PREFACE

The National Institute of Engineering (NIE) has established a tradition of bringing out “Compendium of Research Publications” every year. This issue which is fifth in the series contains abstracts of research articles published by our faculty members in journals and conferences. In the calendar year of 2018, 162 publications, out of which WoS and SCI indexed articles, are 22. There is a growing awareness among faculty to publish only in WoS and SCI indexed journals. The efforts of the college in formulating the mechanism of Institutional level Research Grants has started yielding fruits and in the coming years, our publications are bound to increase.

I would like to compliment our faculty members for their publications. Apart from these publications, 4 book chapters have been brought out by our Dean (R&D) Dr. B. Suresha. The efforts of our faculty in these publications show their commitment and eagerness to contribute to the growth of NIE.

I thank the members of the Core committee for their effort in collecting, consolidating and bringing out this compendium. My sincere thanks to Prof. M. K. Sachidanandan, Special Officer and Mr. Y. S. Harish, Librarian for their effort in bringing out this compendium.

June 24, 2019

Dr. G. Ravi
Principal
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Department of Civil Engineering
Coupled Effect of Temperature and Duration on the Mechanical Properties of Self Compacting Concrete

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ABSTRACT

The present investigation deals with the effect of Self Compacting Concrete (SCC) at elevated temperature and at different time durations. An experimental program was carried on cubes and reinforced beams to study the effect of sustained elevated temperature and duration on the SCC. The specimens were subjected to a range of 100°C to 700°C at an interval of 200°C for 2 hrs and 4 hrs durations, the results were compared with control specimens. The study shows that there is an increase in compressive strength up to 300°C for 2 hrs and found to decrease beyond this temperature. For 4 hrs duration, the compressive strength decreases continuously as the temperature increases. Further, the load at first crack and load carrying capacity of reinforced concrete beams was found to be decreasing with the rise in temperature for both 2hrs and 4hrs duration.

*Full paper: International Journal of Civil Engineering and Technology (IJCIET) Vol. 9, Issue No. 2, pp. 606-616, 2018
A Study on Dalavayi Tank in Mysuru for Rehabilitation

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ABSTRACT

Urbanization is a very important factor leading to the deterioration of small tanks, which are a popular and decentralized means of runoff harvesting in the South Indian plateau. The city of Mysuru is host to a large number of tanks, which are prone to destruction due to rapid urbanization and lack of measures to prevent their fall. Dalavayi tank in the city has been studied in the present work to understand its present status and to suggest steps that are necessary make it more beneficial to the urban and rural population using it. Investigations have been done to know the total volume of runoff entering into the tank, the amount of sewage water that is generated and to understand the quality of the water in the tank, which is already getting sewage as inflow. It is found that the tank gets very huge amounts of runoff only during the rainy season and that treated sewage water can be diverted into the tank so as to maintain the storage during the dry seasons. It is found that quality of the Dalavayi tank water is not that bad, it is good and suitable for irrigation and its quality is improving along the downstream of the tank due to self-purification. It is also inferred that by a small improved sewage treatment, the water can be made suitable for high yield crops, aquaculture and domestic purposes.

Estimation of Surface Runoff Volume in Chamarajanagara District using SCS-CN Method

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³Project Scientist, GIS and Remote Sensing, Karnataka State Natural Disaster Monitoring Center, Karnataka

ABSTRACT

The amount of rainfall in excess of the infiltrated quantity, which flows over the ground surface, is termed to be "Surface Runoff". In this study we are considering SCS-CN method along with Geographic Information Technique for calculating surface runoff volume. It is the most common method to estimate the runoff which was developed by United States Department of Agriculture (USDA) Soil Conservation Service (SCS, 1985). The Soil Conservation Service (SCS) Curve Number (CN) is the widely used method in applied hydrology in order to find the runoff. It's a conceptual model. SCS-CN method depends on soil type, land use and land surface Antecedent Moisture Conditions (AMC). By this study we get the average surface runoff volume from the year 2009 to 2017 of the study area. The analysis in the study area is carried out watershed wise. There are 17 subwatersheds and Surface runoff volume for each subwatershed for the specified years has been calculated. The total surface runoff volume for the study area obtained is 31.64 TMC and peak discharge is 512 m³/sec.
Vulnerability Assessment using Composite Drought Index (CDI) for Chamarajanagara District

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¹ & ³Project Scientist, GIS and Remote Sensing, Karnataka State Natural Disaster Monitoring Center, Karnataka

ABSTRACT

Drought is a natural disaster which is having a negative impact on water resources and crop growth. The objective of the study is to identify the drought prone areas using Composite Drought Index, developed using the major components of drought i.e., Meteorological, Agricultural and Hydrological components which includes the sub components such as Departure Index (DI), Dry Spell, Moisture Adequacy Index (MAI), Normalized Difference Vegetation Index (NDVI) and Ground Water Drought Index (GWDI), in Chamarajanagara District of Karnataka from the year 2009 to 2017. Rainfall pattern (South-West monsoon and North-East Monsoon) has been incorporated in the study. Using variance method, composite indices were developed by computing weights for each Meteorological, Agricultural and Hydrological components. Composite Drought Index (CDI) was developed for each Hobli by integrating all the major components and finally drought vulnerability classifications were generated and drought prone areas were identified. Geographical Information System (GIS) is an effective tool representing and drawing the results. The resultant drought maps will help in development of mitigation measures. The drought risk maps were generate which shows that parts of Santemarahalli hobli, Harve hobli and Begur hobli are slightly, vulnerable to drought and all the others parts of the district are moderately vulnerable to drought. This study will help in future to adopt measures for mitigating the effect of drought.

Morphometric Analysis using ARC GIS Techniques - A Case Study of Chamarajanagara District, Karnataka, India

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ABSTRACT

Morphometric Analysis is the measurement and mathematical analysis of the configuration of Earth surface, shape and dimensions of its landforms. Morphometric analysis gives overall view of the terrain information like hydrological, lithological, slope, relief, variations in the watershed, ground water recharge, porosity, soil characteristics, flood peak, rock resistant, permeability and runoff intensity and is useful for geological, hydrological, ground water prospects, civil engineering and environmental studies. The main objective of this study is to find the watershed characteristics and stream properties from the measurement of various stream attributes. The watershed analysis is done aspect wise such as linear aspects and aerial aspects. The linear aspects include stream order, stream number, stream length, and bifurcation ratio, mean length of stream orders, stream length ratio and mean stream length ratio. Areal aspects comprise drainage density, form factor, drainage texture and elongation ratio. Morphometric analysis of Chamarajanagara district is carried out using Arc GIS (10.2) software. The analysis reveals that in entire Chamarajanagara district has been divided into 17 sub watersheds with stream order varying from 1 to 7. The study area is having uniform lithology and structurally permeable. The low drainage density of all subwatersheds indicates that the study area indicates less surface runoff. An immense control of structure on the drainage in found in some subwatersheds is indicated by their high bifurcation ratios. The analysis also indicates that the subwatersheds are having drainage texture varying from course to fine texture. Elongation ratio and form factor shows that the subwatersheds have elongated to circular shapes. From the integrated morphonietric analysis, important hydrologic characteristics of 17 subwatersheds could be inferred.

Dynamic Analysis and Testing of Steel and Wooden Frames

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ABSTRACT

The paper presents the attempt made in understand the dynamic behaviour of systems using experimental and Finite Element (FE) analysis. Shaking table setup of capacity 50kg along with acceleration sensors and experimental models were used in experimental studies. ETABS (2016) software was used for FE analysis. The study was carried out on the dynamic behaviour of Multi degree of freedom (MDOF) system. In case of MDOF system, the 3-DOF frame model is considered and its dynamic response has been studied. Bracings, base isolators and shear wall arrangement are made in the model. Modal analysis was carried out to find out the natural frequency and mode shape of the model. The analytical solutions idealizing the system as discrete systems and the solutions obtained from FE analysis are compared with experimental results. From the study, it is concluded that the analytical results of discrete idealization of the models and FE analysis results closely matches with experimental results.

*Full paper: International Journal of Civil Engineering & Technology (IJCIET), Vol. 9, Issue 6, pp 264-272, 2018
Assessment of Reservoir Sedimentation using RS and GIS Techniques - A Case Study of Kabini Reservoir, Karnataka, India

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²Department of Civil Engineering, The National Institute of Engineering, Mysuru

ABSTRACT

Reservoir sedimentation is an accepted occurrence. The reduction in storing capacity with sediment deposits in a reservoir over a period of time can be interconnected with the decline in the water spread area at different elevations. This study illustrates the assessment of reservoir sedimentation using RS and GIS. The area capacity curve of the year 1974 (impoundment) is now used as a base for sedimentation assessment for the year 2013-14. This will help us to evaluate sedimentation over a period of time. In this study, digital processing is carried out using the ERDAS image processing software. The Normalized Difference Water Index has been used to delineate open water features and to improve the presence of water surface in satellite imagery of the Kabini Reservoir. The water spread area of the reservoir at a particular elevation on the date of the passing of the satellite is used to develop an elevation-area curve. Then a linear interpolation/ extrapolation technique has been used to estimate the water spread area of the Kabini Reservoir at various elevations. Further, these areas were used to compute the live storage capacity of the reservoir between two elevations by using the Prizmoidal formula.

The revised capacity of the reservoir is then compared with the original capacity of the year 1974 so as to give the loss in capacity from 1974 to 2014 i.e. in 40 years. It was found that the capacity was reduced to 552.64Mm³ from 523.928Mm³ showing 5.20 % of loss in capacity of the total gross storage in 40 years. The rate of sedimentation was estimated as 0.718Mm³/year.

*Full paper: International Research Journal of Engineering & Technology (IRJET), Vol. 05, Issue 8, 2018
Outrigger and Belt Trusses as Lateral Load Resisting System for High-Rise Buildings

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2 PG Scholar, Department of Civil Engineering, The National Institute of Engineering, Mysuru

ABSTRACT

Accommodating the rising population in developing countries has given rise to increased height of buildings. Since the cost of the land is increasing everywhere, there is an affinity among builders, architects, engineers, clients to go for vertical growth instead of horizontal growth. To facilitate the rapid galloping growth of basic infrastructure modern cities are demanding tall structures. Since the structures are growing vertically, the issue of lateral stability and sway has to be dealt with utmost care. Wind and Earthquake forces contribute a great impact on building deflection. Outrigger and Bell Truss are the lateral load resisting systems adopted in high rise buildings to reduce erection. The use of Outrigger and BeltTruss system Plays a major role in resisting lateral loads like wind, seismic forces in tall buildings and has been efficiently used to provide stiffness to the structure.

Seismic Analysis of Vertically Geometric Irregular Structures

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²Professor, Department of Civil Engineering, The National Institute of Engineering, Mysore,

ABSTRACT

Due to the advancement in construction, materials and non-availability of land there is a demand of constructing multi storey structures in the society. In multistory structures different types of loads are acting in that more dangerous is earthquake which shakes the surface of ground and releases the energy in the form of seismic waves. The forces caused by the earthquakes are very high and also they are random in nature so we cannot predict them, hence proper care should be taken in the design of multistory structures so that the lateral load resisting system should be well enough to withstand the forces coming due to the earthquakes. In this study the vertical geometric irregular RC buildings of 15 storeys are studied for seismic performance. Here five buildings, one regular and four irregular buildings are considered with geometric irregularity by considering IS 1893 codal provisions and analysis is done by ETABS 2016 version using three different seismic analysis methods (linear static response spectrum and time history method. The result analysis is done. Bhuj time history is used for time history method) the analysis is done according IS 1893-2016(part 1) Results shows that linear static method gives results in terms of storey displacement, base shear, story drift compared to response spectrum. This study also shows that the stiffness Important parameter in seismic analysis in response spectrum and time history method. It is concluded that geometric irregular buildings are more vulnerable to earthquakes and proper care should be taken in design of these buildings.

Out-of-Plane Flexure Behaviour of Fly Ash-Lime-Gypsum Brick Masonry Walls

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¹ Department of Civil Engineering, The National Institute of Engineering, Mysuru
² Department of Civil Engineering, Indian Institute of Science, Bengaluru

ABSTRACT

Industrial by-products such as fly ash are being used for the manufacture of building products such as fly ash bricks. This paper is focused on understanding the out of plane flexural behaviour of fly ash-lime-gypsum (FaL-G) brick masonry, through experimental investigations. Results of the flexure strength of FaL-G brick masonry walls (under different pre-compression) in the two orthogonal directions are discussed. Load displacement and moment-curvature relationships for the two cases presented. The cracking flexural stress using linear elastic analysis was predicted and compared with the experimental value. The results reveal that (a) the flexure strength of FaL-G brick masonry walls increases linearly with the increase in pre-compression, (b) the flexure strength parallel to bed joints is two times more than that of the flexure strength perpendicular to bed joints under zero pre-compression, (c) lateral displacements for the FaL-G brick masonry walls are larger for the case of bending perpendicular to bed joints when compared with those for bending parallel to bed joints and (d) The cracking flexural stress for the FaL-G brick masonry can be predicted closely with those of experimental values using linear elastic analysis.

Bond Development in Burnt Clay and Fly Ash-Lime-Gypsum Brick Masonry

K. Gourav¹ B.V. Venkatarama Reddy²

¹ Department of Civil Engineering, The National Institute of Engineering, Mysuru
² Department of Civil Engineering, Indian Institute of Science, Bengaluru,

ABSTRACT

Fly ash bricks are used for load-bearing masonry. The bond development between the masonry unit and the mortar is mainly due to the mechanical interlock of cement hydration products in the brick pores. This paper deals with the investigations in understanding the phenomenon of bond development between the fly ash-lime-gypsum (FaL-G) brick and the mortar. The bond strength of the FaL-G brick masonry and the burnt clay brick masonry was determined. Apart from quantifying the bond strength of FaL-G and burnt clay brick masonry, microstructure analysis of the materials at the brick-mortar interfaces was carried out using scanning electron microscopy (SEM), X-ray diffraction (XRD), and thermogravimetric analysis (TGA) techniques to establish the evidence and to quantify the chemical bond development between the FaL-G brick and the mortar. The results show that the flexure bond strength of FaL-G brick masonry is an order of magnitude higher than that of the bond strength of burnt clay brick masonry. This is attributed to the chemical bond between FaL-G brick and the mortar, which has been demonstrated in this study. DOI: 10.1061/(ASCE)MT.1943-5533.0002412 ©2018 American Society of Civil Engineers.

Compaction Behavior of China Clay –Sand Mixtures

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² Department of Civil Engineering, ATME, Mysuru
³Practicing Engineer, Bengaluru

ABSTRACT

Various energy levels is an important process. The aim of this study is to develop correlations in order to estimate the compaction parameters dependent on the compaction energy for soil mixtures with various fine contents. Linear regression analysis are used in the derivation of the correlations for the prediction of maximum dry density($\gamma_d$ max) and optimum moisture content (OMC) obtained from standard, reduced standard, modified and reduced modified proctor compaction tests with the index properties of mixtures. The proposed correlations are reasonable ways to estimate the compaction parameters for a soil, which is to be used for field applications. These correlations minimize field efforts to determine the properties of soil which can be attributed to both savings in time and cost in a construction project.

The Worthiness of using Information on Land-Use–Land-Cover in Watershed Models for Western Ghats: A Case Study

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²BGSIT, Bellur, Mandya District, Karnataka

ABSTRACT

The variable source area (VSA) theory of runoff generation mechanisms has been proved to hold good in many wet mountainous areas, decades ago. According to this theory, infiltration-excess overland flow is limited to very small areas in mountainous and forested catchments. But, the perception that the land surface characteristics, including land-use–land-cover (LULC), form the major factors influencing the response of the catchment to rainfall has dominated the thought in hydrology to such an extent that models based on the overland flow theory continue to be used even in such areas. The present study was taken up in order to understand the worthiness of using parameters, including the curve number (CN), that are based on the physiographic characteristics of the catchment in a watershed model designed to estimate runoff in the wet mountainous areas of the Western Ghats in southern India, where the VSA theory has been proved to hold good. The study has been accomplished by applying the NITK model developed for estimating runoff using daily rainfall data. This model is believed to estimate reliably the streamflow in the region using parameter values that can be computed from catchment characteristics. In the present study, it is applied on three gauged streams in the region of Western Ghats in Karnataka. Initially, the performance of the model has been studied with the parameters fixed using the catchment characteristics. Later, the model has been used as a tool to test hypotheses concerning the catchment response, by varying the parameter values, adopting a trial and error procedure. Initial results showed that the model performance is poor as the coefficients of efficiency vary between –66.9 and 82%. The sensitivity analysis carried out subsequently showed that the model parameters are required to be altered greatly for good performance and that the model simulations are not sensitive to the parameter CN. Further, the performance of this model was compared with that of a VSA model, known to suit the region well. This showed that even after all the changes in the model parameters, the model results are not highly reliable. Hence, in order to understand the reasons for the poor performance of the model, a technique was developed to compute the CN values that would be actually necessary to simulate daily direct runoff (DRO) reliably in this method, the daily values of CN are computed by applying backwards the expression for runoff on the DRO estimated by the VSA model. The variations in the values of CN computed using this method is then studied. It is found that the variations in daily CN are high and highly random too, whereas the NITK model uses only three fixed values of CN. It is thus concluded that factors other than those on which the CN is popularly believed to depend control the runoff generation in the region and that influence of LULC on runoff is not discernible at all from the kind of data that is commonly available.

*Full paper: Journal of Earth System Science, Vol. 128, Issue 5, 2018
Influence of Synthetic Polymer on Fresh and Hardened Properties of PSC Concrete with Partial Replacement of Coarse Aggregate by Cinder Aggregate

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ABSTRACT

The construction chemicals are considered to be fourth basic material of concrete due to its high advantage of improved workability and strength which are the main objectives of concrete. This study focuses on one of such chemicals which might be useful in construction activities in near future. A synthetic polymer i.e., Polyvinyl Alcohol (PVA) is used in concrete with partial replacement of natural granite coarse aggregate by cinder aggregate to know its properties. The fresh and hardened properties of cinder aggregate concrete with varying quantity of synthetic polymer are studied for mix design of M25. The additional of synthetic polymer starts from 0% to 1% with an increase of 0.25%. The compressive strength is determined by casting cubes and curing for 7 days and 28 days. The tests are carried out as per Indian Sytandard (IS) and the results are discussed to reach the optimum dosage of the additive.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 05, Issue: 12, 2018
Grey Water Management - A Case Study of Treatment System in Bengaluru

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ABSTRACT

There is an increase in scarcity of water in the world along with rapid population increase in urban areas giving a reason for concern and the need for appropriate water management practices. Rainwater harvesting and greywater recycling are emerging as new trends in water management practices. Greywater is commonly defined as wastewater generated from bathroom, laundry and kitchen. It comprises of about two-thirds of domestic water use. Treated greywater can be used for toilet flushing, gardening, landscaping, washing cars etc. The literature study indicated that greywater reuse is potentially feasible for garden watering and toilet flushing. The study also revealed that there are a number of greywater recycling systems available which vary greatly in complexity, performance and also cost. But most of them are not functioning effectively due to several reasons. Hence, a well-performing treatment system in an urban household near Kengeri, Bangalore City was selected for the case study. The working of the grey water treatment system was observed and the details of construction were obtained. Raw and treated greywater sampling were done and the samples were analyzed in the laboratory to check the efficiency of the treatment. The Cost-benefit analysis study was made to justify the economics of Greywater treatment in urban households. The results indicate the grey water treatment system present in Kengeri, Bangalore was efficient in removal of BOD5, COD and turbidity from the grey water samples with treatment efficiency of 66%, 68% and 90% respectively. The effluent grey water had a mild odour problem. Hence aeration is required to mitigate odour problem. The treated greywater has been used for gardening and the gardening requirement is around 100 litres per day. This was earlier met by the purchase of water from private agencies. The use of recycled greywater has resulted in good greenery around the house enhancing aesthetics. The reuse of treated greywater helps in conserving water and is economical

*Full paper: International Civil Engineering Symposium -2018, June 17th to 18th, 2018*
Characteristics of Flowable Earth Concrete

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²Senior Project Scientist, Centre for Sustainable Technologies, Indian Institute of Science, Bengaluru

ABSTRACT

The paper presents results of experimental studies on flowable earth concrete (FEC). It is envisaged that FEC will minimize the cost of formwork to construct load bearing walls. FEC will be convenient to build monolithic walls with minimum compaction energy. The results on characteristics of FEC such as workability and compressive strength are discussed. The variables considered include clay content of the mix and cement content. The results indicate the feasibility of producing monolithic FEC walls for load bearing buildings. The compressive strength of FEC can be easily tweaked through the mix design.

*Full paper: International Symposium on Earthen Structures 2018, at IISC 22nd to 24th August 2018*
Increasing the Yield of Ring Wells by User Friendly Method

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ABSTRACT

Agriculture, being the backbone of the developing countries like India, should always be progressive to contribute to the economy of a country. Inadequacy of water for the irrigation purposes is being reported as the remarkable problem from the farmers. Proper facilities for the usage of available water have to be provided in this regard. The ground water and well systems have to be promoted where the construction of dams, reservoirs, canals, etc. alone can't serve the farmers. Thus, innovation has to be brought up to develop new sophisticated methods in order to meet the demand of water.

In the present experimental study, an attempt has been made to develop an innovative method to draw water efficiently, to the ring wells situated along the bank of the river. A ring well was selected as the prototype along the river bank and the physical properties of the soil along the periphery of the well were determined to know the soil profile around the well. A model was simulated accordingly and the yield of the model was determined by conducting recuperation tests. Further, perforated laterals of two different lengths were inserted in eight radial directions alternatively, at the bottom of the well and yield was measured for various combinations of the laterals. Similarly, the recuperation tests are conducted even for the slotted laterals and compared with that of the perforated ones. The yield of the model without laterals and with laterals has been compared to know the efficiency of the model. Regression analysis has been carried out to know the coefficient of correlation for the yield obtained from both perforated and slotted laterals. The combination of laterals which gives the optimum yield in the model is selected for inserting in the prototype. From the present experimental study, it can be concluded that usage of laterals increases the permeability of the system and thereby increases the yield of the well without the need for increasing the cross-section of the well, thus, saving valuable time and money.

*Full paper: IGC-2018 Indian Geotechnical Conference, Indian Institute of Science, Bengaluru, December 13-15, 2018
Characterization of Compacted Fine-Grained Soils

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ABSTRACT

Compaction control is the most significant factor affecting the behaviour of earth work projects constructed with compacted fine-grained soils. The durability and stability of a structure are related to the achievement of proper soil compaction. Correlating engineering properties with index properties have assumed greater significance in the field of geotechnical engineering.

In the present experimental study, an attempt has been made to establish the correlations between index properties of soils with the compaction characteristics of soils having different clay mineralogy altogether for varying energy levels. The compaction characteristics can't be explained only by liquid limit and plasticity index of the soils but more effectively by plastic limit of soils. It can be concluded that these correlations can be used for predicting the compaction characteristics of soils in field compaction works.

*Full paper: IGC-2018 Indian Geotechnical Conference, Indian Institute of Science, Bengaluru, December 13-15, 2018
Department
of
Mechanical Engineering
Deposition of Nano-Structured Multilayer Coatings of Cu$_2$ZnSnS$_4$ (CZTS) Thin Films by Vacuum Thermal Evaporation Method

K. Chandra Sekhar$^1$, Sumukh R Bhat$^2$, Ullas Raj N$^2$, Srikrishna K$^2$, Gopalkrishne Urs$^1$, G.L.Shekar$^3$, Rohini Nagapadma$^2$

$^1$ Department of Physics, The National Institute of Engineering, Mysuru
$^2$ Department of Electronics & Communication Engineering, The National Institute of Engineering, Mysuru
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ABSTRACT

The three step deposition of binary sulfides (CuS,ZnS,SnS) thin films have been prepared on Mo substrate by thermal evaporation method in order to prepare kesterite Cu$_2$ZnSnS$_4$ (CZTS) thin film absorber. The secondary phases of CZTS thin films were studied in detailed by using X-ray Diffractometer. The optical properties of CZTS thin film and its binary sulfides were further studied by using UV-Visible Spectroscopy. The direct energy band gap of CZTS thin film was found to be 1.5eV. Surface morphology studies have been studied using Atomic Force Microscopy and Scanning Electron Microscopy. It is reported that the good quality films were achieved with CuS/ZnS/SnS stacking order of the precursor layers in this paper. Further, it has been observed that the crystalline size of CZTS has been improved after the sulfurization.
Effect of Short Glass Fiber and Ferrosilicon Content on Mechanical Properties of Phenolic Based Friction Composite Material

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ABSTRACT

This paper strives to eliminate the pros and cons of contemporary composition used in the preparation of composite brake blocks manufactured at Central Railway Workshop, Mysuru, India. The prime objective is to develop the composite material with optimum constituents for the application of brake blocks used in railway, emphasizing on the substitution of asbestos by short glass fiber (SGF) and ferrosilicon. Composites of phenol formaldehyde matrix with five different amounts of SGFs have been prepared. Significant differences between phenolic based composites with SGF and ferrosilicon reinforcements on hardness, compression and flexural properties were observed suggesting better compatibility of reinforcements with phenolic matrix. In the case of impact strength decreasing trends were observed as the content of ferrosilicon is varied. The effects of SGFs and ferrosilicon wt.% on mechanical properties are discussed in details.

Fabrication and Mechanical Characterization of Carbon Fabric Reinforced Epoxy with Alumina and Molybdenum Disulfide Fillers

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ABSTRACT

In this research article, a systematic study has been carried out to investigate the mechanical properties of carbon fabric reinforced epoxy (C-E) composites, having alumina (Al₂O₃) in one instance and molybdenum disulfide (MoS₂) of two different loadings in the epoxy matrix resin. The study has revealed that with 60 wt. % carbon fabric loading brings superior mechanical properties to the epoxy matrix. The micron-phased (Al₂O₃/MoS₂ in epoxy resin) matrix is then utilised with T300 carbon fabric performs to fabricate hybrid laminated composites. The resulting structural hybrid composites have been tested under tensile and flexural loads to evaluate mechanical properties. The fillers were micron-sized Al₂O₃/MoS₂ particles which were mixed with epoxy resin using high shear mixer. The amount of particle loading varied in two steps viz. 5% and 10% by weight. It has been observed that microparticles inclusion increases the thermal stability of the system by enhancing cross-linking in the epoxy matrix. Microparticles also tend to reduce air void content of the as-fabricated hybrid composites and thus translate into increased mechanical properties. With 10 wt.% loading of MoS₂ in C-E enhanced the flexural strength and modulus by 20 and 40% respectively.

Optoelectronic Behaviours of UV shielding Calcium Zirconate Reinforced Polycarbonate Nanocomposite Films: An Optical View

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ABSTRACT

Self supporting and design flexible (Calcium zirconate/Poly carbonate) nano composite films were fabricated with varying amounts of CaZrO₃ nano fillers by solution casting under controlled temperatures. The as developed films were structurally characterized by Powder X-ray Diffraction (P-XRD) studies that validate the presence of inorganic nano fillers in the host polymer. The UV-visible transmittance studies narrate excellent UV(200–400 nm) harvesting abilities of composite films in conjunction with a near complete visible transmittance. The excellent UV filtering abilities of nanocomposite hybrids were also assessed through kinetic studies of UV induced photo catalytic degradation of Rhodamine B. The linear decrease in optical band and appreciable increase in refractive index also ascertains successful composite preparation with near uniform filler dispersions. The CaZrO₃nano filler reinforced hydrophobic polycarbonates, that are visibly transparent and UV shielding are highly desirable optical materials for high energy UV sensing and filtering applications.

Mechanical and Tribological Behaviours of Epoxy Hybrid Composites Reinforced by Carbon Fibers and Silicon Carbide Whiskers

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ABSTRACT

Epoxy based hybrid composites were manufactured from epoxy-55 wt% carbon fiber (C/Ep) and C/Ep with 2.5 and 5 wt% silicon carbide whiskers (SiCw) by vacuum assisted resin transfer moulding. The effect of SiCw loading on mechanical properties as well as friction and wear behaviour of the hybrid composite has been discussed. In a comparison to C/Ep composite material without SiCw reinforcements there are modest improvements in the mechanical properties such as tensile strength, tensile modulus and flexural strength; but, a potentially significant decrease is demonstrated for the flexural modulus of these SiCwreinforced C/Ep hybrid composites. The experimental tribological data indicated that the C/Ep with SiCw composite showed excellent tribological properties. It was revealed that the fiber and filler worked synergistically to enhance the wear resistance and reduced the friction coefficient of the C/Ep hybrid composites. Further, for all composites, the friction coefficient increases with increase in load and sliding velocity. However, SiCw reinforced C/Ep exhibited considerably lower friction coefficient compared with C/Ep without SiCw, while SiCw as filler at a content of 5 wt% was effective in reducing the specific wear rate of C/Ep composite. The carbon fiber carried the major load between the contact surfaces and protected the matrix from severe abrasion of the counterface. At the same time, the exposed SiCw out of the epoxy matrix around the fiber inhibited the direct scraping between the fiber edge and counterface, so that the fibers could be less directly impacted during the subsequent sliding wear process and they were protected from severe damage. Further, the reinforcement effect of SiCw on epoxy might also restrict the crack initiation and propagation on the surface and subsurface of the composite, and therefore protect the matrix from fatigue failure during the sliding wear process. Mechanisms for the improved wear resistance were discussed with the help of scanning electron microscopy (SEM) observations.

Role of Metallic Nanofillers on Mechanical and Tribological Behaviour of Carbon Fabric Reinforced Epoxy Composites

G. S. Divya and B. Suresha

ABSTRACT

In this study, hybrid composites based on carbon fabric and epoxy (C/Ep) was fabricated by hand lay-up method followed by compression moulding. The C/Ep with optimum carbon fiber (60 wt%) was chosen as a reference material, and to it, the metallic nanoparticles like aluminum (Al) and zinc (Zn) of different wt% (0.5 and 1.0) were included as secondary fillers. To understand the synergism effect of these hybrid reinforcements, mechanical properties and tribological behavior of composites were studied. From the test results, it was proved that hybridization improved the mechanical and tribological properties. The C/Ep consisting of 0.5 wt% Zn and Al showed higher tensile properties in comparison with all other fabricated composites. Increase in flexural strength and flexural modulus also observed as the filler content increased in C/Ep composite. Higher impact strength is noted at 1 wt% Zn filled C/Ep composite. Wear test data revealed that 0.5 wt% Zn in C/Ep has got superior wear resistance. Wear mechanisms were discussed using scanning electron micrographs of selected worn surfaces of the composites.

*Full paper: Materials Sciences and Applications, Vol. 9, pp 740-750, 2018
Effect of Strain Path on the Evolution of Microstructure, Texture and Tensile Properties of WE43 Alloy

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ABSTRACT

Hot rolling of extruded and solutionized WE43 alloy was carried out at 400 °C through different strain paths such as unidirectional rolling (UDR) and multistep cross rolling (MSCR). The effect of strain path on the evolution of microstructure and texture was investigated. The grain size was 7 µm and 18 µm after hot rolling of UDR and MSCR samples, respectively. A strong basal texture was observed during rolling which is independent of the strain path of the samples and the recrystallization mechanism was identified to be continuous dynamic recovery and recrystallization type. Further, the texture of the deformed and recrystallized grains was observed to be same. Hence, the texture was simulated successfully using visco-plastic self-consistent (VPSC) simulation. The VPSC simulation of UDR sample showed the dominant activity of basal and prismatic slip system up to a true strain of 0.5 and after that pyramidal < c + a > activity dominants, whereas MSCR sample showed the combined activity of basal and pyramidal < c + a > up to a true strain of ~ 0.5 and later on basal activity dominants on further deformation. The room temperature tensile testing showed that the yield strength of MSCR sample was greater than UDR sample except along RD of UDR sample and the tensile strength was more for MSCR compared to UDR sample which suggests that higher volume fraction of metastable precipitates in MSCR than UDR sample during high temperature rolling. The higher volume fraction of metastable precipitates was attributed to lower dislocation activity on prismatic planes of MSCR compared to UDR sample during hot rolling. The current VPSC simulation showed that the prismatic slip activity was four times higher in UDR than MSCR sample. A decrease in mean free path of dislocations by the presence of metastable precipitates led to higher tensile strength of MSCR compared to UDR sample. The mean free path of dislocations increased from RD to TD and hence, results in a decrease in tensile strength from RD to TD of both the samples.

*Full paper: Materials Science and Engineering, Vol. 715, pp 348-358, 2018
Experimental Investigations on Free Vibration of Plates

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ABSTRACT

In this article, the natural frequencies, damping ratios, and damping constants of plates in different materials such as Steel, Aluminum, and Copper, with different boundary conditions like clamped-clamped-clamped-clamped (CCCC), clamped-clamped-clamped-free (CCCF), clamped-clamped-free-free (CCFF), clamped-free-free-free (CFFF) and free-free-free-free (FFFF), have been experimentally investigated. Natural frequencies obtained experimentally are compared to the natural frequencies obtained from numerical analysis using finite element analysis package ANSYS. The effects of different parameters like density, boundary conditions, and fixed edge length on free vibration characteristics of the plates are discussed. The damping ratios are determined experimentally, and the effect of boundary conditions on the damping ratio is also discussed.

*Full paper: Journal of Testing and Evaluation, 2018
Flexural and Impact Characterization of UV Treated Areca Fiber Polypropylene Composites

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ABSTRACT

Polymer based natural fiber reinforced composites are emerging as a promising new engineering material. The main advantage of natural fibers are low density, low cost, biodegradability, acceptable specific properties, availability, less wear during extracting as well as manufacturing composites. This investigation has been carried out to evaluate the interfacial bonding between fiber and polypropylene, flexural and impact properties of composite prepared by areca fibers with randomly distributed fibers. The extracted areca fibers were treated by Ultraviolet radiation to obtain better interfacial bonding between fiber and matrix. The test samples have been prepared as per ASTM standards using injection moulding technique at different fiber weight loading fractions (10%, 20%, 30%, and 40%). Flexural and impact tests have been carried out on the plain polypropylene composites and developed areca fiber-reinforced polypropylene based composites. The treated and untreated areca fiber-reinforced polypropylene composites have been modeled and analyzed by means of finite element method and compared with flexural experimental results. It has been observed that flexural and impact strength increases with increase in the fiber loading percentage when compared to plain polypropylene and untreated areca fiber composites beyond 20% for treated areca fiber composite. The present work also includes the analysis of areca fiber reinforced polypropylene composites using FEA with various fiber volume fractions and these results were validated with the experimental results.

*Full paper: International Journal of Mechanical and Production Engineering, Issue 4, 2018*
ABSTRACT

Design and fabrication of base stand for a flat belt conveyor system and to control the speed of the system of the conveyor system which is done by integrating the conveyor system with Arduino and motor driver which is controlled by mobile app through Bluetooth module. Dynamic analysis of load acting on the base stand is done in order to make the whole system stable.
Study on Two Body Abrasive Wear Behaviour of Carboxyl- Graphene Reinforced Epoxy Nano-Composites

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ABSTRACT

The focus of this study was to investigate the effect of carboxylic acid (COOH) functionalized graphene (CGr) content on abrasive wear behavior of epoxy nanocomposites. CGr-reinforced epoxy (CGr//Ep) nanocomposites were fabricated using probe sonicator for dispersion and vacuum oven for curing. The percentage of CGr in the developed composites was varied from 0.2 to 1 wt. % with an increment of 0.2 wt. %. The abrasive wear tests were conducted on the developed CGr/Ep composites on SiC abrasive paper with two grit sizes at constant velocity and constant load for varying abrading distance. The worn surfaces were analyzed using Scanning Electron Microscope and the images reveals that the develops nanocomposites exhibits good tribological performance at low filler loading (≤0.6 wt. %). Neat epoxy showed the highest specific wear rate as well as high wear volume. On the other hand, epoxy with 0.6 wt. % of CGr exhibited the least friction coefficient and superior wear resistance for 320 grit SiC abrasive paper. It is predicted that the good interfacial adhesion between CGr and epoxy matrix and also tribo-chemical reactions between CGr layer and epoxy matrix for reducing wear rate of the composite materials.
Tribo-Performance of Epoxy Hybrid Composites Reinforced with Carbon Fibers and Potassium Titanate Whiskers

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ABSTRACT

The present investigation deals with the fabrication and characterization of epoxy reinforced with bidirectional carbon fiber mat (CF/Ep) and filled with 2.5, 5 and 7.5 wt% potassium titanate whiskers (PTw) composites. The effect of PTw loading on hardness, tensile properties and dry sliding wear behaviour of CF/Ep composite were carefully investigated in expectation of providing valuable information for the application of hybrid CF/Ep composites. Results indicated that the incorporation of PTw actually improved the hardness, tensile strength and tensile modulus of CF/Ep composites. Meanwhile, the specific wear rate of CF/Ep filled by 5 wt % PTw reached to 6.3× 10⁻¹₄ m³/N-m, which is 41% lower than that of CF/Ep composite at the same dry sliding condition. It also seen that the fiber and filler worked synergistically to enhance the wear resistance. Further, for all composites the friction coefficient increases with increase in load and sliding velocity. However, PTw reinforced CF/Ep exhibited considerably higher coefficient of friction compared to unfilled ones, while PTw filler loading of 5 wt% was effective in reducing the specific wear rate of CF/Ep composite. The carbon fiber carried the applied load between the contact surfaces and protected the epoxy from severe abrasion of the counterface. At the same time, the exposed PTw out of the epoxy matrix around the fiber inhibited the direct scraping between the fiber and counterface so that the fibers could be less directly impacted during the subsequent wear process and they were protected from severe damage.

*Full paper: AIP Conference Proceedings, Vol. 1943, pp 1-9, 2018
Optimization of Boron Nitride Filled Polyaryletherketone Composites Wear Using Taguchi Method

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ABSTRACT

This research article aims to describe the action of boron nitride (BN) filler (0-30 wt. %), applied normal load, sliding velocity and sliding distance on the dry sliding wear behaviour of polyaryletherketone (PAEK) matrix. The objective is to analyze the effect of the aforementioned parameters on the specific wear rate. These composites are fabricated by means of extrusion followed by injection moulding process. Friction and wear loss data is collected using a pin-on-disc wear tester. At all tribo-test conditions, the friction coefficient and specific wear rate decreases up to 10 wt.% of BN and after which it increases. Optimization of the tribological behaviour was conducted via Taguchi design of experiments, and ANOVA was used for the analysis of the specific wear rate. The specific rate of wear for neat PAEK is in the order 4.48×10⁻⁶ mm³/Nm, while the specific wear rate of 10 and 30 wt. % BN filled PAEK is 1.21×10⁻⁶ and 6.22×10⁻⁶ mm³/Nm respectively. The best results are seen at a BN loading of 10 wt. %. Sliding distance was found as the most influential factor affecting the wear behaviour of PAEK-BN composites, other factors like load, filler wt. % and sliding velocity also had a component to play in attaining the minimum specific wear rate. Worn surface morphology was studied using scanning electron microscopy.

*Full paper: International Conference on Automobile, Marine and Mechanical Engineering (ICAMME-2018), Sri Venkateswara College of Engineering, Sriperumbudur, May 4-5, 2018
Role of Metallic Fillers on Mechanical Properties and Tribological Behavior of Carbon Fabric Reinforced Epoxy Composite

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ABSTRACT

It is well known that functional fillers can improve the mechanical properties and wear performance of polymeric materials. The state of dispersion, size and shape as well as loading of fillers establish the strength/stiffness, toughness and wear performance of the composites. In the present study, the role of nano-dimensional metallic particles was incorporated as secondary reinforcements into carbon fabric reinforced epoxy (C/Ep) composites. The influence of the fillers on mechanical properties and tribological behaviour of the composites was investigated. The metallic fillers included are aluminium (Al) and zinc (Zn). Fabrication of the composites was carried out using hand lay-up method followed by compression molding. Ultrasonicator was used for uniform dispersion of the fillers in the composite. The composites were fabricated using 55, 60 and 65 wt. % carbon fiber and mechanical tests were performed as per ASTM standard. To the composite yielding good mechanical properties, 0.5 and 1 wt. % Al and Zn nanoparticles were introduced to fabricate C/Ep hybrid composites. Incorporation of nanoparticles enhanced the mechanical and tribological properties. Carbon/epoxy with 0.5 wt. % Al and Zn exhibited higher tensile strength and Young’s Modulus compared to all other composites. Increasing flexural strength and flexural modulus were observed as the filler content increased in C/Ep composite. Higher impact strength was observed at 1 wt. % Zn in C/Ep composite. Wear test data revealed that 0.5 wt. % Zn particles has got better wear resistance as compared to other hybrids and unfilled C/Ep composites. Involved wear mechanisms of the worn surfaces were analyzed using scanning electron microscope.

*Full paper: International Conference on Automobile, Marine and Mechanical Engineering (ICAMME-2018), Sri Venkateswara College of Engineering, Sriperambudur, May 4-5, 2018
Solid Particle Erosion Behavior of Short Glass Fiber and Particulate Reinforced Polyoxymethylene/Polytetrafluoroethylene Composites

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ABSTRACT

In the present work, the solid particle erosion behaviour and wear mechanisms of polyoxymethylene (POM) based polytetrafluoroethylene (PTFE) blend with short glass fiber (SGF), silicon carbide (SiC) and alumina (Al₂O₃) particles were investigated. The erosion experiments have been carried out using irregular silica sand (212 ± 12 µm) as an erodent. The erosion losses of these composites were evaluated at various impingement angles (30°, 45°, 60° and 90°) with the change of erodent velocity. The results obtained exhibited typical ductile behavior for POM+PTFE blend and POM+PTFE with SGF reinforced composites, where the maximum erosion loss was recorded at an impingement angle of 45° and it has been decreased with increase in impingement angle from 45° to 90°. Moreover, the erosion loss increased with the increase in impact velocity. The erosion behaviour of SiC and Al₂O₃ particles filled in SGF-POM+PTFE blend has changed from ductile to brittle at 45° impingement angle and the erosion loss was the highest. The morphology of eroded surfaces was observed under scanning electron microscope and the involved damage mechanisms were discussed.

*Full paper: International Conference on Automobile, Marine and Mechanical Engineering (ICAMME-2018), Sri Venkateswara College of Engineering, Sriperambudur, May 4-5, 2018
Characterization of Physico-Mechanical Properties of Sansevieria/Carbon Fiber Reinforced Hybrid Epoxy Composite with and without Particulate Fillers

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ABSTRACT

This paper presents the study of physico-mechanical properties of the chemically treated sansevieria/carbon fiber reinforced hybrid epoxy (Sria/CF-Ep) composite with calcium carbonate (CaCO₃) and silicon carbide (SiC) nanoparticles. Sansevieria/carbon fiber (30/5 wt%) reinforced hybrid epoxy composite with 1.5, 3 and 4.5 wt % of CaCO₃ and SiC have been developed by hand lay-up stacking followed by compression moulding. Effects of content of CaCO₃ and SiC on the interlaminar shear strength (ILSS) tensile and flexural properties as well as impact strength were investigated. To evaluate the laminate quality in terms of fiber wet-out at filament level, homogeneity of fiber/matrix distribution, and matrix/fiber bonding, scanning electron microscopy (SEM) was used. Sria/CF-Ep composite gave good mechanical properties when compared to sansevieria fiber reinforced epoxy (30 wt %). By the inclusion of very small weight percentage of CaCO₃/SiC in Sria/CF-Ep show marginal increase in tensile, flexural and ILSS and significant increase in the impact strength. This study proves again that the absence of voids uniform dispersion of CaCO₃/SiC nanoparticles, filler-filler interaction and good interfacial bonding between matrix/fiber leads to increase in the mechanical properties of Sria/CF-Ep hybrid composites. Fractographic characterization of selected post-failed samples of Sria/CF-Ep hybrid composites reveals the information about the cause and sequence of failure.

*Full paper: International Conference on Automobile, Marine and Mechanical Engineering (ICAMME-2018), Sri Venkateswara College of Engineering, Sriperambudur, May 4-5, 2018
Mechanical Performance of HDPE/UHMWPE Hybrid Composites and Tribological Characterization using Taguchi Method

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ABSTRACT

The physical, mechanical and tribological properties of short glass fiber (SGF) reinforced high density polyethylene/ ultra high molecular weight polyethylene (HDPE/UHMWPE blend) composites and zirconia (ZrO$_2$) filled hybrid composites were studied herein. The interfacial adhesion and the influence of the combined SGF and ZrO$_2$ reinforcements loading were examined to characterize the positive hybrid effect. The physical, mechanical and tribological properties of these hybrid composites were evaluated as per ASTM standards. The presence of SGF and ZrO$_2$ in the HDPE/UHMWPE blends enhanced the tensile strength. The three-body abrasive wear test was also investigated and the specific wear rate was increased with the increase in fiber/filler content. The selected fracture and worn surfaces of the test specimen were investigated by scanning electron microscopy.

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*Full paper: International Conference on Advances in Materials and Manufacturing Applications (IConAMMA 2018) August 16-18, 2018*
Effects of Basalt Fiber and Zirconia Loading on Physico-Mechanical Behavior of PA66/HDPE Blend Composites

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ABSTRACT

The polymer blend of polyamide 66 and high density polyethylene (PA66/HDPE) (70/30 wt. %) was selected for the study. The blend was reinforced with 20 and 25 wt. % short basalt fibers (SBFs). Blend reinforced with 25 wt. % SBFs was further loaded with 5 and 10 wt. % zirconia (ZrO2) to study the positive hybrid effect. The density and void fraction of the composites were determined. The characterization for mechanical properties such as tensile and impact was carried out in addition to hardness as per ASTM standards. Lastly, the fractured surface of specimens was examined using scanning electron microscope (SEM).

*Full paper: International Conference on Advances in Materials and Manufacturing Applications (IConAMMA 2018), ASE College, Bengaluru
Static and Dynamic Mechanical Performance of Carbon Fiber Reinforced Polyethersulfone Composites

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ABSTRACT

This study has been carried out to demonstrate the effect of short carbon fiber (SCF) loading on static and dynamic mechanical performance of polyethersulfone (PES) composites. Different combinations of SCF/PES composites were prepared by extrusion followed by injection molding. The static mechanical properties such as hardness, tensile and flexural properties of PES based composites were analyzed following ISO standards. As engineering materials, the polymer composites with high modulus as well as excellent damping properties are of great interest in aerospace and automotive industries for severe dynamic environment. Furthermore, in addition to static properties of composites, dynamic mechanical behaviour of PES based composites was evaluated. Mechanical test results showed that increasing the SCF wt. % in the composites increases the hardness, tensile and flexural properties. Furthermore, the optimal SCF loading was found to be 30 wt. % for significantly improving the overall composite mechanical performance. Upon the reinforcing of SCFs, an improvement in the storage modulus was found. Based on the fractographic analysis, orientation and aligned structure of carbon fibers, good bonding of fibers within the matrix and better fiber-matrix interaction were the primary reasons leading to the improvement of mechanical properties. The optimized composite (PES with 30 wt. % of SCF) could be used in automotive components like frames, flap covers and gears of printing machinery.
Effect of Nanofillers on Physico-Mechanical Properties of Carbon Fiber Reinforced Phenolic Friction Composites

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ABSTRACT

The mechanical properties of nano-sized fillers were investigated in phenolic friction composites. The phenolic friction composite include 25 wt % carbon fiber, 30 wt % binders and 33 wt % fillers. The nano-Molykote (nano-MK) and multiwalled carbon nanotubes (MWCNTs) were used as the friction modifiers to enhance the mechanical properties of phenolic friction composites. Thus the friction composites reinforced with fibers, fillers and friction modifiers were fabricated by compression moulding. The physical and mechanical properties such as density, microstructure, hardness, tensile and flexural strengths/moduli as well as impact strength were measured. After mechanical testing, fractured test coupons were characterized with scanning electron microscope. The results highlight the positive effect of the nano-MK and MWCNTs incorporation to the phenolic friction composites, in terms of mechanical performance, enhancing hardness, tensile, flexural strength/modulus and impact strength.

*Full paper: International Conference on "Advances in Materials and Manufacturing Applications (IConAMMA 2018)", Amrita Vidyapeetham, Bengaluru, August 16-18, 2018
Role of Zirconia on Mechanical Properties of HDPE/UHMWPE Blend Composites

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ABSTRACT

Hybrid composites based on high-density polyethylene-grafted maleic anhydride /ultra-high density polyethylene (HDPE/UHMWPE) loaded with short glass fiber (SGF) and zirconia (ZrO2) microparticles were fabricated by melt-mixing process and their physical and mechanical properties were determined. Physico-mechanical properties such as density, hardness, flexural properties and impact strengths of these composites were studied. The presence of SGF and ZrO2 in the grafted HDPE/UHMWPE blend increased the hardness and bending strength and modulus. However, impact strength decreased with increase in filler loading. Further, it was found that the HDPE/UHMWPE blend with 25 wt. % SGF and 2.5 wt. % ZrO2 showed optimum mechanical properties due to improved fiber/matrix adhesion. Scanning Electron Microscope was used to identify the fractographic features of the failed test coupons.
Role of Fillers on Physico-Mechanical Properties of Pom Based Hybrid Composites

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ABSTRACT

Silicone (SC) and polytetrafluoroethylene (PTFE) reinforced polyoxymethylene (POM) composites have been fabricated by melt mixing followed by injection moulding. Physical and mechanical properties of SC and SC+PTFE/POM composites have been investigated as per ASTM standards. The dispersion of fillers in POM was studied by using scanning electron microscopy (SEM). The effects indicated that the hardness of the POM matrix decreases with increasing the SC content and slight increase in hardness was found in SC+PTFE/POM. The mechanical performance of the composites are investigated by means of a well known universal testing machine and notched Charpy impact tester. The POM with 10 wt. % of SC binary composite reveals good mechanical properties. The tensile and flexural properties of SC+PTFE/POM hybrid composites are higher than that of 20 and 30 wt. % SC reinforced POM binary composites. Further, these mechanical strength and impact toughness are established on the kind as nicely as filler loading over the full range of the study. The uniform dispersion of the filler in the POM matrix is obtained from SEM micrographs. Furthermore, SEM was used to identify the fractographic points of the tensile fractured POM based composites.
Role of Zirconia Filler on Mechanical Properties and Dry Sliding Wear of Glass-Basalt Hybrid Fabric Reinforced Epoxy Composites

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ABSTRACT

This paper presents the role of zirconia filler on mechanical properties and dry sliding wear of bidirectional hybrid (glass and basalt fiber) fabric reinforced epoxy (G-B/E) composites. Fabrication was done using hand layup method followed by compression molding. The effect of zirconia filler loading on mechanical properties such as hardness, tensile and flexure of fabricated G-B/E composites were evaluated as per ASTM standards. Also, the dry sliding wear behavior was assessed using pin-on-disc apparatus under different applied normal loads/sliding distance. Experimental results show that incorporation of zirconia filler improves the mechanical properties. Further, the wear test results indicated addition of zirconia into G-B/E hybrid composites have significant influence on specific wear rate under the tribo-conditions selected for the study. Further it was found that zirconia filled G-B/E composites exhibited better wear resistance and addition of 6 wt. % of zirconia showed lower specific wear rate compared to unfilled and other hybrid G-B/E composites. In addition, Scanning electron microscope images of the selected mechanical test failed coupons also have been discussed.

*Full paper: International Conference on Green Trends in Mechanical Sciences (GTMES-2018), MCE, Hassan October 3-5, 2018
Microstructure and Abrasive Wear Behaviour of Nickel Based Hardfacing Stainless Steel Deposited by Gas Metal Arc Welding

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ABSTRACT

Wear is one of the foremost issues faced in manufacturing industries that reduces the lifestyles of machine elements and will increase the running costs. Therefore, hardfacing is extensively employed by industry professionals to minimise the wear of moving components. In this research work, a nickel primarily based alloy recognized as Hastelloy C-276 strengthened on stainless steel (316L) substrate via the usage of Gas Metal Arc Welding (GMAW) technique. The coating thickness used to be assorted from 2 to 4 mm on the substrate. The optical microstructure of the interface revealed the defect-free fusion between hardface and substrate metals. Microhardness (Hv) and three-body abrasive put on test had proven that the hardfaced alloy metal posses higher hardness and effective wear resistance. The worn surface morphologies have been found using SEM in order to perceive the involved wear mechanisms.

*Full paper: International Conference on Green Trends in Mechanical Sciences (GTMES-2018), MCE, Hassan October 3-5, 2018
Mechanical and Abrasive Wear Behaviour of Waste Silk Fiber Reinforced Epoxy Biocomposites Using Taguchi Method

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ABSTRACT

The aim of the research article is to study the static mechanical properties and abrasive wear behavior of epoxy biocomposites reinforced with different weight percentage of waste silk fibers. The effect of parameters such as velocity (A), load (B), filler content (C) and abrading distance (D) on abrasive wear has been considered using Taguchi's L25 orthogonal array. The objective is to examine which parameter significantly affects the abrasive wear of biocomposites. The addition of silk fiber has resulted in improved flexural properties of the epoxy matrix. ANOVA results indicated that abrading distance played a significant role followed by fiber loading, load and sliding velocity.

*Full paper: 2nd International Conference on Recent Trends in Materials and Manufacturing Technologies, (ICRAMMT-2018), Marri Laxman Reddy Institute of Technology and Management Hyderabad, November 19-20, 2018
Dynamic Mechanical Properties of Glass Fiber Reinforced Epoxy Composites with Micro and Nanofillers

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ABSTRACT

Glass fiber strengthened epoxy (GE) composites are notably used in the field of high voltage insulation due to their stronger overall performance at extended temperatures. This paper discusses benefits of nano and micro fillers in enhancing the dynamic mechanical properties of GE composites with the information derived from Dynamic mechanical Analysis (DMA) and Differential Scanning Calorimetry (DSC). The composites are manufactured by pultrusion technique through dispersion of micro and nano fillers using high shear mixing accompanied by way of ultrasonication. The results evinced that the GE composite with MgO reveals lowest damping factor with a reduction in damping factor of 44 %, reduction in loss modulus of 55% as well an increase in glass transition temperature (Tg) of 29 % in contrast to that of GE composite except fillers. The better performance might be attributed to better adhesion and dispersion of particles in epoxy resin which contributes extended load transfer.
Optimization of Tribological Parameters in Dry Sliding Wear Mode of Thermoplastic Copolyester Elastomer Composites

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ABSTRACT

This research work uncovers the wear performance of short glass fiber (SGF) fortified thermoplastic copolyester elastomer (TCE) hybrid composites loaded up with both micro (short carbon fibers, PTFE, SiC, Al2O3 and MoS2) and nano (Al2O3 and PFPE) sized particulate fillers. The readied hybrid composites are tested for tribological performance using pin-on-disc test rig. Test outcomes uncovered that TCE hybrid composite strengthened with SGF and loaded up with PTFE, SiC, Al2O3 and MoS2 displayed better wear resistance, however TCE hybrid composite loaded up with nano lubricating filler i.e. PFPE displayed slightest friction coefficient (µ) in the investigation. This study additionally archives the impact of tribological control factors such as sliding distance, sliding speed and filler content on tribological conduct of TCE composites in terms of multiple response such as specific wear rate (Ks), µ and hardness. Taguchi based grey relational analysis (GRA) was utilized employing L27 orthogonal array by considering three control factors and three levels. Analysis of wear results demonstrated that lubricating filler with 10 wt. %, sliding distance of 6000 m and sliding speed of 1.5 m s-1 has displayed the slightest Ks, µ and extreme hardness.

*Full paper: International Conference on Green Trends in Mechanical Sciences (GTMES-2018), MCE, Hassan, October 3-5, 2018
Metallic Nanofillers Effect in Assessing the Abrasive Wear Performance of Carbon Fabric Reinforced Epoxy Composites

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ABSTRACT

The potential of metallic nanofiller reinforcement in the carbon fabric reinforced thermoset polymers for bettering the abrasive put on resistance has no longer been explored so far. Hence a sequence of 5 composites of epoxy (Ep) matrix bolstered with high strength carbon fabric (CF/Ep) and aluminium (Al) and zinc (Zn) nanoparticles (0.5 and 1 wt. %) used to be fabricated by hand layup method and three-body abrasive put on overall performance of these composites alongside with the mono-composite (CF/Ep) was once evaluated. A composite slab used to be abraded against free silica sand particles under unique loads/distances. It used to be determined that both Al and Zn nanofillers revealed extensive potential to improve abrasion resistance of mono-composites. The hardness of the composites, however, should no longer be correlated with the abrasive wear performance. Worn surface evaluation by scanning electron microscope on the other hand, helped to correlate the abrasive wear performance of the composites with the worn surface topography, failure of fibers, resin and their interface. Difference in the failure-mode of the fibers/fillers used to be notion to be broadly speaking accountable for controlling the abrasive put on performance of the epoxy composites.

*Full paper: Second International Conference on Polymer Composites 2018, Department of Mechanical Engineering, NITK, Surathkal, December 15-16, 2018.*
Development and Characterization of Novel Fiber Reinforced Hybrid Friction Composites

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ABSTRACT

Fiber reinforced polymer matrix composites (PMCs) are primarily finding their applications in automotive and railway systems as brake friction composites, where friction and wear are critical issues [1]. Fiber reinforced friction composites (brake pads) employed in a brake system often comprise an organic polymer matrix (phenol formaldehyde resin) inside which a number of reinforcing short fibers (glass, carbon, mineral, synthetic, and aramid fibers), frictional additives (molykote, copper, silicon carbide, and alumina) and fillers (barium sulfate and cashew friction dust) are distributed. In the friction composites, the fibers play a very vital role in maintaining the higher and stable coefficient of friction (µ), less brake noise and wear than the asbestos lining, wear minimization and friction optimization under operating variables such as braking force, sliding speed, braking duration and braking temperature [2]. The nonasbestos organic (NAO) materials have been found to be less ductile and to display lower wear rates when compared to other organic friction composites. The design of formulation of friction composites is a well-known problem in multicriteria optimization. This is because it involves handling four prime classes of constituents and also reaching a suitable and desired level of performance attributes. In fact, the formulation of a composite for a brake system should be designed to satisfy a number of requirements for the properties, such as durability, good tribological characteristics and low noise at a wide range of operating conditions [3].
Fabrication and Tribological Behavior of Epoxy Hybrid Composites

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ABSTRACT

The components that are engaged in relative motion with their counterparts in any product demand synergy of mechanical and tribological behavior for service longevity. Traditional materials often demonstrate better performance in either of these, resulting in early failure of the part. This has provided the scope for evolution of tailor-made materials, i.e. composites, to suit the desired applications. Among the available composites, polymer matrix composites (PMCs) offer benefits - for instance, superior strength to weight ratio, resistance to corrosion, simplicity in processing, energy consumption, relatively low processing temperature, and recyclability. This has made PMCs the preferred choice of materials engineers for the development of products. PMCs consist of an engineering polymer as the matrix material. The matrix element is a continuous and homogeneous material into which the reinforcements are entrenched to amend the functioning of the matrix material. Commonly used matrix materials in PMCs are thermoplastics and thermosets.

Glass Fiber Hybrid Effects in Assessing the Abrasive Wear Mechanisms of Naturally Woven Fabric/Polymer Composites under Dry Conditions

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ABSTRACT

Natural fibers are now considered as suitable alternatives to synthetic fibers such as E-glass and other commercial fibers [1]. The major advantages of the natural fibers are that they are biodegradable, renewable, and harmless during processing, etc. Hence, many automobile sectors have now started utilizing vegetable fibers as replacements to the synthetic fibers in use [2]. On the other hand, natural fibers have severe disadvantages such as swelling, high brittleness due to rich cellulose content, and unstableness to chemicals [3]. Hence, in order to attain and maintain the service standard, natural fiber composites need hybridization to provide additional support [4]. Hybridization refers to the inclusion of two or more reinforcements to a single matrix medium [5]. Relative weight percentage of the reinforcement eventually alters the properties of the final hybrid composites [6].

Automotive Applications Reinforced Material Components

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ABSTRACT

The shift to more balanced structures in automotive industry is not only an ingenuity toward a more feasible environment and cost efficiency but also a mandate of policies. They also play an imperative role to forcibly use sustainable materials, i.e., composites. The environmental studies have revealed that the composite in automotive industry has recently attracted attention in terms of volatile organic compound emissions, carbon footprint, and recyclability. As a result, it has become desirable to develop end-of-life strategies that avoid landfill. This has set the automotive industries to design the products, which requires 95% of the mass of each product manufactured to be recycled/recovered. Polymer matrix composites (PMCs), especially thermoplastic-based polymer composites, offer these possibilities. Alternative approach to balance sustainability and cost is with the use of PMCs in automobile panels, as introduced by a number of automobile manufacturers, which use renewable materials as reinforcements in various polymers. Composites made of renewable materials have been rampantly used in inner and peripheral body parts. Similar components are used as trim parts in dashboards, door panels, parcel shelves, seat cushions, backrests, and cabin linings. In recent years, there has been increasing interest in the replacement of fiberglass in PMCs by natural plant fibers such as jute, flax, hemp, sisal, ramie, and so on. This entry tries to impart knowledge on the structural, weathering, high temperature and tribological performances, and applications of various polymers and polymer composites reinforced with fibers, fillers, and the combination of both in the area of automobile engineering.

Department of Industrial & Production Engineering
Significance of the Type of Reinforcement on The Mechanical Behaviour of Thermoplastic Composites

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ABSTRACT

In mechanical engineering applications, composite materials are subjected to a variety of loads such as tensile, bending, compression, impact etc. For the effective use of composites in engineering applications, an insight into mechanical properties is essential. The aim of this study was to investigate the significance of the type of reinforcement on the mechanical behaviour of polypropylene reinforced by glass fiber and carbon fiber. The composite specimens were prepared in accordance with ASTM standards using injection moulding technique varying the fiber weight percentage (10\%, 20\% and 30\% by weight of reinforcement). Mechanical properties were measured according to ASTM. The study suggested that there was a significant role of type of reinforcement and weight fractions on the mechanical behavior.

Studies on Plasma Sprayed Thermal Barrier Coating with Increase in Coating Thickness

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ABSTRACT

In this study, the nature of performance test like a bond test, wear test and hot corrosion test and its effects on plasma sprayed Yttria-stabilized zirconia and Al2O3 composite (50:50 compositions) coating on Aluminium 6061 substrate are carried out. The three topcoat thicknesses of 100µm, 200µm, and 300µm are used for the studies. In case of hot corrosion test, the substrates were spread by molten salt (55wt.% V2O5+45wt.%Na2SO4) which is kept in the furnace at 350 °C for 40 hours. The properties changed for the different bond thickness where for 200 µm wear properties become optimal and 300 µm the corrosion test remains optimal. There is an improvement in the bond strength and its optimal value is obtained for 100 µm topcoat thickness. The physics behind all three experiments are explained in this paper.

Effect of Rotational Speed in Vertical Centrifugal Casting on the Wear Properties of Obtained Aluminum Tubes

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ABSTRACT

The rotational speed of molds plays a predominant role in defining the quality of cast tubes. The melt during the different rotational speeds strongly influences its motion in forming the final cast tube. Here, an Al–2Si alloy was taken for our experiment and cast at various rotational speeds (600–1200 rpm) to observe the formation of the tubes. The uniform tube was formed at 1000 rpm, the optimum speed, and the non-uniform cast tubes were formed at the other rotational speeds. Small grain sizes and optimum wear characteristics were formed in the cast tube that was rotated at the optimum speed. In other cast tubes formed at the other rotational speeds, coarse grains, pores and poor wear characteristics were formed.

*Full paper: Iranian Journal of Science and Technology, Transactions of Mechanical Engineering, pp 1-6, 2018*
Understanding the Effect of Multiple Traverse Feed during Friction Stir Welding Processes

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ABSTRACT

The scope of this paper is to understand the effect of multiple pass of the tool during friction stir welding process of Al-17Si alloy and evaluate its microstructure and tensile strength. The rotational speed of 900 rpm with three different feed rates (50, 100, 150 mm/min) was selected for this process. The weld gap seen below the tool tip has been reduced drastically during the multiple pass and after the third pass the weld gap was invisible. With the increase in the feed rate, the adhesion was reduced between the tool pin circumference and diffused material, hence a small increase in the weld gap was observed. The substantiate changes in the microstructure was observed due to the severe formation of the metal during low feed rate. With the increase in the feed rate, some coarse grains were observed near and below the tool pin. The tensile strength during the multiple pass of the tool was studied and found better for lower feed rate. Further, the variation of the tool speeds (600, 900 and 1200 rpm) for constant feed rates of 100 mm/min were discussed. The more heat input improves plunging depth thereby reduces weld gap, but for higher heat input (tool rotation: 1200 rpm; feed rate: 100mm/min) increase in weld gaps was seen. The tensile properties for all the cases were discussed. The diffusion process, friction force and relative velocity pertaining to this process were highlighted finally.

Evaluation of Mechanical Properties of Polyester Based Glass Fibre Composites

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ABSTRACT

This paper is about the development of Woven E-glass fibre-based polyester composites filled with Zinc Oxide (ZnO) and Molybdenum disulphide (MoS₂) fillers. The mechanical characterization of these composites is performed. The three-body abrasive wear characteristic of fabricated composites has been assessed under different operating conditions. Mechanical properties such as Tensile, Impact, and Hardness were also carried out according to the respective ASTM standards. The objective of this work is to study the influence of Zinc Oxide (ZnO) and Molybdenum disulphide (MoS₂) on woven Glass fabric. It provides and orientation to optimise the present day Glass-fibre polymers and a platform to explore and investigate new combinations.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Mechanical Investigations of Carbon-Jute Hybrid Composites

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ABSTRACT

The effect of the fiber orientation of thermosetting epoxy resin with carbon and jute fiber- a natural polymer hybrid composite has been investigated by experiments. The tensile, flexural, impact, hardness and specific gravity are tested. The natural polymer hybrid composite is developed by the traditional method of fabricating the composite i.e. by hand layup technique. The proportion by weight of fibers and resin are kept constant, while varying the fiber orientation. The laminates are kept for curing at room temperature condition. Specimens are developed according to ASTM standards. Experimental results showed that hybridization of the composite with natural and synthetic fibers shows enhanced mechanical properties. The content of natural reinforcements is 60% in the developed hybrid composite. The effect of untreated jute placed at different fiber orientation has significant effect on the flexural, impact, hardness and specific gravity properties than tensile properties. An overall comparison between the properties of the developed natural polymer hybrid composite revealed that the presence of carbon fiber woven mat on both the sides of the composite has played the critical role by balancing the properties and reducing the overall cost.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Impact Behavior of Hybrid Nano Filled Kevlar Reinforced Composites

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ABSTRACT

Polymer Matrix Composites (PMC) is gaining significant importance due to their unique feature of high to weight ratio, lower wear loss, better tensile strength etc. Behaviour of different fibre-reinforced composite materials is studied with respect to their composition and the applications are discussed. The aramid composites in general resist shattering upon impact, and the presence of the fibers inhibits propagation of cracks. Aramids have high tensile strength, high stiffness, high modulus and low weigh and density. Impact-resistant structures have been usually produced these materials. The present study deals with the mechanical properties of Kevlar reinforced polymer composites focussing on its impact behavior. The addition of ceramic filler material such as nano Silicon Carbide and alumina would further improve its overall mechanical and wear characteristics. The objective of this work is to study the influence of nano Silicon Carbide and Alumina on woven Kevlar fabric. It provides an orientation to optimise the present day Kevlar materials and a platform to explore and investigate new combinations.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Developing a Tipped Carbide Piercing Punch for Cold Forging Nut Former

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ABSTRACT

Cold forging has played a critical role in fasteners and has been applied to the automobile industry, construction industry, aerospace industry, and living products so that cold forging presents the opportunities for manufacturing more products. A vacuum brazing process for joining of Tungsten carbide (WC) and Steel using porous binder cloth was developed for tipped carbide piercing application. First, a 0.5mm porous binder cloth (Ni-Cr alloy) was sandwiched between tungsten carbide (WC) and steel using Natrosol glue. Vacuum brazing experiment was conducted on Furnace brazing chamber at 1130°C for 10 h and post cryogenic stress relief treatment will increase bonding strength. Hardness test reveals a good bonding obtained between tungsten carbide and steel.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Corrosion Resistance and Heat Treatment of Stainless Steels

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ABSTRACT

The world consumption of stainless steels has shown a constant increase of 6% per annum since the middle of the 20th century. Over a few decades, various means of preventing corrosion of steel products have been extensively used. Heat treatment serves to restore maximum corrosion resistance and to improve the mechanical properties. Stainless steels are generally heat treated based on the type and reasons for carrying out the treatment. This paper aims to expound the various heat treatment methods such as stress relieving, hardening and annealing that strengthen the corrosion resistance properties of stainless steel. As a result of these heat treatments, different microstructures can be observed under different temperature. This microstructure provides a clear insight on the environmental susceptibility of stainless steels. The rapidly increasing applications, demand for products and quality requirements are providing a wider scope for heat treatment industries. After implementing these techniques, the performance of stainless steel has been enhanced and total life costs have been reduced considerably.

* Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Study and Analysis of Fuel System Snags in Aircraft

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ABSTRACT

HAL is producing Aircrafts, helicopter for the Indian Defence. In Aircraft division currently HAWK MK-132 aircraft is being manufactured which is an AJT. After the assembly of various components of aircraft, functional checks have to be carried out. During these checks, some of the snags will appear repetitively. These snags are critical and must be rectified immediately. Among those snags are studied and analyzed one of the critical snags which were not rectified after few corrections. The snag has studied and analyzed is regarding the vent system. In the vent system the fuel is venting at 10.2 psi instead of venting between 18.9 to 23.2 psi by the method of snag analysis which is followed as standard method.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Production Loss Management Using Line Balancing in Drive Head Assembly Line

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ABSTRACT

Profit is life-line of any business. Profit can be increased by minimising the losses in production and continuous improvement in quality. Losses will have negative impact on the productivity and quality of the products produced by any organisation. If cycle time is used as one the tool to measure each workstation’s productivity, then reducing the cycle time at the workstation will minimise the time loss in production thereby increasing the productivity. The workstation which takes the longest cycle time will be the critical process or bottleneck process. Also, line balancing is used as one of the effective tools for reducing the cycle time. So, the productivity can be increased only if the critical process is ‘debottlenecked.’ The line efficiency also improves. This paper is aimed at identifying bottleneck workstations with the longest cycle time activities and reducing the losses in production at each workstation in an assembly line of automobile drive head.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Cognitive Ergonomics - Visual Ergonomics for Computer Workstation

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ABSTRACT

Ergonomics is sometimes described as "fitting the system to the human," meaning that through informed decisions; equipment, tools, environments and tasks can be selected and designed to fit unique human abilities and limitations. Cognitive ergonomics or cognitive engineering is an emerging branch of ergonomics that places particular emphasis on the analysis of cognitive processes – e.g., diagnosis, decision making and planning – required of operators in modern industries. Cognitive ergonomics aim to enhance performance of cognitive tasks by means of several interventions, including user-centered design of human-machine interaction and human-computer interaction (HCI), design of information technology systems that support cognitive tasks (e.g., cognitive artifacts), development of training programs, work redesign to manage cognitive workload and increase human reliability.

* Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Study and Assessment of Workplace Ergonomics at Manufacturing Industries

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ABSTRACT

Continuous monitoring of the shop floor and interaction with the workers in an axle manufacturing industry led to the identification of the current work. The pinion assembly which weighs about 43 kg has to be lifted from the differential assembly to check the end play. The range of the lift is 0.05 to 0.2 mm. This work was being carried out manually done. Workers complained musculoskeletal pain involving shoulder and forearm pain; and a few even complained chest pain as well. In order to overcome these problems, a pneumatic drive was developed to lift the pinion assembly to check the play.
Integrating the Ergonomic Factors with the Lean Manufacturing Tools to Improve Productivity

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ABSTRACT

In order to deal with the market competition, industries have undergone many efforts directed to improve productivity with reduced waste. Lean manufacturing system is not limited to only large scale industries but it can adapt to any kind on industries to get a green results. This ongoing study is aims to improve the productivity in medium scale moulding industry laterally reducing the manufacturing lead time by adopting the lean manufacturing tools with integrating the ergonomic factors. From the results it is reported that the manufacturing lead time is reduced by 33.33%.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Productivity Improvement of Surface Mount technology (SMT) line by Analyzing 4Ms

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ABSTRACT

Productivity improvement is one of the core strategies towards manufacturing excellence and it is also necessary to attain good financial and operational performance. It enhances customer satisfaction and reduce time and cost to develop, produce and deliver products and service. To improve the productivity one of the important task of the manufacturer is to find new ways to reduce manufacturing lead time by utilizing the available resources. For this to happen there should be no interruptions during the production. In the current scenario a study was conducted on a Surface mount Technology (SMT) line and delay was noticed during the PCB assembly process leading to lower productivity. The main objective of this work is to analyse the delay with respect to 4Ms (Man, Machine, Material, Method) and reduce the delay by providing solution and suggestions using suitable problem solving tools. The delay data collected is analysed using Pareto chart for selecting the top most causes of delay. The state of productivity for the month of November is as follows: SMT-1 is 81% & delay is 269.5 hrs, SMT-2 is 69% & delay is 163 hrs and in December: SMT-1 is 74% & delay is 355.5 hrs, SMT-2 is 70% & delay is 159 hrs. The result obtained for the month of January is as follows SMT-1 80% & delay is 235 hrs, SMT-2 is 75% & delay is 152 hrs and February is SMT-1 is 94.4% & delay is 200 hrs, SMT-2 is 75% & delay is 149 hrs.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Supply Constraint Removal in Critical Parts

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ABSTRACT

Managing the flow of materials plays a very important role in any manufacturing industry in order to achieve the required demand as well as to maintain the cost of a product. The constraints in SCM play a very crucial role in deciding the cost and the overall profit of a company. These constraints directly affect the production of plant as well as overall profit of the company. This paper explains the different constraints coming into production while supplying the raw materials from the vendor to the manufacturing industry. WHY-WHY Analysis is being carried out to reduce these supply constraint and increase the availability of the materials so that the manufacturing industry can achieve the daily or monthly requirement which indirectly affects the cost of a product.

* Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Improvement and Stream Lining of Quality Gates in Engine Machining Lines

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ABSTRACT

It is about the improvement and streamline of quality gate in the machining line operations of the H6 Series engines. Initially the concept of quality gate is defined, then literature survey about the quality gate through which the objectives of the work were defined. Then the progress of the project is defined and the work carried out till date that is the preparation of SOP (Standard Operating Procedure) for Q gates in the machining lines, before that the introduction about the machining shop is presented with the Layout, Block diagram of machines and the operations carried out are presented. The present situation of Q gate and process carried out is explained. Then later the checklist of the quality gate is further improved as per the situation required. For that the current checklist pros and cons are noted and the required changes are made based on the notes taken. Later on the checklist and the SOP are implemented to the quality gates of the lines. The current states of the defect flow rate across quality gates are tabulated. Thus, due to implementation of reformed checklist and SOP the required objective of the work can be achieved.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Inventory Reduction in Manufacturing Industry

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ABSTRACT

Inventory control is an important part of the supply chain management that deals with optimal balancing service levels against investment over a very large assortment of the stock keeping units and uncertainties. Inventory control of slow-moving items is essential to many establishments, since excess inventory leads to high holding costs and stock outs can have a great impact on the performance of operations. Data analysis and counter measure is carried out. Further implementation of GST (Goods and Service Tax) badly resulted increase in the inventory. This caused many other issues in procuring materials and accounting. Work was done to reduce overall inventory which reduces Inventory days and Inventory carrying cost and to control and reduce the inventory for the smooth running of the industry.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018*
A Study on Barriers in Implementation of Lean Manufacturing System in Indian Industries

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ABSTRACT

Lean manufacturing is considered as a rapid growing manufacturing culture. The organizations to enhance their position and to grow at a faster pace in the competitive world have to adopt a new philosophy like ‘Lean’. The primary competitive measure of lean is “ability to respond to the customer and satisfy his requirements by making the process of production efficient and waste free”. The purpose of this paper is to identify the barriers in lean implementation and to develop the relationship among these identified barriers. It shows that one of the major barriers companies encounter in attempting to apply Lean is not a knowledge of particular tools and techniques, perhaps lack of comprehensive and suitable lean knowledge related to problems within the companies by the managers, direction, gap and lack of recognition of lean culture in the organization and planning will cause the fail in the implementation. The good understanding of lean principles and practices is required for successful implementation of lean as lean practices without knowing lean principles can give short term success, but may fail as long term strategy. In most of the Indian industries it is currently used as improvement tool instead of adopting this concept as a culture. This paper has attempted to explore the key barriers in extensive implementation of Lean Manufacturing in Indian industries.

*Full paper: National Conference on Materials, Mechanics, Manufacturing and Industrial Engineering, April 27-28, 2018
Department of Electrical & Electronics Engineering
Artificial Intelligence for Human Behavior Analysis

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ABSTRACT

As Natural intelligence (NI) is exhibited by humans and other animals, Artificial intelligence (AI) is programmed into machines. AI research field is described as the study of intelligent devices like a Robot, computer etc that recognize its surrounding environment and takes appropriate actions. In the field of video surveillance system, moving object is a prominent area of research under computer vision. This is not effortless work as continual distortion of entity taking place during motion. Any entity in motion has various accredit in spatial and temporal spaces. In temporal space entity varies in motion rate where as in spatial space entity differs in size. The main focus of this work is detection and identification of people. The video datasets of group of people are considered in order to identify humans and track humans in crowd scene. Background subtraction technique is utilized to detect humans. To extract features Histogram of Oriented Gradient feature descriptor technique is applied. Support Vector Machine (SVM) classifier method is made use to recognize human activity performed.

ABSTRACT

With the increased emphasis on both reliability and functionality, Shape Memory Alloys (SMA) is fast becoming an enabling technology capturing the attention of engineers and scientists worldwide. The thermal-electrical-mechanical dynamics of SMA are nonlinear and hysteretic in nature, possessing a problem for the researchers to model the actuator. The increased range of applications and better realisation of SMA actuators have led to the research on modelling of SMA’s thermomechanical response. The paper discusses various SMA actuator modelling approaches such as Preisach model, Fermi Dirac statistics, Duhem hysteresis model, Brinson model, etc. and attempts to elucidate their advantages and limitations through SIMULINK based models and simulation results.

*Full Paper: Emerging Research in Electronics, Computer Science and Technology Vol. 545, pp 1211-1228, 2018*
Progressive Crude Oil Distillation: an Energy-Efficient Alternative to Conventional Distillation Process

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ABSTRACT

Distillation is the major process in crude oil refineries as of now. In this work we focused the attention to energy saving with respect to an industrial crude oil distillation unit. An alternative to the conventional crude oil distillation model present in the Bharat Petroleum Corporation, Kochi Refinery is proposed and simulated. The theoretical predictions as well as the simulated results indicate that the Progressive crude oil distillation reduces the utility burden as well as increase the extraction of more valuable light components. The simulation was carried out using Aspen HYSYS V8.8.2. Different crudes are taken into account and their properties and amount of distillate are analyzed. The optimization is done in an easy manner rather than the conventional mathematical method, together with the advanced process control tools; make it profitable in the operation in real time.

*Full Paper: Fuel, Vol. 239, March 1, pp.1331-1337, 2018
Adaptation of Fuzzy Logic in Improving the Performance of Direct Torque Control of Induction Motor

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ABSTRACT

Fuzzy Logic Controller (FLC) is a type of non-conventional control system, which is knowledge-based approach. Fuzzy logic is a rule-base decision making method, used to control a process that a human can control with expertise gained from experience. FLC step forward as an alternate for conventional control strategies in automatic control systems. Both linear and nonlinear operation can be obtained.

In the paper work the fuzzy based speed controller and fuzzy based voltage vector detector are developed for Direct Torque Control (DTC) of the three phase induction motor using MATLAB/SIMULINK software. Fuzzy logic is used to overcome the conventional DTC drawbacks. The results of the conventional DTC and fuzzy logic based DTC are compared and inference such that fuzzy logic gives better performance is drawn.

*Full paper: International Research Journal of Engineering and Technology (IRJET) Volume 5, Issue 6, 2018
Remote Monitoring and Reconfiguration of Environment and Structural Health Using Wireless Sensor Networks

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ABSTRACT

In the era of Internet of Things, there has been an increasing interest in the adoption of emerging sensing technologies in the real-time applications such as Structural Health, environmental and Traffic Monitoring Systems. The wireless monitoring is gaining popularity as there is no wiring is required between the sensors and data acquisition systems. Recent improvements in GSM and micro controller technologies have led to the development of various Structural Health Monitoring (SHM) systems. The SHM should observe the context and provide reliable information about the integrity of the structure. There is a need for an embedded system with dynamic reconfiguration mechanism which can adapt itself to the unstable and ever changing environments of structural and traffic monitoring. The implementation of dynamic reconfiguration is still challenging for real time embedded system control software. The proposed framework should also support the combined deployment of two heterogeneous applications on the same WSN. The fundamental aim of this paper is to develop a real-time embedded system, which provides flexible and robust mechanism for monitoring and reconfiguration of environment and SHM.

Current Summation Based Approach for Loss Allocation with Distributed Generation

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ABSTRACT

This paper describes how retrofitting machines are designed and implemented to overcome the requirement of the trained persons to do machine operation manually, these old outdated machines are retrofitted by inserting the proper control technology by using power electronics, electrical and programming software and present new programming technologies. In the design, axes movements are driven by the servo motors to get a constant torque and spindle speed is driven from the spindle motors with gear system to get a variant speed and torque modes. Because of using motors and the machine control device working depending on the job’s requirement we can increase the number axes. Different sensors are used to trace out the movement of the axes and controlling of the axes movements. These sensors will send the signals to the controlling unit in order to stop or start the axes movements. Machine movements were controlling by the programmable logic controllers and the computer numerical control. PLC will support for conditional and sequential operations of the machine. Whereas CNC with help of the part programming and controlling structures the machine can do required operations.

Wideband Digital Receiver using Halfband Filters for Weather Radars

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ABSTRACT

This paper describes different challenges related with the design and operation of a multi-channel wideband receiver. Radar signal parameters are measured with high precision and accuracy using wideband digital receiver. For radar data processing the digital Intermediate Frequency (IF) signals are down converted using filters. The paper puts forward the traditional implementation of wideband receiver which should perform subsampling of the input data at Analog to Digital Converter (ADC) level. The major focus of the paper is to design a system compatible for solid-state radars.

Solar Powered Wireless Sensor Network for Pipeline Monitoring System

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ABSTRACT

In this project, a 16-bit MSP430 controller version with an android app is uniquely intended for an incessant crude oil pipeline monitoring and communication about the distance of 1350 Km from pumping station to harbor stockpiling tanks with 135 DCS station. Existing framework running on OFC and wired link to exchange data amongst stations and field engineers, have its own particular confinement, for instance consistent upkeep, transportation, and dedicated personnel which costs more to oil organization. It is inquisitive to build up a hub which must create energy of its own and should exchange information through secured remote system with low bandwidth, which must play all the procedure without human interference and must carry out the work which current system is doing. It will be implemented by building up a framework which gets power from solar panel and stores that same into battery banks. Put away power will be utilized by controller to screen fire, temperature, and levels and transmit SoS information utilizing Wi-Fi with MQTT architecture uncommonly intended for low bandwidth link by IBM Corporation. Expected outcome of this outline will utilize dedicated hub for every station with a secured IP and QoS level three secured MQTT with fixed sensors, dedicated low power controller with an energy harvester will be interfaced and specific firmware utilizing RTOS will be created to do the undertakings.

Comparative Analysis of Performance of D-Statcom and DVR for Voltage SAG, Voltage Swell and Fault Compensation

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Abstract

In this sophisticated era, without electricity, modern society would cease to function. The volume of power transmitted and distributed increases with high quality and reliable power supply. At the same time, rising costs and growing environmental concerns make the process of building new power transmission and distribution lines increasingly complicated and time-consuming. The power quality becomes one of the major considerations in the power system. It has become important especially with the introduction of the advanced devices. These advanced devices are more sensitive to the quality of the power supply. The power quality refers the voltage, current, and frequency at the rated value. If any variation occurred in these quantities with respect to the standard rating is considered as the power quality problems. The power quality problems like voltage sag or voltage dip, voltage swell and harmonic distortion causes a failure of the end-user types of equipment of the customers. In order to overcome these power quality problems, we prefer to use the custom power devices at the distribution side. Among different custom power devices, DVR and D-Statcom are preferred to use for increasing the power quality, because of their simple construction and less complexity. The paper presents comparative analysis of the D-Statcom and DVR by using MATLAB Simulink software.

*Full paper: International Research Journal of Engineering and Technology (IRJET), 2018
Voltage Stability Improvement by Optimal Allocation of Facts Controllers Using ABC Algorithm

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ABSTRACT

The topic of voltage stability in power system study has been paid great attention in recent years as it is one of the major issues of power system network. Increasing interconnection of power network has led to the drastic increase in power demand and as a result of this power network is operated closure to their stability limits. Voltage instability occurs in heavily stressed power system. Thus, voltage stability should be maintained for reliable operation of power system.

In this work, 'reactive power sensitivity index' is referred as an indicator for the analysis of voltage stability and the weakest bus of the system is identified. Artificial Bee Colony Algorithm is used for optimal allocation of SVC. By optimally allocating FACTS controllers i.e., SVC voltage profile and stability of the system has increased. The effectiveness of the present methodology is tested on standard IEEE 14 bus test system by developing a program using MATLAB.

*Full paper: International Conference on Innovations In Engineering, Technology and Sciences (ICIETS 2018)
Optimal Siting and Sizing of DG Employing Multi-Objective Particle Swarm Optimization for Network Loss Reduction and Voltage Profile Improvement

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ABSTRACT

Day by day employing Distributed Generation (DG) is increasing and it is becoming an indispensable small capacity generation in the distribution system. It is cost effective, eco-friendly and it can enhance the reliability of the distribution network.

This paper proposes a technique for optimal sizing and siting of DG, using modified Particle Swarm Optimization technique. It is proposed for optimal placement and sizing of DG. Since the objective is both reduction of losses and voltage profile improvement the multi objective function is chosen and by choosing appropriately desired level of emphasis is given to both the objectives. Also, by using an index Multi Objective Ranking Index (MORI) the best combination of loss reduction and voltage profile improvement is obtained. The effectiveness of the methodology is tested on standard IEEE -a33 bus system and results are presented.

*Full paper: 3rd International Conference on Emerging Research in Electronics, Computer Science and Technology - 2018
Voltage Stability Enhancement in Radial Distribution System by Shunt Capacitor and STATCOM

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ABSTRACT

Voltage stability has a major concern in power system operation. It is the ability of the power system to maintain acceptable voltages at all buses in the system under normal conditions and after being subjected to a disturbance. Voltage instability may result in voltage collapse of the system. Hence assessment of voltage stability is important. Implementation of new equipment including high power electronics based technologies such as Flexible AC Transmission Systems (FACTS) has become essential for improvement of operation and control of power systems. The project work aims at the enhancement of voltage stability in radial distribution system by using shunt capacitor and FACTS controller. A stability index named line stability indicator (LSI) is formulated for voltage stability analysis. This indicator is tested on a standard IEEE 33-bus radial distribution system. The indicator is used to find the weak lines in the system. Placement of shunt capacitor and FACTS controller at the receiving end side of the weak bus results in improvement of voltage profile of the system. Cuckoo Search (CS) algorithm is applied for optimal sizing of shunt capacitor and FACTS controller. Program is coded in MATLAB for the enhancement of voltage stability in the radial distribution system.

*Full Paper: International Conference on Emerging Research in Electronics, Computer Science and Technology, (ICERECT), Mandya, August 23-24, 2018*
Performance Analysis of Solar PV Generation System

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ABSTRACT

In developing countries like India, energy from solar is becoming dominant over other energy sources and also over all the entire universe because of diverse applications. Technically system performance can be improved by correct understanding of the plant. This could even result in better regulation, cost-effective investment and maintenance. Analyzing these grid connected photovoltaic systems performance could help in designing, operating and maintenance. This paper covered various performance parameters like irradiation, weather conditions, design specifications to get improve efficiency of generation are some of the factors which contribute to the performance of solar power plants. In this paper efficiency analysis of Danfoss Industries Ltd. Chennai with 1MWpeak Solar PV system has been considered where solar panels are distributed over five buildings. Performance analysis has been done using the software PV SYST V6.40 and effective solution provided to improve the operating performance and efficiency of solar (PV) system based on assessment of the site and one year solar data collected from Sterling and Wilson Pvt Ltd. Bangalore.

*Full paper: International Conference on Innovation in Engineering, Technology and Science at NIE-IT Mysuru, September 21, 2018
Home Automation for Physically Challenged People

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ABSTRACT

Physically handicapped people have to depend on others for each and every need. Like switching of fans, lights and opening of house door. Here we are designing a system which is useful for them to control the home appliances by using their android phone itself. Which in turn this system helps them to lead their lives easily and independently. Technology is a never ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. This paper presents the design and implementation of a low cost but yet flexible and secure cell phone based home automation system. The design is based on a stand-alone Arduino BT board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Arduino BT board is wireless. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core. Password protection is being used to only allow authorized users from accessing the appliances at home.

*Full paper: National level Symposium –e-belaku-2018, Adichunchanagiri Institute of Technology (AIT) Chikmagalur, 2018
Role of Deregulation in Power Sector and its Status in India

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ABSTRACT

Deregulation is engendering the change in power system structure by including the private participants and by increasing the customer role in pool electricity market. The transition of power sector from regulated to deregulated structure includes many positive and negative outcomes. This paper presents various key aspects of deregulation, pre and post scenarios of deregulated power system, identifying different reasons that led to transition from regulated electricity market to deregulate one, and various impacts of deregulation on the operation of power system. Further, this paper discusses different phases of Indian deregulated power sector and it is exemplified. Also, a brief study of the status of Indian power sector using different parameters such as plant load factor, share of private sectors, Transmission and Distribution losses, average tariff and status of State Electricity boards is performed.

*Full paper: National Power Engineering Conference (NPEC), 2018*
Department of Electronics & Communication Engineering
The Effect of Dielectric Surface Modification and Heat-Treatment on the Performance of Rubrene Based Organic Field-Effect Transistor

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ABSTRACT

In this work, bottom gate top contact structured organic field-effect transistors (OFETs) were fabricated using Rubrene as active material and SiO₂ as the dielectric on n-type silicon wafer by thermal evaporation method. The effect of dielectric surface modification and abrupt heat treatment on the crystallinity of Rubrene thin film and its influence on the performance of OFETs are investigated. The surface morphologies and the crystal structure of Rubrene films are characterized using differential scanning calorimetry, X-ray diffraction and atomic force microscopy. It is observed that the dielectric surface affects the crystalline structure of Rubrene thin film as well as the electrical performance of the OFETs. Thermal transition of Rubrene from amorphous state to highly crystalline state is observed after abrupt heat treatment. It is observed that highly crystalline Rubrene thin films can be obtained by carefully deploying the rapid heat treatment method followed by surface treatment. The electrical properties of the OFETs such as field effect mobility, threshold voltage and current on/off ratio are evaluated using the V-I characteristics and the results are compared with the published data. Improvements in the performance of OFET are evident due to the improved crystallization and highly ordered structure of Rubrene molecules.
Statistical Wavelet Based Adaptive Noise Filtering Technique for MRI Modality

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ABSTRACT

In this research work, wavelet domain method is designed to filter noise in medical images. This method adapts to various types of noise, which is dependent on the user or medical expert. Here, a single parameter can be used to balance the preservation of relevant details and the level of noise reduction. This method needs the subsequent information of the related image details across the resolution scales to perform a preliminary coefficient classification. The statistical distributions of the coefficients can be estimated by using preliminary coefficient classification that characterizes the valuable image features and noise levels. Wavelet domain indicator is used to achieve the conversion to the image features and noise level. The experimental results demonstrated noise suppression in Magnet Resonance (MR) and Ultra Sound (US) images and its performance is validated by using quantitative and qualitative methods.

*Full paper: Journal on Pattern Recognition, Vol. 4, Issue 4, 2018*
Probabilistic Identification and Estimation of Noise: Application to MR Images

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ABSTRACT

For proper modelling of signal and noise in MR data requires proper interpretation and analysis of data, the different approaches with this degradation due to random fluctuations in the MR data, probabilistic modeling is a powerful solution, which needs correctness in the computation of noise is a challenging task and various statistical approaches can be utilized. After modelling the noise it can be integrated to denoising pipeline, in this research work, the recognition of noise only pixels and the evaluation of standard deviation of noise using median, mean or other optimal sample quantiles are combined in to single frame work for noise assessment and uses fixed point iterative procedure to obtain standard deviation of noise. We tested the effectiveness of the algorithm to the MR clinical and synthetic data base.
Retinex Processing for Automatic Image Enhancement Using Wavelet Transformation

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ABSTRACT

Retinex is a method used for image processing. Image processing has a great role in Medical science. Medical images such as MRI, CT, Ultrasound, X-Ray has to be processed for proper diagnosis. Retinex technique can be used for the processing of these images. By Retinex processing, it can provide better dynamic range compression, color consistency, and lightness rendition. The different methods proposed by Retinex algorithm include Light Compensation Algorithm in Color Facial Image, Retinex for bridging the gap between color images and the human observation of scenes, Color Image Contrast Enhancement by Retinex, Color Image Enhancement with Adaptive Filter. Single scale Retinex causes halation due to Gaussian filter and it does not preserve the edges, while the multiscale Retinex has a very high computational cost. So in this project, we propose Retinex algorithm based on wavelet transformation which has low computational cost, i.e. it takes a lesser amount of time and higher efficiency. The input image is processed by wavelet transform. Here the Gaussian filter and Retinex are applied only to the half the resolution of the image. Thus, the computational cost is reduced as the number of pixels for processing is reduced and the Gaussian surround space can be small. Histogram equalization is applied to improve the visual effect. Moreover, we gain higher entropy by using clipping and gain/offset operation. At last, we compare the proposed output with that of the standard MSR output. The experimental results show that proposed method provides satisfactory image enhancement without halation.

RF Controlled Aircraft

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ABSTRACT

There has been a rapid inclination towards wireless communications at present because of the quick and successful developments in the supporting technologies. Flying of an aircraft using Arduino and RF transceiver modules is what we have focused upon in this paper. The project is a prototype of an unmanned aircraft that makes use of Radio frequency. It can also be used in the defense sector for several purposes. The prototype is controlled by the Transmitter circuit, which has been constructed manually. The motion of the aircraft is controlled by the Arduino. The result generates an efficient interfacing between the aircraft and the remote.
Video Processing on an ARM Based Embedded System

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ABSTRACT

One of the many applications of embedded systems is remote image/video acquisition for surveillance purposes. In the recent times, ARM processor and LINUX OS have become more popular in the embedded space with the availability of a number of libraries. In this paper OpenCV library and two cameras interfaced to an ARM development board are used for implementing the surveillance system. Video from more than one camera will provide better information for applications such as intrusion detection. ARM cortex-A8 processor based Beagleboard-xM with interfaces such as USB, DVI-D, S-Video, Ethernet, HDMI, LED and so on, is an ideal platform for low power embedded application development. Angstrom Linux distribution has the necessary device driver are supported by a flexible GNU cross compilation tool chain for application development. The environment supports both C and C++ programming. The primary objective of the paper is to display the processed video on the graphics display. The ARM based embedded system was interface with two cameras for video capturing. Video frames were captured at 10 frames/second instead of 30 frames/second to conserve memory on the embedded system.

*Full paper: International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Vol. 4, Issue 6, 2018
IOT Based Monitoring of Kitchen-Waste Biogas Plant

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ABSTRACT

The biogas generator system put into practice has the deficiencies of poor stability, robustness and real-time, which has impacted the promotion and development of biogas power generation technology greatly. Anaerobic digestion (AD) systems are extremely sensitive to changes in environmental variables. The efficiency of biogas production during anaerobic digestion depends heavily on optimal dosing ratios and stable operations which cannot be achieved without accurate and reliable monitoring and control of the dry matter (DM) and organic dry matter (oDM) content. Correct design and controls of the system’s parameters are essential to maximize process efficiency, increase stability, and prevent system failure. Monitoring systems can help both raise plant availability and help meet the transparency requirements of the process. The project is a prototype of a system that makes use of sensors and micro-controller. It can be used in the biogas system as an external hardware. The prototype is controlled by the ESP8266 controller, which can be programmed and constructed as required by the user. By monitoring the system, the result gives an accurate condition of the biogas unit which can be monitored and corrected in future.

*Full paper: International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Vol. 3, Issue 1, 2018
Simulation of Organic Field Effect Transistor Using LT Spice

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ABSTRACT

In this paper, LTspice was used for simulation of Rubrene organic field effect transistors (OFETs) as a necessary step before fabrication. The OFET model was developed and simulation was performed to study the effects of varying different performance parameters such as mobility, width/length ratio, oxide thickness and gate length and their optimization to improve the performance of OFET. Output and transfer characteristics of the modeled OFET device were drawn using the simulation tool. Drain to source currents (IDS) as a function of drain source voltage (VDS) with gate source voltage (VGS) has been analyzed with different OFET parameters. Insight gained here helps to focus on specific dimensions during fabrication.

\textsuperscript{*}Full paper: International Conference on Electrical, Electronics, Computers, Communication, Mechanical and Computing (EECCMC), IEEE, January, 2018

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ABSTRACT

As the networks on chips is used for designing the multi-processor system on chips, this platform have been typically guaranteed for hard real time property, and for the use of shared resources in a network. The service guarantees has to be provided by the network with respect to bandwidth and latency for a different communications flow. Thus message passing communications between the processor cores are implemented for the network on chip. The TDM is used for controlling the communications over the structures of router, links and network interface. The two main contribution of area efficient are (i) The TDM schedule with combined asynchronous router and (ii) The micro-architecture of NIs. In concert with the design resulted with the transforming the data in a pipelined manner which means transmitting the data from the local memory of send core to the local memory of the receive core, without using any dynamic attributions, buffering and local synchronization. The router also uses the two phase bundled data hand shake latches based on the mousetrap latch controller and it is extended with the gated mechanism for reducing the energy consumption. Network interface is used for integrating the DMA and the TDM functionalities. The dual ported local memory is used for avoiding buffering, flow controls and synchronization. Thus obtained result is verified with respect to area, power and gates.

*Full Paper: Third International Conference on Emerging Trends in Electrical, Communication and Information Technologies, 2018
Number Theoretic Transforms for Fast Digital Computation

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ABSTRACT

This paper examines the properties of Number Theoretic Transforms over FFT. The aim of this study is to show that Number Theoretic Transforms can be really beneficial in terms of error free computation and reduced computational complexity. 1D and 2D NTTs are implemented in Matlab and properties are verified and as an example convolution is implemented using NTT and shown that it can be computed faster.
Quantum Cryptography: An Overview

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ABSTRACT

Quantum cryptography (QC) can be used to unconditionally secure data communications by exploiting the quantum mechanical properties. The best example is quantum key distribution. In future, if the computers are based on quantum mechanics which are exponentially faster when compared to classical computers, QC may be considered as a replica for classical cryptography. In this paper, an overview of post quantum cryptography, mathematical representation of QC by using linear algebra and Julia/Jupiter notebook is studied.

Analyze KDD-Dataset for Detection of SYN-Flood Using Python

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ABSTRACT

Denial of service (DOS) and Distributed DOS (DDOS) are evolving continuously. These attacks make network resources unavailable for legitimate users which results in massive loss of data, resources and money. Combination of Intrusion detection System and Firewall is used by Business Organizations to detect and prevent Organizations network from these attacks. But this combination cannot prevent network from novel attacks as Signatures to detect them are not available. This paper presents a brief description about KDD dataset and signature for detecting DDOS attack called SYN-Flood (Neptune) attack which mainly consumes network resources. Experimental results are provided to support the proposed mechanism.

Analysis of Additive Gaussian Noise Using GNU Radio

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ABSTRACT

GNU Radio is open frame work, in view of C++ and Python which can be utilized to develop real time signal processing application. Presently a day’s interest for Wireless Communication system design is rapidly increasing. At whatever point data is transmitting through a remote channel there is a greater likelihood that data is affected by the noise over the channel. We have to wipe out that noise with a specific end goal to accomplish the reliable communication. In this way, Noise Cancellation has a noticeable part in Digital communication. The aim of this paper is to analyze and synthesize signals using different type of sink. Also, analysis of reconstruction of original audio signal from Additive Gaussian Noise source has been actualized.
Frontend for Assembly Language Programming on Linux

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ABSTRACT

From the past decade, graphical interfaces have taken over command line interfaces, the main reason being its visual appeal. We have been using system commands for the compilation and running of assembly language programs on Linux. This frontend aims at creating a user interface which replaces these commands with buttons. This user interface is simple, consisting of buttons for assembling, linking and running assembly language programs with multiple options. The frontend is neatly packaged and can be used as a better alternative for executing assembly level programs.
Modified Dark Channel Prior for Effective Haze Removal in Indoor and Outdoor Images

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ABSTRACT

Images captured may suffer from color attenuation due to the transmission medium and scattering of the air light and when the weather is foggy the scattering is more, so the color attenuation is to a larger extent resulting in poor quality of the image. Several research has been done to enhance the foggy images captured outdoor but little has been done to enhance degraded images captured indoor too. Hence in this paper a novel approach is proposed to dehaze images captured indoor and outdoor as well, using the traditional dehazing algorithm the Dark Channel Prior (DCP) with efficient transmission map. Further, the contrast of the dehazed image is improved by histogram equalization and sharpened by wavelet transform of the resultant image.

Ascertainment of Lung Cancer at an Early Stage

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ABSTRACT

Lung cancer is a disease of abnormal cells multiplying and growing into a tumor. Recently, image-processing techniques are widely used in several medical areas for image improvement in earlier detection and treatment stages, where the time factor is very important to discover the abnormality issues in target images, especially in various cancer tumors such as lung cancer, breast cancer, etc. The proposed system is designed to detect lung cancer in premature stage in two stages. The proposed system consists of many steps such as image acquisition, pre-processing, binarization, thresholding, marker-controlled watershed segmentation. At first Input lung CT, X-Ray images are taken and then passed through the image pre-processing stage by using some image processing techniques. In first stage, Binarization technique is used to convert binary image and then compare it with threshold value to detect lung cancer. In second stage, marker-controlled watershed segmentation is performed to segment the lung CT images. The performance of proposed system shows satisfactory results and proposed method gives 97% accuracy.

Emotion Recognition Using Neural Networks

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ABSTRACT

Recently, cloud-based services have exploded in usage that has enabled the developers to include a spectrum of recognition services, such as emotion recognition, in their applications. Emotion recognition is really a challenging problem and thus, the aim is to develop a classifier which can recognize emotions in an open world. So we focus on recognizing an emotion in an open world by developing a classifier which will be trained to classify emotions accordingly. The classifier used is a linear support vectormachine. Apart from the classifier, finding better ways to collect and describe data is also equally important. So, the methodology employed in here is to extract raw coordinates from a face, establishing relative positions of these points with respect to another and face offset correction resulting in a coordination matrix which stores all the coordinates of the face which is now fed to the classifier to recognize the emotions in an open world. Using this approach, the recognition rate is proved to be 93.9%.

*Full Paper: Proceedings of NCRTECE-18), 2018*
Brain Tumor Detection Using Advanced Segmentation Method

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ABSTRACT

Classification of MR brain images is extremely important for medical analysis and interpretation. Over the last decade, numerous methods have already been proposed. In this paper, we will present a method to classify a given MR brain image as normal or abnormal. The proposed method first employed wavelet transforms to extract features from images, followed by applying principle component analysis (PCA) to reduce the dimensions of features. The reduced features were submitted to a kernel support vector machine (KSVM). We chose some common brain diseases (Benign, meningioma,) as abnormal brains, and collected 35 MR brain images (20 normal and 15 abnormal) from MATLAB Database. We performed our proposed methods and got the result with accuracy around 80% and calculated many parameters like RBF, Linear, polygonal, Quadratic Accuracy and we also calculated Mean, SD, and Entropy etc. The averaged processing time for a 256 × 256 size image on a laptop of HP with 2.7 GHz processor and 8 GB RAM is 5s. From the experimental data, our method was effective. It could be applied to the field of MR brain image classification and can assist the doctors to diagnose where a patient is normal or abnormal to certain degrees.

*Full Paper: Proceedings of NCRTECE-18), 2018
Department of Computer Science & Engineering
Trust Based Routing Protocol for Ad-Hoc and Sensor Networks

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ABSTRACT

Routing protocols in mobile ad hoc and sensor networks discover usable multi-hop routes between source and destination nodes. However, some of the routes found and used may not be as reliable or trustable as expected. Thus, finding a trusted route is an important component for enhancing the security of communication. This paper presents a trust-based routing protocol for enhanced security of communication in mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs). Enhanced trust and security are achieved by the maintenance of a trust factor by the nodes in the network. This factor is established and refined over time and it increases for each node when it participates successfully in data transmissions. Simulation experiments are performed to verify the operation of the proposed protocol and evaluate its performance. The results show an improvement in the trust potential of the discovered path with the proper choice of certain important trust parameters.
Interactive Gesture Based System with Email Access and Voice Command for the People with Visual, Hearing and Speech Impairment Using IOT

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ABSTRACT

The advancement in communication technology in coordination with IoT made the communication easy. These emerging technologies have been helping the mankind with its wide range of applications. However it is difficult for the visually impaired (blind) to access these technologies because they require visual sensitivity. According to the survey in our country 2.78% people have Hearing and Speech Impairment (dumb). In order to communicate with others Visual, Hearing and Speech Impaired people use the motion of their hands and expressions (gestures) as this method of communication involves a lot of ambiguity. So there is a need for a system to establish communication between the Visual, Hearing and Speech Impaired and the society. A large-scale microcontroller system and a data glove equipped with the accelerometer are proposed to facilitate the communication among the dumb, deaf and visually impaired and their communication with the common people. This system can be dynamically reconfigured to work as a “smart device”. In this system, Gestures are made using data glove equipped with accelerometer sensor. And the microcontroller based system converts specified movements into human recognizable voice and generates an email with predefined images and subject.

Autonomous Wheelchair Using IOV

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ABSTRACT

This paper aims to develop a wheelchair which can move autonomously using Internet of Vehicles (IOV). The Internet of Vehicles is a communication system between vehicles and networks. This communication system gathers data about the movement of vehicles, which can result in the creation of different services. The proposed model uses IOV and image processing to help the wheelchair move autonomously. Image processing used here aims to detect objects in front of the vehicle and allow it to take appropriate decisions. IOV concept helps us to connect many wheelchairs, infrastructure together and have communication between them. This model will enable us to incorporate it with smart city architectures and thereby increasing efficiency.

Analytical Modelling of Power Efficient Reliable Operation of Data Fusion in Wireless Sensor Network

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ABSTRACT

Irrespective of inclusion of Wireless Sensor Network (WSN) in majority of the research proposition for smart city planning, it is still shrouded with some significant issues. A closer look into problems in WSN shows that energy parameter is the origination point of majority of the other problems in resource-constrained sensors as well as it significant minimizes the reliability in standard sensory operation in adverse environment. Therefore, this manuscript presents a novel analytical model that is meant for establishing a well balance between energy efficiency over multi-path data forwarding and reliable operation with improved network performance. The complete process is emphasized during data fusion stage to ensure data quality too. A simulation study has been carried out using benchmarked testbed of MEMSIC nodes to find that proposed system offers good energy conservation process during data fusion operation as well as it also ensure good reliable operation in comparison to existing system.

*Full paper: International Journal of Electrical and Computer Engineering (IJECE) Vol. 8, Issue 6, pp 4637-4645, 2018
A New Wave in Health Informatics: A Brief Overview

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ABSTRACT

The term Health Informatics has become a famous word in recent years because of its increasing usage day by day which has opened up many opportunities in healthcare industries and the medical field at large. Nowadays all kinds of data are being analysed for insights. In this paper, we discuss a brief overview of health informatics and usage of Electronic Health Records (EHRs) and research ideas to get meaningful information from medical data. A new wave has begun to make use of health informatics in providing quality treatment and the required help for doctors which makes their and patient’s lives much more meaningful.
Movie Recommendation System Using Machine Learning

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ABSTRACT

Recommender systems train users to reach products or articles that they would otherwise not be observant of due to the expansion of information to be found on the Internet. The two traditional recommendation techniques are content-based (i.e. preference of user) and collaborative filtering (i.e. preference of similar users). As both the techniques have their advantages and disadvantages, the mishmash of both the techniques can rejuvenate some of the disadvantages and recuperate the position of the recommendation. The resulting system is known as a hybrid recommender system. In this paper we develop a movie recommendation system using hybrid approach that recommends movies to users based on the reference provided by them.
Significance of Applying K-Means Clustering Technique to Video Steganography

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ABSTRACT

The rapid growth in digitalization and usage of public domain channels has greatly facilitated transfer of data. The rapid growth in technology facilitating transfer of data through internet has a lot of security threats as these public domains are highly vulnerable. Among the techniques used for concealing the confidential data, video steganography is eminent. This paper indicates the progress in the field of video steganography, its uses and techniques based on secret media, image and video. The paper also makes a performance comparison of known video steganography techniques and identifies K-means clustering as one of the most suitable techniques for video steganography, which is applied in solving most of the real time problems.

Design of a Secure, Performance Efficient and Low-Cost Attendance Monitoring System Using IoT

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ABSTRACT

Cost reduction on the newer developed embedded systems has resulted in many IoT devices being developed for efficient computations at cheaper costs. These systems can be used for various purposes to reduce expenses and one such application would be to monitor attendance of students residing in hostels. This paper will present an Attendance Monitoring System we developed for the purpose mentioned above.
Placement Portal

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ABSTRACT

Placement activities take place in an institution on a regular basis, due to this the students have to be informed about the companies attending the campus at regular basis. There is also a regular need to maintain a student data for sending the student data to the companies according to their requirements. Due to this there is a need to have a online platform through which the students can register for their details and also register for the companies rather than depending on any physical material. The Placement Portal uses the DBaaS for storing the data permanently.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 05, Issue 04, 2018*
Cloud Based Multimedia Content Protection System

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ABSTRACT

It is necessary to protect the content as multimedia content is increasing exponentially. For large scale multimedia content protection a new design was proposed. To provide cost efficiency, rapid deployment, scalability, and elasticity to adjust varying workloads our design leverages cloud infrastructures. The proposed system can be used to protect different multimedia content types, including 2-D videos, 3-D videos, images, audio clips, songs, and music clips. On private and/or public clouds the system can be deployed. Our system has two novel components: (i) method to create signatures of 3-D videos, and (ii) distributed matching engine for multimedia objects. In this method signatures are extracted or created from original multimedia objects and through online sites. Signatures are also created from query (suspected) objects downloaded from online sites. As this design is based on cloud infrastructures it achieves rapid deployment on content protection system. Our experiments with more than 11,000 3-D videos and 1 million images show the high accuracy and scalability of the proposed system. In addition, we compared our system to the protection system used by YouTube and our results show that the YouTube protection system fails to detect most copies of 3-D videos, while our system detects more than 98% of them. Our analysis shows that the system is more efficient both cost and storage wise.

*Full Paper: IJARIIE, Vol, 4, Issue 2, 2018*
Android Based System for Camera Based Attacks

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ABSTRACT

Android user square measure perpetually vulnerable by An increasing range of malicious applications (Apps), generically known as malware. Malware constitutes a heavy threat to user privacy, money, device and file integrity. During this proposal we tend to note that by learning of their actions will classify malware into a little range of behavioral categories, every of that performs a restricted set of misbehaviors that characterize them. These mishaviors will be outlined by observance options happiness to completely different robot levels. Here we tend to square measure presenting Multi Level Anomaly Detector for robot Malware (MADAM), a unique host-based malware detection system for robot devices. MADAM detects and effectively blocks quite malicious apps, that come back form with un informed features while execution

Sign language Interpreter

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ABSTRACT

This paper aims to design a suitable system that will be useful for the people with hearing disabilities. In this paper we build a user friendly chat application, which helps in the communication of the hearing impaired. The hearing impaired use a very effective method of communication that is the sign language. Sign Language is a language which uses visual gestures, facial expressions and body movements for communication by deaf. The system proposes an application that can be used to convert text to Sign language GIFS and sign language GIFS to text. The aim behind this paper is to bridge the gap between a common man and a deaf by developing a chat application.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 5, Issue 04, April, 2018
An Efficient Education System to Enhance Student Employability Through Mining of Academics and Event Performance

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ABSTRACT

Education system in the current world focuses on multiple dimensions required for overall student development. Ensuring an ability to acquire a job opportunity is the basis of training given at an undergraduate and graduate level. Academic abilities are not alone important when it comes for placement, their co-curricular and extra-curricular trainings also plays a vital role. The pattern of behavior that exists in the student community is that they have tendency to attend program where a lot of people participate, and it is popular. Nobody cares whether the program suits their caliber or is there any benefit for them in attending such programs. The research here concentrates in developing an analytical model which helps in predicting the student community the most suitable program they can attend based on their knowledge level and also provides the rating of the various events in an educational institute. The basic step taken is to categorize the students and events based on various criteria and parameters using a Decision tree algorithm. Naïve Bayesian classification is applied on top the dataset in order to make a classification of event based on student grade and outcome they gained by attending an event. Overall system does the analysis of students and events and creates an analytical model for student community to choose the most beneficial programs that they should attend which enhances their chances of getting placed.

Automation Tool for Effective and Efficient Ration Products Distribution Using Smart Technologies

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ABSTRACT

In this paper, we have proposed a smart ration card utilizing Radio Frequency Identification (RFID) system, time slot allocation and SMS gateway to keep the ration fabrication. In this system, a RFID tag is utilized that conveys relative points of interest and the client needs to demonstrate this tag at the ration shop by scanning the RFID tag in the RFID reader. In the event that the client is discovered bona fide then the amount of ration to be given to client as indicated by the aggregate number of family part will be shown on the monitor. This shrewd ration card is free from robbery and imitation as the data about the purchased ration will be sent straightforwardly to the administration and client through SMS gateway using GSM modem. We have also proposed the idea of using SMS gateway to eliminate the queue system in ration shops. The clients are requested to come and collect their ration only in that time slot. The algorithm used for slot and re-slot allocation is Round Robin scheduling algorithm. Facility of re-slot allocation is provided for each card holder only once in a month.
Security Threats to Mobile Multimedia Applications: Camera-Based Attacks on Mobile Phones

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ABSTRACT

Today many smartphone applications are using wireless multimedia communications and hence in wireless multimedia communications mobile phone security has become an important aspect of security issue. As android is the most popular operating system the researchers has been extensively studied Android security. However, few works have studied mobile phone multimedia security. Here in this article, we mainly focus on security issues that are related to mobile phone cameras and video based attacks. Here we specifically discover several new attacks that may occur based on the use of phone cameras. We implement the attacks on real smart phones, and demonstrate the effectiveness and feasibility of the attacks. Furthermore, we propose a lightweight defense scheme that can effectively detect these attacks. We run these attacks along with popular antivirus software to test their stealthiness, and conduct experiments to evaluate both types of attacks. The results demonstrate the feasibility and effectiveness of these attacks.

Analysis and Detection of E-Mail Phishing Using PySpark

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ABSTRACT

Phishing is an act that attempts to steal information, personal data by using spoofed emails and fraudulent web sites to trick people into giving up personal information. Phishing E-mails involve malware links and is totally committed to obtain sensitive & valuable information. Phishing has become more and more complicated and sophisticated and attack can bypass the filter set by antiphishing techniques. Phishing impact ranges from denial of access to e-mail to substantial financial loss, resulting loss of public’s trust in internet. We provide robust method to detect phishing E-mails which performs some cross-validations techniques. The method includes Text Analysis, Link Analysis to encounter phishing countermeasures. Educational materials reduced user’s tendency to enter information into phishing webpages.

Water Level Monitoring System in Water Dispensers Using IoT

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ABSTRACT

One of the major problems faced by most of the large institutions is maintaining drinking water in water dispensers at various places inside the institution. Monitoring a large number of water dispensers in huge buildings require a considerable amount of manual supervision. This paper proposes a prototype system design, implementation and description of required tools and technologies to develop Internet of Things (IoT) based water level monitoring system which can be implemented in offices, colleges or buildings where many number of water dispensers are present. The smart water dispenser sends a notification when the level of water becomes low in the dispenser through an application to the authorized person. Once the person receives a notification for low water level, the application also provides him option to order water cans.

CKD and Its Stage Prediction Using Navie Bayes and C4.5 Algorithm

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ABSTRACT

Data mining is the process of extracting hidden information from massive dataset, categorizing valid and unique patterns in data. There are many data mining techniques like clustering, classification, association analysis, regression etc. The objective of our project is to project Chronic Kidney Disease (CKD) using classification techniques like Naive Bayes and Artificial Neural Network (ANN). The experimental results implemented showed that Naive Bayes produce more accurate results than Artificial Neural Network. Naive Bayes is a probabilistic classifier based on Bayes theorem. It assumes variables are independent of each other. The algorithm is easy to build and works well with huge data sets. It has been used because it makes use of small training data to estimate the parameters important for classification. Naive Bayes classifies the patients to one of the two classes: CKD or NOT CKD. The Artificial Neural Network (ANN) is a computational model inspired by structure and function of biological neural network. It is an interconnection of artificial neurons that processes information using connected links. It has been used as it works well with noisy data and processes both numeric and categorical data. The current system uses GFR technique for stage prediction, which considers only three constraints for the prediction of the stage, hence less accurate. Stage prediction is one of the challenging tasks in today's medical field and it is the area of concern. Proposed system uses C4.5 technique for the stage prediction, which considers all the 24 constraints unlike GFR technique.

The Segmentation of Nuclei in Digital Pathology in Microscopic Images

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ABSTRACT

We propose a method for segmentation of cancer nuclei which conflicts to the normal nuclei which involve indicative of brain tumors pathologically in microscopic images. To constrain the problem the spaces in the region of color information first we begin by converting the images into the V component of HSV (Hue, Saturation, Value) we are using the level-set segmentation in the training stage, next we follow by applying the sparsity representation (SR) in the test stage. In the process in SR, the proposed system VLS-SR will improve the capability of searching recursively for the optimal threshold level-set in the working subsets of the SR where the image cancer nuclei segmentation

Reranked Keyword Search Access Control in Secured Cloud

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ABSTRACT

In this paper, we study the problem of keyword search with access control over encrypted data in cloud computing. We first propose a scalable framework where user can use his attribute values and a search query to locally derive a search capability, and a file can be retrieved only when its keywords match the query and the user’s attribute values can pass the policy check. Using this framework, we propose a novel scheme called RKSAC, which enables Reranked Keyword Search Access Control In Secured Cloud. RKSAC utilizes a recent cryptographic primitive called CP-ABE to enforce fine-grained access control and perform multi-field query search. Meanwhile, it also supports the search capability deviation, and achieves efficient access policy update as well as keyword update without compromising data privacy. To enhance the privacy, RKSAC also plants noises in the query to hide users’ access privileges.

Hybrid Approach to Text & Image Steganography using AES and LSB Technique

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ABSTRACT

For communication of secret messages or information from one place/source to another for different applications we use Steganography and Cryptography. Usually in Cryptography the content of secret message is scrambled while in Steganography secret message is embedded in a cover medium. In this paper we propose a secured model developed by combining Advanced Encryption Standard (AES) and Least Significant Bit (LSB) algorithms. Here, AES is used for Cryptography and LSB technique is used for Steganography. The system proposed encrypts a text or image inside a Cover image.
ABSTRACT

Digital image processing has a broad spectrum of applications in today’s modern world. Image processing is the use of computer to process pictures, a technique that has revolutionised in the fields of medicine, geology and space exploration. It has become the hottest area in digital signal processing. In this paper, different techniques used in image processing and its applications are introduced. The brief introduction of mixing of two images, which is known as blending, and its usage in different areas like medical imaging, biological research, seismic data interpretation, film industry and photography are presented in this paper.

*Full paper: International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCEIT), Vol. 4, Issue 6, 2018*
Multicast QoS Routing by Using Network Pre-Processing Technique

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ABSTRACT

Asynchronous Transfer Mode has exposed the importance of differentiated-QoS for the various types of services that requires asynchronous mode of transfer. The connections allow the network to guarantee quality of service (QoS) by limiting the number of VC through classification of VCs based on various service classes, connection oriented and connectionless data service. The proposed work presents a multicast QoS provisioning scheme by using network pre-processing technique for finding ideal transmission path. To evaluate the performance of proposed model over state-of-art model, simulation was run considering parameter for slot success ratio and throughput performance considering varied switches and transceiver. Results indicate the significant performance improvement over state-of-art technique.
ABSTRACT

For the study of anatomical structure and image processing of MRI medical images techniques of noise removal have become an important practice in medical imaging application. In medical image processing, precise images need to be obtained to get accurate observations for the given application. The goal of any de-noising technique is to remove noise from an image which is the first step in any image processing. The noise removal method should be applied watchful manner otherwise artefacts can be introduced which may blur the image .In this paper, performance evaluation of the of MRI image de-noising techniques is provided. The techniques used are namely the median and Gaussian filter, Max filter [11], Min filter [11], and Arithmetic Mean filter [8]. All the above filters are applied on MRI brain and spinal cord images and the results are noted. A new method is proposed which modifies the existing median filter by adding features. The experimental result of the proposed method is then analyzed with the other three image filtering algorithms. The output image efficiency is measured by the statistical parameters like root mean square error (RMSE), signal-to-noise ratio (SNR), peak signal-to-noise ratio (PSNR).

*Full paper: International Conference on Electrical, Electronics, Communication, Computer & Optimization Techniques (ICEECCOT) IEEE Xplore, February 8, 2018*
Simulation of Lane Switching in Self-Driving Automobiles Using GTA-V

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ABSTRACT

The key significance of a self-driving automobile is it is a mechanical contraption that can progress between objectives without human maneuvers, sounds exceptionally essential and clear yet, honestly, this scarcely covers the surface. For a self-driving automobile to come to affirmation, we require both gear fragments and programming packs that we compose and construct congruous with each other. In this paper, we exhibit the item points of view vital to producing a model that can make sense of how to drive an automobile in a to a great degree diverse plan of a virtual condition. To content with the software aspects of a self-driving vehicle, we make use of Convolutional Neural Networks (CNN) that works on the idea of regression at its crux. We further discuss the information outlines which shape the foundations of the proposed procedure. The process involves screen capturing by employing OpenCV while physically driving a vehicle in a PC amusement, GTA-V.
Automatic Dialect Classification Using SVM

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ABSTRACT

Automatic Dialect Classification has attracted researchers in the field of speech signal processing. Dialect is defined as the language characteristics of a specific community. As such, dialect can be recognized by speaker phonemes, pronunciation, and traits such as tonality, loudness, and nasality. Dialect classification is a substantial tool in speech recognition and has the potential to improve the efficiency of Automatic Speech Recognition systems. This paper presents a study of different dialects in English language (American) and features that are useful for their classification. The experiment demonstrates that there are several features of the speech signal which are conducive for recognizing different dialects within a language such as chroma features and spectral features. Other speech features including MFCC and FDLP were also used with these features in order to improve the performance of the classifier. The supervised machine learning classifier that has been used in our research is the Support Vector Machine. Some refinements were introduced to the existing chroma feature extraction processes to make them more suitable for speech signal classification.

Department of Information Science & Engineering
Oracle Application with Database Testing Tool

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ABSTRACT

Oracle Database is simple and highly scalable database. It is majorly used for online transactions processing. Large enterprises widely use Oracle Database in their organization in multiple departments like HR Department, IT Department etc., Each department would host their database with large schema and tablespace. Ensuring database is sized well to handle multiple users to get optimal performance is very important. Oracle deployment can be done with single node deployment and Real Application Cluster (RAC) with multiple nodes. Database testing tools help in measuring the workloads on the database. The tool will provide measured values of latency, throughput and Input / Output Operations per Second (IOPS). Mainly there are two notable Oracle Database tools like Vdbench testing tool and Silly Little Oracle Benchmark (SLOB) testing tool.
Facial Key-Point Detection and Real-Time Filtering Using Convolutional Neural Network

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ABSTRACT

In this paper, an effort is made to combine the knowledge of computer vision techniques and deep learning to build and end-to-end facial key point recognition system. Facial keypoints include points around the eyes, nose, and mouth on any face and are used in many applications, from facial tracking to emotion recognition. The partially complete module should be able to take in any image containing faces and identify the location of each face and their facial keypoints. The proposed facial recognition system uses few of the many computer vision algorithms built into the OpenCV library and are implemented at the basic level. This expansive computer vision library is open source and is still growing. The proposed system does real time filtering and facial key point detection. This implementation uses a Convolutional Neural Network to train the system at each step, visualize the loss and learn in the next detection.

*Full paper: International Journal of Scientific Research in Computer Science Engineering and Information Technology (IJSRCSEIT), Vol. 4, Issue 6, 2018
ABSTRACT

Wireless Sensor Networks (WSN) is one of the main zones of research and it has been more well known in the real life difficulties by giving minimal effort arrangements. The system comprises of little sensor nodes capable for detecting, handling, computation and communication. The system comprises of various sorts of assault, the most harming assault is sinkhole assault. In this kind of assault, the sinkhole node tries to draw in information to itself by transmitting counterfeit data to neighbor nodes and henceforth it interferes with the usefulness of such systems. Thusly with a specific end goal to overcome from this sort of assault giving security is critical. In this paper we are proposing sink and also source area protection systems. With a specific end goal to give more protection these procedures like forward random walk (FRW) and BLAST (Base station location anonymity and security technique) is utilized. On account of forward random walk conspire requires every node to acquire its hop count to the sink, which can be accomplished by utilizing a sink-based flooding. Toward the starting, the sink will start a flooding, after which every node can get the both its neighbors hop count to the sink. On account of BLAST conspire the center thought is to change the transmission scope of an arrangement of some chose sensors around the base to befuddle the assailant. Through this procedure, we can make an arrangement of fake base stations which can't be recognized by a solid assailant.

*Full paper: IJSDR, Vol. 3, Issue 4, 2018*
SC-MANET: Threats, Risks and Solution Strategies for Security Concerns in Mobile Ad Hoc Network

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ABSTRACT

A MANET is a form of the wireless network among the mobile, wireless nodes. The presence of various significant attributes in MANET like hop-by-hop communications, dynamic topology and simple setup, leads to difficulties like routing, security, and clustering. These challenges take place due to the MANETs exhibit property of self configuration and maintain-abilities. In this paper, a detailed view towards the security attacks over the MANET is expressed. Also discussed some of the existing solutions to overcome the security attacks are elaborated. An extensive survey of existing researches towards security in MANET is addressed. Later on, a research gap in current state of art in MANET security is discussed. Thus the complete paper addresses various concepts of MANET security and current research trend in it. After analyses and evaluations, a section for future research scope in MANET security improvement mainly for OLSR protocol is introduced.
Security for IoT Systems Using Machine Learning

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ABSTRACT

IoT (Internet of things) represents the systems which are connected by number of devices, having sensors and actuators by wired or wireless network. More than 30 million of devices will be connected together by 2025. IoT is one of the technologies, which is rapidly growing in the last decade. One of the weakest parts in IoT is the “security”. IoT systems lack the security for the data they collect, store & share over the network. Providing the securities such as preventing the unauthorized access of data, handling overloading of requests for access by authorized user has become a major challenge. To approach these challenges for implementing secured IoT environment, we propose a centralized system for allowing only authorized user to access the IoT systems, using cryptography and analyse and maintain logs of the user activity with centralized system and IoT system environment using machine learning.

*Full paper: IJARIIE, Vol. 4, Issue 2, pp 2707-2710, 2018
Cross Layer Optimization in Wireless Sensor Networks

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ABSTRACT

Nowadays, the minimization of energy consumption in terms of cost and lifetime is the main preoccupation in the recent research studies. This paper deals with the proposition of a Power Consumption Protocol-Physical, Mac and Network (PCP-PMN) based on cross-layer for wireless sensor networks which uses three layers (Physical, Mac and Network). Our PCP-PMN algorithm presents the minimum transmission power between nodes at the physical layer. It uses this minimum transmission power as a metric at the network layer for the proposed routing based on LEACH protocol and performs scheduling at the mac layer for the proposed hybrid spread spectrum. The evaluation results mark that the implementation of our proposed approach preserves more energy and leads to a better performance system.
Proposal of a System for Dynamic Management of Road Traffic Signals

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ABSTRACT

Traffic congestion is one of the biggest problems that metropolitan cities are facing. The degree of the effects heavy traffic congestion can have is not very evident. It can have immense effect not only on one’s safety but also on one’s personal life. One of the major contributors for this is traffic jams caused by irregular and often longer durations of waiting time at traffic signal junctions. Finding a solution to this problem is imperative. Current technologies use wired and wireless sensors to optimize traffic light control but this method proves to be expensive and incurs high maintenance cost. This paper presents a new cost effective system for adjusting the traffic light waiting time using machine learning. We make use of previous years’ traffic data of a city and come up with the appropriate number of seconds of waiting time based on patterns in traffic data.

Taxonomy Classification of Product Using Machine Learning Techniques

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ABSTRACT

Product Description must be classified. Each product will be having its own taxonomy, which organises data into its category. Manually classifying these products is not a trivial task, it equires lot of domain expertise and knowledge on product domain. This paper describes the method to classify the products automatically to its respective categories using Machine Learning Technique. That is given product description that includes Brand name, invoice description, catalog description etc. Its category will be predicted. At the same time paper also describe detail analysis of method and few challenges that will come across during implementation. Our implementation results show consequential progress over Standard results. Taking into particular criteria, our implementation is potentially able to considerably increase automation of categorization of products.
Multiple Mobile Elements Based Energy Efficient Data Gathering Technique in Wireless Sensor Networks

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ABSTRACT

WSN applications primarily focus on data accumulation from the various sensor nodes spread across the environment. Many existing data gathering protocols work on the principle of using Cluster Head (CH) which is the designated node in a cluster for collecting data and Mobile Element (ME) which collects data from various CH’s and deposits the data in the Base Station (BS). The proposed work on creation of an efficient data gathering technique in WSN is the result of intense survey of existing technique in related framework and immense understating of the short coming of these existing protocols. The things that predominantly stand out from the survey performed are overflow of buffers at sensor nodes, visiting schedule of MEs, data fusion aspect and Idle listing concept, have not been well addressed. These limitations pave way for inception of novel data gathering technique for WSN. In this paper Energy Efficient Data Gathering Technique using Multiple Mobile Elements (EEDGMME) is introduced. Better efficiency in data gathering technique is achieved by data fusion at Cache Point (CP) which intends to reduce the instances of transmissions, visiting schedule for MEs to reduce buffer overflow and resultant data loss at various nodes of the network, Sleep-Awake duty cycling which prevents the instances of Idle listing and hence conserve the nodes energy. Practical simulation results of proposed EEDGMME technique prove the theoretical perspective of improved performance gains in comparison to the existing protocol Mobile Element based Energy-Efficient Data Gathering with Tour Length-Constrained in WSN (EEDG). Proposed technique EEDGMME provides better packet delivery ratio, lesser delay, reduced overhead, optimum energy consumption with decreased packet drop and hence enhances the network usability span.

*Full paper: Digital Business, Lecture Notes on Data Engineering and Communications Technologies, Vol. 21, pp 263-285, 2018
A Survey on Secure DICOM Transfer through Network

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ABSTRACT

DICOM, a standard used for secure connection and transfer of digital images, which is the integration of medical images with patient related information. The procedures in hospitals require the radiological images which contains few attributes of the image and the patients whose information belongs to. Report without any images is difficult to understand by common man, hence it requires a combination of both image and report. The main issue during transfer of these images is their security. It must be taken care that transfer of data should be protected from third parties, for this DICOM should provide some mechanism for security. Many methods are available for securing the data, by encrypting and decrypting the data. The developing system is used to transfer DICOM files, and extend the same in the system to meet the requirement of security. There are hospitals which allow systems to connect to hospital infrastructure only via secure way i.e., certificate based authentication. The current system on which it is being used supports only standard DICOM protocols, hence the systems cannot be used in hospitals which mandate certificate based authentication. Therefore, the systems which supports certificate based DICOM connectivity software is being developed and this has become a vast area for research.

*Full paper: International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Vol. 4, Issue 6, 2018
Study of Methods to Achieve Near Real Time ETL

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ABSTRACT

Real time analysis has become a norm in today’s fast and competitive business environment. Availability of recent data is a requirement to perform real time analysis. The data warehouse is meant to store historical data for analysis and these are populated from time to time through a process called as extract transform and load (ETL). The ETL process was done during nights or weekends to make the transactional data available at the data warehouse for analysis. But the delay of a day or weekend is not acceptable for real time analysis hence a concept of near real time ETL is developed to perform real time analysis. We explore in this study methods of how near real time ETL could be achieved. We focus on three ways of how near real time ETL could be performed. First is the Meta data management which if done effectively will greatly reduce the development time. Second is the concept of change data capture when implemented with some intelligent would greatly help in making the correct data available for analysis at the warehouse. The third is the use of parallel techniques to partition the flow of ETL and reduce the time window with which the data are available at the warehouse.

*Full paper: International Conference on Current Trends in Computer, Electrical, Electronics and Communication (ICCTCEEC-2018)
A Novel Method in Matched Filter Spectrum Sensing to Minimize Interference from Compromised Secondary Users of Cognitive Radio Networks

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ABSTRACT

The void spectrum in spread out geographical location and congestion in spectrum allotment in different regions of the world has led to the scarcity of precious natural resource – the wireless radio spectrum. This led to cognitive radio wireless networks. In CRN when the secondary users are trying to opportunistically use the licensed band, the probability of misuse is more than tolerable. This unwanted interference to licensed primary users can be muted out or mitigated with intelligent sensing using matched filter spectrum sensing. In this paper we have presented a novel method to minimize the interference using cross-correlation of known sample of primary user and the random sample of secondary user. Using heuristic function and other percepts, the classification of secondary users will be made as compromised or not.

*Full paper: International Conference on Electrical, Electronics, Communication, Computer Technologies and Optimization Techniques (ICEECCOT) December 14-15, 2018
A Survey on Machine Learning Techniques for Intrusion Detection System

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ABSTRACT

Intrusion detection is one of the major security concerns in networking. Many intrusion detection systems (IDS) have been designed and developed to detect various types of attacks. In recent years, machine learning has been extensively used for intrusion detection systems. Machine learning (ML) has been potentially used in various applications that solves problems and enable automation in diverse domains. Primarily, this is due to the explosion in the data, significant improvements in ML techniques, and advancements in computing capabilities. This survey focuses on some of the recent works which utilizes supervised, unsupervised, and hybrid techniques for Intrusion detection systems. In this paper, some of the major research issues and challenges are highlighted based on the literature survey carried out.

*Full paper: Third International Conference on Electrical, Electronics, Communication, Computer Technologies and Optimization Techniques (ICEECCOT) December 14-15, 2018"
Effective Hazy Image restoration using Color Attenuation Prior

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ABSTRACT

Images captured in outdoor suffer from color attenuation due to the transmission medium and scattering of the airlight and when the weather is foggy the scattering is more, so the color attenuation is to a larger extent resulting in poor quality of the image. To enhance the foggy image the contrast and saturation lost due to scattering needs to be recovered. To solve this problem a linear model is developed based on the relation between depth of the scene, brightness, concentration of the fog and saturation of the image. With the depth map obtained as a result of the linear model, we can easily remove haze and enhance the single image captured. Experimental results show that the color attenuation prior is more efficient in terms of the dehazing effect and faster than other haze removal algorithms that are based on Dark Channel Prior.

*Full paper: NCCOSINE-18, 17th and 18th May 2018, NIE, Mysuru
Trace Analyzer – A Way to Automate Debugging

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ABSTRACT

Debugging is the process of locating and removing computer program bugs, errors or abnormalities, which the software programmers handle methodically by using debugging tools. It checks, detects and corrects errors or bugs to allow proper program operation according to set specifications [4]. Debugging process involves regularly compiling the complete software programs to identify and rectify issues. Complex software programs contain millions of source code lines which are divided into small components and each component is separately debugged first, followed by the program as a whole. This can be done manually by going through the code line by line, and finding the errors and fixing them or it can also be done using event logs.

The manual way can be a tiresome process and involves a lot of efforts and is time consuming. Thus, logs such as ETL for example, can be used to obtain data about the system execution which helps in narrowing our view about the root cause of the issue. Eventually, these logs help us in reducing both time and human effort. Thus, in order to reduce the time and manual effort, the debugging process can be automated to some extent. In this paper, we develop a tool which takes the ETL log as input and collects the information by analyzing it and helps the developer to directly identify the root-cause instead of wasting his precious time in just identifying the issue, thereby reducing his time and effort. Here, a part of the tool is implemented for blank-out issues.

*Full Paper: National Conference on Advancements in Information Technology, Organized by JSSATE, Bengaluru, (NCAIT-2018), May 5-7, 2018*
Department of P. G. Studies (MCA)
Brain Tumor Classification with RBF kernel SVM

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ABSTRACT

This paper proposes an automatic classification technique to classify the benign and the malignant tumors from brain MRI images. The conventional methods of manual analysis of tumor based on visual inspection by radiologist/physician, may lead to wrong classification results when a large number of MRIs are to be analyzed. To avoid the errors by the human eye, an automated intelligent classification system is proposed which serves the needs for classification of image. One of the major causes of death amongst people is brain tumor. The chances of survival can be increased if the tumor and its type are detected correctly at its very early stages. In this proposed work, classification techniques based on Support Vector Machines (SVM) are proposed and is applied to brain image for classification. In this paper feature extraction from MRI Images is done by evaluating the Discrete Wavelet Transform (DWT). The objective of this proposed work is to give an accurate outcome of MRI brain cancer classification using SVM. Radial Basis Function is used as the kernel function.

Retinal Disorder Detection and Identification of Disease Using Diabetic Retinopathy

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ABSTRACT

The medical image processing has vast importance in the field of medicine. It is mostly useful for the clinical study and also in non-invasive treatment. In this paper, fundus photographs or retinal images are used. These are broadly used in the treatment of various eye diseases, which occurs in diabetes patients. Generally specially trained ophthalmologist grade the fundus images manually which is, time overriding. Therefore this paper helps in the early recognition of diabetic retinopathy and deals with classifying retinal images as normal, mild and severe.

ABSTRACT

Road accidents are a human tragedy. They involve high human suffering and monetary costs in terms of untimely deaths, injuries and loss of potential income. Road accident is one of the major issues in India. A variety of research has been done on data collected through police records covering a limited portion of highways. The analysis of such data can only reveal information regarding that portion only; but accidents are scattered not only on highways but also on local roads. We have used data mining techniques to analyze the data in which we first cluster the accident data and further association rule mining technique is applied to identify circumstances for each cluster. The results can be utilized to put some accident prevention.
Ranking and Review Based Classifier for Consumer Products

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ABSTRACT

Numerous consumer reviews of products are now available on the Internet. However, the reviews are often disorganized, leading to difficulties in information navigation and knowledge acquisition. This project proposes a product aspect ranking framework, which automatically identifies the important aspects of products from online consumer reviews. The important product aspects are identified based on: 1. Commented by a large number of consumers, and 2. Consumer opinions greatly influence overall opinions on the product. In consumer reviews, we first identify via a sentiment classifier. We then develop a probabilistic aspect ranking algorithm to infer the aspects by simultaneously considering aspect frequency and the influence of consumer opinions.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 05, Issue 5, 2018*
Situation Based Notifier IOT System for Soil Moisturization

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ABSTRACT

The Internet of Things (IoT) is converting the agriculture industry and solving the immense problems or the major challenges faced by the farmers today's in the field. The proposed system utilized Bidirectional communication using MQTT and Socket.io platform in sync. For all thing connections MQTT is being used due to its less resource consumption and Socket.io for android due its mature framework. We are utilizing ESP8266 as a base communication chip with soil moisture sensor as a test case. When the situation arises, i.e. when the threshold set are crossed, the system notifies the user via push notification to act upon the situation.

*Full paper: International Research Journal of Engineering and Technology (IRJET), Vol. 05, Issue 5, 2018*
Department of Basic Sciences
Synthesis and Crystal Structure Analysis of 2 - (6 - Dimethyl) 3, 5 - Dicarboxamide 4 - (4 - Methoxyphenyl) - Bis (3 – Chloro – 4 - Fluorophenyl) Pyridine Using Hirshfeld Surface Analysis

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ABSTRACT

The title compound, C₂₈H₂₂Cl₂F₂N₃O₅, crystallizes in the triclinic crystal system and space group P-1 with cell parameter, a = 9.5780(10) Å, b = 10.3730(18) Å, c = 4.493(2) Å, α = 89.739(4)°, β = 70.940(7)°, γ = 82.402(9)°, V = 1347.9(3) Å³ for Z = 2. The structure exhibits intra and inter-molecular hydrogen bonds of the type C-H...O and N-H...O.

*Full Paper: Journal of Applicable Chemistry, Vol. 7, Issue 1, pp 77-84, 2018
Synthesis, Spectral Characterization, Crystal and Molecular Structure Studies of 5-(5-Bromo-2-Thienyl)-1-(Phenyl)-3-Phenyl-2-Pyrazoline

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ABSTRACT

The title compound 5-(5-bromo-2-thienyl)-1-(phenyl)-3-phenyl-2-pyrazoline has been synthesized and the structure was characterized using ¹H NMR, ¹³C NMR, IR techniques and finally the structure was confirmed by X-ray diffraction studies. The IR spectrum of 5-(5-bromo-2-thienyl)-1-(phenyl)-3-phenyl-2-pyrazoline showed that absorptions in at 3064 cm⁻¹ for C-H sp², 2907 cm⁻¹ for C-H sp³, 1561 and 1591 for C=C aromatic bond stretchings. The ¹H and ¹³C NMR spectra of revealed the existence of all protons and carbons for the structure. The X-ray crystal structure studies revealed that pyrazoline ring in the structure is in an envelope conformation. The structure possesses a chiral centre at C5 with R conformation. The thiophene ring in the structure is affected by π conjugation.

*Full paper: Chemical Data Collections, Vol. 17, Issue 18, pp 132-137, 2018*
Synthesis, Characterization Studies of a Novel Indole Derivative:
3, 3’-[(5-Methylthiophen-2-Yl) Methanediyl] Bis (1H-Indole)

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ABSTRACT

The title compound 3, 3’-[(5-methylthiophen-2-yl) methanediyl] bis(1H-indole) was synthesized and the resultant compound was crystallized using ethanol by slow evaporation technique. The compound was characterized by FTIR, 1H NMR and finally the structure was confirmed by single crystal X-ray diffraction studies. The title compound crystallizes in monoclinic C2/c spacegroup with cell parameters a=26.282(4) Å, b=10.3274(14) Å, c=17.671(2) Å, β=130.254(8) and Z= 8. The indole rings are orthogonal to each other.
The title compound, (4-(6-fluorobenzo[d]isoxazol-3-yl) piperidin-1-yl) (morpholino) methanone was prepared from 3-(piperidin-4-yl)benzo[d]isoxazole and evaluated for antiproliferative activity and structure was characterized using IR, \(^1\)H NMR, LC-MS spectra and finally the structure was confirmed by X-ray diffraction studies. The compound crystallizes in the monoclinic crystal system with the space group \(P2_1/c\). The piperidine ring and the morpholine ring in the title compound adopt a chair conformation with the benzisoxazole ring in the planar conformation within the experimental limits. The molecular structure is stabilized by both inter and intra-molecular hydrogen bonds of the type C–H...O and C–H...N respectively which can account for the stability of the molecule. Further, Hirshfeld surface analysis employing 3D molecular surface contours and 2D fingerprint plots have been used to analyze intermolecular interactions present in the solid state of the crystal.

*Full paper: Chemical Data Collections, Vol. 15, Issue 16, pp 1-9, 2018
Ex Vivo and in Silico Molecular Docking Studies of Aldose Reductase Inhibitory Activity of Apigenin from Morus Indica L

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ABSTRACT

An investigation on Aldose Reductase Enzyme (ALR) inhibitory activity of apigenin (API) isolated from Morus indica L. was evaluated by ex vivo and molecular docking studies. The inhibitory efficacy of API from M. indica was evaluated against ALR in lens tissue of mice by ex vivo and their binding mechanism through molecular docking was carried out by AutoDock. The API (10-50 µg mL⁻¹) concentration exhibited significant inhibition (p ≤ 0.05) of ALR enzyme in a dose dependent manner with IC₅₀ value of 39.23 µg mL⁻¹. The positive control aminoguanidine (AG) at 10 mM inhibited 42.96% of ALR. The molecular docking studies revealed that API showed better binding energy (-9.15 kJ mol⁻¹) when compared to AG (-3.78 kJ mol⁻¹). Molecular interaction analysis showed that API interrupts the proton donation mechanism which is necessary for the catalytic activity of ALR by forming H-bond with Trp20 (proton donor). The ALR inhibition potential offered by API was further confirmed through molecular docking studies. The present findings support the pharmacological application of API for the treatment of diabetes cataract.

*Full paper: Journal of Young Pharm, Vol. 11, Issue 1, pp 101-104, 2018
Synthesis, Antimicrobial, Antioxidant and Molecular Docking Study of Some Novel Bis-1, 2, 4-Triazolo [3, 4-B]-1, 3, 4-Thiadiazoles

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ABSTRACT

A novel series of 1-aryl-3,4-bis-(3-alkyl/phenyl-[1,2,4] triazolo[3,4-b][1,3,4]thiadiazol)-1H-pyrazole (5a-i) are synthesized by the cyclocondensation of 1-(aryl)-1H-pyrazol-3,4-dicarboxylic acids with 3-alkyl/aryl-4-amino-5-mercapto-1,2,4-triazoles. Pyrazole dicarboxylic acids were prepared by the 1, 3-dipolar cyclo addition of 3-aryl sydnones with dimethylacetylenedicarboxylate (DMAD). The newly synthesized compounds were studied for their antibacterial, antifungal and antioxidant activities. Particularly compounds 5a and 5g showed considerable antibacterial activity against the standard drug, while all the tested compounds displayed poor inhibitory effect against fungi. Compound 5d exhibited good antioxidant activity. The docking study was performed with Acinetobacter baumannii penicillin binding protein target using AutoDock 4.2, which proved H-bond interaction and strong binding affinity.

*Full paper: Journal of Medicinal Chemistry and Drug Design, Vol. 1, 2018
Structural Characterization and Docking Studies of (Z)-N-Phenyl Benzo Hydrazonoyl Chloride Derivative as Promising Antimicrobial Acinetobacter Baumannii Penicillin-Binding Protein Target

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ABSTRACT

Computer-aided prediction of interaction of benzohydrazonoyl chloride derivatives with protein target was carried out using open source program Auto Dock. Overall findings of the executed investigations highlight these compounds as very promising potent, broad spectrum antiviral agents. Molecular docking studies showed that the tested compound induced good fitting and forming different hydrogen bonds with the amino acid residues at the active sites of antimicrobial acinetobacter baumannii penicillin-binding target. A moderately high-yield synthesized compound (Z)-N-phenyl benzohydrazonoyl chloride (4a) was characterized and structure was confirmed by X-ray diffraction studies. The molecule crystallizes in orthorhombic under the space group Pcab, with cell parameters a = 7.606(1)Å, b = 11.8817(16)Å, c = 25.219(3)Å and Z=8. Crystal structure stabilized by an N10-H10...Cl8 and C1-H1...Cl8 intramolecular hydrogen bonds.
Structure and Molecular Modeling Studies of 1, 3-Diphenyl-1H-Pyrazole Derivatives as Potential Human Kinase Inhibitor

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ABSTRACT

Molecular modeling was performed for 1,3-diphenyl-1H-pyrazole (2a) derivative with Aurora A (3FDN) inhibitor employing flexible ligand docking method by using Auto Dock. The title molecule found to be minimum binding energy -6.31 kJmol⁻¹ with ligand efficiency of -0.37. The molecular modeling results showed that pyrazole derivative (2a) with Aurora A inhibitor are good inhibition constant, vdw + Hbond + desolv energy with best RMSD value. The compound 1,3-diphenyl-1H-pyrazole derivative (2a) was characterized and structure was confirmed by X-ray diffraction studies. The molecule crystallizes in monoclinic under the space group P21/c, with cell parameters a = 5.619(2) Å, b = 9.362(4) Å, c = 22.553(10) Å, β = 95.429(7)° and Z=4. Crystal structure stabilized by anC11-H11...N1 and C17-H17...N1 intramolecular hydrogen bonds.

Solvent-Free Synthesis of Bis-Hydrazones Via 1, 3-Dipolar Cycloaddition of Sydnone and Study of their Optical, Molecular Docking and Antioxidant Properties

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ABSTRACT

A series of new 1-(aryl)-1H-pyrazol-3,4-bis (aryl)-3,4-dicarbohydrazones (4) was obtained by the condensation of 1-arylpyrazole-3,4-dicarbohydrazides (3) with various aryl aldehydes under solventfree conditions. The structures of the newly synthesized hydrazones were confirmed by proton-nuclear magnetic resonance spectroscopy, infrared spectroscopy, liquid chromatography–mass spectrometry, elemental analysis, and by single crystal X-ray diffraction. All the synthesized compounds were screened for their antioxidant activity, where compound 4a has shown percentage inhibition higher than the standard butylated hydroxyanisole. The molecular docking and photophysical property were also investigated.

*Full paper: Indian Journal of Heterocyclic Chemistry, Vol. 28, pp 335-345, 2018
Optoelectronic Behaviours of UV Shielding Calcium Zirconate Reinforced Polycarbonate Nanocomposite Films: An Optical View

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ABSTRACT

Self supporting and design flexible (Calcium zirconate/Poly carbonate) nano composite films were fabricated with varying amounts of CaZrO$_3$ nanofillers by solution casting under controlled temperatures. The as developed films were structurally characterized by Powder X-ray Diffraction (P-XRD) studies that validate the presence of inorganic nanofillers in the host polymer. The UV-visible transmittance studies narrate excellent UV (200–400 nm) harvesting abilities of composite films in conjunction with a near complete visible transmittance. The excellent UV filtering abilities of nanocomposite hybrids were also assessed through kinetic studies of UV induced photo catalytic degradation of Rhodamine B. The linear decrease in optical band and appreciable increase in refractive index also ascertains successful composite preparation with near uniform filler dispersions.

Yellow-Green Luminescent Poly (Vinyl Alcohol) Nanocomposite Thick Films as Effective Spectral Manipulators

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ABSTRACT

Highly flexible and visibly transparent yellow-green fluorescent poly (vinyl alcohol) (PVA) based nanocomposite (NC) films with rubidium zincate (Rb\(_2\)ZnO\(_2\)) nano impregnates were developed through aqueous solution casting. The introduced rubidium zincate nanofillers impart UV shielding properties to PVA host, through UV to visible (fluorescent yellow-green) photon cutting. The rubidium zincate nanofiller impregnated PVA systems were also characterized for their structural, morphological, optical, and electrical behaviors by various analytical tools. The Fourier Transform Infrared (FTIR) and X-ray diffraction (XRD) studies shed light on the changes in gross structural properties of PVA. While Scanning Electron Microscopic (SEM) profiles support uniform filler dispersions, which aid high visible transparencies.

\*Full paper: Journal of Applied Polymer Science, Vol. 135, Issue 47, 2018
Electrochemical Detection of L-Dopa Using Crude Polyphenol Oxidase Enzyme Immobilized on Electrochemically Reduced RGO-Ag Nanocomposite Modified Graphite Electrode

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ABSTRACT

In the present work, we report the selective and sensitive electrochemical detection of L-dopa using crude Polyphenol oxidase enzyme (PPO) immobilized on electrochemically reduced graphene oxide–silver nanoparticles (RGO-Ag) nano composite modified graphite (Gr) electrode. The Gr electrode is first modified through the electrochemical reduction of graphene oxide - silver (GO-Ag) nano composite to RGO-Ag nano composite on graphite electrode. The crude extract of PPO from Manilkara Zapota (sapota) fruit is later immobilized onto Gr/RGO-Ag modified electrode. Modification of Gr electrode at each step is confirmed by cyclic voltammetry (CV) and Electrochemical impedance (EIS) techniques. The surface characterization of modified electrode is performed by Scanning electron microscopy (SEM). The developed sensor exhibited excellent electrocatalytic activity towards the detection of L-dopa.

Orange-Red Fluorescent Polymer Nanocomposite Films with Large Stokes Shift: An Opto-Electronic Exercise

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ABSTRACT

Herein, we report the successful fabrication of orange-red fluorescent polymer nanocomposite (PNC) hybrids, that envisage efficient photon management and appreciable UVA-protection, besides high design flexibilities and ease of self-cleaning. The visibly transparent PNC thick films were developed via aqueous solution casting of -OH backboned poly (vinyl alcohol) (PVA) with nanostructured sodium zincate (Na2ZnO2). The as developed PNC films offer appreciable photonic down-conversion of high energy UVA-radiations to relatively lower energy Orange-red light via fluorescent emission. The optical band gap studies reveal a direct band gap relationship with valence band maxima and conduction band minima occurring at same wave vectors. While, static contact angle measurements support nano filler induced wettability transitions (hydrophilic to near hydrophilic). The fluorescence spectral (excitation and emission) studies of PVA/Na2ZnO2 NC films validate a promisingly large Stokes shift (~245 nm), which visualises a fair separation between the photonic absorption and emission bands, that may further aid an exponential minimization of optical losses due to re-absorption. The thermogravimetric studies support their excellent thermal stabilities. The relatively large Stokes shift, appreciable thermal stability and excellent UV harvesting ability of PVA/Na2ZnO2 NC films construct them as competent luminescent down-shifting (LDS) materials for possible solar cell applications.

*Full paper: Journal of Luminescence, Vol. 208, pp 488-494, 2018
Synthesis and Biological Activity of 5-Bromo-2-Chloropyrimidin-4- Amine Derivatives

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ABSTRACT

A series of novel 5-bromo-2-chloropyrimidin-4-amine derivatives (7a-h and 8a-e) were synthesized by nucleophilic substitution reaction with various sulfonyl and acid chlorides. The newly synthesized compounds were characterized by elemental analyses, FT-IR, 1H NMR and LC-MS spectral studies. All compounds were evaluated for its in vitro antibacterial and antifungal activities. The Compound N-(5-bromo-2-chloro-pyrimidin-4-yl)-4-methylbenzenesulfonamide (7b) exhibited significant antimicrobial activity against tested pathogenic bacterial and fungal strains.

*Full paper: Chemical Data Collections, Vol. 13, Issue 14, pp 1-10, 2018
Effect of Co Doping on CIS\textsubscript{2} Thin Films

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ABSTRACT

In recent years, substantial scientific attention has been focused on renewable energy resources, which utilize natural resources for the production of electrical energy. Chalcopyrite semiconductors are used as one of the alternatives, Cu(In,Ga)Se\textsubscript{2} (CIGS) and CuInS\textsubscript{2} (CIS) are used for the fabrication of solar cells. These materials possess various properties Viz. ideal band gap (1.5 eV), high optical absorption, low light degradation, high radiation resistance, etc., hence they are suitable in the fabrication of solar cells. In contrast to other chalcopyrates, CuInS\textsubscript{2} is nontoxic, low-cost and easy to prepare by simple deposition techniques. Several impurities were doped to CuInS\textsubscript{2} bulks, to control conduction and also to obtain low resistivity. In this context, the structural, morphological and optical properties are reported for cobalt-doped CuInS\textsubscript{2} (CIS\textsubscript{2}) thin films prepared by electrodeposition technique at room temperature. In the present study, we have used different cobalt concentration in the range of 0–5 wt.%. Doping of cobalt does not lead to the formation of any secondary phase, either in the form of metallic clusters or impurity complexes. However, with increase in cobalt concentration a decrease in the optical band gap, from 2.10 to 1.53 eV, is observed. In addition, implantation of cobalt in the CIS\textsubscript{2} gave changes in structural and surface properties of the thin films obtained. These thin films are also subjected to elemental analysis using EDAX.
A Novel Approach of Using NBS as an Effective and Convenient Oxidizing Agent for Various Compounds – A Survey

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ABSTRACT

N Bromosuccinimide is an oxidizing agent that is used as source for bromine in radical reactions and various electrophilic additions. It was first shown by Ziegler and co-workers that NBS reacts with Cyclohexene to give 3-bromocyclohexene and succinimide. NBS effectively gains electrons from the reactants to form a product. As it has a free bromine in it, it is a strong oxidizing agent.

*Full paper: Journal of Chemistry and Chemical Sciences, Vol. 8, Issue 1, pp 59-65, 2018
Effect of Cadmium Doping on Dye Sensitized Poly(Vinyl Alcohol) (PVA) Nanocomposite Films

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ABSTRACT

Over the last few decades, PVA and its nano-composite based optical materials have received a considerable attention, due to their wide range of applications in optoelectronic devices, and their satisfactory performance and biodegradability. PVA is a potential semi-crystalline polar polymer possesses an excellent charge storage capacity, high dielectric strength, good mechanical stability, and also dopant dependent optical and electrical properties. Hence, in the present work effect of Cadmium (Cd) on dye sensitized PVA is investigated. Synthesis of cadmium doped PVA/Malachite Green (PVA/MG) is achieved by uniform dispersion in PVA matrix using solvent casting method. The optical characterization of prepared composites was elucidated using UV-VIS Spectrometer. The optical parameters like absorbance, transmittance, reflectance and optical constants was studied in the range of 300-1100nm. The effect of Cd on electrical properties has been characterized using source meter. The improved properties and performance of Cadmium doped PVA/MG nano-composite were discussed. The above properties obtained for the composite may be used in optoelectronic devices and hence the composite so obtained is of greater scientific and technological interest.

*Full paper: International Conference on Nanomaterials and their Applications, University of Mysore, March 1-2, 2018
Partition Energy of Complete Product of Circulant Graphs and Some New Class of Graphs

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ABSTRACT

Let $G = (V, E)$ be a graph and $P_k = \{V_1, V_2, \ldots, V_k\}$ be a partition of $V$. The $L$-matrix with respect to a partition $P_k$ of the vertex set $V$ of graph $G$ of order $n$ is the unique square symmetric matrix $L(P_k(G)) = [a_{ij}]$ with zero diagonal, whose entries $a_{ij}$ with $i \neq j$ are defined as follows: (i) If $v_i, v_j \in V_r$ then $a_{ij} = 2$ or $a_{ij} = -1$ according as $v_i v_j$ is an edge or not. (ii) If $v_i \in V_r$ and $v_j \in V_s$ for $r \neq s$, then $a_{ij} = 1$ or $0$ according as $v_i v_j$ is an edge or not. For all $V_i$ and $V_j$ in $P_k$ where $i \neq j$ remove the edges between vertices of $V_i$ and $V_j$ add the edges between the vertices of $V_i$ and $V_j$ which are not in $G$, the resulting graph is called $k$-complement of $G$ and is denoted by $(\overline{G})_k$. For each set $V_r$ in $P_k$, remove the edges of $G$ joining the vertices within $V_r$ and add the edges of $\overline{G}$ (complement of $G$) joining the vertices of $V_r$, the graph obtained is called $k(i)$-complement and is denoted by $(\overline{G})_{k(i)}$. The $k$-partition energy of a graph $G$ with respect to partition $P_k$ is denoted by $E_{P_k}(G)$ and is defined as the sum of the absolute values of $k$-partition eigenvalues of $P_k(G)$. In this paper we construct some graphs such that the graph and its 2-complement are equienergetic with respect to a given partition. We also determine partition energy of complete product of $m$ copies of a circulant graph $G$ and its subgraph, their $k$-complement and $k(i)$-complement.