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3.3.1 NUMBER OF RESEARCH PAPERS PUBLISHED PER TEACHER IN THE JOURNALS NOTIFIED ON UGC CARE LIST DURING THE CALENDAR YEAR 2020

Title of paper	Name of the author/s	Department of the teacher	Name of journal	ISSN number	Link to website of the Journal	Link to article / paper / abstract of the article
The role of AI-based integrated physical security governance for optimizing IoT devices connectivity in smart cities	Rajan, R., Dayanandan, V.S., Shankar, P., Tngk, R.	CSE	AI-Based Services for Smart Cities and Urban Infrastructure	978-179985025-0	https://www.igi-global.com/gateway/book/244652	https://doi.org/10.4018/978-1-7998-5024-3.ch014
Multi-window optimized seizure detection and classification using deep feature extraction for human environmental conscientiousness	Sanila, S., Sathyalakshmi, S., Venkata Subramanian, D.	CSE	Journal of Green Engineering	19044720	http://www.jgenng.com/	NA
Speech to speech interaction system using Multimedia Tools and Partially Observable Markov Decision Process for visually impaired students	Lokesh, S., Kanisha, B., Nalini, S., Ramya Devi, M., Kumar, R.	CSE	Multimedia Tools and Applications	13807501	https://link.springer.com/journal/11042	https://doi.org/10.1007/s11042-018-6264-2

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Cost-effective privacy preserving of intermediate data using group search optimisation algorithm	Jaikrishna, G., Rajendran, S.	CSE	International Journal of Business Information Systems	17460972	https://www.inderscience.com/offers.php?id=110174	https://ideas.repec.org/a/ids/ijbisy/v35y2020i2p132-151.html
Comprehensive and Comparative Study of Efficient Location Tracking Based on Apriori and Dijkstra Algorithms	Venkata Subramanian, D., Sugumar, R., Dhipikha, N., Vinothini, R., Kavitha, S., Anchaliya, A.H.	CSE	Lecture Notes on Data Engineering and Communications Technologies	2367-4512	https://link.springer.com/book/10.1007/978-3-030-43192-1	https://doi.org/10.1007/978-3-030-43192-1_6
Effective Record Search and Update Using Design Patterns - A Case Study of Blood Bank Mobile Application	Dr.D.Venkata Subramanian	CSE	Lecture Notes on Data Engineering and Communications Technologies book series	23674512	https://link.springer.com/book/10.1007/978-3-030-43192-1	https://doi.org/10.1007/978-3-030-43192-1_5
Prediction of Survival Rate from Non-Small Cell Lung Cancer using Improved Random Forest	Nanda, P., Duraipandian, N.	CSE	Proceedings of the 5th International Conference on Inventive Computation Technologies	978-172814685-0	https://ieeexplore.ieee.org/Xplore/home.jsp	https://doi.org/10.1109/ICICT48043.2020.9112558

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Estimation of carrier frequency offset for FBMC/OQAM by using modified Kalman filtering	Dr.B.Sridevi	ECE	International Journal of Communication Systems	10745351	https://onlinelibrary.wiley.com/journal/10991131	https://doi.org/10.1002/dac.4579
An Efficient Carrier Frequency Offset Tracking for OFDMA Systems using Normalized Least-Mean-Square Algorithm.	S.Ilaiyaraja	ECE	Circuit Systems and Signal Processing	0278-081X	https://link.springer.com/	https://doi.org/10.1007/s00034-020-01395-w
Abnormal gait recognition using exemplar based algorithm in healthcare application	Dr.M.Sivarathinabala	ECE	International Journal of Communication system-Wiley Online Library	1074-5351	https://link.springer.com/	https://doi.org/10.1002/dac.4348
Design of Wearable Pentagonal Fractal Antenna for Soldier Locating Tracking	Dr.R.Jothi Chitra	ECE	IEEE International Conference on Communication and Signal Processing	978-1-7281-4988-2	https://ieeexplore.ieee.org/Xplore/home.jsp	https://doi.org/10.1109/ICCSP48568.2020.9182179

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Effective and Accurate Diagnosis Using Brain Image Fusion	Gopal, Babu	ECE	Applications of Deep Learning and Big IoT on Personalized Healthcare Services	978-1799821014	https://www.igi-global.com/gateway/book/235494	https://doi.org/10.4018/978-1-7998-2101-4.ch012
Development of Efficient Swarm Intelligence Algorithm for Simulating Two-Dimensional Orthomosaic for Terrain Mapping Using Cooperative Unmanned Aerial Veh	Pradeep Kumar, G., Sridevi, B.	ECE	The Cognitive Approach in Cloud Computing and Internet of Things Technologies for Surveillance Tracking Systems	978-0-12-816385-6	https://www.sciencedirect.com/book/9780128163856/the-cognitive-approach-in-cloud-computing-and-internet-of-things-technologies-for-surveillance-tracking-systems	https://doi.org/10.1016/B978-0-12-816385-6.00006-4
Performance Evaluation of Multihop Multibranch DF Relaying Cooperative Wireless Network	Dayanidhy, M., Jawahar Senthil Kumar, V.	ECE	EAI/Springer Innovations in Communication and Computing	978-3-030-19561-8	https://link.springer.com/book/10.1007/978-3-030-19562-5	https://doi.org/10.1007/978-3-030-19562-5_25
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Establishing self-healing and error correction in wireless sensor networks using honeypot database	P.Sailaja	IT	IOP Conference Series Materials Science and Engineering	1757-899X	https://iopscience.iop.org/journal/1757-899X	https://doi.org/10.1088/1757-899X/993/1/012069
Energy Efficient Wireless Sensor Network to Enhance Network Security by Detecting Clone nodes	P.Sailaja	IT	IOP Conference Series Materials Science and Engineering	1757-899X	https://iopscience.iop.org/journal/1757-899X	https://doi.org/10.1088/1757-899X/993/1/012067

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A Traceability Set Up Using Digitalization Of Data And Accessibility	D.Dhinakaran	IT	Proceedings of the 3rd International Conference on Intelligent Sustainable Systems	978-1-7281-7089-3	https://ieeexplore.ieee.org/Xplore/home.jsp	https://doi.org/10.1109/ICISS49785.2020.9315938
Scalability Service in Data Center Persistent Storage Allocation Using Virtual Machines	Dr.P.Deivendran & P.Sailaja	IT	International Journal of Scientific & Technology Research	2277-8616	https://www.ijstr.org/	NA
Augmenting the potable water produced from single slope solar still using CNT-doped paraffin wax as energy storage: an experimental approach	Madhu, B	Mech	Journal of the Brazilian Society of Mechanical Sciences and Engineering	1806-3691	https://link.springer.com/journal/40430	https://doi.org/10.1007/s40430-020-02703-w

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Analysis on mechanical properties of wood plastic composite	Joseph Manuel, D	Mech	AIP Conference Proceedings	1551-7616	https://pubs.aip.org/aip/acp	https://doi.org/10.1016/j.matpr.2020.08.570
Performance and emission characteristics of diesel blended with sweet lime peel oil and corn oil	Ragothaman, G	Mech	AIP Conference Proceedings	1551-7616	https://pubs.aip.org/aip/acp	https://doi.org/10.1063/5.0024898
Influence of regular inserts and aluminium oxide nanoparticles on micro finned tube over heat transfer and hydraulic performance under laminar flow	Madhu, B	Mech	AIP Conference Proceedings	1551-7616	https://pubs.aip.org/aip/acp	https://doi.org/10.1063/5.0026199

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Investigation on Heat transfer enhancement of conventional and staggered fin solar air heater coated with CNT-black paint-an experimental approach	Mr.B.Madhu	Mech	Environmental Science and Pollution research	1614-7499	https://link.springer.com/	https://doi.org/10.1007/s11356-019-07561-1
Experimental study on enhancing the yield from stepped solar still coated using fumed silica nanoparticle in black paint	Madhu, B	Mech	Materials Letters	0167-577X	https://www.sciencedirect.com/journal/materials-letters	https://doi.org/10.1016/j.matlet.2020.127873
Effect of water depth and insulation on the productivity of an acrylic pyramid solar still–An experimental study	D.Magesh Babu	Mech	Groundwater for Sustainable Development	2352-801X	https://www.sciencedirect.com/	https://doi.org/10.1016/j.gsd.2019.100319
Design and thermal analysis of coated and uncoated exhaust manifold	Mothilal, T	Mech	International Journal of Ambient Energy	2162-8246	https://www.tandfonline.com/journals/taen20	https://doi.org/10.1080/01430750.2018.1456969

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Influence of fins on the absorber plate of tubular solar still- An experimental study	Madhu, B.,	Mech	Materials Today: Proceedings	1551-7616	https://www.sciencedirect.com/journal/materials-today-proceedings	https://doi.org/10.1016/j.matpr.2020.11.355
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Performance and emission characteristics evaluation of CRDI engine using alternate fuel	Ragothaman, G	Mech	Materials Today: Proceedings	1551-7616	https://www.sciencedirect.com/journal/materials-today-proceedings	https://doi.org/10.1063/5.0024898
Microstructural and mechanical properties of copper matrix composites	Balamanikandasuthan, K	Mech	Materials Today: Proceedings	1551-7616	https://www.sciencedirect.com/journal/materials-today-proceedings	https://doi.org/10.1016/j.matpr.2020.06.600
Analysis of composite leaf spring using ANSYS software	Joseph Manuel. D	Mech	Materials Today: Proceedings	1551-7616	https://www.sciencedirect.com/journal/materials-today-proceedings	https://doi.org/10.1016/j.matpr.2020.08.068

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Star domination and star irredundance in graphs	N.Ramalingam	S&H	Utilitas Mathematica	3153681	https://utilitasmathematica.com/index.php/Index/index	https://utilitasmathematica.com/index.php/Index/article/view/1500
Analysis of multistage M[X]/GK/1 queue with different server's interruptions and its application in energy consumption	Yuvarani, C., Vijayalakshmi, C.	S&H	International Journal of Ambient Energy	25024752	https://www.tandfonline.com/toc/taen20/current	https://doi.org/10.1080/01430750.2018.1490355
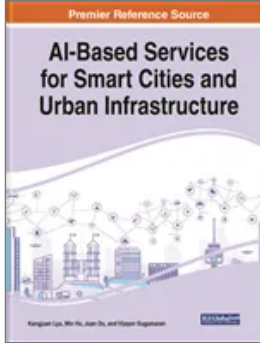
The Role of AI-Based Integrated Physical Security Governance for Optimizing IoT Devices Connectivity in Smart Cities

Rajan R., Venkata Subramanian Dayanandan, Shankar P., Ranganath Tngk

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Abstract

A smart city aims at developing an ecosystem wherein the citizens will have instant access to amenities required for a healthy and safe living. Since the mission of smart city is to develop and integrate many facilities, it is envisaged that there is a need for making the information available instantly for right use of such infrastructure. So, there exists a need to design and implement a world-class physical security measures which acts as a bellwether to protect people life from physical security threats. It is a myth that if placing adequate number of cameras alone would enhance physical security controls in smart cities. There is a need for designing and building comprehensive physical security controls, based on the principles of "layered defense-in-depth," which integrates all aspects of physical security controls. This chapter will review presence of existing physical security technology controls for smart cities in line with the known security threats and propose the need for an AI-enabled physical security premise.

Chapter Preview

Top

Introduction

Traffic management, health care, energy crises, and many other issues, which are some key challenges posed by a large amount of population can be addressed with the combination of artificial intelligence (AI) and Internet of Things (IoT). Developing brownfield and Greenfield cities has different problems, but what is common to both is that technologies like AI and IoT will be the foundation for understanding the objectives of building 'intelligent' cities of tomorrow. The lives of citizens and businesses would improve if they inhabit a smart city. From maintaining a healthier atmosphere to enhancing public transport and safety, AI-powered IoT-enabled technology in smart cities has great usage (Navarathna & Malagi, 2018)

A few decades back, AI was a term used in science fiction and fantasy, but now, it is used in reality. Sentient machines ruling the world is the most evolved AI of our fantasy tales. We have still not reached that level, as imagination and reality are different and reality is much more complicated. Urban infrastructure is a problem requiring immediate attention, and this can be demonstrated by AI and it is the first key step we have taken toward our smart cities mission. India is no longer a nation of villages because of the rapid growth of urbanization. Every minute, about 30 villagers shift to cities to become their residents (Min, Yoon & Furuya, 2019).

Studies say that about 40% of the Indian population would live in cities by 2030. Technologies are being used by cities all over the world in a move to become smarter, and key functions like city services, transport, communication, water, smart grids, public safety, education, and health are managed through a digitally managed central command room. The basic premise of AI is the development of intelligent machines that are capable of high-level cognitive processes like thinking, perceiving, learning, problem-solving, and decision-making. AI has the potential to make sense of the humongous data and use the intelligence to increase the performance of cities, optimize operational costs and resources, and enable sound citizen engagement (Fahmideh & Zowghi, 2018).

Many of our real-life problems can be solved by using AI. Collection of data by using sensors, closed-circuit television (CCTV) cameras, smart energy meters, and even social media engines for real-time human activity is one of the basic Information and communications technology (ICT) functions for smart city operation. Fiber optics, 3G/LTE, internet, Bluetooth, and so on are some communication systems that the IA may relay upon. AI and other tools should be used to analyze the data and decisions, and actions taken based on the intelligence generated. Sophisticated surveillance technologies, accident pattern monitoring, linking crime databases, combating gang violence, and so on, can be used to enhance using public safety and security. Managing the crowd, approximation of size, foreseeing the behavior, tracking objects, and enabling rapid response to incidents can be done with the help of AI. It can be priceless for handling functions and minimum use of resources such as distributed energy and water. AI can lead to smart homes with applications which can save the resources and ease the local jobs. Citizen services delivery, processing of files, and applications through chatbots for responding to enquiries with smart conversations can be made easy with the help of AI (Halder, et al, 2016).

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Multi-window optimized seizure detection and classification using deep feature extraction for human environmental conscientiousness

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Abstract

One of the key approaches for the detection and diagnosis of epileptic seizures which is called as the Electroencephalography, common referred to as EEG. The EEG data that is collected from the numerous patients who undergo this medical procedure is now considered to be part of Big data as we know it. This large volume of rapidly growing data is difficult to handle and the effort and time required for the processing and analysis of this data becomes difficult. There are lots of application in today's real world for detecting and analyzing of Electroencephalography and there are various dedicated algorithms that are already designed for dealing with these data. This study aims to develop a lightweight algorithm that aims to reduce the time lag in detecting seizures from EEG data with increased accuracy. Its purpose is to filter out essentials, and where needed, the work can be accomplished by combining the capability of existing algorithm such as SVM, PCA and ANN and filtering an algorithm using in deep learning analyzes based on the conventional neural network. Here standard sized window is used by the proposed model to decrease the quantity of EEG data used for analyzing and for obtaining the top-

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Speech to speech interaction system using Multimedia Tools and Partially Observable Markov Decision Process for visually impaired students

S. Lokesh[1] · B. Kanisha[2] · S. Nalini[3] · M. Ramya Devi[4] ·
R. Kumar[5]

Abstract In general, visually impaired students need of another person's to teach them with the help of computers and book. However, a number of students are not aware of using the computers and understanding the concepts by self. In order to solve this issue, a speech to speech interaction system is developed on the basis of a novel dialogue management system. This interaction is developed by combining Multimedia tools and Partially Observable Markov Decision Process (POMDP) with agenda based model used in the proposed dialogue management system to learn the speech signals from user and system will reply accordingly. The proposed system helps visually impaired students to learn easily using a novel dialogue

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Cost-effective privacy preserving of intermediate data using group search optimisation algorithm

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Abstract: Cloud computing provides huge storage ability to clients, in order to convey their applications without any infrastructure investment. Alongside those applications, an extensive set of intermediate datasets will be created, and it is a challenging issue to protect the security of those intermediate datasets. Therefore, in this paper, we preserve only sensitive information which reduces the time and cost. For privacy preserving of the intermediate dataset, in this paper, we propose a combination of group search optimisation (GSO) and advanced encryption standard (AES). At first, the original dataset is split into an intermediate dataset and we select the corresponding node from the cloud for each intermediate dataset using GSO algorithm. After that, we separate the sensitive data using information gain. Finally, we apply the AES to encrypt the sensitive data. The performance of proposed methodology is in terms of encryption time and memory usage.

Keywords: cloud computing; group search optimisation; GSO; advanced encryption technique standard; information gain; intermediate data and sensitive data.

Biographical notes: G. Jaikrishna has received his BTech degree from the Anna University, Chennai, India in 2010, MTech degree from the SRM University, Chennai, India in 2012, and he is pursuing his PhD degree in St. Peter's University, Avadi, Chennai, India from 2014. His research interests include data mining. He has published research articles in various international journals and conference proceedings.

Sugumar Rajendran has received his BE degree from the University of Madras, Chennai, India in 2003, MTech degree from the Dr. M.G.R. Educational and Research Institute, Chennai, India in 2007, and PhD degree from the Bharath

Comprehensive and Comparative Study of Efficient Location Tracking Based on Apriori and Dijkstra Algorithms

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Abstract. With the advent of Google maps, pointing the precise location and tracking the movement of objects, people and materials have become an integral part of SCM System. The ERP systems include Logistics and Management as core functionalities along with Artificial Intelligent Systems to facilitate positioning and tracking of materials. Similar to material tracking, it is also important to track the location and movement of the person which is a huge demand in present era. However, the designers of such larger ERP systems use patented protocols for material location identification, predicting the shortest distance and tracking the precise location of cargo when they are on the move. The similar techniques neither fully adopted nor applied with humans. This research paper is aimed at finding out the most efficient route by comparing the most popular Apriori and the Dijkstra algorithms. Apriori algorithm involves supervised mining using association rules which can be used for finding right paths whereas the same can be estimated by the Dijkstra's algorithm, taking the connecting nodes in the graph.

Keywords: Supply chain management · ERP · Apriori algorithm · Dijkstra's algorithm · Location tracking · Dataset · Prediction · Location · Tracking · Database · GPS · Notification

1 Introduction

The location dependent systems predict real-time information about an object location using the coordinates through GPS, Wi-Fi or Cell – ID. The data warehouse system supports the management decision making process with its time variant and non-volatile group of multiple datasets [1]. Data mining helps in predicting the hidden data pattern in a warehouse [2]. By discovering the data patterns, it is easy to predict immediate decisions either for business or in our normal life. The modern data mining methods use clustering techniques by its ability to identify similarity in objects. There is a need to identify and distinguish between similar and dissimilar objects in cluster technology [3]. In this paper, Apriori and Dijkstra algorithm are used for identifying a

Effective Record Search and Update Using Design Patterns - A Case Study of Blood Bank Mobile Application

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Abstract. This is the new era of handling data to develop industry growth by minimizing labor and error, thereby increasing quality as well as extending services to enhance the community. Similarly, there are many technological adjustments brought into the medical sector by managing huge data records and digitizing it. Digitized records provides an efficient data access with great usability. Today, Digitized health records and associated technology plays a vital role in our day to day life. The design patterns like publisher-subscriber, push and query command segregation patterns can be adopted easily across various applications. These advancements enable commercial data services and also assists well-fare groups to serve and contribute to the society. One of the community services addressed by using design pattern is blood donation. This paper briefly discusses about various design patterns and primarily addresses the idea of applying the design patterns to enhance the search and distribution network of blood bank and blood donation. Real-time blood bank needs a dedicated management system with the help of technology [12].

1 Introduction

Blood donation and the associated services are one of the core supporting service for healthcare domain. There are four main types of blood bank administrations maintaining this billion-dollar health care system in India. They are managed by public sectors, Indian Red Cross Society, non-government organizations and corporate or commercial sectors [1]. In support of this, there exists a need to design and develop digitized blood bank application with features like handling of emergency requests based on location constraints and needs. This application maps the nearby donors with requested blood carriers. This application provides the required information on time and also helps in better decision-making. A portable blood bank monitoring system is

Prediction of Survival Rate from Non-Small Cell Lung Cancer using Improved Random Forest

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Abstract

The major advantage of survival rate prediction is to help patients by giving a better understanding about the success rate of his treatment. In case of lung cancer it is difficult to determine which feature should be used in order to determine this information. In this paper a number of algorithms are applied to the data set to classify the survival rate of Non -Small Cell lung cancer patients along with our proposed method Improved Random forest. The key data features used in these algorithms are overall treatment time, stages, total tumor dose, gender and age. The predictive power of various algorithms are compared. The results show that among the four individual models developed, Improved Random Forest is the most accurate one with an accuracy of 98%. Hence this work provides an effective and powerful approach to predict survival rate of NSCLC patients.

Index Terms—Lung cancer, Random forest, machine learning

I. INTRODUCTION

Lung cancer is the type of cancer that starts in the lungs[1,4]. It is one of the leading causes of cancer related death [1,4]. There are two types of lung cancer, Small Cell Lung Cancer (SCLC) and Non -Small Cell Lung Cancer (NSCLC) [12].

NSCLC counts for 85% of total lung cancer [9,11]. Most commonly used treatments for NSCLC are Radiation Therapy and Chemotherapy [2].

The process for finding the extent of the spreading of lung cancer is called as staging. The T-N-M staging information describes the amount of cancer and also its location in the body [2]. This information helps the doctor to choose the best treatment options. But research shows that the prediction system has poor performance when it considers only the staging information.

Survival rate helps the patient by giving a better understanding about the success rate of his treatment after the diagnosis of the disease. This prediction is based on the past data collected from similar patients [3].
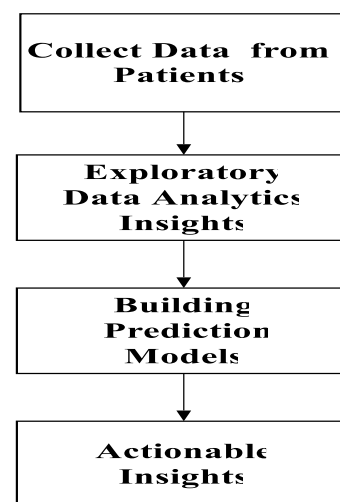

Fig 1: Flow chart showing the steps followed to develop the model

RESEARCH ARTICLE

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Estimation of carrier frequency offset for FBMC/OQAM by using modified Kalman filtering

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Summary

Filter bank multicarrier (FBMC) based on offset quadrature amplitude modulation (OQAM) is regarded as the prospective system for mobile communication. To utilize the potential of the system, the issues like carrier frequency offset have to be investigated extensively. The modulations in the multicarrier system draw a great interest among researchers and engineers in the telecommunication field. Despite the OFDM advantages, significant disadvantages in the system enable researches to approach into efficiently evolved FBMC system. In this paper, the detrimental effects caused by carrier frequency offset on the received signal is considered. Carrier Frequency Offset (CFO) compensation has been effectively undertaken by modified Kalman filtering. The compensation technique not only depends on the specific FBMC modification but also influenced by the selected receiver. A comprehensive analysis of the frequency offset response under three conditions (without offset, with offset, and the compensated samples) has been performed in the proposed system with performance measures as bit error rate (BER) and signal-to-noise ratio. 9 CFO compensation is analyzed by varying the channel characteristics (additive white Gaussian noise [AWGN] and Rayleigh Fading) and subcarrier filtering (prototype filter, Gaussian filter, and root-raised coefficients). From the overall analysis, it is observed that the BER varies from 0.1 to 0.001.

KEYWORDS

filter bank multicarrier, carrier frequency offset, bit error rate, signal-to-noise ratio

1 | INTRODUCTION

In this decade, the filter bank-based multicarrier system is greatly employed for transmission of large data rate over wireless and wired frequency-selective channels. The estimation of CFO possesses predominant significance in the communication system of OFDM. Despite the benefits like the capacity for supporting large data using frequency-selecting channels, the major problem of the multicarrier unit is the sensitiveness toward synchronization faults in frequency. The carrier offset frequency generally occurs because of the Doppler shift which is caused by movement and inherent variation among the oscillators at the receiver and transmitter.[1] This drawback usually destroys the orthogonal behavior in-between the nearby subcarriers and attenuates the desirable signal and initiates the intersymbol and intercarrier interference. In contrast, the FBMC approach affords a more reliable subcarrier spectral shaping than the conventional OFDM through vigilant prototype filter designs.[2] The overlapping of all the subcarriers is restricted with the adjacent subcarrier that not only makes simpler equalization in CP absence but also enhances the system robustness against the prospective CFO. The

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An Efficient Carrier Frequency Offset Tracking for OFDMA Systems Using Normalized Least-Mean-Square Algorithm

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Abstract

In orthogonal frequency-division multiple access (OFDMA), carrier frequency offset (CFO) destroys the orthogonality between subcarriers due to Doppler effect of the channel and also causes inter-carrier interference (ICI) as well as multiple access interference (MAI). In this paper, CFO tracking algorithm for OFDMA system is presented to overcome the effect of ICI as well as MAI. The proposed algorithm employs normalized least-mean-square (NLMS) algorithm which tracks the residual carrier frequency offset in OFDMA system. The proposed NLMS-based tracking algorithm uses average of all residual carrier frequency offset (RCFO) for improving the mean square error (MSE) performance. The proposed NLMS-based frequency tracking along with frequency offset compensator improves the error performance by reducing the effect of ICI and MAI. Simulation results indicate that the proposed algorithm achieves better tracking performance in the presence of frequency offset. From the results, it is observed that the MSE of the proposed estimator is improved about 3.8 dB at SNR = 20 dB with the frequency offset.

Keywords OFDMA · ICI · CFO · MAI · Normalized least-mean square (NLMS) · Frequency offset

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Abnormal gait recognition using exemplar based algorithm in healthcare applications

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Summary

In healthcare applications, gait plays a major role in identification of the normal or abnormal person in different situations. Human gait refers to the walking style of the person, and it may also refer as locomotion using human limbs. The abnormal gait has irregular patterns of stance and swing phases. Without any clinical impairment, this paper proposes a novel approach to classify the person as normal or the person as suffering from neurological disorders from the videos using their gait videos. In addition, neurological gait disorders such as Parkinson gait, hemiplegic gait, and neuropathic gait has been identified using the gait features. Many systems are designed to detect and identify gait disorders using head, hip, heel, and toe behavior analysis from the bidirectional gait videos. As motivated by previous mechanisms, this paper proposes a novel vision based algorithm to recognize the gait abnormalities using model free approaches and significant feature vector generation from complete silhouette images of one gait cycle of a person. Here, a lean angle and ramp angle are considered as distinguishing and prominent features, and the results of these features are properly classified into normal or abnormal gait through the design of an unsupervised classifier.

KEYWORDS

classification, human gait, lean angle, neurological disorder, ramp angle

1 | INTRODUCTION

Over the past decades, there has been much work on human gait analysis for identifying human abnormality. Human gait[1-4] is defined as the alternate sinusoidal movements of different parts of the body by spending some energy. From the clinical gait analysis,[5] it is known that human gait pattern can be characterized by limb movement patterns, kinetics, and kinematics gait cycles. Gait can be categorized into two groups[6] such as the normal gait and abnormal gait. In normal gaits, the gait pattern occurs naturally in gait cycles and allows at least one foot in contact with the ground at all times while walking. However, any gait that does not have the proper sequence of gait pattern is considered as abnormal gait. The leg muscles act as the primary driving force and make the man to move forward in all gait patterns. In general, neurological disorders are identified using neurological examinations, but it has been proved in the literatures that gait features could assist us to identify the neurological disorders.

The normal gait refers as the perfect gait pattern without any deformities in their gait cycle. Abnormal gait is also referred as pathological gait[5,7-9] (or) it is described as an altered gait pattern due to nervous weakness, deformities, loss of motor control, and pain. The gait cycle has been considered to extract gait features between three mid stance phases

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ADVANCED SEARCH

Design of Wearable Pentagonal Fractal Antenna for Soldier Location Tracking

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R. Jothi Chitra ; V. Nagarajan ; D. Mukesh   **All Authors** •••

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Abstract:
In this paper, a Pentagonal Sierpinski fractal antenna for wearable application is designed. The proposed antenna is designed to operate at S-band with frequency range of 2.07 - 2.69 GH with the bandwidth of 650 MHz. The microstrip patch antenna uses FR-4 as the substrate which has dielectric constant ε_r = 4.4 and tangent loss of 0.02. The radiation characteristics such as return loss, VSWR, radiation pattern, gain and SAR value are simulated and presented using CST Suite Studio 2018. Specific Absorption Rate (SAR) value of the proposed antenna is 0.455 W/Kg which is found to be very less than the standard rate of 1.6 W/Kg. The peak simulated return loss of the designed antenna is -38 dB. The proposed antenna can be used for soldier location tracking.

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Contents

I. Introduction

Effective and Accurate Diagnosis Using Brain Image Fusion ⊗

Sivakumar Rajagopal, Babu Gopal

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Abstract

Medical imaging techniques are routinely employed to create images of the human system for clinical purposes. Multi-modality medical imaging is a widely used technology for diagnosis, detection, and prediction of various tissue abnormalities. This chapter is focused on the development of an improved brain image processing technique for the removal of noise from a magnetic resonance image (MRI) for accurate image restoration. Feature selection and extraction of MRI brain images are processed using image fusion. The medical images suffer from motion blur and noise for which image denoising is developed through non-local means (NLM) filtering for smoothing and shrinkage rule for sharpening. The peak signal to noise ratio (PSNR) of improved curvelet based self-similarity NLM method is better than discrete wavelet transform with an NLM filter.

DEVELOPMENT OF EFFICIENT SWARM INTELLIGENCE ALGORITHM FOR SIMULATING TWO-DIMENSIONAL ORTHOMOSAIC FOR TERRAIN MAPPING USING COOPERATIVE UNMANNED AERIAL VEHICLES

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CHAPTER OUTLINE

Chapter 25
Performance Evaluation of Multihop Multibranch DF Relaying Cooperative Wireless Network

M. Dayanidhy and V. Jawahar Senthil Kumar

25.1 Introduction

For achieving high data rate and reliable communication, a network model designed with multiuser–single antenna handset background is called cooperative network. The model consists of a source node (S), multiple intermediate relay nodes (R), and a destination node (D). We utilize the intermediate relay node to receive symbol from source and forward to destination node. Emerging cooperative networks as a feasible solution to close the gap in the end-to-end data rate and transmission range. By selection combining of symbols received through intermediate relay nodes, spatial diversity is exploited at destination. The performance of relay node channels is studied in [1–3].

Four major relaying protocols are used by relay nodes in cooperative networks. Amplify and Forward (AF): The relay nodes amplify the received symbol and forward to the neighbor node, not considering the error in the symbol. Decode and Forward (DF): the intermediate relay nodes regenerate the source symbol and forward the encoded symbol of his confirm to the other node. Compress and Forward (CF): the compressed version of received symbol is forward to neighbor node, compression technique is not unique to all nodes. Coded Cooperation (CC): forwarding of channel coded symbol to other nodes. We consider the intermediate relay nodes are operated with DF protocol.

The performance of multihop single branch relaying without diversity are studied in [4], where the end-to-end probability outage of lower bound of Nakagami

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2D MRI intermodal hybrid brain image fusion using stationary wavelet transform

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Abstract: Medical image fusion involves combination of multimodal sensor images to obtain both anatomical and functional data to be used by radiologists for the purpose of disease diagnosis, monitoring and research. This paper provides a comparative analysis of multiple fusion techniques that can be used to obtain accurate information from the intermodal MRI T1-T2 images. The source images are initially decomposed using stationary wavelet transform (SWT) and the approximations are reconstructed by discrete curvelet transform (DCT), the SWT and DCT are good for point and line discontinuities. The decomposed MRI approximation and detail components are fused using the different fusion rules. The reconstructed fused image is used to accurate identification of brain diseases such as 95.7% of brain lesion, 97.3% of Alzheimer's disease and 98% of brain tumour. Various performance parameters are evaluated to compare the fusion techniques and the proposed method which provides better result is analysed.

Biographical notes: G. Babu is currently working as an Assistant Professor at the R.M.K. Engineering College, Chennai, India. He is also doing his PhD in I&C majoring in Medical Image Processing in Anna University. He obtained his Master's in Medical Electronics from the CEG, Anna University, Chennai and Bachelor's in ECE from the University of Madras. His specialisations include medical image processing, neural network and fuzzy logic.

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Community Energy Sharing in a Microgrid Architecture with Energy Storage and Renewable Energy Support

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Abstract. The increase in the number of installed renewable energy in a residential network needs an efficient energy management system (EMS) to store or sell the surplus energy back to the grid during the surplus generation. Selling of power back to the grid can affect the reliability of the traditional grid system, to avoid this energy sharing is proposed to share the surplus energy with close neighbours to avoid the transmission loss and increase the utilization rate of renewable energy. In this paper, we use the cyber-physical system (CPS) to coordinate the neighbours and to collect data from all the homes using the smart meters. The system's objective is to reduce the grid cost and to benefit each home which shares the energy. This system reduces the need for a huge energy storage system (ESS) which is a major capital cost during the installation. We adopt a scheduling algorithm to manage the loads during the shortage of supply and flexibility in scheduling the loads helps to improve energy management without disturbing the user comfort. The whole model is validated with an experimental setup in the university as a part of the MNRE Funded Project.

1. Introduction

The increase in energy demand and depletion of fossil fuels, the climate changes due to the emission of $CO2$ has forced the country to move towards cleaner energy generation and modernization of existing power grids. Currently, India is the Third Largest producer of electrical energy of about 356.10 GW as per the Central Electrical Authority (CEA) where 21.80 % of total energy is produced RES (Renewable Energy Sources). To increase the RES penetration into existing modern communication technology for data transfer between the generation and load is needed. The Microgrid (MG) is defined as building blocks of the smart grid [1] or as the energy balance cell in the existing power distribution grids. The existing traditional grid cannot withstand the variable generation and sudden changes in the distribution due to its vertical one-way communication between the generation and load. Interconnected MG [2] can operate in grid-connected or island mode. All MG can exchange power among themselves through the power exchange lines. EMS is essential for each prosumer to maintaining the energy balance and optimize energy utilization in the home [3,4]. However, the RES which depends on weather conditions and island mode operation needs a huge ESS to compensate for the loss of renewable energy. We use CPS for safe intercommunication between the prosumers and to operate the smart meters during the sharing conditions. CPS helps in achieving the interoperability, flexibility, and reconfiguration of the system with more efficiency in system and energy consumption.

Swing up and Stabilization of Rotational Inverted Pendulum by Fuzzy Sliding Mode Controller

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Abstract. Rotational inverted pendulum (RIP) is widely used as a benchmark
system in assessing various control strategies. Though a Proportional-Integral-
Derivative (PID) controller is widely used control strategy, it is not recom-
mended for the inverted pendulum due to the difficulties in tuning PID
parameters. This paper presents Sliding Mode Controller (SMC) and Fuzzy
Sliding Mode Controller (FSMC) for stabilizing the RIP. SMC is applied for the
stabilization and robust control of RIP based on pole placement method. The
drawbacks of SMC in terms of high control gain and chattering are overcome by
FSMC. These controllers are applied to the RIP in real-time and their perfor-
mance is compared on the basis of Pendulum regulation.

Keywords: Rotational Inverted Pendulum · PID · SMC · FSMC

1 Introduction

Inverted pendulum is an under - actuated mechanical system with high nonlinearity and
an open loop unstable system. It is a benchmark system for validation of classical and
contemporary control techniques. Its applications range from robotics to space rocket
guidance systems which move away from the gravity. Mostly, inverted pendulum
system is used to illustrate ideas in linear control theory and the control of linear un-
stable systems.

Various control strategies such as PID(Proportional Integral Derivative) [1], LQR
(Linear Quadratic Regulator), SMC (Sliding Mode Controller), FLC (Fuzzy Logic
Controller) [2] have been discussed in the past for the Inverted pendulum system.
Variable structure controller was implemented for the stabilization and robust control
of the double inverted pendulum by using the pole placement method. In order to
overcome the drawback of chattering of the controller, the sliding mode control was
proposed in the simulation of double inverted pendulum system [3]. Fuzzy sliding
mode controller (FSMC) and the additional compensator is presented for a Rotational
Inverted Pendulum position control which in turn provides the characteristics of
insensitivity and robustness to uncertainties and external disturbances [4]. From the
literature survey, it is understood that FSMC is a widely used control strategy to

Establishing self-healing and error correction in wireless sensor networks using honeypot database

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Abstract. The quantity of noxious assault has been ascending due to rise of fresh susceptibilities as well as types of assaults that has been found every day. The stemming of growing counts of pernicious movement in remote system, it has been of a great interest for assault examination as well as the recognizable proof of new dangers. In a model of this kind, safety has not been considered as a condition, but rather a procedure, that implies so as one have to continually enhance and improve safety instruments to ensure worms in system. In order to establish legitimate safety framework one has to recognize and examine the dangers unmistakably. Honeypots, devices for assault examination and zero-day abuse revelation, have been uninvolved in sitting tight for an aggressor. The present study tries to suggest a methodology that involves procedure that has three stages to make it into a successful usage of honeypots taking into account participation amongst honeypots. The system through the methodology programmed distinguishing proof of malignant exercises would be executed in system. The methodology in this study utilizes strategies for i. Hub verification, ii. Self Healing, iii. Mistake Correction. The suggested programmed systems have been effective as well as require neither past preparation nor information of assault marks so as to distinguish malevolent exercises. Server, Database that is real and data based on Honeypot have been utilized to screen besides to explore the vindictive movement in the system. Server has been utilized for social affair hub data since group leader as well as saves the data in a genuine and information has been depending on the Honeypot in light of hubs data. Through the helping of this methodology section of new noxious hub would be confined. At long last, three stage procedure presented in this study distinguish pernicious action and gives secure system.

Keywords: Honeypot, Malicious Detection, Security, Monitoring, Log Analysis.

1. Introduction

Becauseof the expanding intensity of noxious action observed in present days web services, associations have begun to send instruments so as to recognize and react to innovative assaults or doubtful action, known as Intrusion Prevention Systems (IPS). In view of the fact that present IPSes employ principle based Intrusion Detection Systems (IDS), for example,

Energy Efficient Wireless Sensor Network to Enhance Network Security by Detecting Clone Nodes

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Abstract. For replica identification and clone detection a centralized system is proposed in this research, where the network has been separated into inspection node and segments. A clone node can be identified by checking the inspection nodes ID along with the Network security (Cryptographic) key. Detection of clone node done using Chord algorithm, where each and every node in the network have assigned with a unique keygenerated at random.Before the data transmission, it has been given with its key and the assigned keys have been verified for the cloned keys already assigned for some other nodes in the network by the witness node. Also the neighbor node ID and it locations have to be listed to those nodes. In this scheme, Energy-Efficient Clustering Protocol (EECP) has been used to implement different energy saving methods.

Keywords-Wireless Sensor Networks; chord algorithm; clone node; cryptographic key;

1. Introduction

In the modern world, Wireless sensor networks (WSN) have been noticed as a fortunate technology for the society, as it is having enormous pros in it ad has been used by majority of the real time applications. WSN has been linked with various sensor nodes and the sensor nodes can sense the surrounding environment, the obtained data statistics will be transmitted to WSN [1]. WSN having huge scope in the real time applications like agriculture, patient monitoring, aerospace, surveillance, military purposes, nuclear plants, ecological disorder nursing, wildlife monitoring, traffic control, under water surveillance, forecasting, mineral mining, etc. The WSN are commonly used to extract the data from the unreachable and the hazards areas from the sensors node, sometimes these sensor nodes in the unreachable area may vulnerable to numerous attacks. One such major attack is the replication attack i.e. name node replication [6][9]. This research is to overcome the attacks using chord algorithm and Energy-Efficient Clustering Protocol (EECP). This protocol is used to give energy to the nodes after data transmission. The WSN structure is having numerous sensor nodes and is adaptable to include any number of nodes in it. Also the WSN nodes can be accessed by the node ID, cryptographic key, etc. So any attackers with the key or ID can able to access the network and can manipulate the network data. Once the attackers physically seized the any of the original node in the WSN, attackers can easily get the required credential and permits. With those credentials, the attackers can formulate the clones for the nodes and include them in desired accessible locations within the network. Attackers used to create the clone nodes with similar identity and

Performing Experimentation with Physics Model to Predict Statistical Weather Condition

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Abstract. Ice in wind turbines may cause a tremendous reduction in energy conservation. As, ice over turbines are not considered to be a traditional weather prediction data, prediction towards power can leads to higher error. This work anticipates a statistical approach dependent on Niave bayes regression to identify production loss has to be analyzed. It measures input of regional weather condition and various other conditions, and identify power production loss for 48 hours to enhance prediction of next generation energy loss. This can be trained with various prediction measurements and drastically enhances other conventional approaches for longer period. It may diminish absolute production error by ~100kW and it computes its skill with other models. Prediction of weather data is considered to be one of the effectual data for diverse statistical prediction and some calculations are not so absolute. This method can be computational less cost and may be trained again for next prediction.

Key words. Weather prediction, power loss, ice over turbines, naive bayes, regression

1. Introduction

Appropriate recognizing of wind power prediction is essential to handle power demand and energy production. During cold climates, ice over wind turbines may leads to various crises [1]. Owing to variation in aero-dynamic balance, vibration generation, load improvement, ice may outcomes in essential production losses. During end of 2016, 25% of complete installation of wind energy capacity was in cold environment, which makes ice an essential factor in producing energy [2]. Ice modelling over structures like wind turbines or power lines have been performed with physics based ice model

A traceability set up using Digitalization of Data and Accessibility

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Abstract— **Abstract— The main intention of this development is to build a smart outcome for managing and maintaining data digitally using radiofrequency digitalization (RFID) tags and Quick Response code (QR) codes. The component traceability system either requires significant human effort and supervision or outsized amounts of subsidy and capital. This task provides better inventory supervision through enhanced clarity and organization of resources. The RFID- QR employed in this project is to afford admittance to the Records 24x7 that are collected via RFID tags-QR codes. Automated data compilation facilitates to improve the precision of conclusion building processes. RFID tool facilitates to evade vast disasters and upset origin by short of fact concerning the methodological state of rail coaches. The QR code supervision system mitigates some of the human efforts. This supervision system works via one application openly reachable to certified users. The Real-Time Dynamics monitoring System (RTDMS) solution is designed to manipulate manifold facilities or allow numerous users to scrutiny fact at a solitary competence. This method is employed in the cloud server and has password fortification, which averts unauthorized users from screening or revises facts.**

Keywords: Radio frequency Digitalization, Quick Response code, Users, Real time Dynamics Monitoring system.

I. INTRODUCTION

As of now, radiofrequency identification innovation has a place with the majority of extensively accepted applications in the field of ID novelty. The usage of RFID novelty is exploited in practically all zones of industry. RFID labels permit utilizing various items and materials applications. This innovation empowers to record and register the conservation interims of railroad mentors. The utilization of RFID innovation assists with maintaining a tactical reserve from remarkable fiascos and mishaps brought about by an absence of data regarding the specialized condition of rail mentors. RFID based derivative and Data Management System is a viable and moderate resolution for the support and the executives of vehicles (rail vehicle, trailer, holder, etc.) and inventory:

- It is in a small yard or industrial terminal area
- On a short / Long linerailroad
- In a group of separate yards or terminals

Automated fact assortment assists in improving the accuracy of decision-making procedures. The coordination is an altered arrangement with a discrete Server System. Tags/QR ciphers are stuck on the parts plus the tag details can be accessed via the person who reads and portable through the practice and on POH plan.

The remaining Section of the paper is organized as follows. Section II is the RTDM system and the components used in the RFID system. Section III is Literature Survey and Section IV provides the system functioning and section VI concludes the paper.

II. RTDMS SYSTEM

This section follows and the representation of RTDMS and components in the RFID system

a). Portable Reader

The Reader is a low-cost handy reader utilized principally to spot tags on railing vehicles. It can send/ read fact on railing straightforwardly over a net as a file affixed to an email, a file dispatched to an FTP server, and as a data torrent dispatched to

Scalability Service In Data Center Persistent Storage Allocation Using Virtual Machines

Dr. P. Deivendran, Dr. K. Anbazhagan, P. Sailaja, Dr. E.Sujatha, M. Rajesh Babu, S. Sudhakar

Abstract: Cloud Computing is a forthcoming, booming technology that provides the right use to the shared pool of resources by the Service Providers. Scalability is a fascinating feature that attracts most of the customers because it meets with all the needs of the small and big companies either by growing or decreasing the necessary resources, which you are not utilizing. The scalability of Web service centered on the change of the output of the Web service, which is distinct resting on several scaling factors and variables. Productivity is calculated based on the bandwidth consumed by an exacting composite service. A generally use metric for scalability in parallel computing speeded up, which is evident as the relative amount of the sequential execution time over the identical execution time.

Index Terms: Scalability, Virtual Machine, Service, Memory, Performance, Service Migration

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1. INTRODUCTION

The exercise of modeling and simulation are proper in this framework, as there are no open-source Cloud Computing (CC) software forums that assist horizontal scaling. Scalability offers a valuable safety net for your requirements. Though done by either growing or reducing the essential resources, meaning you do not charge for not utilized resources. For these less-considerable enterprises, being able to improve resources from the cloud permits them to escape the enormous one-off hardware expenses and software program, making ready charges efficient and the smallest amount. With the number of opportunities existing within CC resources, there is always an opportunity to help from scalability. Whether its funds via infrastructure costs, the economy of scale, or sharing a group of support, you can adapt CC to suit the need of your company to save money. There are two types of scalability: The first method is Scale Vertically. This type of scalability can work through any request to a limited mark. The second method is Scale Horizontally, by provisioning new instances of the request tier on other virtual machines and then separating the load stuck between them.

2. PROBLEM STATEMENT

A difficulty of a particular database or Structure Query Language (SQL), which means weakly construct might destroy vertical scalability in addition to the rate of deploying in the cloud. CC was altogether not leaving to enhance code or database queries or database through performance in intellect [5]; that's still directly in the hand of the developers, not considering whether or not CC used. CC provider insincerity, and possibly wouldn't if they can (it makes them money, after all), address vertical extensibility problems because they are unusual to the application. Not any obvious explanation can enhance code, such as the

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purpose of the request will magically scale up vertically [11]. Outside solutions can get better overall performance by optimizing protocols, reducing protocol and application overhead, and reducing bandwidth necessities.

2.1 Objective and Methodology

CC and virtualization can deal with vertical extensibility limits for performance level agreement by using a horizontal scaling method.
- •Database queries enhanced.
- •The capability of application benefits.

3. SCALABILITY AND SERVICE

Unlike a conventional laboratory, have a few different cloud features, for example, softness, adaptability, versatility, and rate distribution. Every case study might hold up more than one test project base on their schedule [10]. In adding, it very well may be effectively demand, set-up, and return. Every development could contain various testers, who can right to use, organize, and examine different testing functions. Most accessible tools not created to maintain cloud-based software testing and SaaS assessment; there is a considerable demand for innovative cloud-based testing and assessment settings for SaaS applications. The article has TaaS, and CTaaS concepts have infrastructure, plan, and execution. In enhancing, this article exhibits the application outcome of our earlier projected graphical model and measurability for SaaS achievement and versatility assessment.

4. VIRTUAL MACHINE IN DATA CENTER

The primary infrastructure level services (hardware, software) offer source originator in a CC atmosphere. It summarizes a compute host set to facilitate homogeneous or heterogeneous resource arrangement (cores, capability, and storage) [8]. Additionally, each Datacenter module illustrates a general source furnishing factor to facilitate strategy for assigning bandwidth, space, and storage. The central hardware infrastructure associated with the Cloud is designed in the simulator by a data center module for managing VM requests [12]. A data center mostly controlled by host set, responsible for organizing VMs through their life cycles. A host is a component that represents a physical computing node in a Cloud: it assigned a pre-configured processing capability (expressed in computing power in CPU units), memory, bandwidth, storage, and scheduled strategy for assigning cores to VMs. With the virtualization method, CC offers flexibility in source allotment.

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TECHNICAL PAPER

Augmenting the potable water produced from single slope solar still using CNT-doped paraffin wax as energy storage: an experimental approach

Ali J. Chamkha[1,2] · D. Dsilva Winfred Rufuss[3] · A. E. Kabeel[4,8] · Ravishankar Sathyamurthy[4,5] ·
Mohammed Abdelgaid[4] · A. Muthu Manokar[6] · B. Madhu[7]

Abstract

The present study aims to find the technical feasibility of recently evolved nanomaterial, i.e. carbon nanotubes (CNT), enhanced with paraffin as a novel energy storage material for desalination application. As a primary investigation, the thermo-mechanical properties like density, melting point, thermal conductivity, etc., of CNT enhanced paraffin were first analysed and then integrated with solar desalination application. Three solar desalination stills: (i) conventional solar still, (ii) solar still loaded with fossil paraffin and (iii) solar still loaded with CNT-doped paraffin were fabricated and experimented at Chennai, India (Lat. 13° 08′ N, Long. 80° 27′ E). From the investigation, it is inferred that there is a significant increase (of about 26%) observed in the thermal conductivity of CNT-doped paraffin as compared to fossil paraffin. The cumulative yield of the conventional still, solar still with paraffin and solar still with CNT enhanced paraffin was found to be 2.5 kg/m^2, 3.4 kg/m^2 and 5.8 kg/m^2, respectively. There was 41.4% and 26.4% enhancement, respectively, observed in the daily yield of the solar still with CNT-doped paraffin as compared to conventional still and the still with virgin paraffin. The productivity efficiency was 46.45% for the still with CNT blended paraffin contributing to 24% and 19.6% increase in the efficiency as compared to the other two stills considered for experimentation in this study. Thus, it is concluded that CNT enhanced paraffin is identified as a better potential energy storage material as compared to conventional paraffin in solar desalination application.

Keywords Energy storage · Carbon nanotubes · Paraffin wax · Yield · Desalination

1 Introduction

In the pursuit of alternate energy, many eminent scientists and technocrats have discovered a solitary source of energy in the form of radiation from the sun. The principal advantages of solar energy over fossil energy are they are

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This article has been selected for a Topical Issue of this journal on Nanoparticles and Passive-Enhancement Methods in Energy.

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Experimental and analytical testing of a composite laminate material G10/FR4 under cyclic loading 🛒

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K. Kalaiselvan; D. Athikesavan

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The objective of this work is to predict the deterioration and failure of composites under essentially any type of loading—constant, variable, bending, torsion, tension, compression, or others. G10/Fr4 is a thermosetting industrial fibre glass composite consisting of a continuous filament glass cloth material with an epoxy resin binder. It was matrix formed and layer by layer formed with glass fibre and epoxy resin to study different mechanical properties. Initially experimental and computational studies were performed on matrix formed sample to characterize tensile and compression properties of thermosetting fibre glass composite. When the results of computational and experimental methods were compared, similar values are obtained. Other sample of G10 FR-4 made by layer by layer forming with glass fibre and resin sample is used for bending test. Also, tensile, compression and bending loads are applied repeatedly many number of times to predict the fatigue life of material. Both experimental and computational tests were conducted and compared. We get similar tensile, compression, and bending properties in experimental and computational method.

Topics

Fatigue limit, **Composite materials**, **Glass composite**, **Computational methods**, **Educational assessment**

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Analysis on mechanical properties of wood plastic composite

K. Bhaskar [a], D. Jayabalakrishnan [b], M. Vinoth Kumar [b], S. Sendilvelan [c], M. Prabhahar [d]

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Abstract

Wood-plastic composites (WPC) are actually a type of composites made by blending wood particles/flour with polymers. The Mechanical Properties of Wood Plastic Composites primarily is dependent on the makeup of the matrix of its (Polymers), reinforcements (Sawdust), coupling agents, and lubricants. In general, the polymer of the matrix in WPCs is actually made of a single monomer like HDPE, PS, PP, PET, etc. The Objective of the project is actually investigating the physical properties of a Wood Plastic Composite by using polymer blend (a combination of two or maybe more polymer) as a matrix and the effects of its own physical properties of WPC by varying the makeup of the combination at various proportions.

Introduction

Wood is one of the earth's most versatile raw materials which play a vital role in our daily lives. Since Wood is more flexible to work with many applications such as tools, shelter, furniture, source of heat, transportation, decoration etc. In many developing countries wood is the major source of fuel supply. Over the upcoming years, 3 billion people around the world will face acute fuel wood shortages as a result of decrease in fuel wood sources. The major factor which pushes the use of wood is its low density, high toughness, non-toxicity. However, wood has the major disadvantage having low water resistance due to its natural hygroscopic characteristic. To minimize the use of wood in practical applications Wood Plastic Composites (WPC) are actually created in early 1990s which is actually made up of wood and thermoplastic resins such as High-Density Polyethylene (HDPE), Polypropylene (PP), Polystyrene (PS). In WPC both virgin

Performance and Emission Characteristics of Diesel Blended with Sweet Lime Peel Oil and Corn Oil

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Abstract. Increasing the demand of fossil fuel energy in up-coming days life is become an important problem everywhere, so alternative fuel resources (bio-oil) for reducing the energy demand is produced and compared with conventional fossil fuel. By pyrolysis method, the biomass (solid waste) was converted into pyrolysis oil, which is used as an alternative fuel in the diesel engine without any engine modification. Sweet lime peel and corn pyrolysis oil are blend at 10% with diesel. The results of the tests showed that the brake thermal efficiency of the blends of corn oil and sweet lime peel oil with diesel was greater than diesel and the amount of hydrocarbons, carbon monoxide, carbon dioxide and Nitrogen oxide emissions from corn pyrolysis and sweet lime peel oil was lesser than diesel operation. It was observed that the pyrolysis oil shows better performance and emission characteristics than diesel.

INTRODUCTION

Petroleum products and crude oil will not be sufficient according to current needs and to improve the fuel economy of engines, various investigations and studies are being carried out. Due to the huge increase of vehicles, the demand and availability of gasoline and diesel are unbalanced. The scenario will be more disastrous if this situation continues, then gasoline and diesel will be more expensive and limited. With greater use and depletion of fuels, today more emphasis is placed on alternative fuels. There is an essential need of alternate fuels in a way or other and Industrial growth and economy growth of all country depend on its energy resources. The population increase increases the demand for petroleum fuel energy resources. The fuel price rate is constantly increasing to meet supply, growing demand for oil intensifies air pollution and many alternative fuels have been produced to solve the problem.

Pyrolysis is one of the most important methods for converting biomass or solid waste into bio-fuel (liquid, gases and charcoal) [1]. The pyrolysis process based on heating they are slow pyrolysis, flash pyrolysis and vacuum pyrolysis [2]. Advantages of pyrolysis process are energy independence, smaller trade deficit, less global warming and cleaner air [3]. The fixed bed pyrolysis is the best route for production of biomass into bio-oil (liquid) and it has high conversion capability compare to other pyrolysis methods [4-6]. Tire and plastic pyrolysis oils experimented and it has been discovered that both can run on a CI engine and that the biofuel properties are comparable to diesel [7-8]. At high temperatures, the N_2 and O_2 can react and NOx formation occurs at temperatures above 1500 ° C and the formation rate increases rapidly with increasing temperature [9]. Biodiesel produce less exhaust emissions due to its higher O_2 content [10]. It can be studied effect of antioxidant with NOME for controlling Nitrogen dioxide (NO_x) emission in Direct Injection (DI) Diesel engine. The antioxidant additive (butylated hydroxytoluene) is mixed in various proportions (100-400 ppm) with neem oil methyl ester. The antioxidant additive with NOME reduced NOx emission by 19.99% at full load compared to pure biofuel. The emissions of HC, CO and smoke for all blends are slightly higher and the emissions of carbon dioxide (CO_2) are slightly lower due to the disturbance during combustion [11]. The Waste Cooking Oil mixtures resulted in less thermal efficiency, carbon monoxide, unburned

Influence of regular inserts and aluminium oxide nanoparticles on micro finned tube over heat transfer and hydraulic performance under laminar flow

Mageshbabu Devarajan, Madhu Balasubramanian, Bharathwaaj Ramani, and Ravishankar Sathyamurthy

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RENEWABLE ENERGY AND WATER SUSTAINABILITY

Investigation on heat transfer enhancement of conventional and staggered fin solar air heater coated with CNT-black paint—an experimental approach

Balasubramanian Madhu[1] · Abd Elnaby Kabeel[2] · Ravishankar Sathyamurthy[2,3] · Swellam Wafa Sharshir[4] · Athikesavan Muthu Manokar[5] · Pala Raviramachandran Raghavendran[3] · Thimmaiah Chandrashekar[6] · Devarajan Mageshbabu[1]

Abstract

The present study aims at a detailed experimental study of a passive-type solar air heater (SAH) on the effect of coating the absorber plate with higher thermal conductive black paint under forced circulation method and studied under the climatic conditions of Chennai. Furthermore, to enhance the thermal performance index of conventional SAH, additional enhancement such as coating and staggered fins are fixed to the absorber plate of duct which simultaneously increases the turbulent intensity, kinetic energy to enhance the temperature of outlet air. Comparisons are made with a solar air heater without coating and staggered fin in order to assess the thermal performance. Experiments were conducted on a continuous basis and the flow rates of air flowing through the duct are varied. Experimental results revealed that the effect of coating improved the plate temperature to a maximum of 102 °C while the modified SAH coated with ordinary black paint and staggered fin arrangement is found as 95 °C for the flow rate of $m_f = 0.03$ kg/s. The difference in temperature between exit and inlet of conventional SAH with coating alone is found as 13.09 °C at a flow rate of $m_f = 0.03$ kg/s whereas the average thermal efficiency is found as 22.3%. Similarly, increasing the mass flow rate from 0.13 to 0.22 kg/s has no significant improvement in average daily thermal efficiency, whereas the temperature difference decreases. The coating of absorber plate with higher thermal conductivity paint and increased turbulence created between the duct by using staggered fin improved the temperature of exit air by 63, 64, 38 and 35% for air flow rates of 0.03, 0.04, 0.13 and 0.22 kg/s respectively. On a flat absorber with coating, the average increase in temperature is found at 6.3% compared to that of SAH coated with ordinary black paint. The hourly thermal efficiency of the conventional type SAH with coating exhibited an enhancement of about 5% in thermal efficiency as compared to that of conventional type with black paint coating alone for the same climatic condition, whereas the thermal efficiency of staggered fin SAH with coating alone is enhanced by 7.5%. With staggered fin arrangement in the absorber plate, heat absorption by the air is increased with CNT-coated absorber and excessive turbulence produced by the fins enhanced the average temperature difference from 13.5 to 20.3 °C. The cost per unit kW of conventional type SAH with CNT-doped black paint reduced from 0.01754 $ to 0.00832 $/kW while varying the flow rate from 0.031 to 0.22 kg/s.

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Experimental study on enhancing the yield from stepped solar still coated using fumed silica nanoparticle in black paint

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Abstract

The present experimental study deals with the utilization of fumed silicon oxide nanoparticle in black paint at a varied concentration (10-40%) coated on the absorber plate of stepped solar still for augmenting the freshwater yield. The critical parameter for enhanced evaporation depends on the water temperature. From the experimental investigation, it is found that the temperature of the water and absorber are influenced by the absorption rate and the utilization of fumed silicon oxide nanoparticles in black paint which increases the temperature. The average temperature of water and absorber is higher with an optimized concentration of nanoparticle of 20% with black paint is increased by 10.2 and 12.3% respectively whereas, with further increase in nanoparticle concentration with black paint exhibited no significant improvement. Results also showed that the total yield from the solar still is improved by 27.2, 34.2, 18.3, and 18.4% for 10, 20, 30 and 40% respectively while compared to that of ordinary black paint.

Keywords: - SiO_2; Nanoparticle; Black paint; Water temperature; Evaporation

1. Introduction

Day by day the requirement of drinking water is increasing as the demand for fresh water increases. The demand is higher due to the demand for water from the various surface water sources are used for various industrial developments. The groundwater source is also limited to use as it can't meet the demad by the present population. Large scale desalination includes reverse osmosis, multi-stage flash desalination, vapor desalination, UV filtration. Small scale desalination technique includes

Effect of water depth and insulation on the productivity of an acrylic pyramid solar still – An experimental study

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Abstract

Evaporation and condensation rate directly depend on the surface area provided in the solar still. Considering that, pyramid solar still provides greater surface area than basin type still for condensation process and gives out high performance. In this research work, the pyramid solar still is researched by varying the water depth from 1 to 3.5 cm with and without insulation conditions. The performance of the pyramid solar still with insulation is greater than the without insulation. Insulation plays an important role to increase the yield by increasing the water temperature. The yield produced from the pyramid solar still was higher at the lowest water depth of 1 cm for both insulation and un-insulated condition. The freshwater production from the pyramid solar still without insulation is 3.27, 2.93, 2.26, and 1.59 kg/m^2 and with insulation is 3.72, 3.40, 2.70, and 2.08 kg/m^2 for the water depth of 1, 2, 3, and 3.5 cm, respectively. At 1 cm water depth, the pyramid solar still with and without insulation produced 19.46% and 8.26% higher yield than the single basin type solar still. The daily efficiency of solar still is improved to about 28.5% with insulation whereas, the daily efficiency for solar still without insulation is found as 26.17%.

Keywords: pyramid solar still; acrylic collector cover; insulation; water depth; condensation

Contents

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Design and thermal analysis of coated and uncoated exhaust manifold

T. N. Valarmathi, S. Sekar, M. Purusothaman, J. Saravanan, K. N. Balan, S. D. Sekar & T. Mothilal

Influence of fins on the absorber plate of tubular solar still- An experimental study

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ARTICLE INFO

ABSTRACT

This study emphasizes the importance of adding fins to the flat absorber plate to augment the thermal performance and yield of potable water produced. The potable water produced from both solar still were compared by considering the similar climatic condition. The results showed that the addition of fins in the absorber plate augments the water temperature and thereby the rate of evaporation from the surface. Linear regression between the experimental and predicted yield was carried out. It was clear that the observed and predicted yield have a deviation of about ± 5%. The total yield produced from the modified absorber was improved by about 46.85% than conventional tubular solar still. Also, results of thermal efficiency exhibited that the solar still using finned absorber was increased while compared to the tubular solar still without fins.

1. Introduction

It is necessary for the search for new energy due to the depletion of fossil fuels. Among the ancient source, solar energy is the most valuable energy which is eco-friendly, clean and never-ending energy. There are several methods of harnessing energy from solar [1-14]. Taamneh and Taamneh [15] used a square basin type pyramid solar still and used forced convection technique to augment the potable water produced. The fan was operated using DC battery which was economically viable and cost-effective. The use of fan reduced the temperature of glass cover while the velocity of air through the fan was increased. The results indicated that there was an improvement of about 25% in the potable water produced using forced convection technique rather than naturally occurring wind. The Higher velocities from the fan-produced a maximum daily yield of 2.99 kg/m^2. Mahian and Kianifar [16] made a numerical and experimental analysis on pyramid type solar still with external forced and free convection by varying the water depth. The results showed that the forced convection technique is more effective than free natural convection as the forced convec-

tion improved the potable water produced by 23.21% than solar still with free convection under a constant water depth of 4 cm maintained. Kianifar et al. [17] compared the active and passive type pyramid solar still on energy and economic analysis on various water depth and two different seasons. Results showed the cost per litre of water produced was reduced by 8% using active solar still than a passive one. On increased water depth, the exergy efficiency decreases. It was also found that exergy efficiency was higher during summer using an active and passive type of solar still, while the exergy efficiency was almost the same using active solar still in summer and winter. The induced turbulence by the fan improved the accumulated yield by 15% than solar still without a fan. There are several methods employed to improve the performance of tubular solar still. The efficient method of improving the evaporation rate from the tubular solar still is by increasing the exposure area of water with solar radiation. Effective heat transfer from the basin improves the efficient evaporation of water from the absorber. Heat transfer distribution throughout the basin of solar still is enhanced by providing fins on the surface of the flat absorber. The objective of the present experimental investigation is

Modeling and stress analysis of aluminium alloy based composite pressure vessel through ANSYS software

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ARTICLE INFO

ABSTRACT

The traditional materials based pressure vessels are having more strength. Due to their high weight to strength ratio and corrosive properties, but it is not suitable in the aerospace and oil and gas factories. In industries are extensively required for pressure vessels, which will have low weight to strength ratio without affecting the strength. In recent years, most of the sectors replace conventional materials with aluminum matrix composite materials. On the other hand, Aluminum matrix composite (AMCs) materials with their higher specific strength and these characteristics will reduce the structure's weight. In this research paper, the AA6082 alloy based aluminum matrix composites have been prepared by stir casting technique to test their mechanical properties under different weight percentages of reinforcement. Various mechanical studies have been done, such as tensile, impact, flexural, and hardness. For the same geometrical parameters of the steel pressure vessel, FE Analysis of AMCs composite pressure vessel is carried out, and stresses for different internal pressures are determined. And the design is carried out in design software solid works and analyze in ANSYS workbench. Then the results of steel pressure vessel and composite pressure vessel are compared for stress results.

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1. Introduction

1.1. Pressure vessel

The term pressure vessel refers to those containers or reservoirs which are supposed to both internal and external pressures. The pressure vessels are used for fluid storage in ambient pressure. Pressure vessels has wide-ranging applications in industrial thermal and nuclear power plants, process and chemical industries, in the depths of space and oceans, and water, steam, gas and air supply systems. These vessels also require an authorized inspector to sign on each new vessel constructed and each vessel has a nameplate with specific information on the vessel, such as maximum permissible working pressure, maximum temperature, minimum metal temperature, date, registration number (through the National Board), and official pressure vessel stamping (U-stamp) from ASME. The nameplate makes the vessel traceable, and an representative ASME Code vessel. The pressure vessels are significant in light of the fact that numerous fluids and gases must be put away under high tension. Most weight vessels are needed to carry only less weights and are therefore construction of cylinders and sheets moved to frame chambers. Notwithstanding, some weight vessels must convey more weights, and the thickness of the vessels must increase to give enough quality. From the fifties of the twentieth century, enthusiasm for considering the shell arises.

1.2. Types of pressure vessel

In general there are three main types of pressure vessel. They are

- Spherical pressure vessel.
- Horizontal pressure vessel.
- Vertical pressure vessel.

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Performance and emission characteristics evaluation of CRDI engine using alternate fuel

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ABSTRACT

The experimental study is performed on the performances and emission characteristics of Common Rail (CRI) injection C.I engine. A 4-stroke engine, a cylinder, and a 3.5 kW water-cooled engine were used for the experiment. B10, B20 and B30 biodiesel blends was used to perform performances and emission test under different loading conditions. Several parameters were recorded, such as the BSFC, BTE, the emission of carbon monoxide, hydrocarbons, smoke and oxides of nitrogen in the exhaust. The major properties of Karanja's methyl esters were compared to diesel fuel. The performances and exhaust emissions was compared to single diesel, using karanja fuel blends. This combination shows a significant improvement for the exhaust emission and the fuel consumption under varying loading conditions.
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1. Introduction

The main renewable fuels for transportation are ethanol and animal fats and vegetable oils. Biodiesel delivered with recycled corn oil produced considerably lesser NO_x than diesel, while biodiesel delivered with canola oil produced significantly higher NO_x than diesel [16–21]. The cavity on the performance of the scramjet combustion chamber is recapitulated, namely the geometry of the flame support of the cavity; spot of the fuel and air injection method and modern progress in binary cavity [1]. The poor physical properties of high density and viscosity papaya seed biodiesel cause atomization problems that lead to higher CO, HC, and smoke content [22–29]. NO_x emission high compared to other fuels. Beef tallow oil [2,6]. Karanja's/diesel combine of oxygenated additive namely di-tetra-butyl-phenol and 1-pentadecanol [3]. The role of butanol in the reduction of CO, smoke, NO_x and HC as an oxygen additive. To improved performance characteristics of biodiesel Punnai [4,5]. The pellets absorbed in crude oil and biodiesel [7]. The B20CuO100 mixture can provide a constructive result of increasing BTE, drop of around BSFC, smoke, NO_x. Calophyllum Inophyllum, Orange peel oil, plastic blend [8–13]. 1-pentanol fuel properties compared to lesser alcohols. It was shown that for P30D70 there was a drop in BTE, an increase in BSFC, a decrease in NO_x and a slight increase in HC and CO at a 60% loads [14]. MME20 reduces the thermal efficiency and emission increases [15].

2. CRDI engine

The CRDI specification details in Table 1. The properties of diesel and mixed biofuel are blends B10, B20 and B30 listed in Table 2.

3. Experimental procedure

The exhaust emission concentration was measured byusing the AVL exhaust gas analyzer. The experimental setup is shown in the Fig. 1. Four varies loads (0–9 kg with an increase of 3 kg) were selected for performance tests at two different engine speeds of 1000 and 1500 rpm.

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Microstructural and mechanical properties of copper matrix composites

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Abstract

This article focuses on the synthesizing of copper metal matrix material (CMMC). Titanium carbide and groundnut shell ash strengthen the steel. The 70 per cent hybrid mixture with copper powder, 15 per cent tungsten carbide powder and 15 per cent groundnut shell ash favoured where copper is mixture content. The composite made using metallurgical powder technology. The proposed composite studied through study of microscopy, corrosive analysis and measuring of hardness. Reinforcing the existing 15% Tungsten Carbide Powder mixture and 15% Groundnut Ash shell, enhanced hardness and diminished corrosion rate (increased corrosive resistance). The Scanning Electron Microscopy picture guarantees a clear distribution of reinforced particles in the matrix content.

Introduction

Composites are a mixture of two or more elements attached to a base unit (matrix) of different properties. Enrich base element properties. Composites of metal matrix have superior benefits such as elevated temperature resistance and electrical conductivity, and improved mechanical properties [1], [2], [3], [4], [5], [6], [7], [8], [9], [10]. Composite materials have a matrix-known unbroken phase and a distributed, non-continuous phase called the reinforcement phase. The phase-reinforcing material may be in fiber, particle, or flake form. The materials of the matrix phase are continuous, by and large. As a composite, each material maintains its special properties but as soon as it is composite it develops greater properties that cannot be independently achieved [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22], [23], [24], [25]. Metal

Analysis of composite leaf spring using ANSYS software

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ARTICLE INFO

ABSTRACT

This research work reveals the modeling and investigation of composite leaf spring delivered utilizing polymers strengthened with glass fiber. The plan and investigation of composite leaf spring created utilizing polymers reinforced with glass fiber. The modeling constraints are strains, stresses and deflection. Measurements of the present standard steel leaf spring of a light commercial vehicle. Using E-Glass/ Epoxy unidirectional covers, indistinguishable measurements from customary leaf spring are used to make a composite multi leaf spring. The 3-D model of traditional leaf spring is also dynamically analyzed using ANSYS 12 Workbench and contrasted with the analytical results.

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1. Introduction

To provide adequate comfort, the springs are provided between the wheels and the chassis frame and the shocks from bumps in the road surface must not be transmitted to the superstructure as well. Mostly the applications for the leaf spring consist of multi-leaf systems found primarily in rear suspensions. The point of this exploration is to inspect, fabricate and approve multi-leaf spring models of limited components. The presentation of better materials, advancement of plans and better assembling forms gives weight decrease which has been the main focus for conserving natural resources and saving energy. This also provides more fuel economy and better riding conditions for the car. It is made possible by the use of composite materials to decrease the leaf spring weight with no diminishing in load passing on limit and unyielding nature. Multi-leaf steel springs are replaced by mono-leaf composite springs, as the composite materials have continuously adaptable weight imperativeness accumulating breaking point and high solidarity to weight extent appeared differently in relation to those of steel. According to studies made in the longitudinal direction a material with most noteworthy quality and low flexibility modulus is the most sensible material for a leaf spring. The car components are subject to a number of fatigue loads such as

shocks induced by road irregularities followed by the road wheels, frightening weights on account of the wheel turning over the thumps, etc [1–3]. Owing to fatigue loads, the leaf springs are more affected because they are part of the automobile's unstrung mass. For practical application this relationship is disentangled by the measure of strain disappointment. A seven-leaf steel spring used in voyager vehicles is replaced in the present work with a composite multi-leaf spring made of composites produced using glass/ epoxy. The measurements and number of leaves are viewed as indistinguishable for both steel spring leaves and composite leaf blossoms. The essential point is to gauge the composite leaf spring's cheap conveying force, unbending nature and weight reserve funds. Finally, we likewise gauge the depletion life of the steel and composite leaf spring using life. Lightweight materials based composite materials widely used in the automotive and aircraft applications because of low density and greater mechanical properties [4–70].

2. Leaf spring

The leaf Spring Fiber Reinforced Polymer (FRP) pattern and analysis. The key concern in the vehicle business is weight decrease which is accomplished mainly on implementation of new compositions, refinement of designs and improved manufacturing processes. This was made possible by the introduction of FRP products, without any reduction in load carrying power.

Numerical Investigation of Sinusoidal and Trapezoidal Piston Profiles for an IC Engine

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ABSTRACT

This paper is aimed at a comparative investigation on two different velocity profiles for piston movement namely Sinusoidal and Trapezoidal Profiles for an IC Engine. In conventional IC Engine, velocity profile of piston motion is Sinusoidal. It has many disadvantages such as high mean velocity that leads to high inertial force, frictional losses, wear and high rate of heat leakages. Nearly 20% of the total power produced by the engine is dissipated into heat because of friction. Of this 20%, about 75% is due to friction of piston rings on the cylinder walls. This is an irreversible loss and can be seen as a consequence of high mean piston velocity associated with the existing Sinusoidal Piston Velocity Profile. In addition, varying velocity profile can cause rapid acceleration and finally jerks which lead to considerable mechanical vibration and noise. As a result the mechanical strength of engine material will be high to withstand the inertial force, friction and wear. To overcome these difficulties, an extensive attempt is made to improve the piston movement by restructuring the piston velocity profile with reduced mean velocity which is constant for most of the crank angle. A comprehensive experimental examination is conducted for the Sinusoidal velocity profile, which are utilized in arriving at an optimal CFD procedure through validation study. A proposed connecting rod configuration with internal gear and pinion arrangement is proposed to achieve different Trapezoidal Profiles. The optimum CFD procedure found from validation study is used to analyze and understand the engine with modified Trapezoidal Velocity Profiles. There is almost 20% reduction of mean piston velocity that considerably improves hydro-thermo dynamic and mechanical characteristics of the existing engine.

Keywords: CFD; Sinusoidal; Trapezoidal; Hydro-thermo dynamic and Mechanical characteristics.

NOMENCLATURE

a	radius of crank		S_i	source or sink term for energy
B	cylinder bore		S_{Mx}	source or sink term for momentum
D_b	bearing diameter		TI	turbulence intensity
IC Engine	Internal Combustion Engine		T_n	tumble ratio
I_s , I_t	the moment of inertia with respect to swirl axis and tumble axis respectively.		$\vec{u}$	flow velocity vector
			ω_s , ω_t	angular velocity of rotating flow at swirl axis and at tumble axis respectively
$\vec{J_i}$	diffusion flux of species i			
L	connecting rod length			
L_s , L_t	the angular moment with respect to swirl axis and tumble axis respectively		θ	crank angle
			Γ	diffusion coefficient
m	module		τ_r	relaxation time of the diesel droplet
R_i	the net rate of production of species i by chemical reaction		ρ_p	density of diesel particle

Enhanced properties of cadmium mercury thiocyanate bis(*N*-methyl formamide): A promising non-linear optical crystal

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Abstract

The present study deals with the synthesis and characterization of cadmium mercury thiocyanate bis(*N*-methyl formamide) or CMTN crystals where they were grown in two critical steps. In the first step, cadmium mercury thiocyanate (CMTC) single crystals were grown by intriguing cadmium chloride, mercuric chloride, and ammonium thiocyanate in 1:1:4 ratio and mixed with solvent by a slow solvent evaporation technique. The second step involves the reaction between CMTC and *N*-methyl formamide (NMF) in a 1:2 ratio leading to the formation of CMTN crystals. The growth parameters of CMTN grown crystals were optimized at different pHs (1- 5) and the solubility curve has also been reported. On characterization, the orthorhombic crystallinity having $Pna2_1$ space group of as-grown CMTN crystals has been revealed by single X-ray diffraction analysis (XRD) and the lattice cell parameters are found to be a=15.195Å, b= 7.722Å, c=16.162Å, and α=β=γ=90°. Single the phase crystallinity of CMTN is observed by powder XRD pattern and the increase in the intensity of index peaks shows that there exists good coordination between the CMTC and NMF compounds. The FTIR analysis supported the presence of surface ligands groups of thiocyanate, while the Raman spectroscopy confirmed for the coordination of thiocyanate ions in the CMTN compound and thus both established for the metal-ligand bonding. The UV-vis spectroscopy showed the optical transparency of CMTN to have the cutoff wavelength at 335nm and the Kurtz powder method for studying the second harmonic generation (SHG) output power is 5 times higher than the reference. Further increase of dielectric constant and dielectric loss with respect to the changes in frequency makes it a suitable material for the construction of photonic and non-linear optical (NLO) devices.

Introduction

Star Domination and Star Irredundance in Graphs

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Abstract

A Subset D of a simple graph $G = (V, E)$ is called a dominating set of G if for every vertex $u \in V - D$, there exists $v \in D$ such that u and v are adjacent. Several types of domination have been introduced. In the book *Fundamentals of Domination in Graphs* by [6], it is proposed that a type of domination is "fundamental" if every connected non trivial graph has a dominating set of this type. There are two fundamental varieties of domination namely, domination defined by its nature and domination defined interms of some property of the subgraph induced by the dominating set. In this paper a new domination belonging to the first type is introduced and studied.

1 Introduction

Let $G = (V, E)$ be a simple, finite undirected graph. A subset D of V is called a dominating set of G if for any vertex $u \in V - D$, there exists $v \in D$

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Analysis of multistage M[X]/GK/1 queue with different server's interruptions and its application in energy consumption

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ABSTRACT

In this paper, we consider multistage batch arrival, batch service (fixed batch size) queue having multiple vacation policy subject to server breakdown with the delayed repair. In addition, the server may extend the vacation at each vacation completion points and the server may renege during vacation and breakdown periods. Using the supplementary variable technique, transient and its corresponding steady-state solutions are derived. The results obtained are comprehended by using a numerical example.

1. Introduction

Many real-time situations can be modelled as a vacation queueing model. Numerous authors have contributed significantly on queueing models with different vacation policy.

Queueing system with an unreliable server having Bernoulli vacation is studied in Choudhury and Deka (2012) and Choudhury and Deka (2013). Doshi (1986) and Ke, Wu, and Zhang (2010) are excellent surveys on vacation queueing models. In Kalyanaraman and Nagarajan (2016), bulk arrival, batch service queueing model with an unreliable server having compulsory vacation is discussed. Queueing system with different server's interruptions says vacation, extended vacation, breakdown and repair with delay is studied in Khalaf (2013). In fact, this paper is a generalisation of Khalaf (2013) in which the authors inspected multistage bulk queue with reneging. In Baruah, Madan, and Eldabi (2013), a two-stage batch arrival queue with reneging during vacation period is considered. Some notable works on bulk service queueing model with vacation are discussed in Murthy, Siva Rama Krishna, and Raju (2012) and Sree Parimala and Palaniammal (2014).

In this article, we consider a multistage batch arrival queue where the customers are served by a single server in batches of fixed size K. The server can take multiple vacations and it is optional that the server goes to extended vacations. The service, vacation, extended vacation, repair and delay times are all follows a general distribution.

2. Application in energy consumption

We consider the system of cluster computing which receives jobs (customer) from the user. Our aim is to minimise the electricity consumption in computing cluster. The cluster is implemented as N slave nodes and a master node (server) all connected via a network switch, the master receives jobs and passes them to slaves one by one. We can develop an algorithm for this system that achieves energy savings in the cluster computation by using queueing theory.

Here, we consider two states of server say working state and vacation state. During the working state, there are jobs to be executed and a server is performing useful computation by running the jobs and during the vacation state, the server is idling because there are no jobs. The purpose is to decide when to perform the transition from state to state to minimise the ultimate energy consumption. We can represent mathematically the behaviour of the arriving jobs in terms of probability distribution as the queueing model M[X]/G/1 which is the particular case of our queueing model.

3. Model assumptions

We assume the following to describe the queueing model of our study.

Customer arrive in batches according to Poisson process with mean arrival rate λ and the first-order probability that a batch of i customers arrives at the system during a short interval of time $(t; t + dt)$ is $\lambda c_i dt$ $(i \geq 1)$, where $0 \leq c_i \leq 1$ and $\sum_{i=1}^{\infty} c_i = 1$.

(a) A single server provides 'N' stages of services for the batch of customer of fixed size K, with the service times having general distribution. Let $B_i(x)$ $(i = 1, 2, 3, \ldots, N)$ be the distribution function of i stage service and let $\mu_i(x)dx$ be the conditional probability density of service completion during the interval $(x; x + dx]$, given that the elapsed time is x, so that

$$\mu_i(x) = \frac{b_i(x)}{1 - B_i(x)} \quad i = 1, 2, 3, \ldots, N$$

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