reconfigure the antenna frequency, pattern or polarization for the possible 5G communication requirements. Proposed antenna reconfiguration controller has the ability of switching selected PIN diodes in order to cover the desired frequency bands.

KEYWORDS - Antenna reconfiguration, 5G communication
SIMULINK MODEL FOR PIECE WISE LINEAR APPROXIMATION OF MEMRISTOR

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ABSTRACT

Memristor is a passive circuit element which firstly presented to science world by Leon Chua in 1971. In his paper, Chua showed missing link among four fundamental circuit variables which generate basic passive circuit elements. Chua described missing link between charge and flux, named it as memristor. Memristor as the name is derived from combination of memory and resistor words. Theoretically, it has a memory feature that protects final value even power cut off over it. Also, it has a kind of resistance equation which is derived by charge and flux relationship. Due to these two properties, it is called memristor. It characterized by memristance and has electrical unit ohm. The current-voltage characteristic of memristor is the form of a hysteresis curve. Memristor has a memristance value according to voltage or current applied to it and when energy cut off over memristor which retain its last state until energy comes back. When energized again, it continues memristance value in recent memory. Memristor firstly realized by Stanley Williams and his team from HP (Hewlett Packard) research laboratories in 2006. In this study, doped and undoped TiO\textsubscript{2} are sandwiched between two Pt layers in nano scale. And this element demonstrated voltage-current characteristic like memristor. Physically implementation of memristor is announced with a paper to science world in 2008. The studies about memristor have quite increased along with this paper. In this study, a new PWL (PieceWise Linear) memristor model is obtained thereby linearizing current-voltage characteristic of memristor. The equivalent circuit is derived from this model, built in Simulink and results are observed. The results are compared with other studies in literature and obtained results have been shared.

KEYWORDS - Equivalent circuit, Memristor, PWL model, Simulink model
NEUROSKY EEG BIOSENSOR USING IN EDUCATION

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ABSTRACT

Brain is composed by neurons using electricity to communicate to each other. There is a great amount electrical activity in the brain due to collection of numerous neurons sending signal. Neurons send brainwaves detected by sensitive equipment like electroencephalogram or electroencephalograph (EEG). Beta waves emanates from brains responsible for problem solving or decision making. Some equipment like neurosky biosensor intercepts these brain waves. In this study, neurosky biosensor is used in measuring the meditation level of students in the physics course. Developed program process the data of neurosky biosensor sent and make decision about meditation level of student in the course. Program says that “your meditation level is low to pass another subject or solve the exam”.

KEYWORDS - EEG, neurosky, education, neurolearning, brainwaves
COMPARISON OF TWO DIFFERENT POWER CONTROLLERS FOR GRID TIED DISTRIBUTED GENERATION SYSTEMS

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ABSTRACT

In this study, modelling and simulation studies of DG based fuel cell (FC) and solar cell (SC), connected to the common direct current (DC) bus system to provide energy for various loads. In order to synchronising of energy sources with grid, using three-phase phase locked loop (PLL) technique based park transformation which is one of the most common methods in literature. Power control methods based dq/abc synchronous reference frame (SRF) or proportional resonant (PR) are used in the DG systems. The performances of two controllers are discussed in this paper. Simulation results are obtained for various scenarios at the designed and created simulation model of DG+Grid+Load system. The system is modeled and simulated by using PSCAD/EMTDC software package.

KEYWORDS - Distributed Generation, Renewable Energy Sources, PLL, Synchronous Reference Frame, PR controller
RESIDUAL LSF VECTOR QUANTIZATION USING ARMA PREDICTION

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ABSTRACT

In this work, a residual LSF vector quantization is proposed for designing codebooks at very low bit rates, where residual vectors are obtained from an Auto Regressive Moving Average (ARMA) prediction. Proposed quantizer is embedded into a multi-stage vector quantization system and the corresponding multiple codebooks are designed accordingly. For each codebook, the effectiveness and quality are investigated by calculating the spectral distortion and outliers. The proposed quantization method has resulted in a reduced distortion without additional complexity.

KEYWORDS - Very low bit rate, vector quantization, residual vector quantization
SIMPLIFIED MINLLR EARLY STOPPING CRITERION FOR BELIEF-PROPAGATION BASED POLAR CODE DECODERS

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ABSTRACT

Polar code is one of the major breakthroughs in information theory field by its theoretically proven capacity achieving error correction property and low encoding, decoding complexities. Since Arikan submitted his original paper, researchers have made many improvements on both decoding and encoding sections. Successive cancellation (SC) and belief propagation (BP) is widely used decoding algorithms for polar codes. To reduce the complexity of BP decoder, early stopping methods are studied in literature. In this paper we simplify early stopping method for BP decoder by using channel polarization phenomena and we reduce the complexity of early stopping section by observing only a small cluster of information bits which are polarized to the highest error probabilities. Simulation results shows that early stopping detection algorithm needs to observe only \( n/8 \) bits instead of \( n \) for considered code length and rates without any performance loss and faulty early stopping detection.

KEYWORDS - Polar code, belief propagation decoder, early stopping detection
LOW NOISE HIGH GAIN WIDE BANDWIDTH FOLDED CASCODE CMOS OP AMP BASED ON BIASING CURRENT TECHNIQUE FOR ECG SIGNAL APPLICATIONS

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ABSTRACT

This paper presents low noise, high voltage gain (Av), and wide bandwidth (GW) CMOS folded cascade Op-Amp. The strategy used for improving the input referred noise of the proposed CMOS operation amplifier based on maximizing the value of the small-signal transconductance (gm) of MOSFET transistors. This strategy can be achieved using a large DC bias current. For testing the operation of the proposed CMOS op-amps, Electrocardiogram (ECG) signal used as input signal with 2mV peak to peak value and 200Hz frequency. PSPICE (version 16.6) used for simulation the proposed CMOS OP-AMP with 0.18µm channel length. The simulation results with 10µA DC biasing current showed that, the value of DC power consumption is 0.296mW, the input referred noise is 67.003nV/√Hz, THE Av=13.6dB, 203KHz. The simulation results of the proposed CMOS op-amp with 100µA DC biasing current consumes DC power around 1.002mW and exhibits a lower input referred noise of 16.119nV/√Hz, the voltage gain is 51.4dB and GW is 10MHz. The simulation results confirmed the theoretical calculations and verified very good noise performance of the proposed CMOS OP-AMP.

KEYWORDS - CMOS analog integrated circuit, design CMOS OP-AMP, low-noise OP-AMP, ECG signals data acquisition circuit.
ACTIVE FILTER DESIGN USING CUCKOO SEARCH ALGORITHM

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ABSTRACT

In this paper, Cuckoo search optimization algorithm is used for standard component value selection for active filters by means of fitness function and constrains in order to facilitate design tasks for designer. Conventionally after designers solve circuit, they select the nearest standard values of components, which are available in the market, instead of calculated one. However, this process causes design errors which have to be recalculated. From this perspective, unlike conventional method, Cuckoo Search uses a set of solution, which is discreet component values, and fitness function to minimize the error. As a result of this work, Cuckoo Search algorithm has been successfully implemented to this filter design process for searching the optimum discreet component values of the solution space.

KEYWORDS - cuckoo search, filter design, optimization
THE STATE AND MOMENTUM EQUATIONS OF A NEW TYPE FIVE PHASES SEGMENTAL SWITCHED RELUCTANCE MOTOR

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ABSTRACT

In this study, the mathematical equations of five phase segmental switched reluctance motor (SARM) was established by using basic electrical motor model. This five phases SARM has a different rotor and excitation structure than classical ARM, and its phase currents and magnetic field variations with respect to inductance were calculated by means of magnetic equivalence circuit. The value of inductances was calculated by stating the visible inductance profiles of different phases instantaneously in order to emphasise the difference between two motors. In addition, the momentum equation of SARM was obtained by determining the situations of different phases. The inductance values were calculated by assuming the current applied to phases created from an ideal current source and by determining the situations of different phases. It was revealed that the SARM produced much more momentum than the classical ARM having the same phase number by using a mathematical model. As a result of this study, it was understood that the magnetic flow equations depend not only on the function of rotor position, but also the changing current.

KEYWORDS - Switched Reluctance Motor, Mathematical Model, State Equation
COMPARISON OF PWM AND PCM BASED DIGITAL-ANALOG CONVERTER STRUCTURES

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ABSTRACT

In this work performance limitations of various pulse-width modulation architectures are compared. First, classical pulse-width modulation based analog digital converter is analyzed. Then, pulse-count modulation based digital-analog converter is explored. The structures are implemented on Altera™ Stratix III FPGA. A sawtooth test signal is generated to analyze the performance of the DAC structures. Maximum effective resolution is calculated depending on the architecture selected. The paper is especially useful for the practicing engineers who deal with embedded system design and develop pulse-width modulation and pulse count modulation based digital-analog converters on microcontrollers and FPGA systems.

KEYWORDS - Pulse width modulation (PWM), Pulse count modulation (PCM), Digital-analog conversion, Low pass filter, Embedded systems
A STUDY ON THE PARAMETERS OF PHOTONIC CRYSTAL FIBER MODES

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ABSTRACT

In first decade, optical fibers were used in long haul telecommunication links. But today, fiber optic is used every distance of communications. Beside communications, use of fiber optic is spreading out in optical sensor technologies and networks, industry and medical in today. Classical optical fibers is standardized and has come to limit of refinement. As a new generation of optical fiber, with feature of very flexible design, photonic crystal fibers (PCF) are promising new horizons [1-3]. PCFs are designed as endlessly single mod fiber in very wide range of wavelengths[4-6]. Dispersion, birefringence and nonlinearity can be obtained in desired characters by changing geometrical parameters, [7]. In PCFs, guiding of light is occured with different mechanism from classical fiber optics. PCFs core and cladding modes of guided light. Effective refractive indices of this modes are very important parameters in especially fiber optic sensors[8-12]. In simulation study, fundamental and high order core modes, cladding modes, fundamental space filling mode (FSM) and high order space filling modes were found. Effective refractive indices of the modes were calculated. It is seen that effective refractive index of FSM bigger than the refractive index of fundamental core mode.

KEYWORDS - Fiber optic, Photonic Crystal Fiber, Fiber optic sensor, Effective refractive index
REDUCING THE EFFECT OF IN BAND INTERFERENCE BY USING MUSIC ALGORITHM IN RADIO CHANNEL DATA

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ABSTRACT

An in-band interference occurs when a part of transmission band is simultaneously used by another application. The effect of in-band interference in chirp modulated frequency modulated continuous wave (FMCW) data is to raise the noise floor in the average power delay profiles (APDP). In channel sounding, although the signal processing can be performed off-the-line, measurement campaigns are expensive and difficult to repeat. Since every channel data is valuable for a sound channel model, a technique that alleviates the effect of in-band-interference in FMCW mobile radio channel data is desirable. In this study, band pass filtering and MUSIC algorithm were used to reduce the effect of interference in the FMCW channel data. Since the interference affects a very wide band including the frequency band of interest, the classical band pass filtering did not reduce the noise level. The challenge was do develop an interference reduction algorithm that reduces the noise floor in the frequency band of interest. MUSIC algorithm was chosen for this purpose. The MUSIC algorithm is the one of the subspace method which is frequency estimation technique. The results showed that the MUSIC algorithm performed very good in terms of producing a clean spectrum and reduced the noise floor in APDP more than 10 dB effectively.

KEYWORDS - In-band interference, MUSIC algorithm, band pass filter
DESIGN AN ULTRA-WIDE BAND MICROSTRIP PATCH ANTENNA FOR MICROWAVE IMAGING SYSTEMS

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ABSTRACT

Microwave imaging technology has attracted many interests nowadays. This imaging system has been used in a variety of applications such as: nondestructive testing and evaluation, medical imaging, concealed weapon detection at security check points, structural health monitoring and through-the-wall imaging. The basic idea of using microwave imaging system is to transmit electromagnetic waves from a transmitting antenna to the target material and receive the scattered waves at a receiving antenna. Thus, antenna choice plays an important role. There is a need for compact sized, low cost and high efficiency antennas which can radiate ultra-wideband signal to transmit short pulses. In this study; we selected the printed disc monopole antenna due to their ease of fabrication, properties, small size and other advantages of microstrip technology. The schematic of the proposed antenna is presented and the dimensions are summarized in the paper. Ansoft HFSS software is used to design the proposed structure and optimize the radiation pattern and return loss. Simulation results such as gain, directivity, efficiency, return loss, fields distribution, current density etc. are given and discussed in the result part.

KEYWORDS - Microstrip Antenna, Ultra-Wide Band Antenna, Return Loss, Microwave Imaging
A LITERATURE REVIEW OF WIND SPEED PREDICTION TECHNIQUES

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ABSTRACT

With the developing technology of electrical energy use is increasing, and this increase in the search for new sources of electrical energy generation brings. Fossil-based increasingly depletion of resources and environmental pollution lead to these fuels from renewable energy resources become more important with each passing day brings. Today, wind energy, electricity generation of approximately 70 countries around the world in an area that has become a benefit. There are different prediction techniques useful to estimate the uncertainty of the wind. These prediction techniques are used to estimate wind power generation capacity for the system. This study supplies grip on the first estimation methods, incorporated with wind speed and power, established on numeric weather prediction (NWP), statistical approaches, ARIMA models, artificial neural network (ANN) and hybrid techniques over different time-periods. This study will be helpful for the new surveiroys who are going to work in this area. This study will be useful to the wind generations attendants to understand about the present wind forecasting model capacities and will give an opinion to forecast the wind speed at their exclusive wind energy systems.

KEYWORDS - neural networks, fuzzy logic, wind speed prediction, auto-regressive moving average, auto-regressive integrated moving average
MEASUREMENTS OF HIGH FREQUENCY ELECTROMAGNETIC WAVES IN CENTER OF MUS

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ABSTRACT

All electrically powered devices cause electromagnetic wave exposure on human body and we use them nearly every moment in a day. Mobile phones, computers, televisions, hair dryers, lighting systems, etc. they all use electricity and naturally radiate electromagnetic waves. Effects of electromagnetic waves are not clear but international organizations define limit values depending on epidemiological studies in this field. In this study we measure high frequency electromagnetic waves in city center of Mus. Measurements are made at mobile phone frequencies and results compared with limit values. All measurement techniques and limit values are appropriate with Information and Communication Technologies Authority (ICTA) standards. Measurement points are selected according to population density in city center.

KEYWORDS - Electromagnetic Pollution, Electric Field, Base Station, Mobile Phone, Measurement
ABSTRACT

Low and medium voltage (LV and MV) distribution networks are operated in a radial configuration, but their topology, especially when highly loaded, is usually meshed in order to improve system reliability and quality of the supply. This makes it feasible to configure the network after an outage to restore the service to affected sites. In addition, by modifying the topology of the network, power loss and node voltage deviation can be minimize. However, this network modification is a non-linear, multi-objective, constrained and combinatorial optimization problem. In this paper, Binary Particle Swarm Optimization (B-PSO) technique is employed for optimal network reconfiguration of primary distribution network. The objective of the proposed method is to minimize the total active power loss and voltage deviation experienced in the network. It is carried out subject to varieties of technical constraints, with the search space being the set of networks branches. To ascertain the efficiency of the proposed method and its practicability on multi-scale distribution systems, standard IEEE 16-bus, 33-bus and 69-bus test distribution networks are used. The proposed algorithm is implemented in MATLAB and MATPOWER environments. The results obtained signifies the effectiveness of the proposed technique.

KEYWORDS - Binary Particle Swarm Optimization, Distribution Network Reconfiguration, Loss Reduction, Voltage Deviation
SVDD BASED DATA DRIVEN FAULT DETECTION

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ABSTRACT

Conventional data driven process monitoring algorithms are limited to Gaussian process data for principal component analysis (PCA) algorithm and non-Gaussian process data for independent component analysis (ICA) algorithm. This paper provides a comparison study between the conventional data driven methods and support vector data description (SVDD) algorithm for fault detection (FD). Different from the traditional methods, SVDD algorithm has no Gaussian assumption. Thus the distribution of process data is not important for SVDD method. In order to compare their FD performances of the proposed methods from the application viewpoint, Tennessee Eastman (TE) benchmark process is utilized to compare the results of all the discussed methods. Simulation results on TE process show that ICA and SVDD methods perform better for false faults than the PCA method.

KEYWORDS - Process monitoring, Fault detection, Support Vector Data Description, Independent component analysis, Principal component analysis, Statistical process control.
HIGH GAIN MICROSTRIP PATCH ANTENNA ARRAY DESIGN FOR ISM 2450 MHZ

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ABSTRACT

A coplanar waveguide (CPW) fed patch antenna array is proposed in this paper. The resonance frequency of antenna is 2.47 GHz and is inside of ISM 2.45 GHz band. The dimension of proposed antenna is 230 mm x 91.5 mm. For substrate the material used is Roger 5870. The relative permittivity of the substrate material is 2.33. For increasing the gain, an array antenna has been designed. The antenna gain reaches up to 12 dB. The working has been simulated in the HFSS Ansoft. The reflection coefficient has been measured by Agilent Network Analyzer. The proposed antenna can be used in applications necessaried high gain such as wireless power transmission

KEYWORDS - Antenna, High gain, Antenna array, Microstrip patch antenna
ABSTRACT

We demonstrate a GaN/AlGaN multiple quantum well infrared photodetector grown on a free-standing semi-polar plane (20\(\overline{2} 1\)) GaN substrate. These multi-quantum well heterostructures are nearly free of the polarization-induced internal electric fields that severely complicate the design of nitride intersubband devices on traditional c-plane substrates. An optimized bound-to-quasi-bound THz photodetector design is obtained based on this approach. Photocurrent spectra of the device centered at a wavelength of 31.6 μm (9.5 THz frequency) are resolved up to 50K, with responsivity of 7 mA/W. This materials system provides a promising platform to utilize the intrinsic advantages of nitride semiconductors for THz intersubband device applications.

KEYWORDS - Intersubband photodetector, Terahertz photodetector, quantum well infrared photodetector
OFFLINE VEHICLE TRACKING AND VISUALIZING ON DIGITAL MAPS

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ABSTRACT

Tracking mobile objects has always attracted people’s interest and over time it has become a necessity to keep records of them. Various solutions have been developed to meet this need. In particular, the development of GPS and digital mapping system has contributed greatly to this solutions. The developed methods can be divided into two main categories as online and offline systems. Although the online systems provide advanced features, production and operating costs are quite high and have regular expenses. In this study, we propose a microcontroller based offline vehicle tracking system. The proposed system offers a practical, low cost and high capacity approach for vehicle tracking systems. The proposed system calculates the vehicle’s position and speed according to the signals gathered from GPS satellites and records them to an SD card continuously. The stored data, then, can be transferred to a computer easily whenever needed and the routes that the vehicle followed can be tracked on a digital map using google earth. Besides, some visualization technics like coloring routes with regards to time or speed intervals can be used for advanced analyses of the data. The proposed system allows the GPS data to be recorded as long as 3 months on a 4 GB SD card continuously.

KEYWORDS - GPS; Digital Map; Offline Tracking; Vehicle Tracking; GPS Data Visualizing
A LOW COST SMARTPHONE CONTROLLED WIRELESS DATA LOGGER SYSTEM FOR MONITORING OF SAFETY CRITICAL AREAS

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ABSTRACT

Environment monitoring systems have gained a great attraction to maintain human health and safety in human working areas. To assure appropriate working conditions especially in safety-critical areas, wireless communication systems are mainly preferred. As a main component of such monitoring systems, wireless data loggers are required to collect, store and display sensor data at high speed, lower cost and high efficiency. This paper presents the results of a design process regarding a wireless data logger. The system is designed to detect released toxic gases along with conventional video monitoring of safety-critical areas. The system provides measurement time and date stamped sensor data onto video signal for real-time monitoring of the environment. The system also offers instant access to stored data using a mobile application through Android devices. This provides cost effective solution from end-user perspective.

KEYWORDS - data logger, android applications, wireless communication, remote control, microcontroller
DUAL-HOP DECODE-AND-FORWARD IDMA NETWORKS OVER NAKAGAMI-M FADING CHANNELS

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ABSTRACT

This paper investigates the bit error probability (BEP) of dual-hop interleave-division multiple access (IDMA) systems with decode-and-forward (DF) relaying over Nakagami-m fading channels. A closed-form approximate BEP expression for the considered system is derived. In particular, we present a detailed performance comparison for binary phase shift keying (BPSK) modulation. Computer simulations are also presented to confirm the analytical results. Our findings show that the results obtained by the derived BEP expression are sustained through computer simulation results.

KEYWORDS - Dual-hop DF IDMA, Nakagami-m fading, bit error probability.
PAPR REDUCTION IN OFDM SYSTEMS USING PARTIAL TRANSMIT SEQUENCE COMBINED WITH CUCKOO SEARCH OPTIMIZATION ALGORITHM

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ABSTRACT

Partial Transmit Sequence (PTS) scheme is an effective peak-to-average power ratio (PAPR) lessening tool for Orthogonal Frequency Division Multiplexing (OFDM) system. However, computational complexity for the optimum phase factors searches of PTS scheme entails huge computational requirements and limits its applicability to practical applications especially for high-speed data transmissions. This study proposes a PAPR reduction method with a low computational complexity based on a combination of Cuckoo search optimization algorithm with PTS scheme in OFDM system. In terms of PAPR and computational complexity reductions, the performance of the Cuckoo-PTS scheme is comparatively investigated by performing a set of simulations with different PTS schemes.

KEYWORDS - PAPR, OFDM, partial transmit sequence (PTS), Cuckoo search optimization, phase factor
PERFORMANCE OF DUAL-HOP DS-CDMA SYSTEMS WITH AF RELAYING OVER RICIAN FADING CHANNELS

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ABSTRACT

This paper presents the bit-error rate (BER) performance of direct-sequence code-division multiple access (DS-CDMA) systems with dual-hop amplify-and-forward (AF) transmission over flat Rician fading channels. In the considered system, a source node communicates with a destination node via N relay nodes. BER results are obtained via extensive computer simulations by varying the number of relay nodes and the value of Rician K factor. It is shown that the performance of a DS-CDMA system is improved by using multiple AF relays.

KEYWORDS - DS-CDMA, amplify-and-forward, Rician distribution, BER, Dual-hop.
THE EFFECT OF VIEWING ANGLE ON DETECTION OF LANDMINES FROM THERMAL TIME SERIES IMAGES USING ACTIVE THERMOGRAPHY

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ABSTRACT

Use of landmines in soils is a significant international threat facing the world today. There are no safe and highly reliable methods or inspection systems capable of detecting landmines in all situations. The use of infrared thermography is one of the promising methods for mine detection tasks. In infrared thermography, the investigation is done in either way: actively or passively. In this study, thermal signatures of the active infrared time difference images of buried mines and sand are investigated for different camera angles. It is aimed to find the effects of shot angles of the thermal camera on the performance of landmine detection. The experiments are performed at a sandbox emplaced in an indoor laboratory environment. A metal and a plastic antipersonnel mine are buried at 2 cm depth in sandbox. The sand surface is initially heated homogeneously by an infrared heater (2400 W) for 10 minutes on different days. During the cooling phase of the surface, a sequence of images are captured with an LWIR (8-12 µm band) camera (FLIR T 650 SC), which is 280 cm away from the detection area at different angles (90°, 60° and -60°). Images of the size of 480×640 pixels are taken at 15 seconds intervals during one hour. “Thermal signatures” of the buried mines and soil in three viewing angles are compared in MATLAB® environment. The results show that the locations of landmines are easily detected from the captured images during the cooling phase of the surface since observable differences develop between temperature signatures of landmines and sand, but the observation angle of camera has little affects on the detection performance. In addition, it is found that one hour measurement period is adequate for the detection of landmines at 2 cm depth in active thermography.

KEYWORDS - Landmine detection; Thermal infrared imagery; Active thermography
CURRENT-MODE RAIL-TO-RAIL INSTRUMENTATION AMPLIFIER FOR GENERAL PURPOSE INSTRUMENTATION APPLICATIONS

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ABSTRACT

Instrumentation amplifiers are extensively used in bio-potential reading, industrial sensor applications, Wheatstone bridge amplifiers etc. In this work, a rail-to-rail input common-mode range instrumentation amplifier is presented. The amplifier is composed of two second generation current conveyors (CCII+) with common-mode input range close to supply swings and a differential difference current conveyor (DDCC) at the second stage with high voltage swing at the output. Also an optional DC servo loop is employed as a feedback to second stage for the removal of any possible DC offset voltage at the output which can be used for AC coupled applications. Straightforward design strategy with high input common-mode range and rail-to-rail output stage together with increased bandwidth makes the proposed implementation desirable for many of the general purpose instrumentation applications. The design is made using 0.35µm AMS technology with 3V supply voltage. The operation is verified by HSPICE simulations.

KEYWORDS - instrumentation amplifier; current-mode design; rail-to-rail amplifier
A DESIGN OPTIMIZATION STUDY OF THE OUTER ROTOR PMSM WITH GENETIC ALGORITHM AND DIFFERENTIAL EVOLUTION ALGORITHM

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ABSTRACT

Today, the using of permanent magnet synchronous motors has increased in industrial fields and these motors have many different structures. The outer rotor structure is remarkable in terms of ease of design and torque density. This study proposes to design optimization of the outer rotor with genetic algorithm and differential evolution algorithm. The geometric sizes were selected as design parameters and the motor efficiency is used as objective function. The obtained results by using of each algorithm are compared and the industrial conclusions were presented. As a result, the results are satisfactory and the study is useful for academic and industrial technical staff.

KEYWORDS - design optimization, differential evolution algorithm, genetic algorithm, outer rotor, permanent magnet synchronous motor
PERFORMANCE EVALUATION FOR A PMSG WITH INTERIOR ROTOR OF N35 AND N42 NdFeB PMS HAVING SAME GEOMETRY IN MICRO WIND TURBINES

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ABSTRACT

The aim of this paper is to compare the performance evaluation in terms of the efficiency, cogging torque and manufacturing cost for a permanent magnet synchronous generator (PMSG) with interior rotor of N35 and N42 NdFeB permanent magnets (PMs) having same geometry separately used in a micro wind turbine (MWT). Firstly N35 type PMs have been used on an interior rotor, and then its performance has been measured and calculated by a MWT setup. After that, N42 type PMs have been used on other interior rotor. According to the obtained results, the PMSG with N42 type presented better efficiency than the PMSG with N35 type. But the PMSG with N42 type has induced a bit more cogging torque than the PMSG with N35 type. When comparing in terms of efficiency, a higher efficiency has been obtained by the PMSG with N42 type.

KEYWORDS - PMSG, PM, efficiency, NdFeB, N42, N35
TRANSMISSION AND REFLECTION CHARACTERISTICS OF FOURFOLD ROTATIONALLY SYMMETRIC RECTANGULAR NANOAPERTURE ANTENNA ARRAYS

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ABSTRACT

The geometrical dependence of metallic nano-patterns provides adjustable resonance frequencies. Especially, aperture-based nanostructures exhibit resonant behaviors in transmission phenomena with easily accessible ultra-high-field localization characteristics and aperture dimensions influence the spectral response of the structure. We report the transmission and reflection characteristics of fourfold rectangular shaped nanoaperture antennas that exhibit high near field distributions in the mid-infrared regime. Numerical analyses are carried out by using finite-difference-time-domain method to analyze the transmittance and reflectance spectra of the structure. We investigate the geometrical parameters that can enable fine control of the resonance frequencies and tunable optical characteristics are concluded by the parameter sweeps. High SEIRA (surface enhanced infrared absorption) enhancement at resonant wavelength and resonant behavior in mid-infrared regime ensure that the proposed antenna can be utilized for infrared detection applications.

KEYWORDS - Plasmonics, Sensors, Subwavelength structures, Nanostructures, Spectroscopy, Infrared
DETERMINATION OF THE APPROPRIATE FEATURE VECTOR FROM THE EEG SIGNAL FOR EPILEPSY DIAGNOSIS

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ABSTRACT

Epilepsy that occurs suddenly and repeatability of seizure is a chronic neurological disorder and it is estimated that 1% of the world population suffering from epilepsy. Therefore, many studies are carried out for the diagnosis of epilepsy. In this study, we performed to determine the most convenient features by using electroencephalography signals (EEGs). EEG recordings that obtained from 10 normal subjects and 10 epileptic patients were conducted from Selcuk University Faculty of Medicine. Different features extraction methods that include Discrete Wavelet Transform, statistical methods were applied for identifying highest success features vectors. Different classification methods were performed for determining success of classifiers. High classification accuracy (CA) was obtained when the statistical methods was used in this new dataset. K-Nearest Neighbors (kNN) method achieved higher CA with 98% than the other classification methods.

KEYWORDS - Epilepsy, electroencephalography, feature extraction, discrete wavelet transform.
STUDY ON POWER FACTOR CORRECTION USING FUZZY LOGIC EXCITATION CONTROL OF SYNCHRONOUS MOTOR

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ABSTRACT

The correction of power factor in electric power systems is called reactive power compensation. A synchronous motor is used as a capacitive reactive power generator in compensation systems. It is less costly for an enterprise to use a synchronous motor as both mechanical power generator and power factor corrector, which increases their efficiency. There are various studies on increasing the efficiency, capacity and stability of a power system using power factor correction under different operating conditions. This study focuses on the power factor correction of the system by controlling the excitation current of the synchronous motor via fuzzy logic thanks to the asynchronous motor connected to the system.

KEYWORDS - Power Factor Correction, Fuzzy Logic, Synchronous Motor
A PSO TUNED FRACTIONAL ORDER PID CONTROLLED NON INVERTING BUCK BOOST CONVERTER FOR A WAVE UC ENERGY SYSTEM

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ABSTRACT

In this study, a fractional order PID (FOPID) controller is designed and used to control a DC-DC non-inverting buck-boost converter (NIBBC) for a wave/ultra-capacitor (UC) energy system. Because of the energy discontinuities encountered in wave energy conversion systems (WECS), an UC is integrated to the WECS. In order to obtain the best controller performance, particle swarm optimization (PSO) is employed to find the optimum controller parameters. Integral of time weighted absolute error (ITAE) criteria is used as an objective function. Also, an optimized PID controller is designed to test the performance of the FOPID controller. The whole system is developed in Matlab/Simulink/SimPower environment. The simulation results show that the FOPID controller provides lower value performance indices than the PID controller in terms of reducing the output voltage sags and swells.

KEYWORDS - Fractional order PID controller, wave energy conversion systems, non-inverting buck-boost converter, particle swarm optimization, ultra-capacitor unit
MORTAR MIXING AUTOMATION SYSTEM USING PLC BASED SCADA

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ABSTRACT

With the rapid development of industrial technology, automation systems are important for providing safe, quality, fast and competitive of product manufacturing. Programmable Logic Controller (PLC) is preferred by industrial automation systems due to its features such as process speed, quality and reliability, small physical size and easy installation. As PLC systems develop, SCADA systems are began to use in a wide area. Industrial plants can be monitored and controlled remotely and using SCADA systems with PLC. In this study, prototype and implementation of SCADA based mortar mixing automation system with PLC was carried out. The system was controlled by S7-200 PLC and WinTr SCADA interface. All parameters can be entered, monitored and controlled by means of SCADA interface. In the system, mortar admixture were comprised of sand, aggregate, gravel and water. Each material was located in separate hoppers. When material values for mixture were entered, hoppers cover was opened respectively. The amount of entered value and weighed value were compared and when their values were equal, hopper covers closed thanks to weight sensors located at the bottom of the hoppers. Materials were transferred to mixing hopper by means of band system after sand, aggregate and gravel were added. Then, water was pumped from the water hopper to the mixing hopper and all materials were mixed by mixer.

KEYWORDS - PLC, SCADA, Mortar Mixing Automation
A SIMPLE STATE OBSERVER DESIGN FOR LINEAR TIME INVARIANT DYNAMIC SYSTEMS VIA TAYLOR SERIES APPROXIMATION

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ABSTRACT

State variables that determine a system’s dynamics should be known for analysis and control of dynamical systems. Specifically, dynamics feedback for pole placement is required. Furthermore, estimation of state variables in real time is a very important problem in adaptive control applications. Unfortunately, all of the state variables cannot be measured in practice. As a result, use of a suitable state observer or estimator is unavoidable in order to obtain immeasurable state variables. In this study, a simple general algorithm is proposed for state variables estimation of linear, time-invariant multi-input multi output systems. The proposed algorithm is based on Taylor series approximation and has an analog solution. The solution that results from the proposed algorithm gets closer to the true solution when more and more terms are kept in the Taylor series. Finally, the proposed method gives the approximate solution of the estimation vector as a function of time in the interval \([0,t]\). The algorithm consists of four steps. In the first step, the feedback gain matrix \(G\), which will force the estimation error to go to zero in a short time, is determined by using a suitable method. In the second step, the observer state equation is converted into integral equation by integrating the terms on either side of the equation. Therefore, we have to calculate it’s as the function of time. They can obtained from plant output measurement by using curve fitting methods such. Finally, in the last step, nonlinear equations for unknown state vector are converted into a recursive form whose solution can be obtained easily by a computer program. The proposed estimation algorithm was implemented in MATLAB and it was applied to different cases. Results obtained by the proposed algorithm are in harmony with the real results.

KEYWORDS - State Estimation, Taylor series, State Observers, Curve fitting
STATE SPACE MODELLING AND REALIZATION OF FLYBACK CONVERTER CIRCUIT

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ABSTRACT

This paper gives the state-space model of flyback converter circuit. The circuit is implemented, experimental results and simulation results are compared. Flyback converter is a type of DC/DC converter circuits. It is widely used in industry because of some advantages: (i) it provides an complete isolation between input and output, (ii) One can get multiple and high voltage outputs, (iii) it is the simplest one if compared with other isolated DC/DC converter types, (iv) it is cheap and practical to implement. A flyback converter consists of a controlled switch.,Q, transformer, a diode, D, and a capacitor. In this study, the transformer is modeled by an ideal transformer (consisting of dependent voltage source and dependent current source) and a magnetizing inductance. Transformer leakage inductances and resistances are ignored to simplify the analysis of the converter. The circuit has two topologies according to the states of the controlled switch, Q. In the first topology, Controlled switch is on, Diode is off. In this mode, the magnetizing inductance stores energy and the output capacitor supplies the load. In the second topology, Controlled switch is off, Diode is on. In this mode, the stored energy in magnetizing inductance supplies the capacitor and the load.

KEYWORDS - flyback converter, state-space, modelling
STUDIES ON THE ENERGY EFFICIENCY IMPROVEMENTS AT SEYDIŞEHİR ETI ALUMINIUM PLANT

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ABSTRACT

Many industrial processes deal with reducing production costs and energy consumptions. Additionally, increase in energy demand is becoming a highly challenged issue in past decades. Therefore, strategies on significant energy savings in industries are required. Moreover, a great focus on climate change is needed for greenhouse gas emissions. Seydishehir ETI Aluminium Plant (SEAP) is a highly energy consumer plant in the regional area. This is mainly due to the current technology used. The alumina refinery commenced mass production by 1973 and the smelter unit started to work in 1974 utilizing Soderberg cell technology (SCT). Previously in SEAP, alumina was manually added to each pot in large quantities. This was labor intensive and harmful to thermal balance and current efficiency. Additionally, it caused more specific energy consumptions and environmental emissions. Within the modernization of smelter unit, SEAP changed SCT to Prebake technology and began to use an environmentally-friendly system. In the process, the pot does not encounter large variations in alumina concentration. This caused a 26.5% reduction in specific energy consumption and decrease in PFC emissions. Furthermore, expansion in production amount, increase in amperage and improved current efficiency were obtained. Another on-going modernization operation in SEAP is the installation of a stationary calciner with high thermal efficiency to replace the conventional rotary kiln. This is expected to bring about 26.1% reduction in specific energy consumption. Moreover, SEAP is planning to change its direct heating technique with live steam injection in the digestion process to decrease the evaporation energy consumption by about 13%. This study mainly shows the effects of these improvements on energy savings and current efficiencies. Energy and exergy analyses of digestion, evaporation and calcination units in SEAP were also discussed. Recommendations within the study enable the process more efficient, profitable, productive and feasible while having lower energy consumptions.

KEYWORDS - Alumina calcination/electrolysis, bauxite digestion, energy and exergy analysis, Prebake technology, Søderberg technology
LAMINAR NATURAL CONVECTION IN TRIANGULAR ENCLOSURES

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ABSTRACT

Natural convection in non-rectangular enclosures is numerically analyzed in this study. Streamlines and isotherms are presented for different triangular enclosures with different boundary conditions and Rayleigh numbers. Mean Nusselt numbers on hot walls are also calculated in order to make comparisons between different cases. The solutions are repeated for different aspect ratios where boundary conditions represent the winter time heating of an attic space. So, the effect of aspect ratio on natural convection could be investigated. In this study, quarter circular enclosure which is very similar to right triangles are also examined. Consequently, we had the opportunity to analyze how shape changes affect the heat transfer. The results of the calculations are compared with the the similar enclosures and boundary conditions. In this work, natural convection of air with Prandtl number of 0.72 is analysed. The change of the streamlines and isotherms at different Rayleigh numbers ranging from 10^3 to 10^5 are obtained numerically and presented as graphics. Also the change of the mean Nusselt numbers along the hot walls are calculated for five different cases. The solution is repeated with different aspect ratios and the effect of this change is compared with similar studies in the literature. Finite volume method is used to discretize the Navier Stokes equations. SIMPLE algorithm and upwind difference methods are applied to the governing equations. In order to investigate the effects of aspect ratio on the streamline patterns and isotherms, calculations are made on different triangular enclosures. The present results are in good agreement with the previous experimental and numerical studies.

KEYWORDS - Natural convection, Laminar Flow, Nusselt number, Rayleigh number, right triangular, quarter circular
PD BASED CATALYSTS FOR FUEL CELL APPLICATIONS

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ABSTRACT

Palladium–metal (Cobalt, Zinc, Vannadium, Manganese) bimetallic nanocatalysts were synthesized by polyol method using ethylene glycol (EG) as the solvent and performed reduction by using NaBH₄ at room temperature. Glassy carbon (GC) electrodes are modified with the Pd based catalysts. The electrocatalytic properties of the PdM/CNT are examined for methanol, ethanol and ethylene glycol oxidation with cyclic voltammetry (CV) and chronoamperometry (CA). The electrocatalytic activity of PdCo/CNT is four, eight and ten times higher in methanol (MeOH), ethanol (EtOH) and ethylene glycol (EG), respectively compared to other catalyst modified electrodes (PdZn/CNT, PdV/CNT and PdMn/CNT).

KEYWORDS - Palladium based catalysts, methanol oxidation, ethanol oxidation, ethylene glycol oxidation, cyclic voltammetry, chronoamperometry.
METHANOL COMBUSTION SIMULATION VIA CFD

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ABSTRACT

Methanol combustion can take place in various mediums ranging from internal combustion engines to burners and such. Consequently combustion efficiency and the dimensional system characteristics vary from system to system. Recent researches are going on to identify these aforementioned characteristics. Present paper is a part of such effort. A combustion domain representing the geometrical parameters of a burner was modeled and governing equations for combustion process were selected in a commercial CFD solver. Results constitute base for future work focusing on a similar burner performance. Static pressure distribution, mesh structure, temperature distribution, turbulence intensity, density distribution and velocity vectors are presented in both 2D planes and 3D domain. Results indicate the importance of combustion volume entrance design. There are dead regions adjacent to the combustion volume entrance. It is proposed that a new entrance region should be designed.

KEYWORDS - CFD, Combustion, Methanol, Simulation
DETERMINATION OF VIBRATION CHARACTERISTICS ON VERTICAL AXIS OF A FOUR CYLINDER GASOLINE ENGINE

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ABSTRACT

The vibration characteristics on vertical axis of a four cylinder 1.4 L otto engine was investigated under partial throttle opening rates and different engine speeds, in the study. In the first part of the study, vibration measurements were made in terms of acceleration on the top of engine block. The vibration data were determined in 5 partial throttle opening rates and for 4 engine speed as RMS (Root mean square) and illustrated with graphs. With polynomial regression method, the characteristics equations for each throttle opening has been formed. In the second part, the measurements were made by changing engine speeds for each throttle opening and the obtained results were compared with the results determined from the equations.

KEYWORDS - Engine Vibration, Vibration Measurements, polynomial regression
EFFECT OF JUNCTION RECOMBINATION VELOCITY OF ELECTRICAL PARAMETERS OF A VERTICAL PARALLEL SILICON SOLAR CELL UNDER FREQUENCY MODULATION

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ABSTRACT

This study investigates a theoretical study based on the determination of electrical parameters in solar cell junction vertical parallel silicon under polychromatic illumination and frequency modulation. From the excess minority carrier’s density in the solar cell, the photocurrent density and the photovoltage are derived. The route of the current vs. voltage density (I = f (V)) that materializes the behavior of the generator; we have a model on the shunt resistor and the series resistor. From their expressions, we study their pace according to Bode and Nyquist then extend the study to other electrical parameter. The Bode diagrams of the diffusion capacitance are shown for different junction recombination velocity.

KEYWORDS - Photovoltaic, junction recombination velocity, Nyquist and Bode diagramme, shunt-series and shunt resistance, capacitance
NUMERICAL SIMULATION OF A SINGLE PEM FUEL CELL WITH DOUBLE-SERPENTINE FLOW CHANNEL

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ABSTRACT

In this study, a 3-dimensional, single-phase model has been established to investigate the performance of proton exchange membrane (PEM) fuel cells with double-channel serpentine flow fields. The single PEM fuel cell has a 13x73 mm² active layer. The complete set of conservation equations, mass, momentum, energy, species and charge were taken into account and solved using the commercial computational fluid dynamics (CFD) software ANSYS Fluent® 16.2 with Gambit® (2.4.6) as a pre-processor. Two flow patterns including co-flow and counter flow were considered for all flows in the cell. The model was used to investigate the performance of fuel cell by determining the current density, oxygen and hydrogen mass fraction distributions. The simulation results were illustrated polarization curves including I–V and I–P curves. As a result the counter flow model is more accurate and has higher current density than the co-flow model. It is also noted that the optimal oxygen consumption of the channels was achieved at 0.6 V value obtained the maximum current and power density to improve the performance of fuel cell. Also the performance of the PEM fuel cell can be improved by increasing the reactant gases humidification. But increasing the humidity of the cathode at low cell voltage will lead to decrease performance.

KEYWORDS - PEM fuel cell, current density, performance,humidification
REVIEW OF THE BISMUTH TELLURIDE (BI2TE3) NANOPARTICLE: GROWTH AND CHARACTERIZATION

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ABSTRACT

In this paper, a review of Bismuth Telluride (Bi2Te3) nanoparticle growth and its characterization at nanoscale are discussed through a theoretical and analytical process. Nanotechnology research has become challenging task for modern science and technology. Material of Bi2Te3 is basically known for thermoelectric generation. Now in nanotechnology, all devices are migrating to the level of nanometer scale, the significant amount of experiments are being progressed to keep it up with the rapidly growing research field of nanotechnology. For these reasons, the characterization of Bi2Te3 at nanoscale is investigated and its application as a thermoelectric generator (TEG), thermoelectric cooling (TEC) and other field of material technology is presented. Finally, it is concluded that Bi2Te3 nanoparticles have many future aspect and applications.

KEYWORDS - Bismuth Telluride (Bi2Te3), Nanotechnology, Nanoparticle, Thermoelectric Generator.
CHEMICAL MODIFICATION OF WITH AMINO KETONE DERIVATIVE COMPOUND, CHARACTERIZATION AND REMOVAL OF CHROMIUM CR(VI) FROM INDUSTRIAL WASTEWATERS

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ABSTRACT

The present study describes synthesis of a new resin through immobilization of the 4-amino-2-hydroxyacetophenone (AHAP) onto silica gel modified with 3-chloropropyltrimethoxy silane (CPTS) and its application for the removal of chromium (VI) ions from aqueous solution as well as from industrial wastewater. The same applications were also made for industrial wastewater vapor. The newly synthesized Si-AHAP is characterized with FT-IR spectroscopy, scanning electron microscope (SEM). The sorption of Cr (VI) ion was evaluated with using batch methods. The amount of adsorption of Cr (VI) ion was detected by an atomic absorption spectrometer. The influences of concentration, temperature, contact time and pH to adsorption on the Si-AHAP were also investigated. The maximum adsorption capacities and isotherm parameters were calculated from the Langmuir, Freundlich and Dubinin-Radushkevich (D-R) isotherm equations. Thermodynamic parameters such as free energy (∆Go), entropy (∆So) and enthalpy (∆Ho) were also calculated from the sorption results.

KEYWORDS - Adsorption, Immobilization, Silica gel, Wastewater, Chromium.
COMPARISON OF CFD AND XFOIL AIRFOIL ANALYSIS FOR LOW REYNOLD NUMBER

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ABSTRACT

Blade Element Momentum (BEM) theory is generally used technique for calculation of aerodynamic performance of such turbine application. To obtain close results with blade element momentum theory, aerodynamic data of airfoil has to be as correct as possible. Nowadays, Computational Fluid Dynamics (CFD) is used for optimization and design of turbine application. Lift coefficient, drag coefficient and Lift coefficient over drag coefficient are significant parameters for turbine application. Panel method and an integral boundary layer formulation are combined in the XFOIL code for the analysis of potential flow around the airfoils. In this study, XFOIL code, Transition SST k-omega model was used to predict the aerodynamic performance at low Reynolds number (Re=3x10⁵ and 4x10⁵). The results were compared and CFD results and XFOIL code result are compatible with each other until stall angle. Also, lift coefficient over drag coefficient was tried to optimize by changing the airfoil geometry.

KEYWORDS - Xfoil, Computational Fluid Dynamics (CFD), Transition SST k-omega model, low reynold number
EXPERIMENTAL INVESTIGATION AND FUZZY LOGIC MODELING OF PERFORMANCE HYDROXY DRY CELL WITH DIFFERENT PLATE COMBINATION

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ABSTRACT

In this study, hydroxy (HHO) dry cell with different plate combination performances in terms of current and temperature were experimentally investigated and modeled with Rule-Based Mamdani-Type Fuzzy (RBMTF) modeling technique. Input parameters plate number and time; output parameters current, temperature were described by RBMTF if-then rules. The dimensions of the plates were 9x9 cm2, 10x10 cm2 and 11x11 cm2. Current and temperature were measured for the different plate combination. Tap water was used in the experiments and the system was set to 5 minutes. For each combination, new cells were prepared. Experimental data which obtained for current and temperature according to combination and time were used in the training step. Numerical parameters of input and output variables were fuzzified as linguistic variables: very very low (L1), very low (L2), low (L3), negative medium (L4), medium (L5), positive medium (L6), high (L7), very high (L8) and very very high (L9) linguistic classes. With the linguistic variables used, rules were obtained for this system. The comparison between experimental data and RBMTF is done by using statistical methods like the coefficient of multiple determinations (R2). The actual values and RBMTF results indicated that RBMTF can be successfully used in HHO dry c

KEYWORDS - HHO Dry Cell, rule-based Mamdani-type fuzzy modelling, plate combination
THERMODYNAMIC ANALYSIS OF THE ORGANIC RANKINE CYCLE AND THE EFFECT OF REFRIGERANT SELECTION ON CYCLE PERFORMANCE

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ABSTRACT

The Organic Rankine cycle is a power-generation system for lower temperature ranges in which organic fluids with hydrocarbon components are used instead of water. Organic Rankine Cycles, which are suitable for heat recovery applications at low temperatures, can be used for generating electric energy from various waste heat sources. In this study, a thermodynamic analysis is conducted on an example Organic Rankine Cycle that is used to generate electric energy from a geothermal source. The working fluid to be used in the cycle was selected as R134a, R236fa, R245fa and R600a, which are commonly used. For these selected organic fluids, the required cycle performance to generate 1MW of energy from the turbine was analyzed according to the geothermal source temperature (90-140°C), and the thermal efficiency of the cycle was calculated. The obtained results are presented comparatively with the help of the graphs. R245fa was defined to be more appropriate for the cycle as a refrigerant at constant work conditions.

KEYWORDS - Organic Rankine Cycle, refrigerant, thermodynamic analysis, cycle performance, thermal efficiency
THE EFFECT OF ADDING EN 2 ETHYLHEXYL NITRATE TO DIESEL ETHANOL BLENDS ON PERFORMANCE AND EXHAUST EMISSIONS

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ABSTRACT

In this study, effect of diesel, ethanol and EN blends as fuel in a diesel engine were examined with regard to performance parameters such as brake power, fuel consumption, specific fuel consumption and exhaust emissions such as NOx, CO, CO2. The blends prepared by mixing 10% of ethanol, diesel and EN in different proportions as volume were symbolized as E10 (%10 ethanol and %90 diesel), E10EN2 (%10 ethanol, %2 EN and %88 diesel), E10EN4 (%10 ethanol, %4 EN and %86 diesel) and E10EN6 (%10 ethanol, %6 EN and %84 diesel). The results obtained for these blends were compared with the results for diesel.

KEYWORDS - Alternative fuel, Bioethanol, Diesel, Exhaust emissions, Vehicle performance
THE DEPLOYMENT OF MICROGRID AS AN EMERGING POWER SYSTEM IN UZBEKISTAN

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ABSTRACT

Last decades with rapidly penetration of distributed energy resources to the power system, the interest on microgrid is growing. Microgrid appears with the development of distributed generations and distributed energy resources, such as PV, wind, microturbines, fuel cell, combined heat and power, etc. A microgrid combines distributed energy resources, storage devices (flywheels, energy capacitors and batteries) and flexible loads, and connected to the power grid via switches. Microgrids as a key component of the smart grid are intended to improve energy efficiency, a reliability of power system and decrease carbon dioxide emissions. Uzbekistan has a huge potential of renewable energy resources, especially in solar energy. In this paper are introduced the concept and operation of microgrid, as well as considered the problems and development perspectives of microgrid in Uzbekistan.

KEYWORDS - microgrid, distributed generation, distributed energy resources, power system
MINI SCALED HORIZONTAL AXIS WIND TURBINE ANALYSIS BY QBLADE AND CFD

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ABSTRACT

The software QBlade under General Public License is used for analysis and design of wind turbines. QBlade uses the Blade Element Momentum (BEM) method for the simulation of wind turbines and it is integrated with the XFOIL airfoil design and analysis. It is possible to predict wind turbine performance with it. Nowadays, Computational Fluid Dynamics (CFD) is used for optimization and design of turbine application. In this study, Horizontal wind turbine with a rotor diameter of 2 m, was designed and objected to performance analysis by QBlade and Ansys-Fluent. The graphic of the power coefficient vs. tip speed ratio (TSR) was obtained for each results. When the results are compared, the good agreement have been seen.

KEYWORDS - QBlade, Computational Fluid Dynamics (CFD), Horizontal wind turbine, Blade Element Momentum (BEM), Wind Energy
A REVIEW OF INDOOR LOCALIZATION USE CASES IN THE BUILT ENVIRONMENT

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ABSTRACT

Gaining information about the location of a person or an object has become an important issue in the field of built environment as well as industries such as logistics, transportation, manufacturing and healthcare. Location-based services such as on-road navigation, transportation tracking and route monitoring are the motives for a need towards outdoor location detection. In indoor built environments, the importance of localization arises from its value for construction industry in a various range of applications. Detection of building occupancy for automation systems, tracking personnel and equipment for effective management of facilities, providing assets location in construction sites and supporting building emergency response operations are all within the scope of indoor localization. This research aims to validate the need for indoor localization in buildings and to provide a review of indoor localization use cases in the built environment together with the currently available technologies.

KEYWORDS - Indoor localization, building occupancy detection, asset tracking on construction sites, facility maintenance and operations, building emergency response operations
DESIGN AND IMPLEMENTATION OF SINGLE PHASE INVERTER FOR PERMANENT MAGNET SYNCHRONOUS GENERATOR WIND TURBINE

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ABSTRACT

Almost all of the electrical devices are supplied with 220 V AC, 50 Hz grid voltage in use currently. At the low-power wind energy systems that provide DC voltage, to operate devices which supplied with AC voltage, inverters are used to convert the DC voltage to AC voltage. In this study, a PWM control inverter circuit designed and implemented to convert DC voltage, which is obtained from 400 W PM synchronous generator wind turbines and is stored in the battery pack, to AC voltage. Also, the performed system was also simulated in MATLAB Simulink. Although the low power, performed experimentally inverter circuit can also be performed at higher power. The present circuit can be used easily in applications that need low power.

KEYWORDS - Inverter, Microcontroller, PWM, MOSFET, Wind Turbine
OPTICAL PERFORMANCE INVESTIGATION OF A CLFR FOR THE PURPOSE OF UTILIZING SOLAR ENERGY IN TURKEY

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ABSTRACT

This study provides a feasibility analysis of the performance of a compact linear Fresnel reflector (CLFR) to be used in a renewable system for the energy demand in some cities in Turkey. The main idea of this work is to investigate whether it will be beneficial or not when CLFRs are used for energy production in Turkey. For this purpose, the optical performance of a CLFR system is investigated theoretically in six of the cities of different regions. The results obtained show that for residential and even for small size commercial usage of CLFR systems could satisfy a very huge amount of solar energy. When the energy need in different processes like heating, cooling, drying is considered, it is easily said that the collected solar energy by a CLFR system would be enough for energy need in many processes.

KEYWORDS - Solar radiation in Turkey, concentrating solar energy, linear Fresnel reflectors, optical performance, renewable energy systems
DETERMINATION OF WIND ENERGY POTENTIAL OF CAMPUS AREA OF SIIRT UNIVERSITY

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ABSTRACT

In this study, wind energy potential of Siirt University campus area is statistically examined by using the mean hourly wind speed data between 2014 and 2015 years which are measured by Vantage Pro2 device, located at the roof of the Engineering Faculty building with 6 m altitude. Weibull distribution function and Rayleigh distribution function are used as statistical approach to evaluate the wind data. Weibull distribution function is examined by using two different methods that are maximum likelihood method and Rayleigh method. The determination coefficient (R²) and Root Mean Square Error (RMSE) values of these methods are compared. According the error analysis, it is indicated that the Rayleigh method gives better results. Wind speed and wind power density are calculated in pursuance of Weibull distribution parameters. The results are evaluated as monthly and annually. Hence, this preliminary study is made to determine the wind energy potential of Siirt University campus area.

KEYWORDS - Weibull distribution, Rayleigh distribution, maximum likelihood method, wind speed, wind power density
OPTIMAL TILT ANGLE FOR OBTAINING MAXIMUM ENERGY IN PHOTOVOLTAIC SYSTEM FOR SIIRT PROVINCE TURKEY

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ABSTRACT

Renewable energy sources such as wind, sunlight, waves, hydroelectricity and thermal heat etc. are considered as alternative energy sources that can be replaced with energy derived from fossil energy sources. In particular, Photovoltaic (PV) systems has recently attracted more attention for generating electricity or power to supply energy requirement. Turkey, especially south parts of it, has relatively more solar energy capacity than European countries. It is very critical measurement that angle between incident sunlight and photovoltaic system plays great changes on producing the power. Thus, we here present an experimental study that reports optimal tilt angle for obtaining maximum energy in photovoltaic system for Siirt Province. Since, the optimal angle of the solar panels varies throughout the year, depending on the seasons and location. The panels were faced the south at the optimum angle for the receiving as much sunlight as possible at that time. As the optimal angle was determined, the solar irradiance, air moisture level, panel and ambient temperature, current and voltage were measured. All measured and monitored data were collected by using a data logger. PV performance for a single panel was assessed using PV panel efficiency, which is defined as ratio of DC energy output from the PV panel.

KEYWORDS - PV module, Optimal tilt angle, Solar irradiance, Siirt, Solar power
OPTIMIZATION OF CHAR OBTAINED FROM PYROLYSIS IN PRESSURIZED ATMOSPHERE

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ABSTRACT

In the present study, the influence of pyrolysis temperature and pressure on char yield obtained from St. John’s wort was investigated. The experiments were performed in a fixed-bed tubular reactor at different pressures (1, 21 and 41 bar) in the nitrogen atmosphere and between temperatures of 400-600 °C. The response surface methodology (RSM), with a central composite design (CCD), were used for modeling and optimization the process parameters. The ANOVA analysis was carried out and a model was formed with the conditions that have an effect on the yields. The results showed that both of the pyrolysis temperature and pressure have significant effects on the char yields at 95% confidence interval. An R2 value of 0.6980 indicates a sufficient adjustment of the model with the experimental data. The optimal conditions found to be at the temperature of 400 °C and at the pressure of 41 bar and the yield of char was approximately obtained 41.23 wt %. In addition, photographs taken under the Scanning Electron Microscope (SEM) were used to record morphological details of chars. Brunauer Emmett Teller (BET) was used for the measurement of the specific surface area of the char products. Pressure had a significant effect on char morphology and the surface areas decreased rapidly with increasing pressure.

KEYWORDS - Pyrolysis, Pressure, Char, Response Surface Methodology
USING OF BIOFUEL – DIESEL FUEL BLENDS IN A DIESEL ENGINE

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ABSTRACT

In this study, investigated effect on performance, emission and combustion characteristics of fuel obtained with adding bioethanol to safflower oil biodiesel Ð diesel fuel blends in a diesel engine which has single cylinder, direct injection and water cooling. The prepared test fuels are coded as diesel fuel (DF), BD10 (90% diesel fuel + 3% biodiesel), BDE5 (85% diesel fuel + 10% biodiesel + 5% bioethanol) and BDE10 (80% diesel fuel + 10% biodiesel + 10% bioethanol). Engine tests were performed different engine speeds (1000 min⁻¹ Ð 3000 min⁻¹, ranges of 200 min⁻¹) at full throttle condition. As the results, observed that engine performance values were effect as negative from biodiesel and bioethanol. HC emission is decreased by adding biodiesel to diesel fuel, and itÕs increased some with adding bioethanol. The observed that reduced to smoke emission of using biodiesel, and itÕs decreased rather with using bioethanol. NO emission values increased due to biodiesel are decreased by adding bioethanol.

KEYWORDS - Safflower oil, engine performance, exhaust emissions, biodiesel, bioethanol.
DESIGN AND THERMAL ANALYSIS OF FREE PISTON LINEAR GENERATOR USING IN RANGE EXTENDED ELECTRIC VEHICLES

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ABSTRACT

Today, battery electric vehicles (BEV) have zero emission (tank to wheel) and very high efficiency. However, the most important obstacle of BEV is insufficient range. This disadvantage can be eliminated in term of range extender systems. Range extender system like generator can charge battery when required. Free Piston Linear Generator (FPLG), Wankel engine, Piston Internal Combustion Engine, Gas Turbine Engine and Fuel Cell Engine can be used as range extender unit. In this study, opposed-piston free-piston linear generator which can be used in low weight electric vehicles, which has spark ignition, 153 cm³ volume, and gasoline direct fuel injection was designed via SOLIDWORKS® software. Thermal analysis of the engine were performed by means of ANSYS® software using temperature in the literature. Finally, the engine design is determined to suit thermal operating conditions. It is find out that this system can be used as a range extender unit.

KEYWORDS - Finite Element Method, Thermal Analysis, Free Piston Linear Generator, Series Hybrid Vehicles, Computer Aided Design
ANALYSIS OF CURRENT-VOLTAGE AND POWER-VOLTAGE CHARACTERISTICS OF SOLAR CELLS IN DIFFERENT OPERATING CONDITIONS

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ABSTRACT

Due to the increasing world population and evolving technology, limited energy resources are inadequate to meet the growing demands of society. Therefore, it leads to the emergence of the concept of energy. Since fossil fuels have some limited lifetime and the negative environmental impact, modern society has led to people to look for environmental-friendly and renewable energy sources. Solar energy as a renewable energy source is a clean energy and unlimited. Solar energy does not require sophisticated technologies too. So, in recent years, it has become scientific workspace. Therefore, photovoltaic energy systems are one of the most important renewable energy sources. Photovoltaic technology is direct conversion of sunlight into electricity with photovoltaic cells. In this study, unknown parameters of single diode Rs model are calculated, which one of the most important parameters of a solar cell. The different environmental conditions, such as temperature and solar radiation of the photovoltaic solar cell current-voltage and power-voltage characteristics, were obtained using the solar cell manufacturer's datasheets. While the current and output power increases as the radiation intensity increases, the output power decreases as voltage decreases and the temperature increases. In the case of different radiation intensity and in the different cell temperature, it has been well determined that the radiation intensity is very effective parameter on the short-circuit current while the temperature of the cell was determined to be quite effective parameter on the open-circuit voltage.

KEYWORDS - Solar Cell, Single Diode Rs Model, I-V and P-V Characteristics
ENERGY IMPORT DEPENDENCY AND SEEKING FOR NEW ENERGY TECHNOLOGIES EUROPEAN UNION CASE

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ABSTRACT

In this paper, energy poverty and as a result of this energy import dependency and its possible negative results have been examined by taking European Union (EU) into consideration. This analysis has two aims: the first one is questioning the European Unions’ energy security from supply perspective and the second one is investigating the solutions produced by European Union to get away or at least to reduce its energy import dependency. To guarantee its energy supply security at affordable price and to attain its targets about energy security, some action plans has been being put into practice at energy technologies by the Union, especially about renewable energy technologies and energy efficiency. By analyzing them this study aims to give a perspective for other energy dependent countries such as Turkey. Because, as an import depended country at energy, Turkey has same supply security risks with European Union. Modeling the strategies developed and experienced by the EU at renewable energy and energy efficiency, to cope with energy import dependency, might give Turkey an opportunity to minimize drawbacks of its own import dependency problem.

MONTHLY OPTIMIZATION OF A NEW HYBRID RENEWABLE ENERGY SYSTEM CONSIDERING ENERGY AND AGRICULTURAL EFFICIENCY

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ABSTRACT

Clean and cheap energy in agriculture plays a key role in improving agricultural productivity, environmental sustainability, and economic performance. This paper presents the result of the monthly optimization analysis for enhancing energy efficiency and conservation in a new hybrid system composed of pumped-storage power plant integrated PV platform and wind turbine. The monthly performance of this new hybrid system is analyzed for Karaman which has high solar and wind energy potentials by reason of its climatic and regional factors. Using the data for 9 months of a year 2012, a preliminary study has been carried out for the selected station which produced important information for an extended work. The monthly optimization analysis results have been determined by using earth observation data of solar and the wind which are registered in this region. According to the wind and solar data, the optimum month was found as June considering energy and agricultural efficiency. Results can be used either to increase the performance of the new hybrid system or to analyze long-term agricultural and energy studies with more efficiently.

KEYWORDS - photovoltaic, wind power, pumped hydro plants
MAC PROTOCOLS FOR ENERGY-HARVESTING WIRELESS SENSOR NETWORKS WITH RF ENERGY TRANSFER

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ABSTRACT

Energy harvesting (EH) from surrounding environment has the potential to solve the issue of limited-energy source which converts the environmental energy into electricity for powering sensor nodes in wireless sensor networks (WSNs). However, the level of ambient energy depends highly on environmental conditions. RF energy transfer was proposed to supply energy when there is no ambient energy to be harvested. In this study, medium access control (MAC) protocols specifically proposed for WSN with RF energy transfer will be presented, underlying their operating principles and features. The main architecture of an RF energy transfer system will be studied in details. Also, the key design issues and potential future work directions will be discussed.

KEYWORDS - MAC Protocol, RF Energy, Energy Harvesting
HEAT TRANSFER OF TWO PHASES WATER AIR IN HORIZONTAL SMOOTH AND RIBBED DUCTS

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ABSTRACT

Computational fluid dynamics (CFD) was used to investigate the flow of water and air in smooth and ribbed duct. Temperature was applied for the top and the bottom of the duct where the ribs are located. The heat transfer coefficient were calculate at different location inside the ducts and the results was validated using several heat transfer coefficient correlations that was developed by other researchers. Three shapes of ribs was studied which are rectangular, trapezoidal, and triangle. Three water velocities and three air velocities was studied (0.4, 0.6, and 0.8 m/s), and (0.12, 0.15, and 0.18 m/s), respectively. The heat transfer coefficient increased by adding ribs, it also increased as the velocity of the flow increased.

KEYWORDS - Heat transfer, Ribbed duct, Two phase, Ansys Fluent, CFD
AN ANALYTIC ASSESSMENT OF SHIP ENERGY EFFICIENCY IN MARITIME TRANSPORTATION ENGINEERING

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ABSTRACT

Energy efficiency is one of the core topics in maritime transportation industry as the ships consume a large amount of energy due to nature of work. Environmental awareness is another critical perspective to improve energy efficiency due to greenhouse gas emission from the ships. Therefore, maritime regulatory bodies adopted Ship Energy Efficiency Management Plan (SEEMP) to provide necessary improvement of energy efficiency onboard ship [1]. The aim of this paper is to assess energy efficiency of ships analytically to enhance performance of ships as well as minimize environmental pollution. In this context, the paper adopts Buckley extension based analytic hierarchy process (AHP) under fuzzy sets environment to enhance the sensitivity. Beside its theoretical insight, the paper has practical benefits to shipowner who can seek to improve the energy efficiency aspects for not only ships but also company-wide.

KEYWORDS - Ship energy efficiency, fuzzy AHP, maritime transportation, energy improvement
A PERFORMANCE EVALUATION OF SOLAR ENERGY PREDICTION APPROACHES FOR ENERGY-HARVESTING WIRELESS SENSOR NETWORKS

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ABSTRACT

Energy harvesting from the surrounding environment has been a superior way of eliminating the burden of having to replace depleted batteries in wireless sensor networks (WSNs), thereby achieving a perpetual lifetime. However, the ambient energy is highly time-variable and depends on the environmental conditions, which raises the need to design new approaches for predicting future energy availability. This paper presents a performance evaluation and comparison of three recently-proposed solar energy prediction algorithms for WSNs. In order to provide an accurate performance of the algorithms, real-world measurements obtained from a solar panel were considered. Also, the performance characteristics of the algorithms in four seasons – winter, spring, summer and autumn – were demonstrated. To do this, a month in each season was selected for performance comparison, discussing the performance of the algorithms in each season.

KEYWORDS - wireless sensor networks, energy harvesting, solar energy, EWMA
CLUSTERING OF WIND TURBINES IN A SINGLE SITE USING SCADA DATA

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ABSTRACT

There are many ways to supply energy demand such as; generating energy from fossil fuels, nuclear plants, renewable energy source, and even countries directly buy electricity from other neighbors. Meanwhile, policy makers realize that energy demand of the country has to be supplied in a secure and clear way because they concern over dramatic climate change and energy supply security. Renewable energy resources are clean and local energy production alternatives such as wind energy, solar energy, and hydro energy. The wind energy is one of the most explicit renewable energy sources in the world. As wind energy technology increases day by day and having proved itself over the last 20 years, costs of wind energy decreases. Therefore, wind farms have become more popular on all over the world. In the current literature, effective management of wind farms with an optimum performance level is the most emerging area on wind energy researches. The improvements of wind turbine technology shows the need of systematic, dynamic, and smart control and monitoring strategies for spreading wind farms. By the way, even if they are in the same wind farm and have totally identical technical features, power generation performance of any turbine may differs according to working conditions and any kind of predictable or unpredictable malfunctions. Thus, the main contribution of this paper is focused on a simple and adaptable method to identify different behavioral groups of turbines. In this study, analysis of variance (Anova) technique is used as a statistical method to clarify differences on variances of weekly averaged mechanical speed, wind, temperature, and production data of wind turbines. Also, clustering methods are used to group of wind turbines which have similar behavior in terms of working conditions.

KEYWORDS - Wind Farm, SCADA data, Clustering, Anova, Statistical Analysis

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CFD-BASED PERFORMANCE ANALYSES OF A FRANCIS TURBINE IN SEVERAL GUIDE VANE POSITIONS

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ABSTRACT

Hydraulic turbines are turbomachines that transforms the hydraulic energy into mechanical energy. Francis turbines are the most common hydraulic turbine type in use. A francis turbine consists of several components such as spiral case, stay vanes, guide vanes, runner and draft tube. Design and performance analysis of these turbines requires much time. During the recent years, Computational Fluid Dynamics (CFD) has been frequently used to examine turbomachinery performance since CFD is more effective in terms of time and economy. In this study, a francis turbine is designed with respect to head and discharge values which are significant parameters for preliminary design. Performance analyses have been carried out with commercial CFD codes by changing guide vane positions. For each position of guide vanes, turbine efficiency and velocity and pressure distributions are obtained. In conclusion, the optimum guide vane position is determined for the maximum turbine performance.

KEYWORDS - Turbomachinery, Francis Turbine, Hydraulic Energy, Computational Fluid Dynamics
WIND SPEED MODELLING USING INVERSE WEIBULL DISTRIBUTION: A CASE STUDY FOR BILECIK, TURKEY

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ABSTRACT

Wind speed modelling plays a critical role in wind related engineering studies. Frequency distribution of wind speed can be displayed different distributions such as Gamma, lognormal, Rayleigh and Weibull. Weibull distribution is used to model of many regions of the world wind speed in recent year. In this paper, wind speed potential analysis realized using Inverse Weibull Distribution (IWD) for Bilecik, Turkey. Different parameter estimation methods such as maximum likelihood method, graphical method, method of Justus, method of Lysen used for wind speed modelling analysis. All analysis is carried out by Matrix Laboratory (MATLAB) programming language. Monthly and yearly wind speeds are modeled by Inverse Weibull distribution. Accuracy of the modelling is evaluated in terms of Root Mean Square Error (RMSE).

KEYWORDS - Wind Speed, Inverse Weibull Distribution, Modelling
NUMERICAL ANALYSIS OF A SWEEP-TWIST WIND TURBINE BLADE

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ABSTRACT

Wind energy is being used to generate electricity in many countries all over the world and still the contribution of wind energy to electricity supply increases every day. Researchers work on innovative solutions to increase the efficiency and decrease the cost of wind turbine components, especially those of blades. Various blade designs for different operation conditions are presented in the literature and sweep-twist blades are new type of blades introduced recently. This paper focuses on the numerical investigation of a sweep-twist wind turbine blade using ANSYS-Fluent. NREL Phase VI wind turbine blade is used as the baseline blade and the sweep-twist blade is designed by adding a displacement of 5% of the blade length to the tip. Power output and thrust forces are calculated using the simulation results for both original and sweep blades. In addition, results are compared to the experimental data of original NREL Phase VI blade.

KEYWORDS - cfd, SWEEP-TWIST,BLADE,WIND
A WIND POWER PLANT FEASIBILITY STUDY FOR BURSA, GEMLIK REGION IN TURKEY BY WINDSIM SOFTWARE

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ABSTRACT

Development of technology and industry has been causing a remarkable energy demand all around the world. In order to meet this huge energy demand, conventional energy sources are being used a lot and this issue brings along a serious environmental pollution. Especially, last decades, many countries have signed the agreements to prevent environmental pollution. In conjunction with these events, renewable energy sources have become important. In this context, most of countries have been increasing the incentives to the clean energy systems. Also, Turkey has been increasing the incentives to renewable energy investments; therefore renewable energy usage is increasing day by day. In 2015, Turkey’s installed capacity has reached 72146.7 MW, 42.7% of this amount is met by renewable energy sources. In Turkey most commonly used renewable energy sources are hydroelectric energy, wind energy, solar energy and geothermal energy respectively. In 2013, wind energy installed capacity of Turkey was 2759.6 MW while 2015 this capacity has reached 4503.2 MW. It can be deduced from this data, wind power investment in Turkey is expanding dramatically. In this study, a wind power plant (WPP) feasibility study for Gemlik Bay in Bursa Province in which has not any active WPP is released. 5 number of Vestas V90 commercial wind turbines with 2 MW capacity are installed in Gemlik region. Also, climatology data were obtained from Turkish State Meteorological Service. These climatology data are applied to the Windsim software and annual energy production (AEP) and capacity factor of the WPP are calculated. The study shows that, establishment of a WPP which has 30.6 GWh/y AEP and 34.9% capacity factor is reasonable.

KEYWORDS - Renewable Energy Sources, Wind Energy, Wind Power Plant, Windsim
ENERGY ANALYSIS FOR AN AIR-CONDITIONING SYSTEM OF A COMMERCIAL AIRCRAFT: CASE STUDY FOR AIRBUS A330

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ABSTRACT

The regulation of temperature, pressure, humidity and oxygen intensity of an aircraft cabin is crucial for the flight conditions of a commercial aircraft. Lack of oxygen, lower temperature and pressure induce some health problems for passengers on board. For this reason, hot and pressurized air supplied from aircraft engine compressor section is conditioned in the air-conditioning packages to present comfortable ambience inside of the aircraft cabin as well as cooling of electric components. In this study, an air-conditioning system of Airbus A330 as a commercial aircraft has been investigated at the altitude of 11000 m for 289 people on board under the flight conditions. At this altitude for the aircraft cruising with 871 km/h (Ma = 0.82), cooling loads of cockpit (crew station), passenger cabin and other appliances needed cooling in the aircraft have been calculated. The parameters affecting the cooling load are mainly temperature, pressure and air intensity of aircraft inside and atmospheric outside. In the calculation of the cooling loads, generated heat and heat loss have been considered. For the generated heat value, heat generation by passengers, cabin crew, illumination systems, other equipment and solar radiation have been assumedly calculated. The heat loss from the aircraft fuselage at 20 °C cabin to the outside of the aircraft at -56.5 °C has been found. Heat transfer to meet the fresh air need inside the aircraft has been taken into account. Finally, the obtained cooling loads are 7.4 kW for the maximum value and 5.1 kW for the minimum value at these aforementioned conditions. The maximum and minimum values have been obtained for the daytime and the night time depending on solar radiation, respectively. In the upcoming study, energy analysis is going to be combined with the exergy analysis and the appropriate air-conditioning system for the optimum energy consumption will be evaluated.

KEYWORDS - Air-conditioning, aircraft, altitude, cooling load, energy analysis
EXPERIMENTAL DETERMINATION OF DRAG COEFFICIENTS FOR TORPEDO LIKE GEOMETRIES IN AN OPEN WIND TUNNEL

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ABSTRACT

Autonomous underwater vehicles (AUVs) or unmanned air vehicles (UAVs) as a part of defence systems are evaluated for underwater or atmospheric conditions, respectively. In these operation conditions, these vehicles are expected to have some critical properties such as energetic performance, longer range, less deflection from the target. These expectations are generally related with less resistance or drag. Due to these aforementioned issues, drag coefficient carries importance in the design of a defence vehicle. In the application, drag coefficient for a model can be measured with force measurement systems in water or wind tunnels. With this approach, drag coefficients of torpedo-like geometries have been obtained by force measurement system integrated to an open wind tunnel in Fluid Mechanics Laboratory of Aksaray University. Different models have been investigated for Reynolds numbers range of \( \text{Re} = 6.6 \times 10^4 \) and \( \text{Re} = 33.1 \times 10^4 \). The elliptical cross-sectional one has only been investigated at several attack angles varying from \( \alpha = 0^\circ \) to \( \alpha = 30^\circ \). The effects of torpedoes having various leading edge types with changing length/diameter (L/D) ratios and trailing edges of the elliptical cross-sectional one with different numbers of appendages on drag coefficients have been considered. When the wind speeds increase, drag coefficients decrease owing to shrinking wake region size. In addition, while attack angles rise, drag coefficients also increase because of flow separation around leading edge. Various leading edge types just like elliptical cross-sectional one, circular cross-sectional one and swaged headed one have been examined; the lowest drag coefficient has been found to be an elliptical cross-sectional one whereas the highest one was yielded for the swaged headed one. Furthermore, the more appendages added to trailing sections of torpedo-like geometries, the higher drag coefficients have been obtained. Moreover, inverse relationship between L/D ratios and drag coefficients has been observed.

KEYWORDS - Defence vehicles, drag coefficient, Reynolds number, torpedo, wind tunnel
COMPARATIVE PERFORMANCE ANALYSIS OF PV TECHNOLOGIES FOR APPLICATION IN GRID CONNECTED PV SYSTEMS IN EASTERN PROVINCE OF ZAMBIA

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ABSTRACT

Zambia is vastly endowed with solar energy resources. In order to diversify energy mix and achieve the sustainable development goals of energy access for all, the government of Zambia through build-own-operate mode intends to develop a total of 10MW PV power plants in Eastern provinces. This paper is therefore aimed at analyzing the performance of three types of PV technologies (CIS, C-Si, CdTe) using PVGIS in order to compare their performance for use in grid connected PV systems in Eastern province of Zambia. Furthermore, the effect of using tracking systems on the performance of the PV systems were also investigated. The solar datasets used for analysis were obtained from Photovoltaic Geographical Information System (PVGIS). The analyzed results indicate that CdTe has superior performance followed by CIS, while C-Si has the least. CdTe PV technology shows highest performance ratio of 80.17%, CIS of 73.97% and C-Si of 72.24% for fixed horizontal PV system. In short, thin film PV technologies show better performance than crystalline silicon PV technologies under the weather condition of Eastern Province of Zambia. This study is important as it present an overview performance of the three PV technologies under weather condition of Eastern Province which is vital for decision making, sustainable solar energy system development and selecting of appropriate PV technologies suitable for the weather condition in the country.

KEYWORDS - Capacity Factor, Performance Ratio, Renewable energy technology (RET), Free-Standing Photovoltaic (PV) Plants, Sustainable energy development
COMPUTATIONAL INVESTIGATION OF TURBULENT FLOW IN PIPES

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ABSTRACT

This original research work presents the results of an extensive study of computational solution of steady, incompressible and axisymmetric developing turbulent flow in circular-sectioned pipes at several Reynolds numbers. Employing the finite-volume method, a computer program based on the SIMPLE (Semi-Implicit Method for Pressure Linked Equations) algorithm has been developed. Computer solution of the conservation equations of mass and momentum, together with the standard k-epsilon turbulence model, are obtained using an iterative numerical solution technique. Near the solid boundary, wall-functions are employed. Computational predictions for radial profiles of axial velocity, turbulence kinetic energy, turbulence kinetic energy dissipation rate, effective viscosity, centre-line velocity variation, wall-shear stress and friction coefficient distributions along axisymmetric pipe flow geometry are presented and compared with experimental data. The results of computational investigation are generally in good agreement with experimental measurements.

KEYWORDS - Circular Pipes; k-epsilon turbulence model; Computations.
A SURVEY ON LEARNING SYSTEM APPLICATIONS IN ENERGY SYSTEM MODELING AND PREDICTION

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ABSTRACT

Learning Systems (LS) such as machine learning, statistical pattern recognition and neural networks are computer programs that can learn from sample data and develop a prediction model makes prediction for new cases. The most important thing related with a prediction model is to achieve results as closer as to real situation while making predictions. This is important because being closer to real results are helping to reduce the costs of feasibility studies in system installation. The performance of Learning systems have been rised in latest years such as it sometimes exceeds the performance of humans. That’s why the applications of Learning Systems have been increased in many areas. This paper reviews the present applications of Learning Systems in energy system modelling and prediction especially in renewable energy systems such as wind and solar. The aim of this paper is to create a vision for researchers by gathering the present applications and outline their merits and limits and the prediction of their future performance on specific applications.

KEYWORDS - ENERGY EFFICIENCY, SOURCE INSTALLATION, ESTIMATION, ARTIFICIAL INTELLIGENCE
MECHATRONICS
STEPPER MOTOR MOTION CONTROL THROUGH SERIAL COMMUNICATION USING FPGA-BASED MICROCOMPUTER ARCHITECTURE AND EXAMPLE OF APPLICATION

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ABSTRACT

Abstract: In this study, RS232 asynchronous serial communication protocol was implemented on BZK.SAU microcomputer architecture. Thus, the deficiency of the BZK.SAU microcomputer architecture, which was designed for educational purposes, regarding the peripheral units, was resolved through the protocol created, and the experience which was essential for other serial communication protocols was gained. The aforementioned protocol was coded with the hardware description language (VHDL), synthesized on FPGA board, and proper functioning was verified through PC and ModelSim simulation program. In the second part of the study concerned, the mechanism was provided with the ability to perform the return process in the desired direction and angle using the FPGA-based keyboard without computer through Pan/Tilt mechanism formed on stepper motors with the software created with BZK.SAU. Assm language which is the language of BZK.SAU microcomputer architecture. In this way, it was observed that the serial data transmitted between two FPGAs and the Pan/Tilt Mechanism connected to FPGA formed a basis for the embedded systems and moving associative mechanisms.

KEYWORDS - BZK.SAU, FPGA, RS232, Stepper Motor
ROBUST VARIABLE STRUCTURE CONTROLLERS FOR AXIAL ACTIVE MAGNETIC BEARING

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ABSTRACT

This work focuses on robust variable structure control of a rotor-axial active magnetic bearing system. The electromagnetic force generated by active magnetic bearing is highly nonlinear characteristics. On the other hand, the magnetic force coefficient is a calculated value and its real value is not truly identified, therefore, robustness is a great importance in the operation of the active magnetic bearings system. On this works Lyapunov based three different type of variable structure controllers are proposed and experimentally tested. Robustness of the controllers were tested experimentally by creating some parametric uncertainty in the control system using an external disk mass attached to the rotor. The results of the controllers are also compared with conventional and linear robust controllers.

KEYWORDS - Axial active magnetic bearings, sliding mode controller, high gain robust controller, high frequency robust controller
PID CONTROLLER DESIGN FOR HUMAN ELBOW THERAPY

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ABSTRACT

A controller design for mechatronic system which capable of doing passive therapeutic exercises of patients who have upper extremity limitation is presented in this paper. Expectation from controller is it should produce torque values can exactly repeat degree values depended on time which were taken from first therapy exercises of patients. The designed controller tested with real angle values which was taken from during elbow therapy. Simulation results showed that the proposed control system has good performance at tracking the therapy trajectory. Also that control system may be used for mechatronic upper limb therapy system which can be produced.

KEYWORDS - Controller design, limitation at human joints, therapeutic exercises, therapy system.
GAIN PARAMETER ADJUSTMENT METHODS COMPARISON OF CONTROLLER FOR AUTONOMOUS REHABILITATION DEVICE

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ABSTRACT

PID controller design and comparison between two different gain parameter adjustment method for autonomous physical rehabilitation device is presented in this paper. This device will be capable of doing repeated therapeutic exercises of shoulder joint. That devices main objective is reducing physiotherapist work load. The controllers tested with real angel values. Comparison of simulation results showed Ziegler_Nichols adjustment method has better performance than Matlab's auto-tune method.

KEYWORDS - Autonomous control, PID controller, passive exercises, rehabilitation
AN OFF-LINE SIMULATION TOOL FOR PUMA ROBOT USING UNITY 3D

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ABSTRACT

This paper presents an off-line simulation tool for PUMA robot manipulator which is commonly used various purposes such as material handling, welding and surgery. This new tool using UNITY game engine software provides powerful interactive environment for operators to perform several applications using PUMA robot manipulator. The new PUMA RObot simulation LABoratory, "PUROLAB", provides forward kinematics, inverse kinematics and trajectory planning. PUROLAB allows users to design his/her own virtual robot aboratory including objects and conveyer systems and test the real-time systems. PUROLAB has very powerful Graphical User Interface (GUI) that provides users to understand fundamental of robot kinematics easily.

KEYWORDS - Robotic Simulation tools, Off-Line Robot Programming, GUI, Robot Test Software
MODELLING AND CONTROL OF A SINGLE-WHEEL INVERTED PENDULUM 
BY USING ADAMS AND MATLAB

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ABSTRACT

This research is aimed at developing a multi-body simulation model and balancing control of a single-wheeled inverted pendulum. A virtual prototype of the system has been built by using Adams software and it is simulated in both Matlab and Adams software together. The Adams model has two inputs (disturbance and control) and two outputs (pendulum angle and wheel position). Proportional-integral-derivative (PID) controller is designed and applied in order to use i balancing control simulation of pendulum angle. The modelling and control results show that the Proportional-integral-derivative (PID) controller can successfully achieve balancing control of the single-wheeled inverted pendulum. Also this paper can make an important contribution to background of two-wheeled robots, self-balancing transportation devices.

KEYWORDS - PID Control, Modelling, Simulation, Self-Balancing, single-wheel inverted pendulum
COMPARATIVE ANALYSIS OF TRADITIONAL PRODUCTION SYSTEMS WITH FLEXIBLE MANUFACTURING SYSTEMS

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ABSTRACT

Nowadays, technology is developing rapidly and the adaptation of emerging technology to daily life is very fast. Within this context, production technologies are developing rapidly and parallel to this production instrument's costs are decreased. In this way, producers can make investments more easily by getting current technology. In parallel with industrial development, some parameters such lost time, labor, raw materials must reduce. When considering expected product variety, especially modification on the produced product is a difficult process. Revising of the production system according to the final product is substantially increased the amount of lost time. In addition, in this revision process previously realized investment is becoming inert and this quite increases costs. It is almost impossible the creation of a separate production line for each product in a company which has a lot of variety of products. Nowadays in this needed speed production process, instead of conventional production systems flexible manufacturing systems began to be preferred in the industry. In this study, functions, components and the overall structures of the flexible manufacturing systems are described. Differences between traditional production systems and flexible manufacturing systems, and the advantages relative to each other was examined. In the study, Flexible Manufacturing Systems Laboratory within the Inonu University Arapgir Vocational High School was taken as an example.

KEYWORDS - Flexible Manufacturing Systems, traditional production systems, factory organization
ROBUST STABILIZATION OF A SERVOMECHANISM WITH RESPECT TO 
TIME DELAY

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ABSTRACT

In this paper, a servomechanism subject to teleoperation is considered. Since the teleoperation itself can result in large amount of time-delays, it can be difficult to control such mechanisms in order to accomplish the desired task. From the robust control viewpoint, a methodology that guarantees the stability in worst case is essential. Based on a simple methodology to find the delay independent stabilizing gain regions, by forming the magnitude polynomial and employing the root locus technique, the stability of the robot is guaranteed, even in the worst case: the system becomes stable even if the connection has huge amount of time delays. This fact is evidenced first by the simulations. To perform the simulations, without any knowledge about the motor parameters, the motor is modeled by a global optimization methodology, named Genetic Algorithm in order to obtain a valid model for the system as accurate as possible. Then the resulting gains are applied to the real system, the results of which are found in accordance with the simulation results; the stability of the operation is not affected by the time-delay.

KEYWORDS - Robust Control, Time-Delay Systems, Teleoperation System Control, Low-Order Controllers, Delay Independent Stability
TUNING OF DISCRETE PID CONTROLLERS USING DOMINANT POLE PLACEMENT APPROACH FOR TIME DELAY SYSTEMS OF ANY ORDER

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ABSTRACT

In this paper, a simple methodology is proposed using the dominant pole placement for arbitrary order time-delay systems. Discretization of such systems to avoid the formidableness of the infinite number of poles, and applying the strategy proposed in this paper, two of the closed loop poles can be assigned to the desired locations, whereas the remaining ones are guaranteed to be located inside a disc with the predetermined radius in the z-domain. To prove the validity of the method, the proposed algorithm is applied to a servomechanism in a real environment; whose approximate model is derived as a third order system with time-delay, utilizing the system identification toolbox of the MATLAB. Then it is shown that the proposed controller values satisfy the desired performance criteria; and the actual response of the system is in accordance with the theoretical one.

KEYWORDS - PID Controllers, Discrete Control Systems, Time-Delay Systems, Dominant Pole Placement, Nyquist Criterion
A COMPARISONAL STUDY ON UNBALANCE FAILURE IN THE PERSPECTIVE OF VIBRATION AND ELECTRICAL CONSUMPTION ANALYSIS

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ABSTRACT

In this research, condition of resonance effect which is a common problem for mechanical constructions has been studied in perspective of unbalance failure of a bearing. A test setup designed respect to case practices; constructed and located in laboratory conditions. A bearing in the electrical motor, that is one of the elements in the test setup, has been selected for gathering data in vibration and electrical consumption during the test. The purpose of the research is testing condition of unbalance failure and resonance for studying comparison in various predictive maintenance approaches. Test has been implemented under the electricity frequency of 40.5 Hz that induced the electrical motor for determining rotational speed. According to the analysis results, inspecting of unbalance failure and resonance problem has been detected more clearly by vibration analysis.

KEYWORDS - electrical consumption, unbalance, resonance, vibration, fourier
THE REALIZATION OF A CONTROL ALGORITHM AND ITS PLC BASED PROGRAM ABLE TO AUTHORIZE FOUR DIFFERENT RANKS OF PRIORITY TO ELEVATOR USERS

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ABSTRACT

Elevator software programs are currently unable to meet the required demand regarding elevator services of high-rise community and government buildings such as hospitals and social centers. Administrators, emergency room doctors and nurses in hospitals; authorities in public or governmental buildings (such as ministers, governors, rectors, deans); or managers, and staff working in community buildings wish privileged use of existing elevators. This isn’t only a personal privilege, but an institutional necessity; resulting in a second elevator assigned to VIP use. Regretably, while such elevators are empty, others become too crowded and queues form up, resulting in frequent breakdowns. Not to mention the unauthorized use of said elevators causing problems in instances where an emergency is at hand. The solution of card and/or key systems on the other hand has become tedious and inefficient. In this project, authorization rankings were assigned and special usage privileges given. Thus, in cases where VIP usage is needed, the elevator temporarily cancels out either totally or partially all other calls according to VIP ranking, resulting in the efficient use of elevators by preventing them from being inactive when there is no ongoing VIP usage. Algorithms have been written for authorized use and have been designed for flexible response using PLCs. This project utilizes a model encompassing a four rank authorization system (three VIP, and one normal) which, after a number of simulations, has been tested on a servomotor-powered mechanism. The project is planned to be expanded to incorporate up to a ten rank authorization system.

KEYWORDS - Elevator Control, PLC (Programmable Logic Controller), Privileged Use of Elevators
ELECTROCHEMICAL DISCHARGE MACHINING A REVIEW

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ABSTRACT

In this study, progress and sort of electrochemical discharge machining (ECDM) that was developed to manufacture the micro features like micro grooves, micro pillar, micro holes and micro channels etc. were investigated. Many materials can be machined regardless of material conductivity, hardness and strength by ECDM using electro chemical machining (ECM) and electric discharge machining (EDM) combination. Researchers developed electrochemical discharge drilling (ECDD), turning (ECDT), grinding (ECDG), milling, dressing, trepanning, wire ECDM, die-sinking ECDM, rotary ECDM, powder mixed ECDM, magnetic field assisted ECDM, vibration assisted ECDM methods. Pyrex, glass, stainless steel, cermet, soda lime glass, quartz, silicon nitride, zirconium oxide, borosilicate glass, diamond crystals, e-glass/epoxy composite, kevlar/epoxy composite and silicon wafer were used as a work piece. Effects of machining voltage and drilling depth on mean diameter, influence of tool travel rate on groove width and depth and effects of voltage types on micro holes accuracy and machining type etc were investigated. This review is to discuss the results of studies and applicability of this methods. It sums up also with a vision for future research in electrochemical micromachining.

KEYWORDS - Electro chemical machining (ECM), electric discharge machining (EDM), electrochemical discharge machining (ECDM), micro machining
BALANCE CONTROL SYSTEM APPLICATION FOR ON VEHICLE MOBILE CRANE

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ABSTRACT

In this study, a momentum control system is developed with microcontroller to help the vehicle operators safely utilize on-vehicle mobile crane. Balance measures like boom angle and the pressure on cylinder are controlled with a microcontroller and crane control is regulated depending on the previously recorded limits on microcontroller. Developed system aims to minimize operator originated accidents and provides solution to ensure work safety sanctions.

KEYWORDS - Moment Control System, Balance Control System, On-Vehicle Mobile Crane
ANALYSIS OF SUSPENSION SYSTEM FOR 3D PRINTED MOBILE ROBOT

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ABSTRACT

In this study, 3D printed mobile robot with suspension system was analysed using Computer Aided Engineering (CAE) methods. Spring and damping coefficients of the suspension system were determined. Structural and dynamic analyses were conducted after the selection of appropriate spring and damping coefficients to find structural strength and power requirement of mobile robot. The length of robot and the number of wheels were decreased to one third of the real to ease the analysis. A concrete road with the length of 1,000 mm and 10° inclination was created as ground to simulate the real world. Obstacles with the height of 80 mm were placed on different locations on the path of the wheels for the robot. The designed suspension system was consisted of; two dashpots connected to wheels and body through connection components and a spring between two wheels to ensure the stability. Polylactic acid (PLA) was used as body material. In the structural part; the strength of the robot body and critical part (suspension leg) was computed by Finite Element Analysis (FEA). Safety factor values for body and critical component were found as almost 7 and 4, respectively. It was obtained from the analysis results that maximum equivalent stresses and strains (for body = 3.4 MPa, 3 e-3 mm/mm and for critical component = 6.5 MPa, 6 e-3 mm/mm) were occurred while robot was passing the obstacles. In dynamic analysis; robot was driven with three different speeds (0.25, 0.5 and 1 metre per second) on the same road conditions. The motor torque and force values, suspension system results (force and elongation), angular velocity of the wheels and power requirement of mobile robot were calculated. The results showed the power requirement of robot is 70 Watt when it is driven with maximum velocity.

KEYWORDS - Computer Aided Engineering, Finite Element Analysis, Polylactic Acid, Suspension System, 3D Printed Mobile Robot
Two-Dimensional Sensor Localization Using Different Types of Distributed Sensor Networks

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Abstract

Two-Dimensional Sensor Localization Using Different Types of Distributed Sensor Networks Dogan Yildiz, Serap Karagol Ondokuz Mayis University, Electrical & Electronics Department Samsun, TURKEY Abstract—Wireless Sensor Network (WSN) refers to a group of locationally dispensed and dedicated sensors for observing and recording the physical conditions of the environment and coordinating the aggregated data at a centrical location. To serve such new applications, localization is largely used in WSNs to define the current location of the sensor nodes. Time of Arrival (ToA) localization is one of the prevalent schemes due to its high estimation accuracy. ToA is a method to estimate the location of a target based on the correlation of the signals and calculating the distances from each anchor to the target by multiplying the speed of light and the time at which the signal is received. In our recent study, we propose Modified 3N algorithm in both 2D and 3D spaces. In the Modified 3N algorithm in 2D, three circles were used and in the Modified 3N algorithm in 3D four spheres were used to localize the target nodes in the network. In this paper, we used Normal, Beta, Weibull and Generalized Pareto distributed networks for localization and the localization performance of the networks are evaluated and compared using MATLAB simulations.

Keywords - Sensor Networks, Localization, Time of Arrival, Modified 3N Algorithm
DESIGN AND IMPLEMENTATION OF A MICROCONTROLLER CONTROLLED DIGITAL MAHYA

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ABSTRACT

Mahya is a string of enlightened inscriptions set up between two minarets of mosques during Ramadan nights. In this study, a microcontroller controlled digital mahya which can be programmed with a remote control was designed using digital fonts. Two counts of Pic16F877A microcontroller were employed; one on the mainboard and the other in the remote control. Moreover, one Pic12F675 microcontroller was used for each letter on the mahya. The software installed on the microcontrollers was prepared using the PicBasicPro language. 3 counts of different texts can be stored in the remote control module of the mahya and the desired text on the mahya is sent from the remote control to mahya via serial communication. The mahya designed for this study is made up of 30 digital letters and each letter consists of 14 segments. One-meter long string leds were used for each of these segments. Also, two additional segments were added to every letter for Turkish characters. 2 counts of 74hc595 ShiftRegister integrated circuits were used to drive the total of 16 segments. All the mahya tests were carried out in a workshop setting and then it was started after setting up between the minarets of a mosque.

KEYWORDS - Mahya, Pic Microcontroller, Serial Communication, Software
ELECTRONICS OF A HOLONOMIC RESCUE ROBOT WITH A SCREW DRIVE MECHANISM FOR SOFT TERRAIN MOBILITY

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ABSTRACT

In rescue robotics, one of the most important features of the robot is the mobility, where the robot must be able to move inside the rubble to reach victims. In order to accomplish the difficult task of mobility, robots with different drive mechanism principles are built: ranging from serpentine motion to wheeled and tracked platforms. Another important feature of the mobility is holonomy, where the robot can move in any desired direction so that it can maneuver better in tight spaces. This paper reports design, prototyping and testing stages of a new mobility mechanism, namely a screw wheel drivetrain, where the wheels of the robot are screw shaped wheels. The special wheel design allows the robot to be holonomic and to perform well on soft terrain. The test results on the prototyped robot prove the system efficiency.

KEYWORDS - Holonomic, screw wheel drive, rescue robot design, soft terrain mobility
ANALYSIS OF MECHANICAL PROPERTIES OF SHAPE MEMORY ALLOYS

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ABSTRACT

In this study, a particular mechanism is designed to obtain the mechanical properties of shape memory alloys (SMA). Mechanical behavior occurring due to the superelastic properties is investigated by applying current to shape memory alloys via designed mechanism. Displacement, velocity, time, force physical effects of SMA springs is obtained for different current values, and active operating range of springs is determined. This acquired datas are of importance in determining the area of use of shape-memory alloys. This paper presents the structure of the designed mechanism, and datas of mechanical properties of shape memory alloys which is obtained by using this designed mechanism.

KEYWORDS - SMA, shape memory alloy, superelastic, actuator
DEVELOPMENT OF A 3D LASER SCANNING SYSTEM FOR LOCALIZATION AND MAPPING IN ROBOTIC APPLICATIONS

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ABSTRACT

In the recent decade, one of the most important topics in researches and developments is the studies performed in robotic and mechatronics applications. Especially, the mass production systems, automobile industries and military-defense products are continuously enhanced. They strictly follow and adapt the new methodologies, approaches, systems and tools created in robotic and mechatronics research world. Their common objective is to develop better autonomous / automation systems. While such autonomous systems are designed, some tools used for scanning and recognizing the working environment are required. Considering the efficiency, repeatability, accuracy and environmental conditions, laser scanning systems are generally preferred to meet these expectations. They are used for mapping the surrounding of the working area. If the system is mobile, they are also used for localization. In this study, a 3D laser scanning system based on a 2D laser scanning rangefinder is developed. The system consists of a rotating unit on which a 2D laser scanner is placed. Rotation is provided using a stepper motor. The rotation control of this unit is achieved using a motion controller. A high resolution encoder and encoder interface card are also plugged into the system to get the direct rotation angle information. By this way, the required feedback is supplied to the control structure developed. The use of high resolution encoder provides also getting rotational velocity with high accuracy. The position and velocity control of the rotating parts of the system are controlled using an ATmega based microprocessor. Not only the control issues of the rotating parts, but also data flow and process of the 2D laser scanner is performed in real-time. The decoding process of the laser sensor is done using an algorithm created in C++. In order to create the 3D map of the surrounding, the data coming from the laser scanner and the rotation angle information obtained from high resolution encoder are integrated under a mathematical model built in Matlab/Simulink. Many experiments are conducted and successful results are obtained.

KEYWORDS - Localization, mapping, robotics, laser scanner
IMPLEMENTATION OF FUZZY LOGIC BASED SPEED CONTROL OF BRUSHLESS DIRECT CURRENT MOTORS VIA INDUSTRIAL PC

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ABSTRACT

The brushless direct current motors are often preferred in the industry due to their high development torques, efficiencies, speed and position controls. Especially, they are used with robotic, numeric-controlled machines, electrical vehicles, etc. One of the biggest difficulties of these motors is the closed loop operation of these motors with driver circuits and a controller. In this study, the speed control of the brushless direct current motors was made with PLC-based industrial computer by using the methods of PID and Fuzzy Logic. PLC based industrial computer of Beckhoff firm CX9020 was preferred as a controller. In this industrial computer, the software of the controller was developed by using Structured Text programming language of Twincat 2.11 program. In experimental studies, the speed control of the brushless direct current motors is made with PID and fuzzy logic controller, according to the requested reference. The performances of the controllers were tested by using step, ramp and ladder functions. While PID controller gave better results in reference speed areas whose parameters were determined, fuzzy logic controller gave better results in variable references. Although PID is given as a ready block in PLC and PLC based controllers, fuzzy logic is under development in many of them. In this study, classical PLCs and PLC based industrial computers, which did not have any fuzzy logic controller module, were transformed into intelligent controllers with Structured Text programming language. As a result of this, classical PLCs and PLC based industrial computers can be used in intelligent control, which is very important for industry 4.0.

KEYWORDS - fuzzy logic, speed control, industrial PC
DESIGN AND MANUFACTURING OF A MICRO-TENSILE TESTER

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ABSTRACT

One of the most common used methods for determining mechanical properties of engineering materials is tensile test. The tensile test is a process that test sample is pulled in-line a certain speed and in constant temperature until it breaks. In this study, portable micro tensile tester that low strength materials have enough capacity to do tensile tests has been engineered and produced. Stress and strain in tester have been real time followed by wireless communication with an interface prepared in LABVIEW. Performed tester is workable-sized with needed atomic force microscopy to study microstructure and macrostructure of materials together. Due to being portable-sized of tester, it can be used in classroom in materials science education. Snapshot of sample and stress-strain curve are real time followed with the camera placed on the tester at the same time. Performed tester has been thought that students have understood and have evaluated the mechanical properties of materials.

KEYWORDS - Tensile tester, Mechanical properties, Stress-strain behavior
MATERIAL SCIENCE AND METALLURGY
THE EXPERIMENTAL AND THEORETICAL STUDIES OF THE
CHARACTERISTICS OF LSPR PEAKS OF METAL NANOPARTICLES
CONTROLLED BY AR AMBIENT GAS PRESSURE FOR THE EFFICIENCY IN
THE SOLAR CELL

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ABSTRACT

Metal nanoparticles have size in the range 1-100 nm which show interesting chemical and physical properties compared with its bulk form. Especially, the noble metal nanoparticles such as Au, Ag, Cu have some unique optical properties that are grown by the techniques such as Chemical Vapour Deposition(CVD), Physical Vapour Deposition(PVD), Molecular Beam Epitaxy (MBE), Pulsed Laser Deposition(PLD). In our studies, we use PLD method to deposit the metal nanoparticles. Nanoparticle thin films were deposited on microscope slide glass and silicon substrate by Pulsed Laser Ablation(PLA) and then PLD methods using Nd:YAG laser at the vacuum condition and in Ar background gas pressure. Vacuum chamber can be evacuated down to 10-8 mbar and then experimental works can be carried out using an Ar or other ambient gas pressure over a vacuum range of 1x10\(^{-1}\) - 10\(^{-7}\) mbar. \\
Due to Atomic Force Microscopy(AFM) and Scanning Electron Microscopy(SEM) analyses that the deposition rate was decreased due to the collisions of Ag particles in the shrinking plasma by filling of Ar gas into the vacuum chamber. According to the absorption spectra taken by UV-VIS spectrometer, the wavelength, where the Localized Surface Plasmon Resonance(LSPR) was observed, was shifted towards to the lower wavelength region as Ar background gas pressure was increased. The obtained spectra for some metal thin film nanoparticles was theoretically analysed and figured out by using a BEM(Boundary Element Method) simulation programme. In this study, experimental spectrum and simulation data for metal nanoparticles were acquired and compared, both are in well agreement. As a result of the release of Ar gas into vacuum chamber, the interparticle distance was increased and the changes occurred on the shapes of the metal nanoparticles. This showed that LSPR wavelength can be tuned by adjusting the distance between metal nanoparticles depending the Ar gas pressure.

KEYWORDS - Boundary Element Method (BEM), Pulsed Laser Deposition (PLD)
RESEARCH AND SYNTHESIS OF ALTERNATIVE CHAMOTTE MATERIALS IN SANITARYWARE FINE FIRE CLAY PRODUCTS

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ABSTRACT

Two different slips are used in the ceramic sanitary ware sector for different products. These slips are vitrified clay and fine fire clay (FFC). Large-sized products having low firing deformation requirement, like sink, are produced from FFC slips. It is known that high strength and low deformation behavior of FFC products are provided by fireclay raw material. In addition to these important features of fireclay material, it is imported from quiet limited foreign manufacturers. This situation leads to high cost and economical instabilities. Especially in the last two years, fireclay costs has increased in the rate of 30% due to upgrade exchange rate. This case caused competitive challenges among the ceramic sanitaryware manufacturers in Turkey due to increased production costs. The aim of this study is to increase the competitiveness of ceramic sanitaryware companies in Turkey and offer domestic alternatives to world fireclay market. In this study, domestic synthesis of fireclay and other derivative raw materials have been used as an alternative for imported fireclay. According to the experimental results, it was observed that different materials can be produced instead of imported fireclay. Significant advantages in terms of costs can be provided by these materials.

KEYWORDS - Fireclay; Chamotte Production; Cost Advantage and Competitiveness
SYNTHESIS AND CHARACTERIZATION OF SOL GEL HYDROXYAPATITE COATINGS ON THE BETA TYPE TITANIUM ALLOYS THE EFFECT OF SINTERING CONDITIONS

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ABSTRACT

In this study, hydroxyapatite (HA) based composite films were successfully synthesized on the β-type Ti29Nb13Ta4.6Zr (TNTZ). The solutionized TNTZ substrates coated with HA and HA/Titania (TiO2) bioactive composite coatings by sol-gel method under various sintering parameters related to sintering temperatures and heating ramp rates. Microstructural observations of the coatings revealed that apatite was formed on the substrates. The hardness values of the coatings increase with increasing both the sintering temperature and the TiO2 concentration in the coatings layer. However, it was found that the heating ramp rate of the sintering was not affecting the hardness values so much. Also, the hardness values of the HA/TiO2 composite coatings at all sintering temperatures were higher than only HA coated TNTZ samples due to the existence TiO2 phases in the HA matrix. Results indicating that the doping of HA with TiO2, improve the physical consistency between the coating layer and the substrates and provide a better inter-particle bonding due to the existence TiO2 phases in the HA. This work was financially supported by TUBITAK (The Scientific & Technological Research Council of Turkey, MAG 114M437).

KEYWORDS - Hydroxyapatite, TiO2, Sol-gel, Hybrid coating
BURST FAILURE OF NANO SILICA ADDED 55 6 FILAMENT WOUND BFR EPOXY COMPOSITE PIPE

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ABSTRACT

Filament winding process commonly is applied for high pressure containers, gas and liquid transfer line, mobile bridging components and military applications. In this production methods, glass fiber generally used in but, mechanical properties of glass fibers is lower than Kevlar, basalt and carbon fibers. Although carbon and kevlar fibers have high mechanical properties, their costs are so high. Therefore, basalt fibers, having high mechanical properties than glass fibers and low cost are preferred and gotten by gaining the significant for the polymer composites as reinforcement material. To improve the mechanical properties of composites especially for polymer matrix, the matrix polymers have been modified with nanoparticle addition. SiO2 nanoparticles has low cost and ensuring fine mechanical properties. In this present study, the static internal pressure tests were carried out to 4%wt SiO2 nanoparticle added [±55]6 BFR and pure [±55]6 BFR ±6 layers filament wound epoxy composite pipes under open ended conditions. To find possion ratio and young modules of composite pipes strain gauges were used. At the end of experiments, strength and failures of SiO2 nanoparticle added BFR and pure BFR composite pipes were investigated.

KEYWORDS - Basalt fiber, Composite, Nano Silica
DENSIFICATION AND MECHANICAL BEHAVIOR OF ALUMINA MATRIX NANO METAL COMPOSITES

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ABSTRACT

Alumina is widely used as structural ceramic material because of its mechanical properties such as high hardness, compressive strength, elastic modulus, and it also has low cost, good chemical, and thermal stability; however their use in many applications is limited by low fracture toughness and low tensile strength. For this reason, there has been research being done on alumina matrix composites in order to increase the fracture toughness and strength values. Towards achieving this aim, nanocomposites which are produced by either adding a nano sized metal phase into the alumina or formation of a nano sized metal phase during/or prior to sintering, has an important place.

In the proposed study the effect of using polypropylene carbonate as a binder to increase the green density of pressed Al2O3/nNi and Al2O3/nCo nanocomposites and its effects on sintering behavior will be investigated. For this purpose, Ni and Co precursor will be coated on Al2O3 powder by the heterogeneous precipitation method, metal oxides will be formed by calcination in air and they will be reduced to metal form by heat treatment. Al2O3-nNi and Al2O3/nCo powder mixture will be mixed with varying ratios of PPC to increase the plasticity of the powder mixture, and prismatic specimens will be produced by pressing the powder in the uniaxial press and in the cold isostatic press. These specimens will be sintered in order to produce nano composites. Microstructural characterization of alumina matrix nano composites will be conducted using X-Ray diffraction, scanning electron microscope; compositions with better microstructure will be further investigated for their mechanical properties such as elastic modulus, strength, hardness, and toughness. Finally, microstructure- mechanical property relations will be investigated.

KEYWORDS - Ceramics, Alumina, Composite, Nano, Sintering, Green Density, Microstructure, Strength, Hardness, Toughness
MODELING OF WOOD BONDING STRENGTH BASED ON SOAKING TEMPERATURE AND SOAKING TIME BY MEANS OF ARTIFICIAL NEURAL NETWORKS

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ABSTRACT

Adhesive bonding of wood enables sufficient strength and durability to hold wood pieces together and thus produce high quality wood products. However, it is well known that many variables have an important influence on the strength of an adhesive bonding quality. The objective of the present paper is to predict the bonding strength of spruce (Picea orientalis (L.) Link.) and beech (Fagus orientalis Lipsky.) wood joints subjected to soaking by using artificial neural networks. To obtain the data for modeling, beech and spruce samples were subjected to the soaking at different temperatures for different periods of time. In the ANN analysis, 70% of the total experimental data were used to train the network, 15% was used to test the validation of the network, and remaining 15% was used to test the performance of the trained and validated network. A three-layer feedforward back propagation artificial neural network trained by Levenberg–Marquardt learning algorithm was found as the optimum network architecture for the prediction of the bonding strength of soaked wood samples. This architecture could predict wood bonding strength with an acceptable level of the error. Consequently, modeling results demonstrated that artificial neural networks are an efficient and useful modeling tool to predict the bonding strength of wood samples subjected to the soaking for different temperatures and durations.

KEYWORDS - Neural network, bonding strength, prediction, wood, soaking
WEAR AND EXFOLIATION CORROSION BEHAVIOR OF AA7075-SiCp COMPOSITES FABRICATED USING POWDER METALLURGY AND HOT EXTRUSION

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ABSTRACT

The aim of this study is to investigate the effect of SiC particle size on the hardness, wear and exfoliation corrosion behavior of AA7075-SiC composites. For this purpose, various size (8, 32 and 82 μm) and amount (wt.%10 and %15) of SiC particles have been added into AA7075 aluminum alloy powders and Ø35x30 mm cylindrical blocks were produced by pressing. These pressed powder metal compacts are extruded at 480 °C, with 8,5:1 ratio as 12 mm dia round bars. Then, T6 heat treatment was applied to AA7075-SiCp composites aged at 120 °C for 24 hours after solution heat treatment at 480 °C for 2 hours. In order to identify the hardness and abrasion strengths, hardness and wear tests were performed to all samples under same conditions. Exfoliation corrosion behavior of composites was determined using EXCO corrosion test solution prepared according to ASTM G34-Standard test method. Experimental results showed that with the increase of SiC amount in the composites, the hardness and wear resistance increased, but exfoliation corrosion resistance decreased.

KEYWORDS - AA7075, composite, extrusion, wear, corrosion
ADSORPTION OF METHANE ON NATURAL AND MODIFIED MORDENITE TYPE NATURAL ZEOLITE

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ABSTRACT

The crystal structure of mordenite was determined by Meier (1961) and refined by Gramlich (1971) on Na-exchanged natural crystals from Challis, Idaho, USA. The topology of the framework is characterized by 5-member tetrahedral rings. Mordenite is a high-silica zeolite, in which the Si,Al content of the framework making it more resistant to attack by acids than most other zeolites. Natural zeolite such as clinoptilolite and mordenite are used considerably in many industrial, environmental and energy storage applications due to their unique gas adsorption and molecular sieve properties. Methane is the main component of natural gas that occurs as a result of the decomposition of plant or organic matter in the absence of oxygen. In this study, the methane gas retention of (M) mordenite from Ağva and that of acid and cation-exchanged (H+, Na+, K+, Li+, Ca2+ and Mg2+) forms was investigated up to 100 kPa pressure at 273 and 298 K using automated volumetric equipment (Autosorb 1). All the mordenite samples were characterized by XRF and TG-DTA techniques. It was determined that uptake of methane (CH4) on the mordenite samples at 273 K and 298 K decreased in the following order Li-M > Na-M > Doğal-M > Mg-M > Ca-M > H-M > K-M and Li-M > Doğal-M > Mg-M > Ca-M > Na-M > H-M > K-M, respectively. Experimental results showed that LiNO3 treated form of Ağva mordenite is most optimal for uptake of methane gas compared to natural and other acid and salt modified forms.

KEYWORDS - Adsorption; Methane, Mordenite; TG-DTA; XRF; Zeolite.
WEIGHT REDUCTION STUDY ON BIW BY USING BORON ALLOYED HOT STAMPING SOLUTION OF FRONT FRAME RAIL INSTEAD CONVENTIONAL HSS OR AHSS APPLICATIONS

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ABSTRACT

With the increase of the performance requirements and homologative restrictions the correct way of choosing the right material on the related area is an inevitable manner for weight reduction of the vehicles. A hot stamped front frame rail which have roughly same performance with conventional cold stamped one was designed by using tailor welded and patch reinforcement. The part was optimized with full sized frontal crash (EUNCA P), full sized rear crash (Trias33) and fatigue simulations. Critic interferences-accelerations into the passenger cabin was considered for acceptance criteria of frontal crash, deformations on fuel system for acceptance criteria of rear crash and plastic deformations on the part, especially suspension fixing points, for acceptance criteria of fatigue test. At the end of all optimization the thicknesses of the system was designed as; first tailor welded part: 1.2mm, second tailor welded part:2.5mm and patch reinforcement: 1mm. Also some design critics (such as laser cut holes and trims, seal and barrier application for eliminating water infiltration into the bare surfaces of the hot stamped part) was clarified to guarantee the performance of the part during lifecycle of the vehicle. With final condition new hot stamped system was weighted 5 kg and gained a 2 kg weight reduction.

KEYWORDS - Hot stamping, Front frame rail, boron alloyed steels, Weight Reduction
WELD CURRENT EFFECT ON THE TENSILE STRENGTH OF COLD ROLLED TWIP980 STEEL JOINTS WELDED BY RESISTANCE SPOT WELDING

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ABSTRACT

Recently, as a result of the development of new commercial steel sheets for applications in car body manufacturing, high manganese twinning-induced plasticity (TWIP) steel sheets are gaining popularity in automotive body structure applications. The use of steel sheets in the automotive industry inevitably involves welding, particularly after the cold forming. Resistance spot welding (RSW) is the most widely used joining process for steel sheets in car body manufacturing. The application of cold formed TWIP steels may require a more complete understanding of some issues associated with the resistance spot welding. So, in this study, the effect of weld current on the tensile shear strength of cold rolled TWIP980 steel joints welded by resistance spot welding was investigated. Prior to welding, TWIP980 sheets were cold rolled to 15% reduction in thickness. The welding processes were carried out using MFDC (Mid-Frequency Direct Current) resistance spot-welding machine connected to ABB robotic arm. Weld currents were chosen as 6, 7, 8, 9 and 10 kA and the other welding parameters were kept constant. Microstructural study and tensile shear tests of the joints were conducted. From the examinations, the post weld properties, such as the nugget size, indentation depth and tensile shear strength of the joints, were determined depending on the weld current.

KEYWORDS - TWIP980 sheet steel, Resistance spot welding, Weld current, Tensile shear load
HYDROPHILICITY PROCEDURE OF AGAVA AMERICANA L FIBERS WITH ECOLOGIC METHODS

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ABSTRACT

Agava Americana L. plant is known as ‘century plant’ in Turkey belongs to Amaryllidaceae family. Commonly, the plant is cultivated in West Mediterranean Region and lingo-cellulosic fibers are obtained from the plant. Enzymes are defined as biocatalyzers consisted of the metabolic products of living organism. Trametes versicolor and Coriolus versicolor produce laccase enzymes. In this study, the fiber obtained from Agava Americana L. plants was treated with laccase enzyme at different concentrations (0.5, 1, 1.5, 2 and 2.5 %) in order to remove oils, waxes and other contaminations according to conventional and ultrasonic methods. After the enzymatic treatment, whiteness index, hydrophility and mechanical properties of samples were analyzed in terms of enzyme concentration and treatment methods.

KEYWORDS - Agava Americana L. fibers, laccase enzyme, ultrasonic method.
AN INVESTIGATION ON MICROSTRUCTURE AND MECHANICAL PROPERTIES OF ALC ADDED PM STEELS

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ABSTRACT

In this work, microstructure and tensile behaviours of AIC added PM steels were investigated. The microstructure of the PM steels was characterised by optic microscope, SEM and EDS. Results indicated that 0.2 wt. % AIC added PM steel showed the highest values in yield strength (YS) and ultimate tensile strength (UTS). However, when the amount of Nb content increased from 0.2 to 0.5 wt.%, yield strength, ultimate tensile strength and elongation decreased.

KEYWORDS - Powder metallurgy; powder metallurgy steels; AIC; Microstructure; Mechanical properties
ANALYSIS OF REFRACTIVE INDEX DISPERSION AND RELATION BETWEEN OPTICAL BAND GAPS AND INDEXES OF REFRACTION OF PPTTPP NANOFIBER

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ABSTRACT

The refractive index dispersion of the PPTTPP crystal nanofiber for different solvents was analyzed. The relation between optical band gaps and indexes of refraction of PPTTPP crystal nanofiber for different solvents was investigated. Effects of solvents on refractive index dispersion and indexes of refraction were investigated in detail. Finally, the surface morphology properties of the PPTTPP film were investigated by a Park System, XE100 atomic force microscope (AFM).

KEYWORDS - Refractive index dispersion, PPTTPP crystal nanofiber, refractive index, solvents, AFM.
LOW VELOCITY IMPACT RESPONSE OF NANO-CACO3 MODIFIED EPOXY/CARBON FIBER LAMINATED NANOCOMPOSITES

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ABSTRACT

Nano calcium carbonate (CaCO3) is used to enhance mechanical performance of fiber reinforced polymer composites (FRPs). In the present study, the influence of nano-CaCO3 have been examined by using the low-velocity impact tests on carbon fiber reinforced laminated epoxy nanocomposite to determine its impact response. At the begining, several rates of nano CaCO3 particles which are quoted epoxy (1 to 3 wt %) were dispersed into acetone, than this solution was added into epoxy resin. After aceton was removed via vacuum oven, nanocomposites were manufactured by low cost Vacuum Assisted Resin Infusion Method (VARIM). The test performed according to ASTM-D-7136 standard with impact energies of 5, 10 and 15 Joules on 100 x 150 mm tests specimens. Considering to impact force and displacement versus interaction time ental results, nano CaCO3 particles provided significant improvement on impact damage resistance. The highest damage resistance and more efficient energy absorption observed addition of 2 wt % nano CaCO3 paticles as an optimal ratio.

KEYWORDS - epoxy modification, impact behaviour, vacuum assisted resin infusion method (VARIM),nano calcium carbonate
APPLICATION OF THE SIO2 NANOMATERIAL ON TEXTILE PRODUCTS

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ABSTRACT

Advances in materials technology, the emergence of new products and new markets affect development of all areas and all sectors. Especially in the last 20 years, increasingly gaining importance as an advanced material field, the 'advanced materials' make feel their specified features. effective and safety, excellent properties of physical, chemical and mechanical properties, small, less occupancy, cheaper and better suitable to new functionalities, with high performance and high value materials is increasing. Recently, silicon, and titanium-based nanoparticles have led to significant improvements in protecting the surface of the material in the coating industry and have been often used. Liquid SiO\textsubscript{2} solutions produced by silicon-based nano-powder are covered on the fabric surface by using spray method. Fabric surfaces were coated in the room temperature, in air, at different nozzle (1.8, 1.4, 1,0.8 mm) fewer than 3.5 bar spraying pressure and in 30 cm away from the sample gun. Surface analysis of the coated fabric was performed by using Contack Angle, SEM and AFM imagenies. According to the Contack Angle measurements, the coated surfaces showed hydrophobic character between 120 and 145 degrees, the SiO\textsubscript{2} particles stucked to the fabric fibers as seen from SEM images, surface roughness continued as seen through AFM images. It was detected to getting worse at the quality of the coating while nozzle width increases.

KEYWORDS - Advanced materials, hydrophobicity, SiO2, Nano-coatings, Nano materials
PROPERTIES OF EPOXY COMPOSITES INCLUDING VOLCANIC TUFF

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ABSTRACT

In this study, epoxy composites were synthesized using tuff as filler and three types of plasticizers. Physico-mechanical and thermal properties of the epoxy composites were investigated with different analyses and tests. Well-dispersed epoxy composites were obtained according to XRD and SEM results. The epoxy composite including 3 wt% tuff had maximum tensile strength and elongation at break values as 244.7 MPa and 2.947%, respectively. Incorporation of plasticizers especially PEG decreased brittleness of the composites. Adhesion percent of neat ER slightly decreased with the addition of tuff and plasticizers. It was determined that corrosion resistance of the composites was not affected negatively in different corrosive solutions. The water sorption of the composites decreased with tuff; however plasticizers especially PEG caused to increase water sorption. The decomposition temperature of the composites were improved with tuff addition in spite of a slight reduction in initial decomposition temperatures with plasticizers.

KEYWORDS - Composite, epoxy resin, volcanic tuff, physico-mechanical and thermal properties
INVESTIGATION OF METALLURGICAL AND MECHANICAL PROPERTIES OF WELDED REGION OF API 5L X80 STEEL MERGED BY SUBMERGED ARC WELDING METHOD

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ABSTRACT

In this study, API 5L X80 steel materials which are used in natural gas and petroleum pipeline were welded by submerged arc welding method (FCAW). The macro-microstructure and mechanical properties (tensile and hardness tests) of welded samples were investigated. In the mechanical tests, it was observed with the tensile tests that the ruptures were occurred from the main material. Besides, when the hardness values were examined, the highest hardness values were determined in the weld metal. In the microstructure investigations, it was observed that acicular ferrite phase formed and fine grain structure was obtained in the weld metal. According to all results obtained from tensile-hardness tests and microstructure analyses, the welding process exhibited expected local properties as mechanical.

KEYWORDS - API 5L X80, SUBMERGED ARC WELDING, PIPELINE
CHARACTERISATION OF NITI - TI POWDERS PROCESSED BY MECHANICAL ALLOYING TECHNIQUE

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ABSTRACT

The present work reports the effects of the addition of pure Ti powders in Ni-rich NiTi shape memory alloy powders by mechanical alloying technique. In experimental study, different Ti powder (10µm) ratio were used (respectively 2%, 4%, 6%) for alloying Ni-rich prealloyed NiTi (30 µm) powders. 1:10 powder/ball ration was used for mechanical alloying system. The samples were characterized by X-ray diffractometry (XRD), element distribution spectrometer (EDS), scanning electron microscopy (SEM) techniques. As a result of studies, mechanical alloying technique is effective the Ti addition in NiTi alloy system.

KEYWORDS - Prealloyed NiTi Powders, Shape Memory Alloys, Powder Metallurgy
INVESTIGATION OF THE EFFECT OF NANOCLAY INCLUSION ON CHARPY IMPACT BEHAVIOR OF THE GLASS FIBER REINFORCED COMPOSITE LAMINATES

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ABSTRACT

The progression in technology requires improved material performance to satisfy market necessities. One of the promising ways for the improvement of composite materials is the addition of some additives or fillers. Due to scientific and industrial relevance, the investigation of the effects of additives into material have become popular subject in the current decade. The current study presents the effects of nanoclay particles on the impact behavior of glass fiber reinforced composite laminates. Nanostructured composite laminates are fabricated by a vacuum bag molding after hand layup technique using different weight percentages of nanoclay. Charpy impact tests are performed to determine the impact behavior of fabricated laminates. The results show that the incorporation of nanoclay particles have significant effects on the Charpy impact behavior.

KEYWORDS - Composites, Charpy impact, nanoclay, glass fiber
THE EFFECT OF NANOCLAY ON TENSILE AND FLEXURAL BEHAVIOR OF GLASS FIBER REINFORCED COMPOSITE LAMINATES

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ABSTRACT

In this study, the effect of nanoclay particles on tensile and flexural properties of glass fiber reinforced polymeric composite laminates are investigated. The nano-structured composite laminates are fabricated by a vacuum bag molding after hand layup process using different weight percentages of nanoclay additive. The nanoclay particles are dispersed in epoxy resin using mechanical stirring. The tensile and flexural behavior of fabricated composite laminates are measured by performing uniaxial tensile and three-point bending tests. The present results show that the incorporation of nanoclay yields a substantial effect on the tensile and flexural properties of glass fiber reinforced composite laminates.

KEYWORDS - Composites, flexural, tensile, nanoclay, glass fiber
INVESTIGATION OF THE PROCESS PARAMETERS OF SHEET METAL BLANKING PROCESS BY USING FINITE ELEMENT METHOD

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ABSTRACT

Blanking process has an important usage in manufacturing and has become a necessity in several major sectors like automotive, sheet metal forming industry and etc. Although the general aspects of blanking seem simple, the shearing mechanisms and the governing parameters have a complex relationship and directly affect the surface quality of the blanked part. Also the lack of prediction capabilities in experimental studies leads to time, money and labor consuming trial and error procedures. Usage of FEM based programs to simulate blanking to obtain numerical results and observe the shearing mechanism is a cheap and a detailed way to for industrial applications. In this study five different clearances (%1, %3, %5, %10 and %20) and two different thicknesses (t:2 and t:3) were used to simulate the blanking process. Simulation were executed by using the FEM program, Deform 2-D. Investigations were made on the parameters related to crack progression like indentation angle, rollover angle and depth, crack initiation and crack propagation angles. The results of the present paper are in agreement with the results of experimental studies.

KEYWORDS - Blanking process, Sheet metal, Process parameters, Shearing mechanisms
FRICTION WELDING OF AZ91 AND 316 L STAINLESS STEEL

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ABSTRACT

316 L stainless steel was provided by private firm. AZ91 alloy was melted under argon atmosphere in a furnace and casted in metal mold. Samples were machined to fit size. Friction welding process was performed for various friction durations under 100 MPa forging pressure and 50 MPa friction pressure at 1000 rmp friction speed for different friction times. Microstructure of welding zone and fractured surface were examined with scanning electron microscopy (SEM). Microstructure studies indicated that welding interfaces were continuous and void-free. The shear strength values of the welding zone and matrix were determined. Fractured surface was examined with scanning electron microscopy.

KEYWORDS - friction welding, AZ91, 316 L
A COMPARATIVE INVESTIGATION OF THE EFFECTS OF BRASS AND COPPER ELECTRODES IN HOLE-EDM PROCESS

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ABSTRACT

Hole-EDM drilling is a different type of electrical discharge machining (EDM) processes, i.e. sink-EDM and wire-EDM. Although hole-EDM drilling uses the same principles as other EDM methods, a constantly rotated hollow electrode and pumping of dielectric fluid through the electrode tube are the two distinct features. This process has been alternatively used for producing holes in turbine blades, fuel injectors, medical equipment, cutting tool coolant holes, hardened punch ejectors, plastic mould vent holes and wire EDM starter holes. In this study, a comparative investigation of fast hole drilling of die steel, namely as DIN 1.2379 using EDM method was performed in order to explore the influence of electrode material, i.e. brass and copper electrode materials. The comparisons were made from the results of material removal rate (MRR), electrode wear rate (EWR) and scanning electron microscope (SEM) images of the white layer thickness (WLT) taken from the machined hole surfaces. The experimental results reveal that the brass electrode has comparatively better MRR and lower EWR. However, the SEM images show that brass electrode produces less damage and WLT on machined surfaces than copper electrode for this material.

KEYWORDS - Electrical discharge machining, Fast hole drilling, Electrode, Brass, Copper
THERMAL, MECHANICAL AND SHAPE MEMORY PROPERTIES OF PU/PVA/GRAPHENE NANOCOMPOSITES

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ABSTRACT

Polyurethanes (PUs) are a most versatile engineering material which is synthesized by a simple polyaddition reaction of polyol, isocyanate and chain extender. They find a variety of industrial applications including coatings, adhesives, sealants, elastomers, primer, sports goods, medical devices, textile finish aside from the various foam products [1–3]. Graphene oxide is the most important graphene derivatives [4]. It has unique properties such as electrical conductivity, large specific surface area and high mechanical strength. When the graphene has very little participation in polymer structure, it has improves mechanical, thermal, electrical and gas barrier properties of pure polymer materials. PVA has excellent properties such as biocompatibility, non-toxicity, hydrophilicity and processability. It has inherent disadvantages such as poor mechanical and thermal stability. Graphene has been used to improve the thermal and mechanical stability of commercially available PVA [5].

Polymer blend nanocomposites based on thermoplastic polyurethane (PU) elastomer, polyvinyl alcohol (PVA) and graphene oxide (GO) were prepared via simple melt mixing process and investigated for its mechanical, dynamic mechanical and shape memory properties. The effects of PU/PVA/Graphene on the morphology and properties of the nanocomposite films were examined by Fourier transform infrared spectroscopy, X-ray diffraction, thermogravimetric analysis and scanning electron microscopy. Loading of the graphene oxide in the PU/PVA polymer blends resulted in the significant improvement on the mechanical properties such as tensile strength, when compared to the pure graphene loaded polymer blends. Dynamic mechanical analysis showed that the glass transition temperature (Tg) of the PU/PVA blend slightly increases on loading of graphene and graphene oxide. Thermal and electrical properties of the polymer blend composites increases significantly on loading graphene or graphene oxide. Finally, shape memory studies of the PU/PVA/GO composites exhibit a remarkable recoverability of its shape at lower applied dc voltages.

KEYWORDS - GRAPHENENE, PU, NANOCOMPOSITE
ELECTROCHEMICAL STUDIES ON POLY(3,4-ETHYLENEDIOXYTHIOPHENE) POLYMER AND ITS POTENTIAL APPLICATION IN ELECTROCHEMICAL CAPACITOR

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ABSTRACT

Electrochemical studies on Poly (3,4-ethylenedioxythiophene) (PEDOT) electrode material as a conducting polymer and its potential application in electrochemical capacitor have been concentrated in this study. 3,4-ethylenedioxythiophene (EDOT) has been successfully electropolymerized in the presence of ionic liquid, 1-ethyl-3-methylimidazolium hydrogen sulphate (EMIMHSO₄) and organic electrolyte medium, LiClO₄/ACN electrolytes. Their capacitance performances were evaluated and compared with each other in the monomer free medium. The initial galvanostatic charge/discharge tests of PEDOT polymers were also investigated. The SEM studies show that the PEDOT films electropolymerized in EMIMHSO₄ were highly porous and have a higher anion doping level than those electropolymerized in LiClO₄/ACN electrolytes. Additionally, the symmetrical electrochemical capacitors based on two PEDOT electrodes were also constructed and characterized with electroanalytical methods. Furthermore results were compared with each other.

KEYWORDS - electrochemical capacitor, PEDOT, ionic liquids, conducting polymers
EFFECT OF DENSITY AND BLEND RATES OF COMPOSITE PANELS
REINFORCED WITH POLYESTER FIBRES TO TENSILE RESISTANCE

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ABSTRACT

Using of composite materials are getting important for many areas like aviation and defence industry, land and marine transportation, energy, infrastructure and construction sectors due to increasing necessity for alternative materials nowadays. Therefore; in competitive markets having increased consumption and production of materials, manufacturers are in tendency to add difference and functionality on their products. One of important ways of creating difference and functionality is to choose most available production methods and processes simultaneously with materials and carry out all of these in low costs. In this research, composite materials reinforced with polyester fibres which are known with low cost and high strength features, were obtained by using a resin as bonder. Phenol formaldehyde was preferred as bonder resin by the reason of having low thermal conductivity, high bonding, good water resistance and low cost characteristics during the production of composite materials. Blend consisted of opened polyester fibres together with bonder, was pressed in patterns at 130 0C. Composite materials were produced in two different densities and four blend rate. Tensile tests were applied to all composite samples to observe the performance in areas which they can be used. Obtained test results were evaluated by making essential interpretations.

KEYWORDS - Composite, Phenol formaldehyde, Tensile Test, polyester, Fibres
SYNTHESIS OF RUTHENIUM TYPE PYROCHLOR (EU2RU2O7) AND ITS PHOTOLUMINESCENCE PROPERTIES

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ABSTRACT

There are hundreds of different rare-earth compounds with the pyrochlore structure, so these materials show different properties, i.e. oxygen-ion conductivity, superconductivity, ferroelectricity and unusual magnetic behaviour, e.g. Some of these pyrochlore oxides can also show optical and nuclear properties. In this research, the ruthenium based pyrochlore was chosen and synthesized with solid state reaction method. X-ray diffraction (XRD) and photoluminescence (PL) measurements were carried out for this pyrochlore, Eu2-xInxRu2O7. The phase formation process was investigated by thermal analysis (DTA/TG) in the until 1300 °C. The X-ray diffraction (XRD) analysis results were as the cubic structure single phase with lattice parameters a:10.252 Å b:10.252 Å, c:10.252 Å and α:90° β:90° γ:90°. The photoluminescence (PL) analysis including excitation and emission spectras and decay time were determined by a PL spectrometer under room temperature. The sample was excited at 288 nm which was based on ligand-to-Eu3+ charge-transfer transitions (LMCT). The emission bands at 589, 608 and 692 nm are related with the typical 5D0→7F1, 5D0→7F2 and 5D0→7F4 transitions of the Eu3+ ion, respectively.

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KEYWORDS - Keywords— Ruthenium Pyrochlore, Thermal Analysis, Photoluminescence, Eu3+, X-Ray Diffraction.
MESO/MINIATURE FORMING WITH FLEXIBLE DIE

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ABSTRACT

In recent years, demand of meso/miniature scale sheet metal part with different geometry has increased dramatically. Pins for IC-carriers, fasteners, micro screws, lead frames, micro-cups and connectors, cell phones parts, as well as medical implants are the typical examples of these parts. In sheet metal forming processes, the geometry of the formed part follows the geometry of the die. Sheet metal forming can be divided as rigid die and flexible die according to die material. Flexible-die forming process is a versatile metal fabrication process is used in commercial aerospace, automotive and military applications. This process uses a flexible pressure carrying medium to replace a rigid punch or die. In forming process flexible material has different roles on forming the metal parts such as a punch, or for tube bulge forming etc. In this study, forming processes requires only a single rigid tool half and polyurethane with different hardness will be used as flexible material and experimental data from forming operations are presented briefly.

KEYWORDS - SHEET, FORMING, FLEXIBLE, DIE, MESO
HIGH TEMPERATURE SYNTHESIS AND PHOTOLUMINESCENCE INVESTIGATION OF SM3+ ACTIVATED YTTTRIUM ZIRCONATE PYROCHLORE (Y2Zr2O7)

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ABSTRACT

Rare Earth Zirconate type Pyrochlores exhibit complex and different compositions with high stabilities, high melting points, low thermal conductivities, excellent ionic conductivity and high tolerance to defects. In this research, the zirconate pyrochlore was synthesized as Y1.90Sm0.10Zr2O7 with high temperature solid state reaction method. The investigation of phase formation of this pyrochlore was analysed by thermal analysis (DTA/TG) until 1300 °C. The X-ray diffraction (XRD) analysis results gave the cubic structure single phase with lattice parameters a=b=c=10.335 Å and α:90°, β:90°, γ:90°. The photoluminescence (PL) analysis with excitation and emission wavelengths and decay time were determined by a PL spectrometer under room temperature. The sample was excited at 404 nm which was based on 6H5/2→4F7/2 transition of Sm3+-activator. The other excitations at 277 nm, 370 nm, 473 nm and 528 nm were related with charge-transfer absorption of Sm3+-O2− interaction in the UV region, 6H5/2→6P7/2, 6H5/2→4F5/2, 4I13/2, 6H5/2→4F3/2 transitions of Sm3+, respectively. The emission bands were also determined according to Sm3+-activator ion which were at 570 nm, 612 nm, 654 nm and 720 nm were attributed to the typical 4G5/2→6H5/2, 4G5/2→6H7/2, 4G5/2→6H9/2 and 4G5/2→6H11/2 transitions, respectively. ACKNOWLEDGEMENT The authors would like to thank TUBITAK (The Scientific and Technological Research Council of Turkey) for the support to the project numbered 114Z438.

KEYWORDS - Zirconate Pyrochlore, Thermal Analysis, Photoluminescence, Sm3+, Activator
COMPARISON OF OPTICAL AND ELECTRICAL CONDUCTANCE AND REFRACTIVE INDEX VALUES OF THE PTCDI C5 SMALL MOLECULE FOR VARIOUS RELATIONS AND CONDITIONS

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ABSTRACT

The optical and electrical conductance of the PTCDI-C5 small molecule for different molarities and solvents were compared and the refractive index values of the PTCDI-C5 for various relations (experimental, Moss, Ravindra, Herve-Vandamme, Reddy and Kumar-Singh), different molarities, solvents and types of the optical band transitions were obtained. Effects of molarities and solvents on optical and electrical conductance of the PTCDI-C5 were investigated. Also, effects of various relations, molarities, solvents and types of the optical band transitions on refractive index of the PTCDI-C5 were investigated in detail. The refractive index values were controlled.

KEYWORDS - Optical and electrical conductance, PTCDI-C5 small molecule, refractive index, molarity, solvent.
EXPERIMENTAL INVESTIGATION OF THE BENDING OF LOCALLY HEATED AZ91B MAGNESIUM ALLOY SHEET

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ABSTRACT

Automotive industry focused on reduction in weight to reduce fuel consumption and carbon footprint. This causes new studies on looking for materials has high specific strength. One of the current studies is concentrated on magnesium alloys. Its high specific strength is one of the most important reasons that make it popular. However, the low formability of magnesium alloys due to its hexagonal closed packed crystal structure at room temperature limits their usage in automotive industry. In this study, bending of AZ91B sheet was investigated experimentally. The minimum permissible bend radius, localized thickness change (necking), surface peeling and springback were measured for cold and locally heated specimens. The effects of local heating are presented.

KEYWORDS - Locally heating, formability, AZ91B, Cracking, Bending
IMPROVING DIE FILLING UTILIZING BI-DIRECTIONAL FORGING PROCESS

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ABSTRACT

Precision forging (net or near net shape) process is preferred in manufacturing automobile components due to high productivity, closer dimensional tolerances and minimal material waste. The basic drawback of the process is the requirement of higher forging load and encountered tool stresses. This limits the parts size and shape complexity. In this study, uni-directional and bi-directional forging processes are compared in terms of the forging load and die filling for U-shape axisymmetric part. The finite element analyses package (DEFORM) were used to simulate the process, and an experimental work was carried out for verification of the simulation model. A double acting servo press was used for the bi-directional forging. The movement of the upper and the counter punches of the press can be accurately controlled by the servo drive units. The results show that the forging load asymptotically increases at the final corner filling stage in the uni-directional forging. The corner filling is easier if the counter-punch is acting. The forging load is reduced and the shape accuracy is increased by using bi-directional forging process.

KEYWORDS - precision forging, servo press, die filling, finite element analyses, bi-directional forging
EFFECTS OF SI AND MN ON MACHINABILITY AND WEAR RESISTANCE OF AS91 AND AM90 MAGNESIUM ALLOYS

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ABSTRACT

This study investigates the effect of Silicon (Si) and Manganese (Mn) in AS91 (9% Al, 1% Si) and AM90 (9% Al, 0.5% Mn) magnesium alloys that are among important magnesium alloys wear resistance and machinability. Hardness of intermetallic phases found in the microstructure of magnesium alloys was observed to affect wear resistance and machinability. Mg2Si found in the microstructure of AS91 alloy was established to reduce machinability while intermetallic phase increased hardness and wear resistance. It was found that intermetallic phases (Mg17Al12, Mg2Si and Al8Mn5) of AS91 and AM90 magnesium alloys had an impact on cutting forces and machinability and mechanical properties.

KEYWORDS - Machinability, cutting force, surface roughness, wear, AS91, AM90 series magnesium alloys
THE PHASE COMPOSITION AND MICROSTRUCTURE OF CLINOPTILOLITE BY ADDITION OF AL POWDER

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ABSTRACT

In this study, the effect of Al-powder (up to 50% by weight) on the phase composition and microstructure for the clinoptilolite based ceramics is studied. The mixture was dry ground in a ball mill; it was shaped by uniaxial pressing at 50 MPa and later sintered at the temperatures of 1300°C for 1 hour under air atmosphere. The clinoptilolite is composed from silica and alumina, the silica with Al-powder being in-situ reaction which leads to corundum and silicon product and their amount has been increased with the amount of aluminium additive in the composition. The amount of metal powder in ceramic matrix is strongly determined the microstructure of samples where the material being either glassy foam nature, open-cell microstructure. The clinoptilolite is melted at 1300°C meanwhile its metal additive (Al-powder) is oxidized and thus the crystallization prevent the developed gases in the ceramic matrix and thus obtained glassy foam ceramic. The moderate metal additive increased the crystallization and thus the melting temperature increased where the formed gas discharged makes the sample as open-cell. As the high aluminium additive, the cermet type of sample is obtained where the aluminium coated by ceramic leads to composite material with less porosity.

KEYWORDS - Clinoptilolite, aluminium powder, foam ceramic, corundum phase, capillary, cermet
TERMO MECHANICAL VIBRATION OF FUNCTIONALLY GRADED NANO PLATES AND BEAMS BASED ON COUPLE STRESS THEORY

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ABSTRACT

This paper presents free vibration behavior of nano plates and beams made of functionally graded material subjected to thermal loading based on the modified couple stress theory. Material properties of the plates and the beams are dependent both the thickness direction and temperature. The material distribution is modelled in power-law in the thickness direction. The inclusion of an additional material parameter enables the new plate and beam model to capture the size effect. The new non-classical plate and beam model reduces to the classical plate and beam model when the length scale parameter is set to zero. In the solution of the problem, the Navier type solution is used for simply-supported boundary conditions. In the numerical results, the effects of the different material distributions, material length scale parameter, temperature rising on the fundamental frequencies of functionally graded nano plates and beams are investigated in both classical theory and modified couple stress theory in detail. Also, the effect of the temperature dependent physical properties is discussed for free vibration characteristics of nano FG structures.

KEYWORDS - Nano Structures; Functionally Graded Material; Vibration; Couple Stress Theory
ABSTRACT

Textile structural composites could be considered as alternative materials since they are delamination free and damage tolerant. In this study, multiaxis 3D flat and circular woven preforms were developed to enhance the in-plane properties of 3D preforms for composites. The multiaxis 3D flat and circular weaving method and formation technique was developed. The multiaxis 3D woven preform has five yarn sets as bias(+) and bias(−), warp (axial), filling and Z-yarns while the multiaxis 3D circular woven preform has five yarn sets as (±)bias, axial, circumferential, and radial yarns. In Figure 1, the actual multiaxis 3D carbon preform and multiaxis 3D weaving machine were shown, respectively. Figure 1. Developed actual multiaxis 3D carbon preform and weaving machine were shown, respectively. Multiaxis 3D flat and circular woven preform architectures were developed and made by the new method called “tube-carrier weaving” for flat preform structure and “radial crossing” for circular preform structures. The developed carbon preform was consolidated by compression molding. The basic mechanical properties of the multiaxis 3D woven carbon/epoxy composites were tested and analyzed by the stiffness averaging method. It was found that bias fibers on the top of the preform enhance the in-plane shear modulus and strength properties of the multiaxis 3D composite. In addition, the flexural properties of the multiaxis 3D composites were comparable to the laminated composites at equivalent fiber volume fraction. It was shown that the multiaxis 3D woven preform architectures were developed and successfully made by specially developed methods. Results were considered encouraging making multiaxis 3D woven carbon/epoxy composite for various applications especially space and aerospace industries.

KEYWORDS - Advanced preforms, Textile structural composites, 3D flat weaving, 3D circular weaving, carbon fiber
TRADITIONAL PRODUCTION AND WEAR BEHAVIOR OF COMPOSITE MATERIALS REINFORCED WASTE

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ABSTRACT

Advances in materials science is the basis of technological development. Physical and chemical properties of different materials can be combined to produce composite materials with superior properties descended. Due to the outstanding performance of metal matrix composites in aviation, aerospace, defense industry, led to the rapid advancement of technology is starting to meet the needs of the automotive industry. They are preferred because they have superior mechanical properties. In this study is to investigate the corrosion behavior of traditional and waste reinforced metal matrix composites. Al1014 as matrix material (Al2O3) alloy, the reinforcing member is 10\textmu m - 25\textmu m and 50\textmu m with a grain size of SiC and MgO particles, heater solid waste as the waste material (coal slag) were used. Kokpozit materials and production. SEM analysis, it will be inferred by examining mechanical abrasion tests.

KEYWORDS - Materials, Composite, wear, manufacturing
DRYING OF IONIC HYDROGELS USING FLUORESCENCE TECHNIQUE

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ABSTRACT

Hydrogels were first described in the last century as networks that contain small fractions of polymers and large fractions of water; hydrogels maintain their shapes while they imbibe fluids or are dried [1,2]. The swelling and drying kinetics of hydrogels are very important in the pharmaceutical industry, in designing slow-release devices for drugs, in the agricultural industry for producing storable foods, and in medical industry in developing artificial organs. Hydrogel properties depend strongly on the degree of crosslinking, the chemical composition of the polymer chains, and the interactions of network and surrounding liquid. In this work, Steady-state fluorescence (SSF) technique was employed for studying drying of poly(acrylamide-co-acrylic acid) (P(AAm-co-AAc)) composite gels for different pH. Using the fluorescence technique, a pyrene derivative was employed as a fluorescence probe to monitor the polymerization, aging and drying of aluminosilicate gels[3] where peak ratios in emission spectra were monitored during these process. The fluorescence intensity measurements were carried out using the Model LS-50 spectrometer of Perkin-Elmer, equipped with temperature controller. All measurements were made at 90o position and slit widths were kept at 5 nm. Disc shaped composite gels were prepared by free-radical crosslinking copolymerization of P(AAm-co-AAc). N, N'- methylenebis (acrylamide) (BIS) and ammonium persulfate (APS) were used as crosslinker and initiator, respectively. Pyranine 4 (4sPy) was introduced as a fluorescence probe. Fluorescence intensity of 4sPy was monitored during in situ drying processes of composite gels. It was observed that fluorescence intensity values increased as drying is proceeded. Gravimetrical experiments for drying process were also performed. It was shown that diffusion coefficients for drying process DG decreased as the pH values are increased.

KEYWORDS - Hydrogels, Fluorescence, Drying, pH
RHUS CORIARA AS DYE FOR DYE SENSITIZED SOLAR CELL

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ABSTRACT

To face the environmental issues induced by the fossil energy, researches are focused on the development of renewable energies. Among the suggested system in the literature dye sensitized solar cells (DSSC) are not the most performant. But, their working principe is easy (photosynthesis imitation) and their cost can be reduced by using natural pigments. The conversion rate of the latters are usually low (<2%) comparing to the artificial dyes (<14%). However, a conversion rate of 7,6% has been reached by using Coumarin involving constant attention on natural dye. In this work, Rhus Coriara (Sumac) largely present in the South-East Turkey flora has been extracted and tested as dye in DSSC. Pigments extracted in methanol are better dispersed under vacuum on TiO2 layer than those in ethanol. An energy conversion rate of 0,22% is obtained with Rhus Coriara, which is half of the value of N719 artificial dye prepared and tested in the same condition (0,44%). As in the literature performance of N719 in optimized cell system is reported at up to 11%, Rhus Coriara as natural dye can be an interesting choice in the future.

KEYWORDS - Natural Pigments, Dye Sensitized Solar Cell,
INVESTIGATION OF COMPLEX FORMATION IN GLASS REINFORCED PLASTICS WITH CARBON NANOTUBES

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ABSTRACT

In this study, the existing glass-reinforced plastic (FRP) materials are reinforced with carbon nanotubes with nano-size. It is intended a complex formation via carbon atoms that are attempting to connect to central atom between the reinforcing material and the matrix material at the reinforced process. In this way, we aimed to develop the chemical bonding performance of carbon nanotubes and the fiber/matrix interfacial bond. Functionalized CNTs were bonded to glass fiber surfaces and matriks by chemical methods. In the light of the resulting complex formation can be said that; the development of the interfaces mechanics and increasing the inter-laminar fracture toughness were obtained. After tests, fracture surfaces of nanocomposites and failure mechanisms were investigated via SEM. Also, mechanical mechanisms related with inter-laminar fracture toughness were investigated.

KEYWORDS - Nanocomposites, interfaces, complex formation, mechanical properties
RADIATION ATTENUATION PERFORMANCE AND CHARACTERIZATION OF WB REINFORCED ISOPHTALITIC/NEOPENTIL POLYESTER COMPOSITES

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ABSTRACT

The most common material used as ionizing electromagnetic radiation (IEMR) shield is lead because of its high density and atomic number but lead has some important disadvantages beside its cheapness and high shielding performance as toxicity, inflexibility, heaviness and low impact strength. Thus in this study a nontoxic and light weight composite material that has high IEMR attenuation performance is produced and characterized. The results were also compared with lead. Tungsten is an excellent material for high energy IEMR shielding because of its high density besides being unstable and hard mechanical processing properties. Thus tungsten compounds are much desirable than pure tungsten metal for shielding applications. Thus in this study tungsten boron compound was chosen as filler material of the composite to increase shielding performance of the light weight isophytalitic/neopentile polyester matrix. The composites were produced by radicalic polymerization process of the prepolymer after homogeneous dispersion of the filler material within the matrix in different filler loading values. Shielding performances of the composites were investigated by gamma spectrometric methods for different IEMR energies ranging from low to high. Structure characterizations were done by using FTIR and SEM analysis. Also thermal properties of the composites were examined by TGA and DSC analysis. The percent attenuation ratios for the composite showing best performance were determined as ~84%, ~49%, ~65% at low (0-500 keV), intermediate (500-1100 keV) and high (>1100 keV) energy regions while these values were ~98%, ~68%, ~44% respectively for pure lead shielding. If it is consider that the radiation shields are mostly used by X-ray (<100 keV IEMR energy) workers in medical applications this composite materials could have a wide utilization area as an alternative shielding material.

KEYWORDS - Polymeric shielding, shielding material, radiation shielding, tungsten composite
LIGHTWEIGHT COMPOSITE MATERIALS BASED ON AGRO-RESIDUES AND NATURAL ADDITIVES WITH THERMAL INSULATION PROPERTIES

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ABSTRACT

The thermal insulation materials play an important role in obtaining the energy efficiency of buildings being available in the last time in various structural forms and types. Nowadays, building materials are expected to have low weight and satisfy several aspects such as structural, thermal and acoustical performances, and sustainability. For these reasons, more attention is given to natural materials as alternative to obtain the products with high mechanical and thermal insulation properties, but with less impact on the environment and human health due to their renewability and biodegradability. In this respect, the use of natural fibres as reinforcements in composite materials is more appreciated and studied in the last time, due to their advantages comparing with synthetic fibres: low cost, non-toxic, biodegradable, abundant, low density and very good mechanical properties. Furthermore, in many studies and research are reported the economical advantages of perlite in building industry due to their specific characteristics, being used to obtain the thermal insulation and finishing materials, lightweight and fireproof bricks, shaped composite materials and plates, for ceilings, tiles or exterior plywood etc. In the paper are presented the results regarding the thermal insulating properties of composite materials based on expanded perlite and natural polymers matrix reinforced with lignocellulosic fibres from stems of rapeseed and sunflower, and hemp husks. The samples of composite materials with 29,5 x 29,5 x 1,5 cm dimensions, were obtained in the laboratory and characterised in terms of specific properties of building materials, such as: water absorption, thermal conductivity and mechanical properties. The obtained results regarding the thermal conductivity of composite samples are between 0.05 and 0.11 [W/mK], similar to those of currently materials used in buildings thermal insulating. Based on the preliminary results it can appreciate that this is a good way to valorize the natural resources of mineral raw materials (i.e. perlite rock deposits) and agricultural wastes to obtain the added value products.

KEYWORDS - thermal insulation; lignocelluloses; expanded perlite;composite materials
MAGNETIC LEVITATION FORCE CALCULATION IN TYPE-II SUPERCONDUCTOR CERAMICS

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ABSTRACT

Meissner Effect is, of course, an essential characteristic of a superconductor besides the zero resistivity since the discovery by Meissner and Ochsenfeld in 1933. They showed by experiment that the magnetic field inside a superconductor is always zero. This implies that we can think of a superconductor as being a perfectly diamagnetic material. It is highly attractive for the technological applications of the type-II (High temperature) superconductors as YBa2Cu3O7, Bi2Sr2Ca2Cu3O10 and HgBa2Ca2Cu3O8. One important property is the levitation force and its MagLev application. MagLev systems have become very important in the transportation and other applications. These applications are ranging from in an energy efficient prototype of a cryogen transfer line to in space energy storage systems. In this study, we compared that the effect of magnetic levitation force calculation BSCCO and YBCO superconductors. The results were showed that the BSCCO superconductor’s family is very poor in case of the levitation force compared with the YBCO superconductors. It may be attribute that the YBCO family superconductors have the high critical current density which occurs in case of the flux pinning and the high magnetization behavior.

KEYWORDS - Ceramic, Superconductor BSCCO, YBCO, Levitation Force, Maglev
TO SELECT ALUMINUM AL ALLOYS FOR MANY APPLICATIONS WITH THE HELP OF AN EXPERT SYSTEM

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ABSTRACT

Aluminum, one of the five most widely used metal in metal based industries, has 8 different series and over 30 different alloys. Each alloy has different mechanical and chemical properties. It can meet the requirements of many applications with various needs thanks to this variety. However, the variety of choice also comes with the complexity of choice of the most suitable aluminum alloy. Hence, the choice of optimal aluminum alloy has become an area that requires special expertise. In this study, an expert system that can select the most suitable aluminum alloy using the input of a user was developed. The expert system that is called Al_expert was built up an expert system shell program, Kappa PC. Kappa PC is preferred for some advantages that have inference engine tools and rule base, and programming with C++. The system uses multi-criteria weighted average method. Al_expert has a friendly user interface that is designed visual objects. More than 100 rules are written for Al_expert. The system asks a few simple questions to user about Al alloy. And, Al_expert can make a decision by using forward chaining method. Finally, Thus, Al_experts system can select an ideal Al alloy automatically. As a result show that Al_expert makes easy to select ideal Al alloy for any application area without any expert. In this way, the system helps any user select the most suitable alloy and reduces faults and unnecessary choices.

KEYWORDS - Aluminum Selection, Alloy, Expert System, Kappa PC, Data Mining, MCDM Methods
STUDIES ON THE PREPARATION AND MECHANICAL PERFORMANCE OF THE NANOCLAY/MULTIWALL CARBON NANOTUBE HYBRID EPOXY NANOCOMPOSITES

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ABSTRACT

There are many studies have been carried out about nanomaterials in the last decade. Under the guidance of these studies, the mechanical properties of composite materials can be changed by adding nanoparticles. Multi-wall carbon nanotubes (MWCNT) and nanoclays (NC) have been well known nanoparticles, which can be used to develop mechanical properties of diglycidyl ether of bisphenol A (DGEBA) epoxy composite materials due to their superior properties. In this paper, effects of hybridization with NC and MWCNT were investigated for epoxy modification. At the beginning, nanoclay epoxy nanocomposites were prepared by conventional casting in stainless steel mold to detect optimum ratio of nanoclay range from 1 to 5 wt %. According to the result of mechanical test, optimum ratio of nanoclay particles was found at 2 wt %. Then, 0.1, 0.3, 0.5, and 0.7 wt % MWCNT added into epoxy resin which includes 2 wt % nanoclay to find out the contribution of MWCNT on mechanical properties, respectively. Scanning Electron Microscopy (SEM) and optical microscopy analysis techniques were used to understand the toughening mechanisms of the nanocomposites.

KEYWORDS - hybrid epoxy, mechanical performance, multiwall carbon nanotube, nanoclay, nanocomposites
TENSILE AND FLEXURAL BEHAVIOR OF NANO-SILICA MODIFIED KEVLAR-CARBON HYBRID COMPOSITES

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ABSTRACT

The purpose of this article is to investigate the effect of different particle contents of nano-silica on the tensile and flexural properties of intralaminar carbon/Kevlar hybrid composites. Twill 2/2 woven carbon/Kevlar fiber was used as reinforced fiber with epoxy resin. Five weight fractions (0.5%, 1%, 1.5%, 2.5% and 3%) were used for production of laminated composites. Then, test samples were produced according to ASTM standards. Results showed that addition of nano-silica to carbon/Kevlar composite increased the tensile and flexural strength. Nano-silica contents of 3 wt% gave the highest tensile strength and 1.5 wt% gave the highest flexural strength among the other ratios.

KEYWORDS - Kevlar-carbon fiber, nano-silica, hybrid composite
EFFECT OF OLIVE POMACE CONTENTS ON MECHANICAL PROPERTY OF GLASS FIBER REINFORCED EPOXY COMPOSITES

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ABSTRACT

This work aims to study the effect of the mixing of natural particles of micro-size olive pomace (OP) on the tensile and flexural properties of glass fibre reinforced polymer composite (GFRP). Hence, the mechanical behaviour of recycled olive pomace filled glass fibre reinforced epoxy composites was studied in order to develop an engineering material for industrial applications. The modifying of GFRP was conducting by adding six weight fractions of olive pomace (0.5, 1, 2, 5, 10, and 15%) with a grain size of (75 μm). The composite specimens were prepared by hand lay-up technique and cut according to ASTM standards. It’s found that the highest values of flexural and tensile strength happened at 5 wt % of OP filler. Also, the tensile results showed that with more addition of OP above 5% the elongation at break decreased. The flexural modulus was improved with addition of OP particles in GFRP composite.

KEYWORDS - Glass fiber, olive pomace, polymer composite
INFLUENCE OF PERLITE PARTICLE INCLUSION WITH ADHESIVELY BONDED SINGLE STRAP REPAIRS ON TENSILE PROPERTIES OF S-GLASS/EPOXY COMPOSITE LAMINATES

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ABSTRACT

In this study, the tensile performance of epoxy adhesive with inclusion of micro-scale perlite particles was investigated for glass-epoxy laminates adhesively bonded single-strap repairs. Micro-scale perlite particles were used as additive material with different mass contents (plain, 5, 10, 15 % wt) within the epoxy resin. Composite laminates were weakened by opening circular cutout at the center of them, then repaired by a circular and same composite laminates. The repairmen of the weakened laminates was explored two different patch ratios between patch and cutout diameter, incorporating adhesive epoxy with different perlite particle inclusions. Results showed that tensile strength of repaired samples reached its maximum value when perlite filler content is at 10 %.

KEYWORDS - Composites, perlite particle, patch repair
POTENTIAL APPLICATIONS OF NANO-SILICA PARTICLES IN CIVIL ENGINEERING

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ABSTRACT

Concrete is irreplaceable material in civil engineering world owing to its superior characteristics like strength, moldable, cost-effective and available components that result in widespread utilization. Growing concerns for carbon dioxide (CO2) emission manipulate concrete designs for more environment-friendly mixtures bearing in mind that cement is responsible for 7% of overall (CO2) emission. Production of large amount of cement can be limited by designing long-lasting concrete applications that directly contributes to sustainable development. Recent developments in nanotechnology have led to exploitation of nano-scale products for cementitious composites that exhibit high performance and durable properties. Among nano-scale products, nanosilica materials present unique benefits in cementitious-based systems compared to conventional additives. The purpose of using ultra-fine nanosilica particles in cementitious composites is to improve fresh and hardened properties of composites. Taking into account that there is a link between the micro-scale structure and bulk structure of material, it is quite important to unite both scale in engineering manner. For this reason, researchers study to understand fundamental science of nanosilica on pozzolonic reaction kinetics, morphology and hydration structure in order to control properties at nano-scale which can make radical changes in bulk properties. In this paper, utilization of nanosilica powder in cementitious composites was extensively reviewed considering the wide range of research that were undertaken to enhance performance of cement-based materials. In addition to general approaches in nanosilica applications, some issues that are required to be addressed were summarized in order to take full benefits of nanotechnology. Future challenges in the use of nanosilica in civil engineering applications were considered and potential alternative applications were also discussed within the scope of this paper.

KEYWORDS - Civil engineering, Material science, Sustainable materials, Cementitious composites, Nanosilica
ANALYZING THE EUTECTIC Al Si ALLOYS MODIFICATION USING AL10SR AND CUSN5 MASTER ALLOYS

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ABSTRACT

Changing the size and distribution of the eutectic silisium particles by the addition of alkali metals such as Na, Sr, K, Rb, Cs, Li, Ca, Ba, Mg, La, P, Bi, Cd, Mn, Ni, Pb to Al-Si alloy is called modification. Modification process can be done in different ways such as the addition of elements, rapid solidification, vibration applied during solidification, high pressure and spheroidizing by heat treatment. The modification of casting structure can be described as to be converted from lamellar eutectic Si structure to fiberims structure. During modification process the growth of silicon crystals slows down in the eutectic, the growth of silica-matrix is stabilized and fine lamellar structure is formed in this way. The most practical and widespread application for the modified process is the modification process by the addition of element and the most effective modification can be made by using Na, Sr and Sb. However, there are only strong implications using Na and Sr for industrial applications in a low concentration. Percent elongation and castability of strontium-modified alloy are higher than those modified with sodium. Also the initial effect of Na and Sr is very good, due to the loosing of oxidation and vapor pressure for sodium this effect is temporary. Alternatively, when processing features of Al-Si alloy with eutectoid composition is important it is known to supply significant advantages for the modification with CuSn5 alloys. In this study to examine the effect of the modification of eutectic Al-Si alloy casting experiments will be done. Casting experiments will be done in four ways by no addition, adding Al10Sr, adding CuSn5 and adding Al10Sr+CuSn5 master alloy. The microstructures of the cast samples will be analyzed and the effect of the modification will be determined depending on the master alloy.

KEYWORDS - Aluminum Casting, Modification, Eutectic Solidification
MECHANICAL AND THERMO-MECHANICAL BUCKLING ANALYSES OF COMPOSITE CYLINDRICAL SHELLS

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ABSTRACT

In this study, Mechanical and Thermo-Mechanical Buckling characteristics of thin-walled fiber reinforced composite cylindrical shells have been investigated. Glass/Epoxy and Carbon/Epoxy composite materials are used and mechanical and thermo-mechanical buckling loads are determined for these material types. The composite plies are laid up to form eight-ply laminates having [ _ ]8 stacking sequences and used fiber orientations are: [0/90], [15/-75], [30/-60] and [45/-45]. Comparisons of effects of different fiber orientations on buckling loads with different temperatures are discussed. These analyses are performed using commercial finite element analysis program ANSYS. Effects of temperature, material types, aspect ratio (diameter / length) on mechanical and thermo-mechanical loads are analyzed.

KEYWORDS - Composite, Mechanical buckling, Thermo-mechanical buckling, cylindrical shells.
POLY(ACRYLAMIDE-CO-CROTONIC ACID)/ SODIUM HUMATE HYDROGELS SYNTHESIS AND CHARACTERIZATION

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ABSTRACT

Hydrogels are three dimensional polymeric materials which are widely used in many fields, such as hygienic products, agriculture, horticulture, and drug delivery system. They can swell in water with the abilities to absorb a large amount of water; however they are insoluble in water. The high water absorption capacity is needed for hydrogels depending on application area, and so various hydrophilic groups such as ïCONH2, -CONH-, -OH, -COOH, -SO3H, etc. have been attached to the polymeric structure. In this study, chemically crosslinked hydrogel composites were synthesized. Acrylamide and crotonic acid as a monomer, N, N-methylenebisacrylamide (MBA) as crosslinker, N, N, N", N"-tetramethylene-1,2-diamine (TEMED) as accelerator and ammonium persulfate (APS) as initiator were used in the hydrogel synthesis. Sodium humate (NaH) obtained from lignite was utilized as filler. Polyvinyl alcohol (PVA) and polyethylene glycol (PEG) were used to obtain semi-IPN materials. Structural characterization of crosslinked hydrogel composites were carried out by using XRD and FTIR. SEM micrographs were taken for determination of surface morphology of hydrogel composites. TGA analysis was conducted to examine the thermal stability. Also swelling characterization of these composites investigated in different environment conditions.

KEYWORDS - composite, hydrogel, polymer, semi-IPN, sodium humate
OTHERS
SMART DEVICES BASED REMOTE PATIENT MONITORING SYSTEM

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ABSTRACT

Nowadays, smart devices have become an indispensable part of our lives with the advancement of technology. Developments of wireless and technology have led to the emergence of innovation providing facilities and solutions to the problems in health care. With this development, whatever position, parameters are measured and tracking wirelessly which required following in the diagnosis and treatment process of chronic illness and diseases. In this study, the smart device based remote patient monitoring system realized using microcontroller and Wi-Fi module. Vital parameters are measured wirelessly over patients such as blood pressure, pulse, body temperature. Moreover, ambient moisture and temperature values are determined by device. The measured parameters are recorded on the device and the parameters are transmitted to the experts via web-based mobile interfaces. With this work, physiological parameters of the patients can be measured in their current position. Consequently, patients will be able to follow parameters without requesting help from health personnel's on real time. Moreover they send their parameters to expert persons.

KEYWORDS - Remote Patient Monitoring, Telemedicine, Smart Devices
A GENUINE GLCM-BASED FEATURE EXTRACTION FOR BREAST TISSUE CLASSIFICATION ON MAMMOGRAMS

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ABSTRACT

A breast tissue type detection system is designed, and verified on a publicly available mammogram dataset constructed by the Mammographic Image Analysis Society (MIAS) in this paper. This database consists of three fundamental breast tissue types that are fatty, fatty-glandular, and dense-glandular. At the pre-processing stage of the designed detection system, median filtering and morphological operations are applied for noise reduction and artifact suppression, respectively; then a pectoral muscle removal operation follows by using a region growing algorithm. Then, 88-dimensional texture features are computed from the GLCMs (Gray-Level Co-Occurrence Matrices) of mammogram images. Besides, a formerly introduced 108-dimensional feature ensemble is also computed and cascaded with the 88-dimensional texture features. Finally, a classification process is realized using Fisher’s Linear Discriminant Analysis (FLDA) classifier in four different classification cases: one-stage classification, first fatty then others, first fatty-glandular then others, and first dense-glandular then others. A maximum of 72.93% classification accuracy is achieved using only texture features whereas it is increased to 82.48% when cascade features are utilized. This consequence clearly exposes that the cascade features are more representative than texture features. The maximum classification accuracy is attained when Òfirst fatty-glandular then othersÓ classification case is implemented, that is consistent with the fact that fatty-glandular tissue type is easily confused with fatty and dense-glandular tissue types.

KEYWORDS - breast tissue; digital mammography; feature extraction; computer-aided detection
STRUCTURAL ELEMENTAL AND MOLECULAR CHARACTERIZATION OF HUMAN ARTICULAR CARTILAGE

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ABSTRACT

The articular cartilage overlying the bone consists of a network of collagen fibres. This network is essential to cartilage integrity, suffering damage in degenerative joint disease such as osteoarthritis. We have been applying a number of techniques to study the bone–cartilage interface and of changes occurring in this with disease. The bone-cartilage samples with disease were investigated the structural, elemental and molecular properties. The bone-cartilage samples with disease were characterized by scanning electron microscopy-energy dispersive X-ray spectroscopy (SEM-EDX) and Fourier Transform infrared spectroscopy (FTIR) and Fourier transform (FT) Raman spectroscopy. The energy dispersive X-ray (EDAX) analysis confirmed nearly stoichiometric samples. The Raman spectra made it possible to monitor the changes in the main bone constituents: the mineral component with the apatite band at 960 cm$^{-1}$, the organic component with the collagen amide III band at 1268 cm$^{-1}$. Present results have been obtained on sections of bone not displaying evidence of an osteoarthritic lesion and can be used as a baseline against which diseased bone can be compared.

KEYWORDS - Bone-cartilage, Raman, SEM-EDX, FTIR.
DESIGN AND CONSTRUCTION OF A NOVEL MICRO-EXTRUSION SYSTEM FOR BIO-PRINTING APPLICATIONS

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ABSTRACT

Three-dimensional bio-printing is one of the major research fields of future, as yet at the beginning stage but producing promising solutions in medicine. As technology evolves, novel systems emerge for positioning even a single cell to create functional tissues. The precision of these systems determine the functionality of outputs. In general, bio-printers use Ink-jet, Micro-extrusion and Laser Assisted printing methods to construct a solid tissue or a part of an organ. Ink-jet method, also known as drop-on-demand bio-printing approach is based on spraying cells by means of thermal or piezo electric pulses from numerous nozzles and commonly used when forming tissues like skin and cartilage. Micro-extrusion method is used when bio-printing complex biological structures like blood vessels or solid organs. Laser Assisted method is more preferred for biomaterial or implant production. Components of these systems have direct effects on the output since they determine where and how much biological material will be deposited in every layer. The aim of this study is to design and construct a novel micro-extrusion module for bio-printing applications. The designed module consists of three-dimensional (3d) printed body parts from Polylactic acid (PLA), ball screws (SFU1204), ball screw nuts (M12), flexible couplings (5 x 8 x 25 mm), steel rods (M8), SCE UU series bearings (SCE 8 UU), UFL series bearings (UFL 08), LMEF series bearings (LMEF 8 UU), SK series rod holders (SK 08) and has an ability to control three commercially available syringes with blunt ended needles. For precise micro-extrusion, galvanized steel rods support ball screw driven linear motions. Ergonomically, syringes can be easily mount and locked and this system also has laser holders that can be used for targeted photo polymerization.

KEYWORDS - Bio-printing, Micro-extrusion module, Three syringes, Photo polymerization.
EXAMINATION AND CLASSIFICATION OF ROBOTS USED AT THE HEALTH SECTOR, AND SOME RECOMMENDATIONS FOR DISADVANTAGED CIRCUMSTANCES

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ABSTRACT

Nowadays robotic systems are used in many fields. One of them is the health sector. Surgical robots which are used in the health sector are physically similar to each other but their purposes are quite different. Also surgical robots have major mechanically differences. Using of robotic systems in surgical procedures is revolutionary. Robots are taking the role of the surgeon at simple surgical procedures. In addition to this, in recent years rehabilitation robots have gained importance at the health sector. These robots used in physical therapy significantly facilitates the task of both patients and medical personals. In addition, robotic solutions found an important place also at prosthetic technology. In this study, used from past to present robotic systems at the health sector are examined, made classification depends on the purpose, advantages and disadvantages of this robots have been investigated. Some advices given by us for situations considered to be negative.

KEYWORDS - Surgical Robots, rehabilitation robots, prosthetic technology, Health Sector
FEATURE SELECTION ON MR IMAGES USING GENETIC ALGORITHM WITH SVM AND NAIVE BAYES CLASSIFIERS

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ABSTRACT

Dementias are termed as neuropsychiatric disorders. Brain images of dementia patients can be obtained through magnetic resonance imaging systems. The relevant disease can be diagnosed by examining critical regions of those images. Certain brain characteristics such as the cortical volume, the thickness, and the surface area may vary among dementia types. These attributes can be expressed as numerical values using image processing techniques. In this study, the dataset involves T1 medical image sets of 63 samples. Each particular sample is labeled with one of the three dementia types: Alzheimer’s disease, frontotemporal dementia, and vascular dementia. The image sets are processed to create different feature groups. These are cortical volumes, gray volumes, surface areas, and thickness averages. The main objective is seeking brain sections more effective in establishing the clinical diagnosis. In other words, searching an optimal feature subset process is carried out for each feature group. To that end, genetic algorithm based wrapper feature selection method is used with Naive Bayes classifier and support vector machines. The test phase is performed by using 10-fold cross validation. Consequently, accuracy results up to 93.7% with different classifiers and feature selection parameters are shown.

KEYWORDS - Dementia, feature selection, genetic algorithm, magnetic resonance imaging.
NANOTOXICITY EVALUATION OF TELLURIUM DIOXIDE NANOPARTICLES ON HUMAN AIRWAY EPITHELIAL AND WHOLE BLOOD CELLS IN VITRO

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ABSTRACT

There is a wide range of applications such as laser devices, adjustable filters, thermoelectric, data storage devices, light emitting devices, optical transformers, photonic switches, photodetectors, biomedical applications and nano-electronic of various tellurium nanoparticles, in particular tellurium dioxide (TeO2). However, the recorded information in the literature about the nanotoxicity potential of these nanoparticles is very limited. Therefore, in scope of the present study it is aimed to investigate in vitro cytotoxic and biochemical effects of TeO2 nanoparticles (TeO2 NPs) on human primary alveolar epithelial (HPAEpIC) and blood cells for the first time. The commercially obtained TeO2 NPs were characterized by X-ray diffraction (XRD) and scanning electron microscopy (SEM) techniques. The cytotoxicity potential of TeO2 nanoparticles at different concentrations (0–1280 mg/L) was evaluated by using 3- (4,5-dimethylthiazol-2-yl) -2,5-diphenyl tetrazolium bromide (MTT) and lactate dehydrogenase release (LDH) assays. In addition, total antioxidant capacity (TAC) and total oxidant status (TOS) parameters were used for assessing the oxidative alterations in both cell cultures. The results of MTT and LDH analyses showed that TeO2 NPs affected the cell viability in a clear dose-dependent manner. Our findings exerted that the nanoparticles did not support the antioxidant capacity, and caused to oxidative stress formations at high concentrations (320, 640 and 1280 mg/L) in both cell types. In conclusion, our findings suggested the potential hazardous nature of TeO2 NPs using different primary human cell cultures for the first time.

KEYWORDS - Nanotoxicity, Tellurium dioxide (TeO2), Cytotoxicity, Oxidative stress, Human primary alveolar epithelial cell, Whole blood culture
GENOTOXIC AND CYTOTOXIC RESPONSES TO TELLURIUM DIOXIDE NANOPARTICLES IN VITRO: PROTECTION BY BORIC ACID

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ABSTRACT

In recent years, depending on the vertiginous and rapid developments in nanotechnology, nanomaterials or nanosized particles is located in the content of many commercial products which are commonly used in daily life. Tellurium dioxide nanoparticles (TeO\textsubscript{2} NPs) are being used in many industrial areas including biomedical applications and sensor production. On the other hand, the formation of oxidative stress is considered as main mechanism leading to nanotoxicity by TeO\textsubscript{2} NPs. Interestingly, recent reports indicate that the boron compounds such as boric acid show antioxidant features both in in vivo and in vitro conditions. To our best knowledge, the ameliorative effect of boron compounds against nanotoxicity by TeO\textsubscript{2} NPs is not investigated yet. Therefore we assessed the potential protective role of boric acid (BA) against the toxic responses of TeO\textsubscript{2} NPs in cultured human whole blood cells. Our results showed that TeO\textsubscript{2} NPs induced slight genotoxicity in human lymphocytes demonstrated by sister chromatid exchange (SCE) and micronucleus (MN) assays. Again, TeO\textsubscript{2} NPs caused significant (p<0.01) decreases of total antioxidant capacity (TAC) and increases of total oxidative stress (TOS) levels in vitro. However, the simultaneous treatment with BA (2.5, 5 and 10 ppm) and TeO\textsubscript{2} NPs into the cell cultures significantly ameliorated DNA and oxidative damages by TeO\textsubscript{2} NPs. In a conclusion, this study firstly reveals that BA protected human blood cells from the nanotoxicity of TeO\textsubscript{2} NPs.

KEYWORDS - Genotoxicity, Oxidative stress, Tellurium dioxide nanoparticles, in vitro, boric acid, ameliorative effect
PRODUCTION OF TANTALUM, TITANIUM AND PLATINUM THIN FILMS FOR DOMESTIC DNA SENSOR APPLICATIONS

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ABSTRACT

Studies on biosensor technology that allows the recognition of the target molecule using the analysis of biomolecules are rapidly increasing in recent years. Nanotechnology will open a new page in recognition of specific nucleic acid sequences with the new generation of DNA biosensors developed using modern biosensor chip technology. Biocompatibility of the material is defined as the response of biological system specifically, biocompatibility and the ability of non-interfering with the normal function of surrounding tissues. Metals have the highest biocompatibility among biomaterials and titanium, platinum and tantalum metals find the most application areas. Thin films are used as parts of biosensor systems, such as electronic signal processing, transduction, amplification, biological recognition and sampling. In this work, thin film structures of titanium, platinum and tantalum metals, which have biocompatibility properties, have been produced by using a Pulsed Laser Deposition (PLD) method by use of an Nd:YAG laser (delivering laser beam at =1064 nm, 10 Hz repetition rate, 5 ns pulse pulse width and 40 mJ laser power) system. The morphological structures of titanium, platinum and tantalum thin films have been investigated by Atomic Force Microscopy (AFM). According to the results, good film structure with homogenous and smooth surface was produced. The absorption characteristics of thin films have been investigated by using UV-VIS spectrophotometer. As a result, the production of thin films which is the first step of domestic DNA biosensor production was achieved by this study. It was demonstrated that the thin films have the potential to be used in LIFT (Laser Induced Forward Transfer) technology for DNA sensor production.

KEYWORDS - Biosensor, LIFT, PLD, Laser, Thin Film
FOUR-HEADED ARROW SHAPED DUAL BAND PERFECT ABSORBERS FOR BIOSENSING APPLICATIONS

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ABSTRACT

In this study, a novel perfect absorber (PA) array based on four-headed arrow nanoparticles for biosensing applications in mid-infrared regime is presented. Proposed PA array has a dual-band spectral response, and the locations of resonances can be adjusted by varying the geometrical dimensions of the structure. Nearly unity absorbance is obtained from the PA array for both resonances. Different dielectric spacers (MgF2, SiO2, and Al2O3) are used to investigate the effects of dielectric spacer on the absorbance characteristics of proposed PA array. Absorbance characteristics of PA array are analyzed by using finite difference time domain (FDTD) method. High field enhancement is achieved by the interaction of the sharp corners of arrow nanoparticles. Linear correlation between the resonance frequencies and the refractive index of cladding mediums is determined. Due to the high refractive index sensitivity and near-field enhancement, and nearly unity absorbance, the proposed dual-band PA array with adjustable spectral responses can be useful for biosensing applications in mid-infrared regime.

KEYWORDS - perfect absorber, plasmonics, nanoparticle, mid-infrared regime, biosensing applications
A NOVEL APPROACH IN NON THERMAL PROCESSING OF BIOMATERIALS GLIDING ARC DISCHARGE PLASMA

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ABSTRACT

The non-thermal plasma (NTP) is partially ionized gas where the energy is stored mostly in the free electrons and the overall temperature remains low. NTP is widely used for several years in various applications such as low-temperature plasma chemistry, removal of gaseous pollutants, in gas-discharge lamps or surface modification. However, during the last decade, NTP utilization expanded to new areas in biological applications like plasma microorganisms’ inactivation, ready-to-eat food preparation, biofilm degradation and also in healthcare. It has been employed without causing any damage during sterilization of surfaces, medical instruments, water, food, and living tissues while being chemical and water-free, able to operate openly and continuously at atmospheric pressure. Apart form the other applications of NTP in our research groups, so called Plasma Aided Bioengineering and Biotechnology (PABB) and Plasma Aided Biomedical (pabmed), in this study, a lab-scale non-thermal Gliding Arc Discharge (GAD) microplasma system was designed and its decontamination effect was investigated on Escherichia coli and Staphylococcus epidermidis. Stainless steel (SS), silicone (Si) and polyethylene terephthalate (PET) surfaces were artificially contaminated with E. coli and S. epidermidis and then treated with nitrogen plasma for 1-10 minutes at varying gas flow rates. Significant reductions of 3.76±0.28, 3.19±0.31 and 2.95±0.94 log (CFU/mL) in S. epidermidis and 2.72±0.82, 4.43±0.14 and 3.18±0.96 log (CFU/mL) in E. coli on SS, Si and PET surfaces, respectively, were achieved after 5 min plasma treatment. Temperature on each surface during plasma generation was below than 35 °C. The morphological changes on bacteria cells after GAD plasma treatment was demonstrated by Scanning Electron Microscopy (SEM) images. Acknowledgement This research is supported by FP7-KORANET project program (KORANET 2-20).

KEYWORDS - non-thermal plasma, sterilization, gliding arc discharge
PULSE OXIMETER AND WIRELESS TELEMETRY FOR VENTILATION OXYGEN SUPPORT

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ABSTRACT

Pulse Oximeter devices are widely used as a non-invasive method for instant monitoring of blood oxygen saturation and heart rate. In this paper, a wireless microcontroller based pulse oximeter is proposed to measure the oxygen delivered to the patient via the oxygen flowmeter. In the first step, the signals received from reusable SpO2 sensor (finger probe) are processed by a microcontroller to determine the blood oxygen saturation and heart rate. Depending on the current blood oxygen saturation value, wireless signals are sent to the non-invasive ventilation flow meter vacuum regulator to deliver the necessary oxygen into the patient. Oxygen supplied to the patient is automatically controlled according to the oxygen saturation change.

KEYWORDS - Pulse Oximeter, Oxygen saturation, Ventilation, Oxygen flow meter, Oxygen regulator, Circuit design, Wireless control.
DETECTION AND COUNTING OF EMBRYONIC STEM CELLS IN FLUORESCENCE MICROSCOPY IMAGES BY A FULLY AUTOMATIC METHOD

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ABSTRACT

Abstract— In this paper, an automatic cell counting method under microscopy is proposed. The cell counting process can be performed in two ways: The manual counting in which a specialist counts the cells with naked eye, and the automatic counting that utilizes the computer-based techniques. In manual counting, there are several techniques for dying the cells to turn them visible with naked eye. However, if the concentration is more than normal the cells can overlap. Overlap and incorrect adjusted microscopy parameters are the main factors that cause inaccurate counting results. Furthermore, in manual counting inter-observer variability is high. Even though the same cell image is taken into account by the different specialist, different counting results can be obtained. Because of the above mentioned problems, the cell counting process must be performed automatically. The proposed automatic stem cell counting process is based on image processing techniques that appropriate the frame of method. At first, stem cell sections were obtained under the fluorescence microscopy. In the following pre-processing step Gaussian filtering and background extraction are performed. Before applying watershed algorithm histogram of the image is partitioned in to four parts and the best combination is determined to obtain the most exact counting results. The aim of using watershed algorithm is to make the boundaries and maximum points of the cells more clear. Finally, spherical contours corresponding to the stem cells are counted. The effectiveness of the proposed method is evaluated by performing numerous computer simulations. It is shown that the proposed method gives promising results and can eliminate the subjectivity originated from the manual counting. The method is tested on a database contains two image groups at different noise levels validated by the specialists.

KEYWORDS - cell counting, cell detection, embryonic stem cell, watershed algorithm
THE DIAGNOSIS AND ESTIMATE OF CHRONIC KIDNEY DISEASE USING THE MACHINE LEARNING METHODS

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ABSTRACT

Chronic kidney disease is a prolonged disease that damages the kidneys and prevents the normal duties of the kidneys. This disease is diagnosed with an increase of urinary albumin excretion lasting more than three months or with significant reduction in a kidney functions. Chronic kidney disease can lead to complications such as high blood pressure, anemia, bone disease and cardiovascular disease. In this study we have been investigated to determine the factors that decisive for early detection of chronic kidney disease, launching early patients treatment processes, prevent complications resulting from the disease and predict of disease. The study aimed diagnosis and prediction of disease using the data set that composed of data of 250 patients with chronic kidney disease and 150 healthy people. First, the chronic kidney disease data was classified with machine learning algorithms and then training and test results were analyzed. The estimation results of chronic kidney disease were compared with similar data and studies.

KEYWORDS - Chronic Kidney Disease, Machine Learning, Classification
BIOMECHANICAL CONSIDERATIONS IN FRACTURE FIXATION USING ORTHOPAEDIC IMPLANTS

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ABSTRACT

Orthopaedics is a highly technical field that employs a broad range of techniques, from microvascular surgery to bone fixation implants, to metallic and polymeric composite implants for joint replacement, to sophisticated methods of fixation involving all regions of the skeleton. The use of implants and devices requires sophisticated technical information on the part of the surgeon for the best chance of successful operations. The technical characteristics of applying internal and external fixation implants are critical to achieving bone union in the appropriate position and to avoid implant failure. The major problems encountered in plate fixation of fractures are early plate failures, screw breakage, and screw pull-out. The primary function of the plate is to maintain alignment as an internal splint, and to create compression between the fracture ends such that bone can transfer some of the applied load itself. There are two parameters that effect the performance of plates. Material properties which are the fundamental behaviours of a substance independent of its geometry and structural properties which are the ability of an object to resist bending under torsion, axial load, or bending is a function of its shape and distribution of material around the cross section. The goal of fracture fixation is understanding the basic parameters so that the device used for fracture fixation provides support for repair until adequate healing can occur. The purpose of this study was the investigation of the bending performance of the new designed plate by Finite Element Analysis (FEA) and biomechanical tests. Analysis of Ti6Al4V alloy was carried to estimate the safe bending limit. The results from the ANSYS FEA simulations were validated with experiments based on ASTM F382 standards to detect the lifetime of an implant and the load bearing capacities.

KEYWORDS - Finite Element Analysis (FEA), Biomechanics, Four-Point Bending, Plate Fixation.
THE PREPARATION AND CHARACTERIZATION OF SOLID LIPID NANOPARTICLES FOR BIOMEDICAL APPLICATIONS

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ABSTRACT

Solid lipid nanoparticles (SLN) are submicron colloidal carriers that are developed as an alternative to the traditional carrier systems (emulsions, liposomes, polymeric nanoparticles etc.). One of the fields that benefit from the versatile and the unique features of new generation imaging agents made of nanoparticles is the nuclear medicine. Colloidal particles have an important role in identifying reticuloendothelial system (RES) indications using scintigraphy. The aim of the present work was to investigate the feasibility of using solid lipid nanoparticles, which have found a wide area of application in nuclear medicine recently, in liver and spleen scintigraphy. Initially, the SLNs were prepared using microemulsion and solidification at low temperatures. Particle size and surface charge were determined with the dynamic light scattering (DLS) analysis. According to the scanning electron microscope (SEM) images, these particles were spherical. Differential scanning calorimetry (DSC) analysis indicated they had an amorphous structure. The characterized SLNs were radiolabeled with Technetium-99m (99mTc). Using the thin-layer chromatography technique, the efficiency of radiolabeling was found to be higher than 95%. 99mTc-SLNs were injected into the experimental rabbit intravenously (IV) and then dynamic images were recorded using a gamma camera. The liver and the spleen were clearly visible in the obtained dynamic images. In the ex vivo biodistribution studies were also conducted in addition to the scintigraphic findings.

KEYWORDS - Solid lipid nanoparticle, Tc-99m, Scintigraphy, Imaging, Biodistribution
THE ASSESSMENT OF TIME DOMAIN FEATURES FOR DETECTING SYMPTOMS OF DIABETIC RETINOPATHY

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ABSTRACT

Diabetes affects the capillary vessels in retina and causes vision loss. This disorder of retina due to diabetes is named as Diabetic Retinopathy (DR). Diagnosing the stages of DR is performed on a publicly available database (DiaretDB1) via detecting the symptoms of this disease. Time-domain features are extracted and selected to classify a fundus image. Fisher\textquotesingle s Linear Discriminant Analysis (FLDA), Linear Bayes Normal Classifier (LDC), Decision Tree (DT) and k-Nearest Neighbor (k-NN) are used as the classification methods in the experimental benchmarking. The recognition accuracies are obtained using all features (68 features) and selected features separately. k-NN is observed as the best classification method for without feature selection case and it gives averagely 92.22% accuracy. For feature selection case, LDC gives the best average accuracy as 92.45% with maximum 7 carefully chosen features.

KEYWORDS - sequential feature selection; diabetic retinopathy; microaneurysms; hemorrhages; exudates.
CLASSIFICATION OF STRUCTURAL MRI FOR DETECTING ALZHEIMER’S DISEASE

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ABSTRACT

Alzheimer’s Disease (AD) is a pathological form of dementia that degenerates brain structures. AD affects millions of elderly people over the world and the number of people with AD doubles every year. Detecting AD years before the effects of disease using structural magnetic resonance imaging (MRI) of the brain is possible. Neuroimaging features that are extracted from the structural brain MRI can be used to predict AD by revealing disease related patterns. Machine learning techniques can detect AD and predict conversions from mild cognitive impairment (MCI) to AD automatically and successfully by using these neuroimaging features. In this study common structural brain measures such as volumes and thickness of anatomical structures that are obtained from The Open Access Series of Imaging Studies (OASIS) and made publicly available by https://www.nmr.mgh.harvard.edu/lab/mripredict are analyzed. State-of-the-art machine learning techniques, namely support vector machines (SVM), k-nearest neighbor (kNN) algorithm and backpropagation neural network (BP-NN) are employed to discriminate AD and mild AD from healthy controls. Training hyperparameters of the classifiers are tuned using classification accuracy which is obtained with 5-fold cross validation. Prediction performance of the techniques are compared using accuracy, sensitivity and specificity. Results of the system revealed that AD can be distinguished from the healthy controls successfully using multivariate morphological features and machine learning tools. According to the performed experiments SVM is the most successful classifier for detecting AD with classification accuracies up to 82%.

KEYWORDS - Alzheimer’s Disease, neuroimaging, structural MRI, multivariate analysis, image classification, machine learning techniques
RFID TAG ANTENNA DESIGN IN DIFFERENT ISM BANDS FOR IMPLANT IDENTIFICATION

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ABSTRACT

Microstrip folded dipole antenna to use in RFID tags is presented in this study. This RFID tag antenna is designed for identifying orthopedic implant which can be placed knee or also intracorporal. The proposed antenna consists of one pair of symmetrical folded arms for miniaturizing. The proposed antenna is designed for two different ISM (Industrial, Science and Medical) frequency bands. In first ISM band, microwave (2.4_2.48GHz), the antenna structure is printed on an FR4 substrate with dimensions of 34_12_1.515 mm3 and the surface area 34_12mm2 is suitable for human knee implant. Dielectric constant of used FR4 is _r =4.3 and loss tangent is 0.035. The results obtained show that the resonant frequency of the antenna is 2.45GHz with return loss -49dB and bandwidth 260MHz . The peak gain is 0.103dB at 2.45GHz which is higher than traditional intracorporeal antenna design applications. The second ISM band, UHF (860_960 MHz), the tag antenna design is conducted on FR4 substrate with 1.48 mm thickness with surface dimensions of 37.2_12 mm2 and the same dielectric constant is _r =4.3 and tangent loss is 0.035. In UHF band, the simulated resonant frequency is 888MHz. In this frequency return loss is -25.93 dB and bandwidth is simulated for 74MHz . The peak gain of the RFID tag antenna is -10.7dB. In this study, all folded dipole antennas are designed and simulated by using the software CST Microwave Studio.

KEYWORDS - Implant Identification, RFID Tag, Folded Dipole Antenna, Orthopedic Implant
A VISUAL STIMULUS MODULE FOR P300 BASED BRAIN COMPUTER INTERFACES

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ABSTRACT

Brain Computer Interfaces (BCIs) are the systems that provide a direct communication channel between human brain and environment. P300 potentials are involuntary brain responses which are used to control BCI systems. In order to elicit P300 responses, stimulus presentation must be provided to the users. However, there are not a common paradigm or optimal parameters for all BCI users, or all BCI applications. Using the most convenient method and parameters for each user individually will improve system performance. This study proposes a visual stimulus module for P300 based BCIs. The module offers to design stimulus interfaces based on three different stimulus interfaces, including row/column, single character and region based paradigms. The module also provides customization of the stimulus interface by setting optimal parameters for individuals practically. Furthermore, in this study, we also explained synchronization between stimulus interface and data acquisition module in detailed. In order to test the stimulus module, stimulus interfaces based on three visual stimulus paradigms were designed. All the paradigms were tested by three subjects. P300 responses yielded with three paradigms were compared by using one-way statistical analysis of variance (ANOVA) method. Preliminary results revealed that average amplitude and latency of P300 potentials that were elicited by the different paradigms may differ.

KEYWORDS - Brain Computer Interface (BCI), P300 Potentials, Visual Stimulus Module, Row/Column Paradigm, Single Character Paradigm, Region Based Paradigm
DEVELOPING SOME BIOLOGICAL SYSTEM OF NANO HYBRID PEEK/PVDF REINFORCED WITH NANO HA, ZRO2,Y2O3 FOR INTERNAL FIXATION OF BONE FRACTURE.

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ABSTRACT

In the presented article an attempt has been made to fabricate two biological system from PEEK-7.5%PVDF reinforced with Hydroxyapatite HA from (2.5-7.5)wt.% once and ZrO2 from (2.5-7.5)wt.%+3%Y2O3 once more by melt blending with internal mixer. In the development of biomaterial, both mechanical(tensile ,impact, flexural)strength and biological characteristics must be considered. These biological system has characterized using SEM,X-ray, EDX,FTIR test. A comparison has been made between these two system and results clarify that by increasing the weight percentage of nano-ZrO2,HA the tensile ,impact, flexural elastic modulus were increased in both system but the increase in PEEK-7.5%PVDF reinforced with ZrO2 from (2.5-7.5)wt.%+3%Y2O3 system higher as compared with PEEK-7.5%PVDF reinforced with Hydroxyapatite HA from (2.5-7.5)wt.% . SEM results show uniform distribution of Nano- ZrO2,Y2O3, and fair uniform of Nano- HA as appeared from EDX test. In vitro biological evaluations of the samples were done by carrying out cytotoxicity(3-[4,5-dimethylthiazol-2-y1]-2,5-phenyltetrazolium bromide) using MTT assay. Cell–material interaction with the surface of the composite was examined through inverted microscope, cell viability ,cell proliferation has been calculated.

KEYWORDS - Nanohybrid composite,Nano hydroxyapatite,Biological system
EVALUATION OF THE COMPOUND MUSCLE ACTION POTENTIAL IN DIAGNOSIS OF THE MILD CARPAL TUNNEL SYNDROME

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ABSTRACT

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy. In most patients, the diagnosis can be proposed based on patient history and clinical symptoms, with electro-physical findings. The mild CTS may not produce any nerve conduction abnormalities and this can make standard conventional tests not enough in diagnosis the mild CTS. The aim of this study was to evaluate Compound Muscle Action Potential (CMAP) morphology as more sensitive and specific parameters without any additional testing for diagnosis the mild CTS. A total of 77 clinically diagnosed patients with CTS were prospectively enrolled. Data was evaluated from 70 normal hands and 46 hands with the diagnosis of the mild CTS with standard electrodiagnostic (EDX) tests and clinical findings. The specificity and sensitivity rate were calculated to evaluate the utility of CMAP negative peak (NP) morphology parameters evaluated duration (CMAP NPhalf-duration and CMAP NPfull-duration) and area (CMAP NPhalf-area and CMAP NPfull-area) by comparing the standard EDX test (Median Distal Motor Latency (DML) and peak to peak amplitude of CMAP (CMAP NPamplitude) recorded from the abductor pollicis brevis (APB) muscle. Although CMAP NPhalf-duration and CMAP NPfull-duration had no statistically significantly difference between the mild CTS and normal group (p>0.05), DML, CMAP NPamplitude, CMAP NPhalf-area and CMAP NPfull-area in the mild CTS group were statistically significantly different (p<0.05). The present study shown that CMAP NPfull-area had the highest sensitivity and moderate specificity rate (90.0% and 42.2%, respectively). Furthermore, it was confirmed again that DML was a valuable motor nerve conduction technique for the diagnosis of the mild CTS with high sensitivity and moderate specificity (84.8% and 47.6%, respectively), and it had more sensitive than CMAP NPhalf-area high sensitivity and moderate specificity (80.0% and 38.7%, respectively). This study provided the evidence of CMAP NPfull-area and CMAP NPhalf-area that could be predictors of the mild CTS.

KEYWORDS - carpal tunnel syndrome, motor nerve conduction study, clinical electromyography, signal processing
STIFFNESS ANALYSIS OF ABOVE KNEE PROSTHESIS

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ABSTRACT

While a healthy human walks, his or her legs mutually perform good repeatability with high accuracy. This provides an esthetical movement and balance. People with above knee prosthesis want to perform walking as esthetical as a healthy human. Therefore, to achieve a healthy walking, the above knee prosthesis must provide a good stiffness performance. Especially stiffness values are required when adding a second axis movement to the ankle for eversion and inversion. In this paper, stiffness analysis of above knee prosthesis is presented. The translational and rotational displacements of above knee prosthesis are obtained when prosthesis is subjected to the external forces and torques. Knowing joint stiffness values of the above knee prosthesis, designers can compute prosthesis parameters such as ergonomic structure, height, and weight and energy consumption.

KEYWORDS - stiffness analysis, above knee prosthesis, joint stiffness, prosthesis, accuracy
ACTIVE CONTOUR BASED DEVELOPMENTAL HIP DYSPLASIA DIAGNOSIS WITH GRAF METHOD

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ABSTRACT

Objective: In this article, a study was carried on ultrasound (US) images for the automatic diagnosis of the disease of the developmental hip dysplasia (DDH). It was aimed with this study at minimizing the errors of the experts in DDH diagnosis. Material and Method: As a first step in the study; commonly known as the images and reduce noise in the US image, image filter are applied to improve the quality. In the second stage; by using Active Contour Model method it was determined acetabular roof and labrum areas. In the third stage; alpha and beta angles that is necessary to be applied Graf method and used DDH diagnosis are determined by using various morphological image algorithms on the image. In the last stage, the classification of Graf method was made and the performance of the system was measured by comparing expert data and the results. Results: According to type conditions of Graf method, in the images of 40 out of 50 it was found the same due to software which was designed with expert data. In the remaining 10 images, expert result and program result are rather close especially for alpha angle. As a result, the success rate of the system for the 50 image is 80%. Discuss: When considered the parameters such as the difficulty of physical examination of DDH diagnosis, decreasing quality of life in the people suffered from this disease, limb shortening, limping, functional disability, treatment costs, based on expert data and relativism of applying of Graf method on US images, the importance of DDH diagnosis system supported computer is seen.

KEYWORDS - Developmental Hip Dysplasia, Ultrasound, Active Contour Model, Image Processing
RECOGNITION OF COMMON LUNG SOUNDS USING PCA AND SUPPORT VECTOR MACHINES

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ABSTRACT

Computerized analysis studies that conducted for lung sounds have not yet reached the desired level, could not be developed to be a commercial product that recognizes the lung sounds automatically. The major reasons are lung sounds been recorded as multichannel contrary to the spirit of auscultation as well as the noncompliance with a certain standardization in record retrieval. Results of the studies can not be exactly compared with the papers in literature for these reasons. In this study, all the records are taken by a specialist doctor as a single channel using a single-channel electronic stethoscope that is appropriate to auscultation procedure, because the physicians listen to the lung sounds from specific points on lung lobes with using a conventional stethoscope during the auscultation. Common lung sounds are often heard during auscultation has recorded in this study. Common lung sounds were defined as healthy, rhonchi, fine crackles, coarse crackles, and wheezes by The American Thoracic Society. Wheezing can be noticed easily without the need of a stethoscope, so it was not recorded in our study. Two different datasets were created from the records. The first dataset was created from healthy and pathological lung sounds. The second dataset was created from four different classes including healthy, rhonchi, fine crackles and coarse crackles. Mel Frequency Cepstrum Coefficients (MFCC) and Linear Predictive Coding has been utilized that used frequently in speaker recognition for recognizing the lung sounds automatically. Principal Component Analysis (PCA) which gave successful results in our study too, was applied to increase the hallmark of features. The results were strengthened by the K-fold cross-validation method. Support Vector Machines algorithm was used in the classification stage. The results showed that PCA increased the parser functionality of features. The most successful results were obtained when the means of MFCC and the curve that fit them used for each dataset. The proposed method was successfully applied to the first dataset and achieved the classification rate of 100%. On the other hand the highest performance was obtained as 85.06% for the second dataset. The achieved results showed that the proposed feature extraction and classification methods were quite successful for recognition of healthy/pathological data. In addition, these results have great potential to distinguish healthy, rhonchi, fine crackles and coarse crackles lung sounds and it could be an alternative method to help the physicians.

KEYWORDS - Electronic auscultation, Mel-frequency cepstrum coefficients, Principle Component Analysis
ABSTRACT

In this study, it is aimed to reduce the variability of parameters in the liquid level system controlled by PID controller for a laboratory scale device. An integrated methodology consisting of experimental design and feedback PID (proportional-integral-derivative) controller was proposed to optimize and control the deviation from the average value in the offset value, variability in the offset value and the time to reach the set value in this liquid level system. The optimal valve opening levels that minimizes the average of the offset value ($\mu$), variance ($s^2$) and the first time to reach the set value ($t$) were determined as 40%, 5%, 50% and 80%, respectively, using TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution)-based Taguchi method by Minitab®. A quite successful control was established in the verification test which performed with specified levels of optimal valve opening. Recovery rates in the control performance before and after optimizing the parameter were calculated as 9.53% in the deviation from the average value in the offset values, 29.37% in the variability in the offset value and 11.27% in the time to reach the set value. MATLAB/Simulink was used to simulate of the liquid level system.

KEYWORDS - TOPSIS based Taguchi Parameter Design, PID Controller and Performance Improvement,Laboratory Scale Liquid Level System
COMPARISON OF ASSOCIATION ANALYSIS ALGORITHM IN SPSS CLEMENTINE AND AN APPLICATION

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ABSTRACT

Data mining is the process of knowledge discovery in databases. One of the methods in data mining is association analysis. In this study we developed a new application in association analysis by using SPSS Clementine data mining software. In the study, SPSS Clementine data mining Software Association analysis algorithms have been applied and compared. With the help of different association algorithms, new findings have been discovered for different market-basket analysis scenarios. We produce different association rules in each algorithm and this provides diversity for new customer strategies. This application of the study has been performed in a big shopping mall. The comparative results are reported and discussed.

KEYWORDS - Data Mining, Market Basket Analysis, SPSS Clementine, Association Rules
BIOGEOGRAPHY-BASED OPTIMIZATION ALGORITHM FOR DESIGNING OF PLANAR STEEL FRAMES

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ABSTRACT

The optimization can be defined as a solution of problem under specific conditions to achieve a specific purpose. Optimization strategies commonly used for solving of various problems and have gained great importance in recent years especially in engineering. Evolving optimization methods over the years has many varieties such as shape optimization, topology optimization, size optimization etc. The latest trend of optimization methods is metaheuristics which are more useful with easy applicable to complex problems regarding to traditional optimization methods. So that metaheuristics have supplanted the traditional methods particularly in engineering by the time. In this study, a planar steel frame which is designed according to the requirements comprised by AISC-LRFD (American Institute of Steel Construction-Load and Resistance Factor Design) has been optimized by aid of biogeography-based optimization (BBO) algorithm.

KEYWORDS - Planar Steel Frames, Optimum Design, Stochastic Search Techniques, Biogeography-Based Optimization, Metaheuristics
ADSORPTIVE REMOVAL OF CARBOXYCLIC ACIDS FROM AQUEOUS SOLUTIONS USING FLY ASH FROM SUGAR PLANT

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ABSTRACT

Carboxylic acids are one of the most widely used chemicals in industries such as pharmaceutical, polymer, food, and etc. Their production is possible via biotechnological and chemical means. They are also found in wastewaters of several processes. Their recovery from their production media or industrial wastewater streams is economically important. There have been numerous separation techniques developed in the recent years for the removal of carboxylic acids from aqueous solutions, e.g., solvent extraction, electrodialysis, esterification, reactive distillation and adsorption. The latter is shown to be superior to the others with its simplicity and low cost. Using a waste or low cost material as adsorbent makes the operation even cheaper and more applicable. In this study, fly ash was used as adsorbent to investigate the adsorption equilibrium of levulinic, formic and acetic acids from aqueous solutions. Fly ash is a solid waste generated from sugar plant and is generally used as a filling material in the industry. During the experimental studies, known amount of fly ash and aqueous solutions of carboxylic acids with varied concentration were mixed and adsorption process was carried out. Effects of several types of process parameters on the removal operation were investigated. It was observed that adsorption capacity of fly ash increased with the increase in adsorbent dose and decrease in initial acid concentration. Per cent removal from aqueous solutions varied with the type of carboxylic acid. More than 90% removal and recovery was obtained for each acid. Among the adsorption isotherms, Freundlich was found to be the most satisfactory to represent the equilibrium data. Thermodynamic studies revealed that the adsorption of carboxylic acids on fly ash is exothermic. The pseudo-second-order model, intraparticle diffusion model, and Elovich model were applied to experimental data to be able to describe the kinetics.

KEYWORDS - Adsorption, Levulinic acid, Formic acid, Acetic acid, Fly ash, Equilibrium, Kinetics
AN INTEGRATED APPROACH FOR SUSTAINABLE SUPPLIER SELECTION IN FUZZY ENVIRONMENT

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ABSTRACT

The term sustainability, which means maintaining a balance or acting responsibly for the future, has come into prominence in many fields. One of the most crucial practice is cooperating with convenient collaborators and composing effective supply chains in terms of social, economic and environmental considerations. Therefore, sustainable supplier selection is getting more and more important to compete in rapidly changing environment. To deal with sustainable supplier selection problem, this study aims to determine the selection of appropriate suppliers and allocation of orders to them. The proposed approach operates in three stages. In the first stage, Fuzzy Decision Making Trial and Evaluation Laboratory is used to obtain the weights of the criteria considering sustainability perspective. In the second stage, by using Fuzzy Grey Relational Analysis, a set of suppliers are ranked and their suitability scores are calculated. In the last stage, optimal order quantities to be provided by the suppliers are obtained via fuzzy linear programming including imprecise data of demand, error rate and capacity.

KEYWORDS - Sustainable supplier selection, fuzzy logic, DEMATEL, grey relational analysis, fuzzy linear programming
DEFINING THE PLANTATION ROLE TO MITIGATE THE URBAN HEAT ISLAND EFFECTS ON GLOBAL WARMING USING THERMAL SATELLITE SENSORS

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ABSTRACT

Urban heat island is one of the major effects on climate change based on human activities. Each land use/land cover (LULC) has its own temperature on the ground according to the structural characteristic (built up material), areal diversity (cover degree) and land physical dynamics (topography). Nowadays, many optical satellite sensors can record the thermal wavelength that is coming from the land surface and land surface temperature (LST) may be defined as degree using some allocation equations. Purpose of this research is to detect the plantation effects to mitigate climate change. In this extent, Landsat, MODIS and ASTER thermal satellite sensors used to obtain planted and non-planted area thermal characteristics in same physical conditions. Plant effects were evaluated considering plant species and plant’s effects were detected to reduce warming. Adana city that is located in Southern Turkey was used to be sample plot because of high potential on plant species and hot and dry climatic characteristics. As a result of the study, particularly, deciduous trees were reduced heat effects more than conifers and citrus sp, eucalyptus sp were outshined species. On the other hand, conifers were very effective when they used intensively in huge areas like Pinus brutia. Additionally, while irrigated grasslands were reduced urban heat island effect in daytime, night time surface temperature increased. In this frame, true plantation strategies were suggested to mitigate urban heat effects.

KEYWORDS - Urban heat island effect, Land use/cover, Climate regulation, Plantation, Landscape design
THE MULTIPLICATIVE ZAGREB COINDEXES OF GRAPH OPERATIONS

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ABSTRACT

In mathematics and computer science, graph theory is the study of graphs, which are mathematical structures used to model pairwise relations between objects. Graphs can be used to model many types of relations and processes in physical, biological, social and information systems. In chemistry a graph makes a natural model for a molecule, where vertices represent atoms and edges bonds. A graphical invariant is a number related to a graph, in other words, it is a fixed number under graph automorphisms. In chemical graph theory, these invariants are also called the topological indices. Topological indices are found to be very useful in chemistry, biochemistry and nanotechnology in isomer discrimination, structure–property relationship, structure-activity relationship and pharmaceutical drug design. Different chemically important graphs can be obtained by applying graph operations on some general or particular graphs. For example, the linear polynomial chain (or the ladder graph Ln) is the molecular graph related to the polynomial structure obtained by the Cartesian product of P2 and Pn+1. The C4 nanotube TUC4(m,n) is the Cartesian product of Pn and Pm and the C4 nanotorus TC4(m,n) is the Cartesian product of Cn and Cm. For a given graph G, one of the hydrogen suppressed molecular graph is the bottleneck graph, which is the corona product of K2 and G. In this study, we present some lower bounds for the first and second multiplicative Zagreb coindex of several graph operations in terms of the first and second multiplicative Zagreb coindices and the multiplicative Zagreb indices of their components.

KEYWORDS - Degree, lower bound, multiplicative Zagreb indices, multiplicative Zagreb coindices, graph operations
T0 EXTENDED PSEUDO-SEMI METRIC SPACES

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ABSTRACT

In 1906, Fr che\(^1\) introduced the notion of metric spaces which play an important role in mathematics. There are numerous generalizations and procedures generalizing the notions of metric spaces by weakening or omitting some of the its axioms. In 1931, Wilson [2] introduced quasi-metric spaces (where the condition of symmetry is omitted) and further developed in [3] and [4] have a particular character and significance in the area of Quantum mechanics [5], experimental psychology [6], biological studies [7], from those sciences in which measurement plays an essential role. In 1990, Ad mek and Reiterman [8] defined extended pseudo-metric spaces (where an pseudo-metric is allowed to attain the value infinity). There are several ways to generalize the usual T0-axiom of topology to topological categories [9], [10], and [11] and the relationships among various forms of generalized T0-axiom in topological categories have been investigated in [11]. One of the uses of T0 objects is to define various forms of Hausdorff objects [9] in arbitrary topological categories. In this paper, we characterize each of various forms of T0 extended pseudo-quasi metric spaces and compare each of T0 extended pseudo-quasi metric spaces with the usual ones.

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KEYWORDS - Topological category, T0 objects, pseudo-quasi metric spaces, products.
GENERATION OF DIGITAL TERRAIN MODEL FROM UN-MANNED AERIAL VEHICLE IMAGE DATA

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ABSTRACT

Nowadays, Un-manned Aerial Vehicle (UAV) platforms are having a practical and beneficial data source for analysing of terrain, surveying, three dimensional (3D) surface modelling of structures and extraction of constructions faades. Low-cost platforms with rotary or fixed wing UAVs are capable of performing the multi view geometry and structure from motion with amateur cameras in autonomous mode by autopilot systems. For the purpose of UAV flights are gathering images from sky which becomes powerful technique for many applications such as change detection, deformation monitoring and forestry applications in medium scale study areas. Mostly procedure of gathering raw image data is easier than a traditional photogrammetric pipeline with an image blocks calculations. Generation of very dense point clouds are possible after image alignment and estimating of camera pose by structure from motion (SfM) algorithms. Processing of raw point clouds can result as high accurate Digital Surface Model (DSM), further to that analysis of digital terrain model, in the other words bare earth extraction can be done. This paper presents the latest developments of UAV image processing methods with computer vision for distinctive applications, surveying and 3D modeling issues for landslide area. Automated processing steps are mentioned for image processing, camera orientation, DTM generation and orthomosaic production stage.

KEYWORDS - UAV, DSM, DTM, Point Cloud, Landslide
BLADE NUMBER EFFECT ON THE THRUST, TORQUE AND POWER OF PROPELLER

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ABSTRACT

In this study, thrust, torque and power concepts are investigated according to different blade number. The computational fluid dynamic (CFD) analysis of three dimensional (3D) flow over propeller is used for this investigation. Power and torque concepts are the important parameter for the design of aircraft and airfoil. Thrust is also another critical parameter for the aircraft performance. A propeller is a type of fan that transmits power by converting rotational motion into thrust. A pressure difference is produced between the forward and rear surfaces of the airfoil-shaped blade. Each propeller blade is a rotating airfoil, which produces thrust and drag. Thrust parameter is directly proportionate with blade number. If the blade number of propeller increase, thrust will increase. If the blade number of propeller increase, the produced torque by propeller and the needed power to drive propeller will also increase. In this study, blade number (2, 3 and 4 blades) effect on the thrust, torque and power is investigated.

KEYWORDS - Propeller, Finite Element Analysis, Power, Thrust, Torque.
INVESTIGATION OF WINGLET SHAPE EFFECT ON THE DRAG AND LIFT FORCE OF AIRCRAFT WING

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ABSTRACT

In this study, different winglet shape is investigated to compare lift and drag forces. The computational fluid dynamic (CFD) analysis of three dimensional (3D) flow over wing is used for this examination. Winglets are angled extensions or vertical projections at the tip of a wing. Winglets are used to increase aerodynamic performance of wings. They are widely used on commercial airplanes for the purpose of reducing induced drag, vortices, and increasing lift. Winglets reduce wingtip vortices. Twin tornadoes (vortices) formed by the difference between the pressure on the upper surface of an airplane's wing and on the lower surface. High pressure on the lower surface creates a natural airflow, which makes its way to the wingtip and curls upward around it. The drag force is generated by pressure distributions over the body surface. Winglet reduce the amount of drag. Efficiency of aircrafts are increased by decreasing drag force and fuel consumption is decreased using winglets. When an aircraft is designed, lift and drag forces must be analyzed and the structural design should be based on these forces. Hence, lift and drag forces on the three dimensional wing, which has different winglet types, are analyzed by using a commercial CFD program ANSYS in this study.

KEYWORDS - Winglet, Aircraft Wing, Computational Fluid Dynamic, Lift Force, Drag Force.
STATISTICAL PROCESS CONTROL OF ASH CONTENT FOR 10 0 5 MM COAL PRODUCT OF HEAVY MEDIUM CYCLONE

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ABSTRACT

Nowadays, quality of coal for usage as fuel for domestic and industrial aims is great importance for the environmental protection and air pollution. Depending on the coal formation and production conditions, various impurities affecting the quality of coal are available inevitably. These include inorganic materials, ash and moisture. Among the inorganic substances, the coarse-sized inorganic substances existing as free in the coal are more important than fine-sized ash forming minerals in terms of the enrichment of coal. Such impurities are liberated by the size reduction procedures and then can be separated from coal by physical enrichment methods. In general, the coals produced by underground or open pit mining do not correspond the product quality requirements demanded by the market. The quality of these coals should be improved in order to be offer them for sale. Therefore, coals produced are subjected to washing processes at a coal preparation plant. Final usage of coal is dependent on its quality therefore it is very important to determine and control whether the coal product produced at a coal preparation plant is clean enough to provide the product specifications. Therefore, it is necessary to monitor coal product characteristics of coals produced regularly by applying the quality characteristics such as statistical process control charts (SPC). Ash content is one of the most important characteristic which is often selected as a product quality parameter for the evaluation of a coal beneficiation process. The smaller the ash content value is, the better the coal quality.

This study aims to present the SPC chart on ash data of -10+0,5 mm product of heavy medium cyclone device at Dereköy coal washing plant in Soma, Turkey. The product ash data were determined non-normally distributed and auto-correlated. This research explains the ways how SPC can be applied for this kind of data in terms of ensuring data normality by Johnson transformation and removing autocorrelation by ARIMA(2,0,0) or AR(2) time series model in order to proper application of SPC on ash data.

KEYWORDS - Ash content, coal preparation, statistical process control, Johnson transformation, ARIMA.
A MATLAB SIMULATION OF POSITIONING OF POLITICAL PARTIES IN THE OPINION SPACE

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ABSTRACT

Catch-all parties appealing to wider groups of citizens position themselves near the center of the opinion space representing the median voter’s opinion, but small parties tend to represent border-line, extreme opinions. In this paper, we verify these observations with a simple simulation searching for optimal positions of political parties in a multi-dimensional circularly-uniform opinion space that will maximize the average level of representation throughout the space. The results indicate that optimal positions are seemingly unique in cases two or more parties compete in a perfectly proportional voting system. We argue that more involved forms of such simulations may be used to foresee the consequences of policy shifts of parties, changes in the perceptions, or any other deviations from the highly idealized situation analyzed here.

KEYWORDS - Simulation, Matlab, Political parties,Spatial theory,Electoral competition
T0 REFLEXIVE SPACES

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ABSTRACT

In this paper, we characterize each of various forms of T0 reflexive spaces and compare each of T0 reflexive spaces with the usual ones.

This research was supported by the Scientific and Technological Research Council of Turkey (TUBITAK) under Grant No: 114F299 and Erciyes University Scientific Research Center (BAP) under Grant No: 5627

KEYWORDS - Topological category, reflexive spaces, ordered set, T0 spaces.
DETERMINING EFFECTS OF FLEXIBLE STRUCTURE AND NON-RANDOM ROAD IRREGULARITY ON PASSENGER COMFORT USING A QUARTER CAR MODEL

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ABSTRACT

In this study, coupled interaction of a simply supported Euler-Bernoulli bridge beam with a quarter car travelling with a constant speed on the bridge is presented. Motion equation of the coupled system is derived from Lagrange equations using the kinetic and potential energies of the both system at the contact point. The obtained set of ordinary differential equations is solved in time domain with a special software prepared by computer using the fourth order Runge-Kutta integration method. For special dimensions of the non-random irregularities on the bridge beam, the effect of the irregularity including with the effect of flexibility of the beam on the passenger comfort are analysed in terms of ISO-2631 standard.

KEYWORDS - Non-random road profile, Vehicle-bridge-interaction, Passenger comfort.
UPTAKE OF RARE EARTH ELEMENTS BY USING IONIC LIQUIDS AS SUPPORTED LIQUID MEMBRANE SYSTEM

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ABSTRACT

World’s second largest thorium reserve is in Eskişehir Beylikahır, Turkey. As well as thorium, this reserve involves significant amount of rare earth elements (REE), mostly lanthanum and cerium. REE have been used in high technology products which are in numerous fields of our daily life. Main separation technology methods are; solvent extraction, crystallization, chromatographic techniques and adsorption. These methods have some technological disadvantages. One of current separation method is the supported liquid membrane (SLM) system. This system has some superiorities such as; uses in small quantities of organic phase and carrier, have one-step mass transfer, possibility of reaching high separation factor and concentrating components during separation. SLM is used in industrial fields like; waste water treatment, desalination and gas purification. However, the applications of supported liquid membranes in nuclear industry are in the beginning stage yet. Nowadays, researches continue to find out new extractants and applications which have preferable properties . Ionic liquids (IL) are an alternative to conventional extractants because of having outstanding properties. Use of IL and SLM together provides to benefit technical superiorities. This system allows researchers to use IL in different morphology and configurations. Besides, ionic liquid supported membranes don’t have the volatility problem. SLM system is prepared by immobilization of extractant-ionic liquid mixture into membrane filter, then it is placed between two independent compartments of glass diffusion cell. Lanthanum is transferred into the membrane from the feeding solution in the certain conditions and then metal transport into stripping phase . Thus, separation of Lanthanum is achieved. Concentrations of metal samples are measured by ICP-OES with certain time intervals. In this research, the factors of lanthanum uptake efficiency are studied such as; ionic liquid-extractant ratio, lanthanum concentration in feed phase, pH of feeding phase, and salting agent (NaNO₃) concentration. Membrane characterization is carried out by means of SEM-EDX.

KEYWORDS - Rare Earth Elements, Lanthanum, Supported Liquid Membranes, Ionic Liquid, Separation
USING NANOFIBERS IN FREQUENCY SELECTIVE SURFACES AS DIELECTRIC SUBSTRATE

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ABSTRACT

Frequency selective surfaces (FSS) can allow and block electromagnetic (EM) waves depending on their shape and structure. In this study we demonstrate numerical analysis solutions of flexible micro strip band pass filter as FSS. Proposed design is produced from 50 micrometer thickness polycaprolactone (PCL) substrate which is electro spun nanofiber. The nanofiber flexible substrate is coated by nested two copper rings to constitute FSS. Designed unit cell showed band pass filter characteristic between 6.8 and 7.7 GHz. An array design of 3x3, consisting of same unit cells also displayed similar band pass filter characteristics at same frequencies.

KEYWORDS - frequency selective surfaces, dielectric substrate, Microwave, Polycaprolactone, Nanofibers
COMPARING THE THERMAL PERFORMANCE OF TRADITIONAL BUILDING AND REINFORCED CONCRETE BUILDING BASED ON TS 825 (THERMAL INSULATION REQUIREMENTS FOR BUILDINGS)

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ABSTRACT

This study has been composed for the aim of making a comparison of the requirements for heating energy within TS 825, between the houses built with reinforced concrete frame technique which most commonly used in todayâ€™s Turkey and the houses built with the traditional building techniques. For this purpose, energy requirements of two storey detached reinforced concrete frame building calculated according to TS 825, separately for with thermal insulation and without thermal insulation. The value obtained by calculation, more than twice the permitted value. When the calculation results of both the traditional building and the reinforced concrete building is compared, the thermal insulation made form of a house has the minimum energy consumption. And it has been determined that the energy consumption value of a traditional building is less than a reinforced concrete building without insulation. As a result, modern reinforced concrete structures, if they are not insulated very high level of energy consumed. For this reason, the value of thermal conductivity with new buildings must be appropriate to the region. Appropriate thermal insulation requirements, can be achieved using thermal insulation materials, or as with examples of traditional building, can be achieved using high thermal values building components and passive solar building techniques.

KEYWORDS - TS 825, A reinforced concrete frame construction system, Traditional construction system, Thermal insulation, Energy consume
REMOVAL OF CONGO RED ANIONIC DYE FROM AQUEOUS SOLUTIONS BY ADSORPTION ONTO OLIVE POMACE

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ABSTRACT

The removal of textile dyes from industrial effluents is one of the most serious environmental challenges in recent years. The aim of this study is to remove a toxic dyestuff, CongoRed (CR) from aqueous solutions by adsorption using olive pomace (OP) as a low-cost and eco-friendly adsorbent. The characterization of the adsorbent was carried out using conventional techniques like Scanning Electron Microscopy, Infrared Spectroscopy, Energy-dispersive X-ray Spectrophotometer. Aqueous CR solutions with different initial concentrations (100-5000 mg•L−1) were prepared using ultra high pure water obtained from Millipore UHP Water System. Each solutions were shaken with known amounts of OP (0.05-0.25 g) in a 50 mL conical flask at 150 rpm speed. Batch experiments were carried out to observe the effect of various experimental parameters such as contact time, temperature, aqueous phase pH, initial CR concentration and also adsorbent dose. It was seen that the adsorption equilibrium was reached in 210 min. The percentage of adsorbed CR increased with the increase in OP amount in the system (Highest removal ~ 88.2%). The process was slightly affected from the initial pH of the aqueous solution. Hence, pH was not adjusted in the experiments. The studies on the adsorption kinetic and isotherms were carried out and best fitting models were suggested. From the kinetic studies, it was seen that the adsorption obeyed to the pseudo-second order kinetic model (R2=0.97). It was seen that the adsorption process best described by Freundlich isotherm model (R2≥ 0.91). Thermodynamic studies showed that the process was exothermic in nature. The results generated in this work can be used for determination of the optimum conditions for the removal of synthetic toxic dyes from aqueous solutions via adsorption using OP.

KEYWORDS - Adsorption, synthetic dyes, olive pomace, kinetics, characterization, isotherms.
NUMERICAL SOLUTION OF DELAY INTEGRO DIFFERENTIAL EQUATIONS WITH VARIABLES COEFFICIENTS USING LAGRANGE POLYNOMIALS

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ABSTRACT

In this study, a matrix-collocation method is developed for numerically solving high-order linear volterra-type functional integro differential equations with mixed proportional and variable delays under initial conditions. These type problems often appear in mathematical physics, mechanics, electronics and other branches of natural sciences. The technique we have used is essentially based on Lagrange polynomials along with Taylor matrix method using collocation and interpolation points. And then the solution of problem is reduced to solution of a system of algebraic equations. Also, to demonstrate the accuracy and efficiency of the method, some examples together with an error analysis based on the residual function is performed.

KEYWORDS - Lagrange polynomials, Taylor matrix method, Interpolation and collocation points, Residual function.
ABOUT ONE APPROACH TO INTELLIGENT MANAGING OF HEALTH SPECIALISTS LABOR MARKET

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ABSTRACT

Paper illustrates specific features of the health specialists (HS) labor market, which dictate the variance of fuzzy conditions of demand and supply of HS and the multiple-choice pattern of their reconciliation. Levels of modelling of the supply and demand interaction in the HS labor market are singled out. Task formulation and the purpose of managing the demand and supply of HS are discussed. A microlevel method of supply and demand management in the HS labor market based on fuzzy situation analysis and fuzzy pattern recognition is proposed.

KEYWORDS - health specialists labor market, supply and demand, demand model, supply model, situational management, fuzzy reference and actual situations, fuzzy situation recognition.
NARMA-L2 CONTROLLER BASED ON ONLINE SUPPORT VECTOR REGRESSION

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ABSTRACT

In this study, a NARMA-L2 Controller based on online support vector regression is utilized to control a nonlinear continuously stirred tank reactor (CSTR) system. The main aim in study is to derive a SVR based NARMA-L2 controller via SVR NARX model of the system. For this purpose, firstly, SVR NARX model of the system is decomposed to its internal dynamics which can be represented via SVR-NARMA-L2 model, and then SVR-NARMA-L2 controller is designed via SVR-NARMA-L2 model of the system. The performance evaluation of the controller has been executed on a continuously stirred tank reactor (CSTR) and the results show that the NARMA controller together with NARMA model attain successful tracking performance with small modeling, transient-state and steady state errors.

KEYWORDS - NARMA-L2 Model, NARMA-L2 Controller, Support Vector Regression, SVR-NARMA-L2 Controller, System Identification
A COMPARISON OF DIFFERENT STATISTICAL METHODS FOR
DISCRIMINATION OF ISOMERS

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ABSTRACT

This work will present a comparison of some experimental data with theoretical statistical analysis as well as the results obtained using different statistical techniques such as Principal Component Analysis (PCA)-Linear Discriminant Analysis (LDA)-Factor Analysis (FA) are also known as the multi-variation analysis method that can be used for different purposes, especially to distinguish the chemicals with isomers in current state. These techniques are known a dimension reduction analysis methods which have been used in mainly social sciences and also, in psychology in initially but nowadays it is widely used in every field of science by the multidisciplinary works. In this work, a Femtosecond Laser Mass Spectrometry (FLMS) technique was used to carry out an experimental procedure to investigate molecular isomers to distinguish them from each other which cannot be discriminate using traditional processes. In the experimental work, an ultrafast laser system was used as an energy source for ionisation process and this laser was used in connection with a linear time of flight (L-TOF) mass spectrometer. Data was taken using several laser pulse energies and different sample pressures, and the main purpose of the statistical application is to achieve the most important information from the experimental results. In this regard, the dimension reduction of the data will be presented by analysing the structure of observables and variables of the main components of the spectrum for isomers of a molecules. As a result, we have observed that these statistical techniques promise a powerful technique to establish an industrial product that will be used to distinguish mass spectra in same appearance and cannot distinguished from each other.

KEYWORDS - PCA, LDA, FA, femtosecond, mass spectrometry
APPLICATIONS OF PRINCIPAL COMPONENT ANALYSIS (PCA) ON DATA OF FEMTOSECOND LASER MASS SPECTROMETRY (FLMS) FOR IDENTIFICATION OF HEXANE ISOMERS

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ABSTRACT

The statistical analyses and characterization of molecules are the most important topic to investigate its remarkable properties. The computer programmes allow us to interpret molecular characteristics. The one of the most powerful technique for this purpose is Principal Component Analysis (PCA) which is a statistical technique and widely used in all areas of multidisciplinary studies. Especially, it can help us to statistically identify isomers of molecules, very common case in chemistry. Hexane (C₆H₁₄) has been located in alkane group with five isomers. It is used generally in industry, in laboratory as a non-polar solvent, and also in pharmaceutical applications. Therefore, when the physical and chemical characteristics of molecules are well known, the new application areas will be opened. Laser mass spectroscopy is a very special technique to understand some properties of materials. The mass spectroscopy technique has some unique advantages to reveal in molecular procedures. We have carried out an experimental study to discriminate the isomers of molecules. Hexane (C₆H₁₄) molecule has an unbranched structure with six-carbon atoms and five isomers called to be n-butanol, 2-methylpentane, 3-methylpentane, 2,3-dimethylbutane, 2,2-dimethylbutane. Some properties of hexane isomers will be determined using femtosecond laser mass spectrometry and PCA will be applied to experimentally obtained results. The ionization/dissociation and fragmentation process for molecules can be investigated using FLMS technique. The PCA method can statistically distinguish the isomers of hexane molecule very clearly. The obtained results will be presented in the scope of this study.

KEYWORDS - Hexane, femtosecond, PCA, Isomers
MOBILE ACCIDENT NOTIFICATIONS

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ABSTRACT

Traffic accidents are one of the most important and serious problems, our country encounters. As the percentage of injured and casualties in traffic accidents are huge in numbers, it causes thousand of people injured or dead in a year. In the situation of coming by a traffic accident that we face commonly in daily life, generally people directly use their mobile phones and call the related units. However, as the required, right and adequate information is not given to these related units, the cases may sometimes end with casualties. One of the most important reason of the casualties in car accidents is the wrong, senseless first aids performed to the victims of injuries by surrenders. In this study, the aim is to determine the exact location of the accident with its latitude and longitude that is determined automatically via the application present in the mindful citizen who tries to help the victims of the accident. With this system named as “Mobile Accident Notification” the users are aimed to send accident notification in online or via sending message when there is no internet access with the help of mobile applications that process in Android Operating System. These accident data kept in remote server are monitored on web pages or Android mobile phones. In this thesis, a web-based, open-source accident filtration system was developed and the accidents were provided to be monitored by the authorized people in related units.

KEYWORDS - Mobile accident, Accident notification, Mobile accident tracking, Android mobile accident statement