SELCUK UNIVERSITY
FACULTY OF TECHNOLOGY

ICENTE'23

INTERNATIONAL CONFERENCE ON ENGINEERING TECHNOLOGIES

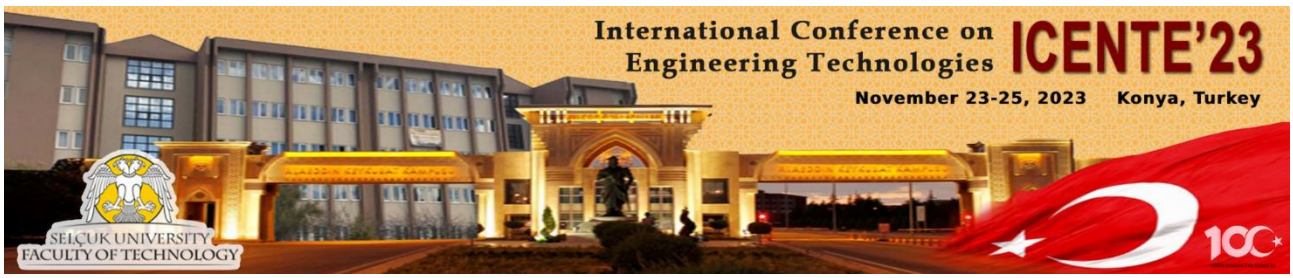
November 23-25, 2023

Konya/TURKEY

ABSTRACTS BOOK

Editor
Prof. Dr Sakir TASDEMIR

E-ISBN: 978-975-448-238-6



International Conference on Engineering Technologies

7th International Conference, ICENTE
Konya, Turkey, November 23-25, 2023

Abstracts

Editor
Sakir TASDEMIR

International Conference on Engineering Technologies, **ICENTE'23**
Konya, Turkey, November 23-25, 2023

7TH INTERNATIONAL CONFERENCE ON ENGINEERING TECHNOLOGIES

23-25 NOVEMBER 2023

Editör
Şakir TAŞDEMİR

EBOOK ISBN: 978-975-448-238-6

EDITOR :

Prof. Dr. Sakir TASDEMIR
Selcuk University, Turkey
Depertmant of Computer Engineering, Faculty of Technology
Alaeddin Keykubat Campus, 42031, Konya, TURKEY
stasdemir@selcuk.edu.tr

PREFACE

International Conference on Engineering Technologies (ICENTE'23) was organized in Konya, Turkey on 23-25 November 2023.

The main objective of ICENTE'23 is to present the latest research and results of scientists related to Biomedical, Computer, Electrics & Electronics, Mechanical, Mechatronics, Metallurgy & Materials and Civil Engineering fields. This conference provides opportunities for the delegates from different areas in order to exchange new ideas and application experiences, to establish business or research relations and to find global partners for future collaborations.

All 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:

- Artificial Intelligence Studies (AIS)
- Gazi Journal of Engineering Sciences (GJES)
- International Journal of Applied Mathematics, Electronics and Computers (IJAMEC)
- International Journal of Automotive Engineering and Technologies (IJAET)
- International Journal of Energy Applications and Technology (IJEAT)
- MANAS Journal of Engineering (MJEN)
- New Trends in Computer Sciences
- Open Journal of Nano (OJN)
- Selcuk University Journal of Engineering Sciences (SUJES)
- Intelligent Methods in Engineering Sciences (IMIENS)

At this conference, there are 177 paper submissions. Each paper proposal was evaluated by two reviewers. and finally, 115 papers were presented at the conference from 6 different countries with 58 local and foreign universities and organizations participating,

In particular, we would like to thank Prof. Dr. Metin AKSOY, Rector of Selcuk University, conference scientific committee, session chairs, invited speakers, referees, technical team, participants, and all our colleagues who have contributed. They have made a crucial contribution to the success of this conference. Our thanks also go to our colleagues in our conference office.

Prof. Dr. Sakir TASDEMIR
Editor

PROGRAMME COMMITTEES

HONORARY CHAIR :

Metin Aksoy, Rector of Selcuk University, Turkey

GENERAL CHAIRS :

Sakir Tasdemir, Selcuk University, Turkey

SECTION EDITORS :

Adem Golcuk, Selcuk University, Turkey
Ali Yasar, Selcuk University, Turkey
Eyub Canli, Selcuk University – Turkey
Fatih Basciftci, Selcuk University, Turkey
Gokhan Arici, Selcuk University, Turkey
Ilkay Cinar, Selcuk University, Turkey
Ismail Saritas, Selcuk University, Turkey
Mehmet Cunkas, Selcuk University, Turkey
Murat Ciniviz, Selcuk University, Turkey
Mustafa Acarer, Selcuk University, Turkey
Mustafa Altin, Konya Technical University, Turkey
Nurettin Dogan, Selcuk University, Turkey
Suleyman Neseli, Selcuk University, Turkey
Yunus Emre Acar, Selcuk University, Turkey

INTERNATIONAL ADVISORY BOARD :

Abdullah Erdal Tumer, Kirgizistan Turkiye Manas University, Kyrgyzstan
Ahmet Yonetken, Afyon Kocatepe University, Turkey
Ahmet Fenercioglu, Gaziosmanpasa University, Turkey
Ahmet Afsin Kulaksiz, Konya Technical University, Turkey
Alexander Sudnitson, Tallinn University of Technology, Estonia
Alina Ivan Dramogir, Gheorghe Asachitechnical University Of Iasi, Romania
Almoataz Youssef Abdelaziz, Ain Shams University, Egypt
Amar Ramdane Cherif, University of Versailles, France
Anca Loana Andreescu, Academy of Economic Studies, Bulgaria
Anne Villems, University of Tartu, Estonia
Antonella Reitano, University of Calabria, Italy
Antonio Mendes, Universidade De Coimbra, Portugal
Arif Gok, Amasya Teknoloji Faculty, Turkey
Aristomenis Antoniadis, Technical University Of Crete, Greece
Artan Luma, South East European University, Macedonia
Bahattin Karakaya, Istanbul University, Turkey
Biagio Lenzitti, University of Palermo, Italy
Binod Kumar, Jspm Jayawant Institute Of Computer Applications Pune, India
Boris Akanaev, Kazak National University, Kazakhistan
Domenico Tegolo, Universita Degli Studi Di Palermo, Italy
Eisha Akanksha, Mvj College of Engineering, India
Elinda Kajo Mece, Polytechnic University of Tirana, Romania
Engin Ozdemir, Kocaeli University, Turkey
Erol Turkes, Kirklareli University, Turkey
Ertugrul Durak, Suleyman Demirel University, Turkey
Gabriel Luna Sandoval, Sonora State University, Mexico
Hamit Saruhan, Duzce University, Turkey
Hamza Bensouilah, Laboratoire de Mecanique et Structures, Algeria
Hasan Gokkaya, Karabuk University, Turkey
Howard Duncan, Dublin City University, Ireland
Huse Fatkic, University Of Sarajevo, Bosnia & Herzegovina

ORGANIZING COMMITTEE :

Murat Koklu, Selcuk University, Turkey
Polyxeni Arapi, Technical University of Greece, Greece
Silyan Sibinov Arsov, Rousse University, Bulgaria

TECHNICAL COMMITTEE :

Abdulkadir Saday, Selcuk University, Turkey
Musa Dogan, Selcuk University, Turkey
Yusuf Eryesil, Selcuk University, Turkey

CONTENTS

CLASSIFICATION OF BREAST ULTRASOUND IMAGES BASED ON REGIONAL AND MORPHOLOGICAL FEATURES

***ZEYNEP AK*[1] *, SERIFE GENGEC BENLI*[2]

[1] Erciyes University, Turkey ; [2] Erciyes University, Turkey

ABSTRACT

Breast cancer is a highly prevalent and the most lethal type of cancer in women, emphasizing the critical importance of early diagnosis and treatment. This study is based on extracting features from breast ultrasound images (BUSI) from publicly available dataset. The research examined breast cancer various of cancer based on regional and morphological features extracted from mask images of breast ultrasound. Regional and morphological features were extracted, and the Least Absolute Shrinkage and Selection Operator (LASSO) method was used for feature selection. The results demonstrated that the selected features could effectively distinguish between malignant and benign breast lesions with high accuracy. In this study, machine learning methods such as Support Vector Machines (SVM), Artificial Neural Networks (ANN), and Naive Bayes were employed to classify benign and malignant lesions. The classification methods were evaluated using various performance criteria. According to the results, in the study conducted with balanced data, the ANN method achieved the highest classification performance, with an Area Under the Curve (AUC) value of 0.9973 and an Accuracy (ACC) value of 0.9887.

KEYWORDS - breast ultrasound image,region and morphological features,machine learning

ANALYSIS OF THE WING STRUCTURE OF THE COENONYMPHA PAMPHILIUS BUTTERFLY SPECIES USING ATOMIC FORCE MICROSCOPY

RASHID DALLAEV[1] , STEFAN ŢĂLU[2] , TATIANA PISARENKO[3] , VLADIMIR HOLCMAN[4]

[1] Brno University Of Technology Faculty Of Electrical Engineering And Communication Department Of Physics Technicka 2848 8 61600 Brno Czech Republic, Czech Republic ; [2] The Technical University Of Cluj Napoca The Directorate Of Research Development And Innovation Management Dmcdi 15 C Tin Daicoviciu St Cluj Napoca 400020 Cluj County Romania, Romania ; [3] Brno University Of Technology Faculty Of Electrical Engineering And Communication Department Of Physics Technicka 2848 8 61600 Brno Czech Republic, Czech Republic ; [4] Brno University Of Technology Faculty Of Electrical Engineering And Communication Department Of Physics Technicka 2848 8 61600 Brno Czech Republi, Czech Republic

ABSTRACT

This article describes the structure of the butterflies' wing scales, their variations, and properties. Experimental data obtained herein using an atomic force microscope (AFM) instrument sheds some light on the Coenonympha pamphilius scaly wing structure. Coenonympha pamphilus is the smallest butterfly of the Satyrinae subfamily and is otherwise known as the 'small heath'. The study of the butterflies' wing structure is important for the creation/improvement of photonic crystals which are commonly used in the field of optoelectronics.

KEYWORDS - Atomic force microscopy, butterflies' wings, Coenonympha pamphilius, scanning electron microscopy, surface morphology.

THE EYE STRUCTURE OF THE COENONYMPHA PAMPHILIUS BUTTERFLY SPECIES STUDIED BY ATOMIC FORCE MICROSCOPY

RASHID DALLAEV[1] , STEFAN ŢĂLU[2] , TATIANA PISARENKO[3] , PETR SADOVSKY[4] , DINARA SOBOLA[5]

[1] Brno University Of Technology Faculty Of Electrical Engineering And Communication Department Of Physics Technicka 2848 8 61600 Brno Czech Republic, Czech Republic ; [2] The Technical University Of Cluj Napoca The Directorate Of Research Development And Innovation Management Dmcdi 15 C Tin Daicoviciu St Cluj Napoca 400020 Cluj County Romania, Romania ; [3] Brno University Of Technology Faculty Of Electrical Engineering And Communication Department Of Physics Technicka 2848 8 61600 Brno Czech Republic, Czech Republic ; [4] Brno University Of Technology Faculty Of Electrical Engineering And Communication Department Of Physics Technicka 2848 8 61600 Brno Czech Republic, Czech Republic ; [5] Brno University Of Technology Faculty Of Electrical Engineering And Communication Department Of Physics Technicka 2848 8 61600 Brno Czech Republic, Czech Republic

ABSTRACT

Butterflies have color vision which they utilize in the search for flowers. There are typically around six different classes of photoreceptors with specific spectral sensitivities. This paper goes over a typical butterfly's eyes structure as well as their properties. The experimental data obtained using an atomic force microscope was used to investigate the surface characteristics of an eye of Coenonympha pamphilus butterfly species. Coenonympha pamphilus which is also known colloquially as the 'small heath' is the smallest butterfly within Satyrinae subfamily.

KEYWORDS - Atomic force microscopy, Coenonympha pamphilius, eye structure, surface morphology

PERFORMANCE EVALUATION OF GRAPH CUT AND SNAKE ALGORITHMS ON SKIN LESION SEGMENTATION

SEVDA GUL[1] , GOKCEN CETINEL[2]

[1] Sakarya University, Turkey ; [2] Sakarya University, Turkey

ABSTRACT

Abstract - This study aimed to detect skin lesions and determine the lesion area using images taken by the dermatoscopy device, widely used by experts in skin cancer imaging. For this purpose, first of all, the hairs on the skin were removed with the Frangi filter based on the fast marsh method, and then the lesion area was determined by graph cut and snake segmentation methods. The segmentation results were compared with the binary ground truth images over five metrics. Simulation results showed that both graph cut and snake algorithms provided successful results in skin lesion segmentation. However, the snake algorithm provided a superior performance with approximately 92% accuracy, 99% sensitivity, 89% specificity, 78% Jaccard index (JI) and 87% Dice coefficient values.

KEYWORDS - Keywords - Skin cancer, Segmentation, Graph cut, Snake algorithm.

BIOINFORMATIC ANALYSIS OF SFRP1 AND AXIN2 GENES SNPS ASSOCIATED WITH BREAST CANCER

***GULSAH UNAL*[1] *, ESMA ERYILMAZ DOGAN*[2]

[1] Institude Of Science, Turkey ; [2] Institude Of Science, Turkey

ABSTRACT

Breast cancer is a disease in which cells in the breast become abnormal and multiply uncontrollably, forming a tumor structure. Although this cancer is more common in women, it can also develop in men. Experts estimate that about 5% to 10% of breast cancers are linked to gene mutations passed down through generations in the family. In this study, the SFRP1 and AXIN2 genes which are located on the WNT signaling pathway associated with breast cancer were studied using bioinformatics technology. The SFRP1 gene is a negative regulator of the WNT pathway. That may involve genetic changes in developing breast cancers that cause abnormal protein expression and promote tumor growth. The AXIN2 gene is a critical regulator playing an important role in cell growth, the formation of a number of malignancies, tumor progression, and so on. The AXIN2 gene forms the signaling pathway necessary to prevent cancerous cells from dividing abnormally and spreading. In this study, single nucleotide polymorphisms (SNPs) of these genes were analyzed using bioinformatics tools. In addition, the functions, structures and stabilization of proteins, three-dimensional modeling of proteins, gene-gene interactions, protein-protein interactions and the evolutionary conservation of amino acid sequences containing non-synonymous SNPs (nsSNPs) were examined in silico. It will positively facilitate the research of scientists in researching these genes with minimum cost and time and will serve as a reference in clinical studies and will guide in vivo research.

KEYWORDS - Breast Cancer, Bioinformatics, SFRP1 Gene, AXIN2 Gene, Single Nucleotide Polymorphism (SNP)

DESIGN OF A WRIST WEARABLE AUXILIARY ALERT SYSTEM FOR THE HEARING IMPAIRED

MUCAHIT EGE[1] , GOZDE KONUK EGE[2] , HUSEYIN KAYGISIZ[3] , IZZET PARUG DURU[4] , RIZA DILEK[5]

[1] Istanbul Gedik University, Turkey ; [2] Istanbul Gedik University, Turkey ; [3] Istanbul Gedik University, Turkey ; [4] Istanbul Gedik University, Turkey ; [5] Istanbul Gedik University, Turkey

ABSTRACT

Today, hearing impaired people, who constitute a significant majority of people with disabilities, resort to many methods in order to meet their daily needs and adapt to their environment. Technological tools contribute significantly to these needs. In this study, an auxiliary warning system that can be worn on the wrist and guides the disabled person depending on the artificial stimuli in the environment has been designed. It is aimed to increase the living standards of people with complete hearing loss or hearing difficulties, to minimize the problems caused by hearing impairment, and to help these people communicate with each other and the outside world more easily. In this regard, a microcontroller-based system that communicates with other peripherals using wireless communication technology has been designed. Identified stimuli such as doorbell and school recess bell are detected by the wristband and the user is guided by vibration, light stimulus and message given on the LCD screen. Communication is provided between environmental stimuli and the device with 433Mhz RF (Radio Frequency). Vibration and visual warnings are created in different tones defined according to the device receiving the warning. The electronic, mechanical and software designs of the system have been completed and its production will be carried out with future studies.

KEYWORDS - Alert system, communication, deaf, disability, electronic communication, hearing, hearing impaired, microcontroller, rf, wristband, wrist-wearable.

IN SILICO ANALYSIS OF SNPS IN DVL3 AND LRP5 GENES ASSOCIATED WITH BREAST CANCER

***FATMA TANER*[1] *, ESMA ERYILMAZ DOGAN*[2]**

[1] Institute Of Science, Turkey ; [2] Institute Of Science, Turkey

ABSTRACT

DVL3 and LRP5 genes play an important role in the regulation of biological processes such as differentiation, proliferation, and growth in units. Increasing the abnormal expression of DVL3 and LRP5 genes is associated with breast cancer and causes cancer to develop and progress. The development of any genetic anomalies such as sequence variation in the form of single nucleotide polymorphism (SNP) in human genome is the most common type and studied by wide range of researchers. The aim of this study is to determine the healthy causative SNPs by evaluating the protein in terms of SNPs in the DVL3 and LRP5 genes. Generic data, SNP lists, and information used in the study were obtained from NCBI, dbSNP and Uniprot databases. Bioinformatics tools such as SIFT, PolyPhen-2, and SNAP2 were used to investigate the role of deleterious SNP. The effects of the detected deleterious SNPs on the structure and stabilization of proteins, their interactions with genes and proteins, evolutionary conservation analyzes of the amino acid sequences, and the three-dimensional structure of the proteins will be examined. The result of the SNP analysis is expected to be used as a guidance in clinical investigation of breast cancer research.

KEYWORDS - Single nucleotide polymorphisms,Breast cancer,DVL3,LRP5,In silico

SKIN LESION SEGMENTATION WITH SEMANTIC SAM PROS AND CONS

SEVDA GUL[1] , BEKIR MURAT AYDIN[2] , DEVRIM AKGUN[3] , RABIA OZTAS KARA[4] , HAMIDULLAH NAZARI[5] , GOKCEN CETINEL[6]

[1] Sakarya University, Turkey ; [2] Sakarya University, Turkey ; [3] Sakarya University, Turkey ; [4] Sakarya University, Turkey ; [5] Sakarya University, Turkey ; [6] Sakarya University, Turkey

ABSTRACT

Abstract - The Segment Anything Model (SAM) was introduced for the first time in April 2023 and gained popularity in a short time. One of the critical application areas of SAM is medical image segmentation. The performance of SAM in various medical image segmentation tasks is still being investigated. The main specifications of SAM can be summarized as follows: i) Excellent generalization on common scenes, ii) Strong prior knowledge requirement, iii) Less effective in low-contrast applications, iv) Limited understanding of professional data, v) Performance degradation in smaller and irregular objects. In this study, our goal is to investigate the performance of SAM for skin lesion segmentation tasks. For this purpose, two comprehensive databases are constructed. The first database includes 3463 public skin lesion images, and the second database consists of 773 private skin lesion images taken from Sakarya University Training and Research Hospital with ethical permission. Both databases have ground-truth segmentation images that a dermatology expert manually determines. The performance evaluation compares manually determined skin lesion regions with automatic segmentation regions achieved by SAM through Intersection over Union (IoU) and Dice metrics. In the presented study, a post-processing step is also applied to increase the skin lesion segmentation ability of SAM, and the results are compared with commonly used deep learning-based segmentation methods.

KEYWORDS - Keywords - Segment Anything Model, Segment Anything Model, Deep Learning

USING MATLAB TOOLBOXES IN BIOMEDICAL IMAGE PROCESSING

***YASIN NUHOGLU*[1] , *YAHIA ADWAN*[2] , *AYTEN ATASOY*[3]**

[1] Karadeniz Teknik Universitesi, Turkey ; [2] Karadeniz Teknik Universitesi, Palestinian Territory ; [3] Karadeniz Teknik Universitesi, Turkey

ABSTRACT

MATLAB and the Computer Vision Toolbox provision a large range of improved image processing functions and correlative tools for developing and to investigate digital images. Correlative tools enable morphological operations for instance spatial image transformations, edge find and noise elimination, related area processing, filtering, FFT, DCT fundamental statistics, graph fitting and Radon Transform to be performed. Making graphic objects semi-transparent is a convenient technique in 3D visualization that provides more knowledge about the spatial intercourses of diverse constructions. The toolbox functions applied in MATLAB have also been used to improve customized algorithms.

KEYWORDS - MATLAB,Biomedical Image Processing,Toolbox

A DEEP LEARNING BASED MEDICATION RECOGNITION SYSTEM PREVENTING ERRORS OF DRUG USE

SIBEL GULER [1] ***, KENAN ZENGIN*** [2]

[1] Muhendislik Ve Doga Bilimleri Fakultesi, Turkey ; [2] Muhendislik Ve Doga Bilimleri Fakultesi, Turkey

ABSTRACT

One of the significant reasons for the failure of medication-based treatment services is the incorrect selection of medications, and the other is the improper utilization of the planned treatment. Regardless of the cause, inappropriate medication use inevitably leads to health issues and economic losses. Medications play a crucial role in medical treatment. However, for a medical treatment to be successful, it is essential for medications to be used regularly. Having several different types of pills can make it challenging for individuals to remember the pill they need to take, especially when the pills closely resemble each other. Another critical aspect of the success of medical treatment is the incorrect and irregular use of the prescribed medications. In chronic conditions like hypertension, only around 30% of patients have reported consistently following their treatments. Approximately one in five patients (21%) admitted to not taking any medication. These findings underscore the fact that medication use is not correctly adhered to in our society, leading to the accumulation of unused medications in households. In the literature, most developed drug detection and recognition applications have been limited in solving this problem due to the insufficient number of examples per drug category. In this study, we will utilize a dataset that we have created ourselves, which contains more diverse imaging conditions and examples for each drug category. To ensure that individuals can easily access the device used in the medication recognition system and do not need to carry an additional device for medication recognition, it has been decided that smartphones are the most suitable device. The widespread use of mobile devices today makes it even more meaningful to implement this study on the mobile platform. Furthermore, although this problem exists in many countries, the drug recognition applications that developed are not effectively utilized in our country. This is attributed to the applications remaining local or encountering language barriers. For this reason, this study aims to be a mobile application with Turkish language support. In this proposed study, a mobile application will be developed to facilitate the detection and classification of drugs/medications from images captured by a camera. The study will primarily consider three main features (shape, imprint, color) in the drug images. For this purpose, the training of drugs will be carried out using deep learning models, specifically Convolutional Neural Networks (CNN). It is aimed to create a CNN model for each feature, along with a multi-convolutional neural network. The study aims to have a more diverse set of imaging conditions for each drug category. A dataset with various imaging conditions and samples will be used for each drug category in the study. The experimental and graphical results obtained will be provided and compared through analysis.

KEYWORDS - Deep Learning, Drug Detection and Classification, CNN

DEVELOPING A DESKTOP APPLICATION FOR REAL TIME DETECTION OF ACROMEGALY FROM FACIAL IMAGES WITH ARTIFICIAL INTELLIGENCE

MEHMET OZEL[1] , NURETTIN DOGAN[2] , RUKIYE KARAKIS[3] , MUHAMMED KIZILGUL[4] , MUHAMMED MUTLU YAPICI[5] , ELVAN DUMAN[6]

[1] Selcuk University, Turkey ; [2] Selcuk University, Turkey ; [3] Sivas Cumhuriyet University, Turkey ; [4] Saglik Bilimleri University, Turkey ; [5] Ankara University, Turkey ; [6] Mehmet Akif Ersoy University, Turkey

ABSTRACT

In this study, a desktop application that automatically recognizes acromegaly disease from real-time facial images using deep learning algorithms in the early diagnosis of acromegaly disease and facilitates the diagnosis of the disease has been implemented. The application was prepared using the data and methods in the study previously developed by Kizilgul et al. In the desktop application, it is possible to evaluate instant facial images, previously taken images and video images. The application developed in the study produces results as "Healthy" or "You may have Acromegaly" for the relevant facial image. The developed desktop application has so far been tested in 32 patients for testing purposes. As a result of this trial, it gave healthy results to all 32 people. It is aimed to contribute to the early diagnosis of Acromegaly disease by placing the desktop application developed with this study on Kiosk devices in places such as hospitals and shopping centers.

KEYWORDS - Acromegaly, Desktop, Deep Learning, Artificial Intelligence.

MULTI LINGUAL SPEECH EMOTION RECOGNITION SYSTEM USING MACHINE LEARNING ALGORITHMS

EMEL COLAKOGLU[1] , SERHAT HIZLISOY[2] , RECEP SINAN ARSLAN[3]

[1] Kayseri University, Turkey ; [2] Kayseri University, Turkey ; [3] Kayseri University, Turkey

ABSTRACT

Predicting emotions from speech in different languages with high accuracy has been a challenging task for researchers in recent years. When the studies in this field are examined, it is seen that researchers generally try to recognize emotions from speech in their traditional language. However, these studies cannot be generalized for multi-lingual environments around the globe. The Turkish speech emotional dataset, which was created for use in our previous studies, was further expanded for use in this study too. Emo-db dataset was also used to benchmark the success of the proposed model. Various pre-processing stages such as standardization, sorting and resampling were applied to the data in the datasets to increase the performance of the model. OpenSMILE toolbox, which is frequently encountered in studies, was used to obtain features that provide meaningful information corresponding to the emotion in speech, and thousands of features were obtained from emobase2010 and emo_large feature sets. 8 different machine learning algorithms were used in the model to classify 4 different emotions for the Turkish dataset and 7 different emotions for the Emo-db dataset. The best recognition rates were achieved with 92.73% and 96.3%, respectively, for the Turkish dataset consisting of 1099 records and the Emo-db dataset consisting of 535 records, using the Emobase2010 as a feature set and Logistic Regression as a classifier.

KEYWORDS - Speech Emotion Recognition,Machine Learning,OpenSMILE,EmoDB

ENHANCING AIR TRAVEL EXPERIENCE FOR PASSENGERS THROUGH MACHINE LEARNING BASED FLIGHT DELAY PREDICTION

***ESMA ERGUN*[1] *, SUHA TUNA*[2]**

[1] Informatics, Turkey ; [2] Informatics, Turkey

ABSTRACT

Flight delays can lead to significant inconvenience for passengers, potentially resulting in missed connections, altered plans, and time losses. In this study, we endeavored to alleviate these challenges by developing a machine-learning based application that predicts flight delays and offers passengers insights to avoid travel disruptions. We employed a variety of machine learning algorithms to develop models for flight delay prediction, using the Airline On-time Performance dataset from the United States Department of Transportation and weather data from the National Oceanic and Atmospheric Administration Service. Our application assists travelers in making informed and accurate decisions by recommending optimal flight times and airlines, based on historical flight data and weather conditions. By understanding the unique needs and priorities of passengers, we aim to empower them to plan their journeys with confidence. The study also acknowledges the challenge of imbalanced data and explores various techniques, including Synthetic Minority Over-sampling Technique (SMOTE) and Undersampling to address this issue effectively. We then compared the results of different machine learning methods. Among the algorithms examined, our findings consistently demonstrate that Light Gradient Boosting Machine (L-GBM) outperforms the others. In conclusion, our study with the application of the L-GBM 56% F1-score and 0.76 AUC value in predicting flight delays, thereby offering a promising solution to provide passengers with better flight recommendations.

KEYWORDS - Flight Delay Prediction, Flight Recommendation, L-GBM, Classification, Machine Learning

DETECTION OF EMERGENCY WORDS WITH AUTOMATIC IMAGE BASED LIP READING METHOD

***BEYZA ULKUMEN*[1] *, ALI OZTURK*[2]

[1] Kto Karatay University, Turkey ; [2] Kto Karatay University, Turkey

ABSTRACT

Lip-reading automation can play a crucial role in ensuring or enhancing security at noisy and large-scale events such as concerts, rallies, public meetings, and more by detecting emergency keywords. In this study, the aim is to automatically detect emergency words from the lip movements of a person using images extracted from silent video frames. To achieve this goal, an original dataset consisting of silent video images in which 8 emergency words were spoken by different 14 speakers was used. The lip regions of the images obtained from the videos in the dataset were labeled through relevant region detection. Labeled data were then evaluated using the SSD (Single Shot MultiBox Detector) deep learning method. Subsequently, subsets of labeled data with 8, 6, and 4 classes were created. The SSD algorithm was evaluated separately for each of these subsets. During the training of the SSD algorithm, weight initialization methods such as 'he,' 'glorot,' and 'narrow-normal' were used, and their performances were compared. Additionally, to compare accuracy performance, the SSD algorithm was trained with two different values for the maxepochs parameter: 20 and 30. According to the results obtained, the highest accuracy value was achieved for the 4-class subset, with an accuracy of 76% obtained using the SSD training with 30 epochs and the 'glorot' weight initialization method. The lowest accuracy value was found for the 8-class subset, with an accuracy of 42% obtained using the SSD training with 20 epochs and the 'narrow-normal' weight initialization method.

KEYWORDS - Lip Reading, Convolutional Neural Networks, SSD, Region of Interest Detection

BREAKDOWN PREDICTION WITH MACHINE LEARNING METHODS

AZHAR MURZAEVA[1] , SEVINC ILHAN OMURCA[2] , BERK OZSOY[3] , KADIR YUNUS KOC[4] , ENES DENIZ[5] , MUHAMMMED GUNDOGDU[6]

[1] Ibss Technology And Software, Kyrgyzstan ; [2] Kocaeli University, Turkey ; [3] Ibss Technology And Software, Turkey ; [4] Ibss Technology And Software, Turkey ; [5] Ibss Technology And Software, Turkey ; [6] Ibss Technology And Software, Turkey

ABSTRACT

In factories, the cessation of manufacturing processes due to machine breakdowns is an undesirable situation for companies. It is crucial to swiftly understand and resolve the issue in case of a breakdown. However, this often takes considerable time, causing financial losses to companies. Artificial intelligence is being considered to predict machine failures in advance. This study aims to design a system that anticipates breakdown situations in factory manufacturing lines. The goal is for this product to be sustainable and adaptable to changes in manufacturing lines, with the potential for application in similar product groups. This study involves innovative solutions such as a Predictive Maintenance System, enabling authorized personnel to monitor the operational status of machines. It encompasses alerting authorized personnel when machines are nearing breakdown conditions. We used the data from machine-attached sensors and trained Artificial Intelligence models with the breakdown records. Based on the data obtained from the company, while achieving a 48% efficiency rate in the first quarter of 2020, there was only approximately a 7% efficiency loss during the same period. This project aims to predict breakdown situations with a 90% accuracy rate. Through the use of AI technologies in this study, we aim to achieve the desired precision, obtain higher success rates, and expedite processes. In the modeling processes, we use some fundamental models based on classical machine learning methods (Support Vector Machines (SVM), Decision Trees (DT), etc.) for classification purposes. Additionally, Bagging algorithms such as Random Forest and Boosting algorithms like XGBoost, Gradient Boosting, and AdaBoost were applied. These methods were utilized for testing and enhancing the fundamental models, aiming to achieve fast and robust models. Models with high performance were integrated into the system for practical use. This study is supported within the scope of project number 3215073 by TÜBİTAK.

KEYWORDS - predictive maintenance, machine learning in manufacturing, breakdown prediction, manufacturing production line breakdowns

EVALUATION OF THE DEEP Q LEARNING MODELS FOR MOBILE ROBOT PATH PLANNING PROBLEM

MEHMET GOK[1]

[1] Kahramanmaras Istiklal Universitesi, Turkey

ABSTRACT

Search algorithms such as A* or Dijkstra are generally used to solve the path planning problem for mobile robots. However, these approaches require a map and their performance decreases in dynamic environments. These drawbacks have led researchers to work on dynamic path planning algorithms. Deep reinforcement learning methods have been extensively studied for this purpose and their use is expanding day by day. However, these studies mostly focus on training performance of the models, but not on inference. In this study, we propose an approach to compare the performance of the models in terms of path length, path curvature and journey time. We implemented the approach by using Python programming language two steps: inference and evaluation. Inference step gathers information of path planning performance; evaluation step computes the metrics regarding the information. Our approach can be tailored to many studies to examine the performances of trained models.

KEYWORDS - Deep Q-Learning, Mobile Robots, Model Inference, Path Planning.

ENHANCING ON TIME PERFORMANCE THROUGH FLIGHT TIME PREDICTION A MACHINE LEARNING APPROACH

***SEDA SOYKAN*[1] *, SEFER BADAY*[2]

[1] Informatics Institute, Turkey ; [2] Informatics Institute, Turkey

ABSTRACT

Aviation industry efficiency and on-time performance are vital to passenger satisfaction and operational excellence. This study focuses on improving on-time performance by accurately predicting flight duration. We combined on-time performance data from the Bureau of Transportation Statistics (BTS) with Microsoft Azure-sourced weather data to create a diverse dataset. A comprehensive analysis of machine learning algorithms, including linear regression, random forest, and XG Boost, was conducted to predict flight duration. Notably, the XG Boost algorithm outperformed its counterparts, demonstrating its potential for optimizing aviation operational efficiency. Our models underwent rigorous evaluation of standard metrics such as Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), R-squared and Mean Absolute Percentage Error (MAPE). The XG Boost model consistently exhibited the lowest MAE and RMSE, confirming its reliability in forecasting flight duration. The mean absolute error consistently remained below the aviation industry's accepted delay threshold of 15 minutes. The chosen model achieved a proportion of variance explained value of 0.97 in predicting flight duration. Furthermore, the integration of weather data sheds light on the influence of meteorological conditions on flight schedules, thereby augmenting the model's predictive capabilities. This holistic approach to flight duration forecasting enhances our understanding of this domain. In conclusion, our research underscores the pivotal role of accurate flight duration prediction in bolstering on-time performance. The XG Boost algorithm, in conjunction with weather data, is a potent tool for this purpose. These findings furnish invaluable insights for aviation stakeholders seeking to optimize their operations, elevate passenger satisfaction, and mitigate unforeseen disruptions. Future research endeavors will refine the model, encompass relevant factors such as taxi durations, and broaden its applicability within the aviation sector.

KEYWORDS - Aviation industry, On-time performance (OTP), Flight time, Machine Learning, Prediction

A LOCATION BASED AUGMENTED REALITY APPLICATION WITH MACHINE LEARNING METHODS

KUBRA KAPICI [1] ***, ALI OZTURK*** [2]

[1] Kto Karatay University, Turkey ; [2] Kto Karatay University, Turkey

ABSTRACT

Location-based augmented reality is a markerless technique which uses data from GPS, digital compass, etc. to determine the location of a mobile device. After making calculations by using the GPS and compass data, the application figures out where the mobile camera is looking and displays the relevant virtual information about the environment on the screen. In this study, a location-based augmented reality mobile application has been developed to inform users about the buildings of a university campus. The application determines which building it is by making angular calculations using the geographical position of the mobile device and the corner coordinates of the buildings. The application was then used within the campus to record the current latitude, longitude of the mobile device and the distance information of the buildings that were displayed on the device screen. The collected data were applied to Decision Tree, Random Forests, Support Vector Machines (SVM), and XGBoost algorithms with 3-fold cross validation and the results were compared. Based on the results obtained, the best performance belongs to the SVM algorithm with accuracy, precision, recall, and F1 Score values of 0.90, 0.91, 0.90, and 0.90, respectively. The use of machine learning algorithms within the application allows the detection of the buildings using only latitude, longitude of the mobile device and the building distance information, eliminating the need for angular calculations.

KEYWORDS - LOCATION BASED AGUMENTED REALITY ,MACHINE LEARNING ,AUGMENTED REALITY

Deep Learning in Vegetable Classification and Comparison of Pooling Methods

ABUBAKAR MAYANJA[1] , ILKER ALI OZKAN[2] , SAKIR TASDEMIR[3]

[1] Kto Karatay University Konya Turkey, Turkey ; [2] Selcuk University Konya Turkey, Turkey ; [3] Selcuk University Konya Turkey, Turkey

ABSTRACT

Vegetable identification and classification is one of the most crucial stages in cultivated agricultural products processing. Earlier categorization of yields can help farmers learn the quality and quantity of the vegetables before sending them to the market. In return, unexpected losses are minimized, and solutions for better future yields are sought. The application of artificial intelligence in the agro-processing industry has become one of the state-of-the-art techniques of classification. In this study, a deep convolutional neural network is used to classify four categories of Indian-origin vegetables under five conditions, i.e., row, ripe, unripe, damaged, and dry. Furthermore, a comparison between the usage of MaxPooling and AveragePooling techniques in the neural network was done. The upshot of this research can be of great importance to machine learning researchers as it is evident that the need to use machine learning techniques in almost every field of life is increasing. Additionally, researchers will be able to quickly make decisions on what pooling layer technique to use in the neural network structure. The results showed the network could distinguish the vegetables with best accuracy of 96.9% for Bell pepper, 96.7% New Mexico pepper and 98.6% for Chili pepper. Additionally, AveragePooling performed better than MaxPooling in the Bell and New Mexico pepper sets and the reverse was true on the Chile pepper set.

KEYWORDS - Machine learning, Convolution neural network, Classification, Indian Origin

PERFORMANCE EVALUATION OF CLASSIFICATION ALGORITHMS FOR DEFECT DETECTION IN PATTERNED FABRIC IMAGES

***YUNUS EMRE MERAL*[1] *, OSMAN GOKALP*[2]**

[1] Izmir Katip Celebi Universitesi Fen Bilimleri Enstitusu, Turkey ; [2] Izmir Katip Celebi Universitesi Fen Bilimleri Enstitusu, Turkey

ABSTRACT

Defect identification holds substantial relevance across diverse industries, encompassing the textile sector, as well as materials like marble and metal. Automatic defect detection technology, by minimizing human factors influenced by employee distraction and limited concentration time, offers consistent and accurate identification of defects. This study aims to evaluate the performance of various classification algorithms on automatic defect detection in patterned fabric images. The feature extraction stage incorporates Grey-Level Co-occurrence Matrix utilizing seven distinct statistics, as well as Local Binary Pattern techniques. The obtained results on 4 public datasets indicate that Random Forest and XGBoost consistently outperform other classifiers in terms of accuracy, precision, recall, and F1 score across all datasets. This suggests that ensemble methods are well-suited for fabric image classification tasks.

KEYWORDS - automatic defect detection, feature extraction, GLCM, fabric images, classification

DEVELOPING A RULE BASED DIAGNOSTIC ALGORITHM USING MACHINE LEARNING METHODS FOR THE DIAGNOSIS OF ANEMIA

HACER OZCAN[1] , MUHAMMED KURSAD UCAR[2]

[1] Karadeniz Technical University, Turkey ; [2] Sakarya University, Turkey

ABSTRACT

Background and Objective: Anemia is a disease that occurs with a decrease in the number of red blood cells/red blood cells or a decrease in the amount of hemoglobin in the red blood cells. Anemia affects approximately a quarter of the population. Early detection of anemia allows the use of appropriate methods for alleviating disease symptoms and treatment. If not diagnosed and treated early, it can cause various serious diseases, from fatigue and dizziness to pregnancy problems, arrhythmias, and heart failure. This study aims to develop a rule-based algorithm using machine learning methods that will detect Anemia with high accuracy and can be used in the clinic. Material and Method: The data set obtained from Kaggle, an open-source data set platform, was used in the study. The data set contains 8544 clinical measurements from blood test samples taken from 4348 patients of different genders and 4196 healthy individuals. Since the data set is balanced, no balancing was performed on the data set. It is aimed to increase performance by selecting features using feature selection algorithms. Rule-based diagnostic algorithms have been developed with the help of decision trees. Results: As a result of the study, a rule-based algorithm that can be used clinically in diagnosing anemia with accuracy, sensitivity, and specificity rates between 90% and 100% was developed using clinical findings such as Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC) and Mean Corpuscular Volume (MCV). Conclusion: According to the results obtained in the study, it is evaluated that the algorithm developed using machine learning methods in diagnosing Anemia can be used as a diagnostic algorithm in the clinic with a high accuracy rate.

KEYWORDS - Anemia, Machine learning, Decision Trees, Rule Based Diagnostic Algorithm

A NON GEOMETRICAL FEATURE IMPACT COMPARISON FOR REMOTE SENSING IMAGE CLASSIFICATION

ALI SAGLAM[1]

[1] Konya Technical University, Turkey

ABSTRACT

This work measures the impacts of the non-geometrical average feature values of the pixels in the segments gained from the remote sensing images which have the values of color, IR (Infrared) and nDSM (Normalized Digital Surface Model). In this work, image pixels are firstly segmented before the classification process because the images in the dataset are high resolutions (6000x6000 pixels), and so much data takes very long time to train. As classification methods, three methods (RF – Random Forest, SVM – Support Vector Machines and k-NN – k-Nearest Neighbors), which are used in the literature commonly, are tested. The pixels in the dataset (Potsdam) have RGB (Red, Green and Blue as color values), IR and nDSM values. The color value transformations between different color spaces also affect the segmentation and classification results. Therefore, the color values in the HSV, L*a*b* and YCbCr transferred from the RGB color space are also tested in both processes which are segmentation and classification. The results show that classification give better success if all the attributes (color, IR and nDSM) are used. In all the train and test processes, the SVM method gives better results. On the other hand, HSV and L*a*b* color spaces are the most suitable for the classification of remote sensing images.

KEYWORDS - Remote sensing, image classification, color spaces, RF, SVM, k-NN

A SOFTWARE PACKAGE TO COMPUTE EQUIVALENT WATER THICKNESS CHANGES DIRECTLY FROM GRACE GGMS ESKAD

EMEL ZERAY OZTURK[1] , RAMAZAN ALPAY ABBAK[2]

[1] Konya Technical University, Turkey ; [2] Konya Technical University, Turkey

ABSTRACT

In this study, ESKaD software, which estimates equivalent water thickness changes through global geopotential models published by GRACE (Gravity Recovery and Climate Experiment) data processing centers, is introduced. Then, the performance of the software was analyzed with auxiliary data on the test points determined in Konya basin. The numerical results show that the equivalent water thickness changes, which play a major role in the monitoring groundwater changes, have been successfully estimated. The software package which aims to satisfy the demands of users quickly and practically, offers an alternative calculation tool for scientific researches in disciplines such as geodesy, geophysics, hydrology, and etc.

KEYWORDS - Equivalent water thickness; GRACE; Global Geopotential Models; Software package; Groundwater changes.

OPTIMIZATION OF CONVOLUTIONAL NEURAL NETWORKS FOR THE CLASSIFICATION OF RETINAL DISEASES

MAHIR KAYA[1]

[1] Tokat Gaziosmanpasa University Department Of Computer Engineering, Turkey

ABSTRACT

The eye is one of our most important sensory organs, helping us to meet all our needs in life. When it comes to diseases that may occur in such an important organ, it negatively affects our lives. While some eye diseases are easily treatable, others can cause permanent visual impairment or even loss of vision if not diagnosed early. Vision loss is caused by problems in the retina and the image not falling on the retina. Optical Coherence Tomography (OCT) can detect disease from retinal images captured from a side-view perspective. Convolutional Neural Networks (CNNs) are utilized to automatically detect diseases from medical images. Doctors can make different evaluations of disease diagnoses from medical images. CNNs can prevent these problems. CNNs need to be very well designed for successful performance. Trying all hyperparameter combinations requires much time due to the long training time of CNNs. In this study, optimal hyperparameters for CNNs were determined by Bayesian optimization. A dataset of four classes (CNV, DME, DRUSEN, NORMAL) was used. In this model proposed with Bayesian optimization, 99.69% accuracy and 99.90% F1 score values are obtained, which is better than the existing studies in the literature.

KEYWORDS - Retinal Diseases, Deep Learning, CNN, Computer-aided diagnosis

USING BIG DATA FOR OPTIMIZING ADVERTISING CAMPAIGNS IN SOCIAL NETWORKS

ARJAN KRASNIQI [1] ***, BERAT MAKSUTAJ*** [2] ***, ERBLIN JANUZAJ*** [3]

[1] University Haxhi Zeka In Peja Faculty Of Business, Albania ; [2] University Haxhi Zeka In Peja Faculty Of Business, Albania ; [3] University Haxhi Zeka In Peja Faculty Of Business, Albania

ABSTRACT

In the digital era, advertising on social networks has become a crucial element of marketing strategies. With the increasing number of users on platforms such as Facebook, Twitter, Instagram, and others, companies have unprecedented opportunities to target and engage consumers. This paper aims to examine the role and importance of Big Data usage in optimizing marketing campaigns on social networks. In an era where data is limitless, Big Data has become a valuable resource for businesses looking to understand consumer behavior and improve the efficiency of advertising campaigns. In this paper, we will shed light on the history and development of Big Data, including their volumes and sources. We will explore the potential of Big Data and categorize their sources to better understand how they can be leveraged for social media marketing. Furthermore, we will analyze the benefits and challenges of using Big Data in marketing. Additionally, we will examine cases where the use of Big Data has failed to optimize advertising campaigns on social networks and focus on the influence of Big Data in digital marketing, including personalization and sales promotion. We will also explore the technologies and methodologies used for making marketing decisions using Big Data. This study concludes that Big Data offers exceptional potential for innovation in the field of advertising on social networks, helping companies cope with rapid changes in consumer preferences and market dynamics. The results indicate that the strategic use of Big Data can lead to a deeper understanding of consumer behavior and offer a competitive advantage in a crowded and fast-paced market.

KEYWORDS - Big Data, advertising optimization, social networks, digital marketing.

IMPLEMENTATION OF A SECURE VOTING SYSTEM USING BLOCKCHAIN

OMAR AHMED SALAD[1] , AHMET SENOL[2]

[1] Uskudar Universirty, Somalia ; [2] Uskudar University, Turkey

ABSTRACT

To implement a secure voting system using blockchain technology, it is necessary to ensure that the current voting process takes place in an honest, accurate, and highly secure way that all participants, including candidates and voters, can trust. This system stores the details of candidates and voters in blockchains, which provide transparency into election results by allowing voters to independently vote while protecting each voter's right to privacy and the integrity of his/her vote by preventing voters from being able to vote multiple times. The blockchain is a new technology that is decentralized, distributed, and has strong cryptographic foundations. It has the potential to enhance numerous sectors in various ways. The current security challenges with voting could be resolved by incorporating blockchain technology into the process. An electronic voting system based on blockchain technology was built that will reduce voting fraud and make the voting process quicker, safer, and more effective.

KEYWORDS - Blockchain, Electronic voting, Decentralized, Security

GENERATING SYNTHETIC BRAIN MRI IMAGES WITH GENERATIVE ADVERSARIAL NETWORKS

UVEYS YILDIZ[1] , EMRE UNSAL[2] , RUKIYE KARAKIS[3]

[1] Department Of Optic Engineering Institute of Natural Sciences Sivas Cumhuriyet University, Turkey ; [2] Department Of Software Engineering Faculty of Technology Sivas Cumhuriyet University, Turkey ; [3] Department Of Software Engineering Faculty of Technology Sivas Cumhuriyet University, Turkey

ABSTRACT

Deep learning (DL) methods have been extensively employed in analyzing medical images for disease diagnosis, treatment planning, region of interest localization, and image enhancement in recent years. The performance of DL models is directly proportional to the size of the training dataset. However, collecting medical data can be time-consuming and costly. Therefore, the transformation of original data (including elastic transformation, affine transformation, and pixel-level transformations) and synthetic data generation methods are often utilized to augment the data. However, the original data transformation techniques might not adequately preserve the meaning of the data and fail to provide the necessary diversity to represent all potential scenarios in the problem space. For this reason, this study aims to generate realistic brain magnetic resonance imaging (MRI) images using a modified deep convolutional generative adversarial networks (DCGAN) model while preserving the original data and adding unique features to them. The DL model was trained and tested using T1 and T2 weighted MRI images from two open datasets, Neurofeedback Skull-stripped (NFBS) and IXI. The performance results have demonstrated the DCGAN model's effectiveness in generating brain MRI images.

KEYWORDS - Deep learning, data augmentation, generative adversarial network, deep convolutional generative adversarial network, magnetic resonance imaging.

TURKISH AND ENGLISH DATASETS IN PARAPHRASE GENERATION TASK WITH BART MODEL

***HILAL TEKGOZ*[1] *, SEVINC ILHAN OMURCA*[2]**

[1] Loodos Technology A S, Turkey ; [2] Institute Of Science, Turkey

ABSTRACT

Paraphrase generation is a way of expressing the same meaning of a text or sentence using different syntax or words. It is one of the most challenging tasks of natural language processing due to the complexity and diversity of the language. However, with the recent progress in deep learning models, more promising results have been acquired for paraphrasing tasks. In this study, a pre-trained BART language model was trained both with English and Turkish paraphrasing datasets. Quora Question Pairs (QQR), Microsoft Common Object in Context (MSCOCO), and General Language Understanding Evaluation (GLUE) datasets were used for English paraphrasing, and for Turkish, these datasets were translated from English to Turkish using the Google Translate API. Cosine similarity, Bleu score, Rouge score, and novelty score metrics were considered for a comprehensive evaluation of the obtained results. Consequently, the experimental results show that BART is a successful model for Turkish paraphrasing as well as English paraphrasing.

KEYWORDS - Paraphrase Generation ,Natural Language Processing,BART,Transformer,BLEU

VEHICLE DETECTION AND COUNTING IN TRAFFIC VIDEOS USING DEEP LEARNING

AHSEN BATTAL[1] , YUNUS EMRE AVCI[2] , ADEM TUNCER[3]

[1] Yalova University, Turkey ; [2] Arizona State University, United States ; [3] Yalova University, Turkey

ABSTRACT

Nowadays, many factors such as population growth and urban growth lead to the emergence of traffic-related problems such as traffic accidents and traffic congestion. Artificial intelligence technologies, which have gained momentum in recent years and have been used effectively in addressing a wide range of problems, have also found a place in traffic applications. By using artificial intelligence-based algorithms on traffic videos, the type of vehicles passing through the specified regions can be determined and the number of vehicles can be calculated. In this study, vehicle detection and classification were carried out using YOLOv5 (You Only Look Once), a deep learning method, in flowing traffic videos. The accuracy rate of the model developed for the detection of five different classes, namely cars, motorcycles, trucks, buses, and bicycles is 88% on average. After the detection of the vehicles, the SORT algorithm was used to calculate the number of passing vehicles. The model produced an average accuracy rate of 85% in counting vehicles. Experimental results show that vehicle detection, classification, and counting are successfully achieved using YOLOv5 and SORT algorithms.

KEYWORDS - Vehicle Detection, Traffic, Deep Learning, YOLOv5, SORT

DETERMINATION OF DIABETIC RETINOPATHY GRADES USING A DEEP LEARNING BASED CLASSIFICATION

***NUR SENA OZTEKIN*[1] *, ALI SAGLAM*[2]**

[1] Konya Technical University, Turkey ; [2] Konya Technical University, Turkey

ABSTRACT

Diabetic Retinopathy (DR), one of the most common causes of blindness in our age, is the damage caused by diabetes in the blood vessels in the retinal mesh layer of the eye. Early diagnosis and treatment of DR is of great importance so that patients do not lose their sight. In this study, a deep learning-based classification process has been applied using fundus images to determine the degrees of DR. In our study, some pre-processing methods (Gaussian blurring, thresholding to convert binary image, and Contrast Limited Adaptive Histogram Equalization - CLAHE) has been applied to the fundus images and a classification model has been trained using transfer learning methods. Three different datasets, named Asia Pacific Tele-Ophthalmology Society (APTOS), Retinal Fundus Multi-Disease Image Dataset (RFMID) and Indian Diabetic Retinopathy Image Dataset (IDRID), have been used in the training and testing phases. As a result, 95.82% accuracy value is achieved for APTOS, while the precision value is 95.66% and the recall value is 94.49%. The results for RFMID show that the accuracy value is 91.24%, the precision value is 91.24% and the recall value is 90.64%. On the other hand, the accuracy value for IDRiD is 94.40%, the precision value is 88.42% and the recall value is 95.79%.

KEYWORDS - Diabetic Rethinopathy, Deep Learning, Classification, EfficientNetB5, Transfer Learning

LANE TRACKING AND COLLISION AVOIDANCE USING DEEP LEARNING IN AUTONOMOUS VEHICLES

CEMRE BELEMIR SAFAK[1] , ALI OZTURK[2]

[1] Kto Karatay Universitesi, Turkey ; [2] Kto Karatay Universitesi, Turkey

ABSTRACT

Autonomous cars can navigate their surroundings with little or no need for driver assistance. Autonomous cars allow disabled individuals to drive individually. Due to its benefits such as reducing human errors, fuel efficiency and comfortable driving, it is a technology that is always open to improvement. In this study, an autonomous vehicle simulation that automatically follows the lane and avoids obstacles while driving was made using a deep learning model. For this purpose, Webots, a free and open source 3D simulation environment, was used. Four different tracks were created to increase the variety of objects on the route to be followed in the simulation environment. There are animals such as cats, dogs and foxes on the first track. The second track is a track where there are more people. The third track is a track with road construction work and various obstacles. The last track is a track with other vehicles. The vehicle with a camera on it was driven full laps on these four tracks without interruption. The drive lasted approximately 2 minutes, and data was collected from steering angle and camera images during the drive. The autonomous feature of the vehicle is given by a deep learning model. While training the model, three different optimizers were tried and different filters were applied. While evaluating the results, mean square error (MSE) and accuracy values were examined. Accuracy values were obtained as 95.31%, 95.01% and 95.26% for the "sgdm", "adam" and "rmsprop" optimizer parameters, respectively. The MSE values were 0.3673, 0.3976 and 0.3885, respectively. Autonomous vehicle driving was achieved with the deep learning model using the "sgdm" optimizer, which has the highest accuracy.

KEYWORDS - Lane tracking,collision avoidance autom,deep learning ,autonomus driving

A COMPARISON OF THREE FAST GRAPH BASED SEGMENTATION ALGORITHMS ON 3D POINT CLOUDS

***ALI SAGLAM*[1] *, NURDAN AKHAN BAYKAN*[2]**

[1] Konya Technical University, Turkey ; [2] Konya Technical University, Turkey

ABSTRACT

In this paper, the success of two graph-based methods which have significantly accelerated the literature in terms of success and speed in 2D image processing for 3D point cloud segmentation is measured. In our previous study, we propose a cut criterion for edges between boundary voxels and apply this criterion in our boundary constrained method (BCS – Boundary Constrained Segmentation). In this study, we use the same criterion on two older 2D image segmentation algorithms that inherently use Euclidean distance of color attributes for edges between pixels. 3D point clouds have color features rarely because 3D geometric features give more meaningful information about the objects. Many point cloud segmentation methods usually utilize normal and tangent vectors of point groups in voxels, which are rasterized cubic volumes that include local point groups. While both two methods use the MST (Minimum Spanning Tree) data structure, one (SGS – Sequential Graph-Based Segmentation) separates segments only respecting to gradients between the objects and the other one (EGS – Efficient Graph-Based Segmentation) also considers the object sizes. The methods have been tested on two datasets, and the results have been compared using the overall F-score values of the segments. According to our measurement results, the EGS method shows considerable high performance with 0.7019 and 0.6584 F-score values, relatively to the other two methods. The methods have been tested with different parameter values and the graphical results of the test scores are also given in this work.

KEYWORDS - Point cloud segmentation, graph-based segmentation, cut criterion, MST

A DISTRIBUTED ALGORITHM FOR BACKBONE CONSTRUCTION IN THREE DIMENSIONAL WNSNS

OMER GULEC[1]

[1] Pamukkale University, Turkey

ABSTRACT

In light of recent developments in nanotechnology, the Internet of Nano-Things (IoNT) concept has become a crucial field in today's world which realizes the communication of nano-machines that enable measurements at the molecular domain. The communication between these nano-machines, such as nano-sensors and nano-routers, is provided through a network which is called Wireless Nano-Sensor Networks (WNSNs). However, the energy should be used efficiently while establishing communication on the network due to the limited resources of nano-machines. One of the solutions to this problem is constructing energy-efficient network backbones and providing packet routing over these backbones. Therefore, in this paper, a distributed network backbone construction algorithm is proposed for three-dimensional WNSNs. The proposed algorithm successfully clusters the nodes, selects cluster heads and constructs the efficient network backbone around these nodes in a 3D medium.

KEYWORDS - Wireless Nano-Sensor Networks, Internet of Nano-Things, Network Backbone Construction, Three-Dimensional Networks, Distributed Algorithm

DETECTING DDOS ATTACKS WITH DEEP LEARNING METHODS

SABAHAT SUMEYYE GUCLU [1] ***, ALI OZTURK*** [2]

[1] Kto Karatay University, Turkey ; [2] Kto Karatay University, Turkey

ABSTRACT

Distributed Denial of Service Attacks (DDoS), which is the most common type of attack, is used to take targeted devices or servers offline, interrupt network services, and limit or prevent the target resource from providing service by maximizing resource consumption. Detecting this type of attack in advance allows us to prevent data loss, cost loss or resource consumption by ensuring early use of solution methods. For this reason, DDOS attack detection is of great importance in the field of cyber security. In this study, the use of deep learning methods to detect DDoS attacks is discussed. First of all, the data set containing DDOS attack types and normal traffic was edited and optimized. Then, the edited data set was applied to CNN and LSTM deep learning models. While the accuracy of detecting DDOS attacks of the CNN model was 76%, this rate was found to be 72% in the LSTM model.

KEYWORDS - LSTM,CNN,DDOS

ON TRENDS OF INVESTMENT PORTFOLIO MANAGEMENT A BIBLIOMETRIC ANALYSIS

DARIUS SABALIAUSKAS [1] ***, JOLANTA MILIAUSKAITĖ*** [2]

[1] Vilnius Gediminas Technical University, Lithuania ; [2] Vilnius Gediminas Technical University, Lithuania

ABSTRACT

This paper conducts a thorough bibliometric analysis of Investment Portfolio Management research, unveiling its intellectual landscape, emerging trends, and key contributors. By employing advanced bibliometric techniques on a vast collection of articles from Web of Science databases, we map the evolution of IPM research, identify influential works and authors, and reveal thematic clusters. Our analysis spans traditional portfolio optimization to modern themes like artificial intelligence and machine learning integration. We also illuminate global research networks. This study offers a holistic view of IPM, aiding scholars, practitioners, and policymakers in understanding its trajectory and fostering interdisciplinary collaborations. Therefore, our survey advances comprehension of the field, encourages research innovation, and informs strategies for navigating complex financial markets. The study's findings help academics and practitioners to navigate the literature on socially responsible investing, provide a systematic basis for developing the field, and suggest promising avenues for further research.

KEYWORDS - investment portfolio management, portfolio optimization, financial predictions, investment, portfolio allocation, algorithms,bibliometric analysis

COMPARISON OF DIFFERENT SEGMENTATIONS IN AUTOMATED DETECTION OF HYPERTENSION USING ELECTROCARDIOGRAPHY WITH EMPIRICAL MODE DECOMPOSITION

YUNUS EMRE ERDOGAN [1] ***, ALI NARIN*** [2] ***, WALID HARIRI*** [3]

[1] Zonguldak Bulent Ecevit University, Turkey ; [2] Zonguldak Bulent Ecevit University, Turkey ; [3] Badji Mokhtar Annaba University, Algeria

ABSTRACT

Hypertension (HPT) refers to a condition where the pressure exerted on the walls of arteries by blood pumped from the heart to the body reaches levels that can lead to various ailments. Annually, a significant number of lives are lost globally due to diseases linked to HPT. Therefore, the early and accurate diagnosis of HPT is of utmost importance. This study aimed to automatically and with minimal error detect patients suffering from HPT by utilizing electrocardiogram (ECG) signals. The research involved the collection of ECG signals from two distinct groups. These groups consisted of ECG data of both five thousand and ten thousand data points in length, respectively. The performance in HPT detection was evaluated using entropy measurements derived from the 5-layer Intrinsic Mode Function (IMF) signals through the application of the Empirical Mode Decomposition method. The resulting performances were compared based on the nine features extracted from each IMF. To summarize, employing the 5-fold cross-validation technique, the most exceptional accuracy rates achieved were 99.9991% and 99.9989% for ECG data of lengths five thousand and ten thousand, respectively, using decision tree algorithms. These remarkable performance results indicate the potential usefulness of this method in assisting medical professionals to identify individuals with HPT.

KEYWORDS - HPT, ECG, Segmentation, Empirical Mode Decomposition, Decision Trees.

POLARIZATION AND OBLIQUE INCIDENCE INSENSITIVE DUAL BAND METAMATERIAL ABSORBER FOR WI FI APPLICATIONS

***BAHAR ILA*[1] *, ERCAN YALDIZ*[2]**

[1] Konya Technical University, Turkey ; [2] Konya Technical University, Turkey

ABSTRACT

In this work, polarization and oblique incidence insensitive dual-band metamaterial-based absorber is designed for Wi-Fi bands. The proposed metamaterial absorber (MMA) structure consists of a resonator layer, dielectric layer, and ground plane. The resonator layer occurs from two closed square rings. While the first ring ensures absorbance at 2.45 GHz, second one provides absorbance at 5 GHz. MMA structure has been designed and analyzed with Ansys HFSS full-wave electromagnetic (EM) simulation software. According to the results under normal incidence MMA provides in 2.45 GHz and 5 GHz 98.8% and 99.66% absorption rate, respectively. In addition, the EM wave to the MMA structure has been examined under TE and TM polarizations, polarization angle, and oblique incidence angle. It has been observed that the peak absorptions remain constant in TE and TM polarization. On the other hand, the proposed MMA is ensured over 92% absorbance in oblique incidence in 2.45 GHz and 5 GHz at θ=50°. According to the results, MMA is quite insensitive for both polarization and oblique incidence. These results obtained show that the structure for the Wi-Fi bands can be efficient for communication systems applications.

KEYWORDS - Metamaterial, Wi-Fi band.,Absorber,Resonator

PERMANENT MAGNET SYNCHRONOUS MOTOR DESIGN FOR ROPE DRIVEN GEARLESS ELEVATOR MACHINE

AHMET FENERCIOGLU[1] , DAGHAN ATAKAY[2] , EMRE PINARBASI[3]

[1] Bursa Technical University, Turkey ; [2] Emlak Konut Asansor A S, Turkey ; [3] Emlak Konut Asansor A S, Turkey

ABSTRACT

The new generation gearless machines used in elevators operate with permanent magnet synchronous motors (PMSMs) that provide direct drive without the use of a reducer. These motors can provide high torque at low speeds with their multi-pole structure. Their efficiency is high and torque ripple are low. Since they are driven by an inverter, they provide soft start. Therefore, they offer a comfortable travel. Gearless systems can be connected to the elevator shaft without the need for a machine room. Thus, by providing a more efficient and economical solution, elevator systems allow high speeds for modern buildings and high-rise buildings. This study includes the design verification of a permanent magnet synchronous motor with a power of 6.1 kW for 1000 kg carload and 1 m/s speed by finite element analysis (FEA). Torque ripple, which affects efficiency and passenger comfort, has been optimized. The electrical and mechanical power, efficiency, speed, current, torque and torque ripple, magnetic flux density and current density parameters that determine the output performance of the motor are analysed.

KEYWORDS - Gearless elevator machine, Permanent magnet synchronous motor

REDUCING CROSSTALK IN ELECTRONIC CIRCUIT BOARDS

***SULEYMAN COSKUN*[1] *, MERIH YILDIZ*[2] *, TEMEL SONMEZOCAK*[3]

[1] Dogus University, Turkey ; [2] Dogus Universty, Turkey ; [3] Dogus Universty, Turkey

ABSTRACT

Crosstalk between signal lines in electronic circuit boards is one of the most important factors that disrupt signal integrity. This article explores methods of reducing crosstalk through both design and manufacturing methods and presents their advantages and disadvantages. Discussed design methods include guard tracks, toll fences, reference planes, layout planning, and irregular track structures. He studied the effects of fabrication methods, solder mask, coating and bulk separation materials on electronic circuit boards. A combination of design and fabrication methods was applied to study the return losses by adding graphene paraffin to the two protruding signal lines. In addition, the effect of multilayer stack design on single-ended and differential signal lines is discussed to reduce interference in flexible electronic circuit boards. The irregular trail design method reduced crosstalk by 48dB at 3.2GHz, while the shrouding method reduced crosstalk by 48dB at 16GHz. Combining both design and fabrication methods, the graphene paraffin application reduced interference by 16dB at 3.2 GHz. Findings were obtained with MATLAB, 2D and 3D electromagnetic simulation programs. The simulation results for the applied methods have been verified by laboratory tests on sample electronic circuit boards. Changes in crosstalk for each method are demonstrated in both simulation and measurement results with a focus on far-end reflection, near-end reflection, and insertion losses. In our future studies, researches will be made on the examination and reduction of crosstalk in transmission lines in UCPW structure.

KEYWORDS - Crosstalk, electronic circuit board, signal integrity, far-end reflection (FEXT).,near-end crosstalk,UCPW

AGRIVOLTAIC SYSTEMS COMBINING FOOD AND ENERGY PRODUCTION

MUSTAFA SACID ENDIZ[1]

[1] Necmettin Erbakan University, Turkey

ABSTRACT

The worldwide use of photovoltaic (PV) energy, a prominent renewable energy source, has significantly increased in recent years due to its numerous benefits. PV energy generation requires a significant land area. Agrivoltaic (AV) systems, which integrate agricultural and electricity production by placing solar modules several meters above the ground, are gaining popularity in renewable energy and farming sectors. The purpose of this study is to investigate AV systems for widespread adoption. The concept, opportunities, challenges, and real applications of AV systems around the world are explained. The optimal integration of AV systems will both meet the growing energy demands and enhance agricultural productivity.

KEYWORDS - Agrivoltaic, solar power generation, agriculture, electricity production

BRAIN TUMOR SEGMENTATION AND CLASSIFICATION FROM MRI IMAGES

***BEKIR HAKAN AKSEBZECI*[1] *, MAHMUT BUYUKBAS*[2] *, ALPEREN OZCELIK*[3] *, HASAN HUSEYIN ERKEN*[4]**

[1] Abdullah Gul University, Turkey ; [2] Abdullah Gul University, Turkey ; [3] Abdullah Gul University, Turkey ; [4] Abdullah Gul University, Turkey

ABSTRACT

Brain tumors are crucial to human health as they can lead to severe disabilities or even life-threatening consequences. Brain tumors consist of two types benign and malignant. Glioma is a benign tumor whereas, meningioma and pituitary are malignant tumors. Magnetic Resonance Imaging (MRI) is a valuable tool for detecting brain tumors due to its ability to provide detailed images of the brain's structures and abnormalities. This study aims to improve and facilitate the brain tumor detection process from MRI images. To improve the precision and efficiency of brain tumor diagnosis, this study focuses on the use of image processing techniques and machine learning algorithms. Different classification methods were applied to classify brain MRI images into 4 classes (glioma, meningioma, pituitary and no tumor). The Random Forest method provided the best classification accuracy of 96.32%.

KEYWORDS - Brain tumor, MRI, image segmentation, image classification, machine learning.

RANGE ANGLE BEAMPATTERN SYNTHESIS WITH LOGARITHMICALLY INCREASING CONCENTRIC CIRCULAR FREQUENCY DIVERSE ARRAY

UGUR YESILYURT[1]

[1] Erzurum Technical University, Turkey

ABSTRACT

A phased array antenna with the same carrier frequency for all elements provides only an angle-dependent beam pattern. Unlike a phased array antenna, which employs phase shifters, a frequency diversity array (FDA) is capable of creating a unique beam pattern that depends on both angle and range by adjusting a small frequency shift between array elements. Conventional linear FDA produces an S-shaped beam pattern that depends on range and angle. In order to decouple the beam pattern depending on the range and angle, which is the disadvantage of the FDA, many studies have been carried out in the literature on how the frequency increase of the FDA affects the beam pattern. In this study, the logarithmically increasing concentric circular frequency diverse array (CCFDA) is proposed to obtain a well-focused dot-shaped beam pattern. A non-linear logarithmic frequency increase is applied to eliminate the range periodicity in the FDA beam pattern. In addition, thanks to the circular symmetry feature of the proposed CCFDA structure, a smooth dot-shaped beam pattern is created. Since the proposed logarithmically increasing CCFDA structure also scans in the azimuthal plane, it provides a more accurate dot-shaped beam pattern compared to the linear FDA structure limited to two-dimensional space. By examining both the array geometry and the frequency increase, it has been confirmed with numerical results that a range-independent dot-shaped radiation pattern can be obtained with the proposed logarithmically increasing CCFDA structure.

KEYWORDS - Phased Array Antenna,Frequency Diverse Array,Concentric Circular Array

ROLE OF ANTENNA STRUCTURES IN EARTHQUAKE APPLICATIONS ENHANCING MONITORING COMMUNICATION DISASTER RESPONSE

DUYGU NAZAN GENCOGLAN[1]

[1] Adana Alparslan Türkeş Science and Technology University, Türkiye

ABSTRACT

In earthquake-prone regions, the role of antenna structures in earthquake applications is indispensable, enabling diverse sensing and monitoring techniques that enhance earthquake detection, characterization, and response. This study explores the pivotal contributions of antenna structures to earthquake preparedness and mitigation, shedding light on innovative applications that harness their capabilities for improved seismic monitoring. One notable application lies in the deployment of ground-penetrating radar (GPR) patch antennas on unmanned aerial vehicles (UAVs). These antennas, equipped with advanced bandwidth and performance, play a pivotal role in quick search and rescue operations following seismic events. By transmitting and receiving electromagnetic waves that penetrate debris, they enhance the accuracy and efficiency of survivor detection, thus expediting life-saving efforts. Additionally, GPS antennas, integrated into GPS seismometers alongside accelerometers and velocimeters, offer valuable insights into seismic waveforms and ground displacement during earthquakes. Through data integration, a comprehensive understanding of seismic activity and its impact on the surrounding environment is achieved, empowering researchers and responders with critical information. Antennas also find application in distributed acoustic sensing (DAS) for reservoir monitoring with vertical seismic profiling (VSP). Optical fibres act as antennas in DAS, enabling cost-effective and on-demand seismic monitoring of reservoirs. This technology enhances our understanding of reservoir behaviour during seismic events, contributing to improved safety and resource management. Furthermore, the study highlights the detection of ultra-low-frequency (ULF) emissions associated with earthquakes. These emissions, generated by charge separation during micro-fracturing in the focal region prior to an earthquake, can be detected using a network of small antennas. Such detection offers promising avenues for earthquake prediction and monitoring, potentially revolutionizing our ability to prepare for seismic events. In conclusion, antenna structures serve as indispensable tools in earthquake applications, advancing seismic monitoring and response capabilities. Their diverse applications encompass survivor detection, seismic waveform analysis, reservoir monitoring, and ULF emission detection, collectively enhancing our preparedness and resilience in the face of seismic hazards. This study underscores the critical importance of antenna structures in safeguarding lives and mitigating the impact of earthquakes. Keywords: Antenna Structures, Earthquake Applications, Seismic Monitoring, Ground-Penetrating Radar (GPS), Unmanned Aerial Vehicles (UAVs), Ultra-Low-Frequency (ULF) Emissions

KEYWORDS - Antenna Structures, Earthquake Applications, Seismic Monitoring, Ground-Penetrating Radar (GPS), Unmanned Aerial Vehicles (UAVs), Ultra-Low-Frequency (ULF) Emissions

DESIGN AND IMPLEMENTATION OF BLDC MOTOR THRUST MEASUREMENT AND TEST SYSTEM

ALPASLAN DURMUS[1] , EROL DUYMAZ[2] , AHMET MURAT KADIOGLU[3] , FATIHA BAYKAL[4] , CEBRAIL OLMEZ[5] , HUDAVER ATASOY[6]

[1] Ostim Technical University, Turkey ; [2] Ostim Technical University, Turkey ; [3] Ostim Technical University, Turkey ; [4] Ostim Technical University, Turkey ; [5] Ostim Technical University, Turkey ; [6] Ostim Technical University, Turkey

ABSTRACT

Some problems may arise during the determination of the propulsion system combination, especially in the selection of the right engine and propeller. In general, motor manufacturers specify the recommended propeller combination for BLDC motors. However, the fact that engine and propeller performance data are generally not available can cause problems in selecting the right propeller for the desired flight performance. In addition, if a different propeller engine combination is required, problems may be encountered in determining the thrust power to be obtained. In addition, determining the rpm value to be obtained from the designed engine and propeller combination and the amount of current to be drawn from the circuit is important in order to obtain accurate flight parameters. At the same time, the current drawn from the battery depending on the desired thrust power is important in determining the flight duration. Empirical approaches to determine the characteristics of propellers and engines are more preferred because they are practical. The development of Thrust Benchmarking Systems (TBS: Trust Benchmarking Systems) for electric UAV propulsion systems provides convenience in comparing UAV systems with different battery, engine and propeller systems. The TBS system, realized with the BAP support provided by OSTİM TECHNICAL UNIVERSITY, was developed from low-cost materials. It also has a graphical interface so that users can easily perform analyzes and monitor all performance data. The TBS is equipped with various sensors that will perform the data collection necessary to determine the optimal combination of the electric UAV propulsion system. The developed thrust meter system has a wide capacity and development potential as a static propulsion test device. It is designed to measure key parameters such as static thrust, battery voltage, battery current output, engine temperature, engine speed controller temperature and propeller rotation speed (RPM). At this point, it has a wide potential for use in Türkiye and around the world. It can be easily used by teams in Teknofest and other competitions to measure thrust power and other parameters accordingly, as well as to measure thrust system parameters of industrial electric UAV systems with small adjustments that can be made on the system.

KEYWORDS - Thrust, BLDC, Propulsion system, BLDC Test Bech

REDUCING ENERGY CONSUMPTION OF PNEUMATIC FANS IN MILLS

NIHAT CANKAYA[1]

[1] Necmettin Erbakan University, Turkey

ABSTRACT

Pneumatic fan is the equipment that causes the highest energy consumption in mills. To ensure smooth production, all fans need to operate with some degree of tolerance. However, in many facilities, this tolerance value is quite high due to reasons such as diagrams and engineering errors, leading to abnormal energy consumption values. In this study, a control algorithm has been developed to operate pneumatic fans at the lowest possible speed while considering the variations in environmental conditions such as production tonnage, ambient temperature, dynamic and static pressure, relative humidity, and wind speed. This algorithm was tested under real production conditions in a large-scale flour mill. With the implementation of the developed system, it was observed that for 6 pneumatic motors totaling 592 kW of power consumption, the frequency, current, and power values decreased by 7%, 20%, and 25%, respectively. In addition to the decrease in power consumption to 444 kW, significant reductions in pneumatic pipe blockages were also observed.

KEYWORDS - pneumatic fan; flour mill; energy consumption; control algorithm

IMPACT OF FEATURE AND SENSOR SELECTION ON EMG SIGNAL PROCESSING

EMIN MOLLAHASANOGLU [1] ***, YUSUF SEVIM*** [2]

[1] Karadeniz Technical University, Turkey ; [2] Karadeniz Technical University, Turkey

ABSTRACT

Electromyography (EMG) signals, widely used medical method for measuring the electrical activity of muscles, represent the electrical activity of muscles during contraction and relaxation. The main objective of this study is to investigate the importance of the influence of feature and sensor selection to improve the success rate of EMG signal classification. To enhance the classification success, the study assesses the influence of each of the 13 different feature extraction techniques on classification performance. This is achieved by evaluating their individual and combined effects in dual, triple, and quadruple combinations. Various mathematical and statistical methods such as Zero Crossing Point, Wilson Amplitude, AR Coefficients were used as feature extraction methods. K-Nearest Neighborhood (K-NN) was used as the classification algorithm. In addition, variance calculation was performed among 128 sensors and the sensor array was reorganized according to the highest variance ranking and it was shown that this sensor selection improved the classification performance. With the K-NN classification algorithm, a high success rate of 99.75% was achieved with 120 sensors and a dual combination of Zero Crossing Point and Slope Signal Variation features.

KEYWORDS - Electromyography, Feature Selection, Sensor Selection, Classification, KNN

MACHINE LEARNING BASED CLASSIFICATION OF NEONATAL HYPERSPECTRAL SIGNATURES

MUHAMMET MUSTAFA ERGIN[1] , MUCAHIT CIHAN[2] , MURAT CEYLAN[3]

[1] Konya Technical University, Turkey ; [2] Konya Technical University, Turkey ; [3] Konya Technical University, Turkey

ABSTRACT

Hyperspectral Imaging (HSI) is a method that allows for the acquisition of diverse two-dimensional data across a wide spectral range. HSI holds significant importance in the biomedical field due to its non-contact nature and its ability to provide diagnostic information about tissues. In this study, a total of 220 data were collected from neonates using the HSI method. Subsequently, spectral signatures for these data were extracted within a computerized environment. These spectral signatures were then classified using five different machine learning methods: Linear Discriminant Analysis (LDA), Naive Bayes (NB), Support Vector Machine (SVM), K-Nearest Neighbors (KNN), and Tree methods. Following the classification processes, the best results were achieved with LDA, which exhibited accuracy, sensitivity, and specificity rates of 81.81% each.

KEYWORDS - Machine Learning, Classification, Neonatal, Hyperspectral Imaging, Signatures

DETERMINATION AND MATHEMATICAL MODELING OF ENERGY CONSUMPTION PROFILE OF COMMERCIAL BUILDINGS

NIHAT CANKAYA[1]

[1] Necmettin Erbakan University, Turkey

ABSTRACT

Retail markets, shopping malls, and office plazas constitute the commercial buildings with the highest energy consumption. Today, various energy-saving methods are being implemented to reduce the energy consumption of these buildings. The establishment of renewable-dominated hybrid energy production facilities to meet the self-consumption of these buildings is becoming increasingly common. For all these efforts to be successfully concluded, it is essential to first understand the energy consumption profiles of these buildings. In this study, hourly and monthly energy consumption values were determined, considering variables such as seasonal conditions, holidays, and working hours that influence the energy consumption. These data were analyzed and modeled using a system identification method. A mathematical model was developed to represent the energy consumption profile of different types of commercial buildings.

KEYWORDS - System identification; modelling; energy consumption

OPTIMAL CONTROL OF QUADROTOR UAVS WITH TIME DELAY

S MERT OZER[1]

[1] Eskisehir Technical University, Turkey

ABSTRACT

Quadrotor unmanned aerial vehicles (UAV), also known as quadcopters, have a wide range of applications such as aerial photography, agriculture, search and rescue, mapping and surveying, delivery services, defense and security, and scientific research. In the feedback control of a quadrotor system, there can be a time delay between the measurement of the system's state or output and the utilization of the control input. A time delay may occur due to sensors, wireless communication, control signal computations, actuators, and signal filtering. These time delays may degrade the system's performance or even cause instability, resulting in a lack of safety. In this respect, it is crucial to analyze the effect of time delays and, if possible, design a feedback control that takes the time delay into account. In this study, we design a feedback control for a quadrotor UAV that not only guarantees stability under certain time delays but also achieves optimal performance in the sense of fast disturbance rejection and set-point tracking. However, because of the existence of time delays, the design and analysis require advanced techniques. In this regard, we proposed an optimal control method based on the minimization of the spectral abscissa of the closed-loop system to achieve stability. Once the stabilizing controller is obtained, we solve the linear quadratic regulator problem by employing a derivative-free optimization algorithm. The results of the study are illustrated through real-time experiments conducted on the test bench of the Quanser 3 DOF Hover System.

KEYWORDS - quadrotor,time delay systems,optimal control,stabilization,optimization

RULE BASED DIAGNOSTIC ALGORITHM UTILIZING PATHOLOGICAL FINDINGS IN BREAST CANCER

HILAL HAZEL YORDAN [1] ***, MUHAMMED KURSAD UCAR*** [2]

[1] Sakarya Universty, Turkey ; [2] Sakarya Universty, Turkey

ABSTRACT

Abstract - Breast cancer, the most prevalent cancer among women, typically arises in the breast's lobules, ducts, and connective tissue regions and is characterized by abnormal cell proliferation. Early diagnosis plays a critical role in reducing mortality rates associated with breast cancer. Advanced machine learning techniques have yielded highly successful outcomes in this field, where experts traditionally interpret diagnostic tests. This study aims to employ artificial intelligence to achieve a high level of accuracy in detecting benign and malignant tumors. Within this framework, ten of the data used consist directly of pathological findings, while the other twenty are numerical features generated through various statistical calculations based on these pathological characteristics. The Fisher Feature Selection algorithm was employed for feature selection, calculating the correlation coefficient for each feature and ranking all features according to these scores. Features with high Fisher Scores were combined to create ten distinct new models. These newly created models were subsequently trained using the Random Forest decision tree classification model, leading to the development of a rule-based diagnostic algorithm. When these developed models were evaluated, the dataset created using a minimum of three features achieved a breast cancer detection accuracy of 91.51%, a sensitivity of 0.91, and a specificity of 0.92. By identifying only the highly influential features for disease diagnosis, it may be possible to create a more robust and secure diagnostic system without utilizing all the provided features.

KEYWORDS - Keywords - Breast Cancer, Machine Learning, Fisher Score, Random Forest, Classification

CHARACTERISTICS OF FOAM CONCRETE WITH CAPRIC ACID DIATOMITE COMPOSITE

***SULTAN ASLANTAS*[1] , *ALI YARAS*[2]**

[1] Bartin University, Turkey ; [2] Bartin University, Turkey

ABSTRACT

In this investigation, porous diatomite (DA) utilized as a support material was directly impregnated with capric acid (CA), a phase change material. Leakage experiments showed that DA could adsorb up to 50% of CA by mass. The prepared CA/DA composites were incorporated into foam concrete at three different rates (15, 20 and 25% by weight). Foam concrete specimens with CA/DA were examined for physical characteristics (porosity and water absorption) and compressive strength. Porosity and water absorption rose in comparison to reference sample, but mechanical performance dropped. For foam concrete with 25% CA/DA, the values for porosity, water absorption and compressive strength were 31.5%, 22.6%, and 8.93 MPa, respectively.

KEYWORDS - Phase change material, diatomite, foam concrete, porosity, compressive strength.

IMPROVING THE QUALITY OF IN SITU PRETREATED TEXTILE WASTEWATER FOR REUSE APPLICATIONS BY ADSORPTION

GOKHAN KORKMAZ[1] , NAZLIM AKTAY[2] , BURCU PALAS[3] , GULIN ERSOZ[4] , SUHEYDA ATALAY[5]

[1] Ege Universty Graduate School Of Natural And Applied Sciences Chemical Engineering Department, Turkey ; [2] Ege Universty Graduate School Of Natural And Applied Sciences Chemical Engineering Department, Turkey ; [3] Ege Universty Faculty Of Engineering Chemical Engineering Department, Turkey ; [4] Ege Universty Faculty Of Engineering Chemical Engineering Department, Turkey ; [5] Ege Universty Faculty Of Engineering Chemical Engineering Department, Turkey

ABSTRACT

The increasing scarcity of water due to the increasing industrialization and growing population has become an important challenge for irrigation. Recently, reuse of treated wastewaters for agriculture has attracted interest since adequately treated wastewaters has a great potential to be used in agricultural irrigation. Textile industry consumes huge amounts of process water and textile industry wastewaters are characterized by intense color, acidity, toxicity and the high total organic carbon, chemical oxygen demand, and suspended solid content. Adsorption is considered a cost efficient technique for the treatment of industrial wastewaters since it has a greater flexibility in the design and operation. Adsorption has many advantages including lower sensitivity to toxic chemicals, higher organic pollutant removal performance and requirement for less land area. Activated carbon is widely used as adsorbent for the removal of water contaminants that are resistant to biological treatment. Many types of biomass and organic wastes as renewable resources can be utilized in activated carbon preparation by applying physical or chemical activation. Agricultural by products have been effectively used in activated carbon production due to the low manufacturing costs and abundance and availability of agricultural wastes. In this study, in situ pretreated textile wastewater was treated by adsorption in the presence of activated carbon prepared from walnut shells. Zinc chloride was used as chemical activation agent. The intecative effects of the adsorption paremeters including adsorbent loading, pH and shaking rate on total organic carbon removal were imvestigated by response surface methodology and Box-Behnken design. According to the results, increasing the adsorbent loading improved the total organic carbon (TOC) removal efficiencies. For instance, when the adsorbent loading is increased from 0.5 g/L to 2 g/L at pH 7 and 250 rpm shaking rate, the TOC removal efficiency incresed from 13.3% to 27%. Incresing the shaking rate also enhanced the TOC removal efficiencies. As an example, when the shaking rate was increased from 250 rpm to 350 rpm the TOC removal efficiency increased from 10.6% to 33.9% at pH 11 and 1.25 g/L of adsorbent loading. A quadratic polynomial equation was used to derive the model equation expressing TOC removal. The relationship between the response (TOC removal efficiency) and the independent variables (adsorption parameters) was as follows: TOC Removal,% = 133.4 - 6.1 AL - 2.12 pH - 0.832 SR - 5.23 AL*AL - 0.4704 pH*pH + 0.001019 SR*SR + 0.835 AL*pH + 0.0907 AL*SR + 0.02908 pH*SR In the equation, AL represents the asorbent loading in g/L and SR represents the shaking rate in rpm. The high regression and adjusted regression coefficients which were evaluated as 98.58% and 96.04%, respectively, indicated that the fitted model is in a good agreement with the experimental data. The adsorption conditions were optimized at 2 g/L of adsorbent loading and 350 rpm shaking rate. At neutral pH, 42.6% total organic carbon removal was evaluated. Acknowledgement: This study is supported by Horizon 2020 Project-TRUST (Management of industrial Treated wastewater ReUse as mitigation measures to water Scarcity in climaTe change context in two Mediterranean regions)-Partnership for Research and Innovation in the Mediterranean Area Programme (PRIMA).

KEYWORDS - Real textile wastewater, adsorption, biomass, activated carbon, response surface method

STATISTICAL ANALYSIS OF HARDNESS OF HIGH DENSITY POLYETHYLENE COMPOSITES

ECEM AYDIN[1] , ALI YARAS[2] , BILAL DEMIREL[3] , BILAL KURSUNCU[4]

[1] Metallurgy And Materials Engineering, Turkey ; [2] Bartin University, Turkey ; [3] Erciyes University, Turkey ; [4] Bartin University, Turkey

ABSTRACT

Within the scope of this study, high density polyethylene (HDPE) composites were prepared by using various additives (ethylene vinyl acetate (EVA), graphite and calcite) and cross-linker (maleic anhydride) at different rates through the extrusion process. Afterwards, samples for hardness testing were prepared by the injection process. The effects of composite components on linear model were analyzed by analysis of variance (ANOVA). According to analysis findings, incorporating EVA to composites has the greatest impact on their hardness, while binder has the least impact.

KEYWORDS - HDPE composite, hardness, ANOVA

FOAM CONCRETES CONTAINING CAPRIC ACID EXPANDED PERLITE COMPOSITE PHYSICO MECHANICAL PROPERTIES

***ZELIHA YUKSEL*[1] , *ALI YARAS*[2]**

[1] Fen Bilimleri Enstitusu, Turkey ; [2] Fen Bilimleri Enstitusu, Turkey

ABSTRACT

The aim of this study is to investigate the usability of capric acid (CA)/perlite (PE) composites replace aggregate in foam concrete production. For this purpose, firstly, CA/PE composites that absorb the highest amount of CA (58%) without leakage were prepared. In foam concrete mixture, the produced CA/PE composites were added at ratios of 15, 20, and 25% by weight. Using Archimedes method, water absorption and porosity characteristics of foam concrete specimens were determined. Porosity and water absorption values rose together with CA/PE content. In the presence of 25% CA/PE, porosity and water absorption values rose by 69.7% and 98.4%, respectively, in comparison to reference sample. A decrease in compressive strength was also observed and the lowest compressive strength was measured as 5.39 MPa for 25% CA/PE content.

KEYWORDS - Expanded perlite, capric acid, foam concrete, physico-mechanical properties

USE OF DRINKING WATER TREATMENT SLUDGE AND EGG SHELL FOR CLAY FREE BRICK PRODUCTION

GIZEM BAKIROGLU [1] **, *ALI YARAS*** [2]

[1] Fen Bilimleri Enstutisi, Turkey ; [2] Fen Bilimleri Enstutisi, Turkey

ABSTRACT

Consumption of limited clay reserves in brick production is a serious problem in terms of fertile soils in nature. Egg shell (ES) were employed in the brick-making process as a pore-forming agent and drinking water treatment sludge (DWTS) was substituted for clay to address this issue. To achieve this, specimens containing three different ES components (5, 10 and 15% by weight) were fired at 900°C. Water absorption, porosity, and density values were calculated according to Archimedes method. There was a drop in density and compressive strength and an increase in porosity and water absorption with a rise in ES content. Porosity, water absorption, density and compressive strength values were 43.73%, 30.49%, 1.44 g/cm3 and 15.7 MPa in the presence of 15% ES, respectively.

KEYWORDS - Drinking water treatment sludge, egg shell, brick, porosity, mechanical strength

EFFECT OF SILVER ADDITION ON THE SODIUM AMOUNT AND THE GRAIN SIZE OF THE CHALCOPYRITE THIN FILMS DEPOSITED ON DIFFERENT BACK CONTACT MATERIALS

SEMIH AGCA[1]

[1] Ankara Yildirim Beyazit University, Turkey

ABSTRACT

In this study, the effect of silver addition on the sodium amount and the grain size of chalcopyrite thin films was investigated. Soda lime glass was used as substrate which was the source of sodium. The sodium was diffused from soda lime glass to chalcopyrite thin film through the back contact material. Different back contact materials were used to understand the effect of back contact material on the diffusion mechanism of the sodium. Molybdenum and ITO back contact layers around 500 nm were deposited on the soda lime glass by RF magnetron sputtering. Cu(In0.7Ga0.3)Se2 and (Ag0.5Cu0.5)(In0.7Ga0.3)Se2 chalcopyrite thin films were deposited by physical vapor deposition both on molybdenum and ITO back contacts at actual temperatures of 420°C and 560°C to understand the effect of silver addition and the temperature difference. The chemical composition of chalcopyrite thin films were obtained by energy dispersive X-ray spectroscopy. The microstructure photoes were taken by scanning electron microscope. The amount of sodium through the thickness of the samples was investigated by glow discharge optical emission spectroscopy. The results showed that the addition of silver increased the average grain size for both low and high process temperatures. However, it has been observed that the silver effect is more effective at higher temperatures. The average grain sizes of Cu(In0.7Ga0.3)Se2 and (Ag0.5Cu0.5)(In0.7Ga0.3)Se2 chalcopyrite thin films produced at 420°C were 500 nm and 950 nm, respectively. On the other hand, the addition of silver has increased the average grain size of the thin film from 750 nm to 2 μm. These results also showed that the temperature increase has a positive effect on the average grain size. Although there are partial differences, it has been determined that the amount of sodium generally increases after silver addition. At low temperature, the amount of sodium in Cu(In0.7Ga0.3)Se2 thin film deposited on molybdenum were higher than the one deposited on ITO back contact. After the addition of silver, the amount of sodium in the (Ag0.5Cu0.5)(In0.7Ga0.3)Se2 sample with ITO back contact became higher than that of with molybdenum back contact. Furthermore, at high temperature, the amount of sodium in the samples with molybdenum back contact were higher than that of ITO back contact for both Cu(In0.7Ga0.3)Se2 and (Ag0.5Cu0.5)(In0.7Ga0.3)Se2 chalcopyrite thin films. At the same time, the effect of silver on the sodium amount were more pronounced in the sample with molybdenum back contact. As a coclusion, it is found that the temperature, back contact material, average grain size, and the silver addition had an effect on the amount of the sodium in the chalcopyrite thin films. All these parameters should be optimized to be able to get the appropriate amount of sodium.

KEYWORDS - Chalcopyrite,Thin film,Back contact,Silver,Sodium

SYNTHESIS OPTIMIZATION AND CHARACTERIZATION OF METAL ORGANIC FRAMEWORKS MOF AS EFFICIENT ELECTROCATALYSTS FOR HYDROGEN PRODUCTION FROM WATER

KINDA JOUNA VETTI[1]

[1] Marmara University, Turkey

ABSTRACT

Nowadays, with the increasing global warming issue it is crucial point to find environmentally friendly methods to store and transport energy derived from renewable energy sources as chemicals such as green hydrogen. Consequently, the current concern focuses on the production of green hydrogen from water by using renewable energy sources. The challenge is to develop a sustainable hydrogen energy system with high efficiency that can be achieved by utilizing low-cost and earth-abundant electrocatalysts. Transition metal-based metal-organic framework (MOF), which is a class of crystalline porous materials that possess high specific area, high porosity, and customizable structure, has emerged as a promising electrocatalyst [1, 2]. In this study, MOF-based electrocatalysts have been investigated as functional electrocatalysts for hydrogen evolution reactions. particularly, zeolitic imidazolate frameworks (ZIFs)which represent a new and special subclass of MOFs that rely on imidazole linker, have been prepared by a solvothermal method that requires conducting the reaction between metals salt (Cobalt (II) nitrate hexahydrate, iron (III) nitrate monohydrate) and organic linker (benzimidazole) with using more than one kind of solvent such as methanol, water and dimethyl formamide (DMF) at high temperature and pressure by using hydrothermal method. Structural characterization of the prepared novel nano-electrocatalysts is performed by fundamental characterization techniques (SEM, FTIR, and XRD) that are indispensable to understanding crystalline solid materials. The electrocatalytic reaction performance of the prepared novel nanocrystalline ZIFs has been assessed by electrochemical analytical tools. More precisely, these utilized parameters that include LSV (linear sweep voltammetry), EIS (electrochemical impedance spectroscopy) (carried out to study the catalyst's conductivity and the mass transfer between the electrolyte and electrode), and Tafel slope (that provide an idea about the electrochemical reaction kinetics). All these measurements have provided evidence that confirms the high activity of the as-prepared electrocatalysts. Its effects enhance the performance of the water electrolysis to produce hydrogen efficiently, displaying high intrinsic activity compared to noble metals(Pt), with incredible achievement to lower the HER overpotential to 50 mV to achieve a current density of 10 mA/cm2 that approaches commercial Pt/C catalyst which has about 42 mV of overpotential. The significance of this scientific work will be represented in breaking off the limitation for finding available and inexpensive catalysts that are competitive with platinum catalysts that represent the major obstacles (being expensive and rare) that hamper the development of more and more sophisticated hydrogen production systems.

KEYWORDS - HER: Hydrogen Evolution Reaction MOF: Metal Organic Framework ZIFs: Zeolitic Imidazolate Frameworks DMF: Dimethyl Formamide SEM: Scanning Electron Microscopy FTIR: Fourier Transform Infrared Spectroscopy XRD: X-Ray diffraction LSV: Linear Sweep Voltammetry EIS: Electrochemical Impedance Spectroscopy

STRUCTURAL AND ELECTRICAL CHARACTERISTICS OF REBCO 358 SUPERCONDUCTORS PRODUCED USING A MODIFIED MPMG METHOD

***SEZAI KUTUK*[1] *, SULEYMAN BOLAT*[2]**

[1] Recep Tayyip Erdogan University, Turkey ; [2] Karadeniz Technical University, Turkey

ABSTRACT

(RE)BCO superconductors can carry high electric current in a strong magnetic field. Additionally, bulk (RE)BCO superconductors are advantageous due to their smaller volume and weight in applications such as magnetic separation, a magnetic drug delivery system, a desktop MRI system, a wind turbine generator, and a ship propulsion engine. In this study, RE3(Nd, Sm, Gd)Ba5Cu8Oy (RE358) superconducting samples were produced using a modified melt-powder-melt-growth (MPMG) method. A bulk density test, an X-ray diffractometer (XRD), and a polarized optical microscope (POM) were used to evaluate the materials' structural characteristics, and also a four-point probe approach was used to look into their electrical characteristics. The Gd358 sample was determined to have higher bulk density (6.44 g/cm3) resulting in lower porosity (6.87%). Superconductor phase and minor phases like RE211, Ba–Cu–O, and Cu–O were identified in the XRD pattern. The Gd358 sample was observed to consist of lower weak-link, larger superconductor grains, smaller RE211 particles, and fewer pores in the POM image. Besides, the Gd358 sample was detected to have the best Tc,onset, Tc,offset, and ΔTc transition temperatures under a magnetic field of 0.25, 0.50, 1, and 5 T. The values of Tc,onset, Tc,offset, and ΔTc were 97.98 K, 90.44 K, and 7.54 without field, respectively, and moreover 97.19 K, 86.34 K, and 10.85 K at the maximum field of 5 T. The lowest β value found from the activation energy was calculated as 0.23 in the Gd358 sample; in other words, this β value is quite good according to the literature. Taking into account the $U_0 \infty H^{-\beta}$ power law relationship, a smaller β value indicates that the pinning energy is larger or the sample is less sensitive to the magnetic field. The reason for the low β value in this study is most likely due to the production method. It is believed that the Gd358 superconducting material in this study can be used in superconducting applications.

KEYWORDS - Superconducting material, MPMG method, Structural property, XRD, Electrical property

STRUCTURAL MORPHOLOGICAL AND MAGNETIC INVESTIGATIONS OF HALF DOPED LA0 5BA0 5MNO3 PEROVSKITE NANOPARTICLES

YUSUF SAMANCIOGLU[1]

[1] Mugla Sitki Kocman University, Turkey

ABSTRACT

This study investigated the effect of barium (Ba) substitution for lanthanum (La) on the magnetic properties of the half-doped perovskite manganite compound La0.5Ba0.5MnO3. The sample was prepared using the sol-gel method and sintered in air at 1000°C for 24 hours. Scanning electron microscopy (SEM)-energy dispersive spectroscopy (EDS) analysis revealed the growth of BaMnO3 nanorods on La0.5Ba0.5MnO3 due to self-assembly. The particle size of the perovskite compound La0.5Ba0.5MnO3 was found to be approximately 60 nm. The nanorods had a width of 100-250 nm and a length of 5-20 μm. X-ray diffraction (XRD) analysis showed that the main perovskite compound is cubic (a= 3.9108 Å), while the nanorods have a hexagonal (a=5.6454 Å, c=4.8224 Å) crystal structure. The temperature dependence of magnetization was measured at 5 mT in zero-field-cooled (ZFC) and field-cooled (FC) protocols. The Curie temperature was found to be near room temperature, at 325 K. The magnetic entropy change calculated from the Maxwell transformations of magnetization measurements was found to be 0.62 J/kgK at 1 T and 2.25 J/kgK at 6 T.

KEYWORDS - Half-doped perovskite manganite, La0.5Ba0.5MnO3, BaMnO3, nanorods, magnetic properties, Curie temperature

INVESTIGATION OF STRUCTURAL MAGNETIC AND MAGNETOCALORIC PROPERTIES OF LA0 8AG0 2MN0 9A0 1O3 A MN CU CO NI MO COMPOUNDS*

BARIS ALTAN [1] **, *ATILLA COSKUN*** [2]

[1] Fenerbahce University Vacational School Of Health, Turkey ; [2] Mugla Sitki Kocman University Faculty Of Science Department Of Physics, Turkey

ABSTRACT

Manganite compounds which commonly used in magnetic cooling systems, have recently become very popular. In this study, the physical properties of these manganite compounds were examined. All samples used in the study were produced by the sol-gel method, and the crystal structures of the compounds were revealed by X-Ray Diffraction (XRD) studies. The crystal lattice parameters of all compounds, Mn-O bond lengths and Mn-O-Mn bond angles, which are very important in explaining Magneto Caloric Effect (MCE), were found by XRD refinements. The surface morphologies of all compounds were determined by Scanning Electron Microscopy (SEM) studies and the effects of different elements doping in the B-region on the surface morphologies were explained. The metal-insulator phase transition temperatures (TIM) of the compounds were determined in zero field and under an external magnetic field of 0-3 T, and their magneto-resistance properties were explained. Magnetisation measurements versus temperature (M-T) were experimented as field-free and under magnetic field (500 Oe) to determine the Curie transition temperatures (TC) of the compounds. After determining the TC temperatures of the compounds, magnetization (M-H) against the external magnetic field measurements were made at 30 K above and 30 K below the TC temperatures of the samples under a 0-5 T field. MCE values of the compounds were calculated using the magnetic isotherm curves obtained in these measurements. Experimental XRD data was analysed using General Structure Analysis System (GSAS) and the lattice parameters, Mn-O bond lenghts, Mn-O-Mn bond angles, are calculated. Also the proportion and composition of impurities are calculated. All compounds were found to have Rhombohedral (R3c) crystal symmetry. From this point of view, it can be said that 10% doping of different elements in the B-region does not change the crystal symmetry. The Mn-O-Mn bond angles of the compounds were almost unchanged. It is possible that the very small changes, detected in the Mn-O bond lengths, have an effect on the magnetic properties of the compounds. It is predicted that the different shaped voids on the surface of all compounds, which are visible in SEM examinations, will have negative effects on the electrical conduction at the grain boundaries of the compounds. Resistivity of all compounds significantly decreases as the external magnetic field increases. La0.8Ag0.2MnO3 and La0.8Ag0.2Mn0.9Mo0.1O3 compounds exhibited metal-insulator phase transition around room temperature, which is the most important parameter in magnetic cooling technologies. These results show that some of the produced compounds can be used as magnetic sensors. It is thought that the differences in the TC values of all compounds, which show almost the same crystalline properties, are due to possible magnetic interactions within the compounds. The physical properties of La0.8Ag0.2MnO3 and La0.8Ag0.2Mn0.9Mo0.1O3 compounds such as TC values, which were determined around room temperature, and relatively high MCE values at low magnetic field, indicate that these materials have the potential to be used in magnetic cooling technologies.

KEYWORDS - Magnetocaloric Effect, Manganites,Perovskites,Sol-Gel method,Doping

** This work was supported by the Muğla Sıtkı Koçman University Research Support and Funding Office (BAP) Under Grant Contract no: 19/077*

ON THE DEMAGNETIZATION FACTOR IN THE CALCULATION OF PERMANENT MAGNET FIELDS

ANATOLII PODOLSKII[1]

[1] Magnetic Technologies Llc, Russian Federation

ABSTRACT

The article shows that demagnetization factor of a permanent magnet defined as the ratio of magnetic field strength to magnetization value depends on hysteresis loop parameters, in addition to the shape, the relationships between magnet sizes, and the direction of magnetization. The analytical expression for calculating the demagnetization factor is obtained. It allows constructing the load line of a magnet. It is shown that the magnetization value obtained from the load line makes it possible calculating field parameters close to observed. Graphical dependencies to determine demagnetization factor values of ring-shaped permanent magnets are constructed.

KEYWORDS - demagnetization factor, magnetic field strength, magnetization, load line, permanent magnet

SYNTHESIS OF GRAPHENE NANOSHEETS FROM PLASTIC WASTE FOR HYDROGEN STORAGE APPLICATIONS

NASRIN POURMOGHADDAM[1] *, NEZIHE AYAS*[2]

[1] Eskisehir Technical University, Turkey ; [2] Eskisehir Technical University, Turkey

ABSTRACT

One of the biggest challenges is to eliminate the environmental damage caused by plastic, which is widely produced. Graphene is of great importance because it has an enormous number of applications in a wide range of science and technology fields, such as energy conversion and storage devices, fuel cells, biosensors, supercapacitors, drug delivery, polymer and nanocomposites. The presence of graphene nanomaterials in composite materials indicates significantly enhanced mechanical, electrical, and thermal properties. Although, several techniques such as mechanical exfoliation, chemical vapor deposition (CVD), epitaxial growth on single crystal SiC and chemical coupling reactions have been used in graphene synthesis, the bulk production of graphene nanosheets remains a massive challenge. Since hydrogen gas is the lightest molecule and has low density (1 kg of hydrogen gas occupies over 11 m3 at room temperature and atmospheric pressure), the process of storage of hydrogen is a major obstacle. Consequently, the storage density must be increased to be economically viable by selecting effective materials such as graphene. In this study, facial synthesis of graphene nanosheets from plastic waste has been investigated by two-step pyrolysis processes (firstly at 400 °C in the presence of bentonite followed by 950 °C under nitrogen atmosphere). Bentonite nanoclay was used in the pyrolysis process as a degradation and transforming agent which is cost-effective and almost non-toxic effect. The synthesized graphene was characterized using different techniques such as ultraviolet visibale (UV-VIS) spectroscopy, thermogravimetric analysis (TGA), transform infrared spectroscopy (FT-IR) and x-ray diffraction (XRD). The weight loss of the synthesizing graphene was investigated by the TGA technique which is about 7% due to the loss of water molecules and the elimination of the oxygen functional groups. A sharp peak at 2θ of about 24° (002) and a small peak at 44.8°(100) were observed in the XRD analysis of the sample. The UV-VIS spectroscopy provides valuable insight into optical properties which shows a strong absorption peak at about 221nm corresponding to the n-π* plasmon peak. The FT-IR method was applied to identify characteristic functional groups such as carboxyl C=O, epoxy C-O and alkoxy C-O which were observed by peaks at 2750, 1638, 1156 and 1038 cm-1 corresponding to the -OH vibration stretching.

KEYWORDS - Waste Plastic, Graphene, Characterization, Hydrogen Storage

NEURAL NETWORK BASED SELF TUNING PID AND SMC PID CONTROLLERS FOR POSITION CONTROL OF ELECTROACTIVE POLYMER ACTUATORS

EZGI KESTEK[1] , BESIM SOGUT[2]

[1] Yildiz Technical University, Turkey ; [2] Yildiz Technical University, Turkey

ABSTRACT

Conjugated conducting polymer actuators present a range of distinct advantages over alternative actuator types. These advantages encompass notable characteristics such as substantial displacement capacity, a mechanistic similarity to biological muscles, inherent damage tolerance, low actuation voltage requirements, biocompatible composition, and operability within aqueous environments. Owing to these salient attributes, these actuators hold considerable potential across diverse applications including biomimetics, manipulation of individual cells, robotics, and prosthetics. Notwithstanding their successful performance within controlled settings, it is important to address certain challenges inherent to the operation of Electro-Active Polymer (EAP) actuators, arising from nonlinear effects stemming from the inherent material structure. These nonlinearity-induced complexities can, at times, pose obstacles within the domain of control applications for such actuators. This paper undertakes a comprehensive investigation into the potential application of a controller scheme aimed at enhancing tracking accuracy in the context of conjugated conducting trilayer polypyrrole (Ppy) actuators. The study encompasses the simulation of three distinct control methodologies: the Artificial Neural Network PID (ANNPID), a conventional Proportional-Integral-Derivative controller (PID), and the Sliding Mode Control with Artificial Neural Network (ANNPIDSMC). In line with the obtained results, it becomes evident that the ANN-PID controller showed best tracking performance and ANN-SMC-PID controller performed fastest one when compared to PID controller. Notably, this study marks the inaugural utilization of the ANN-PID and ANN-PID-SMC control approaches within the domain of electro-active polymer actuators.

KEYWORDS - Electroactive polymer actuators, neural network, Sliding Mode Controller, smart actuators

ARTIFICIAL INTELLIGENCE SUPPORTED UNMANNED AERIAL VEHICLE WITH SEMI AUTONOMOUS FLIGHT CONTROL FOR FOREST FIRE DETECTION

ABDULLAH GENC[1] , EMRE KOYUN[2]

[1] Isparta University Of Applied Sciences, Turkey ; [2] Isparta University Of Applied Sciences, Turkey

ABSTRACT

Nowadays, early detection of forest fires using unmanned aerial vehicles (UAVs) and image processing is very crucial. In this study, a semi-autonomous flight-controlled artificial intelligence-supported fire detection UAV is designed and manufactured. Image processing is performed using Raspberry Pi 4 with OpenCV library and trained by utilizing a dataset obtained from open source. Then, both fire and smoke detection can be performed by means of this dataset. The mechanical parts of the UAV are 3D printed using FDM technology. APM 2.8, which supports autonomous flight, is used as the control board. When the proposed UAV detects the fire, it sends an instant message to the user's computer via a Wi-Fi signal. Unlike the studies in the literature, this study includes artificial intelligence and semi-autonomous flight. As a result of the final trained data set, the proposed system is able to detect fire with 94% accuracy.

KEYWORDS - Forest fire detection,Unmanned aerial vehicle (UAV),Image processing ,Semi-autonomous flight,Artificial intelligence

DESIGN OF SMART GLASSES TO MAKE LIFE EASIER FOR THE VISUALLY IMPAIRED BY DETECTING OBJECTS

ABDULLAH GENC[1] , AYSE TOY[2] , HAVVA GULSUM ALTINAY[3] , ISMAIL SAHIN FURAL[4]

[1] Isparta University Of Applied Sciences, Turkey ; [2] Isparta University Of Applied Sciences, Turkey ; [3] Isparta University Of Applied Sciences, Turkey ; [4] Isparta University Of Applied Sciences, Turkey

ABSTRACT

The perception of objects that visually impaired individuals encounter in daily life and sending feedback to the user in different ways directly affect the quality of life of these individuals. In this study, in order to facilitate the lives of visually impaired individuals, smart glasses that can detect different objects and read the text in front of it has been designed and manufactured using image processing. The mechanical production of the proposed glasses is 3D printed using FDM technology. Then, with the camera module and ultrasonic sensor placed on the frame of the glasses, it detects the objects in front of it and transmits commands to the user with the help of a voice assistant. Raspberry Pi Zero W is used as the processor. OpenCV provides a set of functions and tools for operations such as color detection, color filtering, and color-based object detection. The text-to-speech (TTS) library is used to voice the names or descriptions of detected objects to the user. After the tests and trials, the success rate of the study is determined as 85%.

KEYWORDS - Image processing, smart glasses, visually impaired, python, artificial intelligence

OPTIMAL SPHERICAL MECHANISM DESIGN FOR SUN TRACKING ON TWO AXIS

ZIYA OZCELIK[1] , OSMAN ACAR[2] , AZIM HANSU[3]

[1] Selcuk University, Turkey ; [2] Selcuk University, Turkey ; [3] Selcuk University, Turkey

ABSTRACT

This paper presents a research for minimum torques on the fixed joints rotation axis of optimum spherical mechanism design with five bar and two degree of freedom which can provide a solar panel to get sun rays perpendicular. In this context, the objective function and constraints of the optimization problem were created. The solution was obtained using the Artificial Harmonic Bee Colony (AHBC) algorithm. The schematic design of mechanism was given as result with the best design variables.

KEYWORDS - Spherical mechanism, Solar Energy, Sun tracking system, Heuristic optimization, Artificial Harmonic Bee Colony algorithm

ERGONOMIC DISABLED RAMP DESIGN AND APPLICATION FOR PUBLIC TRANSPORTATION VEHICLES

CEM EKER[1] , OMER DOGAN DOGANCIK[2] , SEMIH ICYUZ[3] , METEHAN ONAT[4] , YAVUZ CATMAZ[5] , ELIF CAK[6] , DUYGU CELIK[7] , ALEV YUKSEL PECELI[8]

[1] Kns Automotive, Turkey ; [2] Kns Automotive, Turkey ; [3] Kns Automotive, Turkey ; [4] Kns Automotive, Turkey ; [5] Kns Automotive, Turkey ; [6] Kns Automotive, Turkey ; [7] Kns Automotive, Turkey ; [8] Kns Automotive, Turkey

ABSTRACT

Purpose and Scope: Electronic and mechanical systems such as disabled ramps are needed for disabled people to travel in public vehicles. Disabled ramps are of great importance to improve the quality of life of disabled individuals and to make their lives easier. It is aimed to design a ramp that can only operate when the vehicle is stopped, with dimensions in accordance with 2001/85/EC standards. The minimum ramp width should be longer than 80cm and have a load-carrying capacity of 350kg. The weight of a 350 kg load-bearing capacity disabled ramp can vary between 30kg-35kg on average. This design, it is aimed to reduce the weight of a disabled ramp with the same weight carrying capacity by 50%. By reducing the weight of the ramp used in the project by 50%, the design study was carried out to provide cost and weight advantage in the short term and to prevent carbon emission emissions due to weight reduction in the long term. Material and Method: The project was realized according to the following steps. Firstly, a mechanical design suitable for production was made with CAD application by automotive regulations. Static analysis was performed in Ansys. Ansys static analysis was repeated by making revisions if needed for production. Extrusion molds were designed and manufactured for the production of aluminum profiles. Extrusion printing was taken for the prototype. Aluminum profiles were machined with CNC for prototype production. Sheet metal for the fixed floor was processed with laser cutting and textured paint was applied. The prototype was assembled and 350 kg strength tests were performed. A mechanical strength test was applied to examine the deformation situation. Afterwards, the transition to mass production was realized. Results: Each mobile aluminum block was loaded with a load of 350 kg in a time-dependent manner and the result was observed. The total deformation was calculated as 0.079mm and the maximum stress was calculated as 179.46MPa as follows. Since the material is used as aluminum 6063- T6, the value found is safe. In another analysis option, the analysis was performed for 6 aluminum blocks of the design with a load of 58.3kg per block. The total deformation amount was calculated as 0.015mm and the total stress amount was calculated as 24.011MPa. When the parts were evaluated one by one, it was determined that the Aluminum 6063-T6 material to be selected was suitable for this product. In addition, measures to prevent falls were also included in the product design. By using a non-slip tape, the risk of slipperiness on the ramp was minimized. In this way, it is aimed to increase the safety of disabled people when using the ramp. Conclusion: According to the design and production results obtained, the added values of our product are as follows. (1) The weight of the designed product has been reduced by 50% compared to its counterparts in the market. (2) The production cost of the designed product has been reduced by 64.5% compared to its counterparts in the market. (3) Since the designed product will add 50% less weight to the public vehicle to be assembled compared to its counterparts in the market, more performance will be obtained from the vehicle with less energy. In this way, the carbon emission of the vehicle has been reduced and made more beneficial to the environment. (3) The ergonomic design of the product has been achieved. (4) Since it is an extruded design, it is possible to produce products in different sizes. (5) By means of the claw structure in the contact areas, the non-slip and possible accidents of the product have been minimized. (6) Disabled ramp were designed according to mass production. According to the results of the research, it is evaluated that the designed and produced disabled ramp can be used commercially.

KEYWORDS - Disabled Ramp, Transportation Technologies, Wheelchair, Passenger Cars, Disabled Individual

TUBULAR PERMANENT MAGNET LINEAR MOTOR DESIGN FOR AIRCRAFT ACTUATOR INSTEAD OF HYDRAULIC ACTUATORS

HALIT UZUNER[1] , KADIR ERKAN[2]

[1] Yildiz Technical University, Turkey ; [2] Yildiz Technical University, Turkey

ABSTRACT

The aviation industry has long struggled with the hydraulic leakage and wear problems in traditional hydraulic actuators, and the maintenance costs that come with these issues, necessitating the search for more efficient and eco-friendly alternatives. This paper presents design of a Tubular Permanent Magnet Linear Motor (TPMLM) as a prospective solution to these problems, aiming to replace hydraulic actuators in aircraft control systems. Hydraulic actuators have been plagued by issues such as fluid leakage and component wear, leading to costly maintenance and potential safety concerns. The TPMLM, known for its simplicity, compactness and low mechanical friction offers a promising remedy for these challenges. In this study, we conducted magnetostatic and transient simulations using the Finite Element Method (FEM) implemented in ANSYS Maxwell to comprehensively evaluate the performance of TPMLM and the simulation results were compared with the hydraulic actuators used in aircraft.

KEYWORDS - Tubular permanent magnet linear motor ,TPMLM,Tubular linear motor

NON DISABLED MODULAR USB CHARGE SUPPORTED EMBEDDED STOP BUTTON DESIGN AND APPLICATION FOR BUSES

CEM EKER[1] , ALEV YUKSEL PECELI[2] , FERHAT COMERT[3] , YUNUS EMRE TARHAN[4] , DAMLA CEREN TEKTAS[5] , EDA NUR UYUK MADEN[6] , YAVUZ CATMAZ[7] , ABDULLAH VIDINLIOGLU[8] , DUYGU CELIK[9] , ENES GENC[10]

[1] Kns Automotive, Turkey ; [2] Kns Automotive, Turkey ; [3] Kns Automotive, Turkey ; [4] Kns Automotive, Turkey ; [5] Kns Automotive, Turkey ; [6] Kns Automotive, Turkey ; [7] Kns Automotive, Turkey ; [8] Kns Automotive, Turkey ; [9] Kns Automotive, Turkey ; [10] Kns Automotive, Turkey

ABSTRACT

Background and Purpose: In public vehicles, there is a need for buttons that will stop on the vehicle holding pipes and in areas close to the seats for disabled people so that passengers can inform at which stop they will get off. Stop buttons should have grab bars and a structure that can be placed on flat surfaces so all passengers can easily reach them. For disabled and non-disabled individuals to use it efficiently, there should be a stop text in the Latin alphabet and Braille alphabet on the button. It should have a suitable design so that there are no unintentional presses. In today's buses, many stop buttons can be reached faster than the old ones. However, the protruding structure of the buttons used causes the stop buttons to be pressed accidentally and unintentionally. This study aims to design a stop button that can be mounted on both flat surfaces and grip pipes so that it can be placed in areas that all passengers can easily reach. It aims to prevent unintentional pressing of the buttons, which will be placed in positions accessible to everyone, by designing them to be somewhat embedded in the body. In order to add functionality to the button body to be designed, it aimed that the product can be used as a USB charger with the electronic board and front frame that can be mounted in the same body. Materials and Methods: The project was carried out following steps. First of all, the mechanical design was made by the production and automotive regulations. Universal Serial Bus (USB) 5V 2A supported electronic card design has been added so passengers can charge their phones during the journey. Automotive regulation tests after mass production are repeated as the final test. ABS material was used in mass production, taking into account visual integrity, strength, and non-flammability tests. Results: An embedded design has created a modular structure to prevent incorrect printing due to impact. With the design of these modules, it is easy to install on circular and flat surfaces. Practical tests were made for the prototype to be mounted on different surfaces, and it was found suitable. Unlike the products on the market, with two molds instead of four molds, mold costs, mold replacement times, and mold stocks have been reduced by 50%. Radiated emission tests were conducted at an operating voltage of 12V and in accordance with CISPR 25 as the worst case due to the dual voltage operating voltage. In addition, immunity to transients and emission tests were performed at 24 V operating voltage and according to ISO 7637-2 2nd edition. The tests were carried out successfully, and the E24*10R06/02*4814*00 approval certificate was obtained from the external laboratory. Climatization test: Within the scope of cooling for 4 hours at -40°C and heating for 4 hours at 120°C, the visual and design wear of ABS material was checked for 24 hours. No deformation has occurred. Conclusion: According to the design and production results obtained, the added values of our product are as follows. (1) Ergonomic embedded modular design to prevent crashes (2) Ease of mounting on pipes and flat surfaces with a modular structure (3) Barrier-free button with embossed structure (4) Use of 5V-2A USB charging module (5) 100 thousand compression strength (6) Electronic card design suitable for ECE-R10 Electromagnetic Compatibility (EMC) test (7) Manufacturing with two molds instead of 4 molds compared to products on the market, (8) Reducing the cost of mold storage (9) Ease of rapid mass production with two molds. It is evaluated that the product produced according to automotive regulations can be used frequently in buses with its high quality and existing added value.

KEYWORDS - Stop Button, Public Transport, USB Charger, Modular Design, Embedded Stop Button

INTELLIGENT CONTROL OF ELECTROACTIVE POLYMER ACTUATORS VIA NEURAL NETWORK TUNED SLIDING MODE PID CONTROLLER

EZGI KESTEK[1] , BESIM SOGUT[2]

[1] Yildiz Technical University, Turkey ; [2] Yildiz Technical University, Turkey

ABSTRACT

Conjugated conducting polymer actuators present a range of distinct advantages over alternative actuator types. These advantages encompass notable characteristics such as substantial displacement capacity, a mechanistic similarity to biological muscles, inherent damage tolerance, low actuation voltage requirements, biocompatible composition, and operability within aqueous environments. Owing to these salient attributes, these actuators hold considerable potential across diverse applications including biomimetics, manipulation of individual cells, robotics, and prosthetics. Notwithstanding their successful performance within controlled settings, it is important to address certain challenges inherent to the operation of Electro-Active Polymer (EAP) actuators, arising from nonlinear effects stemming from the inherent material structure. These nonlinearity-induced complexities can, at times, pose obstacles within the domain of control applications for such actuators. This paper undertakes a comprehensive investigation into the potential application of a controller scheme aimed at enhancing tracking accuracy in the context of conjugated conducting trilayer PPy actuators. The study encompasses the simulation of three distinct control methodologies: the Artificial Neural Network PID (ANNPID), a conventional Proportional-Integral-Derivative controller (PID), and the Sliding Mode Control with Artificial Neural Network (ANNPIDSMC). In line with the obtained results, it becomes evident that the ANN-PID controller exhibits best tracking performance and ANN-SMC-PID controller performed fastest one when compared to PID controller. Notably, this study marks the inaugural utilization of the ANN-PID and ANN-SMC-PID control approaches within the domain of electro-active polymer actuators.

KEYWORDS - Electroactive polymer actuators, neural network, Sliding Mode Controller, smart actuators

METAL BAND SAW MACHINES FROM TRADITIONAL DESIGN TO MODERN TECHNOLOGY

SERKAN YILDIZ[1] , SAIT ALI UYMAZ[2] , ERSIN KAYA[3] , EMIN YESIL[4]

[1] Imas Machinery R D Center, Turkey ; [2] Konya Technical University Computer Engineeing, Turkey ; [3] Konya Technical University Computer Engineeing, Turkey ; [4] Imas Machinery R D Center, Turkey

ABSTRACT

This study examines the evolution of band sawing machines from their traditional design to modern technology and their role in metal cutting operations. Band saw machines are an important tool in the metalworking industry and are used in various sectors. These sectors include metalworking factories, automotive sub-industry sector, iron and steel sector (steel sheet manufacturers, pipe manufacturers), machinery manufacturers, construction sector and steel construction manufacturers. At this point, band saw machines are widely used in the processing of metal materials. Determining the most suitable parameters for the cutting process depends on factors such as material type, dimensions, geometry of the part to be cut, targeted geometric completeness and surface quality objectives. The wide variety of material types and strip types to be cut and the wear and tear of the band saw due to use cause the optimum cutting parameters to vary for each cutting process. In cutting processes performed with conventional band saw machines, these parameters, which affect product efficiency, energy efficiency and cutting quality, are determined by the operator. Modern machines can adjust these parameters automatically. Furthermore, technologies such as cloud-based monitoring systems, sensors and AI-based software are being used to optimize cutting processes. In the future, AI and sensor technology will make band saw machines more efficient and transform the manufacturing sector. This study addresses the development of band sawing machines, cutting parameters and future technological trends.

KEYWORDS - Metal Band Saw Machine, Machining, Artificial Intelligence, Optimization

NUMERICAL INVESTIGATION OF FLOW AND HEAT TRANSFER IN ASYMMETRICAL TRIANGULAR CORRUGATED CHANNELS WITH TRIANGULAR OBSTACLES

SELMA AKCAY[1]

[1] Cankiri Karatekin University, Turkey

ABSTRACT

In this study, flow and heat transfer in asymmetrical triangular corrugated channels with triangular obstacles were numerically investigated. Numerical study was carried out with the help of the ANSYS Fluent solver. In the study, triangular barriers were placed in the channel in two different configurations (Case 2 and Case 3), and the results were compared to the corrugated channel without obstacles (Case 1). The walls of the corrugated channel are kept at a constant temperature of 330 K. The working fluid is air. Reynolds number changed in the range of $2000 \leq Re \leq 8000$. To observe the effects of the triangular obstacles on flow and thermal fields, the velocity and temperature contours were obtained. According to the findings, while less pressure drop occurred at Case 3, the highest Nusselt number was obtained at Case 2. For both the triangular obstacle cases, the heat transfer and the pressure drops increased with increasing Reynolds number. The numerical results indicated that the flow and heat transfer were substantially affected by Reynolds number, triangular obstacle configuration, and channel geometry.

KEYWORDS - Triangular corrugated channel, triangular obstacle, heat transfer, turbulent flow, friction factor.

APPLIED COMBINATION OF VALUE STREAM MAPPING AND MODAPTS METHOD IN THE METAL SECTOR

OMER ABDULAZIZ KORKMAZ [1] ***, SELCUK OZCAN*** [2]

[1] Karabuk University, Turkey ; [2] Karabuk University, Turkey

ABSTRACT

Nowadays, improving productivity has become a demand for competition. Developing the production cycle is a non-end process that all firms try to obtain seeking continuity. Any enhancement that happens in the production area leads directly to progressions in capacity and delivery time causing profit growth. The real challenge to achieve high results for this improvement process is to recognize the problems and identify the development needed operations because most of the production problems are hidden. For this reason, the best solution to start with the enhancement journey is using Lean Manufacturing tools to be able to see the real obstacles and solve most of them economically. Value Stream Mapping (VSM) is one of the most reliable Lean Manufacturing techniques to identify the enhancement needed for production stations by highlighting the wastes and suggesting solutions to eliminate them. Supporting VSM, this study used Modular Arrangement of Predetermined Time Standards (MODAPTS) to standardize the production time ergonomically for more credibility. A new model was generated combining lean manufacturing, a predetermined motion time system, and ergonomics. As a result of this combination, the development was proved with improvements in the activity ratio by 100%, rolled percent complete and accurate by 120%, and delivery time by 47%. These percentages display the efficiency of the model that was created in this study opening the area for more studies to be built on it.

KEYWORDS - Lean Manufacturing, Value Stream Mapping, Predetermined Motion Time System, MODAPTS, Delivery time

THERMAL ANALYSIS AND DESIGN OF COMPOSITE STRUCTURES UNDER REALISTIC FLOW CONDITIONS

***DAMLA PEHLIVAN*[1] *, HASAN AYDOGAN*[2]**

[1] Selcuk University, Turkey ; [2] Selcuk University, Turkey

ABSTRACT

Composites are the material of choice for the wing structures of unmanned aerial vehicles (UAV) due to their high specific strength. However, their strength properties detoriate faster with the changes in the temperature, and they have low thermal conductivity.. Due to these reasons, for anti icing and de icing purposes, conventional technique of using heated air from the engine cannot be used. Without a proper de icing solution, overall aerodynamic performance of the wing will be hampered and the flight safety will be greatly reduced. An alternative technique, known as electrothermal heating is used for the anti icing and de icing of UAV wings. In this technique, heat generating fabrics are utilized inside o rover the wing structure to avoid and/or remove the ice under cold weather conditions. Using, 2D and 3D composite thermal analysis, the wing structure can be optimised. Active thermal control of composite materials and structures is an important field of study. In the literature, various electrothermal heating solutions exist. Roy et al. (2021) has carried out thermal modelling studies on carbon fibre reinforced plastics (CFRP) wing structures. In tis study, convection coefficients are taken from the correlation equations available in 1D equations. In the numerical analysis, two different heating configuration(15 heating strips, 5 heating strips) were utilised. No optimisation studies were done on the size, position or the surface temperature of the heater. Mohseni(2012) has studied the thermal behaviour of glass fibre reinforced epoxy (GFRP) structure experimentally.Metal heating strips have been added to the structure. The position of the heating strips have been changed to optimise the surface temperature on the wings. In this study, an infrared camera is used. Under -17 centigrade and 27 m/s flow conditions, icing can be observed especially close to the leading edge of the wing. To avoid icing, it is stated that it could be useful to apply different currents (hence different heat fluxes to the metal heating strips) No calculation has been performed for the optimum currents for different metal heating strips. In this study, the following methodology is utilised; -Performing 2D and 3D RANS&energy equation solutions to obtain convection coefficient under realistic Reynolds number and freestream temperature conditions, with comparisons to 1D correlation coefficients - The prelimanary design of the wing structure with heating elements included -Thermal analysis of the wing structure -Design modifications to the thermal heating solution based on the surface temperature and maximum temperature observed during analyses, The study is important in the field of aviation as it contributes to the efficiency and overall reliability of the UAVS. The studies in the literature use mostly convection coefficients based on 1D relations, however in this study, more realistic 2D and 3D results are incorporated to the overall design methodology. Besides, in addition to the location of the heating strips, number of heating strips, size, of the heating strips, current&heat flux parameters are studied extensively. In future, based on the findings in this study, experimantal studies shall be performed to validate and showcase the technological value of the results.

KEYWORDS - Thermal Analysis, Composites, De Icing

THREE DEGREE OF FREEDOM SIMULATION AND CONTROL OF A QUADROTOR UNMANNED AERIAL VEHICLE

ABDULHAMID HAN DOGRU[1] *, HUSEYIN ENES SALMAN*[2]

[1] Tobb University Of Economics And Technology, Turkey ; [2] Tobb University Of Economics And Technology, Turkey

ABSTRACT

Quadrotor Unmanned Aerial Vehicles (UAVs) are frequently used in industries such as transportation, defense, and entertainment. These UAVs are generally controlled using complex flight algorithms to perform complicated maneuvers on varying weather conditions. To observe the desired flight performance in such conditions, the analysis of uncertainty should be performed. This study aims to explain the modeling and control of a quadrotor UAV in three degree of freedom (3-DOF) space. The generated 3-DOF model is used for the uncertainty analysis to investigate the flight performance of the quadrotor UAV under varying weather conditions, unprecise sensor measurements, and unknown mass properties. The modeling and controller development are performed by using MATLAB Simulink software. Since the modeling is practiced in 3-DOF space, the pitching plane is the main movement plane of the UAV. Therefore, the study mainly focuses on the longitudinal and vertical translations, and pitching rotation of the UAV. To evaluate the performance of the UAV, the path-following characteristics are examined under uncertain conditions.

KEYWORDS - Quadrotor UAV, modeling and simulation, flight control, uncertainty analysis, flight performance

MANIPULATOR FLEXING MECHANISM IN PANEL BENDING MACHINES

MERT YALCINTAS[1] , FATIH AYDEMIR[2] , RECEP DONMEZ[3]

[1] Durmazlar Makina A S, Turkey ; [2] Uludag University, Turkey ; [3] Durmazlar, Turkey

ABSTRACT

Panel bending machines are generally used in sectors such as elevators, steel doors, electrical panels, kiosks, control panels, cabinets, safes, industrial cooling systems and industrial kitchens. These machines have the ability to bend sheet metal and panels in various shapes. The manipulator mechanism in panel bending machines is the part that we can call the bending manager, which ensures that the sheet to be bent in the form of angulation taken from the loading area is compressed between the upper and lower clamps and takes the material to the positions required for bending after it is compressed. During the bending process, thanks to the clamp system on it, it allows panels of different sizes and shapes to be safely captured, transported and positioned in the bending area. With the manipulator mechanism, it is possible to automatically bend different edges at different angles and depths. The manipulator mechanism is designed in the form of a C body due to its automatic rotation movement in different edge bends. After the clamps clamp the sheet, the manipulator mechanism must allow a rotational movement of Ø3300 mm. The clamping force applied by the clamps to the sheet and the optimisation of the flexing of the manipulator main body, which is designed in the form of a C body, are the subject of the study and the main aim is to obtain perfect bends by providing more efficient, versatile and precise operation of panel bending machines. The results of the analysis of the manipulator mechanism using the finite element method (FEA) were evaluated and the appropriate geometry for the design was presented. In this study, the manipulator stretching mechanism used in panel bending machines is introduced and its working principle is explained.

KEYWORDS - Panel bending, upper and lower clamp system, bending method,automatic bending,Manipülator flexing mechanism

PERFORMANCE EVALUATION OF A VERTICAL COOLER FOR FEED PELLETS

EMIN YESIL[1] , MUHARREM HILMI AKSOY[2] , MAHMUD BAKIRHAN[3]

[1] Imas Machinery R D Center, Turkey ; [2] Konya Technical University Mechanical Engineering, Turkey ; [3] Imas Machinery R D Center, Turkey

ABSTRACT

Pelleted feeds are preferred because they are less dusty, have a longer shelf life and are easier to store than other feed types. A pellet cooler is a counter-flow cooling system that reduces the high temperature and humidity pellets from the pellet press to the appropriate humidity and temperature in the pellet feed process. Counter-flow coolers provide a homogeneous temperature distribution from the hot material feed zone to the cold outlet zone, allowing the material to cool homogeneously. This process contributes to maintaining the quality and long shelf life of pellet feeds. According to the pellet production recipe, raw materials are mixed in a certain ratio and crushed to a certain size in a crushing machine known as a hammer mill. Then they are mixed in horizontal mixers and oil, vitamins, etc. are added. If molasses is to be added after the mixer, molasses syrup produced from sugar beet is added in the molasser machine and enters the conditioner, which is the next stage. The conditioner is the section where the feed is subjected to heat treatment. The conditioned feed is then pelletized in the pellet press and enters the cooler. In general, pellet coolers cool the products entering the cooler at 65-85°C up to 5 to 10°C above the ambient temperature. The moisture value decreases from an average of 17% to around 12%. This rate is specified in the "Regulation on the Supply and Use of Feeds to the Market" of the Ministry of Food, Agriculture and Livestock. In addition, it is also undesirable for manufacturers to reduce the moisture value of pellet feed below this rate for commercial reasons. Moisture values above 12% cause deterioration of the feed and decrease the shelf life. In order to be reduced to the storage temperature, the pellet's residence time in the cooler is approximately 7-10 minutes in conventional cooling systems. In the pellet cooler, energy and mass (moisture) transfer takes place between the product and the ambient air pressurized by the fan. The main problems experienced in pellet coolers today are low cooling efficiency, hot or too humid ambient air, clogging and pollution. In addition, low capacity and unstable cooling is the most important problem of existing systems today. The main reasons for low efficiency in pellet coolers are insufficient or inhomogeneous air flow, improper humidity control, design of the cooler, obstructions in the air flow inside the cooler. In this study, the cooling performance of the pellet cooler was investigated by developing a conical (octagonal prism) based cooling system instead of the horizontal based cooling surface of conventional vertical cooling systems. The taper angle shew angle was selected 50° by analyzing the values of pellet feeds. It was calculated that the average forced convection coefficient (h) was increased by 4% in the newly designed conical cooler with a cooling surface kept approximately constant as 13.5 m2 compared to conventional flat bottom machines because the distribution height in the pellet stack was kept constant. In addition, analysis and actual tests have shown that the waiting time until the pellet reaches the ideal temperature in the cooler is reduced by 40% and faster cooling is achieved. In this way, the cooling capacity in the conventional cooling system is 20 tons/h in this new design. The power of the fan used for air circulation in the system decreased from 45 kW in the conventional system to 37 Kw in the new design. This reduces the energy consumed for cooling per unit ton per day from 2.25 kWh/ton to 1.85 kwh/ton in a facility producing pellets for 16 hours a day at an average capacity of 20 tons/hour. In this way, 46720 kWh of energy is saved per year. In addition, the ease of installation and the footprint has been reduced by 4m^2. In addition, since the stability of the temperature distribution in the stack is ensured, the product quality has increased and the wastage rate has decreased. The newly designed conical cooler was also found to be techno-economically feasible.

KEYWORDS - : Stack, pellet feed, cooling, dehumidification, temperature distribution, stack angle.

UNDERSTANDING THE IMPACT OF TEMPERATURE VARIATIONS ON WING STRUCTURE INTEGRITY

MUSTAFA TOLGA YAVUZ[1]

[1] Istanbul Technical University, Turkey

ABSTRACT

Aircraft wing structures operate in a dynamic environment where temperature fluctuations play a pivotal role in influencing structural integrity. This paper presents a thorough examination of the repercussions of temperature variations on the durability and safety of wing structures in aerospace applications. By leveraging advanced finite element simulations and experimental investigations, we meticulously analyze the distribution and magnitude of thermal stresses imposed on various wing materials and configurations. Beyond mere stress assessment, this research delves into the implications of temperature-induced stress on fatigue life, crack initiation, and propagation within wing components. Our multidisciplinary approach amalgamates principles of structural mechanics, material science, and aerospace engineering, fostering a comprehensive understanding of the challenges associated with thermal fluctuations. The insights derived from this study are poised to inform the design and maintenance strategies for aircraft wings, emphasizing the enhancement of reliability and longevity under diverse thermal conditions. This research underscores the pivotal role of temperature variations in shaping wing structure integrity, contributing to the continuous pursuit of safety and performance improvements within the aviation industry.

KEYWORDS - Thermal Stresses, Aerodynamic Heating,Wing Structures,Supersonic Flight,Structural Integrity

INVESTIGATING FREE VIBRATION OF RECTANGULAR PLATES IN THERMAL ENVIRONMENTS BY DIFFERENTIAL QUADRATURE METHOD

***MUSTAFA TOLGA YAVUZ*[1] *, IBRAHIM OZKOL*[2]**

[1] Istanbul Technical University, Turkey ; [2] Istanbul Technical University, Turkey

ABSTRACT

In recent decades, numerous numerical methods have emerged to address the complexities of solving linear and nonlinear equations, considering issues like governing equations, boundary conditions, computation time, algorithm intricacies, accuracy, convergence, and stability. Among these methods, the Differential Quadrature Method (DQM) has gained prominence due to its ease of implementation, numerical stability, and efficiency.This study investigates the dynamic characteristics of rectangular plates, focusing on those exposed to thermal environments and employing the Differential Quadrature Method. It involves a comprehensive comparative analysis of numerical solutions under varying conditions, including boundary constraints, aspect ratios, temperatures, and materials.The research enriches the field of structural dynamics by providing insights into computational efficiency in structural analysis, addressing multifaceted challenges in analyzing structural elements exposed to thermal environments.

KEYWORDS - Differential Quadrature Method, Thermal Effects ,Rectangular Plates,Free Vibration Analysis

INVESTIGATION OF THE IMPACT BEHAVIOR OF STRUCTURAL STEEL COATED WITH THERMAL FLAME SPRAYING METHOD

SERAFETTIN EKINCI[1] , BUKET CAKAR ACIKGOZ[2]

[1] Institute Of Sciences Selcuk University Konya 42130, Turkey ; [2] Institute Of Sciences Selcuk University Konya 42130, Turkey

ABSTRACT

Thermal spraying, also known as flame spraying or wire flame spraying, is a coating method applied to various metals with the aim of enhancing oxidation and corrosion resistance by creating a layer on the material surface. In this research, sandblasting was performed as a surface preparation technique to clean and prepare the material surface before coating. Coating processes were carried out using Zinc/Aluminum 85/15 wire on S355 steel at three different spraying distances and thicknesses. Low-velocity impact tests were conducted to quantitatively assess the impact resistance of the coated steel material. These tests involve subjecting the material to controlled low-velocity impacts and measuring its response, including deformation. During the low-velocity impact test, a coating defect known as a coating crack was observed in one of the coated samples, and the causes of this crack were investigated. As a result, it is presumed that one of the substrate materials had surface imperfections such as burrs prior to the coating process.

KEYWORDS - Wire Flame Sprey, Zinc/Aluminium 85/15 Wire, Low Speed Impact, Coating Crack,Drop Weight Test

THE EFFECT OF BACKWARD TRIANGULAR TYPE VORTEX GENERATORS AT DIFFERENT CHORDWISE DIRECTIONS

***MEHMET SEYHAN*[1] *, MUHAMMET AKIF OZDEN*[2]**

[1] Karadeniz Technical University, Turkey ; [2] Karadeniz Technical University, Turkey

ABSTRACT

The effects of a backward triangular type vortex generators on the suction surface of NACA 0012 airfoil was performed to investigate at a suction type of wind tunnel. Vortex generators that have a length of 15 mm, a height of 5 mm, a distance between VGs of 5 mm, a distance between VG pairs (λ) of 20 mm and an angle of (β) VG of 15 ° attached to the surface of the airfoil at different chordwise locations changing between 0.1c and 0.5c with an increment of 0.1c. This airfoil dimensions are a chord (c) of 150 mm and spanwise length (s) of 300 mm. The Reynolds number based on the chord is 6x104. Force measurements experiment is carried out with the help of six axis load cell at the angle of attack changing from 0º to 30º with an increment of one degree. This study aims to provide important insights about the backward triangular type vortex generators at low Reynolds number and reveal the aerodynamic performance of these airfoils. According to the force measurement experiments, the results reveals that backward triangular type vortex generators at low Reynolds number significantly enhanced stall characteristic and maximum lift coefficient as compared to baseline airfoil.

KEYWORDS - Triangular vortex generator,NACA 0012,lift coefficient ,drag coefficient

THE FEASIBILITY STUDY OF A VEHICLE CRASH SYSTEM

***ARIF DOGAN*[1] *, BULENT AYDEMIR*[2]**

[1] Marmara University, Turkey ; [2] Tubitak Ume, Turkey

ABSTRACT

Crash tests are tests that evaluate how cars perform in various crash scenarios. These tests are carried out to determine the safety level of vehicles and to ensure the protection of drivers and passengers in a possible accident. A large number of crash systems have been developed according to the axis of collision or the types of colliding elements (vehicle-vehicle, vehicle-pedestrian, vehicle-barrier, etc.). The most basic type of crash test is called frontal crash test. This test simulates a collision of the front of the vehicle with a fixed barrier or another vehicle. In this study, the current market analysis of the vehicle crash test system prepared in accordance with the relevant standards and test procedures was carried out and a cost-oriented feasibility study was prepared.

KEYWORDS - Feasibility study, Crash test system NCAP, Frontal crash

PASSIVE VIBRATION ISOLATION OF A PAYLOAD IN ROTARY WING UNMANNED AERIAL VEHICLE SYSTEM

BERKAN ERTEN [1] ***, VAHIT MERMERTAS*** [2]

[1] Aselsan Inc Istanbul Technical University, Turkey ; [2] Istanbul Technical University, Turkey

ABSTRACT

Unmanned aerial vehicles are systems that are operated remotely by a pilot or autonomously without a human pilot onboard. These systems are crucial for both military and civil applications and considered as future of the aviation. Due to its application type, the unmanned aerial vehicles could be in different topology such as rotary wing, fixed wing or hybrid systems. Due to its capability of vertical takeoff and landing, rotary wing unmanned aerial vehicles has been used for a long time for military applications. This vehicles have to carry one or multiple payload to be an effective systems. Usually, the payloads that are been carried by rotary wing systems are effected by vibration that has been caused by the vehicle. The chief objective of this study is vibration isolation of a payload in a rotary wing unmanned aerial vehicle system. To achieve this objective, flight vibration data has been collected from vehicles payload bay. After collecting vibration data, acceleration and rotation data has been categorized as vehicles flight phase such as climbing, hovering and landing. For each case the acceleration data and rotation data has been processed and power density graphs has been developed. Since PSD data shows the vibration envelope for each axes and each flight phase, the vibration envelope that wants to be isolated is been determined. Consequently, spring constants for each axes can be determined.

KEYWORDS - Unmanned Aerial Vehicle, Vibration Isolation, Power Spectrum Density, Payload Isolator

VEHICLE CRASH SYSTEM DESIGN

***ARIF DOGAN*[1] *, BULENT AYDEMIR*[2]**

[1] Marmara University, Turkey ; [2] Tubitak Ume, Turkey

ABSTRACT

Crash tests are tests that evaluate how cars perform in various crash scenarios. These tests are performed to determine the safety level of vehicles and to ensure the protection of the driver and passengers in a possible accident. A large number of collision systems have been developed according to the axis of the collision or the types of colliding elements (vehicle-vehicle, vehicle-pedestrian, vehicle-barrier, etc.). The most basic type of crash testing is called frontal crash testing. This test simulates the front of the vehicle colliding with a fixed barrier or another vehicle. In this study, the system design, relevant standards and commonly used test procedures were examined and carried out through the Solidworks program in order to perform the front crash test. Although the design is based on the Japanese-NCAP frontal crash test procedure, it has been developed to be adaptable to different test procedures such as Euro-NCAP.

KEYWORDS - Crash test system, NCAP, Frontal crash test

NUMERICAL INVESTIGATION OF THE THERMAL AND ACOUSTIC EFFECT OF MATERIAL VARIATIONS ON THE EXHAUST MUFFLER

HAYDAR KEPEKCI[1] , MEHMET EMIN AGCA[2]

[1] Istanbul Gelisim University, Turkey ; [2] Istanbul Cerrahpasa University, Turkey

ABSTRACT

Exhaust silencers are used in automobiles to prevent the noise arising from exhaust gases resulting from internal combustion engines. With the advancement of the automotive industry, exhaust silencers have become more complex over time to reduce noise and increase driving comfort. Within the scope of this study, exhaust silencer geometries with different geometries have been designed, and harmonic acoustic analyses have been carried out. In the analysis, the airflow speed has been accepted as 30 m/s. Acoustic pressure and transmission loss data obtained as a result of analyses performed with 1Pa pressure input have been evaluated. As a result of the evaluations, it has been concluded that the silencer modeled in a complex structure has been better acoustically. Although the main task of exhaust silencers is to reduce the sound level at the exit of exhaust gases, it is also important to reduce the temperature of the air in the exhaust system and have good thermal conductivity so as not to jeopardize the thermal safety of the system. For this reason, CFD thermal flow analysis has been carried out with 4 different materials using a complex design with high acoustic efficiency. Gray cast iron, stainless steel, 1020 steel, and aluminum have been used as materials. In this part of the study, it has been determined that the use of aluminum material has been better in terms of thermal efficiency.

KEYWORDS - Exhaust silencer, Harmonic acoustic analysis, Thermal flow analysis, Computational fluid dynamics

SYSTEM HEAT TRANSFER OF USING ALUMINUM HONEYCOMB AS THERMAL RESISTANCE EXPERIMENTAL INVESTIGATION OF ITS EFFECTS ON

***CUMA ALI YILMAZ*[1] *, ADNAN BERBER*[2]**

[1] Altigen Uzay Havacilik Gemi Insaat Panel San Tic Ltd Sti, Turkey ; [2] Selcuk University Faculty Of Technology Department Of Mechanical Engineering, Turkey

ABSTRACT

In this study, the effects of using a honeycomb core made of aluminum alloy 3005 as thermal resistance on the system heat transfer have been investigated. The convective heat transfer, friction factor, and performance evaluation criteria of the aluminum honeycomb on internal flow have been experimentally examined. In the study, air was used as the fluid. The experiments were conducted with air flow rates of 10 m/s and 15 m/s, and for each flow rate, current values of 50, 100, 150, 175, 200, 225, and 250 Amperes were applied. The experiments were carried out as combinations of variable parameters. The cell diameter of the honeycomb used as thermal resistance is 5.2 mm, and its dimensions are 8x250x250 mm. The results show that the thermal resistance of the honeycomb in the rectangular channel heats the incoming cold air by 7.21°C at a speed of 10 m/s and a power of 250 Amperes. As the air flow rate from the fan increases, the heating of the air passing through the honeycomb decreases. The Nusselt number increases linearly with the flow rate and decreases with the increase in the electrical power supplied to the honeycomb. When the graphs of the experimental results are examined, a constant increase in temperature is observed as the current value increases.

KEYWORDS - Aluminum, Aluminum Honeycomb, Thermal Resistance, Heat Transfer

DEVELOPMENT OF WASHER DISINFECTOR PROTOTYPE FOR VARIOUS GLASS MEDICAL PRODUCTS

ZAFER KAHRAMAN[1] , MURAT HACI[2] , SONER GURCU[3] , HAKAN SERHAD SOYHAN[4]

[1] Oztiryakiler Madeni Esya San Ve Tic A S, Turkey ; [2] Oztiryakiler Madeni Esya San Ve Tic A S, Turkey ; [3] Oztiryakiler Madeni Esya San Ve Tic A S, Turkey ; [4] Sakarya University, Turkey

ABSTRACT

In line with the constantly increasing need for all kinds of equipment in the medical field and technological developments, interest in products for the disinfection process is increasing, mainly to ensure the reuse of various products. Washer disinfector systems for cleaning and disinfecting various reused products (surgical instruments, respiratory equipment, glass tubes, etc.) are critical for efficiently using resources for medical applications (medicine, pharmacy, laboratory, etc.). Washer disinfectors are available in various models (under-counter, tunnel, etc.) with different operating systems (thermal, chemical, ultrasonic, etc.) and applications in various medical product groups. In addition, washer disinfectors stand out as technological products in a different category compared to commercial dishwashers with their structural models, purpose of use in the medical field and operating systems. Within the scope of this study, the cleaning and disinfection of medical glass materials (beakers, tubes, etc.) to be selected according to the manufacturer's declaration will be carried out in accordance with ISO 15883-1, IEC 61010-2-40, etc. It is aimed to develop an originally designed washer disinfector prototype that will meet international standards in cooperation with industry and university. While the innovative prototype was obtained, original designs were developed, and original simulation studies were carried out during the design verification phase. Different from our company's commercial dishwashers of various models and capacities (medical field application and working principle), the prototype developed through R&D activities and international standards have also been developed with disinfection and drying features, resulting in an innovative product that can be commercialized. Acknowledgment This study was prepared from the project study numbered 3170435 within the scope of TÜBİTAK-TEYDEB 1501 coded Industry Research Technology Development and Innovation Projects Support Programme. We would like to thank TÜBİTAK-TEYDEB Transport, Defense, Energy and Textile Technologies Group (USETEG) for their contribution to the project work.

KEYWORDS - Washing disinfector, Medical glass products, Drying and cleaning technology.

ROBUST FUZZY LOGIC FLIGHT CONTROL FOR UNMANNED AERIAL VEHICLES UAVS

CENGIZ OZBEK[1]

[1] Istanbul Beykent Universitesi, Turkey

ABSTRACT

Abstract - Researches on Unmanned Aerial Vehicles (UAVs) have been recently attracting considerable interest in the field of control theory applications. They are used in a wide range of areas thanks to having the potential of high manoeuvrability, hovering and flying, taking off and landing capabilities. However, to maintain robust control action towards changing conditions of the system is not an easy matter since quadrotor UAVs are highly unstable systems with high precision. Therefore, the main purpose of this study is to control a quadrotor UAV by using a proposed multi-input single-output (MISO) fuzzy-logic controller that ensures robustness if model parameters and trajectory change. For that reason, a 2-dimensional 3 degree-of-freedom quadrotor was used in this study to better evaluate the performance of proposed controller on UAVs. Afterwards, numerical analysis was performed and the findings were analysed. Consequently, the single most striking observation to emerge from the study is that the satisfactory results have been obtained demonstrating that the proposed fuzzy logic controller has remarkable advantage on the robustness of quadrotor UAVs.

KEYWORDS - Quadrotors, Fuzzy Control, UAVs, Robustness

DEVELOPMENT OF AN INNOVATIVE COMMERCIAL STEAM PEELING SYSTEM FOR VARIOUS VEGETABLE PEELS

ZAFER KAHRAMAN[1] , MURAT HACI[2] , ORKUN UGUR[3]

[1] Oztiryakiler Madeni Esya San Ve Tic A S, Turkey ; [2] Oztiryakiler Madeni Esya San Ve Tic A S, Turkey ; [3] Oztiryakiler Madeni Esya San Ve Tic A S, Turkey

ABSTRACT

The United Nations Food and Agriculture Organization (FAO) emphasized the importance of increasing productivity in the food production sector by declaring that food production should increase by 60% until 2050 with the increase in the world population. In our company's portfolio, there is only a potato peeling machine for peeling various vegetable skins, and potatoes are peeled by hitting the silicon carbide-based emery surface with the effect of centrifugation. Vegetable losses up to 20% are experienced in this peeling process. The design and development of an innovative vegetable peeling machine that provides steam peeling for commercial kitchen applications for the elimination of losses and effective peeling of various vegetables (potatoes, celery, etc.) has been carried out with R&D activities. Acknowledgment This study was prepared from the project numbered 3160597 within the scope of TÜBİTAK-TEYDEB 1501 Industry R&D Projects Support Program. We would like to thank TÜBİTAK-TEYDEB Transport, Defense, Energy and Textile Technologies Group (USETEG) for their contribution to the project.

KEYWORDS - Commercial steam peeling system, energy efficiency, reducing food losses, machine design

INVESTIGATION OF THE USE OF R134A AND R290 REFRIGERANTS IN REFRIGERATED DISPLAY CABINETS LCCP AND THERMODYNAMIC ANALYSIS

MELIS ODER[1] , ADNAN BERBER[2]

[1] Nurdil Teknik Sogutma A S Ankara Turkiye, Turkey ; [2] Selcuk University Faculty Of Technology Department Of Mechanical Engineering, Turkey

ABSTRACT

ABSTRACT As the world's population grows, the demand for chilled and frozen foods is increasing, and this increase is impacting food costs due to rising energy costs. Therefore, the development of more efficient next generation refrigeration systems to reduce energy consumption and address these challenges is of paramount importance. Therefore, the development of efficient next generation refrigeration systems is of extremely importance. Refrigerated Display Cabinets (RDC) are an important part of the cold chain. They are used in food storage and sales processes and account for a significant share of energy consumption. In supermarkets, RDCs are used particularly intensively and account for a large part of the costs due to energy consumption. RDCs play a critical role in the healthy preservation of food, so energy-efficient coolers must be developed. As of March 1, 2021, within the scope of the energy labeling obligation, energy classes from A to G are determined according to the Energy Efficiency Index (EEI) value. There is also an obligation for the EEI value to be less than 80 as of September 1, 2023. The environmental impacts of refrigerants are mentioned in international agreements such as the Montreal Protocol. Global Warming Potential (GWP) and Ozone Depletion Potential (ODP) values are important in the classification of refrigerants. Recently, with the spread of global warming, it is preferred to use refrigerants with low ODP and GWP values. In this study, thermodynamic and Life Cycle Climate Performance (LCCP) analyses were performed using R290 (Propane) and R134A refrigerants and their effects on the environment were investigated.

KEYWORDS -

CONTROLLED DISCRETE CHIP FORMATION IN TURNING WITH CNC PROGRAMMING

***MUHAMMED EMIN DURSUN*[1] *, SINAN KESRIKLIOGLU*[2]**

[1] Abdullah Gul University, Turkey ; [2] Abdullah Gul University, Turkey

ABSTRACT

In machining operations, continuous chip formation has been a problem affecting the surface quality of machined parts, tool-life, cutting fluid performance and energy dissipation. Although the methods such as cutting parameter optimization, high-pressure coolants, chip breakers, chip-pullers, and modulation assisted machining (MAM) with piezo actuators has been used in the previous studies and practices, the problem still exist or requires expensive equipment. This study focuses on MAM which is quite complex, but effective method in chip management. The sinusoidal cutting path of the MAM was replicated by modulating the tool in the feed direction by computer numerical control (CNC) manipulation without using an expensive and/or complex system. A program was written in Matlab to create the G-codes based on MAM parameters so that the cutting tool completely disengages from the workpiece during each turning cycle, and it results in the disruption of the severe and continuous tool chip contact. This method enables the control of the chip sizes cost effectively without any external devices such as piezoelectric transducers and high-resolution sensors. To test the effectiveness of the method, cutting experiments were conducted under two different turning speeds with various MAM parameters on Al6061-T6 alloy. The results of the experiment indicate that while the cutting insert with chip brakers still creates continuous chips in the CNC turning operations of a ductile workpiece material, this method can be effectively used for controlling the chip length at different cutting and modulation frequencies.

KEYWORDS - Madulation Assisted Machining, Continuous chip,Turning,CNC Programing

DEVELOPMENT OF MULTI MATERIAL SANDWICH STRUCTURE PRODUCTION TECHNIQUE FOR ELECTRIC VEHICLES

***ERMAN ZURNACI*[1] *, MURAT KOYUSTU*[2]**

[1] Kastamonu University, Turkey ; [2] Kastamonu University, Turkey

ABSTRACT

Sandwich structures are one of the components widely used in engineering applications requiring high mechanical strength and low weight. Sandwich structures consist of high-strength and stiff surface plates covering a low-density core. The method used to bond the core and surface plates directly affects the mechanical strength of the sandwich structure. Debonding failures between the core and surface plates cause the structural integrity of sandwich panels to deteriorate under load. In this study, a production technique of a multi-material (CFRP + PLA) sandwich structure suitable for electric vehicles produced using lightweight components has been developed to ensure low carbon emissions and high range. With this method, core and surface plates can be bonded by the vacuum infusion method without the need for adhesive film during the production stage. Failures that may occur in the application of the developed method and deformations that may occur during the service period of the sandwich structures produced with this method were evaluated. Results of study: it has been revealed that sandwich structures consisting of different materials can be produced, and the structural integrity between the surface plates and the core is preserved by combining them with the vacuum infusion method.

KEYWORDS - multi-material sandwich structure,electric vehicles,light core,production technique

ANALYSIS OF SURFACE ROUGHNESS IN MACHINING OF AL SI BASED ALLOYS AN EXPERIMENTAL STUDY

CEM ALPARSLAN[1] , SENOL BAYRAKTAR[2]

[1] Recep Tayyip Erdogan University, Turkey ; [2] Recep Tayyip Erdogan University, Turkey

ABSTRACT

In this study, Al-7Si-Mg and Al-7Si-0.6Mg alloys were produced by permanent mold casting method and their microstructural, mechanical and machinability properties were analyzed. While the microstructures were examined with an optical microscope, Brinell hardness measurement and tensile tests were performed for mechanical properties. Machining tests were conducted using 6 mm diameter two-fluted uncoated carbide end mill, different cutting speed (V: 50, 80 and 110 m/min), feed rate (f: 0.08; 0.16 and 0.24 mm/rev) and constant depth of cut (1 mm) in CNC vertical machining center. The microstructure of the Al-7Si-Mg alloy comprised of α-Al, primary Si, eutectic Al-Si, Mg2Si, β-Al5FeSi and π-AlSiMgFe phases. Al-7Si-0.6Mg alloy exhibited higher mechanical properties than Al-7Si-Mg alloy. Machining tests showed that the SR (Surface roughness), BUL (Built –up layer) and BUE (Built-up edge) reduced with raising V and raised with raising f. Al-7Si-0.6Mg alloy exhibited better mechanical and machinability properties.

KEYWORDS - Al-Si based alloy, Microstructure, Hardness, Mechanical properties, Cutting, Surface roughness

RECENT DEVELOPMENTS ON REFRIGERATION SYSTEMS THAT USE EJECTORS AS EXPANDERS FOR PERFORMANCE ENHANCEMENT

OGUZ CALISKAN [1] ***, H KURSAD ERSOY*** [2]

[1] Department Of Mechanical Engineering Konya Technical University, Turkey ; [2] Department Of Mechanical Engineering Konya Technical University, Turkey

ABSTRACT

Global warming and the rise in energy costs force engineers to develop more efficient refrigeration systems and use environment-friendly refrigerants. The use of ejectors for expansion is becoming a widespread application in refrigeration. Ejector has no motor or moving parts, which reduces operation and maintenance costs. This study presents recent developments on refrigeration systems with ejector expansion. Transcritical CO2 cycles as well as cycles with new-generation refrigerants were investigated. It is obvious that ejector expansion is a suitable solution to improve the performance of the refrigeration cycles for a sustainable future.

KEYWORDS - Ejector,Energy efficiency,Environmental impact,Refrigeration

INFLUENCE OF MILLED CARBON FIBER FILLERS ON MECHANICAL PROPERTIES OF JUTE FIBER REINFORCED EPOXY COMPOSITES

MEHMET ISKENDER OZSOY[1]

[1] Sakarya Universitesi, Turkey

ABSTRACT

The interest in the use of natural fibers in engineering applications is increasing day by day due to their low density, eco- friendly, economical and easy availability features. On the other hand, natural fibers have lower mechanical and physical properties than synthetic fibers. Reinforcements and fillers such as fibers, particles and whiskers are added to strengthen the physical and mechanical behavior of natural fiber reinforced composite materials. As an alternative to the production difficulties and high costs arising from the use of these materials mentioned above, recycling industrial and organic wastes added to composite materials in recent years allows improving the mechanical behavior of composite structures, providing cost advantages and contributing to environmental sustainability. In this study, mechanical behavior of milled carbon fiber (MCF) filled five layers of jute fiber/epoxy composites was investigated. For this purpose, MCF powders were added to the epoxy resin to constitute 2.5% and 5% by weight of the total composite ratio. In this context, dynamic mechanical analyses (DMA) such as glass transition temperature, storage modulus, loss modulus and damping factor were evaluated and falling weight impact tests under 10J, 20J and 30J impact energies and hardness tests were carried out. The results show that the mechanical characteristics of composites were affected by the content ratio of MCF powders. Fillers increased the load carrying ability of composites by improving the fiber/matrix interface and the mechanical performance of jute fiber/epoxy composites improved. DMA characteristics were improved and hardness and energy absorption capacity of the composites increased with the addition of MCF powders. At the end of the impact tests, MCF filled composites showed the higher peak force, higher energy absorption capacity and lesser damage than the unfilled composites. At the same time, the damage area on the composite surfaces decreased due to the addition of fillers.

KEYWORDS - Jute/epoxy laminate, milled carbon fiber, dynamic mechanical analysis, hardness, low velocity impact

DETERMINATION OF TOOL WEAR SURFACE ROUGHNESS AND CUTTING TEMPERATURE PARAMETERS IN MILLING ST37 STEEL

UNAL DEGIRMENCI[1] , USAME ALI USCA[2] , SERHAT SAP[3]

[1] Bingol University, Turkey ; [2] Bingol University, Turkey ; [3] Bingol University, Turkey

ABSTRACT

This research focuses on the machining properties of St37 low-carbon steel, which is commonly used in the metal industry, under different milling conditions, specifically dry and compressed air environments. The milling process was carried out using a single feed rate of 0.05 mm/rev and three different cutting speeds (125-150-175 m/min) under both dry and compressed air conditions, while maintaining a cutting depth of 0.75 mm. The experiments were conducted using a computer-controlled CNC milling machine. Following the milling operations, analyses were performed to assess tool wear, surface roughness, and cutting temperatures. The results of the study clearly demonstrate the superiority of the compressed air environment over the dry environment in terms of reducing tool wear, improving surface roughness, and lowering cutting temperatures. In the compressed air environment, tool wear, surface roughness, and cutting temperatures decreased by approximately 19%, 24%, and 13%, respectively, when compared to the dry environment. Furthermore, the impact of cutting speed on machinability parameters was also examined.

KEYWORDS - St37 steel, milling, tool wear, surface roughness, cutting temperature

EFFECT OF MESH SIZE ON FINITE ELEMENT ANALYSIS OF FUNCTIONALLY GRADED POROUS DOMES

ASENA PINAR OZER[1] , AHMAD RESHAD NOORI[2] , YURDAKUL AYGORMEZ[3]

[1] Istanbul Gelisim University, Turkey ; [2] Istanbul Gelisim University, Turkey ; [3] Yildiz Technical University, Turkey

ABSTRACT

The size of the mesh plays an important role in the analysis of the domes with the finite element method. Also, in the finite element analysis of structures made from functionally graded materials the mesh size influences the accuracy of the results more than those of isotropic structures. In this research, the material properties are assumed to be graded in the thickness direction. This paper focuses on the investigation of the optimum number of material layers for the accurate static analysis of functionally graded porous domes. In this research, the finite element package program ANSYS is employed to analyze the considered structures subjected to several static loadings. Symmetric and uniform porosity distributions are considered as two different porous materials. Results are obtained for different values of the material gradient index in terms of displacements and internal forces. Clamped, pinned and roller supports are used as different boundary conditions. The effects of transverse shear deformation are included by using the SHELL209 element. Comparisons are presented for various values of thickness-to-radius ratios.

KEYWORDS - Finite Element Method, Functionally Graded Materials, Static Analysis, Domes, Porosity.

EFFECT OF POROSITY ON NATURAL FREQUENCIES OF THE FUNCTIONALLY GRADED POROUS SANDWICH PIPES

AHMAD RESHAD NOORI[1] , ASENA PINAR OZER[2] , MUSTAFA NURI[3] , OGUZHAN MURAT HALAT[4]

[1] Istanbul Gelisim University, Turkey ; [2] Istanbul Gelisim University, Turkey ; [3] Istanbul Gelisim University, Turkey ; [4] Istanbul Gelisim University, Turkey

ABSTRACT

In this study, the free vibration response of functionally graded porous sandwich pipes is investigated with the aid of the finite element method. The core layer of the sandwich pipe is made of functionally graded porous material with porosity varying along the thickness direction according to symmetric and uniform porosity distribution. It is assumed that the inner layer of the pipe is made of metal and the outer layer of the pipe is made of ceramic. The results of the present study are validated by comparing the obtained numerical results with those published in the available literature. After the verification, the natural frequencies of the considered pipes are obtained for various values of porosity material gradients to highlight the influence of the material gradient indexes on the fundamental frequencies of the sandwich pipes. To obtain the frequencies and mode shapes the ANSYS Mechanical APDL is implemented.

KEYWORDS - Finite Element Method, Functionally Graded Porous Materials, Natural Frequencies, Free Vibration.

CHALLENGES ENCOUNTERED IN COLUMN TESTS UNDER ECCENTRIC AXIAL LOAD AND PROPOSED SOLUTIONS

AHMET OZBAYRAK[1]

[1] Erciyes University, Turkey

ABSTRACT

The difficulties encountered in experimental research cause loss of time and money. For this reason, both the sample production process and the experimental setup design are extremely important. In this study, the difficulties encountered in column tests under uniaxial bending and the solution of the problem are presented. For the solution, the structure of the end regions of the columns and the design of the support plates of the experimental setup are revised and the expected column buckling behavior is obtained. The unreinforced concrete cover in the end zones of the columns breaks suddenly due to bending effect as a result of eccentric axial compressive loading and the expected collapse behavior in the middle zone does not occur. In order to solve the problem, firstly, modifications were made to increase the support stiffness in the experimental setup. Then, in order to provide sufficient improvement, the 25 mm concrete cover formed during production at the ends of the columns was cut. In fact, column longitudinal reinforcements should be welded directly to the metal plates to be formed in the end cross-section of the column during fabrication without mitring. Thus, in this way, no concrete cover is left in the end regions of the column, preserving its slenderness without reducing the effective length of the column, and preventing fracture from occurring at the end region.

KEYWORDS - Column test, uniaxial bending, experimental difficulties, longitudinal reinforcements,test setup

ANALYSIS OF CUT AND FILL SLOPES UNDER EARTHQUAKE

ZAMZAM SHUAYB OSMAN [1] ***, TAHA TASKIRAN*** [2]

[1] Civil Engineering, Turkey ; [2] Ankara Yildirim Beyazit University, Turkey

ABSTRACT

Statically balanced slopes may lose their stability under the influence of dynamic forces. The impacts of probable earthquakes of varying magnitudes on slope stability were explored in this study, Earthquakes are highly destructive natural disasters that have impacted life on our planet since their inception. Turkey, being one of the significant earthquake-prone regions, experienced a 7.6-7.7 magnitude earthquake in February 2023, leading to a study focused on analyzing the seismic slope stability of rock slopes. The objective of this research is to examine and utilize a specific section of a highway located in the Palu region of Turkey and discussing the difficulties involved with seismically generated soil deformations in compacted fill and cut soils in order to identify the main soil failure mechanisms for soils. The study employs the finite element method in conjunction with the PLAXIS 2D software, utilizing its dynamic option, to evaluate the stability of slopes where the soil is used as both fill and cut material for rocks. The analysis, conducted by incorporating experimental data from geotechnical and geophysical laboratory tests, reveals that the seismically-induced permanent slope displacements vary depending on the selected stations. This research provides valuable insights into the analysis of seismic slope stability, underscoring the significance of considering the effects of earthquakes. The findings have practical implications for engineers and practitioners involved in slope design within earthquake-prone areas, stressing the importance of comprehensive analysis strategies to ensure slope stability and mitigate risks. The knowledge gained from this study can aid in the development of design guidelines and strategies to enhance the seismic resilience of such infrastructure. Future research should focus on further exploring the factors influencing these deformations and developing innovative techniques for minimizing their impact.

KEYWORDS - Earthquake,Slope,cut,fill,Analysis

INVESTIGATION OF TORSIONAL AND SOFT STOREY BEHAVIOR OF A REINFORCED CONCRETE BUILDING IN ADANA PROVINCE ACCORDING TO TURKEY BUILDING EARTHQUAKE CODE 2018

DUYGU ERTURKMEN[1]

[1] Mersin University Faculty Of Engineering Civil Engineering Department, Turkey

ABSTRACT

Earthquakes are an important reality in our lives. Turkey is located on many active fault lines and a large part of Turkey is always in danger of earthquakes. The recent earthquakes, which took place simultaneously in Kahramanmaraş and Hatay and affected 11 provinces, have painfully revealed the extent of this danger. By the earthquake, many lives and property were lost in a large area. When the collapsed structures are examined, it is observed that the structures are not suitable for the soil they are located on and the current earthquake regulations. This bad result proved once again how important earthquake-resistant building design is for human life. Adana was one of the most damaged cities in the recent earthquakes. For this reason, this research is focused on the seismic response of structures in Adana. The earthquake analysis of L'shaped ten-story building with five and seven spans in x directions is performed, respectively. Five different districts of Adana city are chosen to carry out the comparison between different locations. The equivalent seismic load method is used based on the Turkey Building Earthquake Code-2018. In the earthquake analysis for the considered building models, the SAP2000 structural analysis program is used to investigate the torsional and soft storey irregularities that may arise in the structure. As a result of the analysis, by increasing the number of spans in the x-direction of the building the irregularity in the plan also increases. It is carried out that there is an increase in the torsional irregularity values calculated especially in the y direction. In the building models examined within the scope of the study, it was also observed that the soft storey irregularity was within acceptable limits.

KEYWORDS - Torsional irregularity, Soft storey irregularity, Turkey Building Earthquake Code 2018, Earthquake analysis, Irregular buildings

ARCH THEORY IN THE HISTORICAL PROCESS OF STRUCTURAL ANALYSIS

ABDULLAH CETIN [1] ***, SAHNAZ TIGREK*** [2]

[1] Mardin Artuklu Universitesi, Turkey ; [2] Iskenderun Teknik Universitesi, Turkey

ABSTRACT

Although the arches used as load-bearing elements in buildings have a history of several thousand years, there are different claims about how they were formed. According to one claim, arches were formed as a result of the fall of false vaults, and according to another claim, arches were formed as a result of the disintegration of the lower parts of the supporting stone elements or beams into individual pieces. Even if arch structures have survived from the past to the present, there is no theoretical information and therefore no structural analysis to support them. It is assumed that, the first arch theory, which forms the basis of structural analysis, started with Robert Hook (1675). Since the arch theory, which started in the seventeenth century, emerged at a time when the reinforced concrete structures did not exist, the theory was formed by accepting stone as the material of the arches. During the eighteenth and nineteenth centuries, theoretical and experimental studies were carried out on arches made of stone material, while the foundations of the arch theory were shaped, contributing to the existing architecture and trying to analyze the structures from the past. Later in the twentieth century, Pipard and Heyman introduced the limit analysis method based on the arch theory. In the twenty-first century, Gilbert, Orduña and Lourenço developed the hand-based calculation method of the limit analysis method and transformed it into computer-aided calculation methods. These methods are still in use, usually in the form of thrust line analysis (static method) or discrete rigid block analysis (kinematic method). Although alternative structural systems to arch structures are available today with the development of construction technology, the need for arch theory for the protection and restoration of structures from the past continues and a computer-aided structural analysis can provide important information. For possible restoration works to be carried in masonry structures, structural analysis is required to determine the final collapse condition of the structure. Within the scope of this study, the development of arch theory from Hook to the present day will be summarized by drawing three-dimensional solid models for a better understanding of the two-dimensional studies that have been done before, and how it has developed with the innovations in structural analysis will be explained and the importance of the correct determination of the properties of the materials used in historical buildings will be examined. In addition, it is hoped that three dimensional solid modelling of a masonary arch will help to better understand the structural behavior of stone structures.

KEYWORDS - Arch Theory, Limit Analysis, Masonry Structures.

ESTIMATION OF THE UNCONFINED COMPRESSIVE STRENGTH OF CEMENT STABILIZED CLAY USING ARTIFICIAL NEURAL NETWORKS ANN

ZAINAB RAZZAQ ALMAHMODI[1] , SULEIMAN KHATRUSH[2] , METIN MEHMETOGLU[3]

[1] Istanbul Gelisim University, Turkey ; [2] Istanbul Gelisim University, Turkey ; [3] Istanbul Gelisim University, Turkey

ABSTRACT

Stabilization of clay soils is necessary in many civil engineering projects in order to increase strength, reduce settlement and also for other special purposes, especially when weak soils do exist. Soil treatment with cement is one of the most commonly used method, it is proved to be an efficient and effective chemical stabilization method due to its economic advantages and ease of use. In this research, Test data sets with a wide range of parameters were implemented in an Artificial Neural Networks (ANN) program in order to evaluate the unconfined compressive strength of cementations clay soils. The data were collected from the selected published laboratory experimental investigations conducted by many researchers to study the effect of various parameters on the strength improvement of cement treated clay. The selected data were chosen to represent a wide range of clayey soils obtained from different places around the world. The predictive model was developed using the artificial neural network tools in MATLAB software. The artificial neural network (ANN) technique was applied using the Levenberg-Marquardt algorithm to develop a model that predicts the unconfined compressive strength of cement treated clayey soils. The number of data sets for this study were (389) collected from (17) previous research studies. Eight input parameters were chosen as follows: Liquid limit (LL)%, Plasticity index (PI)%, Clay fraction (CF)%, Sand (S)%, silt (M)%, water content (Wc) % , curing time (day) and cement ratio (c)% The unconfined compressive strength (qu) was chosen as one output parameter, then the data was normalized using the min-max method. In order to evaluate the performance of the predictive model developed in this study, the statistical analysis of the model was performed using regression (R2), mean square error (MSE), root mean square error (RMSE), and coefficient of efficiency (CE). The results showed that the complex relationship between the various clay properties, cement stabilized parameters, and the unconfined compressive strength was well predicted by the proposed ANN model, which provided an effective and reliable tool for strength prediction of cement treated soils.

KEYWORDS - artificial neural networks (ANN), cement soil stabilization, unconfined compressive strength, clay soil.

STEADY STATE SEEPAGE ANALYSIS OF DAM FOUNDATION MADE OF DIFFERENT LAYERS

TIMUCIN ALP ASLAN[1] , BEYTULLAH TEMEL[2]

[1] Cukurova Universitesi, Turkey ; [2] Cukurova Universitesi, Turkey

ABSTRACT

- In this study, the steady-state seepage problem of dam foundations made of different layers has been investigated. Equations obtained by using Darcy's law and continuity equations are solved by finite element method (FEM) based on Galerkin's method. A program written in the Fortran programming language has been utilized for the solution process. The paper presents the determination of hydraulic head, pore water pressure values, uplift pressure beneath the dam, and seepage quantities for dam foundations with different layers. To verify and ensure the accuracy of the written programs, the suggested method results are compared with those obtained from SEEP/W, a finite element CAD software.

KEYWORDS - Steady-state seepage analysis,Galerkin method,Fortran program,Uplift pressure,Seep/w program

INVESTIGATION ON FRESH PROPERTIES OF GEOPOLYMER MORTAR

ASENA KARSLIOGLU KAYA[1] , MEHMET INANC ONUR[2]

[1] Eskisehir Technical University, Turkey ; [2] Eskisehir Technical University, Turkey

ABSTRACT

Waste recycling is a significant concern in the contemporary world from both economic and environmental perspectives. Cement-based industries have shown an increasing interest in researching the properties and potential applications of waste-incorporated geopolymer building materials due to their sustainability benefits. The incorporation of various waste materials instead of cement has a vital impact in advancing the improvement of sustainable construction materials. Geopolymer mortar is a type of mortar created by combining sand and geopolymer made from raw materials opulent in aluminum and silicon activated with an alkaline solution. This research examines the fresh performance of geopolymer mortars. The findings from this study suggest that geopolymer mortar has the potential to be utilized as an eco-friendly and sustainable building and construction material, making it a viable alternative to traditional cement mortar in the coming years.

KEYWORDS - Boron waste, Silica fume, Geopolymer, Taguchi optimization, Workability

EVALUATING SLOPE STABILITY AND RETAINING WALL DEFORMATIONS IN HATAY AFTER THE 2023 KAHRAMANMARAS EARTHQUAKES

HILAL UGURLU [1] ***, TAHA TASKIRAN*** [2]

[1] Ankara Yildirim Beyazit University, Turkey ; [2] Ankara Yildirim Beyazit University, Turkey

ABSTRACT

On February 6, 2023, according to the data provided by AFAD, two significant earthquakes occurred. The first earthquake, with a magnitude of 7.7, struck the Pazarcık district of Kahramanmaraş at 04:17, while the second earthquake, with a magnitude of 7.6, occurred in the Elbistan district of Kahramanmaraş at 13:24. Tragically, the earthquake led to extensive destruction, encompassing both physical infrastructure damage and loss of life. The purpose of this research is to examine and utilize the displacements that affect the stability of the retaining wall in Hatay. This study focused on evaluating seismic site effects during the 2023 Kahramanmaras earthquakes. The assessment process involved three main stages: (i) modeling the stability of the retaining wall in Hatay, (ii) performing slope stability analyses for the region, and (iii) comparing the retaining wall displacements. Prior to initiating the study, geotechnical and geophysical data were obtained. Additionally, Plaxis 2D software was used to conduct the dynamic analysis. In conclusion, due to the different soil and earthquake magnitudes, the analysis for the finding resulted in different deformations that occurred in the retaining wall in Hatay.

KEYWORDS - slope stability,retaining wall, deformation,Hatay region,Seismic site effects,2023 Kahramanmaras earthquakes

COMPARATIVE STUDY OF ANALYSIS RECTANGULAR AND CIRCULAR UNDERGROUND WATER TANKS

MOHAMED ABDINUR MOHAMED[1] , RIFAT RESATOGLU[2] , AYA AHMAD[3]

[1] Near East University, Somalia ; [2] Near East University, Cyprus ; [3] Final International University, Cyprus

ABSTRACT

This research addresses the growing challenges faced by the world's water systems, including pollution, diminishing resources, and the impact of climate change. It focuses on the planning and evaluation of underground water storage systems as a solution to ensure access to clean drinking water. The study proposes effective strategies for designing, capacity planning, water quality management, operation, and environmental impact assessment of underground water tanks. The behavior of rectangular and circular tanks is analyzed using the guidelines provided by ACI-350-06, utilizing both equivalent lateral forces and response spectrum analysis based on NCSC2015. The study is conducted as a case study in Lefkoşa, Northern Cyprus. The results obtained provide valuable insights into the performance of underground water tanks. A comparison between rectangular and circular tanks reveals that circular tanks exhibit higher story displacement values, while rectangular tanks experience greater base shear due to seismic forces. Circular tanks also demonstrate higher hoop tension and compression, indicating greater expansion and contraction under internal and external pressures. Additionally, rectangular tanks experience higher bending moments, whereas circular tanks undergo higher axial forces and shell stress. The findings highlight the crucial role of tank shape and analysis method in assessing the structural behavior of underground water tanks. The research contributes to the development of sustainable and reliable water storage systems to meet the increasing demand for clean drinking water. Based on the results, the study recommends circular underground water tanks for larger capacities compared to rectangular tanks.

KEYWORDS - Underground, Water tank, Rectangular, Circular, ETABS, Northern Cyprus.

EFFECT OF NANO ZINC OXIDE POWDERS GLASS FIBER AND ALTERNATIVE CURRENT ON MORTAR HYDRATION TEMPERATURE

ISMAIL HOCAOGLU[1]

[1] Afyon Kocatepe University, Turkey

ABSTRACT

The strengthening of cement-based materials is critical in the initial reaction levels of cement and water. In some cases, it is essential to accelerate the hydration reactions (cold weather conditions, etc.). In some cases, it is vital to slow down the hydration reactions (hot weather conditions, mass concrete casting, prefabricated construction element manufacturing, etc.). This study aimed to reduce the hydration temperatures of the mortars by replacing the cement in 300 dosage mortars with glass fiber (FG) at 0%, 0.5%, 1%, and 2% ratios, respectively. The mortars were placed in 40mm x 40mm x 160mm wooden molds. The internal temperature values of the mortars were measured (every minute) through a temperature measuring sensors which were placed at the midpoints of the samples. The data is stored in a data logger. Afterward, some comparisons were made by modeling in the Excel program. The mortars were cured in lime water for 7 days and 28 days. Then, flexural strength and compressive strength tests were applied. Higher mechanical strength was obtained by increasing the FG ratio in the mortar. The highest internal temperature values were reached when 1% FG was substituted for cement. Within the scope of the study, the effects of FG (1%) and nano zinc oxide powders (ZnO) on the hydration temperature were also investigated when added together. In some series, alternative current (AC) was applied to the mortars for one day through an AC power source to accelerate the hydration reactions. It was observed that both the internal temperature and the mechanical strength increased with the FG-ZnO addition and AC application to the mortars. It was concluded that both ZnO and FG delayed the setting time by reducing the mortar's internal temperature; however, applying AC to fresh mortars at the beginning of hydration could shorten the curing time. This study is supported by Afyon Kocatepe University Scientific Research Projects Coordination Unit. Project Number: 22.KARIYER.01.

KEYWORDS - Glass fiber, Nano ZnO, AC, accelerated cure, mortar.

MECHANICAL PROPERTIES OF ECO FRIENDLY WARM MIX ASPHALT CONTAINING NANO SIZED RAW COLEMANITE

SEZAI KUTUK[1] , TUBA KUTUK[2]

[1] Recep Tayyip Erdogan University, Turkey ; [2] Recep Tayyip Erdogan University, Turkey

ABSTRACT

The production and spreading of asphalt mixtures constitute one of the major sources of pollution coming from sectors associated with transportation infrastructures (road construction). Decreasing the producing temperature of bituminous mixtures is necessary for a cleaner production process without lowering the mechanical performance of the mixtures. Besides, the colemanite mineral, one of 230 boron minerals, is widely used in numerous industrial sectors since it exists in abundance in the earth's crust. In this study, a planetary high-energy ball mill was utilized to grind raw colemanite mineral (B2O3: 30.43 wt%) by taking into account the grinding parameters such as milling time, diameter of ball, vial volume, ball-to-powder weight ratio, rotation speed, and process control agent. Using 53 µm and 25 µm sieves, the ground powder was divided into separate fractions. Powder over the size of 53 µm (C+53µm) was favored for micron-sized particles, while powder under the size of 25 µm (C−25µm) was preferred for submicron-sized/nano-sized particles. C+53µm and C−25µm mineral additive powders were added to eco-friendly warm mix asphalt (WMA) mixtures in proportions of 5% and 10%. Marshall Stability, Indirect Tensile Stiffness Modulus (ITSM), and Repeated Creep Tests were conducted on the prepared asphalt briquettes. The maximum stability value was attained in the WMA samples containing both 5%C−25µm and 10%C+53µm. The WMA samples' stability was found to be 25% higher than the reference bitumen mixture and 17% greater than the reference Advera (foaming additive) mixture. The maximum values for creep and the Marshall Quotient were determined in the WMA sample containing 5%C−25µm. This indicates that the nano-sized raw colemanite mineral additive was important. The results of the ITSM analysis suggested that, independent of the size impact, it would be beneficial to use boron minerals in WMA technology. Finally, it was deduced that the nano-sized raw colemanite additive in WMA samples increased not only rutting resistance but also vertical deformation.

KEYWORDS - Asphalt, Colemanite mineral, Ball milling process, Nano-sized particles, Repeated creep test

USE OF LOCAL ZEOLITE AS A SUBSTITUTE FOR SILICA FUME IN UHSC

DALAL AL ANI [1] ***, LUTFULLAH TURANLI*** [2] ***, FATIH BEKTAS*** [3]

[1] Civil Engineering Department, Turkey ; [2] Civil Engineering Department, Turkey ; [3] Minnesota State University Mankato, United States

ABSTRACT

Ultra High Strength Concrete (UHSC) is a special type of concrete that is distinguished by its higher mechanical properties and durability when compared to conventional concrete. However, because of its high cost, large volume of cement, and environmental effects, UHSC is not commonly used. As a result, supplementary cementitious materials (SCMs) are utilized as a partial substitute for cement or as an addition to decrease costs, minimize environmental effects, and improve some qualities. This paper presents an experimental study on the effect of zeolite on the mechanical properties of UHSC. The first mixture was the reference for the rest of the mixtures, and in the other mixtures, it was considered to replace 10%, 25%, 50%, 75%, and 100% of the silica fume with zeolite. The mechanical properties of the UHSC indicate that using 75% zeolite can develop compressive strength, in addition to some other properties.

KEYWORDS - UHSC, Zeolite, Silica fume, Pozzolan, compressive strength

NON LINEAR STATIC ANALYSIS OF SELECTED RC BUILDING MODELS BETWEEN DIFFERENT SEISMIC CODES AND SOIL PROPERTIES IN NORTHERN CYPRUS

AMER YASSIN[1] *, RIFAT RESATOGLU*[2]

[1] Near East University, Cyprus ; [2] Near East University, Cyprus

ABSTRACT

The dominant construction system in Northern Cyprus remains the reinforced concrete (RC) building. When designed and applied correctly, RC buildings have the ability to withstand natural disasters. This paper shows the seismic analysis of regular RC building systems of varying stories, and soil classes. It takes into account three seismic codes-Northern Cyprus Seismic Code 2015 (NCSC-2015), Eurocode 8 (EC 8), and Turkish Buildings Earthquake Code 2018 (TBEC-2018). This study compares regular forms of Moment-resisting frames (MRF) and Moment-resisting frames with shear walls (MRF+SW) systems in different configurations: G+3, and G+11. In addition, the pushover analysis method was used in ETABSv18 to display the results of base shear, displacement, and plastic hinge behavior. The study found that buildings with shear walls are more resistant to earthquake loads. Additionally, the results demonstrated that soil class significantly affects the differences between codes. Finally, TBEC-2018 introduced a hazard map specifically for Turkey which offers data on coordinates and specifies the long and short-period spectral acceleration for each provision. As a result, certain equations that relied on the PGA were utilized to determine the long and short-period spectral acceleration values for the studied locations in Northern Cyprus.

KEYWORDS - soil types, seismic codes, non-linear static analysis, northern Cyprus, reinforced concrete.

USE OF CERAMIC FIBER IN CONCRETE WITH DIFFERENT CONTENTS

ARAS DALGIC[1] , BERIVAN YILMAZER POLAT[2]

[1] Munzur University, Turkey ; [2] Munzur University, Turkey

ABSTRACT

In this study, high temperature test and explosion test were applied to ceramic fiber added concrete slabs prepared by using different ratios of mineral additives and three different ceramic fiber ratios. Portland cement concretes were used as control samples in the experiments. Test results revealed that concrete with ceramic fiber addition was more durable than control samples against high temperatures and explosions. Additionally, the samples subjected to explosion tests were modeled using the ANSYS-Workbench program. This study aims to investigate the structural performance of ceramic fiber reinforced concrete slabs against explosion and to minimize the damage caused by terrorist attacks. It is aimed to use the prefabricated elements that will be produced after obtaining the expected results in the study, for purposes such as loopholes, barriers and protection walls in places that may be the target of terrorist attacks.

KEYWORDS - Ceramic Fiber, High Temperature, Explosion, Finite Element Method

MODAL ANALYSIS OF RECESSED REINFORCED CONCRETE RECTANGULAR WATER TANK USING MATLAB PARTIAL DIFFERENTIAL EQUATION TOOLBOX

OLGUN KOKSAL[1] , ZEKI KARACA[2] , ERDEM TURKELI[3]

[1] Samsun University, Turkey ; [2] Ondokuz Mayis University, Turkey ; [3] Ordu University, Turkey

ABSTRACT

Recessed rectangular water tanks have been built to store drinking water in our country and around the world. In addition, it performs tasks such as balancing the water consumption of the water tank at different times of the day, meeting the water need at the time of the fire, maintaining the water pressure in the network at a certain level, and becoming a water source for another tank. Recessed water tanks are built below the ground surface so that the water is not affected by environmental conditions. Recessed water tanks can be made of reinforced concrete, steel, prestressed, and masonry materials. Recessed water tanks are designed according to the results of static and dynamic analysis, taking into account the ground effect, the effect of water. For this reason, after static analyzes are performed, modal analysis is required for dynamic analyzes. Modal analysis is often performed for dynamic analysis of Recessed RC rectangular water tanks. This analysis is carried out by many numerical methods. In this study, the finite element method was preferred for the modal analysis of Recessed RC rectangular water tanks. Different grades of concrete are selected for the tank. Modal analyses were performed with MATLAB PDE based on the finite element method. As a result of the analysis, the mode shapes and frequencies of the Recessed RC rectangular water tank are presented visually.

KEYWORDS - Finite Element Method, Modal Analysis, Partial Differential Equation Toolbox, RC Rectangular Water Tank

SCOUR MONITORING AT BRIDGE PIERS WITH TIME DOMAIN REFLECTOMETRY

MEHMET OZGUR[1]

[1] Canakkale Onsekiz Mart University, Turkey

ABSTRACT

Bridges are one of the key components of the transportation systems. These structures are totally a part of their environment and they often faced with environmental exposures which were rarely considered in the design process. Especially, the scour due to the high-flow events at waterway bridges results in inadequately supported piers or abutments because of the bed material loss, and it frequently initiates a structural failure. Scour, as reported by the National Cooperative Highway Research Program (NCHRP), is responsible for 60% of bridge failures in the United States. Additionally, around 84% of the country's 575,000 bridges are in need of scour mitigation measures, according to the NCHRP. It is clear that addressing only lower construction costs and operational requirements cannot be a complete design approach from the point of sustainability. Monitoring of the bridge scour process is essential for the durability of a bridge by means of longer service life and lower maintenance costs resulting in a sustainable transportation system. This paper briefly investigates the usability of Time Domain Reflectometry (TDR) as a bridge scour monitoring method. Scour monitoring using TDR depends on the significant contrast in dielectric permittivity between water and sediment soils. Experiments were performed in a tank filled with water, and the sedimentation process was simulated by removing sand gradually from the tank. The sedimentation thickness was monitored by a two conductor TDR probe with a high level of accuracy, and it was concluded that TDR is a usable method for bridge scour monitoring contributing to sustainability of bridges.

KEYWORDS - Scour, Bridge pier,TDR

Biomedical Engineering

Computer Engineering

Electrical and Electronics Engineering

Mechanical Engineering

Mechatronic Engineering

Metallurgical and Materials Engineering

Civil Engineering

ICENTE'23

INTERNATIONAL CONFERENCE ON ENGINEERING TECHNOLOGIES

November 23-25, 2023

Konya/TURKEY

icente.selcuk.edu.tr