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Original Article

Evolutionary Computing Driven ROI-Specific Spatio-Temporal Statistical Feature Learning Model for Medicinal Plant Disease Detection and Classification

Margesh Keskar[1], Dhananjay D Maktedar [2]

[1,2]*CSE Department Guru Nanak Dev Engineering College Bidar Karnataka, India*
Visvesvaraya Technological University Belagavi, Karnataka, India

[1] mskeskar38@gmail.com

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Abstract *- Plants can be hypothesized to be the inevitable need of living beings on earth. Amongst the gigantically large plant species and varieties, the medicinal plants have a distinct and significant role in herbal remedies, ayurvedic medicine, the pharmaceutical industry, and the major modern medicine world. Various medicinal plants like roots, stems, and leaves are used for the abovementioned purposes; however, their efficacy depends on their intrinsic health condition. In other words, a medicinal plant with healthy and non-contentious characteristics can positively impact medicinal uses. On the contrary, plants with the disease can have a negative or insignificant impact on medicinal purposes. In sync with this fact, detecting plant disease over the different medicinal plants can be vital for healthy plant selection and identifying diseases for preventive measures or decisions. Despite the robustness of the vision-based automatic plant disease detection and classification systems, the non-uniform disease patterns, non-ROI feature learning, and inferior feature space confine the efficacy of the major at-hand solutions. To alleviate such limitations, in this paper, a highly robust evolutionary computing-driven ROI-specific Spatio-temporal statistical feature learning model is developed for medicinal plant disease detection and classification. To ensure solution optimality, the proposed model first performed pre-processing employing image histogram equalization, intensity equalization, and Z-score normalization, followed by annotations. Subsequently, a first-of-its-kind Firefly algorithm-driven Fuzzy C-Means clustering (FFCM) was developed for ROI segmentation. Subsequently, the proposed model performed an ROI-specific color space overlay to reconstruct ROI in RGB color space to extract significant Spatio-temporal statistical or textural features. In the proposed model, eight Gray-level co-occurrence metrics named correlation, heterogeneity, entropy, energy, contrast, mean, standard deviation, and variance were extracted as STTF features, which were subsequently applied to perform two-class classification for healthy and diseased medicinal plant classification. The simulated results revealed that the proposed model yields superior medicinal plant disease detection and classification performance in terms of accuracy (98.62%), precision (98.81%), recall (98.79%), and F-Measure (0.988).*

Keywords *- GLCM Features Heuristic-based ROI Segmentation, Medicinal Plant Disease Detection, Neuro-computing.*

1. Introduction

The life of a living being can be hypothesized to be centered on plants and their product called oxygen. In other words, living beings rely primarily on oxygen from different plants and herbs. The gigantic types of plants on earth have different significance toward living beings. However, based on reachability and scientific understanding, plants are categorized into certain categories, including cereals, medicinal plants, wood plants, etc. The different plants play significant roles in maintaining the earth's biodiversity while providing air and water to living beings, including humans. In addition to the air mentioned above and water support, a significantly large number of plants provide grains for food, medicine, wood, etc., thus helping human beings for sustainable living on earth. Amongst the known bio-diversity centered on the term plant, medicinal plants have distinct and undeniably a specific role where it provides ingredients for medicine, ayurvedic treatment resources, herbal remedies, etc. Several medicinal plants are employed for disease treatment and prevention.

Interestingly, these medicinal plants have been employed for generations, and still, the scientifically enriched and advanced pharmaceutical industry depends on these medicinal plants to produce high-efficacy medicines. Medicinal plants possess unique and highly significant properties ranging from its root to leaves and are serving a savior role for humanity on

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Secured Data Transmission Using Multi-Objective Trust Based Bat Optimization Algorithm and Enhanced Homomorphic Cryptosystem for WSN

Gouramma Halidoddi[1]* Rubini Pandu[2]

[1]*Department of Computer Science and Engineering, Guru Nanak Dev Engineering College, Bidar, India*
[2]*School of Engineering and Technology, CMR University, Bengaluru, India*
* Corresponding author's Email: gouramma.16phd@cmr.edu.in

Abstract: Wireless Sensor Networks (WSNs) have gained huge attention in different areas due to their self-configurability, easy maintenance and scalability features. WSN is configured with more nodes to transfer the data inside the network. The sensor networks are usually classified by low bandwidth, limited energy, limited power supplies and small size memory which leads to a very demanding environment to provide security. In recent years, accomplishing the network security objective with low energy utilization is a major issue in WSN. In this paper, two-level security is proposed to secure data transmission over the WSN. First, the secure clustering and routing operation are performed by using the Multi-Objective Trust-based Bat Optimization Algorithm (MOTBOA). Second, the data security of the network is improved by the Enhanced Homomorphic Cryptosystem (EHC). This paper aims to offer secure communication in WSN. It is achieved by using the EHC method for the operation of encryption and decryption over the data during communication among the nodes. The performance of the proposed MOTBOA-EHC method is evaluated in terms of detection rate, delay, throughput, routing load and Packet Delivery Ratio (PDR). The existing methods namely Trust based Dynamic Source Routing (TDSR), Monarch-Cat Swarm Optimization-based routing protocol and Secured Quality of Service aware Energy Efficient Routing (SQEER) are used to evaluate the performances of the MOTBOA-EHC method. The PDR of the MOTBOA-EHC method is 92% at 100 rounds that are high when compared to the TDSR, MCSO and SQEER.

Keywords: Detection rate, Enhanced homomorphic cryptosystem, Network security, Packet delivery ratio, Trust-based bat optimization algorithm, Wireless sensor networks.

1. Introduction

WSNs is a promising technology used globally in different real time applications such as healthcare monitoring, battlefield monitoring, emergency response and environmental monitoring [1-3]. In WSN, the sensor nodes are unsystematically organized in the search areas to gather data in a periodic or event-driven form. Here, the wireless broadband channels are utilized by the end-users to access the required sensor data from base station (BS) over the internet [4, 5]. Besides, all the data collection and data transmission in WSN is performed through the sensor nodes deployed in the network area. The energy required in the sensor nodes for data transmission and collection is provided by the battery [6]. Hence, the lifespan of the network is mainly dependent on the sensor nodes. The nodes are only able to participate in data transmission until they run out of power. The replacement or charging of the failed sensor nodes in the network is expensive and complicated [7, 8].

Security is one of the essential requirements in WSN [9]. The security of WSN includes four major factors such as confidentiality, integrity, authentication and availability of data. In the WSN network, the confidentiality and authentication of data in every node is essential to secure the data transmission over the network [10, 11]. Generally, WSN is vulnerable to various threats [12, 13]. Hence, the sensor nodes are easily affected by the enemies and act as malignant nodes. The malignant nodes in the network cause insecurity to the entire network during data transmission. The occurrence of unauthenticated data access is possible that results in

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IMPLEMENTATION OF A NOVEL TECHNIQUE FOR SIGNATURE VERIFICATION AND KEY COMPUTING FOR SECURE DATA SHARING IN CLOUD

Masrath Begum* **and Dr. Mohammed Abdul Waheed**

Keywords: Cloud computing data-privacy, data sharing, role based access control and encryption.

ABSTRACT

During cloud transactions, providing identity privacy, multiple owner access as well as dynamic data sharing for multiple users without any intervention with number of revoked cloud users is complicated mission. In this paper, secure data sharing scheme for dynamic cloud users using Linear Feedback Shift Register (LFSR) is proposed where any user of a cloud can utilize the cloud services like data sharing and data storing. Encryption's computational and storage costs are not affected by how many people have their access restricted. This algorithm will correlate the LFSR sequences by selecting random numbers with the output sequences generated by the ciphers. If the generated correlation value present below 0-1 then it proves that the channel is secure to communicate then the group user will be able to communicate with the cloud. If attack occurs then change the public key values. Proofs and cloudsim are used to conduct security analyses that will provide a cloud efficiency report.

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Title: Enhanced ant colony-based AODV for analysis of black and gray hole attacks in MANET

Authors: Premala Bhande; Md. Bakhar

Addresses: Department of Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar, India ' Department of Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar, India

Abstract: The security issue is a major concern in mobile ad hoc network (MANET). There are various solutions on secure routing protocols that are developed to count the well- known attacks. This network is always highly vulnerable to attackers due to wireless communication medium. This is quite easy for attackers to access the wireless medium and easily enter into the network. So, any kind of attacks occur in the network degrades the network performance and increases the packet overhead in the network. In this paper, we have proposed enhanced ant colony-based AODV (EAAODV) protocol for the analysis of gray and black-hole attack effects. A comparative analysis is shown among energy aware ant colony optimisation (EAACO) and enhanced AODV (EAODV) protocols. We compared the performance of these protocols based on various QoS parameters like delay, control overhead, throughput and the packet delivery ratio. The reproduction results show that our protocol performance clarity is better than others.

Keywords: mobile ad hoc network; MANET; black hole; gray hole attack; malicious node.

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Power and area optimized adaptive Viterbi decoder for high speed communication applications

Namratha & Md. Bakhar

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58 Accesses | Metrics

Abstract

Viterbi algorithm is very popular for error detection and correction in communication systems and is widely used as a unique method for the process of decoding in convolutional codes. Viterbi decoder (VD) is known to be the predominant unit that determines the lowest power consumption in an integrated communication system.Adaptive Viterbi decoder can work with different code rate parameters based on the incoming bit sequence. In this work, a new architecture for the area and power-efficient adaptive Viterbi decoder is proposed. This Viterbi decoder can be able to support the constraint lengths of 3–9, code rates of 1/2, 1/3, 2/3, 3/4, 5/6, and corresponding arbitrary

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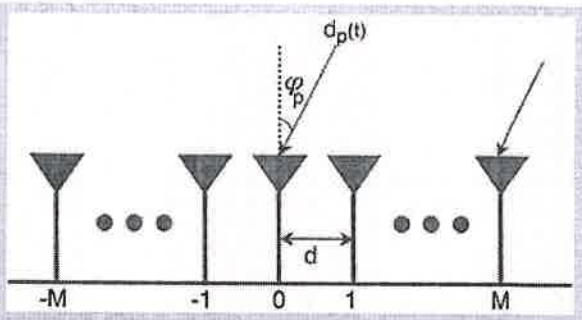
Improved Direction-of-Arrival Estimation and Its Implementation for Modified Symmetric Sensor Array

Veerendra Dakulagi, *Member, IEEE*, and Jin He, *Member, IEEE*

***Abstract*—In this paper, we propose a modified symmetric sensor array for the estimation of uncorrelated and coherent sources by reconstructing the modified Toeplitz matrices. The rank of these matrices only corresponds to DOAs and the coherency present between the signals cannot affect it. Uniform linear array (ULA) and symmetric ULA do not make the correct estimation of DOAs near the array endfires. The proposed algorithm deciphers this problem by exploiting two extra sensors placed at both the ends of the modified symmetric ULA. Although the new method is computationally simple since it does not use the process of peak searching and does not depend on the coherency between the signals. The efficacy of the proposed method is exemplified by both computer simulations and practical realization. Firstly, computer simulations are presented for various conditions, and then a practical possible concept is explained. Finally, the new method is implemented using an advanced TMS320C6678 digital signal processor (DSP). Both simulated and practical experiments verify the efficacy of the new method.**



***Index Terms*—Direction-of-arrival (DOA), coherent sources, eigendecomposition, Toeplitz matrix, sensor arrays, uniform linear array.**

I. Introduction

SENSOR arrays are extensively exploited in many array signal processing applications, including, low-angle radar [1]–[3], sonar [4], and wireless communication [5] to solve the plethora of problems related to direction-of-arrival (DOA) estimation. For many years, a lot of interest has been given in developing techniques for estimating coherent DOAs using sensors arrays. Eigenstructure techniques such as MUSIC [6] and ESPRIT [7] can offer high-resolution estimation. In practice, the rank loss of spatial covariance matrix is usually due to the presence of coherent sources. This causes deterioration in the performance of eigensystem-based DOA estimation algorithms [8]. To tackle this problem, the spatial smoothing (SS) technique was developed [9]. They separate the entire sensor array into many overlapped subarrays and estimate the sources by averaging full rank covariance matrices [10].

Widrow *et al.* [11] and Gabriel [12] developed DOA estimators similar to [10], both methods targeted to decorrelate the multiple coherent sources. A preprocessing scheme based on the spatial smoothing (SS) method to resolve the coherent signals is devised first by Evans *et al.* in [13]. Later this technique was excessively studied and further developed by Shan *et al.* in [14]. They described a forward-only spatial smoothing (FOSS) method to circumvent the problem raised in the estimation of fully correlated signals. However, it has a diminished aperture array that causes a serious performance deterioration. To solve this problem, S. U. Pillai *et al.* have developed a forward/backward spatial smoothing (FBSS) technique in [15]. However, this method effectively not reduces the aperture loss, and the subarray outputs cross-correlations are not considered.

To resolve the coherent sources, maximum-likelihood [16] and signal subspace fitting [17] approaches have been proposed. The key features of the techniques are that they can resolve the problems of multidimensional iteration through irregular maximization [18]. In recent times, coherent DOA problems are resolved using the techniques exploiting Toeplitz matrices and its modifications [19]–[24] were discussed. An ESPRIT-Like method discussed in [20] employs partial

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Veerendra Dakulagi is with the Department of Electronics and Communication Engineering, Lincoln University College, Kuala Lumpur 47301, Malaysia (e-mail: veerendra.gndec@gmail.com).

Jin He is with the Shanghai Key Laboratory of Intelligent Sensing and Recognition, School of Electronic Information and Electrical Engineering, Shanghai Jiao Tong University, Shanghai 200240, China (e-mail: jinhe@sjtu.edu.cn).

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Improving the VSSNLMS adaptive beamformer for adaptive antenna systems

Pavan Mankal
Department of E&CE, Bheemanna Khandre Institute of Technology, Bhalki, Karnataka, India
*Corresponding author email: pavanmankal.2010@gmail.com

Sanjaykumar C. Gowre
Department of E&CE, Bheemanna Khandre Institute of Technology, Bhalki, Karnataka, India

Shashidhara K. S.
Dept of E&CE, Nitte Meenakshi Institute of Technology, Yelahanka Bangalore-560064

Hussain K. Bhaldar
Department of E&TC, SVERI's College of Engineering Pandharpur, Maharashtra, India

Abstract---A new configuration for the adaptive beamforming technology has been presented in this research work. We modified the structure of the uniform linear array (ULA) in such a way that a correct beam can be formed uniformly for all azimuth angles. For ULA composed of M antennas, we place two extra elements on the top and the bottom of the configuration of the ULA (at the array axis). Then, we develop the mathematical model or the same. To investigate the efficacy of the proposed antenna configuration, we deploy the VSSLMS beamformer. The new beamformer is compared with the well-known LMS and the MLMS adaptive beamformer. Computer simulations are provided in the result section of this paper to validate that the new beamformer has enhanced convergence rate and high data transmission compared to the LMS and the NLMS methods. Also, the new method has the same performance for middle angles, near boresight and array end fires which is not possible for the LMS and the NLMS method using a ULA.

Keywords---adaptive beamforming, LMS, NLMS, VSSNLMS, ULA.

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Introduction

Adaptive beamforming technology has been extensively deployed in numerous applications including radar [1], satellite [2], sonar [3], seismology [4], astronomies [5], etc. Among the numerous approaches, LMS [6], [7], NLMS [8] and

Enhanced ant colony-based AODV for analysis of black and gray hole attacks in MANET

Premala Bhande* and Md. Bakhar

Department of Electronics and Communication Engineering,
Guru Nanak Dev Engineering College,
Bidar, India
Email: kashipremala@gmail.com
Email: mohammed.bakhar@gmail.com
*Corresponding author

Abstract: The security issue is a major concern in mobile ad hoc network (MANET). There are various solutions on secure routing protocols that are developed to count the well- known attacks. This network is always highly vulnerable to attackers due to wireless communication medium. This is quite easy for attackers to access the wireless medium and easily enter into the network. So, any kind of attacks occur in the network degrades the network performance and increases the packet overhead in the network. In this paper, we have proposed enhanced ant colony-based AODV (EAAODV) protocol for the analysis of gray and black-hole attack effects. A comparative analysis is shown among energy aware ant colony optimisation (EAACO) and enhanced AODV (EAODV) protocols. We compared the performance of these protocols based on various QoS parameters like delay, control overhead, throughput and the packet delivery ratio. The reproduction results show that our protocol performance clarity is better than others.

Keywords: mobile ad hoc network; MANET; black hole; gray hole attack; malicious node.

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Biographical notes: Premala Bhande is an Assistance Professor in the Department of Electronics and Communication Engineering at the Guru Nanak Dev Engineering College, Bidar, India. She earned her Master's in Computer Science and Engineering from the PDA Engineering College, Gulbarga, India. Her field of interest is network security, wireless communication and information technology.

Md. Bakhar is a Professor in the Department of Electronics and Communication Engineering at the Guru Nanak Dev Engineering College, Bidar, India. He received his BE in Electronics and Communication Engineering from the Bapuji Institute of Engineering and Technology, Davangere, India, in 1995 and ME in Communication Systems from the PDA Engineering College, Gulbarga, India, in 1998. He has awarded PhD in Applied Electronics from the Gulbarga University, Gulbarga, in 2013. He has been working as a Professor in the Guru Nanak Dev Engineering College, Bidar,

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ORIGINAL RESEARCH

Power and area optimized adaptive Viterbi decoder for high speed communication applications

Namratha[1] · Md. Bakhar[1]

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Abstract Viterbi algorithm is very popular for error detection and correction in communication systems and is widely used as a unique method for the process of decoding in convolutional codes. Viterbi decoder (VD) is known to be the predominant unit that determines the lowest power consumption in an integrated communication system.Adaptive Viterbi decoder can work with different code rate parameters based on the incoming bit sequence. In this work, a new architecture for the area and power-efficient adaptive Viterbi decoder is proposed. This Viterbi decoder can be able to support the constraint lengths of 3–9, code rates of 1/2, 1/3, 2/3, 3/4, 5/6, and corresponding arbitrary block lengths. This work is synthesized using Xilinx Virtex-6 family devices and evaluated hardware resource utilization such as the number of slices, Lookup Table (LUT), flip flop and maximum operating frequency. Also, the proposed technique is compiled with Taiwan Semiconductor Manufacturing Company (TSMC) 180 and 45 nm technology to validate area, power and delay. Proposed architecture achieves significant improvement in power consumption per bit scale when compared to current multi-core VD architectures. Comparison with other designs shows that the proposed scheme significantly improves decoder performance at the cost of fewer resources.

Keywords Viterbi decoder · Trellis coded modulation · Register exchange · Memory-based trace-back · Network on chip · Field Programmable Gate Array · Application Specific Integrated Circuit

1 Introduction

Viterbi algorithm (VA) is known as an ideal decoding method for convolution code. The communication signals for digital signal processing have evolved in theory from the 1950s and signals are very essential to communication systems. This can be done in digital communication transmitters and receivers for practical and scalable implementation. VA was achieved by implementing numerous combinations of encoding modulators and decoding demodulators. Electronic chips such as Application-Specific Integrated Circuit (ASIC), Field-Programmable Gate Array (FPGA), and Digital Signal Processor (DSP) chips have made digital signal processing possible due to the rapid advancement of linear and nonlinear electronic circuits. Improved hardware architectures are essential at the end of the receiver systems, transmitting systems and decoding of digital streams can use reliable algorithms [1].

With Viterbi decoding, it can achieve favorite performance with a low signal-to-noise ratio.In modern communication systems, the efficient transmission may mainly rely on convolution encoding. When the increase in demand for the modern mobile satellite communication systems for high communication and quality efficient encoding with high accuracy is needed with low cost. While implementing the VA, the convolutional coded coding can be decoded with a Soft-Output Viterbi Algorithm (SOVA) or background maximal algorithm called maximum a-posteriori (MAP) [2]. Convolutional codes

✉ Namratha
namratha.nst@gmail.com

Md. Bakhar
mohammed.bakhar@gmail.com

[1] Department of Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar, Karnataka, India

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Research Article

Internet of Things-Based Intelligent Ontology Model for Safety Purpose Using Wireless Networks

Harish Kumar Shakya,[1] **R. Sundar**,[2] **Ajay Kushwaha**,[3,4] **Rakhi Thakur**,[5] **Anurag S. D. Rai**,[6] **Praveen Kumar Reddy**,[7] **M. Sivasubramanian**,[8] **R. Jaikumar**,[9] **V. Venkataramanan**,[10] **S. Chandragandhi**,[11] **and Worku Abera**[12]

[1]*Computer Science & Engineering, Amity University, Gwalior, Madhya Pradesh, India*
[2]*Department of Marine Engineering, AMET Deemed to Be University, India*
[3]*Computer Science and Engineering, Rungta College of Engineering and Technology, Bhilai, India*
[4]*CSVTU, India*
[5]*Department of Electronics and Communication, Kalaniketan Polytechnic College, Jabalpur, Madhya Pradesh, India*
[6]*Incubation Center, LNCT University, Bhopal, M.P., India*
[7]*Department of ECE, Guru Nanak Dev Engineering College, Bidar, India*
[8]*Department of Computer Science, JP College of Arts and Science, Agarakattu, 627852, Tenkasi, Tamilnadu, India*
[9]*Department of ECE, KGiSL Institute of Technology, Coimbatore, India*
[10]*Department of Electronics and Telecommunication Engineering, Dwarakadas J. Sanghvi College of Engineering, Vile Parle West, 56 Mumbai, India*
[11]*CSE, JCT College of Engineering and Technology, India*
[12]*Department of Food Process Engineering, College of Engineering and Technology, Wolkite University, Wolkite, Ethiopia*

Correspondence should be addressed to S. Chandragandhi; chandragandhi09@gmail.com
and Worku Abera; worku.abera@wku.edu.et

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Intelligent transportation systems (ITS) are a newer trend in technology that improve the safety and performance in transportation systems. The exchange of information is considered as one of the key elements for ITS since it involves communication between vehicles and other components of ITS on road. On other hand, the data collections via Internet of Things (IoT) sensors play a major role for data collection and transmission between the vehicles and road segments in ITS. The data collection provides the current traffic and weather conditions that is considered necessary for driving in traffic. However, energy savings is one of the predominant objectives of electric vehicle (EV) while it is connected with ITS. In this research, we propose an ontology-based architecture for EVs using the data collected from IoT sensor network, which is intended to improve the overall driving experience. The system uses IoT sensor data to execute a range of activities in order to ensure the driver safety and comfort while on the road. The simulation is conducted on an Eclipse SUMO simulator, and the performance is reported. The results of simulation shows that the proposed intelligent model on making decisions along with weather and traffic conditions is reported efficient than existing ITS models.

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Research Article

A Power Efficiency Wireless Communication Networks by Early Detection of Wrong Decision Probability in Handover Traffic

Patil Shweta,[1] **Leena Bojaraj**,[2] **Pallavi Biradar**,[3] **Mohammed Bakhar**,[4] **and Alazar Yeshitla**[5]

[1]*Guru Nanak Dev Engineering College, Mailor Road, Bidar, India*
[2]*Department of Electronics and Communication Engineering, KGiSL Institute of Technology, Coimbatore, India*
[3]*Department of Electronics and Communication Engineering (R&D), Guru Nanak Dev Engineering College, Bidar, India*
[4]*Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar, India*
[5]*Department of Biotechnology College of Biological and Chemical Engineering, Addis Ababa Science and Technology University, Ethiopia*

Correspondence should be addressed to Patil Shweta; shweta.gadgay@gmail.com and Alazar Yeshitla; alazar.yeshi@aastu.edu.et

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This paper highlights the energy consumption due to handovers in wireless communication system. Ever-increasing demand for higher data rate for users of cellular networks and the energy consumption that results from the effective satisfaction of these demands leads to greater consumption of energy from such energy sources that depend on burning of greenhouse gas emitting fossil fuels for energy production. An evolved Node B or e-NB inside, as in equipment handling the radio frequencies, can be divided into two large categories (1) BaseBand Unit (2) Remote Radio Head or RRH. For the purpose of our current work, we will focus on mainly the Remote Radio Head part. A simple picturization of the evolved Node B and the User Equipment (UE) that are included in the power model has been discussed. The proposed framework for mobility management/security gateway protocol including wrong decision probability of handover evaluation following measurements' procedure has been designed successfully. We have compared to other UL/UE power consumption. The lowest ISD has the largest power usage in resultant output.

1. Introduction

A seamless context-aware architecture for fourth generation wireless networks, Handoffs in fourth generation heterogeneous networks, is designed [1]. Nowadays, the mobile wireless network evolution and emerging difficulties is also highlighted in communication [2]. Deng et al. proposed a Quality of Service (QoS) system for multimedia transmission using IEEE 802.11 wireless LANs. Comparison of vertical handoff decision algorithms for heterogeneous wireless networks and vertical handoff method for cellular multihop networks which has been reviewed from the vertical handoff decision technique is presented [3–5]. In the wireless overlay networks is an adaptive technique for a vertical handoff method. Parallel and distributed dystems are two types of systems that can be used together. Optimizations for vertical handoff decision algorithms were developed by Zhu et al. in 2004 [6–8]. In the upcoming year, wireless networks will use active application-oriented vertical handoff technique. With the heterogeneous networks, handover decision with fuzzy MADM has been explained [9–11]. The Wireless Communications and Networking Conference is a gathering of people who are interested in wireless communications and networking. For next-generation networks, a network selection process is in place [12–14]. The wireless overlay network is an adaptive technique for a vertical handoff method. The large bandwidth industrial IoT has advantages due to positioning-assisted communication technology involved [15–18]. Future air traffic control communications will require the design of air-ground data linkages [19–24]. Architectural difficulties and potential for air-ground integrated mobile edge networks. A

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Research Article

Active Learning Assisted Admission and Bandwidth Management in HWN for Facilitating Differential QoS under Multicriteria Factors

Pallavi Biradar,[1] **Patil Shweta**,[2] **K. Padmanaban**,[3] **A. Suresh**,[4] **Mohammed Bakhar**,[5] **and Alazar Yeshitla**[6]

[1]*E&CE Department (R&D), Guru Nanak Dev Engineering College, Bidar, India*
[2]*Guru Nanak Dev Engineering College, Mailor Road, Bidar 585403, India*
[3]*Department of Computer Science and Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, AP, India*
[4]*Department of Computer Science and Engineering, Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, Chennai, India*
[5]*Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar, India*
[6]*Department of Biotechnology, College of Biological and Chemical Engineering, Addis Ababa Science and Technology University, Addis Ababa, Ethiopia*

Correspondence should be addressed to Pallavi Biradar; pallbiradar@gmail.com and Alazar Yeshitla; alazar.yeshi@aastu.edu.et

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Control of call admission and management of bandwidth are the two important functionalities to achieve higher call handling capacity in heterogeneous wireless networks (HWN). This work addresses the problem of supporting differential qualities of services (QoS) with adherence to multicriteria factors in addition to reducing call-dropping probability in HWN. Toward this end, learning-assisted admission and bandwidth management are proposed. The decision to control the call acceptance ratio and bandwidth allocation level is learned continuously based on current network dynamics and the differential QoS requirements of the current calls. This learning reduces the call drop probability and slippage in QoS for calls. The parameters employed for evaluation in the suggested approach for call admission control include call priority, service type, service delivery mode, bandwidth availability for scalable and nonscalable calls, QoS distortion rate, and call ratio.

1. Introduction

The rapid proliferation of mobile devices and Internet of things (IoT) devices are increasing mobile traffic exponentially. The demand for bandwidth-crunching services like video calls, video streaming, etc., creates congestion and reduces the quality of services in wireless networks [1]. The admittance of calls is based on several factors, including priority, service, network conditions, and load circumstances, with the ultimate objective of maximizing revenue. The training dataset can be changed to easily adapt the call admission control algorithm. This solution's proposed bandwidth adjustment features two modes—aggressive and nonaggressive—that are highly adaptable to the characteristics of a dynamic load. A heterogeneous wireless network combining multiple radio access technologies along with multimode terminals is one of the solutions to meet the huge bandwidth requirements. The goal for next generation wireless networks (NGWNs) include a core network including several radio access technologies (RATs) in a uniform and seamless manner. Wireless access networks are continually growing, constantly increasing both in coverage and offered bandwidth. In such a setting, providers using multi-RAT technologies will strive to maximize subscriber happiness while minimizing the strain on their subsystems. The multimode terminal can use one or more RAT

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Artificial intelligent controller-based energy management system for grid integration of PV and energy storage devices

Durga Prasad Ananthu[1], Neelashetty Kashappa[1], M. Venkateshkumar[2]
[1]Department of EEE, Faculty of Elctrical and Electronics Engg, GuruNanak Dev Engineering College, Bidar, Karnataka, India
[2]Department of EEE, School of Engineering, Amrita Vishwa Vidyapeetham, Chennai, India

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ABSTRACT

In the modern world, photovoltaic (PV) energy generation is becoming more prevalent and cost-effective. To address climate change, many countries have prioritised photovoltaics and made significant investments in energy generation. Because of its non-linear nature, solar energy generation is extremely difficult. This is completely dependent on the solar radiation and the outside temperature. The maximum power generation of a PV system in non-linear weather circumstances and the grid integration of PV with power management are discussed in this article. Artificial intelligence (AI) is vital for improving the energy output of PV systems across a wide range of environmental conditions because traditional controllers do not aid a solar system in producing the maximum energy. The grid integration of PV and energy management systems (EMS) was covered in the later part of this article. In this paper, artificial intelligence is used to provide customers with continuous power through a battery system, which plays a critical role in energy management. Furthermore, the suggested model was simulated in MATLAB and its performance was evaluated under various operational scenarios. To demonstrate the effectiveness of the proposed system, the results are compared to IEEE 519.

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Corresponding Author:

Durga Prasad Ananthu
Department of EEE, Faculty of Elctrical and Electronics Engg, GuruNanak Dev Engineering College
Bidar, Karnataka, India
Email: adp.ananthu@gmail.com

1. INTRODUCTION

As energy consumption carbon dioxide emissions and global insufficiency of demand and supply rise, so does population growth and urbanisation. Due to environmental concerns, energy scarcity, and pollution, wind and pv power are the most prominent alternative sources that are presently the dominant energy source for present power system [1], [2]. An microgrid (MG) is a less voltage supply system with controlled reserves and consumers that incorporates variable distributed renewable sources such as wind, photovoltaic (PV), and fuel cells [3]–[5]. Improve network stability while providing reliability, high quality power. Due to the low penetration of renewable energy (RG) generation, controlling an MG with a wide combination of distributed generators (DGs), cyclic loads, and energy storage aggregator (ESA) is even more challenging [6].

Maximum power point tracking (MPPT) methods are widely utilized to regulate the RG [7]-[8]. As a result of the uncontrolled climate conditions, it is considered as a non-regulable generation. The MG concept of integrating non-conventional energy sources with battery storage systems (BSS) has received a lot of interest and admiration [9], [10]. The stability of the system facilitates renewable energy integration by supporting the whole power system by storing energy at a reduced cost during off-peak hours. The microgrid

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Electrical Load Forecasting using ARIMA, Prophet and LSTM Networks

Durga Prasad Ananthu[1] and Prof. Neelashetty K[2]

[1]*Research Scholar, VTU-RRC, Belagavi, India*
[2]*Professor, DoEE, GND, Bidar, India*

*Correspondence: Durga Prasad Ananthu; Email: adp.ananthu@gmail.com

ABSTRACT: Forecasting electrical load plays a vital role in power system planning. However, it is quite difficult to forecast electrical load, as the load on the system varies continuously concerning time and seasons. In this paper, we are proposing an advanced artificial neural network model to forecast short-term electrical load. The proposed method tested on historical data collected from Karnataka power corporation, India, and test results compared with other data-driven models viz. ARIMA, RNN, LSTM, and Prophet. The accuracy and RMSE values were calculated and observed that the proposed model was superior in a day and weekly ahead electrical load forecasting.

Keywords: Load forecasting, ARIMA, RNN, LSTM (Long Short-Term Memory), Prophet, Artificial Neural Network (ANN), Power System Planning.

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1. INTRODUCTION

The demand of electrical energy is increasing day by day, supplying electricity to all the stakeholders is challenging in countries like India, as it is a fast developing nation. The load on the grid varies with respect to time, to meet these demand utilities need to estimate the consumption demand priority. This can be possible by using AI/ML techniques to estimate the load demand accurately. The advantages of load forecasting is that it helps in reducing outages, losses, overall operating cost and improves the stability, reliability, power quality and also helps in power system planning. It plays a major role in implementing demand side management.

[1] In this paper they proposed a method to forecast the load using a correlation analysis and i2 input selection method. Euclidian distance is used for BNN (Bayesian neural network) training. Forecast accuracy, and error were measured. [2] Proposed a GABICS (Genetic algorithm binary improved cuckoo search) with extreme learning machine techniques to forecast the Short term load by using date framework with feature selection method. [3] Presented a SWEMD (Sliding window empirical mode decomposition) model for building load forecasting this method used for small sites. [4] Used support vector regression analysis for day ahead LF. [5] Presented feature engineering and modified firefly optimization algorithm with SVR model for STLF (Short-term load forecasting). Ref. [6] presented a comparison study between ARIMA and LSTM models to forecast daily load for smart homes using STDAN algorithm. [7] Proposed multistep forecasting using autoregressive and integrated MA and RNN-LSTM methods for nonlinear loads.

In this paper we have collected Karnataka State load consumption data for various seasons; the data set contains 360 samples to forecast the load in a day and week ahead of time. The data is available at "http://218.248.45.137:8282/LoadCurveUpload/lcdownloadview.asp".

The flow of work is as follows, section 1 gives the literature survey/Background, section 2 discusses the implementation of load forecasting using LSTM networks section 3 deals with the other forecasting models like ARIMA, SARIMA, RNN and Prophet Section 4 discusses results and conclusion.

2. BACKGROUND

Xin Liu et al. [8]elaborated various data driven models to forecast short term electrical load in this they used GFW based feature selection to determine the correct predictions and these results are compared with the DNN model using shallow neural networks. Elvisa and Marijana [9] proposed different machine learning algorithms to forecast electrical load and implemented additive regression and ANN analysis on STL forecasting for summer and winter seasons. Wan He [10] presented DNN technique to predict one day ahead loads and developed CNN models to extract features in historical load. Ammar O et al. [11] in this paper used MC(Multicolumn) radial basis function NN for STLF. They implemented k-d tree algorithm using modified error correction method to form MCRN, this technique improves the speed of convergence and improves the generalization over other methods. Stefan Hosein et al. [12] in this they applied DNN(Deep neural network) and other machine learning techniques on SMART Meter data to STLF in a power grid and also discussed dynamic pricing to

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Electrical Load Forecasting using ARIMA, Prophet and LSTM Networks

Durga Prasad Ananthu[1] and Prof. Neelashetty K[2]

[1]*Research Scholar, VTU-RRC, Belagavi, India*
[2]*Professor, DoEE, GND, Bidar, India*

***Correspondence:** Durga Prasad Ananthu; Email: adp.ananthu@gmail.com

ABSTRACT: Forecasting electrical load plays a vital role in power system planning. However, it is quite difficult to forecast electrical load, as the load on the system varies continuously concerning time and seasons. In this paper, we are proposing an advanced artificial neural network model to forecast short-term electrical load. The proposed method tested on historical data collected from Karnataka power corporation, India, and test results compared with other data-driven models viz. ARIMA, RNN, LSTM, and Prophet. The accuracy and RMSE values were calculated and observed that the proposed model was superior in a day and weekly ahead electrical load forecasting.

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1. INTRODUCTION

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DETERMINANTS OF BANK STABILITY: FINANCIAL STATEMENT ANALYSIS OF BANKS SPECIFIC FACTORS AFFECTING OF DCC BANKS-KARNATAKA

Mahesh Kumar M
Research Scholar, Department of Management, Guru Nanak Dev Engineering College Bidar-585403, Research and Development Centre, Dr. A.P.J. Abdul Kalam University, Indore-452016, Email: mgmeenkera@gmail.com, ORCiD: 0000-0001-7196-3451

Dr. Sushil Beliya
Principal College of Professional Studies and Dean Management
Research and Development Centre, Dr. A.P.J. Abdul Kalam University, Indore-452016

ABSTRACT
This paper examines the determinants of financial performance of DCC Banks-Karnataka. In order to investigate the determinants of financial performance, 21 DCC Banks-Karnataka have been taken as sample. Data are collected from annual report of the Apex Bank. ANOVA F-Tests have been employed for the analysis of data. The result shows a positive relationship of Share Capital, Own Fund, Deposits, Borrowings, Loans & Advs Issued, Loans & Advs O/s, Investments, Working Capital, Profit & Loss, Recovery and NPA. It is evident from the findings that financial performance of DCC Banks-Karnataka is strongly affected by Share Capital, Own Fund, Deposits, Borrowings, Loans & Advance Issued, Loans & Advs O/s, Investments, Working Capital, Profit & Loss, Recovery and NPA and Assets quality.
KEYWORDS: Own Fund, DCCBs, Share Capital, Financial Analysis, Non-Performing Loans, etc.,

1. INTRODUCTION
A balance sheet provides vital information regarding a bank's financial position at any given point of time. The asset side includes loans forwarded to borrowers while the liabilities side, among other things, shows deposits made by customers. Banks not only support the economy by providing finance, but also assist in transactions carried out by an economic agent. Further, banks play a crucial role of transforming illiquid assets into liquid assets through demand deposits. With the development of this banking sector, the interest of stakeholders and parties with an interest in the banking sector will also develop to invest. Financial reports are very important for internal and external parties to determine the financial condition of banks. With financial position, parties with an interest in banking can assess the financial performance of banks, so that they are used as a basis for decision making.
From the above background, it is necessary to have factors that influence the assessment of banking financial performance.
These factors include the

- Capital Adequacy Ratio (CAR),
- Non-Performing Loans (NPL),

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ACCELERATION AND BRAKING OF EV USING ELECTRONIC CONTROLLER

Durga Prasad, Neelasheety K, Vinay Kumar, Prashant G
Department of Electrical & Electronics Engineering, Guru Nanak Dev Engineering College, Bidar – 585403, Karnataka
E-mail: dpgndeee@gndecb.ac.in

Abstract

We are slowly reaching the age of electric vehicles within the last few years research for electric vehicles has significantly increased. The major issue behind the mass use of electric vehicle is the battery charging time and lack of charging station. So, here we proposed "Regenerative braking system". When we switch on the power supply the wheel starts propelling, but due to some interruption when brakes are applied small amount of voltage will be generated. Further that energy will be stored in the battery which will be given to a load.

Keywords: *Electric Vehicle, Charging Station, Regenerative Braking*

I. Introduction

Now a days, with the increasing of the pollution and global warming one of the solution for the current problem could be resolved with the usage of electric vehicles. The development and research of the electric vehicle includes establishment of electrical and mechanical system Every time you step on your vehicle brakes, you are wasting energy. Physics tells us heat energy cannot be destroyed. So when your vehicle slows down, the kinetic energy dissipates as heat and becomes useless. That energy which could have been used to do work .In most vehicles it is inevitable byproduct of braking and there is no way you can drive a vehicle without occasionally hitting the brakes. But engineers have given this problem a thought and have come up with a kind of braking system that can recapture much of the vehicles batteries. This system is called
"Regenerative braking". Regenerative braking is the most excellent way for electrical vehicle to expand their during capabilities. The regenerative braking plays an vital role to maintain the vehicle strength and better energy. Electric vehicle use mechanical brake to boost the roughness of
wheel for the deceleration purpose. However from the point of view of saving energy,

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L16 Taguchi orthogonal array experimental set up 25-28

Md Ashfaq Hussain, Digamber Benne, Nagraj G, Parameshwar
Guru Nanak Dev Engineering College, Bidar, 2020-21

I. INTRODUCTION

One of the major developments in production engineering over 20 years is the application of numerically controlled machine tools in production. It is for sure that CNC application first started with "AEROSPACE" Industries to manufacture highly complex parts that are made up of light alloys, having a better material removal. The capital cost of CNC machines is relatively high, further to be justified only by the "AEROSPACE" industries, it is now being accepted by other industries because of numerous direct and indirect benefits driven by their applications.

Turning is a material process where the excess of material is removed in order to attain the required dimensions of the work-piece. At present advancement of technology in the CNC turning machines are being significantly increased, for meeting up the progressing needs in different manufacturing industries, especially for high quality turning industries. Among the several industries the CNC is commonly applied Production process. The important controlling factors in the turning process are the Accuracy, Material removal rate (MRR) and the Surface roughness. The foremost parameters that manipulate the MRR, Acc and Ra are speed, feed and depth of cut. By considering these parameters the work-piece can be machined to the required dimensions to attain the product of required quality. The MRR and Ra are the measures of efficiency, dimensional tolerance and quality of the machining elements. The improvement of characteristics of machining parameters is mainly dependent on the values such as surface roughness.

In the field of industrialization different techniques have been implemented for optimizing the parameters. Optimization problem includes process engineering, product design and quality control, process planning and different machining operations numerically or conventionally controlled. These problems can be differentiated into

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Mechanical Properties of Glass Fibre Reinforced Concrete using Jhama Bricks as Fine Aggregate Replacement

VIVEKANAND ALOJI
Department of Civil Engineering, Guru Nanak Dev Engineering College, Bidar – 585403, Karnataka, India

PARASHURAM L
Department of Civil Engineering, Guru Nanak Dev Engineering College, Bidar – 585403, Karnataka, India

AMAR R D
Department of Civil Engineering, Guru Nanak Dev Engineering College, Bidar – 585403, Karnataka, India

SUNIL KUMAR
Department of Civil Engineering, Guru Nanak Dev Engineering College, Bidar – 585403, Karnataka, India

Abstract: Fibre Reinforced Concrete (FRC) is a composite or a complex material comprising of mixtures of cement, fine aggregates and coarse aggregates and distinct, discontinuous, uniformly dispersed suitable fibres such as natural fibres, artificial fibres, used in civil engineering field and other applications. Fibre is a tiny piece of reinforcing materials holding definite characteristics properties. Fibres may be circular or flat. Conventional concrete has poor tensile strength so its capacity to absorb energy is limited. By strengthening the cement concrete matrix with reinforcing fibrous materials, the weakness in the tension zone can be overcome. Compressive strength, Tensile strength, flexural strength of the materials can improve by usage of fibres in concrete. The concrete is permeable and the porosity is owed to water-void sand air-voids. Due to presence of voids naturally strength of the concrete reduces. The addition of Glass fibres to the cement concrete matrix gradually increases the strength. GFRC is having advantage of being lightweight and thereby the overall cost of construction is reduced, ultimately it brings economy in construction. The addition of Glass fibres and Jhama powder to the cement concrete matrix gradually increases the strength. GFRC is having advantage of being light weight and thereby the overall cost of construction is reduced, ultimately it brings economy in construction. The alternative material can be used as partial or fully replacement of the conventional material. In this research we use the Jhama Brick Dust as an alternative material for the fine aggregate. Here we use the Jhama Brick Dust as partial replacement of the sand from 40% The various tests are carried out such as Compressive, Strength, Flexure Strength and Split Tensile Test at an age of 7 and 28 days of curing. Here the Grade of the concrete is M30 and the mix design is carried out as per IS provision the main purpose of this research is to use the waste material for making the concrete. Here we are using Glass fibre at 0%, 0.5%, 1%, 1.5%, 2% 2.5% and we use the Jhama Brick Dust at 40% as alternative material for fine aggregate.

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Reinforced Concrete Beams and Columns Retrofitted with Ferro-cement using Corrosion Inhibitor

Umashankar Y, Manoj Kumar, Sandeep Kumar, Manish S.
Department of Civil Engineering, Guru Nanak Dev Engineering College, Bidar – 585403, Karnataka, India

ABSTRACT

Ferrocement is one of the cement based composites used for retrofitting and rehabilitation among many applications. One of the foremost factors affecting the durability of ferrocement is the corrosion of wire meshes. This problem is magnified in corrosive environments. With the passage of time, the effective strength of the wires is reduced due to a reduction in diameter and deterioration of the bond between the matrix and the reinforcement. In the present study, an attempt has been made to improve the corrosion resistance of the metallic wire meshes used in ferrocement with corrosion inhibitors. Two corrosion inhibitors, viz. Calcium Nitrite and Tannic Acid, were used. Weight loss studies and potentio-dynamic polarization tests were conducted in saline water medium. Corrosion efficiency and corrosion rate were calculated. At a 1% dose, both the inhibitors, when applied in a slurry coated form, were found to be sufficiently effective in controlling the corrosion. The effect of these corrosion inhibitors on compressive strength of cement sand mortar was also observed.The high efficiency and low corrosion rate exhibited by both the inhibitors proves their potential in controlling the corrosion. The electrochemical tests also confirm these findings. Compressive strength test also suggest that these inhibitors do not have any significant adverse effect on the mechanical properties of mortar mix. Long term studies are needed to make final recommendations with regard to the dose of these inhibitors for the protection of steel wire mesh reinforcement in ferrocement. One of the foremost factors affecting the durability of ferrocement is the corrosion of wire meshes. This problem is magnified in corrosive environments. With the passage of time, the effective strength of the wires is reduced due to a reduction in diameter and deterioration of the bond between the matrix and the reinforcement. In the present study, an attempt has been made to improve the corrosion resistance of the metallic wire meshes used in ferrocement with corrosion inhibitors. Two corrosion inhibitors, viz. Calcium Nitrite and Tannic Acid, were used. Weight loss studies and potentio-dynamic polarization tests were conducted in saline water medium. Corrosion efficiency and corrosion rate were calculated. At a 1% dose, both the inhibitors, when applied in a slurry coated form, were found to be sufficiently effective in controlling the corrosion. The effect of these corrosion inhibitors on setting time of cement, pH, and compressive strength of cement sand mortar were also observed.

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Leaf Disease Detection and Prevention using Machine Learning

Rajshekar Gaithonde
Department of Computer Science & Engineering, Guru Nanak Dev Engineering College, Bidar India

Dayanand Jamkhandi
Department of Information Science & Engineering Guru Nanak Dev Engineering College, Bidar India

Padmanjali A Hagargi
Department of Computer Science & Engineering, Guru Nanak Dev Engineering College, Bidar India

Guru Prasad
Department of Computer Science & Engineering, Guru Nanak Dev Engineering College, Bidar India

Abstract

Plant illnesses are often brought on by pests, insects, and pathogens, and if they are not promptly handled, they significantly reduce yield. Farmers are losing money as a result of different crop diseases. When the cultivated area is enormous, measured in acres, the cultivators find it tiresome to routinely check on the crops. The suggested approach offers a way to automatically diagnose diseases using photos from remote sensing while also offering a solution for routinely monitoring the agricultural area. The suggested approach alerts the farmer about crop illnesses so they may take additional action. The suggested technology aims to identify infections early, as soon as they begin to spread to the leaf's outer layer. The two phases of the proposed system's operation start with training data sets. This involves using training sets with both healthy and sick data. The second stage involves crop monitoring and disease identification using Canny's edge detection technology.

Introduction

Farming gave rise to civilisation. India is a mostly agricultural nation with a crop-based economy. All economies are based on agriculture. A nation like India, where the population is growing and there is a constant need for food, has to make breakthroughs in the agricultural sector to

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Sign Language Recognition

Bhavana Bidakar, Giriraj Patil, Gouri Patil, Sandeep Iddalgave
Department of Computer Science & Engineering,
Guru Nanak Dev Engineering College, Bidar India

ABSTRACT

A person who is unable to speak or hear relies solely on sign language to communicate. People who are physically unable can use sign language to express their thoughts and feelings. In order to identify alphabets and movements in sign language, a novel technique is proposed in this work. We can identify the clues using computer vision and neural networks and output the right text.

INTRODUCTION

Those who are unable to talk communicate using gestures and hand signs. The average person has problems understanding their own language. Therefore, a system that can recognise different signs and gestures and communicate information to common people is needed. It links those with physical disabilities to others who are not.

IMAGE PROCESSING

People who are mute communicate via hand signals and gestures. Most people have difficulty understanding their own language. Therefore, a system that can convey information to common people while also recognising various signs and gestures is required. It connects people with physical limitations to people without them.

The following are the three stages of image processing:

1. Importing the picture using picture-taking software
2. Examining and adjusting the image
3. The eventual outcome, which might be a changed picture or a report in light of picture examination.

The two sorts of picture handling advances that are utilized are simple and computerized. Simple picture handling is beneficial for actual propagations like prints and photos. Picture experts utilize a scope of interpretive establishments while utilizing these visual systems. Advanced pictures can be changed with the guide of a PC because of computerized picture handling innovation.

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BIO-DERIVED MATERIALS AND THEIR APPLICATION IN WATER PURIFICATION

Rajani Saranadagoudar, B.B.Kori, Puneet Kumar, Amar R D

Department of Civil Engineering Guru Nanak Dev Engineering College,
Bidar 585403, Karnataka

ABSTRACT

The scarcity of clean and safe drinking water is one of the major problems faced by human nowadays. The study is focused on the filtration of domestic waste water. This filtration is done by preparing here different bed using different layers of powdered cactus, pine bark, sand and coarse aggregate. The use of pine bark enhances the purification by preventing microbial action and reduces turbidity. But the application of the pine bark increases the concentration of acidity. In order to reduce the acidity, coarse aggregate is used as another layer. Finally a sandy layer is provided as a supporting layer for powdered cactus. The thickness was fixed by column study method. As per the column study, we fixed different layers for different filter bed (f1 f2 f3) consist of F1: 3cm pine bark and 3cmcactus powder F2: 3cm pine bark and F3: 5cm pine bark and 5cm cactus powder. The percentage reduction for Turbidity, Alkalinity, Hardness, Chloride, Acidity, BOD for F3 were obtain 56%, 13%, 43%, 85%, 58%, 84% respectively.

INTRODUCTION

The growth of the global population, the increasing need of water for agriculture and the increasing urbanization put great pressure on the existing resources of freshwater and the finding of news sources of freshwater become necessary. An alternative source of water can be to reuse wastewater. Grey water is all wastewater from a household, with the exception of toilet water, which is called black water. Water from dishwashing, from kitchen sinks and from laundry machines constitute grey water and it account for 80% of the household wastewater. Grey water can be reused in areas that do not require portable water such as irrigation and toilet flushing. The reuse of grey water reduces

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HYBRID ELECTRIC VEHICLE

T Vinay Kumar,Durga Prasad, Megha Kulkarni, Neelashetty K. Department of Electrical & Electronics Engineering, Guru Nanak Dev Engineering College, Bidar – 585403

E-mail: tvinaykumar.gndec@gmail.com

Abstract

The renewable energy is vital for today's world as in near future the non renewable sources that we are using are going to get exhausted. The multi powered Hybrid Electric Vehicle (solar and wind) is a step in saving these non renewable sources of energy. The basic principle of HEV is to use energy that is stored in a battery during and after charging it from a solar panel and wind turbine. The charged batteries are used to drive the motor which serves here as an engine and moves the vehicle in reverse or forward direction. The electrical tapping rheostat is provided so as to control the motor speed. This avoids excess flow of current when the vehicle is supposed to be stopped suddenly as it is in normal cars with regards to fuel. This idea, in future, may help protect our fuels from getting extinguished.

Introduction:-

Fossil fuel combustion, particularly as it occurs in motor vehicles, has been identified as the largest contributor to air pollution in the world. The biggest disadvantage of burning fossil fuel is the by-product, carbon dioxide, which leads to a greenhouse effect that harms the planet. If Environmental concerns keep growing, and restrictive guidelines constrain the use of the pollutant sources, wind and solar Photovoltaic (PV) power can be considered as viable option for future transportation. Therefore, the electric vehicle with zero emission will undoubtedly become the mainstream means of private transportation in the future.

The governments of each country and their societies have outlined large scale plans to promote battery-powered electric vehicles and for considerable opportunities to change the nature of private vehicles. As

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"DUAL AXIS SOLAR TRACKING SYSTEM"

Megha Kulkarni, Durga Prasad, Rohini D, Shubha S.
Department of Electrical & Electronics Engineering, Guru Nanak Dev Engineering College, Bidar – 585403, Karnataka
E-mail: meghakulkarni037@gndecb.ac.in

Abstract: *Solar panels are devices that convert light into electricity. Solar panels use sunlight to generate power. Solar panels work best when the sun is shining. As the angle of the sun varies throughout the day and seasons, this affects the amount of electricity a solar power system will generate. To make solar power the systems work more efficiently, this project will include the design and construction of a microcontroller-based solar panel tracking system. Solar tracking allows more energy to be produced because solar array can remain aligned to the sun. In this project, we will design a dual-axis solar tracker that allows solar panels to move on two axes, aligned both north-south and east-west. This type of system is designed to maximize solar energy collection throughout the year. This project will make use of the Light Depending Resistor (LDR) which is important to detect the sunlight by following the source of the sunlight location. Arduino Uno microcontroller is used to control the motors based on LDR. The drastic improvement in power output from the solar panel can be seen on a LCD Display attached to the system. This project discusses the development of a prototype for a dual axis solar tracking system.*

***Keyword Word**: Solar Panel, Arduino Uno, Dual axis, LDR, IR Sensor, LCD*

Introduction

This project will utilize the maximum solar energy through solar panels. To do so, a digital automatic sun tracking system is proposed. The project will help solar panels to get the maximum sunlight automatically thereby increasing the efficiency of the system. In this project, a working dual-axis solar tracker is built by using a balanced concept which is four signals from the different sensors are compared. Light Dependent Resistor (LDR) as a light sensor has been used. The four light-sensors are

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CUSTOMER SATISFACTION TOWARDS KAJARIA PRODUCTS AT MBK TRADING COMPANY, BIDAR

AUTHOR:

KALYANRAO K, Harshavardhan M, Mahesh Kumar, Jyothi A.
Assistant Professor,
Department of MBA,
Guru Nanak Dev Engineering College Bidar,
(Visvesvaraya Technological University, Belgaum, Karnataka, INDIA)
Email-ID: rao.kalyan999@gmail.com

Abstract: *The tiles industries are growing in the Indian market, where consumers are always moving and they are not satisfied with the same product. The company's Hercules job is to retain customers. Therefore, they place a high priority on customer satisfaction.*

The study is about customer satisfaction towards Kajaria Products. The theme of selected tiles deals with various factors and relationships that directly affect customer satisfaction in Kajaria products.

Kajaria is a survey for customer satisfaction. Selected descriptions in this article describe the various factors and relationships that directly affect customer satisfaction with Kajaria products. we can see intense competition in all industries from pins to platforms. Customers' tastes and preferences are very dynamic and can change whenever they want, and they are constantly on the lookout for the best and latest products and services. Retaining customers is a difficult task. Therefore, effective customer satisfaction data are needed.

Keywords: *Consumers, expectations, retention, relationship, satisaction, tiles.*

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Design and Fabrication of Battery Operated Paddy Transplanting Machine

Sangamesh Sirsgi, Anoopkumar Elia, NandKishore Rao, Sanjay Patil

GURU NANAK DEV ENGINEERING COLLEGE BIDAR 585 403

ABSTRACT: *Comfort coupled with safety and simplicity is what man strives for. Our project has been to bring about both .The culmination of our effort has resulted in development of new "**PADDY TRANSPLANTER MACHINE**". The project present a basic as well as very professional treatment of thesubject in a very comprehensive, based on learning effort and understanding capability of today as per their levels. The device is simple and comfortable. Basic calculation, drawing, designing is included in the project The salient features of our machine can be listed as the mechanism usedis very simple, easy for operation; no skill is required to operate the machine.*

INTRODUCTION

In India agriculture has been facing serious challenges like scarcity of agricultural labour, not only in peak working seasons but also in normal time. This is mainly for increased non-farm job opportunities having higher wage, migration of labour force to cities and low status of agricultural labours in the society. On the other hand cultivable land is decreasing due to urbanization. Agricultural mechanization is one way to overcome this problem. Fortunately, there are many opportunities to move forward with

OBJECTIVES & SCOPE OF STUDY

To obtain uniform spacing and optimum plant density.

To achieve higher productivity (0.5-0.7t/ha) compared to traditional methods where plant spacing and density may not always be consistent.

To lower stress drudgery and health risks for farm labours.

To create better employment opportunities for rural youth through the development of custom

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Voice Based Email System for Blind People using Speech Recognition Technology

Suresh Chimkode
Guru Nanak Dev Engineering College, Bidar India

Padmanjali A Hagargi
Guru Nanak Dev Engineering College, Bidar India

Dayanand Jamkhandi
Guru Nanak Dev Engineering College, Bidar India

Rajshekar Gaithode
Guru Nanak Dev Engineering College, Bidar India

ABSTRACT

This chapter presents the Internet is considering as an important information repository now. Without it no single work is possible. It is even regarded as one of the de facto techniques that are used in transmission. In the enterprise world, including all the forms of communication particularly the Email is most common form. But all people can not use the internet. Because you need to know what's on the screen to access the internet. It doesn't matter if you don't see it.Thatleads to making the internet as not useful technology for blind and uneducated people. The currently available structure , such as TTS and ASR screen readers, do not allow visually impaired people to use the Internet efficiently enough. With around 285 million people with visual impairments worldwide, they need access to the

1. INTRODUCTION

The Internet is considering as an important information repository now. Without it no single work is possible. It is even regarded as one of the de facto techniques that are used in transmission. In the enterprise world, including all the forms of communication particularly the

Email is most common form. But all people can not use the internet.

Because you need to know what's on the screen to access the internet. It doesn't matter if you don't see it.Thatleads to making the internet as not useful technology for blind and uneducated

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"ROBO-WATERING SYSTEM BASED ON SOIL MOISTURE"

Rajendra Mogre, Shivshankar B C, Anil Jadhav, Digambar B

GURU NANAK DEV ENGINEERING COLLEGE BIDAR

ABSTRACT

This project work focuses on a smart sprinkler irrigation system that is less costly and any farmer used in farm division. In 21st century where automation is playing the most significant role in the life of human. Automation allows us to control appliances with automatic control. Automation gives comfort, increase efficiency as well as save time.

Our proposed system uses a robot with a single sprinkler and a water tank that moves throughout the field spraying water all over it. This technology could improve agriculture efficiency, promoting water conservation and reducing the environmental impacts. The objectives of this project are to avoid wastage of water and increase agriculture efficiency by using Arduino Uno based automatic plant watering system. Soil moisture sensor inserts in the soil to sense whether the soil is wet or dry. The control unit monitors the sensors and when moisture sensor senses dry condition the control circuit will switch on the motor for watering the soil and it will switch off the motor when the moisture sensor senses enough wetness of the soil at which one, two or three of the factors are in abnormal conditions. It is like a moving water tank that automatically moves all over the field spraying water through it. This robot is equipped with geo fencing sensors, so it will cover complete fields without needing any manual intervention.

1. INTRODUCTION

Irrigation is the agricultural process of applying controlled amounts of water to land to assist in the production of crops, as well as to grow landscape plants and lawns, where it may be known as watering. Agriculture that does not use irrigation but instead relies only on direct rainfall is referred to as rain-fed. Irrigation has been a central feature of agriculture for over 5,000

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COMPARATIVE ANALYSIS AND DESIGN OF PUBLIC BUILDING USING MANUAL METHOD AND STAAD. PRO SOFTWARE

Parashuram Lokre, Manoj Kumar, Umashankar Y, Vivekanand A
Deparment of Civil Engineering
Guru Nanak Dev Engineering College Bidar

ABSTRACT: Analysis and design of a any building needs basic knowledge of structural analysis, so in this project considering basic idealization how the structure is to analyze and design is to be carry out is covered by considering some ongoing projects. In the project tried to cover all the necessary analysis data consideration for different loads and load combination is considered manually and results are compared with software readings by considering same and design data loads and load combination. In detailed detailing is also tried to cover as per the IS code provisions.

1. INTRODUCTION

1.1 ABOUT THE PROJECTS

We started our project through inspection of drawings of function hall building which is proposed to locate at K.R.Nagar. The project work deals with the structural analysis and design of a proposed multipurpose hall located at K.R.Nagar, Having C+G+1 floors. Architectural plans were provided. With the given plan, beam column layout was plotted, with the help of which slabs were identified as one way, two way.Loads were worked out using IS:875-1987. Here the analysis of the structure is carried out using the software STAAD.Pro V8i. 3D Model were considered and are analyzed for Dead loads and Live loads. The design is carried out as according to IS: 456:2000. Design aids of SP 16 are considered for the design of section. After the completion of function hall building we did many more buildings which include Residential building consists of C+G+2 floors and a Hospital building having G+3 floors.

1.3 ABOUT THE SOFTWARES

STAAD.Pro:

STAAD.Pro is one of the leading analysis and design software used in the industry. It stands for Structural Analysis and Design Program.

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A GOA Based Secure Routing Algorithm for Improving Packet Delivery and Energy Efficiency in Wireless Sensor Networks

Gouramma Halidoddi[1]* **Rubini Pandu[2]**

[1]*Department of Computer Science and Engineering, Guru Nanak Dev Engineering College, Bidar, India*
[2]*School of Engineering and Technology, CMR University, Bengaluru, India*
* Corresponding author's Email: gouramma.16phd@cmr.edu.in

Abstract: Wireless Sensor Networks (WSNs) attain much attention in different areas due to their self-configurability, easy maintenance and scalability feature. WSN is configured with more nodes to transfer the data inside the network. The sensor networks are usually characterized based on low bandwidth, limited energy, limited power supplies and small size memory, which leads to demand for the environment to provide security. Recently, the objective is to accomplish network security with low energy utilization is a challenging task in WSN. In this paper, an appropriated node selection and secure route path generation are achieved by using Grasshopper Optimization Algorithm (GOA) and Elliptic Curve Cryptographic and Diffie Hellman (ECCDH) based key exchange algorithm. The main aim of using the GOA-ECCDH method is to select the optimal route path with minimum energy consumption and improving the network lifespan in WSN. The performances of the GOA-ECCDH method are evaluated and compared to the existing Secure and Energy-aware Heuristic-based Routing (SEHR) method and Secure Routing Protocol based on Multi-Objective Ant-colony-algorithm (SRPMA) method in terms of packet delivery ratio, average energy consumption, packet loss rate, and routing load. The packet loss rate of the GOA-ECCDH method is 7.2% for the network with 8 black hole nodes, which is lesser when compared to the SEHR method and SRPMA method.

Keywords: Diffie-hellman key exchange, Energy consumption, Elliptic curve cryptography, Grasshopper optimization algorithm, Network lifespan, Wireless sensor network.

1. Introduction

WSNs are composed of a large number of smart sensor nodes, which are of strictly limited power, capabilities of computation, storage, and communication. Recently, WSNs have been widely used in many fields such as wild animal monitoring, military surveillance, target tracking, forest fire detection, and industry security. [1]. The WSN is a self-organization network with numerous sensor nodes, which determine the life span of the network [2, 3]. The sensor nodes are denoted as hubs and observed physical data such as relative humidity, pressure, temperature, etc., [4] where the sensing data was forward to the Base Station (BS), which is acts as a sink. The sensor node consists of four main units' transceiver, power unit, sensor, and processor [5, 6]. Energy is the main constrain while designing the WSN due to its battery-powered sensor nodes. [7, 8].

Security is one of the essential requirements in WSN. Generally, WSN is vulnerable to various kinds of threats [9-11]. The several attacks in WSN are Sybil attacks, wormhole attacks, black hole attacks, and hello flood attacks [12, 13]. The WSN has some security goals such as primary and secondary. The primary goal includes confidentiality, integrity, and authentication and the secondary goal includes data freshness, self-organization, secure localization, and self-organization [14, 15]. The encryption has done using three keys: such as hash, private and public keys. The public key (asymmetric) affords the similar key encryption and decryption whereas private key (symmetric) afford different key for encryption and decryption. The

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Student Attendance Tracking Management

Manikrao Mulge
Department of Computer Science Engineering Guru Nanak Dev Engineering College, Bidar India

Padmanjali A Hagargi
Department of Computer Science Engineering, Guru Nanak Dev Engineering College, Bidar India

Dayanand Jamkhandi
Department of Information Science Engineering Guru Nanak Dev Engineering College, Bidar India

Rajshekar Gaithodei
Department of Computer Science Engineering, Guru Nanak Dev Engineering College, Bidar India

ABSTRACT

Tracking student attendance is essential for keeping tabs on their performance in the classroom and during their studies. It becomes a significant issue since the university administration upholds the rule that a student may only take the exam if his or her attendance is greater than or equivalent to a certain percentage (60 percent, 70 percent, 80 percent, etc.). According to the conventional method of keeping track of attendance, each time a class is attended, students must physically sign the attendance sheet. Noticing and marking a student's name on the attendance sheet takes too much time. Additionally, it can happen that some students will fully or unintentionally mark another student's name as a proxy. The paper attendance record could disappear. Using smartphone technology similar to Android our developed mobile application will make it simple for the course instructor to take attendance, save it to the phone and to the server, verify the percentage, and print out a paper copy. This system can mark attendance, mark intruders' admission, calculate attendance percentages, send emails, and send SMS to the guardian to keep them informed about their child's attendance at the institute using the stored information. The established system allows for internet access at any time and from any location, which can be incredibly helpful for the course instructor in managing their students' attendance.

1. INTRODUCTION

The management of student attendance is a crucial component of student administration in high school, college, and universities. The standard method of monitoring student attendance in a classroom involves requiring the students to physically mark the attendance sheet that circulates in the room while the course instructor is giving the lecture. For instance, a teacher of a course with a large class can

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"CASE STUDY ON BIO-MEDICAL WASTE MANAGEMENT OF BIDAR GOVT. HOSPITAL BEFORE AND AFTER COVID-19"

Puneeth Kumar, Rajani S.S, B.B.Kori, Amar R.D.

Department of Civil Engineering, Guru Nanak Dev Engineering College, Bidar, Karnataka, India

ABSTRACT

Advances in medical facilities with the introduction of sophisticated instruments have increased the waste generation per patient in health care units. It is the waste that is generated during the diagnosis, treatment or immunization of human beings or animals or in the production or testing of biological components. According to the Government of India as contemplated under section 6,8 and 25 of the Environment (Protection)Act,1986,has made the Biomedical Waste (Management & Handling) Rules,1998 applicable to every institution generating biomedical waste which includes hospitals, nursing homes, clinic, dispensary, veterinary institutions, animal houses, pathological lab, blood bank ,the rules are applicable to even handlers. The process of handling biomedical waste includes segregation, transportation with suitable treatment method as incineration, deep burial, autoclaving, microwave treatment. The preference of which pertains to the category and characteristics of Bio medical waste. Although Bio medical waste includes a percent of hazardous waste, there exists an equal competent method of treatment. During the study, it was observed that: (i) the process of segregation, collection, transport, storage and final disposal of infectious waste was done in compliance with the Standard Procedures, (ii) the final disposal was by incineration in accordance to EPA Rules 1998, This hospital also extends its facility to the neighboring clinics and hospitals by collecting their produced waste for various treatment.

1. Introduction

Everything is made for a defined purpose "anything which is not intended for further use is termed as waste". In the scientific and industrial era combined with increasing population and their demand, the turnover of products has gone very solid waste. With increasing need of Health Care in fast changing society the role of hospitals/nursing homes comes to the forefront. "Hospital is a residential establishment which provides short term and long term medical care consisting of observational, diagnostic, therapeutic and rehabilitative services for a person suffering

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SOLAR POWER GENERATION BY USING VK0001 PANEL

Megha Kulkarni, Shubha S, Durga Prasad, Deepak Ghode
Department of Electrical & Electronics Engineering, Guru Nanak Dev Engineering College, Bidar – 585403, Karnataka
E-mail: meghakulkarni037@gndecb.ac.in

Abstract

Solar power is the conversion of sunlight into electricity, either directly using photovoltaic (PV), or indirectly using concentrated solar power (CSP). Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. This storage energy we are using for home applications, this voltage retrieves and converts DC to AC voltage to activate CFL bulb. Received voltage from the SOLAR VOLTAIC is charges the battery and it converts the voltage in to 230 voltage by the way it amplifies the current to activate CFL bulb.

Before years natural power generation is expandable and costly project for home and industrial areas but these days it might be very common topic for installing natural power sources like solar panels and wind. My idea about power generation is that we can't create natural power sources but we can retrieve power which already exists like sun and air. Power generation from sun with solar panel only existed. What happen if an invention generates power from sun without solar panel? This project publish reveals the power generation form without solar panel I named this panel name as "VK0001 panel".

Key Words: Concentrated Solar Power, Photovoltaic, Solar Panel, VK0001Panel

Introduction

A solar panel is a photovoltaic cell where light energy is converting into electrical energy. Photovoltaic cells are made of silicon (Si) chip above which resides a very layer of noble metal through which around 1% photon particles enter the natural and activates electron flow. Each individualvk0001-panel cell produces 0.65v which is 44% more voltage and produced 42.2mA current which is 210 times more

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RATIO ANALYSIS, TREND ANALYSIS, OMPERATIVE ANALYSIS AT BIDAR DISTRICT CO-OPERATIVE CENTRAL BANK LTD.

Mahesh Kumar M,[1] Jyothi A,[2] Kalyanrao, Harshavardhan[3]

Department of MBA,
Guru Nanak Dev Engineering College Bidar,
(Visvesvaraya Technological University, Belgaum, Karnataka, INDIA)
Email-ID: mgmeenkera@gmail.com

Abstract:

Each and every company wants to know its states whether it is fulfilling its objective of wealth maximization and it is moving towards and profitability so the study is under taken to know the financial soundness of the bank with the help of RATIO ANALYSIS, TREND ANALYSIS, COMPERATIVE ANALYSIS.

Comparative studies are broad concepts. Comparative means comparing at least two comparable alternatives, processes, products, qualifications, data sets, systems, and so on. If there area unit changes within the monetary statements in accounting, multiple accounting periods are often given together to sight new trends within the company's operations and results. Comparative is useful for guiding or modeling something else. employing a comparative analysis, it's helpful to live the relationship between 2 or additional variables and therefore the coverage amount.

The topic of the research is "Comparative analysis of DCC Bank". The financial performance plays important role in every banking sector by ascertaining the performance and maintaining loans and advances functions effectively, this study has been conducted tograsp the effectiveness of both the banks.

Keywords: Ratio Analysis, Trend Analysis, Comperative Analysis, Monetary Statements, Co-Operative Societies

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Parkinson's Disease Analysis and Detection using Machine Learning Technique

Padmanjali A Hagargi, Rajshekar G, Masrat Begum, Manikrao M.
Guru Nanak Dev Engineering College, Bida India

ABSTRACT

This chapter presents Parkinson's disease analysis and detection using machine learning techniques. The Parkinson's information is tested with two different models in order to determine whether model provides the most accurate categorization. Logistic Regression is used in parametric modelling to organize the Parkinson's information that has been collected. ML Algorithms are applied to organize the preparation and test information of Parkinson's disease. These algorithms are derived from non-parametric showing. The order is determined by combining the results of the parametric and non-parametric models with the information acquired about Parkinson's disease. This chapter advances on research and the discussion on their importance and efficiency in the efficient treatment and further diagnosis.

INTRODUCTION

Parkinson's disease is a progressive ailment that affects the central nervous system over a lengthy period of time. Parkinson's disease is a brain disorder that causes unintended or uncontrollable movements, such as shaking, stiffness, and difficulty with balance and coordination. Symptoms usually begin gradually and worsen over time. As the disease progresses, people may have difficulty walking and talking. The symptoms manifest themselves gradually, with trembling and stiffness being the most noticeable, followed by slowness of movement and difficulties walking. It is believed that variables in both the genes and the environment contribute to the development of Parkinson's disease. Each year, India sees the reporting of more than one

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EMPLOYEE JOB SATISFACTION SATYADEEPTHA PHARMACETUICAL LIMITED, HUMNABAD

KALYANRAO K, Arati B, Mahesh Kumar, Harshavardhan
Assistant Professor, Department of MBA,
Guru Nanak Dev Engineering College Bidar,
(Visvesvaraya Technological University, Belgaum, Karnataka, INDIA)
E-mail: rao.kalyan999@gmail.com

Abstract: Job satisfaction is such a complex task for any organization that it can't be overcome but if the organization doesn't has a specific modus operand then this simple task can have for reaching adverse effects on the functioning of CVCR department of tile organization. Every organization has a model to adjust, replace and bridge rare job satisfaction but the guidelines which the organization draws and the way it implements has a conclusive impact particularly in front office customer facing and oilier public centered and oriented services, job satisfaction can result in a great mess and sometimes a might more. The project report title "EMPLOYEE JOB SATISFACTION" has been studied in Humnabad at Satya Deeptha Pharmaceuticals Ltd. To understand the employee's performance the company has conducted job satisfaction hence this topic is analyzing that after job satisfaction whether employees were increasing their skill or whether they increasing working efficiency to know this topic is chosen.

Keywords: Employee, Job Satisfaction, Performance, facilities, benefits

1. INTRODUCTION

Job Satisfaction Concept:

The word job satisfaction has been gotten from thought process which implies any thought, need or feeling that prompts a man in to activity. Whatever might be the conduct of man, there is some improvement behind it. Stimulus is needy upon the thought process of the individual concerned. Thought process can be known by examining his needs and wants.

Job satisfaction is a term that most bosses have perused or if nothing else caught wind of. In any case, with regards to really inspiring representatives, numerous businesses don't know about or acquainted with the distinctive methods and

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KITE SPRAYER

NAGRAJ R.G, Sangamesh Sirsgi, Mohammad Ashfaq Hussain, Gangadhar Biradar

Guru Nanak Dev Engineering College, Bidar

Abstract

To meet the growing needs of the farmers who wish continuously to improve the profitability of their farming by using more efficient materials and machineries. The use of different spraying techniques in agriculture is increasing day by day to growing the importance in increasing the crop yield. It is also one of the best methods to spray the pesticides, fertilizers, etc.To improve the process of crop treatment. The working and parameters of Kite sprayer machine for minimizing the human efforts and increasing productivity of crops.

1 INTRODUCTION

Sprayer is a machine used to apply liquid chemicals on plants to control pest and diseases. It can also be used to apply herbicides to control weeds and to spray micronutrients to enhance plant growth.

The main functions of a sprayer are:

- Breaking the chemical solution in to fine droplets of effective size.
- Distributing the droplets uniformly over the plants.
- Applying the chemicals with sufficient pressure for positive reaching the plants
- Regulating the amount of liquid applied on plants to avoid excessive application.

A good sprayer should posses the following qualities

- It should produce a steady stream of spray material in desired droplet size so that the plants to be treated may be covered uniformly.
- It should deliver the liquid at sufficient pressure so that the spray solution reaches all the foliage and spreads uniformly over the plant body.
- It should be light in weight yet sufficiently strong, easily workable and repairable.

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MULTI OBJECTIVE OPTIMIZATION OF PARAMETERS INFLUENCING PERFORMANCE INDICES WHILE TURNING SUPER ALLOY HASTELLOY-C 276 USING GREY RELATION ANALYSIS OF TAGUCHI

Md. Ashfaq Hussain[1], Asst. Professor, Mech.Dept, GND Engg. College Bidar.
Prasad K K[2], Professor Mech. Dept.,GND Engg. College, Bidar,
Digambar Benne[3], Asst. Professor, Mech.Dept, GND Engg. College Bidar.

ABSTRACT

Conventional machining is a subtractive process in which overabundant material is removed in the form of chips.CNC turning being used as one among the primary methods of achieving different geometry and shapes for various products, its performance is of paramount importance. CNC turning of super alloys like Hastelloy- C276 posses a great challenge to machinists because of its peculiar properties, hence an aggressive cutting regime it warrants for optimum quality of final products and for improving productivity. Any deviation from optimum parameter settings may result in poor cutting performance. Turning process parameters like cutting speed, feed, depth of cut and geometrical parameters of turning tool like nose radius may impose conflicting requirements.

This investigation is an attempt to predict optimal tuning parameter settings of cutting speed, feed rate, depth of cut and nose radius for minimized surface roughness, maximized material removal rate and minimized tool wear for Hastelloy-C276 , when turned with coated carbide turning inserts on CNC lathes ,employing Grey Relation Analysis(GRA) of Taguchi.

Experiments were conducted based on L27 Orthogonal Array(OA) .The proposed cutting regime if implemented on shop floor will result in considerable savings while machining difficult to machine super alloys like Hastelloy276

Key words: CNC turning, Hastelloy276, Grey Relation Analysis (GRA), Orthogonal Array(OA).

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ORIGINAL RESEARCH PAPER | Open Access

Optimized deep learning model for mango grading: Hybridizing lion plus firefly algorithm

Mukesh Kumar Tripathi, Dhananjay D. Maktedar

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Abstract

This paper intends to present an automated mango grading system under four stages (1) pre-processing, (2) feature extraction, (3) optimal feature selection and (4) classification. Initially, the input image is subjected to the pre-processing phase, where the reading, sizing, noise removal and segmentation process happens. Subsequently, the features are extracted from the pre-processed image. To make the system more effective, from the extracted features, the optimal features are selected using a new hybrid optimization algorithm termed the lion assisted firefly algorithm (LA-FF), which is the combination of LA and FF, respectively. Then, the optimal features are given for the classification process, where the optimized deep convolutional neural network (CNN) is deployed. As a major contribution, the configuration of CNN is fine-tuned via selecting the optimal count of convolutional layers. This obviously enhances the classification accuracy in grading system. For fine-tuning the convolutional layers in the deep CNN, the LA-FF algorithm is used so that the classifier is optimized. The grading is evaluated on the basis of healthydiseased, ripeunripe and bigmediumvery big cases with respect to type I and type II measures and the performance of the proposed grading model is compared over the other state-of-the-art models.

1 INTRODUCTION

Mango (*Mangifera indica* L.) belongs to the family Anacardiaceae. These are cultivated commercially and extensively in India, tropical Australia, Thailand, Philippines, Hawaii, the lowlands of South-East Africa, and in the lowlands of South and Central America. When exporting the mangoes over other countries, the grading [1-4] is essential for quality consideration. Conventionally, the fruit grading is handled by those trained inspectors and this is considered to be labour-intensive, time-consuming, and inefficient. The majority of the countries consider the size feature for mango grading. Still, it remains to be a complex task due to inappropriate grading. Therefore, the automatic grading process [5-7] is very necessary and helpful. On grading the mangoes, the features such as shape, size, firmness, maturity,

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Block chain Technology in Agriculture Product Supply Chain

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Abstract:

Globalized delivery of manufacturing and agricultural production offer renewed attention to the health, efficiency, and validation of many vital criteria in the food and agricultural supply chain. That numbers of food safety and corruption hazards have generated an enormous need of an efficient traceability solutions which acts as an essential quality managements tools ensuring to enough product's safety within the agriculture supply chain. Block chain is the revolutionary technological method, which provides the groundbreaking result for commodity traceableness in agriculture and in food supply chains. Today's agricultural supplying chains are complicated ecosystems mixing several stakeholders making it difficult to validate several significant requirements mainly towards nation of first origin, crop growth phases, quality standards compliance, and yield monitoring. This paper proposes a strategy that levitates the block chain and conducts business operations effectively across the agricultural supply chain for tracking crop prices and traceability. The proposed framework solution discards the need for trusted centralized authority, intermediaries and offers records of the transactions, improving efficient science and safety with high integrity and reliability. All transactions are registered and then stored in block chain's unchangeable ledger with linkages to a decentralized le network, thereby ensuring vary high degree of traceability and transparency in the supply chain ecosystem in a stable, reliable and in efficient manner.

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Robust Image Feature Description, Matching And Applications: A Review

PDF (https://www.tojqi.net/index.php/journal/article/view/2685/1799)

Shivendra, Kasa Chiranjeevi , Mukesh Kumar Tripathi, Dhananjay D.Maktedar

Abstract

Many computer vision applications such as visual communication and image processing, object detection, shape recognition, recognition of face and face expression, 3D reconstruction, etc. included two images to suit. To compare two images, or in other words, to evaluate the similarity / difference between the two images, a certain picture definition is required since the comparison between the raw intensity values of two images takes more time and is influenced by small differences in the inherent properties of each image, such as luminosity, orientation, scaling etc. The photographs may then be corresponded with their definition extracted from the fundamental characteristics of the picture, such as colour, texture, structure, etc. The actual descriptor / signature of the picture is this definition. Any descriptor's main objectives are (1) to collect discriminatory picture details, (2) to provide the invariance to geometric and photometric modifications, and (3) to - its size. The key objective of the paper is to construct the image descriptors with differential strength, image variations robustness and small scale. For regionally based photos under different geometric and photometric transformation conditions we have provided an interlaced strength value local descriptor (IOLD). We have checked four local gray-scale image descriptors, namely Local Extremity Diagonal (LDEP), a Local Bit plane Diagonal (LBDP) pattern, local LBDISP and local wavelength (LWP) pattern in the MRI and CT repositories for biomedical image retrieval. Four colour-based local descriptors, i.e. local colour occurrence descriptors (LCOD), robust hybrid (RSHD) scale and rotating, multiple-channel adder based, and multi-channel decoder-based, local binary (md LBP) patterns for natural and texture image recovery, have been reported. For more details, see LCOD. As a favored phase in pre-processing an illumination compensation mechanism was recorded. Filter bags and SVD-based solutions were suggested in order to boost descriptor efficiency.

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Articles

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A Bibliometric Analysis of Impact Energy Absorption System to Enhance Vehicle Crashworthiness

Archana Nema
archana.nema2020@gmail.com

Nagraj R. Gandhe
nagugr@gmail.com

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A Bibliometric Analysis of Impact Energy Absorption System to Enhance Vehicle Crashworthiness

Archana Chandak[1], Nagraj R. Gandhe[2]

[1]Department of Mechanical Engineering, Guru Nanak Dev Engineering College, Bidar, India, archana.nema2020@gmail.com.

[2]Department of Mechanical Engineering, Guru Nanak Dev Engineering College, Bidar, India, nagugr@gmail.com.

ABSTRACT

In automotive engineering, crashworthiness is defined as an automobile's functionality to shield its occupants from critical harm or death just in case of accidents of a given proportion. The comprehensive study observed composite materials exhibit a high specific energy absorption rate in a controlled manner while crushing. Crashworthiness research has also captured attention, especially to evaluate the energy absorbing capacity of different components made from composite material while undergoing deformation. Composite materials may be custom designed to show that specific energy absorption abilities are better than the metal structures. The present study will benefit the community of engineers resulting in a sturdy automotive system. It is observed that a total of 1458 articles are published in different forms by past researchers. Following the trend of publications in the concerned area, the last six years are the point of significant contribution, and in the year 2016, a maximum of 263 articles are published worldwide. The detailed survey revealed that a maximum of journal articles are published compared to the other relevant sources. The United States is the leading country in the concerned research area publications, followed by China and Germany. Different energy absorbing system has shown promising attributes for reducing the fatality of accidents during a collision. Still, it has a long way to achieve a system that can absorb the total energy generated during a crash.

Keywords- Crashworthiness, Frontal crash, Carbon fibre, Energy Absorber

1.INTRODUCTION

Nowadays, crashworthiness is a vital development issue by considering the increasing road population of vehicles. Although well-designed energy-absorbing vehicle structures significantly reduced the fatality rate by collapsing in a controlled manner, which improves the and occupant safety. [1]

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Numerical investigation of Belleville spring as an energy absorbing component

Archana Chandak* and Nagraj R. Gandhe
Department of Mechanical Engineering
Guru Nanak Dev Engineering College, Bidar
**archanachandak2020@gmail.com*

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Crashworthiness research has attracted significant attention, focusing on evaluating deformation behavior and selecting composite material components that act as energy-absorbing devices. Among the available composite materials, carbon fibers can absorb high energy during a crash. This paper presents the initial concept of the design application of a carbon fiber Belleville spring. The proposed design of the mechanism is directed to reduce the extent of the impact. An analytical approach is followed to calculate the energy absorbed during a crash. The parametric study is conducted for a different range of load $22\,250 \leq F \leq 27\,000$ N to predict which spring material absorbs maximum energy. The impact on the occupant side is minimum by the finite element approach. A brief overview of the spring's energy absorption capability is provided through Ansys, and a correlation is proposed, which helps predict the value of Energy for different loads.

Keywords: Belleville spring; crashworthiness; crash safety; composite material; energy absorption.

Nomenclature

D	Outer Diameter of Belleville Spring (mm)
d	Internal Diameter of Belleville Spring (mm)
σ_{all}	Allowable Stress (MPa)
σ	Maximum theoretical Stress (MPa)
h	Height (mm)
m	Mass of Passenger Vehicle (kg)
P	Design pressure (N/m^2)
t	Thickness of Belleville Spring (mm)
V	Velocity of Passenger Vehicle (m/sec)

Abbreviations

UTS	Ultimate Tensile Strength
FOS	Factor of Safety

*Corresponding author.

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ORIGINAL PAPER

Design of two-dimensional photonic crystal based ultra compact optical RS flip-flop

Savita Soma[1] · Mahesh V. Sonth[2] · Sanjaykumar C. Gowre[3]

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Abstract
The presented research deals with designing of a new ultra compact all-optical RS flip-flop on a two-dimensional (2-D) hexagonal photonic crystal platform. The flip-flop is designed by using two NOR gates, photonic crystal waveguides, four silicon ring resonators, four input ports and two output ports. The designed flip-flop structure has hexagonal silicon rods in the air host with a lattice constant a of 630 nm. Si rods have a radius of $0.2a$ and operating waveleangth of 1550 nm. The novel design provides proper distinction between logic 1 and logic 0 at the output by giving 8.7 dB and 4 dB contrast ratio at Q and $Qbar$ output, respectively. Furthermore, uncomplicated structure resulting in small dimension of 28 μm * 28 μm makes it appropriate for optical integrated circuit in optical networks. FDTD method is used to model the proposed structure and simulated using RSoft FullWAVE simulator tool.

Keywords Optical flip-flop · Photonic bandgap · Photonic crystal ring resonator (PCRR) · Contrast ratio

1 Introduction

In recent years, demand for optical signal processing using all optical devices is greatly increasing in the telecom applications. As already electronic technology has reached its speed limit in computation and communication, all optical devices constructed by using photonic crystals can increase the speed of operation as compared to electronic devices. Substantial progress has been made on photonic crystal based optical devices as, the cost of these devices is less. These devices can be used for all optical data processing in the areas of fast and low-power switching and storing optical data. Optical logic gates are the major components used for signal processing in optical communication. In recent past, various optical logic gates like AND, NOT, OR, NOR and NAND [1–6], logic devices like adders [7, 8], multiplexer, demultiplexer [9–11], decoders [12, 13], filters [14] and counters [15] have been demonstrated. Complex structures such as flip-flops are constructed using combination of these logic gates.

The optical flip-flop is one of the important building blocks for optical counters and optical memory needed for photonic integrated circuits (PICs), and optical communication systems. Optical flip-flop can be constructed by using different methods such as using a single Semiconductor Optical Amplifier-Mach–Zehnder Interferometer (SOA-MZI) [16], based on multimode interference photonic crystal waveguides [17], kerr nonlinear PhC [18] with micro-cavities based on 2D heterostructure and PhC based flip-flop [19]. PhC based flip-flop has solutions for optical flip-flops which have difficulties such as switching speed, size and contrast ratio. In [20] RS flip-flop using NOR gates with photonic crystal ring resonator square lattice is demonstrated. Ring resonators are created by removing rods in the structure and these cavities couple the light to the waveguide.

Tamer Moniem et al. [20] designed an all-optical RS-FF using two NOR gates and four nonlinear resonant rings. By giving feedback from the output of NOR gates, previous state is maintained at the same level. They have obtained

✉ Savita Soma
savita.soma@gmail.com

Mahesh V. Sonth
maheshsonth@gmail.com

Sanjaykumar C. Gowre
sanjaygowre@gmail.com

1 Guru Nanak Dev Engineering College, Bidar 585403, India

2 CMR Technical Campus, Hyderabad 501401, India

3 Bheemanna Khandre Institute of Technology, Bhalki 585328, India

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ORIGINAL RESEARCH

Cross layer packet drop attack detection in MANET using swarm intelligence

Premala Bhande[1] · MD. Bakhar[1]

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Abstract The mobile ad hoc networks gained its popularity for its various applications, quick and easy deployment. This network does not require any fixed infrastructure for deployment. Mobile nodes in this network communicate with each other through a wireless communication medium and makes this network highly vulnerable to many attacks. One of the well-known attack is packet drop attack. Whenever the network faces any kind of attack suddenly degrades network performance. In this paper, we have designed a protocol known as cross-layer packet drop attack detection using swarm intelligence (CLPDM-SI). This protocol followed a cluster based collective swarm intelligence detection mechanism to find a malicious node in real data acquisition system which undergoes packet drop attack. Our protocol (CLPDM-SI) is compared with a protocol which does not follow swarm intelligence known as Adapting Cross-Layer Approach for Detecting and Segregating Malicious Nodes (ACLDSM) mechanisms. Our comparison is done based on various QoS parameters delay, throughput, packet delivery ratio and false positive detection in the MAC layer. Our result shows significant improvements after incorporating the swarm intelligence. By inspecting CPU and memory utilization time, the algorithm finds the false positive of suspected malicious nodes.

Keywords *MANET* · Cross-layer attack · Collective swarm intelligence · False positive and malicious node

1 Introduction

Mobile ad hoc networks is a collection of various wireless devices communicating through the wireless medium without following any fixed infrastructure. There are wide varieties of fields where MANET is used. The devices in this network known as the node and they follow different mobility methods. The node in this network may join and leave the network very frequently. Nodes in this network communicate with each other in a multi-hop fashion. The communication link frequently breaks due to nodes movements. There are various types of routing protocols exist for MANET are reactive, proactive and hybrid routing protocol. In a reactive routing protocol, the node discovers a route when required. In this, there is no compelling reason to keep up a routing table ahead of time as in routing protocols such as AODV, ABR, WRP and DSR etc. In proactive, it is required to keep up a routing table ahead of time as in routing protocols such as DSDV, LSP and OLSR. Hybrid routing algorithm consolidates the advantages of both reactive and proactive routing protocol [1]. The major disadvantages of hybrid routing are expansive routing overhead, delay, bandwidth, transfer speed, more power utilization. To cope with these shortcomings numerous analysts have proposed swarm intelligence (SI) algorithms. SI models are described as computational models influenced by natural swarm systems. Till date, a number of SI algorithms depend upon different natural swarm systems are effectively used in many genuine applications. The SI is motivated from collective conduct of common frameworks like ant colony (ACO), honey bee

✉ Premala Bhande
kashipremala@gmail.com

MD. Bakhar
mohammed.bakhar@gmail.com

[1] Department of E&CE, GND Engg College Bidar, Bidar, Karnataka, India

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Simultaneous Interference Localization and Array Calibration for Robust Adaptive Beamforming With Partly Calibrated Arrays

JIN HE, Member, IEEE
TING SHU, Member, IEEE
Shanghai Jiao Tong University, Shanghai, China

VEERENDRA DAKULAGI
Lincoln University College, Petaling Jaya, Malaysia

LINNA LI
Shanghai Aerospace Electronic Communication Equipment Research Institute, Shanghai, China

In this article, we address the problem of robust adaptive beamforming in the presence of array sensor miscalibration. We consider the use of partly calibrated linear arrays, where only a small portion of sensors have been gain-phase aligned. Our solution is based on the interference-plus-noise covariance matrix (INCM) reconstruction principle. In our solution, the INCM is reconstructed by performing simultaneous interference localization and array calibration (SILAC). Toward this end, a novel virtual baseline extension technique is presented for high-accuracy SILAC. After SILAC, the interference and noise powers are estimated, and the INCM is reconstructed subsequently. No computations of integration/summation and nonlinear optimization are involved in our beamformer, which is termed as "INCM-SILAC" beamformer. Numerical examples are offered to validate the performance of the INCM-SILAC beamformer. A MATLAB code for reproducing the results of radar application example is available at *https://github.com/jinhesjtu/SILAC.git*

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Authors' addresses: Jin He and Ting Shu are with the Shanghai Key Laboratory of Intelligent Sensing and Recognition, School of Electronic Information and Electrical Engineering, Shanghai Jiao Tong University, Shanghai 200240, China, E-mail: (jinhe@sjtu.edu.cn; tingshu@sjtu.edu.cn); Veerendra Dakulagi is with the Department of Electronics and Communication Engineering, Lincoln University College, 47301 Petaling Jaya, Malaysia, E-mail: (veerendra.gndec@gmail.com); Linna Li is with the Shanghai Aerospace Electronic Communication Equipment Research Institute, Shanghai 201109, China, E-mail: (linnali86@outlook.com). *(Corresponding author: Jin He.)*

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I. INTRODUCTION

Adaptive beamforming is a significant sensor array processing technique with various applications in radar, sonar, and wireless communications for signal-of-interest (SOI) enhancement and/or jamming rejection (see [1]–[3] and references therein). Physically, a beamformer manifests as a spatial filter to strengthen or suppress incoming signals by setting appropriate weights to different measurement channels. In the ideal situation, where the actual array covariance matrix is known and no array manifold error is present, the Capon beamformer [4] is the optimal one because it achieves the maximization of the signal-to-interference-plus-noise ratio (SINR). However, such an ideal situation is nonexistent practically. In practice, a sensor array would have some inevitable imperfections such as mutual coupling [5], [6], sensor position error [7], and gain-phase uncertainty [8]–[11], thus causing array steering vector (SV) errors. Furthermore, it is unrealistic to estimate the actual array covariance matrix with infinite data samples.

To handle the aforementioned problems, the robust adaptive beamforming (RAB) techniques have been proposed recently [13]–[44]. A thorough review on RAB techniques is conducted by Gu *et al.* [45]. Based on the designing philosophies, these RAB techniques may be classified into the following six major categories: 1) the diagonal loading technique [13]–[18]; 2) the eigenspace-based technique [19]–[22]; 3) the cumulant-based technique [12]; 4) the worst-case (WC) optimization technique [23]–[25]; 5) the mainlobe controlling technique [26], [27]; and 6) the interference-plus-noise covariance matrix (INCM) reconstruction technique [28]–[44]. The present work falls into category 6, i.e., our solution is based on the principle of the INCM reconstruction.

The diagonal loading technique finds the beamforming weight vector by introducing some additional quadratic constraints on the SV. A major shortcoming of this technique is the mathematical difficulty in choosing an optimal diagonal loading factor. The eigenspace-based technique finds the beamforming weight vector by performing the projection of the nominal SV onto the signal-plus-interference subspace (SIS) to reduce the effect of SV mismatch. The shortcoming of this technique is the difficulty in separating the SIS from the noise subspace in a low signal-to-noise ratio (SNR) situation, resulting in the unavailability of a "clean" SIS. The cumulant-based technique is robust to SV errors. However, this technique also has difficulty in accurately acquiring the SV of the desired signal in the low signal-to-interference ratio (SIR) condition, especially when the interference signals are not pure Gaussian. The WC optimization technique finds the beamforming weight vector by imposing some uncertainty constraints on the SV. A major drawback of this type of solution is the computationally complex nonlinear

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A New Approach to Achieve a Trade-Off Between Direction-of-Arrival Estimation Performance and Computational Complexity

Veerendra Dakulagi, *Member, IEEE*

***Abstract*— The multiple signal classification (MUSIC) algorithm is a promising method for the plethora of problems related to the direction-of-arrival (DOA) estimation. Conventionally, this approach uses the whole sensor array observations to obtain the signal or noise subspace, which consequently leads to a huge computational burden. In this letter, to circumvent this problem, we make a significant modification to the traditional MUSIC algorithm. First, we compute only two sub-matrices of the sample covariance matrix (SCM) exploiting the Nystrom method avoiding its complete calculation. These matrices can be used to construct an accurate noise subspace without calculating the SCM and its eigenvalue decomposition (EVD). Furthermore, to have a uniform DOA estimation, we modify the classical ULA by displacing two antenna elements from both the ends of the array to a top and a bottom of the array axis. This unique structure improves the estimation of DOAs near and at the array end fires. Several numerical results are included to confirm the efficacy of the new method.**

***Index Terms*— Direction-of-arrival, noise subspace, Nyström.**

I. Introduction

NUMEROUS DOA estimation techniques have been reported in the literature, in which directions of impinging sources are estimated using a spectral search function. Among all methods, the most widely studied method is the MUSIC [1] algorithm. The key features of this method are high resolution and easy implementation. Nonetheless, in the MUSIC method, the computation of signal and noise subspaces depends on the EVD of SCM that leads to intensive calculations. Various alternative methods [2]–[6] have been suggested to save the computational cost of the subspace-based algorithms. Most of the methods have compromised both the estimation accuracy and computational complexity. Alternative to the MUSIC algorithm, the propagator method (PM) has been developed in [4] to estimate the sources for ULA composed of large antenna elements. Indeed, this method significantly reduces the computational complexity. However, this method deteriorates in performance when the sources are close to the array end fires, especially for [80 90] degrees. In [7], Fast Fourier transform (FFT) has been exploited to estimate narrowband sources in some automotive radar. Though this method reduces the complexity of time to $O(M\ logM)$ has low accuracy and thus not suitable for high-resolution automatic sensing [8], [9]. Xin and Sano [11] have obtain the signal subspace by deploying the least-mean-square (LMS) beam former and the approximate Newton scheme is used update the directions. In addition, reduced-dimension MUSIC (RD-MUSIC) algorithm was suggested in [10] to reduce the computational complexity. Nonetheless both the techniques have low-resolution when the sensor number is more than the number of samples. Recently, Babur *et al.* [12] have suggested the variable step-size LMS (VSS-LMS) for for estimating multiple uncorrelated narrowband sources. This approach varies the step size adaptively to get high accuracy with reduced time complexity. Nevertheless, the performance of this method deteriorates in low-signal-to-noise (SNR) ratio scenarios.

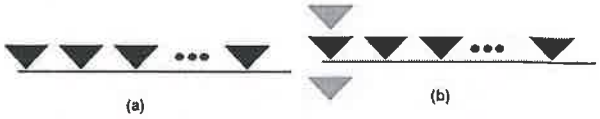

Fig. 1. (a) ULA (b) Modified ULA.

A low-complexity modified MUSIC algorithm for estimating DOAs is presented in [13]. The idea behind this method is using an odd-numbered array of the symmetric antenna array and exploiting each mirrored pair of sensors. Hence, $(2M+1)$ antenna elements are required.The resulting array correlation matrix is $(M+1)\times(M+1)$ matrix. Fundamentally, (approximately) double the number of antenna elements is used to estimate the impinging signals. In other words, the array antenna significantly spatially oversamples the signal.

In this letter, we solve the limitations of [13] by proposing a computationally efficient DOA estimation method using a ULA composed of M sensors. Unlike the traditional methods and [13], the proposed method only needs to compute two sub-matrices of the SCM, which is $\mathbf{R}_{11}$ and $\mathbf{R}_{12}$, avoiding its whole calculation. Meanwhile, the Nyström method [14] is employed to construct the noise subspace without the direct computation of SCM and its EVD.

II. Array Signal Model

Figure 1 (a) shows the conventional uniform linear array (ULA). In many scenarios, ULAs deteriorate in performance for DOA estimation at angles near the array end fires. This problem can be circumvented by displacing two extra antenna elements at the top and bottom of the array axis as represented in Figure 1 (b). Consider the modified ULA with M sensors receives $P(P<M)$ uncorrelated narrow-band sources.

Assume snapshots number is N. The received signal under noise vector $\boldsymbol{\zeta}(\boldsymbol{k})$ is

$$\mathbf{x}(k) = \mathbf{A}(\theta)\,\mathbf{s}(k) + \boldsymbol{\zeta}(\boldsymbol{k}), \quad k = 1, 2, \cdots, N \qquad (1)$$

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The author is with the Department of Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar 585403, India, and also with the Department of Electronics and Communication Engineering, Lincoln University College, Petaling Jaya 47301, Malaysia (e-mail: veerendra.gndec@gmail.com).

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Regular paper

A new Nystrom approximation based efficient coherent DOA estimator for radar applications

Veerendra Dakulagi

Department of Electronics and Communication Engineering, Lincoln University College, 47301 Petaling Jaya, Malaysia

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ABSTRACT

In this work, we present a new method for the direction-of-arrival (DOA) estimation of coherent sources using the symmetric uniform linear array (ULA) without prior source number information. The proposed method constructs a new cost function based on the joint diagonalization structure of the Toeplitz matrix. The estimation of DOAs is made by developing a new spatial spectrum via a 1-D search. Furthermore, we exploit the Nystrom method to diminish the computational complexity of the proposed method. The efficacy of the new estimator is theoretically investigated and the complexity of the computation is also addressed. To examine the efficacy of the proposed method, various experiments are conducted and comparisons with the recent methods are carried out.

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1. Introduction

The signal source number estimation is an important issue in direction-of-arrival estimation (DOA) [1]. Signal detection and estimation using an antenna array is required in many applications, such as wireless communication [2,3], sonar [4], radar [5–7]. The subspace-based DOA approaches, namely, MUSIC [8] and ESPRIT [9] can present a high resolution in DOA estimation. Nevertheless, the occurrence of many coherent signals leads to a spatial covariance matrix (SCM) rank loss. This causes the invalidity of the DOA methods including MUSIC and ESPRIT. All the eigenstructure-based DOA methods [10–20] need an accurate and effective rank determination of the correlation matrix, which is indeed a difficult task without prior source information. The performance of the DOA methods deteriorates dramatically if the source number is estimated incorrectly. Among many methods, the MDL [21] and the AIC [22] are the most effective approaches for the estimation of source number. However, for a low signal-to-noise ratios (SNRs) and a small sample size, they have a tendency of making wrong source estimation. Hence they are not well performers as we expected. To exemplify this, an experiment on the AIC and the MDL criteria is made in the following environment. We use a ULA composed of eight antennas with half-wavelength spacing in the far-field. Let three sources with the directions -40°, 0° and 40° are impinging a ULA.

Let us assume that the SNR is -10dB and the sample number is 100. Fig. 1 shows the simulation for the source estimation using the AIC and the MDL methods. It is noticed that both the approaches are deviating in performance and make incorrect source estimation. Although various improved approaches have been developed, the exact probability of detection is still quite a low [23]. In [24–26], to handle the coherent sources and to make subspace-based techniques to perform well, a variety of spatial smoothing methods have been suggested.

A beamforming method such as the Capon [27] shall be utilized to evade the estimation of source number. Though this technique is computationally efficient, its accuracy of signal estimation is still low and for an M−element uniform linear array (ULA), this approach resolves only M/2 coherent DOAs. Apart from beamforming methods, a few other DOA estimators have been proposed for the signal estimation without the information of source number [28]. However, these methods work properly only when the received signals are not more than half of the antenna elements. Also, how the number of sources is estimated is not properly addressed. Later, to circumvent this problem MUSIC-Like algorithm is presented in [29]. Though this technique is much better than the FBSS [30], SSMUSIC [31], ESPRIT-Like [32], and EVESPA [33] would not resolve the coherent sources, and is computationally intensive and also decreases in performance for low SNRs. Hence to conquer the limitations of the above mentioned well-known methods, we propose a new technique for the estimation of DOAs. In this work, we use the covariance matrix of an array output to reconstruct a Toeplitz matrix whose rank corresponds only to received signals and the coherency exists between them cannot

E-mail address: veerendra.gndec@gmail.com

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RESEARCH ARTICLE
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Warpage Reduction for Power MOSFET Wafers

Kim Ho Yeap[1], Humaira Nisar[1], Veerendra Dakulagi[2]

[1]Faculty of Engineering and Green Technology, Universiti Tunku Abdul Rahman, Kampar, Malaysia
[2]Department of Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Karnataka, India

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ABSTRACT

Wafer warpage is a baseline issue faced by semiconductor manufacturers and is, in fact, particularly conspicuous among those which are involved in the fabrication of power metal oxide semiconductor field effect transistors (MOSFETs). This is because vertical MOSFETs experience larger warpage effects compared with their conventional lateral counterparts. Wafers with warpage exceeding its critical value fail to be chucked by vacuum adsorption during the automatic handling process; the devices fabricated in the wafer face reliability issues as well. This paper presents an analysis on various mechanisms employed to reduce warpage in power MOSFET wafers. The warpage behavior was examined by varying the backside metallization (BSM) thickness, the sputtering power for film deposition and the wafer's temperature (i.e., a cryogenic condition was introduced into the process). The results suggest that both the BSM thickness and wafer's temperature do not manifest a clear correlation with the wafer warpage when the front-end fabrication process is completed. The wafer bow level was, however, found to be in direct proportion with the magnitude of the sputtering power. When the sputtering power is reduced, less residual stress is induced to deform the wafer structure. Hence, the sputtering power could be adjusted to ensure that the warpage effect stays below its critical value.

Keywords: Warpage, power MOSFET, residual stress, backside metallization, sputtering power, cryogenic temperature

Corresponding Author:
Kim Ho Yeap

E-mail:
yeapkh@utar.edu.my;
yeapkimho@gmail.com

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Introduction

Although planar metal oxide semiconductor field effect transistors (MOSFETs) [1-3] have been widely implemented in the electronics industry [4], they are not well suited for power applications [5-7]. Unlike its conventional lateral arrangement, a power MOSFET takes the form of a vertical trench, with a varying design structure, depending on its trench technologies and applications [5]. Figure 1 and Figure 2 depict two of the most widely used trench structures. As can be clearly seen from the figures, a vertical trench is used to isolate the gate terminal from the substrate. The former structure utilizes, respectively, a thin and thick gate oxide at the upper and lower portions of the trench, resulting in a gate with an extended field plate, whereas the latter segregates the field plate from the gate, with the field plate connected to the ground to reduce the gate-to-drain capacitance [5]. Despite being structurally different, the operational concept of all trench power MOSFETs is similar. When the transistor is switched on, the carriers flow from the source across the body into the epitaxial layer and finally to the substrate, which is in direct contact with the drain electrode. The breakdown voltage of the device is dictated by the epitaxial thickness and its doping concentration and its current rating by the channel width. Hence, the trench power MOSFET is capable of sustaining higher breakdown voltage and carry higher current compared with its planar counterpart [8-16].

Wafer warpage is the deformation of the wafer structure into a saddle shape when stress is introduced to it during the fabrication process. This phenomenon is a consequence of the thermal expansion coefficient (CTE) mismatch among different stacked materials deposited onto the wafer. As the temperature cools down, the films and the substrate contract at different rates. The wafer, therefore, warps upward or downward to accommodate the residual stress induced within [17]. Owing to the presence of the vertical trenches, power MOSFET wafers are more susceptible to the warpage effect in comparison with the planar MOSFET wafers. As a

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A New DOA Algorithm for Spectral Estimation

Pavan Mankal[1,2] · Sanjaykumar C. Gowre[2] · Veerendra Dakulagi[1]

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Abstract
Uniform linear arrays (ULAs) are the most commonly used configurations for the direction-of-arrival estimation of radio signals in many wireless communication applications due to its simplicity. However, this configuration does not provide uniform estimation and deteriorates in performance for the grazing incidences. In this work, we solve this problem by modifying the structure of a conventional ULA. This new confirmation has two extra antenna elements at the ends of the array. These extra elements will automatically activate when the source signals are impinging for the grazing incidences. We modify the multiple signal classical algorithm and develop an improved array signal model to obtain the high-resolution pseudo-spectrum of the received signals for full azimuth angles. The performance of the proposed method is compared with the various well-known methods in many practical scenarios. Finally, total Root Mean Square Error is examined over a wide range of Signal to Noise Ratio. Simulation results show that the proposed method outperforms the well-knows methods and provides the accurate and uniform estimation of narrowband signals for end fire array angles which fall in the range $(-70^\circ \leq \theta \leq -90^\circ)$ and $(70^\circ \leq \theta \leq 90^\circ)$, at middle angles $(-60^\circ \leq \theta \leq 60^\circ)$ and at boresites which is very useful in 5G and beyond mobile communication.

Keywords Direction-of-arrival (DOA) · Capon · Grazing incidence · MUSIC · ULA

✉ Veerendra Dakulagi
veerendra.gndec@gmail.com

Pavan Mankal
pavanmankal2010@gmail.com

Sanjaykumar C. Gowre
sanjaygowre@gmail.com

PRINCIPAL
Guru Nanak Dev Engg. College
BIDAR

1 Department of Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar, Karnataka, India

2 Department of Electronics and Communication Engineering, Bheemanna Khandre Institute of Technology, Bhalki, Karnataka, India

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ORIGINAL RESEARCH

Cross layer packet drop attack detection in MANET using swarm intelligence

Premala Bhande[1] · **MD. Bakhar**[1]

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Abstract The mobile ad hoc networks gained its popularity for its various applications, quick and easy deployment. This network does not require any fixed infrastructure for deployment. Mobile nodes in this network communicate with each other through a wireless communication medium and makes this network highly vulnerable to many attacks. One of the well-known attack is packet drop attack. Whenever the network faces any kind of attack suddenly degrades network performance. In this paper, we have designed a protocol known as cross-layer packet drop attack detection using swarm intelligence (CLPDM-SI). This protocol followed a cluster based collective swarm intelligence detection mechanism to find a malicious node in real data acquisition system which undergoes packet drop attack. Our protocol (CLPDM-SI) is compared with a protocol which does not follow swarm intelligence known as Adapting Cross-Layer Approach for Detecting and Segregating Malicious Nodes (ACLDSM) mechanisms. Our comparison is done based on various QoS parameters delay, throughput, packet delivery ratio and false positive detection in the MAC layer. Our result shows significant improvements after incorporating the swarm intelligence. By inspecting CPU and memory utilization time, the algorithm finds the false positive of suspected malicious nodes.

Keywords *MANET* · Cross-layer attack · Collective swarm intelligence · False positive and malicious node

1 Introduction

Mobile ad hoc networks is a collection of various wireless devices communicating through the wireless medium without following any fixed infrastructure. There are wide varieties of fields where MANET is used. The devices in this network known as the node and they follow different mobility methods. The node in this network may join and leave the network very frequently. Nodes in this network communicate with each other in a multi-hop fashion. The communication link frequently breaks due to nodes movements. There are various types of routing protocols exist for MANET are reactive, proactive and hybrid routing protocol. In a reactive routing protocol, the node discovers a route when required. In this, there is no compelling reason to keep up a routing table ahead of time as in routing protocols such as AODV, ABR, WRP and DSR etc. In proactive, it is required to keep up a routing table ahead of time as in routing protocols such as DSDV, LSP and OLSR. Hybrid routing algorithm consolidates the advantages of both reactive and proactive routing protocol [1]. The major disadvantages of hybrid routing are expansive routing overhead, delay, bandwidth, transfer speed, more power utilization. To cope with these shortcomings numerous analysts have proposed swarm intelligence (SI) algorithms. SI models are described as computational models influenced by natural swarm systems. Till date, a number of SI algorithms depend upon different natural swarm systems are effectively used in many genuine applications. The SI is motivated from collective conduct of common frameworks like ant colony (ACO), honey bee

✉ Premala Bhande
kashipremala@gmail.com

MD. Bakhar
mohammed.bakhar@gmail.com

[1] Department of E&CE, GND Engg College Bidar, Bidar, Karnataka, India

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BIDAR

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Smart Electronic Carrier in Shopping Malls Using Rifid and Zigbee

Dr. Praveen Reddy[*1], Dr. SSPM Sharma B[2], Nanditha Krishna [3] & Mohammed Manzoor Hussain[4]

[*1]*Associate Professor, ECE Department, GNDEC Bidar, Karnataka*
[2]*Assistant Professor, Mechatronics Engineering, Parul University, Vadodra,Gujrat*
[3]*Assistant Professor, Biomedical Engineering, ACS College of Engineering, Bangalore, Karnataka*
[4]*Assistant Professor, CSE Department, BVR Institute of Technology, Narsapur, Telangana*

ABSTRACT A supermarket or a hypermarket is a form where wide variety of product items is available. These product items can be food, beverages or any household product. Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. Nowadays, buying and searching at huge malls is turning into a daily activity in subway cities. We can see large rush at malls on holidays and weekends. The rush is even a lot of once there are special offers and discounts. People purchase totally different things and place them in trolley. After total purchase one needs to go to cashier for payments .The cashier prepares bill victimization bar code reader that could be a time overwhelming method and leads to long queues at charge counters.

This study targeted to minimize the Queue at a billing counter in a shopping complex. Smart Trolley does the same by displaying the total price of the product kept inside the cart. In this way the customer can directly pay the amount at the billing counter and leave with the commodities he/she has bought. It eliminates the traditional scanning of products at the counter and in turn speeds up the entire process of shopping, also with this system the customer shall know the total amount to be paid and hence can accordingly plan his shopping only buying essential commodities resulting in enhanced savings. Since the entire process of billing is automated it reduces the possibility of human error substantially.

Keywords: supermarket, food, shopping mall etc.

I. INTRODUCTION

A hypermarket or supermarket is a form where wide variety of product items is available. These product items can be food, beverages or any household product. The main purpose of supermarkets is to provide availability of all the products and save the time of the customers but sometimes customer gets frustrated while waiting in the queue at billing counter and sometimes they get confused while comparing the total price of all the products with the budget in the pocket before billing. To overcome these problems, we have designed a smart trolley using arduino. With this system, there is no need for customer to wait in the queue for the scanning for the product items for billing purpose. Supermarkets or Hypermarkets provide this faculty to only those customers which having membership cards. When the customer inserts the membership card in the basket or trolley only then it will work as a smart trolley. Otherwise, it will work as a normal trolley. Supermarkets and hypermarkets use this technique as a strategy to increase the number of customers.

II. PROBLEM STATEMENT

The system aim is to eliminate all the inconveniences as possible from the systems and to make a system, which is consumer kindly, customer-friendly and high performing. The System's aim would be consumer convenience and an overall time efficiency and high Performance. This goal could be achieved by using the Zigbee system implemented using RFID technology. Present scenario in shopping supermarkets are time consumption is big problem at billing section. Consumers have no idea about the present day offers in supermarkets. Sometimes, shopping is done beyond the budget of the customer. So keeping all these in mind the system needs to be developed which provides customer an easy to use interface and also a way for the vendors to endorse more products alongside and achieve high profit. This could be achieved through the RFID technology, which is currently in its preliminary stages. After using this device customers can no longer have to wait for the scanning of the products while billing. With this system, there is no need for customer to wait in the queue for the scanning for the product items for billing purpose. Supermarkets or Hypermarkets provide this faculty to only those customers which having membership cards. When the customer inserts the membership card in the basket or trolley only then it will work as a smart trolley. Otherwise, it will work as a normal trolley. Supermarkets and hypermarkets use this technique as a strategy to increase the number of customers .It is a time saving device Sometimes customers get confused while comparing the total price of all the products within the budget before billing, to overcome these problems we have designed this device.

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REDUCTION OF WRONG DECISION PROBABILITIES IN THE HANDOVERS WITH MOBILITY BASED HANDOVER CRITERIA

Shweta Patil[1], Mohammed Bakhar[2]
[1]Asst.Professor, E&CE Dept., Gurunanak Dev Engg. College Bidar
[2]Professor, E&CE Dept., Gurunanak Dev Engg. College Bidar

ABSTRACT

In this work, the unnecessary, missing and wrong decision probabilities have been estimated based on several handover criteria. Available bandwidth in each of the network nodes was the handover criteria used in most of the previous works. In this work, additionally, bit error rate, received signal strength and mobility of the mobile node are added to the handover criteria. Simulations were performed for a five node network with bandwidth alone, bandwidth and bit error rate, bandwidth, bit error rate and received signal strength; and bandwidth, bit error rate, received signal strength and mobility of node as the hand over criteria. Mobility has been simulated for movement of mobile node both in normal and tangential directions along the boundary of network coverage area. Mathematical equations driving the handovers have been presented along with the simulation results.

Keywords: Mobility, bandwidth, received signal strength, bit error rate, wrong decision probabilities.

1. INTRODUCTION

When people move from one place to another place, mobile node must be handed over to the nearest network nodes in order to ensure good quality of service. For example, if a person is traveling in a train, which is moving with a speed of 120 km per hour, then he would travel 10 km in just 5 min. In such a scenario, the mobile will lose its connectivity to the network node it was linked to 5 min back. Hence the mobile nodes must be handed over continuously to all the nearest network nodes available in the path of the train. Therefore, the mobility is one of the important factors to be considered while handing over the mobile node.

If a person is not moving but stay in an office or hotel room for long time, in such a scenario also, the handover of mobile nodes to other network nodes is important as the bandwidth available in the networks keep changing. Other parameters like received signal strength, bit error rate, power consumption in the network stations also keep changing [1, 3] in the network stations. Hence the mobile nodes would be continuously handed over to other network nodes to provide a continuous and good quality of service to the customers. There are some algorithms based on available bandwidth in the networks are analyzed by the researchers available bandwidth as the criteria. Procedure to derive the probability equations and definitions of unnecessary handover probability, missing handover probability and wrong decision probability are provided. The research was based on a two node network.

Other parameter like signal strength was also considered for handovers [7, 8]. In some other research work [9], both bandwidth and signal strength were considered as parameters for handovers. IEEE 802.11 and IEEE 802.16a have been considered as the standard to verify the capabilities of the proposed algorithms. In this work [9], authors sampled signal strength and bandwidth at the source and destination network nodes to measure the success of handovers. Other important works [10,11] also used both bandwidth and signal strength as the criteria for handovers. A comparison was made between the signal strengths of GPRS and Wi-Fi by deriving the metrics into common factors. One of the metrics used in this work was signal to noise ratio. It was found that when the variation of signal to noise ratio was high, the handovers were very high.This is known as ping-pong effect in the handovers [12].

Akhila et al [13] have developed the bandwidth based handover algorithm for a three node network. The approach proposed by Chi et al [2] has been extended to athree node network by Akhila et al [13]. It was also experimented by Akhila et al. [14] to extend the bandwidth based handover algorithms in three node networks to networks with large bandwidths. In mathematical expressions for probability in estimating the unnecessary, missing and wrong decision probabilities, there are some terms with factorials that need to be evaluated. As the factorial of the value is high, it takes long time for a computer to estimate the factorials. In ref [14], an effort is made to address this problem.

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REDUCTION OF WRONG DECISION PROBABILITIES IN THE HANDOVERS WITH MOBILITY BASED HANDOVER CRITERIA

Shweta Patil[1], Mohammed Bakhar[2]
[1]Asst.Professor, E&CE Dept., Gurunanak Dev Engg. College Bidar
[2]Professor, E&CE Dept., Gurunanak Dev Engg. College Bidar

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1. INTRODUCTION

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If a person is not moving but stay in an office or hotel room for long time, in such a scenario also, the handover of mobile nodes to other network nodes is important as the bandwidth available in the networks keep changing. Other parameters like received signal strength, bit error rate, power consumption in the network stations also keep changing [1, 3] in the network stations. Hence the mobile nodes would be continuously handed over to other network nodes to provide a continuous and good quality of service to the customers. There are some algorithms based on available bandwidth in the networks are analyzed by the researchers available bandwidth as the criteria. Procedure to derive the probability equations and definitions of unnecessary handover probability, missing handover probability and wrong decision probability are provided. The research was based on a two node network.

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Power Quality Improvement Using Open Loop Single Phase Ac Chopper with Comparison of R and RL Load

BASAMMA R
Department of Electrical &Electronics Engineering, Guru Nanak Dev Engineering College

Abstract- ***Some of the sensitive loads like the communication equipments, computer systems and process automation equipments could introduce voltage imbalance in the single-phase power supply. In order to enhance the voltage or to manage the voltage regulators were used which introduced input side and output side harmonics. This paper is an attempt to develop an ac-ac buck boost topology that would introduce the voltage regulation in single phase AC systems. The system consists of an AC chopper which is derived from the DC buck boost chopper. The AC buck boost chopper would work in four quadrant operation and thus needs the bidirectional switches to operate it. According to the IEEE 519 standard for the total harmonic distortion (THD) the input current THD must be less than 5%. Thus, an input side LC filter is used to obtain the input current THD reduction. The higher efficiency AC chopper for voltage regulation is developed with the regenerative DC snubber connected to the switches which observe the energy stored in the stray inductance. Matlab Simulink model is created to have a closed loop operation of the implementation with the zero crossing detectors and to engage in the PWM that it would provide for the voltage regulation. An open loop AC chopper circuit is designed with comparison of RL load and R load. The FFT analysis is carried out in order check the Total Harmonic Distortion of source current, output voltage and current.***

I. INTRODUCTION TO AC-TO-AC CONVERTER

The power quality disturbances sensitive loads such as communication equipments, computers and method of automation system results in loss of valuable data, interruption to communication services and long production shutdowns. As per IEEE standard 446-1987 describe the voltage tolerance limits for sensitive loads, such as computer power supplies [1-2]. As per this standard, a voltage drop of more than 15% cannot be tolerated for more than 25 cycles. Similarly, a 35% voltage drop can be tolerated for only one cycle (20ms). Loads like heaters, illumination control, furnaces, and ac motor speed control and theatre dimmers uses ac voltage controllers. Such voltage regulators, however, have slow response, poor input power factor, and high magnitude of low order harmonic at both input and output sides. And they require large input-output filters to reduce the low order harmonics which are large in the line current. These drawbacks have been overcome by designing various topologies of ac chopper [3-9]. In most standard ac choppers, the commutation causes high voltage spikes and another current path has to be provided when current paths are changed. This alternative current path is implemented using additional bidirectional switches or ac snubber. Such topologies are difficult and expensive to realize and the voltage stress of the switch is also high, resulting in reduced reliability. A fast voltage control technique using a conventional peak voltage detector has been proposed [10]. The converter topologies and design of VSI for grid connected PV system and reliable PV system parameter are studied [11]. This scheme still has a dynamic speed of the half period of the line voltage when increasing the output voltage and longer dynamic speed when decreasing the output voltage.

II. SINGLE PHASE OPEN LOOP AC CHOPPER USING BIDIRECTIONAL SWITCHES

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Framework on Solar Angles to Track Sun Position Using Matlab

Deepak Ghode[1] Pallavi[2] Ayesha Fathima[3] Divyarani[4]
[1,2,3,4]Department of Electrical and Electronics
[1,2,3,4]Guru Nanak Dev Engineering College, Bidar, Karnataka, India

Abstract— This paper revolves around the MATLAB project from which we can calculate the solar angles i.e. solar azimuth angles, solar altitude angles, solar incidence angles of any specific time, date and month in a year. It will also help us to know the position of the sun with maximum radiation from which we know the optimum position of the solar panels for the generation of maximum solar power at any time for any specific locations. We can also compare the solar angles seasonally for any locations.

Keywords: Solar Angles

I. INTRODUCTION

Solar energy is an essential source of renewable energy, and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. In remote areas the sun is a cheap source of electricity because instead of hydraulic generators it uses solar cells to produce electricity. While the output of solar cells depends on the intensity of sunlight and the angle of incidence it means to get maximum efficiency; the solar panels must remain in front of sun during the whole day.

This module includes the simulation for the sun position in sky and the solar angles ray upon the plane of solar module irrespective of the tilt. In this module we have considered the latitude of Bidar, Karnataka i.e., 17.20000 degrees North and study the nature of the sun position throughout the year.

It will help us to track the position of sun on every day, seasonally and monthly basis. Based on monthly and seasonal calculation of different solar panels that are useful to understand solar power generation in that area and exact position of the sun in the sky and also helps to increase efficiency. The amount of the solar radiation incident on a surface is inversely proportional to the value of incidence angle which is defined as the angle between the solar rays and the normal line on the surface. The incidence angle can be calculated by a long equation which depends on several angles. This method also allows us to protect our appliance from excessive solar radiation and can be use in solar protection system in many equatorial countries. At last, these calculations will give us wide range of useful application of these angles but we basically focus on solar power generation.

The photovoltaic module in the market is usually not equipped with solar-tracker to have better performance. Users who buy this module will assign other party to install them at home/industry. Most of the simple installation is by finding the best location and orientation with open and clear sky during the day. And then, the system is installed with a fixed tilt and orientation. However, many systems have been developed to be able for tracking the sun. The common method and more popular for example is by using sensors as a feedback to adjust the orientation of the panel to track the sun, but the problem with this system is when the sky is cloudy or the sun is obscured.

II. SOLAR ANGLES

A. Solar Azimuth Angle

Solar Azimuth angle is an angle between Sun beam's and the north axis or south direction. This angle helps in locating the sun's relative position along the local horizon. Azimuth angle is compass direction of sun. In north hemisphere we take it reference from south direction and in south hemisphere we take it reference axis as north axis.

Mathematical expression for azimuth angle is given below;

$$\cos \varphi_s = \sin \delta - \frac{\sin \theta_s - \sin \emptyset}{\cos \theta \cos \emptyset} \quad (1)$$

Where;
φs: azimuth angle
θs: elevation angle
ϕ: local altitude.
θ: solar incidence angle

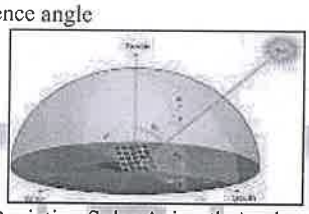

Fig. 2.1: Depicting Solar Azimuth Angle of Sun with Compass Axes

B. Solar Altitude Angle

Solar altitude angle is the angle between sun in the sky and horizon of the earth. It increases with day time as its minimum in morning then attending its highest value in noon, after that it decrease till evening to minimum value. It attains a maximum value in equatorial regions. It changes its value every hour, every day, every month.

Mathematical expression for altitude angle is given below;

$$\sin \alpha = \cos \emptyset \cos \theta \cos h + \sin \emptyset \sin \delta \quad (2)$$

Where;
α: altitude angle
h: hour angle
δ: declination angle
ϕ: local altitude.

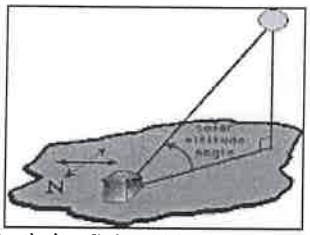

Fig. 2.2: Depicting Solar Altitude Angle of Sun with Horizon

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Solar Powered Regenerative Sewing Machine Using PMDC Motor

Pritpal Singh[1], Sachin. Rathod[2], Munwar Hussain[3], Sudarshan[4]
[1]ISTE, IETE Member, Assistant Professor, Guru Nanak Dev Engineering College, BIDAR
[2,3,4] Student, Guru Nanak Dev Engineering College, BIDAR

Abstract - **This paper captures the opportunities of a livelihood decentralized energy nexus where no grid availability is an issue. The intervention of manual sewing machine into solar photovoltaic array fed sewing machine incorporates energy efficiency. Solar energy into existing system which made a clear impact in reducing the electricity consumption, improving productivity, financial inclusion and enhancing their income.**

The solar powered regenerative sewing machine is basically a sewing machine designed to run for local entrepreneur's tailoring business in small cities and villages where little or eight operating hours are required on solar energy. The other components are charge controller, pedal control. Solar panel with battery was used to provide eight hours of backup per day.

Index Terms - **Sewing Machine, PMDC Motor, Solar Panel, Charge Controllers, Intervention, Regeneration.**

I.INTRODUCTION

Tailoring is one of the most important livelihoods in India. Traditional tailors who generally serve local customers in small cities and villages use manual sewing machine. To compete on the existing market and achieve higher productivity some of them have modified their machines by retrofitting the motor. However, in places with little or no grid availability, it is difficult to meet the increasing demands. Hence this paper come up with a viable solar solution for them.

Solar is an ideal solution for micro generation. But the main challenge was to make it affordable for small scale business. Hence this paperwork made it possible by understanding the actual energy need and introducing energy efficiency measures. Hence this paperwork takes the benefit of sunlight energy as input which is free and plentiful, and it is exceedingly advantageous and inexpensive to numerous household and industrial applications.

This work presents the intervention of manual sewing machine by using PMDC (permanent magnet dc) motor with regeneration of electric power when needed. The other major components include solar photovoltaic cell, battery, charge controller, pedal control. This substantially reduced the cost of solar powering the equipment as well.

Sewing machines were invented during the first Industrial Revolution to decrease the amount of manual sewing work performed in clothing companies. Since the invention of the first sewing machine, generally considered to have been the work of Englishman Thomas Saint in 1790, the sewing machine has greatly improved the efficiency and productivity of the clothing industry.

Home sewing machines are designed for one person to sew individual items while using a single stitch type at a time. In a modern sewing machine, the process of stitching has been automated so that the fabric easily glides in and out of the machine without the inconvenience of needles, thimbles and other tools used in hand sewing. Early sewing machines were powered by either constantly turning a handle or with a foot-operated treadle mechanism. Electrically powered machines were later introduced. Industrial sewing machines, by contrast to domestic machines, are larger, faster, and more varied in their size, cost, appearance, and task.

II. MEASURES OF INTERVENTION OF SEWING MACHINE

A. Energy Efficiency Measures

Mostly in existing electric sewing machine a universal motor of 1/10 HP or 1/12 HP is used along with a simple pedal control. These motors are highly inefficient. It was noticed that while a 1/12 HP universal motor consumed more than 100W to run a

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A Power Control Method for PV-Wind-Energy Storage Systems with Voltage Support Capability Using MATLAB

Deepak Ghode[1] Nameera Farheen[2] Pooja A[3]
[1,2,3]Department of Electrical and Electronics Engineering
[1,2,3]Guru Nanak Dev Engineering College Bidar, India

Abstract— The paper presents a new Model Predictive Power and Voltage Control (MPPVC) scheme to control and coordinate the dc-dc converter, inverter and rectifier for grid connected PV-Wind-Energy Storage Systems. The cascaded control method with multiple feedback loops has been traditionally employed for voltage and power control of PV inverters. But this method has very limited power regulation capability. As the fast increasing penetration of PV and Wind power generation systems in the distribution network, the voltage rise/drop has become a serious problem impacting negatively on the power quality and grid stability. As we are using renewable energy sources, fluctuating outputs from energy sources and variable power demand may deteriorate the voltage quality. To overcome these problems a MPPVC is proposed without using any PID regulators. By regulating the dc-bus voltage and controlling the active and reactive power flows, this method can support the power grid to maintain stable voltage, frequency and improve power factor. By controlling the bidirectional dc-dc converter of the battery energy storage system, the fluctuating output from the renewable energy sources can be smoothed, while stable dc-bus voltage can be maintained. Compared with the traditional cascade control, the proposed method is simpler and shows better performance. Numerical simulation have been conducted on a PV-Wind-Energy Storage Systems to verify capability and effectiveness of the proposed control strategy.

Keywords: Hybrid AC/DC Microgrid, Energy Storage, Coordinated Control, Model Predictive Control, DC-DC Bidirectional Converter, DC-DC Converter, Voltage Support

I. INTRODUCTION

For PV system control, the cascaded linear control method has been widely used for decades [1]. This control structure requires multiple feedback loops and PWM modulation, resulting in relatively slow dynamic response. In a practical PV power plant, the fluctuating PV panel output can cause oscillations in the dc-bus voltage, and deteriorate the power quality on the ac side. As a result, the traditional cascaded control is ineffective to deal with this fluctuation. Another concern is the power flow between the PV system and utility grid, which is usually handled by the grid-connected inverters. Traditionally, the cascaded feedback loops with PID controllers are adopted to control the ESS dc-dc converter and the grid-connected inverter [2]–[9]. To regulate the ESS charging or discharging current, an inner current control loop is commonly employed [2]–[3]. In this cascaded control strategy, the flexible power regulation capability is limited because both the active and reactive power flows between the PV system and the grid cannot be controlled directly. With the fast increasing penetration of PV systems in the distribution network, the voltage rise/drop has become a problem which impacts negatively on the power quality and grid stability [4], [5]. Therefore, flexible power regulation is highly desired for PV inverters to provide ancillary services.

Because of the intermittent power generation, PV-Wind systems must be equipped with energy storage systems (ESS) to achieve smooth power flows [6], and connected to the power grid for reliable power supply. In grid integration, the power electronic converter plays an important role to interface between the power grid and renewable energy sources [7], [8]. Fig. 1 shows a typical PV-Wind-ESS configuration. The boost converter is used to achieve maximum power point tacking (MPPT) for the PV panels. The bidirectional dc-dc converter is controlled to absorb excess energy by charging or supply additional energy by discharging the ESS. The grid connected inverter converts the dc-bus voltage into the ac grid voltage. To achieve flexible power regulation, the PV-Wind system control method must be modified to control the active and reactive power flows injected in the point of common coupling (PCC) with the grid.

In this paper, a new model predictive power control (MPPC) strategy is proposed to control and coordinate the bidirectional dc-dc converter and inverter in PV-Wind-ESS systems as shown in Fig. 1. The active power is chosen as the control objective for the bidirectional dc-dc converter and both the active and reactive power flows as the control objectives of the grid-connected inverter. The MPPC method in ESS can smooth the PV fluctuating output and maintain the stability of dc-link voltage, and the MPPC scheme for the inverter can control flexibly the power flow between the PV-Wind-ESS system and the utility grid, such that the PV-Wind-ESS system can support the grid by compensating the voltage to a certain degree.

Carrying out extensive simulations under different key control parameters is an effective way to evaluate the robustness and stability of the designed MPC controllers [10], [11]. In this study, the robustness and stability are estimated by gradually varing filter settings. It is proved that the proposed MPPC scheme is highly stable and robust, as well as invulnerable to parameter variations. After that, the system performance are also examined with a longer horizon prediction and compared with existing MPC methods. The results show that the proposed MPPC scheme is indeed feasible and effective using only one-step prediction. In addition, the proposed MPPC scheme is superior to existing MPC combinations in terms of maintaining a stable dc-bus voltage and providing a flexible power regulation.

For decades, cascade linear control has dominated the power Electronic control techniques. However, this approach has major Drawbacks [15]. First, the control structure is complicated with multiple feedback loops and PWM modulation, which leads to slow slow dynamic response. Second, the tuning of the proportional - integral-differential (PID) parameters is time - consuming, which makes the controller not easy to implement. In a practical microgrid, fluctuating output from renewable energy sources

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Research Article

A SCITECHNOL JOURNAL

Some Enhancements in the Choice of Functionalities for Data Mining and their Application in Opinion Mining

Brijendra Gupta[1*], Girish kulkarni[2], A Rajesh Kumar[3], VS Padmini[4], SM Uma[5] and Devika Rani Roy[6]

Abstract

Digital marketing is playing an increasingly important role in e-commerce, particularly in terms of sharing meaningful information about a product or service. Information extraction has emerged as the most important technique in digital marketing. The method of recommender systems in social sites while looking at the various types of argumentative documents, as well as the difficulties connected with a machine translation from social media, are addressed in this article. Using an image recognition tool, a K-means clustering algorithm has been used to a sample Twitter database to aggregate various attitudes in relationship with different product characteristics. The technique has been tested and described with the aid of the tool. Computing methods cluster analysis topics in Computer Science.

Keywords: K-Means; Sentiment analysis; Analytics; Compatibility

Introduction

Social media monitoring and analysis

The primary goal of the social mainstream press is to maintain a relationship through all online communications such as interactions, sharing of personal views, and receiving necessary information. The primary reason for selecting Social Media Analytics (SMA) is to showcase the goods or services being promoted [1].

- Social platforms have surpassed all other online activities and have become a daily pastime for adults.
- Provides a simple method of grouping consumers *via* the use of the internet.
- Context of providing about either the Product/Service is simple and quick to do.

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Facilitates the collecting and evaluating comments on a specific Product/Service by providing a simple interface.

Because although Social Media Analytics (SMA) can assist in determining the needs and sense of achievement of users, it is extremely important to obtain accurate or valuable information again from comment sections or likes that are gained on social networking sites. As a result, we must go through a special protocol in process of extracting the appropriate information from multiple information. The Social Networking Tools aid in the collection and interpretation of textual material to make it more structured. The method of "recommender systems" is one of the most important in the field of Social Networking Sites. An "assessment" is a point of view, attitude, or assessment of a thing expressed by a person or organization about that item. Opinion Mining (OM) is a research field that focuses on the collection of views or sentiments from data utilizing. It is all about discovering what individuals believe and how they act. OM must take into consideration the amount of impact that each one point of view has. This may be influenced by a variety of reasons, such as faith in the product, company, or individual.

Organization responsible: It is analogous to a group of individuals who have similar views and who put their faith in the viewpoints of the other members of the team.

Credibility: If your suggestion is similar to whatever the overwhelming of others believes, then you are regarded as experienced and then have a high level of renowned trust.

Information Extraction Via Social Media is Becoming More Popular

A significant amount of opinionated material may be found on every website on the internet; the typical individual comment will have trouble selecting relevant websites and absorbing the opinions and insights included within them [2]. Figure 1 depicts the overall picture

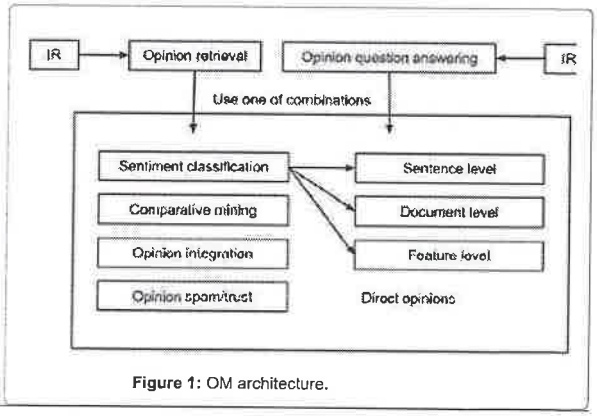

Figure 1: OM architecture.

*Corresponding author: Gupta B, HOD IT Department, Associate Professor, Siddhant College of Engineering, Pune, India; E-mail: gupbrij@rediffmail.com

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Heat Transfer in Peristaltic Motion of Rabinowitsch Fluid in a Channel with Permeable wall

[1*]Mahadev M. Channakote and [2]Dilipkumar V. Kalse

[1]Department of Mathematics and Statistics
M. S. Ramaiah University of Applied Science, Bengaluru
Karnataka 560058, India
email: mchannakote@rediffmail.com

[2]Department of Applied Sciences and Humanities
Gurunanak Dev Engineering College, Bidar
Karanataka 585403, India
email: kalsedilip@gmail.com

*Corresponding author

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Abstract

This paper is intended to investigate the effect of heat transfer on the peristaltic flow of Rabinowitsch fluid in a channel with permeable wall. The Navier-Stokes equations that governs the channel flow are constituted with Rabinowitsch fluid model. Corresponding equations are solved by utilizing approximations of the long-wavelength and small Reynolds number. The expressions for axial velocity, temperature distribution, pressure gradient, friction force, stream function is obtained. The influence of different physical parameters on velocity, pressure gradient, friction force, temperature and pumping action is explored via graphs.

Keywords: Peristaltic motion; Rabinowitsch fluid model; permeable wall; heat transfer; pressure; friction force

MSC 2010 No.: 76Z05, 76A05, 35C05

1. Introduction

Recently biologists, researchers, and scientists show deep interest in studying the problems of peristaltic flow of non-Newtonian fluid in tube/channel because of its increasing importance and extensive range of applications in a physiological, environmental, geophysical, and industrial process. In physiology, peristalsis plays a vital role in various situations such as urine transport from the kidney to bladder through the ureter, blood circulation in the small blood vessels, the transport of spermatozoa in the duct's afferents of the male reproductive tract, swallowing food through the esophagus, movement of chime in the gastro-intestinal tract, sanitary and corrosive fluids transport, and etc.

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Synthesis, Characterization and Electrical Properties of $ZnFe_2O_4$ Nanoparticles

Md Ashfaq Hussain[1], S. Sindhu[2], B. Raghunanda[3], Ajai Kumar S. Molakeri[2,*]

[1]Department of Mechanical Engineering, Guru Nanak Dev Engineering College, Bidar – 585 403, Karnataka, India.
[2]Department of Physics, Guru Nanak Dev Engineering College, Bidar – 585 403, Karnataka, India.
[3]Department of Physics, Government First Grade College, Bidar – 585 401, Karnataka, India.

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ABSTRACT

Zinc ferrite ($ZnFe_2O_4$) nanoparticles were prepared by combustion method. The FT-IR, XRD and SEM with EDS were used to characterize the prepared sample. The characterization results confirm the successful synthesis of $ZnFe_2O_4$ nanoparticles with the particle size range of 24 – 30 nm. The temperature dependent DC conductivity of the sample has been studied in the temperature range 30-175 °C and AC conductivity was investigated between the frequencies of 10 Hz and 10 MHz. DC conductivity of the sample was increased while increasing temperature and AC conductivity was increased as the frequency increased.

1. Introduction

Magnetic nanoparticles already gained significance in a variety of fields, which include ferrofluids, magnetic separations, magnetic drug delivery, magnetic data storage systems, magnetic resonance imaging (MRI) and so on [1-8]. Magnetic nanoparticles are promising catalysts because they can be separated from the response medium by adding a magnetic attractive field from the outside. In comparison to filtration or centrifugation, magnetic partition is a magnificent choice because it prevents catalyst failure and improves reusability, making the catalyst cost-effective and suitable for advanced applications [9-11]. A significant class of magnetic metal oxide materials is cubic spinel ferrites. Zinc ferrite nanoparticles being invaluable among ferrite materials because of their specific magnetic, magneto-resistive, magneto-optical, mechanical, thermal, and electric characteristics including ferromagnetism, outstanding creep and resistance to radiation damage tolerance, higher thermal conductivity higher electric resistivity, and configurable saturation magnetization, the thermal expansion coefficients are moderate, the energy transfer performance is high, and in ferromagnetic resonance the line width is narrow [12-16] and also zinc ferrite is noteworthy because of its possible applications in data storage media, adsorption, sensors, and other appealing technologies. It has low saturation magnetization and excellent photo-induced catalytic reactant properties, high electric resistivity and low eddy current lost and uniform and reproducible qualities [17-20].

2. Experimental Methods

2.1 Materials and Methods

All of the chemicals were AR grade and they were used exactly as they were received. Throughout the solution preparation and experiment, double distilled water was used.

2.2 Synthesis of Zinc Ferrite Nanoparticles

A known quantity of zinc salt and iron salt were mixed thoroughly and ground well with polyvinyl alcohol in a pestle and mortar in a 1:5 ratio to produce zinc ferrite ($ZnFe_2O_4$) nanoparticles. The reaction product was transferred to a crucible, which was initially burned in an electrical oven to complete the fume evolution. The resulting residue was continually heated at temperature 500 – 600 °C and the reaction took 30 minutes for the complete combustion, yielding brown colored crystalline $ZnFe_2O_4$. Carbon impurities in the ferrite sample are eliminated by cooling to room temperature and then treating with acetone. The carbon that passes into the acetone was decanted and the acetone being evaporated. The same procedure was clearly explained in our earlier work [21]. The chemical reaction is as shown below.

$$\underset{\text{(Zinc nitrate)}}{2Zn(NO_3)_2} \longrightarrow \underset{\text{(Zinc oxide)}}{\mathbf{2ZnO}} + \underset{\text{(Nitrous oxide)}}{4NO_2} + O_2$$

$$\underset{\text{(Ferrous nitrate)}}{4Fe(NO_3)_2} \longrightarrow \underset{\text{(Ferric oxide)}}{\mathbf{2Fe_2O_3}} + \underset{\text{(Nitrous oxide)}}{8NO_2} + O_2$$

$$\underset{\text{(Zinc nitrate)}}{ZnO} + \underset{\text{(Ferric oxide)}}{Fe_2O_3} \xrightarrow{500-600\,^{\circ}C} \underset{\text{(Zinc Ferrite)}}{\mathbf{ZnFe_2O_4}}$$

2.3 Instrumentation Techniques

In this study FTIR spectra of the considerable number of tests are recorded on ThermoNicolet, Avatar 370 IR spectrometer in KBr medium at ambient room temperature. Powders are combined with KBr in a 1:25 weight ratio to ensure uniform dispersion in KBr pellets for capturing FT-IR spectra. The morphology of the sample was observed by using Joel model JSM-6390 LV scanning electron microscope (SEM). A two probe setup is used for measuring DC conductivity and AC conductivity measurements of the sample at room temperature was performed using LCR meter Newton Model PSM-1735 NumetriQ with a Kelvin fixture between the frequencies of 10 Hz and 10 MHz.

3. Results and Discussion

3.1 FT-IR and XRD Analysis

The FT-IR spectrum of $ZnFe_2O_4$ nanoparticles is shown in Fig. 1. Two absorption peaks below 600 cm^{-1} can be seen in Fig. 1, which is a typical characteristic of all spinel ferrites. The vital peaks observed in $ZnFe_2O_4$ are 550 cm^{-1} and 453 cm^{-1} are due to the presence of M–M bond and M–O stretching frequencies respectively [22]. However, organic material traces were found at 1603 cm^{-1} and 1115 cm^{-1}, which have been associated to C=O and CO_2 stretching vibrations, respectively [23]. From our earlier article [21], XRD analysis confirms the sizes of $ZnFe_2O_4$ nanoparticles found over the range 24 – 30 nm and the prominent peaks corresponds

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EXPLORING FACTORS AFFECTING RETAIL INVESTORS AWARENESS AND INVESTMENT PREFERENCE TOWARDS FINANCIAL DERIVATIVE INSTRUMENTS

Jyoti Ainapur Department of MBA, Guru Nanak Dev Engineering College Bidar
Shailaja Kheni Department of Management Studies, VTU, Centerfor Post Graduate Studies, Kalburagi, shailakheni@gmail.com ; jyoti01.ainapur@gmail.com

ABSTRACT

The present study focuses on the factors affecting retail investors awareness and investment preference towards investment in financial derivative instruments, in order to achieve this objective survey was administered using a google form, consisting structured questionnairewhich was shared among 119 retail investors ,who constitute the sample and were active investors in derivatives trading in Bidar city, India. In this study factor variables such as Awareness, Product innovation Perception Price discovery, volatility, Risk management and returns were constructed. Hypothesis were formulated to investigate the relationships between the Awareness (dependent variable) and Product innovation Perception Price discovery, Risk management and returns(independent variable) Data collected were analyzed with the help of SPSS version 25 and AMOS version26. Following analysis were carried out such as reliability test, Exploratory factor analysis, multiple regression descriptive statistics mean, standard deviation correlation coefficient .The results of the present study revealed that the respondents are having awareness of investing in financial derivatives. The factor score revealed that respondents agree that they are aware of all the stated factor variables. They feel that most influential factors for investment in derivative instruments are risk management and returns. The highest preference reason in investing in financial derivative is perception, price discovery, risk management and returns.

Keywords: Derivative financial instrument, Factors affecting Derivative investment, Investment preference in derivative instrument, Retail investors, Bidar city

1. INTRODUCTION

Bidar is a hill top city in the north-eastern part of Karnataka state in India. It is the headquartersof the Bidar district which borders Maharashtra and Telangana. It is a rapidly urbanizing city in the wider Bidar Metropolitan area. The city is well known for its many sites of architectural,historical and religious importance.[22] Bidar city population 214.373 ,average literacy percentage as per 2011 statistical data 85.90% [23]

In India trading in derivatives commenced in June 2000 with index futures on NSE. The market regulator securities & Exchange Board of India (SEBI), has been taking active steps to increase liquidity in the available contracts to make the market more robust and viable for all kinds of investors. There are various factors which affect the retail investors investment preference into financial derivatives. The present study aims to discover the most influential factors affecting retail investors awareness and investment preference towards investment in financial derivative instrument.

The layout of the article includes: Introduction, Literature review, research methods, research results and conclusion.

2. LITERATURE REVIEW

2.1 Growth of Derivative market in India

Financial Derivatives contribute a lot to the development of financial system which results in the development of nation's economy. India's experience with the launch of equity derivatives market has been extremely encouraging and successful. The derivatives turnover on the NSE hassurpassed the equity market turnover (Ashutosh; Satish,(2019)[1]. Derivative market is growingvery fast in the

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Review

Produced Water Treatment with Conventional Adsorbents and MOF as an Alternative: A Review

Humaira Gul Zaman [1], Lavania Baloo [1,*], Rajashekhar Pendyala [2], Pradeep Kumar Singa [3], Suhaib Umer Ilyas [4] and Shamsul Rahman Mohamed Kutty [1]

1 Civil and Environmental Engineering Department, Universiti Teknologi PETRONAS, Seri Iskandar 32610, Malaysia; humaira_19001707@utp.edu.my (H.G.Z.); shamsulrahman@utp.edu.my (S.R.M.K.)
2 Chemical Engineering Department, Universiti Teknologi PETRONAS, Seri Iskandar 32610, Malaysia; raj.pendyala@gmail.com
3 Department of Civil Engineering, Guru Nanak Dev Engineering College Bidar, Bidar 585403, India; pmsinga@gmail.com
4 Institute of Hydrocarbon Recovery, Universiti Teknologi PETRONAS, Seri Iskandar 32610, Malaysia; suhaibui@outlook.com
* Correspondence: lavania.baloo@utp.edu.my

Abstract: A large volume of produced water (PW) has been produced as a result of extensive industrialization and rising energy demands. PW comprises organic and inorganic pollutants, such as oil, heavy metals, aliphatic hydrocarbons, and radioactive materials. The increase in PW volume globally may result in irreversible environmental damage due to the pollutants' complex nature. Several conventional treatment methods, including physical, chemical, and biological methods, are available for produced water treatment that can reduce the environmental damages. Studies have shown that adsorption is a useful technique for PW treatment and may be more effective than conventional techniques. However, the application of adsorption when treating PW is not well recorded. In the current review, the removal efficiencies of adsorbents in PW treatment are critically analyzed. An overview is provided on the merits and demerits of the adsorption techniques, focusing on overall water composition, regulatory discharge limits, and the hazardous effects of the pollutants. Moreover, this review highlights a potential alternative to conventional technologies, namely, porous adsorbent materials known as metal–organic frameworks (MOFs), demonstrating their significance and efficiency in removing contaminants. This study suggests ways to overcome the existing limitations of conventional adsorbents, which include low surface area and issues with reuse and regeneration. Moreover, it is concluded that there is a need to develop highly porous, efficient, eco-friendly, cost-effective, mechanically stable, and sustainable MOF hybrids for produced water treatment.

Keywords: adsorbents; adsorption; metal–organic frameworks (MOFs); produced water; sustainability; water treatment

check for updates

Citation: Gul Zaman, H.; Baloo, L.; Pendyala, R.; Singa, P.K.; Ilyas, S.U.; Kutty, S.R.M. Produced Water Treatment with Conventional Adsorbents and MOF as an Alternative: A Review. *Materials* **2021**, *14*, 7607. https://doi.org/10.3390/ma14247607

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1. Introduction

Oil and gas reserves play an essential role in the global economy, and resource use has been intensified over the years to meet rising energy demands [1]. Oil and gas industries produce a significant amount of wastewater in large quantities, bringing it to the surface as part of the oil production process. This wastewater is generally termed produced water (PW). It is polluted with heavily immiscible oil, organics, heavy metals, salts, suspended solids, and radioactive components [2]. From 1990 to 2015, PW production increased from less than 30,000,000 barrels per day to approximately 100,000,000 barrels per day [3]. Worldwide, day-to-day fuel consumption is expected to increase from 85 million barrels in 2006 to 106.6 million barrels by 2030 [4]. The oil and gas production activities have produced a vast amount of PW, with oil generating a greater upward flow of PW compared

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Optimization of palm oil mill effluent final discharge as biostimulant for biodegradation of tapis light crude petroleum oil in seawater

Khalid Sayed [a,*], Lavania Baloo [a], Shamsul Rahman B.M. Kutty [a], Wesam Al Madhoun [b], Mubarak Usman Kankia [a], Ahmad Hussaini Jagaba [a], Pradeep Kumar Singa [c]

[a] Civil and Environmental Engineering Department, Universiti Teknologi PETRONAS, Seri Iskandar, Perak 32610, Malaysia
[b] Faculty of Civil Engineering and Built Environment, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Johor, Malaysia
[c] Civil Engineering Department, Guru Nanak Dev Engineering College, Bidar, Karnataka 585403, India

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ABSTRACT

This study investigated the biodegradation of Tapis light crude petroleum oil (TLCO) in coastal seawater samples utilising palm oil mill effluent final discharge (POME FD) as biostimulant using rotatable central composite design (CCD) under response surface methodology (RSM). In a 23-day study, the independent variables (factors) were initial TLCO concentration, POME FD dosage, and incubation time, and the dependent variable (response) was TLCO biodegradation. The residual TLCO analysis was carried out using the gravimetric method, which was then verified by GCFID. The gravimetric analysis produced a coefficient of determination ($R^2 = 0.9764$) and a probability value ($P < 0.0002$) indicating significance for the regression model. Similarly, the GCFID analysis identified a coefficient of determination ($R^2 = 0.9973$) and a probability value ($P < 0.0001$) indicating significance for the regression model. Numerical optimization based on the desirability function was performed, gravimetric and GCFID analyses revealed errors of 4.81% and 1.04%, respectively.

1. Introduction

Due to advances in biotechnology, bioremediation has become one of the fastest developing fields of environmental restoration (Petrik et al., 2022; Sharma et al., 2022; Wartell, 2022; Zahed et al., 2010b). Malaysian coastal waters intermittently faces rare incidents of marine oil spill (Munirah and Zaideen, 2019; New Straits Times, 2020; Sayed et al., 2021c; Star, 2018). Petroleum hydrocarbon oil pollution in coastal seawater off Malaysia occur in three ways (Sayed et al., 2021a). The first is disposal of treated petroleum refinery effluent in seawater by marine outfalls, second is rare vessel accidents containing petroleum oil spill in seawater, and third is crude oil exploration activities in offshore rigs (Sayed et al., 2021a). All of these activities have increased the vulnerability of Malaysian coastal waters to petroleum hydrocarbon oil pollution (Nkem et al., 2016; Sayed et al., 2021c; Zakaria et al., 2001). The environmental issues that have recently affected the Strait of Malacca are marine oil pollution from shipping operations (Munirah and Zaideen, 2019; Sayed et al., 2021c) and others (New Straits Times, 2020). The concerns, mainly the accident or operational releases of toxic petroleum hydrocarbons, are severe problems with Strait of Malacca, as they can affect humans by entering food chain (biomagnification) and marine environment (National Academies of Sciences Engineering and Medicine, 2020; Sayed et al., 2021a, 2021b, 2021c).

Approximately, 7 million tonnes, from roughly 140 major global oil spills, has been spilled into the surface waters (Li et al., 2016a). Also, millions of tonnes of petroleum hydrocarbons are spilled every year through natural seepages and abundant oil wells (Bôto et al., 2021; Sayed et al., 2021b; Speight, 2018). Many physicochemical technologies are used to clean-up the spilled oil in seawater (Sayed et al., 2021a, 2021b; National Academies of Sciences Engineering and Medicine, 2020). The available techniques for petroleum oil spill clean-up in seawater are unable to completely remove emulsified oil that has concentration <5%, which is a residual leftover of physical-chemical clean-up techniques (Bôto et al., 2021; Sayed et al., 2021b; National Academies of Sciences Engineering and Medicine, 2020; Zafirakou et al., 2018; Li et al., 2016b). Clean-up of oil spills containing petroleum hydrocarbons in water bodies to stable products or less toxic compounds can be achieved with bioremediation (biostimulation) (Li et al., 2016a; National Academies of Sciences Engineering and Medicine, 2020; Sayed et al., 2021b). The biostimulant used in bioremediation has numerous

* Corresponding author.
E-mail address: khalid_19000239@utp.edu.my (K. Sayed).

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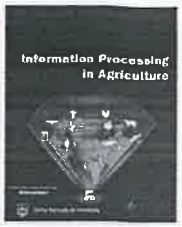

A role of computer vision in fruits and vegetables among various horticulture products of agriculture fields: A survey

*Mukesh Kumar Tripathi**, *Dr. Dhananjay D. Maktedar*

Department of CSE, Guru Nanak Dev Engineering College, Bidar, Karnataka, India

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ABSTRACT

Computer vision is a consistent and advanced technique for image processing, with the propitious outcome, and enormous potential. A computer vision has been strongly adopted in the heterogeneous domain including agriculture. During the study of existing research on the role of computer vision in fruits and vegetables among various horticulture products of agriculture fields it is noticed that, the existing survey paper has not focused properly on mathematical framework, feature descriptor, defect detection on multiple datasets of fruits and vegetables elaborately. This has motivated us to undertake an extensive survey. In this paper, we examine the paper broadly related to fruits and vegetables among various horticulture products of agriculture fields, specific model, data pre-processing, data analysis method and overall value of performance accuracy by using a particular performance metric. Moreover, we study the different type of disease present in various fruit and vegetable. We have also focused on the comparison of different machine learning approach with respect to different performance metrics on the same dataset. Thus, we have found that among all existing machine learning techniques SVM give better classification accuracy. A generalized framework to grade the quality and defect detection of multiple fruits and vegetables is also proposed in this survey. This paper covers the survey of ninety-eight papers closely related to computer vision in the agricultural field. By the survey, we have found that computer vision plays an important role and has a large potential to address the challenges related to the agricultural fields.

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* Corresponding author.
E-mail addresses: mukeshtripathi016@gmail.com (M.K. Tripathi), dhananjay.maktedar@gmail.com (D.D. Maktedar).

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EXPERIMENTAL EVALUATION OF Al6061 OF FLAT SECTION BY EXTRUSION PROCESS

SANGAMESH SIRSGI & Dr. DHANORANJAN CHOUDHARY

Department of Mechanical Engineering, Guru Nanak Dev Engineering College, Bidar, Karnataka, India

ABSTRACT

Metal forming process has become an important area in the industries due to their regular usage in all the relevant fields engineering. Extrusion makes an impact in the industries; a study of extrusion process with the variation of parameters h become difficult, as controlling of these parameters are very difficult. A research work was carried out for the Al60 specimen to check the various mechanical properties by varying the different parameters. In this work, the tensile properti and hardness were checked for both artificial ageing and natural ageing for the work pieces under different conditions a it is found that there is an increase in the tensile properties and hardness values, both in the case of natural ageing a artificial ageing.

KEYWORDS: Al6061, Natural ageing (NA), Ram speed & Artificial ageing (AA)

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Original Article

1. INTRODUCTION

A Metal forming is widely used in the current industry where the metal undergoes permanent deformation with change in the shape and size. Extrusion process is most important process which is defined as the raw billet is pushed through the die opening by ram to get the required shape of the product which may be circular, square etc. While extruding a metal, many parameters which affects the material behavior, the parameters which influences the extrusion process are Extrusion ratio, temperature, speed if these parameters are under well controlled, then it is possible to get the good extruded material. Many researchers have investigated in the field of extrusion process, it may be parametric study or in finding different properties [1-6].

A parametric study has been carried out to find out the effect of billet, extrusion ratio and geometry on the material flow [1]. Similar findings have been found by Hyperxtrude software in which the flow of material and its behavior in the two hole extrusion process on both hollow sections and thin walled sections were studied [2]. Extrusion was carried out for square section by using upper bond technique and it was found die length, pressure & at the boundary constant friction factor were investigated [3]. It was found that for Al6063, an experimental and numerical investigation was conducted to get the metal flow behavior and also its effects on quality of surface [4]. A Numerical simulation by DEFORM 2D was used to calculate the parameters which affects the extrusion process and also it has been investigated the optimum die angle which minimizes the surface permeation [5]. In this research work, numerical analysis was used to calculate the various metal flow conditions which affects the extrusion process [6]. HyperXtrude software was used to analyze the behavior of material and it was validated experimentally [7]. FEM was used to analyze the different parameters and also to get good quality welds in the longitudinal direction [8]. Material behavior and thermal behavior of high speed train were analyzed by using compressive test and thermo-mechanical test with DEFORM 3D simulation for the extrusion process [9]. With the

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EVALUATION OF AL6061 ALLOY OF ROUND SECTION BY EXTRUSION PROCESS

Sangamesh Sirsgi
Department of Mechanical Engineering,
Guru Nanak Dev Engineering College Bidar, India

Dr. Dhanoranjan Choudhary
Department of Mechanical Engineering,
Guru Nanak Dev Engineering College Bidar, India

ABSTRACT

A research work was carried out for the Al6061 alloy specimens to check for the various mechanical properties by varying the parameters involved in the extrusion process. In this work the hardness for different specimen and the tensile properties for the specimens under Artificial ageing and Natural ageing were determined and it is found that the properties were increased with the variation of speed in the extrusion process.

Key words: Artificial Ageing (AA), Extrusion process, Natural ageing (NA), Ram speed

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http://iaeme.com/Home/issue/IJARET?Volume=11&Issue=9

1. INTRODUCTION

Extrusion process is one of the important process in the industries for production of various parts which are useful in many sectors such as automotive and transport field in that different profiles such as solid sections and hollow sections are also produced in automotive parts[1]. Many researchers have carried out the research in the field of extrusion by the finite element method as experimental method is difficult to predict the control parameters such as power of the machine, billet temperature etc. [2]. Al alloys are used in extrusion industries for their good mechanical properties and ductility of the material which are used in the aerospace industries for producing many parts and in the automotive industries for many parts [3]. In one of the research of aluminium alloy in combination with magnesium and silicon is used to enhance the ageing properties[4]. If there was no proper proportion used in the magnesium and silicon there, lot of yield stress involved, which reduces the extrudability of the material which leads to surface defects and many more possibilities [5]. In hot extrusion the material is

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RESEARCH ARTICLE

Investigation of light behavior of all optical full adders in two-dimensional photonic crystals

Mahesh V Sonth[1] | **Savita Soma**[2] | **Sanjaykumar C Gowre**[3]

[1]CMR Technical Campus, Hyderabad, Telangana, India

[2]Guru Nanak Dev Engineering College, Bidar, Karnataka, India

[3]Bheemanna Khandre Institute of Technology, Bhalki, Karnataka, India

Correspondence
Mahesh V. Sonth, Department of Electronics and Communication Engineering, CMR Technical Campus, Hyderabad, 501401, India.
Email: maheshsonth@gmail.com

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Abstract

In this article, an optical full adder is investigated in terms of light flow inside the two-dimensional (2-D) crystal lattice waveguide structures. The phenomenon such as resonance, splitter, and combiner based on the principle of constructive and destructive interference is used in the modeling of all optical full adders. Also, defects are introduced in the junction of the waveguide structures to pass/stop light wave inside the waveguide structure. The designed full adder structure in 2-D photonic crystals (PhCs) occupies an area of 382.91 μm^2 and maximum light confinement at the Sum and Cout output ports are 0.52 and 0.6 arbitrary unit (a.u.), respectively. The response time of the full adder structure is about 0.25 ps and the maximum contrast ratio achieved at the Sum is 7.16 dB and Cout is 5.74 dB. RSoft FullWAVE simulation tool is used to perform a full-vector simulation of photonic structures.

KEYWORDS

contrast ratio, optical full adder, photonic crystals, waveguides and cavities

1 | INTRODUCTION

Ever increase demand of optical processing in electronic industries forcing the research towards all optical processing devices. The 2-D PhCs periodicity of dielectric material occurs in two directions is used as a basic fundamental in the creation of waveguides and cavities. The optical full adder crystal lattice with three inputs (A, B, Cin) and two outputs (Sum, Cout) is designed in 2-D PhCs. The basic operation of the device is to perform addition of incoming logic values with its internally generated carry input. The same logic can be built with the 2-D PhCs for adding light signals logically. The finite difference time-domain (FDTD) FullWAVE method[1-3] is used for the simulation of all optical two bit adders[4-11] and three bit adders.[12-17] The light propagation inside 2-D PhCs lattice structure of an optical full adder is obtained in simulation as a sinusoidal wave (indicated by blue and red color) within the created defect crystal waveguides and cavities.

2 | OPTICAL FULL ADDER-STRUCTURAL DESIGN ASPECTS

The full adder structure is created in 2-D PhCs as shown in Figure 1 with an array of utility 41 × 31 hexagonal lattice structures of cubic silica rods in free space. The radius and pitch value of an optical full adder is 0.118 and 0.558 μm respectively.[13] The optical full adder designed in 2-D PhCs with waveguides and ring resonators[18] based on the following expressions of the waveguides and constructive (R1 and R3) and destructive (R2 and R4) interference phenomenon of the four ring resonators to produce Sum and Cout output of full adder.

$$W4 = W2 \bigoplus W3 \quad (1)$$

$$W5 = W1 \bigoplus W4 \quad (2)$$

The refractive index of the silica is 1.46 and that of background air medium of refractive index is 1. The designed structure is analyzed using BandSOLVE tool based on PWE computational method. The analysis of this method gives us the details of its bands existing as either transverse electric (TE) or transverse magnetic (TM) modes or sometimes both the modes exist for the lattice structure. The existence of the bands and its coordinates depends upon the type of the geometry chosen, if the geometry chosen is hexagonal, we

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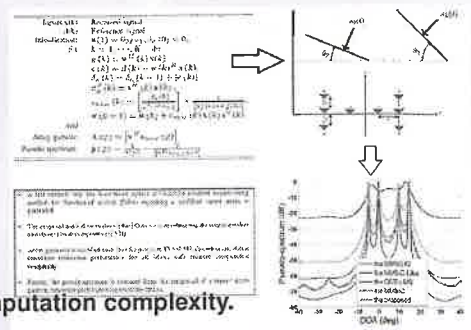
A Fast Adaptive Beamforming Technique for Efficient Direction-of-Arrival Estimation

Veerendra D and Babur Jalal

***Abstract*—A plethora of problems related to signal estimation and direction can be effectively solved by using a sensor array. To this end, uniform estimation for all direction-of-arrivals (DOAs) with low computational complexity is an indispensable step for numerous applications. In this paper, we present the DOA estimation method exploiting the recently proposed fast variable step size least mean square (FVSSLMS) method [1]. In most of the DOA estimation works, a uniform linear array (ULA) was used. Nonetheless, a ULA does not perform well for the DOA estimation when the signal sources are impinging close to the array endfire. To circumvent this issue, we modify the structure of ULA by displacing its four sensors to the top and bottom of the first and the last sensor. Computer simulations demonstrate that the proposed method provides uniform estimation performance for all DOAs with reduced computation complexity.**



***Index Terms*—Sensor Array, direction-of-arrival (DOA), VSSLMS, ULA.**

I. Introduction

Adaptive beamformers have been deployed to the sensor array for numerous applications such as acoustic echo cancellation, interference mitigation, biomedical engineering, etc. Sensor array plays a vital role in enhancing the performance of various communication systems, radar, sonar, localization and tracking. The accuracy of the DOA estimation can be significantly enhanced when an array of sensors are used over a single sensor. A sensor array can be exploited to measure plane waves.Digital sensor arrays have numerous benefits over classical arrays including DOA estimation, enlarged coverage, and capacity of systems. The impact of adaptive beamforming algorithms for various wireless, aeronautical, and aerospace applications is growing dramatically. Military aircraft regularly exploit a Controlled Reception Pattern Antenna (CRPA) to alleviate interference in reception of satellite navigation signals. CRPAs (also called as adaptive antennas) make use of spatial diversity to form beams in the direction of the satellite and nulls in the direction of the interference sources. Adaptive antennas when used in radar, sonar and wireless communication systems [2]-[7] can improve system capacities, and performance in DOA estimation, and beamforming. Also, they increase frequency reuse and suppress the deleterious effect of multipath and clutter. Subspace-based DOA estimation techniques [8]- [14] require the calculation of sample covariance matrix (SCM) and its eigenvalue decomposition (EVD) that inevitably increases the complexity of computation. This hinders the application of subspace DOA estimators in many wireless applications. Among many DOA estimation techniques, the MUSIC [15], the root-MUSIC [16], and the ESPRIT [17] are the most widely studied methods. Nevertheless, EVD of the covariance matrix is required for subspace-based methods.

This demands a huge computational cost and also requires estimation of a source number. Various DOA methods to estimate the source signals with the reduced computational cost are available in the literature. In [18], a modified MUSIC (MMUSIC) method is presented using the Nystrom approximation. In [19], a modified Nystrom method to achieve the trade off between the DOA estimation efficacy and the computational complexity is presented. The reduced rank covariance method was presented in [20] to reduce the computational complexity. These methods have certainly reduced the computational cost. However, they still require the EVD for estimating the DOAs.

In [21], a MUSIC-Like algorithm was discussed which does not require the prior information of the source number. However, the downsides of this method are (1) high computational complexity and (2) poor performance in low SNR scenarios. Recently, a constant step size (CSS) least mean square (LMS) method is used to estimate the DOAs in [22]. Though this method dramatically reduces the computation complexity by avoiding the EVD, it deteriorates in many wireless applications due to its CSS. The step-size parameter is directly proportional to the convergence of the LMS method. The slow convergence will be resulted due to the too-small step-size. This causes the overdamped case. The sensor array will not acquire the desired signal if the rate of convergence is slower than the changing DOAs. The

Veerendra D is with the department of Electronics & Communication Engineering, Guru Nanak Dev Engineering college, Bidar-585403, India. (email: veerendra@ieee.org).

Babur Jalal is with college of Electronics and Information Engineering Shenzhen University Shenzhen, China.

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Robust Modified Multiple Signal Classification Algorithm for Direction of Arrival Estimation

Veerendra Dakulagi[1]

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Abstract
A modified robust multiple signal classification (MUSIC) algorithm for direction-of-arrival (DOA) estimation of coherent source signals is devised in this work. Classical and subspace-based methods require large antenna elements and huge computations for the estimation of intended signals. It also deviates from its performance in low signal-to-noise ratio (SNR) conditions. Hence efficient and robust DOA estimators are required to tackle the real-time problems in wireless communication applications. To overcome these problems, the classical MUSIC algorithm is modified by assimilating Jordon canonical matrix in the covariance matrix for the reconstruction of data. With this modification, it is possible to make an accurate estimation of coherent sources even under an extremely low SNR environment. Furthermore, the proposed method requires fewer antenna elements, fewer snapshots, and less computation as compared to the classical MUSIC algorithm. The experimental results signify the effectiveness of the new method.

Keywords Coherent signals · Direction-of-arrival · FOSS · MUSIC · Toeplitz matrix

1 Introduction

DOA estimation of coherent sources using antenna arrays plays a remarkable role in wireless communication applications [1–3], especially in sonar [4], radar [5], and mobile commutations [5], etc. DOA algorithms are responsible for the estimation of desired signals. Basically, there are two types of DOA algorithms, namely, classical and subspace method based algorithms. The beam scanning concept is used in the classical method for direction finding [7]. In this approach, each direction power is calculated by scanning a beam through space. The direction which has the highest power is considered as an angle of arrival of the signal [8, 9].

Subspace method based algorithms have high resolution in DOA estimation [11]. In this approach, the autocorrelation of the user signal and noise model is formed and then they are converted into matrix [11]. The Eigen structures of this matrix are formed and are

✉ Veerendra Dakulagi
veerendra.gndec@gmail.com

PRINCIPAL
Guru Nanak Dev Engg. College
BIDAR

[1] Department of Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar, Karnataka 585403, India

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RESEARCH PAPER

Reactive magnetron sputtered–assisted deposition of nanocomposite thin films with tuneable magnetic, electrical and interfacial properties

R. K. Ratnesh · M. Singh · S. Pathak · Veerendra Dakulagi

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Abstract In this work, different magnetic thin films of Ni, NiFe and $NiFe_2O_4$ are deposited on the SiO_2 substrate using sputtering technique. Our experiments confirmed that thin films possess a good nanocrystalline structure. The key deposition parameters controlling their magnetic properties are sheet resistivity, crystalline structure and microtopography of the sputtered thin film. Besides, the reactive gas oxygen (O_2) also plays a leading role in transforming the phase and structure of the ferrite film. The nanocrystalline nature of the ferrite film results in the reduction of overall coercivity (H_C). The thickness of the sputtered thin film is in the range of 800–1000 Å. The prepared film exhibits roughness in the range of (~0.60 to ~0.98 nm). Furthermore, the structural transformation study is performed with X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR). The quite low roughness, high resistivity and low H_c make $NiFe_2O_4$ thin film as a potential candidate for the future spintronics, optoelectronics, photocatalysis and solar cell applications.

Keywords Magnetic material · Nanomaterials · $NiFe_2O_4$ · Thin film · Sputtering

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R. K. Ratnesh (✉) · S. Pathak
Department of Electronics and Communication Engineering, Meerut Institute of Engineering and Technology, Meerut 250005, India
e-mail: ratnes123@gmail.com

e-mail: ratneshwar.ratnesh@miet.ac.in

M. Singh
Department of Electronics and Communication Engineering, National Institute of Technology Karnataka, Surathkal 575025, India

V. Dakulagi
Department of Electronics and Communication Engineering, Lincoln University College, Kuala Lumpur, 47301, Malaysia

Introduction

Over the past few years, ferrite nanocomposite thin film research is an exciting research area attracting the scientific community with advantages, such as low cost, easy availability and producing remarkable electronic and magnetic properties. Chiefly ferrite thin film has been used in many potential applications such as magnetic sensor (Chen et al. 2011; Kennedy et al. 2014; Chinnasamy et al. 2015) high-density data storage, magnetic resonance imaging, ferrofluid, radiofrequency component and drug delivery (Pankhurst et al. 2003; Moser et al. 2002; Kim et al. 2007). In the past, various methods are used to prepare the nanoferrite $NiFe_2O_4$ such as mechano-synthesis (Vladimir et al. 2007; Manova et al. 2004), soft templating (Bala et al. 2005; Jia et al. 2008; Zhao et al. 2015), thermolysis of organometallic compounds, microwave-assisted and Chemie-douce approach (Shemer et al. 2007; Adireddy et al. 2009). These techniques are not favourable for ferrite powders synthesis and hence are not used for ferrite film

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INVESTIGATIONS ON CASCADED MULTI LEVEL INVERTER SYSTEM

Neelashetty kashappa

Faculty, EEE department, Guru Nanak Dev Engineering College, Bidar
Karnataka-585401.

Abstract: This paper deals with modeling, simulation and implementation of five level cascaded inverter system. A five level inverter fed induction motor drive system is modeled and the results are presented. The prototype of the system is also presented to compare the simulation results with experimental results. There is close agreement between simulation results and experimental results.

Keywords: Induction motor, Multi level inverter, Cascaded inverter, Total harmonic distortion, Matlab Simulink.

I. GENERAL

Multilevel inverter [MLI] topology is a most promising inverter topology for medium voltage and high power applications. This inverter synthesizes several different levels of DC voltages to produce a stepped AC output that approaches the pure sine waveform [9]. It has the advantages like high power quality waveform, lower voltage ratings devices, lower harmonic distortion, lower switching frequency losses, higher efficiency, reduced dv/dt stresses etc.

II. CASCADED MULTILEVEL INVERTER

Cascaded multilevel inverter is based on the series connection of inverter with separate DC sources. Cascaded multilevel inverters eliminates the excessively large number of bulky transformers required by conventional multilevel inverters, the clamping diodes required by diode clamped multilevel inverters and the bulky capacitors required by flying capacitor multilevel inverters. Therefore cascaded multilevel inverters (CMLI) appear to be superior to other multilevel structures. The cascaded multilevel structure uses two H-bridge inverters: A main bridge and an auxiliary bridge. The load is connected in such a way that the sum of the outputs of these bridges will appear across it. The ratio of power supply between auxiliary bridge and main bridge of 1:1, 1:2 and 1:3 are used to produce, five level, seven level and nine level voltage across the output terminals.

III. OPERATION OF CASCADED FIVE LEVEL INVERTER

Five level inverter fed induction motor drive system uses a Symmetrical Cascaded Multilevel Inverter (SCMLI) consisting of two cascaded H-bridge inverters: a main bridge inverter and an auxiliary bridge inverter. The load is connected in such a way that the sum of the outputs of these inverter bridges will appear across the load. The ratio of power supplies between the auxiliary bridge and main bridge is 1:1.

The main bridge H_1 as well as auxiliary bridge H_2 consists of DC source of $1V_{dc}$ each as shown in Figure 5.2. By proper opening and closing of switches, each H-bridge can generate three different voltage outputs $+V_{dc}$, 0 and $-V_{dc}$. H_1 can generate these voltages by proper combination of four switches S_1, S_2, S_3 and S_4. When S_1 and S_4 are simultaneously on, the output of H_1 is $+V_{dc}$, when S_2 and S_3 are simultaneously on, the output of H_1 is $-V_{dc}$. Similarly the output of H_2 can be made equal $+V_{dc}$, 0 and $-V_{dc}$ using S_5, S_6, S_7 and S_8. Simultaneous turning of switches S_1, S_2 or S_3, S_4 or S_5, S_6 or S_7, S_8 results in zero output voltage. The output voltage of H_1 is taken as V_1 and the output voltage of H_2 is taken as V_2. The output voltage of the inverter is synthesized by the sum of output voltages of main bridge and auxiliary bridge. i.e. the output voltage of H_1 and H_2 and is given as $V = V_1+V_2$. Thus the five level inverter output voltage of $+2V_{dc}$, $+1V_{dc}$, 0, $-V_{dc}$, $-2V_{dc}$ can be obtained. Table 5.1 shows the switching states of transistors, output voltage of

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AUTOMATED LOAD MANAGEMENT SYSTEM AT COLLEGE

[1]Deepak Ghode, [2]Syeda Bibi Sara, [3]Vaishnavi, [4]Soumya Nimbure, [5]Sheema Humera
[1]Assistant Professor, [2]Student, [3]Student, [4]Student, [5]Student,
[1]Department of Electrical and Electronics Engineering,
[1]Guru Nanak Dev Engineering College, Bidar, India.

Abstract: Due to increase in population and modernization electricity consumption has increased. With increase in electricity consumption there is a gap between generation and demand. To reduce the gap, we need to generate extra units or save units. Considering economy point of view energy conservation opportunity will be effective and quick. Energy management methodology can be used in colleges to reduce unwanted consumption. Energy conservation can be done by "IOT based automated load management system" making use of college time table and using Raspberry pi. Load can be managed to saved extra units. This will not only save extra units but also reduce harmful gases emitted by power generation house to the environment, which are contributing to the global warming. Real time energy monitoring and management assist consumers to overcome the burden of load shedding, energy surcharges and dependence on secondary energy sources like generators and inverters in residential buildings.

Index Terms **- Automated load management system, Energy conservation, Internet of thing, Raspberry pi, Real time energy monitoring.**

I. INTRODUCTION

The surge in energy demand escalating energy price and shortfall between energy demand and supply express the importance of load management. Real time monitoring, load scheduling will lead the consumer for optimized energy usage. Load management system based on IOT facilitates such requirement at ease in a benefit driven manner. IOT acts as communication link between things like load scheduling and internet for real time monitoring responsive control on energy utilization. This will enhance the energy saving opportunities by various means of load management. The main advantage of using this system is to turn ON/OFF the power based on specific rate timing set using an android app. This system will continuously monitor the timing to turn on a load and when the desired off time is set it executes the logic of turning off. A manual switch provision is also provided to assess the loads. Additionally, there will be automatic load control of the outside of the class or lab rooms based on light intensity, based on the light availability or not this system on/off the corridor lights. Through which enormous power saving will be achieved. The system is equipped with a single board computer Raspberry pi based, which runs on linux operating system, as well as load control relays to switch the loads and LDR sensors for calculating the light intensity. In existing system, the manual operation of the loads is done. Several times the users will forget to turn off the loads when work is done, and due to which wastage of electricity is increased as because of which power generated will be more. In this system there is monitoring and controlling of the load through any sort of application is available. IOT based load automation system can be controlled over mobile devices. This system can perform varied functions to be perform at college. This allows accessibility over internet from any corner in the world. The main focus of this project is to minimize the usage of electricity and reduced human efforts. The proposed system incorporates various aspects of technologies such as wireless network, communication over cloud. The users can access multiple appliances over the internet as per convenience. This is a low cost system. This system can control multiple devices

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SOLAR BASED RAILWAY TRACK PEDESTRAIN CROSSING WITHOUT USING STAIRCASE AND AUTOMATIC LIGHTING

[1]Deepak Ghode, [2] Priyanka Kadode
[1]Assistant Professor[2]Student ,
[1]Department of Electrical and Electronics Engineering,
[1]Guru Nanak Dev Engineering College, Bidar, India.

Abstract: It is very difficult for senior citizens and physically challenged people to cross the bridge. In railway stations to move from one platform to other platform people take risk without having the knowledge of train approaching, also the pedestrian's carrying heavy luggage's face difficulties to cross the platform using cross over. "Solar based railway track pedestrian crossing without using staircase" can be the solution for above difficulties. By using "Sensor base and manual operators" technology automatically bridge is moved in backward direction. When the train will pass from platform then command will be sent through microcontroller through motor to open it. And by using automatic lightning, the consumption of electrical power can be minimized and for that sensors and microcontrollers are used such that lights get ON/OFF based on motion in a room. The various sensors used for sensing the motion in an area are PIR and IR motion sensor.

IndexTerms **- Railway, Pedestrian crossing, mobile platform.**

I. INTRODUCTION

In present railway stations normally we use bridges to cross from one platform to another platform; it is very difficult to cross the bridge for physically challenged and elderly persons. Also pedestrians carrying heavy luggage's face difficulty to cross the bridge. In modern times escalator or lift system is also being implemented but these options are either a costly affair or time consuming affair. To overcome these all difficulty found more efficient technique "Solar Based Railway track pedestrian crossing without using staircase and Automatic lightning". The tracking of a train is sensed by sensor; this is used for automatically close/open the mobile platform. Sensors are placed on two sides of track to sense the motion of train. The microcontroller will sense the presence of trains by using infrared sensors. So on sensing the train on one path, the controller will give pulses to the stepper motor to close the mobile platform automatically. As electric power is one of the major concerns, so the concept of the automatic lightning saves the electric energy. For reducing the man power and energy saving, we are using manual system where the light will turn on in evening time and turn off during day time, so that this system saves the energy. The proposed system can be referred as enhancement of current railway system converting the manned and unmanned railway light into automated railway platform. Light control system by using IR sensors. As we have seen the most of power get wasted on railway platform rather than other public sector.

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ORIGINAL PAPER

Photo-Fenton process for removal of polycyclic aromatic hydrocarbons from hazardous waste landfill leachate

P. K. Singa[1,2] · M. H. Isa[3] · J. -W. Lim[4] · Y. -C. Ho[1] · S. Krishnan[4]

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Abstract
Polycyclic aromatic hydrocarbons (PAHs) are the toxic and persistent micro-pollutants recalcitrant to biodegradation. Photo-Fenton process is a commonly adopted advanced oxidation process. Advanced oxidation processes generate highly reactive hydroxyl radicals (OH·) which completely mineralise the organic contaminants. This study aims to find the efficiency of photo-Fenton oxidation process in the removal of PAHs and COD from landfill leachate, and investigate its effect on 16 PAHs according to their number of aromatic rings. Experiments were designed using central composite design, a module of response surface methodology (RSM) in the Design-Expert software. pH, Fe^{2+} concentration, H_2O_2 concentration, reaction time and UV intensity were the five experimental variables which were optimised and modeled successfully. The statistical analysis proved that all the variables have significant effect on the model. The value of R^2 (0.94) showed a high reliability in the estimation of chemical oxygen demand and polycyclic aromatic hydrocarbons removal efficiency. Optimum experimental conditions of pH 6.5, Fe^{2+} 1.1 g/L, H_2O_2 concentration 5.5 g/L, reaction time 40 min and UV intensity 13.5 W resulted in the maximum chemical oxygen demand and polycyclic aromatic hydrocarbons removal efficiency of 84.43% and 92.54%, respectively. Validation was carried out by conducting additional set of experiments, and the small gap between observed and predicted values confirmed that central composite design is the effective tool to optimise the photo-Fenton oxidation process in the degradation of chemical oxygen demand and polycyclic aromatic hydrocarbons.

Keywords Advanced oxidation process · Chemical oxygen demand · Hydroxyl radical · Landfill leachate · Response surface methodology · Statistical analysis

Introduction

The significant issue in landfilling is management of leachate. It is well known that leachate contains many contaminants which pollute various environmental media; hence, adequate treatment of leachate is necessary before its discharge into the environment. Many of the advanced countries still pose difficulty in the complete treatment of the leachate. Apart from the conventional contaminants present in the leachate, studies show that it may also contain many of the micro-pollutants (poly-aromatic hydrocarbons and phthalate acid esters) in ppb range (Asakura et al. 2004; Fang et al. 2009; Zheng et al. 2009).

Polycyclic aromatic hydrocarbons (PAHs) are the group of compounds which are ubiquitous contaminants produced from both natural and anthropogenic activities such as pyrolysis, automobile exhaust and coal refining (Lyche et al. 2009; Ranc et al. 2016). These are used in the production of several plastic products, personal care products,

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✉ P. K. Singa
pmsinga@gmail.com

[1] Civil and Environmental Engineering Department, Universiti Teknologi PETRONAS, 32610 Bandar Seri Iskandar, Perak Darul Ridzuan, Malaysia

[2] Civil Engineering Department, Guru-Nanak Dev Engineering College, Bidar, Karnataka 585403, India

[3] Department of Civil Engineering, Universiti Teknologi Brunei, Jalan Tungku Link, Gadong BE1410, Brunei Darussalam

[4] Fundamental and Applied Sciences Department, Universiti Teknologi PETRONAS, 32610 Seri Iskandar, Perak Darul Ridzuan, Malaysia

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Tunable Optical Add/Drop Filter for CWDM Systems Using Photonic Crystal Ring Resonator

SAVITA SOMA,[1,4] MAHESH V. SONTH,[2,5] and SANJAYKUMAR C. GOWRE[3,6]

1.—ECE Department, GNDEC, Bidar, Karnataka 585403, India. 2.—CMR Technical Campus, Hyderabad 501401, India. 3.—ECE Department, BKIT, Bhalki, Karnataka 585328, India. 4.—e-mail: savita.soma@gmail.com. 5.—e-mail: maheshsonth@gmail.com. 6.—e-mail: sanjaygowre@gmail.com

In this paper an add/drop filter based on a two dimensional (2D) photonic crystal ring resonator (PCRR) is proposed and its performance is studied. This device is comprised of a hexagonal PCRR between two parallel waveguides formed by creating line defects in a 2D lattice structure with an array of 20 × 20 Si (Silicon) rods in air host. The lattice constant a is 636 nm and the radius of silicon (Si) rods r is $0.2a$. The size of the add/drop filter is 6 μm × 6 μm. We have achieved nearer to 100% dropping efficiency when the wavelength (λ) of the optical input signal is 1.55 μm. Optical signal can be made to drop at a different port by varying its wavelength or radius of Si rods. Simulation of the device is performed using a licensed RSoft FullWAVE tool based on a finite difference time domain (FDTD) simulator. The proposed structure could be used as an add/drop filter in the wavelength division multiplexing.

Key words: Photonic crystal ring resonator (PCRR), resonant wavelength, photonic bandgap, add/drop filter

INTRODUCTION

There is an ever-increasing demand for higher bandwidth and speed of the Internet worldwide. This demand can be fulfilled by replacing electronic communication with optical communication due to enhanced durability and speed of optical devices especially in photonic integrated circuits. Lot of research is being done on optical devices constructed on 2D photonic crystal (PhC) as they weigh in as electronic devices in size, durability, speed and are also, appropriate for photonic integrated circuits. In this regard researchers have studied various optical devices such as add/drop filters,[1] channel drop filters using directional couplers,[2] band stop filters,[3] decoder,[4] demultiplexer and adders circuits.[5] An optical add/drop filter is an important device used for adding or dropping a specific wavelength signal in Wavelength Division Multiplexing (WDM) as WDM plays a crucial part in multiplexing and routing optical signals into or out of a single mode fiber.[6]

We focus on the design of an add/drop filter based on a 2D silicon PCRR. We have used the Plane Wave Expansion (PWE) method to obtain the photonic bandgap and Rsoft FDTD full wave simulator for performing simulations of the proposed structure and analyze the propagation of light.

PROPOSED STRUCTURE OF ADD/DROP FILTER

Structure of an add/drop filter designed on a 2D hexagonal photonic crystal, with 20 Si rods in X direction 20 Si rods in Z direction is shown in Fig. 1. The index of refraction of Si rods $n_s = 3.476$[7] and air host $n_a = 1.00$. The distance between two rods, lattice constant a is 636 nm and radius of the Si rods r is $0.2a$. These values for designing an add/drop filter are chosen from a band diagram with respect to TE/TM photonic bandgap (PBG) calculated by using PWE method. The projected add/drop filter supports two transverse electric (TE) modes as shown in Fig. 2 wherein one of the TE

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Realization of Three Input Optical AND Gate in a 2D Photonic Crystal

Savita.Soma[1], Sanjay Gowre[2], Mahesh Sonth[3]

[1]Department of ECE, GNDEC.BIDAR,585402, INDIA
[2] Department of ECE, BKIT. BHALKI, 585328, INDIA
[3] Department of ECE, BKIT. BHALKI, 585328, INDIA
(E-mail: savita.soma@gmail.com, sanjaygowre@gmail.com & maheshsonth @gmail.com,
*Corresponding author: Savita Soma, Email Id: savita.soma@gmail.com, +8123746674abc@gmail.com)

Abstract— Proposed and designed a 2D (two-dimensional) photonic crystal(PhC) based three input optical AND gate. The proposed structure is designed by cascading two optical AND gates. Initially a two input AND gate is designed by creating a square ring resonator in a rectangular lattice structure, later two such AND gates are cascaded to realize the operation of three input AND gate.The size of this structure is 10μm*6μm with operating wavelength of 1550μm. We have obtained contrast ratio of 8.2dB for the designed AND gate. The threshold value for logic1 is above 0.5. The size of the proposed structure is small and it is suitable for optical integrated circuits. Plane Wave Expansion (PWE) method is used to calculate the bandgap and simulations are done by using and Rsoft Finite Difference Time Domain (FDTD) simulator.

Keywords— *Ring resonator, 2D Photonic Crystal (PC), Optical logic gate, Rsoft Full wave FDTD simulator.*

I. INTRODUCTION

In recent years, photonic crystals provide the excellent platform for construction of optical logic devices. Optical devices can be used in optical memory, optical computing units, processors, and controllers [1]. Using all-optical devices, we can afford wide bandwidth, high speed and compact size. Optical logic gates are the most essential devices used in optical signal processing [2,5,6], as they improve the speed and consumes less power and can be used in optical integrated circuits. Numerous methodologies like Semiconductor Optical Amplifier (SOA), MZI and photonic crystal are used to design all-optical logic gates. The former method consumes more power and requires large space which can be improved by using photonic crystal [3,7].

Photonic crystals are dielectric structures in which refractive index of the dielectric material is varied periodically. Photonic band gap in a photonic crystal is the range of frequencies in which light cannot propagate through the structure.

Photonic bandgap is calculated by using plane wave expansion method. The band diagram of the proposed structure is shown in Fig.2, The frequency bandgap of the proposed structure (a/λ) = 0.36 to 0.48 and corresponding wavelength range from 1.34μm to 1.79μm.

By creating Point and line defect in a PhC structure we can manipulate the propagation of light. This behavior of PhC can be used to design and realize many PhC devices. Photonic crystals have some unique properties such as compactness, high speed, low power consumption, better confinement which make them promising candidate in photonic integrated circuits.

II. STRUCTURAL DESIGN

Initially, two input AND gate is designed by using structure [4] as shown in Fig.1. Optical AND gate is constructed by using a square lattice photonic crystal structure with 25 and 15 Si rods in X and Z direction respectively. Three parallel line waveguides are created by removing Si rods and a square ring resonator is placed between them. High spectral selectivity is provided by four scattering rods placed at four corners of Square ring resonator. Optical input signals are launched at ports A and B, output is observed at port Y. Fig.2. shows the cascading of two gates to form a three input AND gate.

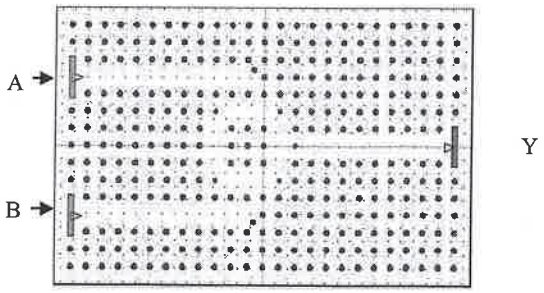

Fig.1. structure of two input AND gate using square ring resonator

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Life Time Improvement and Attack Resilience Against Gray and Black Hole Attacks in Dragon Fly Topology Based MANET

Premala*, Md.Bakhar**

Dept. of E&CE, Guru Nanak Dev Engineering College, Bidar, Karnataka, India

Dept. of E&CE, Guru Nanak Dev Engineering College, Bidar, Karnataka, India

Corresponding Author; e-mail: kashipremala@gmail.com

ORCID ID: 0000-0003-3267-4731, 0000-0003-2624-6298

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Abstract-MANET is an autonomous network of nodes with capability of movement and without any necessity of infrastructure for connectivity. Due to mobility of nodes, network topology changes continuously characterized by network partitioning and routing disruptions. Dragon fly topology is used to improve the network throughput and reduce latency in internet. The hierarchical nature of Dragon fly reduces the network diameter, cost and latency. This work proposes Dragon fly clustered energy efficient ant colony based AODV (DC-EEAAODV) protocol extending the concepts of Dragon fly topology to MANET and ant colony based route selection with goal to improve network QOS and life time of the network. Due to hierarchical nature, the impact of attacks like gray, black hole on network is high and this work proposes efficient routing resilient against gray and black hole attacks for Dragon fly based MANET. The simulation of the proposed DC-EEAAODV is done in NS2 environment and performance of the proposed protocol is compared against AOMDV and Dragon fly based FFAOMDV to prove the efficiency of the proposed DC-EEAAODV protocol.

Key words: MANET, Black hole, Gray hole attacks, Dragonfly Topology.

1. Introduction

MANET is created by autonomous moving nodes which cooperatively engage in a continuously changing infrastructure. An Important characteristic of MANET is that there is no necessity of a backbone infrastructure for connectivity and communication of the nodes.

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Advances in Smart Antenna Systems for Wireless Communication

Veerendra Dakulagi[1] · Mohammed Bakhar[1]

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Abstract
Wireless communication is one of the fastest growing fields of communication industry. Cellular phones have shown the drastic exponential growth from the last decade and this growth has reached about one billion mobile phone users worldwide. Certainly, mobile phones have become one of the most importants components of daily life and a critical business tool in all countries. Huge gap between a vision for future wireless communication systems and the current system's performance represents that massive research work has to be carried out to make future communication system vision a reality. In this paper, all most all the types of beamforming and direction of arrival schemes for wireless communications have been presented. This paper also presents the comprehensive study of smart antenna systems, its advancement in recent years and futuristic scope.

Keywords Array antenna · Beamforming · DOA · ESPRIT · Smart antenna · Wireless communication

1 Introduction

From the last few years, provision of service through the wireless communication reached beyond all the expectations. This aspect introduces the most challenging technical issue in wireless networks; the need to increase the efficiency of spectrum. Until recently less importance was given towards the antenna related technology. Indeed self configured or new intelligent and highly efficient technique will be replaced to achieve the requirement of future communication systems.

In practice, no antenna is smart, but an antenna system is smart. Hence a 'smart antenna' combines an array of antenna with signal processing capabilities, which makes it possible to transmit and receive the incoming signals in spacial sensitive and adaptive manner.

Adaptive antennas were first studied by Van Atta [1] and their main applications were only in military. He described adaptive antenna as a "self-phased array". In this array, received signals are reflected back in the direction of incoming signals. Hence they were called as "retro directive array". Later, in 1960, phased-looked loop (PLL) was used in the

✉ Veerendra Dakulagi
veerendra.gndec@gmail.com

1 Department of Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar 585403, India

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RESEARCH PAPERS

ADAPTIVE BEAMFORMING ALGORITHMS APPLICABLE FOR MOBILE COMMUNICATION

By

PAVAN MANKAL *

SANJAY C. GOWRE **

*-** Department of Electronics and Communication Engineering, Bheemanna Khandre Institute of Technology, Bhalki, Karnataka, India.

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ABSTRACT

A smart antenna system attracts a lot of attention now a days and believed to be more in the future. The smart antennas when used in communication system, enhances the system capacity, efficiency and bandwidth. From the past decade huge amount of research has been carried out in array signal processing to improve the communications systems. In this paper, most popular beamforming methods used in array signal processing are discussed in terms of its benefits and the reason for its popularity. Furthermore, various fixed weight beamforming and adaptive beamforming techniques are also discussed in this paper. A simulation of beamforming in a particular direction of interest with nulls in interfering directions is done using MATLAB simulation software. Array factor for the range between $-90° \leq \theta \leq 90°$ are plotted. The purpose of this article is to give an overview of the technology and used beamforming techniques.

Keywords: Adaptive Array, Beamforming, Switched Beam Systems, Mean Square Error.

INTRODUCTION

In recent years, smart antenna for mobile communication has received enormous interest worldwide. From the last 10 years wireless communication has significantly attained the drastic growth to meet the demands of today's requirement, particularly in cellular communication. This is possible by the use of multiple antennas at the transmitter and/or receiver. These antennas are also called as adaptive or smart antennas (Godara, 1997; Kwong & Johnston, 1992).

The adaptive antennas can be employed to increase the reliability in communication systems by diversity or increase the data rate by spatial multiplexing or a combination of both. Smart antenna patterns are controlled via algorithm, based upon the radiation pattern the antennas are completely controlled by the signal processing algorithms using certain criteria (Slock, 1993). These adaptive algorithms certainly enhance the ratio of Signal-to-Interference (SIR) by suppressing the Mean Square Error (MSE), steering towards a signal of interest, and nulling the interfering signals (Rupp, 1993; Slock, 1993). There are adaptive algorithms that must allow for the continuous adaptation to an ever-changing electromagnetic environment (Srar, Chung, & Mansour, 2010).

1. Smart Antenna Systems and Its Benefits

The term "smart antenna" generally refers to any antenna array terminated in a sophisticated signal processor, which can adjust or adopt its own beam pattern in order to emphasize signals of interest and to minimize interfering signals (Lopes, Tavares, & Gerald, 2007). The traditional and smart or adaptive antenna array are shown in Figure 1. Adaptive array antennas are actually an extended version of cell sectoring in which the sector coverage is composed of multiple beams (Wax & Sheinvald, 1994). Thus the 120° sectors can be further sub divided as shown in Figure 2. These systems can generally be classified as either switched beam or adaptive-array systems as shown in Figure 3 (Wong, 2002).

Mainly, there are two types of configurations, namely,

- Switched beam system
- Adaptive array system

1.1 Switched Beam System

- This antenna system forms fixed multiple beams which

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Advances in Smart Antenna Systems for Wireless Communication

Veerendra Dakulagi[1] · Mohammed Bakhar[1]

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Abstract
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1 Introduction

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In practice, no antenna is smart, but an antenna system is smart. Hence a 'smart antenna' combines an array of antenna with signal processing capabilities, which makes it possible to transmit and receive the incoming signals in spacial sensitive and adaptive manner.

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✉ Veerendra Dakulagi
veerendra.gndec@gmail.com

[1] Department of Electronics and Communication Engineering, Guru Nanak Dev Engineering College, Bidar 585403, India

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BIDAR

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Efficient Multipath Routing to Increase QoS by Link Estimation and Minimum Interference Path in Manet's

Pradeep Karanje, Ravindra Eklarker

Abstract: ***Many significant techniques have been developed for real time transmission to meet stringent QoS for various applications of wireless sensor network. However routing in MANET's still a challenging issue to achieve QoS due to frequent topology changes and its dynamic nature. For majority MANET applications, on demand multi path data routing protocols have been modelled to transfer data in multiple routes to prove its effectiveness on link disjoints and high packet delivery ratio. However due to mobility and underlying medium, multiple routes are exposed to interference and low power unstable link quality which are essential to guarantee QoS in routing. In this paper we propose link quality estimation and minimum path interference based on Geographic adhoc on demand multi path distance vector (GAOMDV) an adaptation of AOMDV routing protocol. To ensure the reliability of MANET's this adaptation is done by considering routing metrics. GAOMDV selects forwarding neighbour nodes based on link quality and minimum path interference across multiple paths and ensures high stable links between nodes. Extensive simulation is carried on discrete event simulation tool and performance of GAOMDV is analysed in terms of network QoS parameters.***

Keywords :. Adhoc, Geographic, Link Quality, MANET's, QoS

I. INTRODUCTION

MANET's are group of dynamic and self organizing wireless nodes that exchanges data among nodes without centralised administration [1]. Wide variety of MANET's applications has been established in battlefield, military, rescue and mission critical networks. MANET's causes frequent topology changes due to its self organizing characteristics. Performance of MANET's depends on routing protocol employed, wherein nodes with limited transmission range relay on neighbour nodes to forward data from source to destination hence routing a crucial issue [2].Complexity of routing fundamentals in MANET's are addressed but still some routing issues are unresolved [3-5]. Issues related to delay and congestion has been discussed and many solutions have been proposed by authors to decrease average delay and high packet data delivery [6-8].

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* Correspondence Author
Pradeep Karanje*, Department of E&CE, Guru Nanak Dev Engineering College, Bidar, India. Email: pradeepkaranje2012@gmail.com
Dr. Ravindra Eklarker, Department of E&CE, Guru Nanak Dev Engineering College, Bidar, India. Email: reklarker@gmail.com

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In past, identifying single path between source and destination was the principle of routing protocol and it was limited with minimum hop counts. While routing in certain scenarios, multipath routing is most effective way for data transfer between source and destination. Multipath routing involves in finding all possible paths from source to destination node to carry data concurrently for efficient data delivery [9-11]. Providing efficient routing for reliable WSN communication is a challenging work because of link failures caused by topology changes in MANET's. QoS in network is to deliver guaranteed level of service for different applications [12]. QoS parameters such as delay, throughput and packet delivery ratio are achieved through efficient routing. However due to multiple constrains and dynamics in WSN's delivering QoS parameters becomes research issues [13].In this paper we propose Geographic adhoc on demand multi path distance vector (GAOMDV) an adaptation of AOMDV routing protocol. This paper mainly concentrates on nodes link quality estimation of multiple paths and minimum interference of nodes disjoints links. Neighbour nodes are selected on minimum routing cost as forwarding node through geographic information. This ensures the high stable links for dynamic nodes to achieve QoS parameter for MANET's. The rest of this paper is organized as follows. In Section II describe problem definition and related work carried out. Section III describes the propose system model. In section IV the performance analysis and relative simulation are conducted. Finally we draw the conclusion on the proposed scheme in section V.

II. PROBLEM DEFINITION AND RELATED WORKS

Due to physical changes in environment low power embedded wireless links are error-prone, unstable and vulnerable to spatial variations [14]. Links are unstable and lossy in such environments due to dynamic characteristics of nodes. To guarantee QoS parameters it is essential to estimate the link quality among nodes to increase the performance of routing protocol. Single path between source and destination was the principle of routing protocol and it was limited with minimum hop counts. In case of route fail, new route is evaluated this led to high communication cost and more resource consumption. Multipath routing provides key solution under various conditions to achieve QoS requirements.

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Efficient Multipath Routing to Increase QoS by Link Estimation and Minimum Interference Path in Manet's

Pradeep Karanje, Ravindra Eklarker

Abstract: *Many significant techniques have been developed for real time transmission to meet stringent QoS for various applications of wireless sensor network. However routing in MANET's still a challenging issue to achieve QoS due to frequent topology changes and its dynamic nature. For majority MANET applications, on demand multi path data routing protocols have been modelled to transfer data in multiple routes to prove its effectiveness on link disjoints and high packet delivery ratio. However due to mobility and underlying medium, multiple routes are exposed to interference and low power unstable link quality which are essential to guarantee QoS in routing. In this paper we propose link quality estimation and minimum path interference based on Geographic adhoc on demand multi path distance vector (GAOMDV) an adaptation of AOMDV routing protocol. To ensure the reliability of MANET's this adaptation is done by considering routing metrics. GAOMDV selects forwarding neighbour nodes based on link quality and minimum path interference across multiple paths and ensures high stable links between nodes. Extensive simulation is carried on discrete event simulation tool and performance of GAOMDV is analysed in terms of network QoS parameters.*

Keywords *:. Adhoc, Geographic, Link Quality, MANET's, QoS*

I. INTRODUCTION

MANET's are group of dynamic and self organizing wireless nodes that exchanges data among nodes without centralised administration [1]. Wide variety of MANET's applications has been established in battlefield, military, rescue and mission critical networks. MANET's causes frequent topology changes due to its self organizing characteristics. Performance of MANET's depends on routing protocol employed, wherein nodes with limited transmission range relay on neighbour nodes to forward data from source to destination hence routing a crucial issue [2].Complexity of routing fundamentals in MANET's are addressed but still some routing issues are unresolved [3-5]. Issues related to delay and congestion has been discussed and many solutions have been proposed by authors to decrease average delay and high packet data delivery [6-8].

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* Correspondence Author
Pradeep Karanje*, Department of E&CE, Guru Nanak Dev Engineering College, Bidar, India. Email: pradeepkaranje2012@gmail.com
Dr. Ravindra Eklarker, Department of E&CE, Guru Nanak Dev Engineering College, Bidar, India. Email: reklarker@gmail.com

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Prominent smart grid measurements by RAP-NN to warrant the reliability of the PV system

Durga Prasad Ananthu and Neelshetty K

Guru Nanak Dev Engineering College, Bidar, India

ABSTRACT

Nonetheless, the PV system evolves a clear fuel source, is a fluctuating source of energy subsequently it has to ensure its reliability, which can be got through the Knowledge about the reliability sensing parameters such voltage, current, power factor. But when it comes to sense knowledge about the reliability parameters of the PV system over the large cover area there arise the recurrence problem. Therefore, this scenario forces the PV system to have reliability recurrently sensing prominent smart grid strategy. Hitherto, those recurrent inputs are being clustered and the parameters have been sensed but the accurate measuring is lacking due to the squander of essential data and due to the increased memory utilization for recurrence operation. Regarding this issue, this work presentedAdvanced Artificial intelligent RAP-NN (Recurrent Approximated Predictive – Neural Network) for Prominent Smart Grid Measurements which avoids increased utilization of memory by including Long Short Term Memory for recurrently updating values and also the accurate measurement of the parameters are done by fourth-order Runge-Kutta approximation strategy which in turn gives very accurateprediction parameters readily yields better power quality measurement.

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KEYWORDS
DRNN-LSTM; RAP-NN; Runge-Kutta approximation; multi-hidden Markov model(MHMM); PV system

Introduction

The increasing demand for electrical energy and increased greenhouse gases have motivated power utilities to integrate distributed generation (DG) to the distribution network. The wind and solar photovoltaic (PV) are widely popular DG resources which can be operated in isolated or grid-connected mode depending upon the requirement (Aghaei and Alizadeh 2013). The integration of DG systems to existing utility networks degrade system reliability and produce power quality (PQ) disturbances such as voltage sag, swell, notch, momentary interruptions, etc., (Ray, Kishor, and Mohanty 2012). The high penetration of solar PV into the utility network cause power disturbances, voltage disturbances, frequency variations, harmonics, rise in voltage profile along the feeder on which PV is connected, and risk of violating system operation limits caused by changes in network behavior (Agalgaonkar 2014). The quality of the supply is further affected by the operation of solar PV such as grid synchronization and outage (Eltawil and Zhao 2010).

The accurate assessment and possible impacts of PQ events associated with solar PV and their operations on the performance of the grid before the installation of plant is crucial. The different techniques used for the detection of PQ events have been reported in (Honrubia-Escribano et al. 2015). The use of continuous wavelet transforms for detection and analysis of voltage sags and transients using the recursive algorithm is proposed in (Costa 2014). A de-noising technique using inter and eventually scale dependencies of wavelet coefficients to de-noise PQ waveform data for detection and

CONTACT Durga Prasad Ananthu adp.ananthu@gmail.com; Neelshetty K neelshettyk@gmail.com Guru Nanak Dev Engineering College, Bidar-585403, Karnataka

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Smart Antenna Algorithms for Mobile Communication

Rohini Dakulagi[1] and Veerendra Dakulagi[2]
[1]Department of E&EE, [2]Department of E&CE,
[1,2]Guru Nanak Dev Engineering College, Bidar - 585403, India

ABSTRACT

A smart antenna system attracts a lot of attention now a days and believably more in the future. The smart antennas when used in communication system, enhances the system capacity, efficiency and bandwidth. From the fast decade huge amount of research has been carried out in array signal processing to improve the communications systems. In this paper, most popular beamforming methods used in array signal processing are discussed in terms of in benefits and the reason for its popularity. Furthermore, various fixed weight beamforming and adaptive beamforming techniques are also discussed in this paper. A simulation of beamforming in a particular direction of interest with nulls in interfering directions is done using MATLAB simulation software. Array factor plots for the range $-90^{\circ} \leq \theta \leq 90^{\circ}$ are plotted
The purpose of this article is to give an overview of the technology and used beamforming techniques.

Keywords : Adaptive Array, beamforming , Switched Beam Systems, Mean Square Error.

I INTRODUCTION

Smart antenna for mobile communication has received enormous interests' world wide in recent years. From the last 10 years wireless communication has significantly attained the drastic growth to meet the demands of today's requirement, particularly in cellular communication. This is possible by the use of multiple antennas at the transmitter and/or receiver. These antennas are also called as adaptive or smart antennas [1-2].
The adaptive antennas can be employed to increase the reliability in communication systems by diversity or increase the data rate by spatial multiplexing or a combination of both.
Smart antenna patterns are controlled via algorithm based upon The radiation pattern of antennas are completed controlled by the signal processing algorithms using certain criteria [3-4].
These adaptive algorithms certainly enhance the ratio of signal-to-interference (SIR) by suppressing the mean square error (MSE), steering towards a signal of interest, nulling the interfering signals, or tracking a moving emitter to name a few [5]. There are adaptive algorithms then must allow for the continuous adaptation to an ever-changing electromagnetic environment [6].

II SMART ANTENNA SYSTEMS AND ITS BENEFITS

The term "smart antenna" generally refers to any antenna array terminated in a sophisticated signal processor, which can adjust or adopt its own beam pattern in order to emphasize signals of interest and to minimize interfering signals (Figure 1) [7-8]. Adaptive array antennas are actually an extension version of cell sectoring in which the sector coverage is composed of multiple beams [9].
Thus the 120° sectors can be further sub divided as shown in Figure 2.
These systems can generally be classified as either switched beam or adaptive-array systems (Figure 3) [10].
Mainly, there are two types of configurations, namely,

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Survey on Utilization of Wireless Communication Technology for Smart Grid

T. Vinay Kumar[1] Neelshetty K[2]
[1,2]Faculty
[1,2]Department of Electrical & Electronics Engineering
[1,2]GNDEC, Bidar, India

Abstract— To transform the existing power sector into secure, adaptive, sustainable, that provides reliable and quality energy to the consumers we need smart communication system. Presently efficient wireless communication technology is needed for Smart Grids. The proposed technology should enable seamless and latency free communication between various smart grid components like generating stations, substations, consumers and operators. Energy companies have been seeking for a cost effective and reliable communication technology to support their grid automation and control. The future development of electric power grid is smart grid, which include features like flexible, clean, secure, economic, and friendly and so on. This paper explores the possible infrastructure for communication architecture for Smart Grid with modern techniques firstly: then feasibility study of using Commercial networks, like LTE and 4G in smart grid communication is presented.

Keywords: Computer Networks, Smart grid, GSM, LTE, 4G, IoT, Interoperability

I. INTRODUCTION

IEEE vision of the smart grid communications and lays out the technology roadmap that will lead us. The construction of smart grids in India is very complicated system engineering, for this reason some concrete suggestions are made, such as fully taking advantages of integrated management, carrying out architectural design of smart grids. The drafting pilot plans and implementation schemes; coordinating secure and economic operation of power generation, transmission and distribution. Currently, electric grid utilities have numerous communication platforms and networking protocols operating in their networks having different application level requirements for the bandwidth and latency. A utility's choice for communication technology also depends on the location within the network as well as existing communication equipment that can be leveraged. One of the resulting challenges of this evolution is the increased need for interoperability at different levels of smart grid components.

A. Challenges in Communication System for Smart Grid:

Presently the following challenges are faced in smart grid for communication

1) Implementation of Interoperability.
2) Latency in data transfer among various components in the smart grid.
3) Synchronization among various components of smart grid for quick response.
4) Standardization to have well defined connection of various smart grid devices.
5) Heterogeneous Networks Integration to Coordinate the Smart Grid Functions
6) Security for data transfer among consumers and power suppliers.

II. LITERATURE SURVEY

Currently, electric grid utilities have numerous communication platforms and networking protocols operating in their networks having different application level requirements for the bandwidth and latency. A utility's choice for communication technology also depends on the location within the network as well as existing communication equipment that can be leveraged. As a result, utilities are dependent on several communication technologies in order to fulfill their applications' requirements. IEC 61850 standard [3] defines stringent requirements for communication and automation within the grid components. Network latency is the key parameter. The standard defines diversified latency requirements for different grid functions. This growing demand for virtually zero latency and ultra-reliability has been addressed by 3GPP (3rd Generation Partnership Project) community. The development and standardization work in LTE is focusing on upgrading the features of 3GPP technologies to support better MTC (Machine Type Communications) [1]. we studied the interdependencies between communications and electricity distribution networks in rural areas focusing on availability, redundancy (number of detected cells in a particular place at a particular time), and fault resiliency using GSM and UMTS networks. In this paper, we are extending our study to semi-urban area where more radio access technologies and capacity are available. The mobile networks and the energy grid are denser than in rural areas. Our study covers medium-voltage grid entities controlled by SCADA systems. High-voltage grid entities as well as low-voltage home metering devices were excluded from the study.[2]

A. Interoperability:

Interoperability refers to the ability of diverse systems and organizations to work together (inter-operate). In the context of the electricity system, interoperability refers to the seamless, end-to-end connectivity of hardware and software from end-use devices through the T&D system to the power source, enhancing the coordination of energy flows with real-time information and analysis. A technical standard consists of specifications that establish the fitness of a product for a particular use or that define the function and performance of a device or system. It is usually a formal document that establishes uniform engineering or technical criteria, methods, processes, and practices.

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Solar Based Automated Pumping System for Small Fields

MD Zahid Ahmed[1], Adarsh Reddy[2], Mithun, Mohammad Sameer Hussain[3], Megha[4]
[1,2,3]*IETE Member, Guru Nanak Dev Engg College, Bidar, EEE Department*
[4]*Assistant Professor, IETE Member, Guru Nanak Dev Engg College, Bidar, EEE Department*

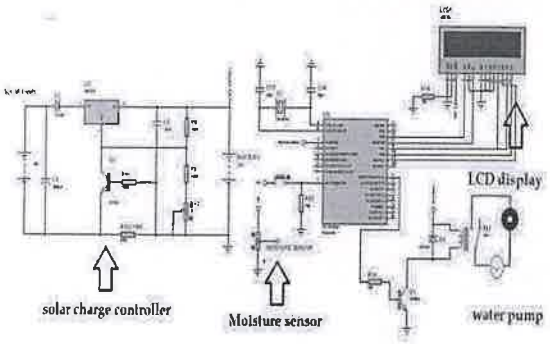
Abstract- **Agriculture for small fields technology is changing rapidly. Farm machinery, farm building and production facilities are constantly being improved. Agriculture for small fields applications which is done by photovoltaic (PV) solutions. These applications are a mix of individual installations and systems installed by utility companies when they have found that a PV solution is the best solution for remote agricultural need such as water pumping for small fields or livestock. A solar powered water pumping system is made up of two basic components. These are PV panels and pumps. The smallest element of a PV panel is the solar cell. Each solar cell has two or more specially prepared layers of semiconductor material that produce direct current (DC) electricity when exposed to light. This DC current is collected by the wiring in the panel. It is then supplied either to a DC pump, which in turn pumps water whenever the sun shines, or stored in batteries for later use by the pump.**

Index terms- SBAPS solar based automatic pumping system, .RES renewable energy sources.

INTRODUCTION

SBAPS is most widely used in agriculture. Agriculture is the major source of income in a country like India. Till today, most of the irrigation systems are operated manually resulting in over irrigation & water wastage most of the times. It is usually designed for ensuring the proper level of water for growing up the small plants all through the season. Even when the farmers are away, these automatic pumping for small fields systems always ensure the proper level of water in the sites. In addition, it provides maximum water usage efficiency by monitoring soil moistures at optimum level. With the development of technology in water saving irrigation and automation, automatic pumping is going to be more popular in the small fields. Thus the problem related to agricultural productivity for small fields, poor performance and decreased availability of water. This problem can be solved by using the automatic pumping for small fields systems.

Circuit diagram:



Explanation of circuit diagram:

Pumping to small fields is nothing but a slow and regular application of water and nutrients moving down drop-by-drop directly to the root zone of the plants through low-discharge emitters and plastic pipes. This irrigation system is today's need of the hour as the natural water resources which are gift to the mankind have become scarce, and that are now not unlimited and free forever. But, the world's water resources are now fast moving back on track. After one completes the study of inter relationship between crops, soil, water and climatic conditions, one will find pumping to small fields system as a suitable system capable of delivering exact quantity of water at the root zone of the plants.

This system ensures that the plants do not endure from the strain or stress of less and over watering. The advantages of using this system are that for every drop of water used, we get more crop, better quality, early maturity, higher yield. Moreover, this system

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Bio Battery

Prakash Udgire
Associate Professor, IETE Member, Guru Nanak Dev Engineering College, Bidar

Abstract- **Bio battery, which is based on Energy for activity, that is the ATP and thermal energy commonly used in the living organism, can be obtained from the exchange of the electrons and protons through these two enzymatic reactions. To take advantage of this living organism mechanism, the energy for activity from inside the organism must be removed outside the organism as electrical energy. That is, when the electrons and protons move from enzyme to enzyme, it is necessary to extract just the electrons and divert them through a separate path. Thus Sony used an electron transport mediator so that electrons could be exchanged smoothly between the enzymes and the electrodes that are the entrance and exit to that detour. The principles of the bio battery are based on the energy conversion mechanism in living organisms.**

However, in order to create the bio battery, several technologies needed to be developed. These include immobilization of enzymes that are normally incompatible with carbon and metal electrodes, electrode structures, and electrolytes. Mechanisms used in living organisms, are not only friendly to the environment but is also likely to be of practical use as an energy source. This prototype bio battery has achieved the world's highest power output of 50 mW*2. There are two types of Bio batteries Passive system type & Active type system. In passive type system reactive substances are absorbed in to the electrodes through a process of natural diffusion.

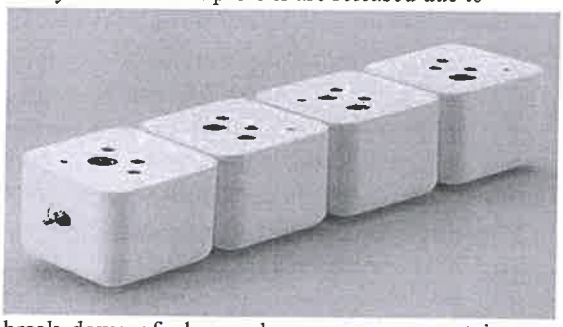
In active type system the reactive substance are introduced by force by technique as string, convection. Bio batteries work similarly to the metabolic process in our bodies, or more specifically the metabolic processes in ruminants and termites that have the ability to digest cellulose. Enzymes break down cellulose into glucose, a central energy source in both animal and plant metabolism and a clean energy source while bio-battery is more environmentally friendly to recycle than metal-based batteries as it creates its own energy from the cellulose found in cardboard and paper.

Index terms- SCBB single cell bio battery

I. INTRODUCTION

A bio-battery is an energy storing device that is powered by organic compounds. Bio-Battery generates electricity from renewable fuels (glucose, sucrose, fructose, etc) providing a sustained, on-demand portable power source. When enzymes in our bodies break down glucose, several electrons and protons are released. Therefore, by using enzymes to break down glucose, bio-batteries directly receive energy from glucose. These batteries then store this energy for later use. This concept is almost identical to how both plants and many animals obtain energy. Bio battery use biocatalyst, either bimolecular such as enzymes or even whole living organism to catalyze oxidation of bio mass-based materials for generating electrical energy.

Bio Battery can be called as energy accumulated device that is motorized by organic compounds, usually being glucose, like glucose in human blood. Many electrons and protons are released due to



break down of glucose by enzymes present in our body. Thus, bio batteries directly get energy from glucose by using enzymes present in a human body break down glucose. An interesting fact is that bacteria can generate electricity when a protein in their cell membranes gets in touch with a mineral surface. Shewanella oneidensis is marine bacteria that can develop electric currents when bared to heavy metals like iron and manganese. These proteins can transmit electrons transversely a membrane at a rate faster enough so that the energy produced is sufficient so that bacteria can survive. Functioning of these bacteria will help scientists in making those bio

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Power Quality in a Smart Grid Distribution System using Automatic OLTC

S. Pretpal Singh
IETE Member, Guru Nanak Dev Engineering College, Bidar

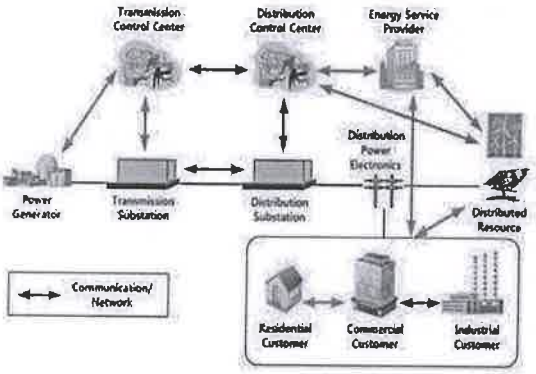
Abstract- **This paper is mainly focused on distribution of power with quality throughout the day. It is proposed in this to provide automatic control circuits to operate the available On Load Tap Changers (OLTC) effectively. The available taps and its voltage levels may be analyzed and suitable applications solution will be automatically generated to select and operate the desired tap to deliver the quality of power to meet the system voltage close to the rated voltage. These programs may be pre-loaded to operate OLTC"s at the power generating stations, Sub stations. Micro controllers are system based controllers may be installed to operate the OLTC"s from 11Kv to 400Kv power and distribution transformers. Universal motors or step drive motors or servo motors may be operated by the controller on auto with the aid of programs pre-loaded. No manual commands and controls needed if the OLTC is put on auto mode**

In the distribution transformers also all the tap positions may be effectively utilized by providing automatic OLTC"s with the aid of local operated controllers or remote operated auto controllers. In this paper voltage transducers are used to sense the voltage and ADC to convert into digital signals. These digital signals are fed to the controller or interfaced computers. Controller or the computer programs checks the present voltage and its required suitable controls from the available solution data table. The necessary controls are generated and operated the drives to operate the on load tap changing devices. These controls are being initiated at the moment of deviation occurs in the system voltage desired quality band. It is also planned to include the high resolution advance graphics files in C programs to represent the present status of the OLTC with its connected tap position. The taps operated and the voltage levels may be recorded and represented graphically with time scale.

Index terms- OLTC On line tap changer. ADC analog to digital converter, SG smart grid, DS distribution system, UM universal motor

I. INTRODUCTION

Smart Grid is the modernization of the electricity delivery system so that it monitors, protects and automatically optimizes the operation of its interconnected elements – from the central and distributed generator through the high-voltage network and distribution system, to industrial users and building automation systems, to energy storage installations and to end-use consumers and their thermostats, electric vehicles, appliances and other household devices. Smart grid is the integration of information and communications system into electric transmission and distribution networks. The Smart Grid in large, sits at the intersection of Energy, IT and Telecommunication Technologies



Some of the enabling technologies & business practice that make smart grid deployments possible include:

1. Smart Meters & Meter Data Management.
2. Field area networks & integrated communications systems.
3. IT and back office computing.
4. Data Security.
5. Demand Response & Distributed generation.
6. Renewable energy

To maintain the voltage throughout the day, the variation of load is the main criteria. It is more in the peak hours, medium in the rest of the hours and less in the midnight to early morning. This variation is

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Power Quality Improvement Using Bidirectional AC Chopper with RL Load

BASAMMA R

Assistant Professor, Department of Electrical &Electronics Engineering, Guru Nanak Dev Engineering College

Abstract- *Some of the sensitive loads like the communication equipment's, computer systems and process automation equipment's could introduce voltage imbalance in the single phase power supply. In order to enhance the voltage or to manage the voltage regulators were used which introduced input side and output side harmonics. This paper is an attempt to develop an ac-ac buck boost topology that would introduce the voltage regulation in single phase AC systems. The system consists of an AC chopper which is derived from the DC buck boost chopper. The AC buck boost chopper would work in four quadrant operation and thus needs the bidirectional switches to operate it. According to the IEEE 519 standard for the total harmonic distortion (THD) the input current THD must be less than 5%. Thus an input side LC filter is used to obtain the input current THD reduction. The higher efficiency AC chopper for voltage regulation is developed with the regenerative DC snubber connected to the switches which observe the energy stored in the stray inductance. Mat lab Simulink model is created to have a closed loop operation of the implementation with the zero crossing detectors and to engage in the PWM that it would provide for the voltage regulation.*

An open loop AC chopper circuit is designed with RL load and hardware is implemented to observe the buck and boost operation of the converter. The FFT analysis is carried out in order check the Total Harmonic Distortion of source current, output voltage and current. The hardware results obtained is confirmed with the simulation result obtained.

I. INTRODUCTION TO AC TO AC CONVERTER

Electricity distribution in India is 230V designed for single phase and 415V line to line for three phase system. All appliances sold in India works in the range of 230V-240V. Voltage lower and higher than this range needs to be corrected, if the appliances cannot handle that voltage which are called as sag and swell corrections.

1.1 AC To AC Converter

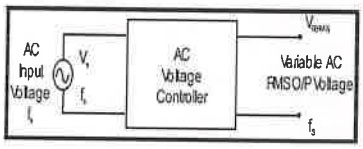

Fig.1.1 AC to AC Converter Block Diagram

The control and conversion of power from AC-DC to AC-DC is the main application of power electronics converter. The above block diagram is the AC to AC converter that uses thyristor family members which has fixed input voltage and variable output voltage. This AC to AC converter is also known as cycloconverter where both frequency and output voltage are variable.

These AC voltage controllers have low input power factor even for resistive loads. They have high value of lower order harmonics both at input and output sides. Hence they require large value of filter elements to reduce lower order harmonics.

These problems can be overcome by using AC chopper circuits. In this case, the PWM technique can be implemented to fluctuate the RMS value of the output electrical energy. In this circuit we can use transistor family members to chop the waveform at higher switching frequency. Now a day's these converters are mainly used in AC drives, series & shunt controllers, as a dimmer stat that handle up to 10 MW of power.

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Impedance and Electric Modulus Studies on Polyaniline/Nickel Ferrite (PANI/$NiFe_2O_4$) Composites

Ajai Kumar S. Molakeri[1,*], S. Sindhu[1], M. Shivalingayya[1], Sangappa K. Ganiger[2]

[1]*Department of Physics, Guru Nanak Dev Engineering College, Bidar – 585 403, Karnataka, India.*
[2]*Department of Physics, Government Engineering College, Raichur – 584 134, Karnataka, India.*

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Nickel Ferrite

ABSTRACT

Conducting polyaniline/nickel ferrite (PANI/$NiFe_2O_4$) composites are synthesized by employing interfacial polymerization method. The composite has been synthesized with 10, 30 and 50 wt.% of nickel ferrites in PANI. The prepared samples were characterized by FTIR and SEM with EDS. The dominant peaks in FTIR graph confirm the formation of PANI/$NiFe_2O_4$ composites. The XRD pattern, confirms the formation of composites. The surface morphology of these composites was studied with scanning electron microscope (SEM). Impedance and electric modulus of these composites was investigated in the frequency range of 10^2 Hz to 10^6 Hz. It is found that Debye type relaxation has been confirmed by the Cole-Cole plot and electrical modulus is inversely proportional to the conductivity of these composites.

1. Introduction

The conducting polymers are a new group of synthetic polymers which combines the chemical and mechanical properties of polymers with the electronic properties of metals and semiconductors [1]. Conducting polymers are used in many applications such as microwave absorption, electronic displays, corrosion protection coating, electrochemical batteries, supercapacitors, sensors, and electrodes [2-6]. They have extended p -conjugation with single- and double-bond alteration along its chain. They behave as a semiconductor material with low charge carrier mobility [7] and their conductivity is increased to reach the metallic range by doping with appropriate dopants [7]. Polyaniline is the most widely studied conducting polymer because of its facile synthesis, low synthetic cost, high electrical conductivity, good environmental and thermal stability [8-12]. Polyaniline can be easily prepared either chemically or electrochemically from acidic aqueous solutions [13, 14]. The most common preparation method is by oxidative polymerization with ammonium peroxodisulfate as an oxidant.

Ferrites belong to a special class of magnetic materials, which have a wide range of technological applications. Due to their low cost, ferrite materials are used in various devices like microwave, transformer cores, magnetic memories, isolators, noise filters, etc [15-18]. The spin-glass state in ferrites exhibits the most interesting magnetic property that causes high field irreversibility, shift of the hysteresis loops, and anomalous relaxation dynamics [19, 20].

Nickel ferrite ($NiFe_2O_4$) is one of the most important spinel ferrites that have been studied. Stoichiometric $NiFe_2O_4$ considers as n-type semiconductor [21]. It exhibits different kinds of magnetic properties such as paramagnetic, superparamagnetic or ferrimagnetic behavior depending on the particle size and shape.

In our earlier paper, we reported AC conductivity and dielectric properties of PANI/$NiFe_2O_4$ composites [22] and in the present paper, the preparation of PANI/$NiFe_2O_4$ composites, its characterization through FTIR spectra, scanning electron microscope, impedance spectroscopy and electric modulus is reported.

2. Experimental Methods

2.1 Synthesis of Polyaniline/$NiFe_2O_4$ Composites

The polyaniline/$NiFe_2O_4$ composites were prepared via interfacial polymerization method with different weight percentage of $NiFe_2O_4$ (10, 30 and 50 wt.%). One gram of aniline was dissolved in 40 mL of $CHCl_3$. 0.1 M ammonium persulphate was dissolved in 1 M HCl and the $NiFe_2O_4$ particles prepared by combustion method in the weight percent of 10, 30 and 50 are added to the above mixture of aqueous and organic phase. After 5 minutes dark green precipitate formed slowly at the interface and then gradually diffused into aqueous phase. After 24 hours, the entire aqueous phase was filled homogeneously with dark green color film, organic layer observed shows orange color due to the formation of aniline oligomers. The aqueous phase was then collected and washed with ethanol and water to remove the unreacted aniline. The residue of polymer thus obtained is purified and dried in vacuum oven at 40 °C for 36 hours. In this way 3 different polyaniline – $NiFe_2O_4$ composites with different wt.% of $NiFe_2O_4$ in polyaniline have been synthesized as reported [22, 23]. The dried polymer composite sample was used for structural characterization and further used to study the electrical properties.

2.2 Characterization

The above synthesized samples were structurally and morphologically characterized by using different techniques like FTIR, XRD and SEM. The FTIR spectra of samples were recorded on ThermoNicolet, Avatar 370 spectrometer in KBr medium at room temperature. The X-ray diffraction patterns of the prepared samples were obtained by employing Bruker AXS D8 advance X-ray diffractometer using CuKα radiation (λ=1.5418 Å) in the 2θ range 10° to 65°. The surface morphology of polyaniline-$NiFe_2O_4$ composites were studied by using Joel model JSM-6390 LV scanning electron microscope (SEM). To measure the AC conductivity, the pellets of the prepared samples were coated with silver paste on either side was held between two nominally spring-loaded copper plates and the AC parameters were measured using N4L-PSM 1735 Numetri-Q programmable LCR meter in a frequency range 10 to 10^6 Hz.

3. Results and Discussion

3.1 FTIR Spectral Studies

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Stress Corrosion Studies of Al 2024 alloy using Novel synthesized inhibitor

Nathaniel Raj* Vijayakumar Durg**

*Department of Chemistry, Guru Nanak Dev Engineering College, Bidar, Karnataka

**Department of chemistry, Bheemanna khandre institute of Technology, Bhalki, Bidar, Karnataka

Abstract

The stress corrosion resistance of AL 2024 in high temperature acidic media using 2, 6-diphenylpiperidin-4-one has been evaluated using an autoclave. The liquid melt metallurgy technique using vortex method was used to fabricate Al 2024 alloy. Stress corrosion tests was conducted using weight loss method for different exposure time, normality and temperature of the acidic medium. The corrosion rates of Al2024 alloy was lower to that of Concentration increases of the inhibitor.

Keywords: Vortex method, Stress corrosion, Autoclave .AL2024 alloy, synthesized inhibitor

1. Introduction

AL2024 offer the designer with many added benefits, since they are particularly suitable for application requiring their combined high strength,[1] better wear resistance [2], thermal conductivity[3], damping properties [4], and low coefficient of thermal expansion with lower density[5]. These properties of alloy enhance their usage in automotive and tribiological applications. The trend is towards safe usage of MMC parts in the automobile engine, which works particularly at high temperature and pressure environments.[6-7] Particle reinforced alloy has been the most popular over the last two decades. Among them ceramic reinforced AL2024 are very popular in the recent days. The addition of the ceramic particle not only enhances the mechanical and physical properties, but also it change the corrosion properties significantly.

Particle reinforced AL find number of applications in several thermal environments especially in the automobile engine parts such as brake drum, brake rotors, cylinders and pistons. used at high thermal conditions should have good mechanical properties and resistance chemical attack in air and acidic environment. It is necessary that the detail corrosion behaviour of AL composites must be understood thoroughly for high temperature applications. Several authors [8-10] point out that the extent of pitting in AL2024 increased with increase in volume fraction which may be due to the preferential acidic attack at the matrix -reinforcement interface.[11] The corrosion behaviour of is influenced by the nature of matrix alloy, a type of reinforcement and alloying elements[12], in spite of these factors the corrosion behaviour in AL2024 is a complex nature. [13] The objective of the present investigation is to understand the role reinforcement on the stress corrosion behaviour of AL2024 at high temperature in varied normalities of Hydrochloric acid solutions. High temperature and pressure in an autoclave is an excellent test for stress corrosion.

2. Experimental procedure

Material selection

Here the matrix alloy used in AL 2024 and its composition is given in Table 1.

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Table 1: Composition of AL2024

Silica	Copper	Magnesium	AL
26-28%	2-2.5%	0.01-0.02%	Balance

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Effective Utilization of Opposition Based Genetic Algorithm for Multi Objective Optimization of CNC Turning Process

K.K. Prasad and D. Chaudhary
Department of Mechanical Engineering, Guru Nanak Dev Engineering College,
585403 Bidar, Karnataka, India

Abstract: The machining is about outward appearance, the fundamental of contemporary manufacturing industry and is concerned either directly or indirectly in the manufacture of almost every product of recent development. A term that covers a hefty anthology of manufacturing processes designed to remove unwanted material, habitually in the appearance of chips from a work piece to provide desired geometry, size and finish specified to fulfil design requirements. This paves the research intention towards incorporating soft computing techniques to acquire better result in short intervals. This study includes the significance of predicting optimal tuning input parameters such as cutting speed, feed rate, depth of cut and nose radius for minimized surface roughness, maximized material removal rate and minimized tool wear. This objective is achieved by developing a mathematical model which incorporates optimization techniques. Genetic Algorithm (GA) is the ultimate tool to utilize in this research for its bettermen, Genetic algorithm has further developed as Adaptive Genetic Algorithm (AGA) and Opposition based Genetic Algorithm (OGA) amid opposition based Genetic algorithm reveal better performance both in the mathematical model designing and tuning input parameter optimization. In this research three different super alloys have been subjected to turning on CNC lathes with a combination of uncoated and coated carbide turning inserts.

Key words: Inconel 718, Hastelloy 276, Monel 400, turning inserts, Genetic algorithm, adaptive Genetic algorithm and opposition based Genetic algorithm

INTRODUCTION

Turning is a machining process in which a cutting tool, usually a non-rotary tool bit, generates a surface of revolution whilst the work piece turn around. Manufacturing strategy that begins with corporate, business and marketing strategies and then intend a manufacturing system to shore up (Elmoselhy, 2013). Manufacturers are beneath tremendous pressure to perk up productivity and quality while plummet costs.

Machining in general and turning in particular, surface finish and accuracy of the machined surface has been identified as quality attributes on the other hand, Material Removal Rate (MRR) which indicates processing time of the work piece is another important factor that greatly influences production rate and cost and hence treated as performance index directly related to productivity. The tool wear and hence, tool life has been identified as an economic criterion which is having a direct influence on quality and productivity. So, an attempt has been made to optimize quality and productivity in a manner that these multi-criteria could be fulfilled simultaneously up to the expected level.

So, as a whole, there is need for tools that will allow the prediction or estimation of the surface roughness, MRR and expected tool life before the machining of the part and which at the same time can be easily used in the production floor environment for contributing to the minimization of required time and cost and the manufacture of desired quality products.

In order to build up a bridge between quality and productivity and to achieve the same in an economic way, the present research highlights optimization of CNC turning process parameters to provide good surface finish, high Material Removal Rate (MRR) and maximum tool life. All of the above attributes greatly vary with the change of cutting process parameters and tool geometry hence, it warrants proper selection of cutting process parameters and tool geometry along with the ability to predict the various responses.

Surface roughness mainly depends on work piece hardness, tool geometry like nose radius, edge geometry, rake angle and various process parameters like feed rate, cutting speed, depth of cut, etc. There are various machining parameters those have an effect on the surface roughness but those effects have not been adequately

Corresponding Author: K.K. Prasad, Department of Mechanical Engineering, Guru Nanak Dev Engineering College, 585403 Bidar, Karnataka, India

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Modeling and Optimization of Optical Half Adder in Two Dimensional Photonic Crystals

Mahesh V. Sonth, Savita Soma, Sanjaykumar C. Gowre & Nagashettappa Biradar

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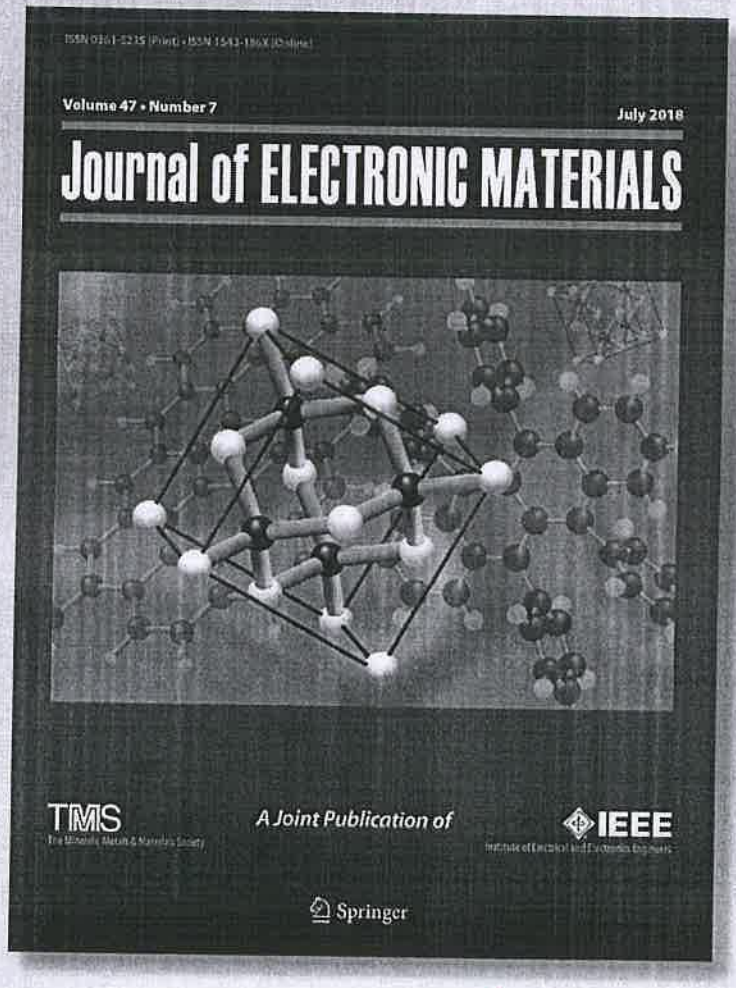

Springer

IMPLEMENTATION OF CASCADED LOGIC GATE IN A 2D PHOTONIC CRYSTAL

[1]Savita Soma, [1]Mahesh V, [2]Sanjaykumar C. Gowre
[1]Research Scholar, ECE Research Centre, BKIT Bhalki-585328, India
[2]Professor, ECE Department, BKIT Bhalki-585328, India

Abstract : We have implemented a new design of all optical NOR logic gate by cascading OR and NOT gates structures on a 2-D Photonic Crystal. Firstly, we have designed optical logic OR and NOT gate by using cross waveguide structure. Cross waveguide structure is constructed by creating two cross line defects in square lattice structure of 8 μm*8 μm photonic crystal. We use silicon rods with refractive index of 3.40 in air host of 1 refractive index. The distance between two Si rods, a=0.637μm. and Si rod radius, r = 0.2a. Later we have cascaded OR and NOT gates structure to realize universal NOR gate. The output power level greater than 0.5 and smaller than 0.1 is treated as logic 1 and 0 respectively. Since the proposed structure is compact, simple and clear operating principle it can be used to generate any other logical function in optical integrated circuits. The proposed structure is simulated using Rsoft FDTD Full wave licensed simulator tool.

IndexTerms - Logic gates, Lattice structure, Cross Waveguide, Photonic Crystal (PC), Rsoft Full wave FDTD simulator.

I. INTRODUCTION

The requirement for high bit rate and demand for large bandwidth is growing due to growth in the internet application and communication traffic. Optical devices used for communication has many advantages over electronic devices like high speed, compact size, low maintenance and has large bandwidth of operation. Data processing in optical domain can be done by all optical logic devices like optical logic gates [1-4], adders [5], multiplexers [6], demultiplexer [7], add-drop filters [8], which increases information rate limit and power utilization as it avoids optical-to-electrical conversion. Lot of research is going on all optical logic gates and optical devices. All-optical logic gates can be designed by utilizing numerous methodologies like, Semiconductor Optical Amplifier (SOA) and by using photonic crystal. The former method consumes more power and requires large space which can be improved by using photonic crystal.

In this paper, we have considered the design, simulation and performance analysis of all optical universal NOR gate by cascading OR and NOT gates on a 2D photonic crystal fiber. Performance is analyzed by constructive and destructive interference of light in the cross waveguide. Proposed structure is designed on a square lattice of silicon dielectric rods in an air background. To construct several optical devices in optical integrated circuits we can use this structure. Input port is excited by a continuous wave (CW) sources with operating wavelength of 1.55μm. The electromagnetic wave propagation takes place in the (x, z) plane. Firstly, we have considered the design and analysis of OR and NOT gate followed by the construction and analysis of NOR gate, results and discussion. The proposed structure is simulated and analyzed using Rsoft full wave FDTD simulator.

II. Models

2.1. Model of all optical OR and NOT gate

The square lattice has 13 Si rods in X and 13 in Z direction in the air host. The size of the structure is 8 μm*8 μm and the distance between two Si rods, a=0.637μm. and Si rod radius, r= 0.2a. Gates structure is constructed by creating two cross line defects called cross waveguides in a square lattice. The optical gate structure shown in Fig.1, has four ports, A, B and R ports are used to apply input and port Y is used as output port. Proposed structure works on constructive and destructive interreference principle. For few gates output requirement is high even if input is zero, Input applied at R and R′ port acts as a reference input to produce output even if input is not applied.

To realize the operation of optical NOT gate, the optical signal is excited at port A as a reference input which is always high, the optical signal excited at port B is the input of NOT gate and port C is not used in this gate, Y port is used as output of NOT gate.

To realize the operation of optical OR gate, the optical signal is excited at port A as a reference input which is always high, the optical signal excited at port B and C acts as two inputs of OR gate and signal obtained at port Y is the output of OR gate.

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Efficient Blind Beamforming Algorithms for Phased Array and MIMO RADAR

Veerendra Dakulagi & Md Bakhar

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Multiband Operation of Microstrip Antenna

Santosh Yadav[1], Dr. Kishan Singh[2]

[1]Research Scholar, Department of EEE, Mewar University, Rajasthan, India
[2] Research Supervisor, Department of EEE, Mewar University, Rajasthan, India

Abstract—The effect of proximity and aperture coupling on the resonance behavior of the microstrip antenna is presented. With proximity coupling the antenna resonates with two bands having bandwidths of 16.75% and 35.58%.When the same antenna is fed by aperture coupling, three bands occur with bandwidths of 44.3%, 4.75% and 53.43%. Further when the H-slot is replaced with a dumbbell slot all the three bands merge to give single band of 91.43% with a peak gain of 10.23dB while retaining the broadside radiation characteristics. The design concept is presented and experimental results discussed.

Keywords: *Bandwidth, gain, groundplane, multiple bands, return loss, proximity, aperture.*

*****

I. Introduction

Microstrip Antennas have gained much significance in communication systems.They are capable of multiband operations, low profile planar configuration making them easily conformal to host surface, light weight, low volume,low fabrication cost etc[1]. They can be easily integrated with microwave integrated circuits(MICs) and show the unique characteristcs of linear as well as circular polarization,They come in various shapes like rectanular, square, circular, triangular, elliptical and can be housed easily on moving vehicles. But these antannas have some drawbacks like narrow bandwitdh, low efficiency, low gain, extraneous radiation from feeds and junctions. To overcome these drawbacks researchers have worked by using parasitic elements[2], thicker substrate[3],proximity coupling[4], aperture coupling[5] etc. In this work the effect of proximity and aperture coupling with a slot in the ground plane is studied.

In the proximity coupling two substrates are used with the patch on top of the upper substrate and the microstripline feed on the top of the lower substrate.The microstripline feed lies between the upper substrate with the patch on it and the lower substrate with the ground plane at the bottom of it. This configuration reduces the cross polarization due to elimination of spurious radiation from feed geometry and possibility of two different dielectric media,one for the patch and the other for the feedline. But the disadvantage is that the proper alignment of the two substrates has to be taken care of and the overall thickness of the antenna increases. In the aperture-coupling , the field is coupled from the microstripline feed to the patch through an electrically small aperture or a slot cut in the ground plane. The shape, size and location of the aperture decide the amount of coupling from the feed to the patch[3].In this paper antennas fed by proximity and aperture coupling techniques have been presented. Further the shape of the aperture is varied in the aperture coupling and its effects on the performance is studied.

II. Antenna Configuration

The microstrip patch, the microstripline feed and the quarterwave transformer are designed using the equations equations available in the literature[6-7]. The artwork is sketched using the computer programme Auto-cad 2006 to achieve better accuracy.The antennas are fabricated using photolithography process on low cost substrate material of glass epoxy with thickness of h=3.2mm and the dielectric constant of ε_r=4.2.

Fig.1(a) shows the top view of the microstrip antenna with the feed on top of substrate2 thus forming proximity coupling(PCRMSA).The patch of length L and width W is etched on the top of substrate s1. The corners of the patch are truncated by taking $L_t=W_t=\lambda_0/15$ corresponding to the design frequency of 4.2GHz, where λ_0 is the free space wavelength in cm. The mirostripline feed is etched on top of substrate s_2 which is shown in figure.1(b) with its tip lying below the centre point of the upper radiating patch placed on the top of the substrate s_1 as shown in fig.1(a).The length and feed of microstripline feed are L_f and W_f respectively. The thickness of the substrate h, ε_r and dimensions of the substrate s_1 and s_2 remain same .Since the substrate s_2 is placed below s_1 and the feedline lies between the two substrates, the proximity coupling takes place. Further the same antenna is fed through aperture coupling and the antenna is named as aperture coupled(ACRMSA).The top geometry of ACRMSA remains same as that of Fig.1(a). The coupling slot is placed on top of the substrate s_2. The microstripline feed shown in Fig.1(b) is etched on the bottom surface of s_2.

Since the coupling slot is placed between the two substrates, it acts as the aperture and thus forming the aperture coupling feed. The slot is placed exactly below the truncated patch on top of s_1.The microstripline feed is placed such that its tip lies exactly below the centre of the patch thereby enabling the feed from microstripline through the coupling aperture.

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Research paper

FPGA based least mean square algorithm for noise cancellation in communication system

Praveen Reddy [1] *, Dr. Baswaraj Gadgay [2]

[1] *Asst.Prof. Gndec Bidar. Karnataka. India*
[2] *professor Vtu Kalaburagi. Karnataka. India*
**Corresponding author E-mail: reddysirlogin@gmail.com*

Abstract

We present modified Distributed Arithmetic (DA) based architecture for LMS Adaptive filter which has improved the throughput of the filter also area and power has been comparatively been reduced. As we know, the adaptive filter uses continuous recalculation and generation of new coefficients will generate the negative effect on the use of algorithm. We have used a special temporary LUT addressing technique has overcome the issues resulting in better performance and good results. In this paper, we have discussed about the adaptive filter and implementation of DA adaptive filter and also discussed the results obtained from the design. Comparison with traditional design has also been done to show the effectiveness of the algorithm.

Keywords: Least Mean Square (LMS) Algorithm; Distributed Algorithm (DA); Adaptive Filter; Field Programmable Gate Array(FPGA); Throughput; Efficiency; Convergence Rate; Power Analysis; Look Up Table(LUT); Convergence Matrix; Interference Signal.

1. Introduction

Array of reception apparatuses or sensors is broadly utilized as a part of numerous applications like correspondence, radar and so on. Points of interest of such frame-work are higher degrees of opportunity, excess, adaptability and so forth. In genuine the signs got by the cluster comprise of wanted flag as well as the obstructions from the sources in the encompassing condition, it is fundamental to expel the meddling sign and increment the Signal to Interference in addition to Noise Ratio (SINR) of the coveted flag... Obstruction corrupts the execution of the framework and diminishes the recognition and estimation of the coveted flag in the got flag. Slightest Mean Squares (LMS) calculations depends on figuring of minimum mean square of the flag having mistake and the real flag. At the end of the day, we can state it is the distinction of real flag and they got flag.

As the name suggests adaptive means keeps on changing. The filter is designed in such a way that it's coefficient are continuously changing due to the feedback system into the filter to re-move the noise from the output signal till the time is minimum. The filter keeps on updating the feeding the generated noise error to the feedback till the total system output power, updating the weighting coefficients as the need arises. The advantage of this system is that it works well in non- stationary conditions, i .e. when the relative difference in the characteristics of the RFI in the primary and reference channels change with time.

Interference is the kind of time-varying, unknown signal. This characteristic requires the filter can automatically track the changes of signals, and respond to the changes by adjusting the weight coefficient quickly. What is more, this just fits well with the functions of the adaptive filter. Thus, the adaptive filter is what to be chosen for the interference cancellation. The principle of adaptive filtering interference cancellation is shown in Figure 1

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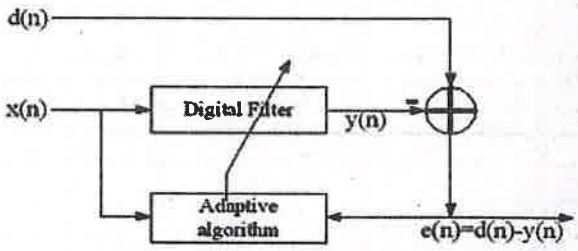

Fig. 1: Block Diagram of Adaptive Filter.

Where x(n) is the input signal to a digital filter y(n) is the corresponding output signal d(n) is an additional input signal to the adaptive filter e(n) is the error signal that denotes the difference between d(n) and y(n). The adaptive canceller will not distort the spectrum of the astronomical signal, yet it will provide a high degree of interference attenuation. Noise injected by the reference channel can be minimized if and a large number of filter taps are used. The higher the interference to noise in the reference channel relive to that in the Primary channel, the lower there residual noise in the system

LMS Algorithm

The primary highlights that pulled in the utilization of the LMS calculation are low computational many-sided quality, confirmation of joining in stationary condition, fair union in the intend to the Wiener arrangement, and stable conduct when executed with limited exactness math. The meeting investigation of the LMS displayed here uses the freedom supposition.

Derived the optimal solution for the parameters of the adaptive filter implemented Through a linear combiner, which corresponds to the

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A Case Study: Performance Evaluation of 100kW SRPV at GNDEC, Bidar

Deepak Ghode

Pratiksha Apoorvaand

ABSTRACT

In recent years, increased emphasis has been placed on Photovoltaic(PV) Technology as the application of this technology has shown a sustained growth.In the emerging PV markets worldwide, the use of appropriate estimation of the operating performance grid-connected PV system is becoming more and more crucial. This paper presents an assessment of the electricity generated by 100kW PV grid connected system installed on the rooftop of Electrical Science Block of Guru Nanak Dev Engineering College, Bidar.A central issue in the sustainable diffusion of PV technology is represented by the actual energy efficiency of the PV system. For this reason, a performance analysis needs to be carried out. The various performance indices that are used to analyze

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An Eextension Analysis of SRPV Generation at GNDEC Bidar: A Case Study

Deepak Ghode, Assistant Professor, GNDEC, Bidar, J Pooja and Pooja. N. P, Student, GNDEC, Bidar.

Abstract--In present scenario, the electricity requirements are increasing at alarming rate and the power demand is ahead of supply. It is also now widely recognized that fossil fuels may not be either sufficient or suitable to keep pace with ever increasing demand of electricity. The recent severe energy crises has forced to develop alternative method of power generation. The solar PV system is one of the example and it has several benefits such as self-reliance in electricityin a cost-effective manner, environmental sustainability reduction in carbon foot print and minimize the payoffs. As a result, GNDEC Bidar has installed 100kw solar power plant on electrical science block to satisfy the college load. Since college connected load is 400kw and contract demand is 200kva, which accounts for expansion of existing SRPV generation plant. In this paper primary objective is to create a realistic plan for expansion of solar PV system at GNDEC, Bidar.

Index terms: SRPV (solar rooftop photovoltaic), tilt angle, payback period.

I.INTRODUCTION

A solar photovoltaic system is a renewable energy power generation that uses photovoltaic module to generate electricity. The electricity generated can be stored, used directly, or fed back into grid. Solar photovoltaic is a reliable and clean source of electricity that can suit a wide range of power generation applications for residential, industrial, agriculture etc. success for power generation in recent year across the world. When it was first invented, each cell had a 6% efficiency rate, currently most cells have an efficiency rate of approximately 25%, still research is going on and efficiency may reach up to 40%.

In concern GNDEC Bidar has installed and commissioned a 100KWp solar photovoltaic rooftop plant. The plant consists of a total 400PV modules and generate more than 1.5 Lakh units every year, Average monthly power generated is

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Solar Still

Megha
Assistant Professor, IETE Member, Guru Nanak Dev Engineering College, Bidar, EEE Department

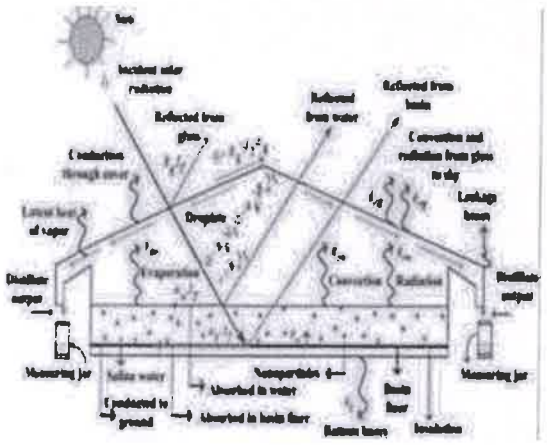
Abstract- **Water is the main source for sustaining living beings on earth. Water shortage has become one of the major global challenges, which is linked to population growth. Ground water and reservoirs are the available sources of fresh water. But these sources are not always useful due to pollution and dissolved impurities. Solar distillation is a process by which we can purify the salty, blackish water with the help of solar radiation. The main goal of this paper is to provide drinking water from salty, blackish water.**

Index Terms- Solar Water Distillation, Solar Energy, Active Techniques, Solar Still, Performance etc.

1. INTRODUCTION

Water is an essential element on earth for the living beings. Nearly three fourths of earth surface is covered with water and 97% of which is salt water in the oceans. On the other hand remaining water is in the form of ice, ground water, lakes and rivers. Only less than 1% of the available water is fresh and accessible to humans. Water on earth is contaminated with impurities and chemical substances. Therefore it cannot be used for agriculture, industrial and human consumption.

Demand for clean uncontaminated water is an integral part of daily life. Healthy drinking water is unavailable in impoverished region is increasing day by day parallel to increasing population on earth. Distillation is thermal energy based process that removes impurities from water. Solar distillation is one of the methods of getting distilled water using solar energy. Due to abundant solar energy solar distillation is cost saving in comparison to other types of distillation such as reverse osmosis. Now day's solar stills are widely used for distillation. It is one of the most important and technical application of solar energy. It is an inexpensive device.



2. BASIC PRINCIPLE OF SOLAR STILL

A solar still is a device used to produce clean, drinkable water from dirty water using solar energy from the sun. It is coupled with thermal collectors, concentrators, and photovoltaic panels which makes the system active and increases distillation three to six times. The sun energy heat water to the point of evaporation. When water evaporates, water vapour rises, which condenses on the glass surface and they are collected by using collectors. This process removes impurities and eliminates micro organisms.

3. PARTS OF THE SOLAR STILL

The major parts of a solar still are given below,

A.Transparentcover- It should have high transmittance for solar radiation, opaque to thermal radiation, low cost, light weight, easy to handle and long life. This cover transfer solar radiation into the still and also helps to condensate the vapour. The material uses for transparent cover is glass.

B. Black liner-It should be durable, easily cleanable, water tight, low cost and should be able to tolerate

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Concepts of Power Electronic Devices

S. Pretpal Singh
IETE Member, Guru Nanak Dev. Engineering College, Bidar

Abstract- **Power Electronics is a branch which combines Power (electric power), Electronics and Control systems. Power engineering deals with the static and rotating power equipment for the generation, transmission and distribution of electric power. Electronics compromise with the study of solid state semiconductor power devices and circuits for Power conversion to meet the desired control objectives (to command the output voltage and output power). Power electronics may be defined as the subject of applications of solid state power. Power electronics deals with the study and design of Thyristorised power controllers for many of application like Heat control, Light/Illumination control, and Motor control - AC/DC motor drives used in industries, High voltage power supplies, Vehicle propulsion systems, High voltage direct current (HVDC) transmission. Semiconductor devices (Thyristors) for the control and conversion of electric power.**

Index Terms- Electric Power, Control System, Semiconductor.

INTRODUCTION

The first Power Electronic Device invented was the Mercury Arc Rectifier during the year 1900. Then the other Power devices like metal tank rectifier, grid controlled vacuum tube rectifier, ignitron, phanotron, thyratron and magnetic amplifier, were invented& used gradually for power control applications until 1950. The first SCR (silicon controlled rectifier) or Thyristor was found and developed by Bell Lab's in 1956 which was the first PNPN transistor. The second electronic revolution began in the year 1958 with the development of the commercial grade Thyristor by the General Electric Company (GE). Thus the new area of power electronics was born. After that many different types of power semiconductor devices & power conversion methods have been introduced. The power electronics innovation is giving us the ability to convert shapes and control large amounts of power.

Appliances – (domestic and industrial), battery chargers, audio amplifiers, , blenders, blowers, boilers, burglar alarms, cement kiln, chemical processing, Advertising, air conditioning, aircraft, alarms, power supplies, clothes dryers, conveyors, , computers ,cranes and hoists, dimmers (light dimmers), elevators, fans, flashers, food mixers, food warmer trays, fork lift trucks, furnaces, games, garage door openers, gas turbine starting, generator exciters, grinders, hand power tools, heat controls, high frequency lighting, HVDC transmission, induction heating, laser power supplies, latching relays, light flashers, linear induction motor controls, locomotives, displays, electric door openers, electric dryers, electric fans, electric vehicles, electromagnets, electro mechanical, electronic plating, electrostatic precipitators, electronic ignition, machine tools, magnetic recording, magnets, mass transit railway system, mercury arc lamp ballasts, mining, model trains, motor controls, motor drives, movie projectors, nuclear reactor control rod, oil well drilling, oven controls, paper mills, particle accelerators, servo systems, sewing machines, VLF transmitters, voltage regulators, washing machines, welding equipment , solar power supplies, solid-state contactors, synchronous motor starting, solid-state relays, static circuit breakers, static relays, steel mills, phonographs, photo copiers, power suppliers, printing press, pumps and compressors, radar/sonar power supplies, refrigerators, regulators, security systems, TV circuits, temperature controls, timers and toys, traffic signal controls, trains, RF amplifiers, TV deflection circuits, ultrasonic generators, UPS, vacuum cleaners, VAR compensation, vending machines.

DOMESTIC APPLICATIONS: Lighting, Cooking Equipments, Personal Computers, Entertainment Equipments, UPS, Heating, Air Conditioners, Refrigerators & Freezers. COMMERCIAL APPLICATIONS: Lighting, Computers and Office equipments, Uninterruptible Power Supplies (UPS), Heating Systems Ventilating, Air Conditioners, Central Refrigeration, Elevators, and Emergency

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A DC-DC Converter for standalone applications

S. Pretpal Singh
IETE Member, Guru Nanak Dev. Engineering College, Bidar

Abstract- **The conventional energy sources available in the world are diminishing every year creating a huge difference between the demanded energy and the available energy. Efficient utilization of the ample renewable energy resources present in the world can be used to cover this extra demand. With the use of this renewable energy sources the levels of pollution and global warming can controlled to a lower level. A significant demerit with the renewable energy sources is their fluctuating nature. Hybridization technique is hence utilized to overcome this problem. This allows two sources to meet the load separately or simultaneously depending on the availability. In this paper a double input single output DC-DC converter is presented for stand-alone systems. The topology operates as a bootstrap circuit by employing the charging switches in case of only one input port powering or one input being short circuited and maintains the expected output voltage making the system fault tolerant.**

Index Terms- Hybrid system, Multi-input converter, Bootstrap operation, Solar panel, Fuel cell.

I. INTRODUCTION

Rise in the energy demand and limitation in fossil fuels have increased the role of renewable energy resources. Renewable energy sources will have to play a significant role in overcoming these problems. Systems based on petroleum product and fossil fuels will result in environmental pollution and hence global warming. This elevated the need for renewable energy sources which is abundant and environment friendly. Solar energy, wind energy, etc. are capable of supplying energy to meet the power demand. Even though the capital cost and space requirement for such systems are high, the running cost is extremely low. They can be easily utilized in distributed generation, micro grid, standalone systems, rural telephony systems etc. The main disadvantage of such a system is its unpredictable and intermittent nature, i.e., the output from these systems will always be fluctuating and doesn't deliver a constant output.

To overcome this challenge, hybrid renewable energy systems were implemented which clubs two or more energy resources to produce a constant output. Hybridization improves the efficiency and life of the system and also brings down the storage requirement. However, by combining these two fluctuating sources, the efficiency and reliability of the system can be refined notably. At the same time, the capital cost and complexity can increase as a result of hybridization. Multi input converters (MIC) have a simpler structure, improved power density and lower cost due to sharing of switches and other components [1]-[3]. Dynamic performance can be improved and complex communication among multiple different sources can be avoided due to the unified power management with centralized control. Thus MIC is appropriate for renewable power systems. Isolated [4]-[6] and non-isolated MIC has been developed for DC-DC conversion. Galvanic isolation is used in isolated MICs, but the disadvantage is the larger number of active switches present in it. Non-isolated converters have the advantages of small size, high power density and more efficiency. Based on buck and/or boost converter structures, various non-isolated topologies were developed. A triple input boost DC-DC converter developed in [7] consists of a photovoltaic source, fuel cell and a battery in a unified structure. A buck voltage source cell parallel connected MIC is presented in [8] which can operate in buck, boost or buck-boost mode, but with only any one of the input ports powering. Two-input series connected buck DC–DC converters proposed in [9]–[11] have a simple topology and efficient energy utilization. They can deliver power to the load from two power sources simultaneously or individually. The series-connected two input converter in [10] has one input port connected to a renewable energy source and other to a storage element, used for nanogrid application. Although both individual and simultaneous operations are possible for this converter, when one input source is shut down, the

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Generation and Economics of 100kwp Roof-Top Grid Connected PV Plant

Durga Prasad Ananthu[#1] and Dr.Neelshetty K[#2]
[#1] Asst.Prof - (Ph.D scholar), Member IEEE, GNDEC, Bidar, VTU Karnataka, INDIA
[#2] Prof & Head EEE Dept. GNDEC, Bidar, VTU Karnataka, INDIA

Abstract

This paper gives the detailed study of generation and economics of 100 kwp grid connected roof top solar pv power plant. Total no of units Generated, no of units consumed at the site and no of units (kwh) exported to the grid recorded for two years. A comparison statement prepared with net savings, payback period and also recommendations made to extract more energy for better performance. Maximum power output both AC and DC side are measured.

Keywords: *Solar PV System, MPPT, Inverter.*

I. INTRODUCTION

Solar energy is gaining high popularity in India. It sets a target of installed capacity of 100GW (40 GW from roof top) by 2022 through MNRE (Ministry of New and Renewable Energy) and achieved 20GW by Jan 2018. The unit cost is Rs 2.44. A 100KW ROOF TOP Grid connected PV installed at GNDEC, Bidar in 2015. It has 400 Modules each rated 250 W capacity with 6 string inverters with a roof area of 1256m^2. PV module type Poly Crystalline. Inverter type grid tied IGBT Based SMA inverter, capacity 17 kVA.

The average monthly generation from the 100kWp roof top solar plant from April 2016 to March 2018 is 10865 kWh. This typically accounts for 35 % of gndec monthly electricity consumption. This has resulted a monthly saving of Rs 70000 to 90000 in the electricity bill of gndec. The plant exported a monthly average of 460 kWh. However the gndec has net import from the grid as its consumption is more than the solar generation.

GNDEC has a contract demand of 200 kVA, approximate billing demand is 150 kVA. It has 500kVA Transformer and 2x 125 kVA DG sets in the campus and is maintaining a unity power factor.

Table 1. Solar array Support Roof Structure

Type: Elevated roof mount	Material: Galvanized Iron
AC Distribution board: Type: 6 in and 1 out	Make: Greensol Renewable power pvt ltd.
Table configuration: Total no of modules : 400	16 no's of 2 x 11 =352 modules 2 no's of 2 x 12 = 48 modules
Major components:	4P, 32 A MCB for each inverter on input side Surge protecting device for each phase Disconnect switch on output side.
Synchronization panel:	LV panel: existing GNDEC panel board Disconnect: 4pole 200A Isolator with enclosure
Voltage	320-480 V
Frequency	48-52 Hz.
Average daily generation	390 kWh.

II. INSTALLATION OF ROOF TOP SOLAR PLANT AT GNDEC

A 100KWP ROOFTOP GRID TIED solar pv plant installed at gndec in may 2015. It is located in the roof of electrical science block of GNDEC. The output from the PV system connected to the grid through local AC Distribution Boards (ACDB). The college DG set is being used to create the local grid during load shedding.

Major components of the plant are 250Wp polycrystalline PV modules 400 in numbers, 17 kVA string inverters 6 in numbers and Aluminium mounting structure. The rated output is generated at standard test condition (STC), which is defined as 1000W/m^2 irradiance, 25°C cell temperature, Air mass 1.5g and the NOCT is 46°C.

Table 2. Solar Module Specifications

Solar cell	Poly crystalline
Module dimensions	1639x982x35
NOCT	46°C
Open circuit voltage	37.20
Short circuit current	8.75
Maximum power voltage	29.95
Maximum current	8.35
Peak power	250
Fill factor	74
Maximum system voltage	1000
efficiency	15.54%

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Waste Water Treatment Using PLC and SCADA

NEELSHETTY K [1], AVINASH [2], MD JALEEL [3], MD MUJEEB [4], SHARANAPPA [5]
[1,2,3,4,5] Dept. of Electrical and Electronics Engineering, GNDEC, BIDAR

Abstract *-- The proposed automation solution for waste water treatment plant involves the use of a series of small control systems that run the facility, PLC (Programmable Logic Controller) continuously monitor the operation of pumps, closures and other devices, collect and execute commands coming from the higher levels, while programmable controllers (PLC) are used to control various processes based on the data and the built-in algorithm. According to the given specifications, a control panel was created in a suitable SCADA software for the control and monitoring of waste water treatment, which requires the communication between the SCADA application and local PLC controller is necessary. A program that provides the appropriate behavior of the valve, placed at the entrance and the control of the pumps was written in a ladder diagram. The alarm and monitoring system is of the highest importance. It covers the most significant facilities of the waste water treatment plant having pumping stations, reservoirs and supply lines and shows that the plant as a whole works well. If something unexpected happens – such as a failure or a malfunction of a vital facility – the system should register and alerts the staffs who work there.*

Indexed Terms – Supervisory Control and Data Acquisition (SCADA), Programmable Logic Controller (PLC), Inputs/Outputs tags, Programming Interface, Alarms.

I. INTRODUCTION

Everyone generates wastewater. Typical residential water usage is from 75 to 100 gallons per person per day. Seventy-three percent of the population is connected to a centralized (municipal) wastewater collection and treatment system, while the remaining 27percent uses on-site septic systems. Water is not used up. When people are through with water it becomes wastewater—better known as sewage—that must be cleaned up before it is returned to the environment for reuse. In one way or another, all water is recycled. In the past, people had the idea that wastewater was something that could be disposed of—it would just disappear. This idea has caused many people to assume that when they dispose of the wastewater they also dispose of any problems or hazards related to it. Today we recognize that we must recycle water to maintain sustainable supplies of safe drinking water for future generations. In order to clean up or treat wastewater for recycling, it is important to understand what wastewater contains, what problems it may cause, and what it takes to clean it up.

In addition to water that we want to recycle, wastewater contains pathogens (disease organisms), nutrients such as nitrogen and phosphorus, solids, chemicals from cleaners and disinfectants and even hazardous substances.1 Given all of the components of wastewater, it seems fairly obvious that we need to treat wastewater not only to recycle the water and nutrients but also to protect human and environmental health. Many people, however, are not very concerned about wastewater treatment until it hits home. They can ignore it until bacteria or nitrates show up in their drinking water, the lake gets green in the summer and the beach is closed, or the area begins to smell like sewage on warm days. Sometimes residents discover they can't get a building permit or sell their home without a septic inspection or upgrade, or they find out there is no room on their property for a new or replacement septic system. Often when one homeowner has a sewage treatment problem, others in the neighborhood have the same problem. People don't always talk to their neighbors about sewage problems for a variety of reasons, including risk of enforcement actions. Ultimately, people using water are responsible for treating and recycling their own wastewater. As individuals and members of a larger community, everyone must take responsibility for wastewater generated in their community. To protect the health of all, they must make sure that all wastewater is delivered to a good treatment facility.

II. BLOCK DIAGRAM

The block diagram of the overall process is Represented in figure 1

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Variable Frequency Drive Based Speed Control of 3 Phase Induction Motor in Sugar Mill Using PLC AND SCADA

SHUBHA KULKARNI [1], DEEPIKA [2], ASHA [3], KAVYA [4], PRIYANKA. N [5]
[1,2] Dept. of Electrical and Electronics Engineering, GNDEC, BIDAR

Abstract *-- The Variable Frequency Drive(VFD) based speed control of three phase induction motor using PLC(Programmable Logic Controller) and SCADA(Supervisory Control and Data Acquisation system) involves a sugar plant. The sugar plant contains various stages involved in the production of sugar starting from the inflow of sugarcane into the crushing machine. The speed of the sugarcane crushing machine depends on the amount of sugarcane flowing into the machine. When the conveyor which supplies the sugarcane increases its speed then the load on the machine increases automatically.*

Now-a-days in sugar plant, if heavy load enters into the crushing machine it cannot crush properly. So the wastage is increased and production rate will be reduced. To overcome this problem, we are going to implement the VFD based speed control of 3 phase induction motor. The whole unit is controlled by PLC and monitored by SCADA.

Indexed Terms *-- Supervisory Control and Data Acquisition (SCADA), Programmable Logic Controller (PLC), Variable frequency drive (VFD), Motor.*

I. INTRODUCTION

The most commonly used motor in sugar industry is three phase Induction Motor (IM) as it require very less maintenance. To alter the speed and rotating direction of the three phase induction motor Variable Frequency Drive(VFD) is used in the present years. In order to control and monitor the speed through Variable Frequency Drive, Programmable Logic Controller and Supervisory Control and Data Acquisition system are used. Automation of Variable Frequency Drive (VFD) based sugarcane crusher system consists of the following two main sections: Speed control using VFD, PLC-SCADA based Induction motor drive control.

The three-phase induction motor is used in a VFD system. As induction motor runs only at a steady speed rate so VFD is attached so that it can run at a varying speed. The VFD controller is a power electronics conversion system, which has an AC to DC converter, a buffer and filter link, and a DC to AC converter. The DC link in the VSI drive has a capacitor that will eliminate the noise distortion from the converter's DC output and a good signal without any warp is given as input to the inverter. With the help of inverter's Active switching element the filtered DC voltage is converted to quasi-sinusoidal AC voltage output. VSI drives supply higher power factor and lower harmonic distortion.

The advantages of VFD are that they are energy saving, consumes less current for starting of motor, thermal and mechanical losses are less on motors, maintenance is not required often, has high power factor and a low KVA. The PLC controls and monitors VFD and VFD acts as a conciliator between 3phase induction motor and the PLC. A conveyer is connected to the induction motor and cell sensor input is connected uniformly across the conveyer. The sensor input is connected to the PLC. This processes the input according to the ladder logic programming and initiates corresponding output to the VFD.

II. BLOCK DIAGRAM

The figure shows the block diagram of variable frequency drive speed control of three phase induction motor in sugar mill using PLC and

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Monitoring of Thermal Power Plant Using PLC and SCADA

SHUBHA KULKARNI[1], SOWMYARANI MALSA[2], NIDHISHREE D[3], PATIL ARCHANA[4], SHRUTI[5]
[1,2,3,4,5] *Dept. of Electrical & Electronics Engineering, GNDEC, BIDAR*

Abstract *-- Over the years the demand for high quality, greater efficiency and automated machines has increased in this globalised world. This paper summarize the various stages of operations involved in the conversion of a manually operated boiler towards a fully automated boiler The automation is further enhanced by constant monitoring of boiler using SCADA screen which is connected to the PLC by means of communication cable. In order to automate a power plant and minimize human intervention, there is a need to develop a SCADA system that monitors the plant and helps reduce the errors caused by humans. In this project SCADA system is used in monitoring the boiler parameter likes temperature, pressure, flow, level. Sensors are used to monitor the parameter and the sensed signals are processed by PLC and monitor with SCADA the signals are compared with the reference parameter and the respective valves of the parameter are adjusted with the monitoring and logic control system. We are generating 4MW and 6MW with the help the help of PS1 and PS2 respectively.*

Indexed Terms *-- Supervisory Control and Data Acquisition (SCADA), Programmable Logic Controller (PLC), Inputs/Outputs tags, Programming Interface, Alarms.*

I. INTRODUCTION

Now a day's the demand for higher reliability and efficiency is increasing in thermal power plant. Power plant requires continuous inspection & monitoring after regular intervals. There may be chances of errors while measuring at various stages by human workers. Thus to increase reliability the automation is needed so that overall efficiency of power plant gets improved. The automation is developed by using PLC (Programmable Logic Controller) and SCADA (Supervisory Control and Data Acquisition system) which reduces the errors caused by human workers. PLC is programmable logic control. It is used for implementing various function such as sequencing, timing, counting, logic, arithmetic control through analog and digital input output modules. In order to store the program in PLC it must be interfaced to computer via interfacing unit. The programmed can be implemented through various languages. In this paper ladder logic is used for programming. SCADA system is used to supervise a complete process. The output of different sensors is given to the PLC which takes necessary action to control the parameter. SCADA and PLC are interfaced by using communication cable. The alarm system is also provided to inform the operator. SCADA is used to monitor water level, temperature, pressure using different sensors and corresponding output is given to the PLC, for controlling these parameters. The sensors used are pressure sensor, temperature sensor, and water flow level sensor. The pressure is measured and control at turbine too.

Boiler is one of the most important units in thermal power plant. Boilers are used to generate the steam at a pressure of 66Kg/cm^2 and 900°C, this steam is used to rotate the Turbine at speed of 7700 RPM. Turbine is coupled with generator via a reduction gearbox. Gearbox is used to reduce the speed from 7700 to 1500 RPM. Once the generator rotates at its rated speed, with excitation it starts generating the Power. This power will be supplied to plants for their production and for self-consumption.

II. BLOCK DIAGRAM

Boiler unit is the heart of thermal power plant. Human intervention is difficult because of high boiler temperature. Hence we control the boiler using automation (PLC and SCADA). The process flows as per figure 1.

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A Complete Automation of Grid Tied Roof Top Solar 11kV Substation at GNDEC, Bidar

Deepak Ghode[1] Apoorva[2] Pooja Jawake[3] Pooja Pershetty[4] Pratiksha Deshmukh[5]
[1,2,3,4,5]GNDEC, Bidar, India

Abstract— With increase in population, the demand for electricity is increasing tremendously and leading to complexity in the power system. In which, substation has the critical role in the power system because it is subsidiary station of an electricity generation, transmission and distribution system. As the power consumption increases, unprecedented challenges are being faced which require modern, sophisticated methods to control and maintain them. This calls for the use of automation in the power system. The Supervisory Control and Data Acquisition (SCADA) and Programmable Logic Controller (PLC) are answer to this. SCADA refers to the system that enables on electricity utility to remotely monitor, co-ordinate, control and operate transmission, distribution and maintenance. PLC is like brain of the system i.e., PLC is a medium between electrical system and personal computer for software to take database. With the co-operative operation of the SCADA and PLC, it is possible to control and operate the power system remotely. To reduce the gap between generation and demand, Rooftop Solar Power Plant is used as alternate source of energy. The model is proposed for college 11KV Substation at GNDEC, Bidar with grid tied 100 kW solar roof top power plants. Various tasks like determining oil level, thermal stability, moisture content, loading, overvoltage, under voltage, overcurrent and maintenance schedule in Transformers, Generators and Solar Power Plant using sensors. This type of automatic network can manage load, maintain quality, and detect theft of electricity and tempering of meters. It gives the operator an overall view of the entire network.

Key words: Supervisory Control and Data Acquisition (SCADA), Programmable Logic Controller (PLC), Rooftop Solar Power Plant

I. INTRODUCTION

Electrical Power Systems are a technical wonder. Electricity and its accessibility are the greatest achievements of the 20th century. A modern society cannot exist without electricity. A substation is a place where high voltage electricity from power plants is converted to lower voltage electricity for homes or factories. Substations form a very important part in the transmission and distribution of electrical power system. The main function of the substation is to receive energy transmitted at high voltage from the generating station to a value appropriate for local distribution and provide facilities for switching.

As the demand for electricity is increasing day by day, unprecedented challenges are being faced. This calls for the use of automation in the power system. The SCADA and PLC are an answer to this. SCADA stands for Supervisory Control and Data Acquisition. As the name indicates, it is not a full control system, but rather focuses on the supervisory level. It is used to monitor or control the power plant. The control may be automatic or initiated by operator commands.

PLC (Programmable Logic Controller) is a digital computer used for the automation of various electromechanical processes in industries. PLC consists of a microprocessor which is programmed using the computer language. The program is written on a computer and is then loaded into the PLC via communication cable. These loaded programs are stored in the non-volatile memory of the PLC. With the joint operation of PLC and SCADA, it is possible to control and operate any power system remotely.

II. COMPONENTS REQUIRED

This chapter includes the hardware and the software tools used for the implementation of the project.

1) Control Kit
- Toggle Switch.
- SMPS (Switch Mode Power Supply)
- Panel Led Lighting

2) Buzzer

A. Control Kit

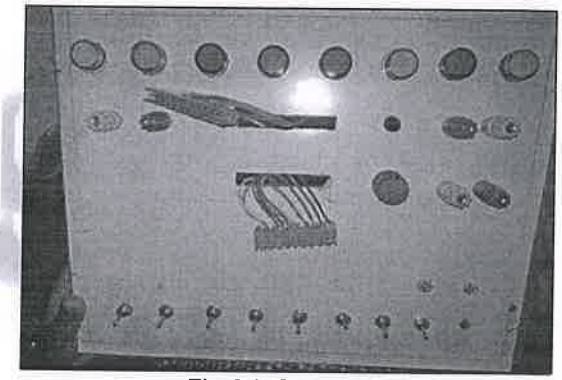

Fig. 2.1: Control Kit

The SCADA system uses different switches to operate each device and displace the status at the control area. Any part of the process can be turned ON or OFF from the control station using these switches. SCADA system is implemented to work automatically without human intervention but at critical situations it is handled by man power. A typical control kit used here consists of toggle switches, LED lights, SMPS and connecting wires.

1) Toggle Switch

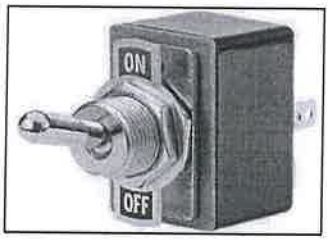

Fig. 2.2: Toggle Switch

A toggle switch is a class of electrical switches that are manually actuated by a mechanical leveller, handle or rocking mechanism. Toggle switches are available in many different styles and sizes and are used in numerous applications. Many

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Power Factor Correction Using Bridgeless AC-DC Boost Converter

Prakash Udgire
IETE and ISTE Member, Associate Professor in EEE Department, Guru Nanak Dev. Engineering College, BIDAR, Karnataka

Abstract- **Nowadays electronic equipment such as computers, televisions, audio sets and others they need to require dc power supply. Power supplies make the load compatible with its power sources. The presence of nonlinear loads result into low power factor operation of the power system. Several techniques for power factor correction and harmonic reduction have been reported and a few of them have gained greater acceptance over the others. In this paper a bridgeless power factor correction boost converter is proposed which results in improved power factor and reduced harmonics content in input line currents as compared to conventional boost converter topology. Bridgeless power factor correction boost converter eliminates the line voltage bridge rectifier in conventional boost power factor correction converter, so that the conduction loss is reduced.**

*Index Terms-*Power factor correction (PFC), Conventional boost converter (CBC), Bridgeless PFC boost converter (BPFCBC), Total harmonic distortion (THD), Power factor.

I. INTRODUCTION

The extensive use of dc power supplies inside most of electrical and electronic appliances lead to an increasing demand for power supplies that draw current with low harmonic & also have power factor close to unity. DC power supplies are extensively used inside most of electrical and electronic appliances such as in computers, audio sets, televisions, and others. The presence of nonlinear loads results in low power factor operation of the power system. The basic block in many power electronic converters are uncontrolled diode bridge rectifiers with capacitive filter. Due to the non-linear nature of bridge rectifiers, non-sinusoidal current is drawn from the utility and harmonics are injected into the utility lines. The bridge rectifiers contribute to high THD, low PF, and low efficiency to the power system. These harmonic currents cause several problems such as voltage distortion, heating, noises etc. which results in reduced efficiency of the system. Due to this fact, there is a need for power supplies that draw current with low harmonic content & also have power factor close to unity.

The AC mains utility supply ideally is supposed to be free from high voltage spikes and current harmonics. Discontinuous input current that exists on the AC mains due to the nonlinearity of the rectification process should be shaped to follow the sinusoidal form of the input voltage. Power factor correction techniques are of two types – passive and active. While, passive power factor correction techniques are the best choice for low power, cost sensitive applications, the active power factor correction techniques are used in majority of the applications due to their superior performance.

The continuous-conduction mode (CCM) conventional boost topology has been widely used as a PFC converter because of its simplicity and high power capability. Recently, in order to improve the efficiency of the front end PFC rectifiers, many power supply manufacturers have started considering bridgeless power factor correction circuit topologies. Usually, the bridgeless PFC topologies, also known as dual boost PFC rectifiers, reduce the conduction loss by reducing the number of semiconductor components in the line current path.

II. CONVENTIONAL PFC BOOST CONVERTER

The conventional input stage for single phase power supplies operates by rectifying the ac line voltage and filtering with large electrolytic capacitors. This process results in a distorted input current waveform with large harmonic content. As a result, the power factor becomes poor (around 0.6). The reduction of

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GSM Based Power Theft Detecting and Monitoring

Prakash Udgire
IETE and ISTE Member, Associate Professor Guru Nanak Dev. Engineering College, Bidar

Abstract- **Electrical energy is very imperative for ever day life and a spine for the industry. Electricity is indiscipline to our daily life with increasing need of electricity the power theft is also increasing, the power theft is a problem that continue to pledge power sector across the whole country. The objective of this paper is to design a system in order to avoid the displeasures for the users from theft bills irrespective of the use of the electricity due to theft using a GSM model. In order to integrate the various parts together we must first properly understand the working of the different parts to be integrated together. A brief study is alone on the component and the technology which we are going to use in our paper.**

Index Terms- **Global system for mobile (GSM), Digital Energy meter (DEM), Automatic meter reading (AMR), Tactile sensor (TS), Water and power development authority (WAPDA).**

I. INTRODUCTION

The electricity is needed to be protected for efficient power delivery to the consumer because electricity is indispensable to domestic and industrial development activity. There are two types of losses technical and non-technical losses. Every year the electricity companies fare the line losses at an average 20-30% according to power ministry. WAPDA Company's loss more than Rs. 125 billion. The T&D losses have been a concerns for the Indian electricity sector. Since these have been very high when compared with the other developed countries, the present T&D losses including unaccounted energy are about 30% and there is a need to reduce these losses through efficient management the best operation and maintenance practice of the transmission and distribution. When we talk about T&D losses it also include the theft of the electricity, although it is a part of the commercial loss but there is no way to segregate theft from the T&D losses.

In practice we know the energy built and the input energy the difference between these two is T&D losses. Obviously the theft is included in this loss. SERC, MOP also ask to segregate T&D loss and commercial loss but nobody is able to tell how these losses can be segregated as a theft (the part of the commercial loss) is embedded with T&D. electricity theft is at the center of focus all over the world but electricity theft in India has a significant effect on the Indian economy. The loss on amount of theft is reflected in ARR of the electricity economy. Thus these costs are routinely passed on to the customers on the form of the higher energy charges. Electricity power theft takes place in the variety of the forms and thrives with the support of the people from the different walks of life, utility staff, consumers, labor union leader, political leader, bureaucrats and high level utility officials. The problem challenging the power utilities worldwide is the electricity, in other words using electricity from utility company without the companies consent, significantly, it is enough to destroy the entire power sector of the country. According to sources 20% losses means the masses would have to pay extra 20% in terms of electricity tariffs. This paper discuss the problem of electricity theft as well as proposed new method of calculate and judge the seal breaking and also weather the electricity stealing is happened or not.

FACTORS THAT INFLUENCE ILLEGAL CUSTOMERS

There are many factors that encourage people to steal electricity of which socio-economy factors influences people to a great extent in stealing electricity. A common notation in many peoples is that it is dis honest to steal something from their neighbored but not from the state or public owned utility company. In addition other factors that influence illegal consumers are

1. Higher energy prices deject consumers from buying electricity. That able to illustrate the energy prices in different countries. In light of this, rich and highly educated communities also

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Structural Analysis of Nano Ferrites Synthesized by Combustion and Microwave Methods[1]

A. S. Molakeri[a], S. Kalyane[b], A. B. Kulkarni[c], and S. N. Mathad[d, *]

[a]*Guru Nanak Dev Engineering College, Bidar, Karnataka, India*
[b]*Bhemanna Khandre Institute of Technology, Bhalki, Karnataka, India*
[c]*Jain College of Engineering, Belagavi, 590014 India*
[d]*K.L.E. Institute of Technology, Hubballi, 580030 India*
**e-mail: physicssiddu@gmail.com*

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Abstract—We suggest a new approach to synthesis of nano nickel ferrites via combustion synthesis in electric and microwave ovens. The oxidation of organic compounds, decomposition of salts, and their degradation were explored by TGA–DTA. As-prepared nanopowders were characterized by X-ray powder diffraction. Structures of both ferrites were slightly different. Detailed material parameters such as crystallite size (D), lattice constant (a), micro strain (ε), X-ray density (Δ_X), dislocation density (ρ_D), hopping lengths (L_A and L_B), bond lengths (A–O and B–O), ionic radii (r_A and r_B), texture coefficient [TC(hkl)], and mechanical properties were measured and comparatively analyzed.

Keywords: ferrites, combustion synthesis, electric heating, microwave heating, XRD, mechanical properties
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1. INTRODUCTION

A significant growth in the number of studies on ferrite nanocrystals is due to such their properties as surface effect (large surface-to-volume ratio) and quantum confinement effects (size-dependent properties). Nano spinel ferrites are regarded as one of the most important inorganic nano-materials because of their electronic, optical, electrical, magnetic and catalytic properties, all of which are different from their bulk counterparts [1–3]. In order to prepare materials with desired physicochemical properties, preparation of nickel ferrite nanocrystals through different routes has become an essential part of research and development. Nano ferrites exhibit the electrical and magnetic properties that are attractive for application in information storage systems, sensors, telecommunication devices, magnetic refrigeration, catalysis, magnetic drug delivery, antenna rods, permanent magnets, recording heads, magnetic liquids [2, 3]. To date, spinel nickel ferrite nanocrystals are fabricated by chemical method [4], hydrothermal methods [5], microwave processing [6], polymer-assisted route [7], auto combustion [8], co-precipitation [9], in micro emulsions [10], in reverse micelles [11], and sucrose precursor method [12].

In this communication, we report on comparative study of the nickel ferrites obtained by combustion synthesis and microwave method by using detailed XRD analysis, Williamson–Hall plot technique, and size–strain plot method.

2. EXPERIMENTAL

2.1. Synthesis in Electric Oven

Weighed amounts of $NiCl_2 \cdot 6H_2O$ (99.00% pure, Molychem) and $FeCl_3 \cdot 6H_2O$ (99.00%, Molychem) were thoroughly mixed and grounded in polyvinyl alcohol medium (1 : 5) with a pestle in a mortar. The reaction mass was transferred into a crucible and calcined in an electric oven to remove gas fumes. The residue was then heated continuously in electric oven until initiation of combustion reaction. The reaction (hereinafter termed *combustion reaction*) was completed in 30 min to yield brown crystals of $NiFe_2O_4$. After cooling down to room temperature, carbon impurities in the ferrite sample were removed by treating with acetone. The carbon flow outs were decanted and the acetone was evaporated.

2.2. Synthesis in Microwave Oven

Weighed amounts of $NiCl_2 \cdot 6H_2O$ (purity 99.00%, Molychem) and $FeCl_3 \cdot 6H_2O$ (purity 99.00%, Molychem) were dissolved in minimal amount of water and similarly oxalic acid was dissolved in water in a sepa-

[1] The article is published in the original.

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Characterization and Magnetic Properties of Zinc Ferrite Synthesized by Combustion Route

Anil S. Jadhav[1], B. Raghunanda[2], Ashok D. Shetkar[3], Ajai Kumar S. Molakeri[4*]

[1]*Department of Mechanical Engineering, Guru Nanak Dev Engineering College, Bidar – 585 403, Karnataka, India.*
[2]*Department of Physics, Government First Grade College, Bidar – 585 401, Karnataka, India.*
[3]*Department of Physics, Karnataka Arts, Science and Commerce College, Bidar – 585 401, Karnataka, India.*
[4]*Department of Physics, Guru Nanak Dev Engineering College, Bidar – 585 403. Karnataka, India.*

ARTICLE DETAILS

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Zinc Ferrite
Nanoparticles
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ABSTRACT

Zinc ferrite ($ZnFe_2O_4$) nanocrystalline powder material was prepared by combustion method. The X-ray diffraction (XRD) and scanning electron microscopy (SEM) is used to study on structural properties. The magnetic properties of the sample were measured at room temperature using vibrating sample magnetometer (VSM) in the field range ±15000 G. Hysteresis loop obtained room temperature for $ZnFe_2O_4$ nanoparticles indicates that the nanoparticles are ferromagnetic in nature.

1. Introduction

The special features of nanomaterials arising because of their unique physical properties viz., electrical conductivity, optical band gap, refractive index, magnetic properties and superior mechanical properties such as hardness of nanomaterials are being gradually revealed and understood by many researchers. A new field of study known as "nanotechnology" has been emerged due to deep understanding of these unique behaviors and applications of nanostructured materials by the research community [1, 2]. Among various nanomaterials, magnetic nanoparticles mainly spinel ferrite (MFe_2O_4, M = Ni, Co, Mn, Zn etc.) nanoparticles, are of special interest for their attractive scientific and technological aspects in different fields such as magnetic recording and separation, catalyst, photocatalyst, drug delivery, pigments, ferrofluids, magnetic resonance imaging (MRI), hot gas desulfurization etc., [3-8]. Apart from these applications spinel ferrites can also be used in many electronic devices due to their high permeability at high frequencies, high mechanical hardness, chemical stability and reasonably low cost. The spinel ferrites are highly suitable for computer memories, logical devices, transformer cores, recording heads etc. The size of the grain plays an important role in all these applications [9]. The synthesis of spinel ferrites is being carried out by different techniques in order to achieve desired size and shape and to improve their physical properties and widen the scope of their applications [10, 11]. Different methods, such as traditional ceramic synthesis [12], ion implantation [13], co-precipitation [14], ball milling [15], sol-gel combustion [16] combustion method [17] etc. have been adopted by the scientists to prepare zinc ferrite nanoparticles. Here, we have successfully synthesized zinc ferrite nanoparticles by combustion route.

2. Experimental Methods

2.1 Materials and Methods

All the chemicals were of AR grade and were used as received. Double-distilled water was used for preparation of the required solutions.

2.2 Synthesis of Zinc Ferrite ($ZnFe_2O_4$) Nanoparticles by Combustion Route

Zinc ferrite ($ZnFe_2O_4$) nanoparticles were prepared by known quantity of zinc salt and iron salt was mixed thoroughly and is grounded well with polyvinyl alcohol in 1:5 in a pestle and mortar. The reaction mass was transferred in to crucible initially burnt in an electrical oven for complete evolution of the fumes. The resultant residue was heated continuously for complete combustion. The reaction was completed within 30 minutes to form brown colored crystalline $ZnFe_2O_4$ is formed. On cooling to room temperature carbon contaminations in the ferrite sample is removed by treating with acetone. The carbon flowts on the acetone is decanted and evaporated the acetone [18-21]. The various steps involved in the synthesis of $ZnFe_2O_4$ nanoparticles are shown in flow chart (Fig. 1).

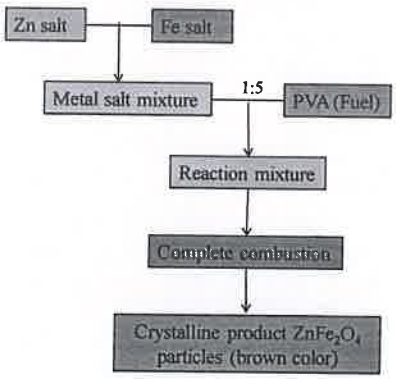

Fig. 1 Flow chart: Synthesis of $ZnFe_2O_4$ nanoparticles

2.3 Characterization Techniques

The X-ray diffraction patterns of the samples in this present study are obtained on Bruker AXS D8 Advance, X-ray diffractometer using CuK_α radiation (λ = 1.5406 Å). The diffractograms were recorded in terms of 2θ in the range 20° – 120° with a scanning rate of 2° per minute. The Joel model JSM-6390 LV scanning electron microscope (SEM) is used to observe the morphology and particle size distribution of the samples. The magnetization measurements of the samples were carried out using measured using vibrating sample magnetometer (LakeShore, Model-7410) at room temperature with a maximum field of -15000 G to +15000 G.

*Corresponding Author:ajaymolakeri@gmail.com(Ajai Kumar S. Molakeri)

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QUANTITATIVE DETERMINATION OF THIOUREA & SOME OF ITS DERIVATIVES WITH NBSA REAGENT

Raghunandan Kumar[1], Chandrashekhar kr Roy[2], R P S Chauhan[3]
[1]Department of Chemistry, GND Engineering College, Bidar (Karnataka)
[2,3]Department of Chemistry, Magadh University BodhGaya 824234 (Bihar)

Abstract

An accurate method has been described for determination of thiourea & some of its derivative at micro scale using N-bromosaccharin as brominating & oxidizing agent. A known volume of sample solution of thiourea & some of its derivative was treated with excess of N-bromosaccharin. After the reaction was complete the unreacted N-bromosaccharin was determined by titrating against standard sodium thiosulphate solution using starch as indicator. A blank Experiment was also run under identical condition without the sample. The method is simple, quick, convenient and accurate and performed in an ordinary laboratory condition without using any sophisticated instruments. The precision & accuracy was within ±1%

Keywords: Analytical studies, Thiourea ,Determination, NBSA

I. INTRODUCTION

Thiourea and its derivatives are generally used as preservatives, insecticides, rodenticides and pharmaceuticals; and possess anesthetic, antibacterial and antipyretic properties. They are also used in dye, photographic film, plastic and textile industries and for the manufacture of chemically deposited radiation detectors and sulphide phosphorus materials. They are of great value in the characterisation of organic compounds. A number of methods have been proposed from time to time for determination of thiourea[1-11]. In the present paper we describe a method for determination of thiourea & some of its derivative at the mg level using N-bromosaccharin reagent. The sample was allowed to react with excess of N-bromosaccharin and reaction was allowed to proceed for 10 minutes at room temperature. After the reaction was complete ,the unreacted N-bromosaccharin(NBSA) was back titrated iodometrically using starch as indicator.A blank titration was also run under identical experimental condition using reagent without the sample and recovery of Thiourea and its derivatives sample was calculated. The method is convenient and performed in ordinary laboratory condition. It does not involve sophisticated instruments and rigrous reaction conditions. The precision and accuracy are within ±1%

II. EXPERIMENTAL

REAGENTS AND SOLUTION

N-BROMOSACCHARIN : . 0.02 M

1.3116 g of N-bromosaccharin was accurately weighed and dissolved in 100 ml of glacial acetic acid by shaking thoroughly in a 250 ml volumetric flask. The solution was made upto the mark with distilled water and standardised iodometrically.

SAMPLE SOLUTION

A stock solution of each sample (thioureas) was prepared by dissolving an accurately weighed amount (20-50 mg) of sample in distilled water in a 50 ml standard volumetric flask & made upto the mark. Phenyl and allyl thioureas were dissolved in minimum amount of hot distilled water while thiourea and amino thiourea in cold distilled water and made upto the mark. Aliquots containing 1-4 mg of sample from stock solution were used for each determination.

GLACIAL ACETIC ACID (A.R., B.D.H.)

SODIUM THIOSULPHATE (A.R., B.D.H.), 0.01 N

2.4820 g of sodium thiosulphate was accurately weighed and dissolved in distilled water in 1 litre

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Quantative Determination of Aromatic Phenols with NBSA Reagent

Raghunandan Kumar, Chandrashekhar Kr. Roy & R.P.S. Chauhan*
Department of Chemistry, GND Engineering College, Bidar-585403 (Karnataka)
**Department of Chemistry, Magadh University, Bodh Gaya – 824234(Bihar)*
Corresponding Author: Raghunandan Kumar

Abstract: *An accurate method has been described for determination of Aromatic phenols & its derivatives at micro scale using N-bromosaccharin as brominating & oxidizing agent. A known volume of sample solution of Aromatic phenols was treated with excess of N-bromosaccharin. After the reaction was complete the unreacted N- bromosaccharin was determined by titrating against standard sodium thiosulphate solution using starch indicator. A blank Experiment was also run under identical condition without the sample. The method is simple, quick, convenient and accurate and performed in ordinary laboratory condition without using any sophisticated instruments. The precision & accuracy was within ±1%.*

Keywords: *Analytical studies, Aromatic phenols, Determination, NBSA*

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I. Introduction

Aromatic phenols are widely used is the manufacture of dyes, drugs, explosive, resins, plasticizers, printing materials, accelerators etc. A large number of polyphenolic compounds present in nature are responsible for their colour and taste. In view of the fact that a large number of naturally occurring compounds containing phenolic functions are of great practical and industrial importance. Suitable methods for determination of these functions or of the compounds containing these functions would be of special significance to analytical chemists. Large number of procedure for determination of organic compounds containing these functions are available[1-13].These procedures are based on application of important reactions of such functions, like esterification, oxidation, diazotisation, nitrosation and bromination of the phenyl ring. Although some of these methods are gravimetric, it has been found that volumetric or colorimetric methods are better and these frequently forms the basis of specific methods. Methods based on spectrophotometry, mass spectrometry, fluorometry or chromatography have also been proposed from time to time and are frequently employed .In the present paper we describe a method for determination of Aromatic phenols at the mg level using N-bromosaccharin as oxidizing agent. The sample was allowed to react with excess of N-bromosaccharin and reaction was allowed to proceed for 10 minutes at room temperature. After the reaction was complete, the unreacted N-bromosaccharin(NBSA) was back titrated iodometrically using starch as indicator. A blank titration was also run under identical experimental condition using reagent without sample and recovery of Aromatic phenols sample was calculated. The method is convenient and performed in ordinary laboratory condition. It does not involve sophisticated instruments and rigorous reaction conditions. The precision and accuracy are within ±1%.

II. Experimental

REAGENTS AND SOLUTION

N-BROMOSACCIIARIN : 0.02 M

0.5240 g of N-bromosaccharin was accurately weighed and dissolved in 40 ml of glacial acetic acid by shaking thoroughly in a 100 ml volumetric flask. The solution was made upto the mark with distilled water and standardised iodometrically.

SAMPLE SOLUTION

A stock solution of each sample was prepared by dissolving an accurately weighed amount (20-60 mg) of sample in a minimum amount of 4 M sodium hydroxide (for phenols) by shaking thoroughly in a 50 ml standard volumetric flask. The solution was made upto the mark with distilled water. Aliquots containing 1-5 mg of sample from stock solution were used for each determination.

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MAJOR PROBLEMS OF INDIAN EXPATS: AIMING WORK HARM REDUCTION FOR THEIR SUSTAINABILITY

KALYANRAO K
Assistant Professor, Department of Master of Business Administration
Guru Nanak Dev Engineering College Bidar, (Visvesvaraya Technological University, Belgaum, Karnataka, INDIA)

Dr. REKHA N PATIL
Asst. Professor, Department of MBA,
VTU Regional Centre, Gulbarga, Visvesvaraya Technological university, Belgaum Karnataka (INDIA)

ABSTRACT: This study is conducted on the Indian expatriates working abroad. As the non supportive environment can cause major problems for them and also to their family who undergoes some challenges such as issues related to loneliness & adaptation & their Children may suffer some issues and not adapt well to their new school context.

In the developed countries like CANADA, UK & USA where Indian community are nothing more than Native American or hardly behave like Indians resulting they are not coping with the new expats. Individuals from different cultures may encounter difficulties in comprehending each other's values and behaviour towards another leading Cultural clash.

Everything has its cause and effect, one cannot exist without the other and this law exists through everything in nature. Work life harmony is also matters much than just work life balance. One should consider love, career and being happy for creating & maintaining harmony and balance in life. Our primary focus should be on our relationships with preferably the Nature, Society, Family & Friends then succeeding to the working environment. Understanding what we need in order to fulfil our requirements of happiness, financial security, relationship, friendship, passion, valuing & respecting, spending time with family, being honest with the friends, self caring.

***KEY WORDS*: Expatriates' Psychology, Problems faced, Sustainability of IHRM, Tolerance, and Adjustments.**

INTRODUCTION:

FACTS:

- Saudi government stated 'Sack all foreigners by 2020,' & has instructed ministry officials to end the employment of foreign workers within the next three years, affecting 70,000 expatriates.
- "There will be no expatriate workers in the government after 2020," Abdullah al-Melfi, deputy minister for civil service, instructed ministry officials during a meeting. It means that ministries will be forced to sack 70,000 foreign workers over the next three years and make room for Saudi nationals.
- Saudi Arabia is also pursuing an aggressive diversification plan known as Vision 2030, which looks at massively expanding the private sector.
- The declining occupations require some level of precautions from Indian Govt. for expatriates to settle bck at India.
- The occupations are getting job declines in many countries like Saudi Arabia, USA, Australia etc.
- The economic recession of the last decade decimated the U.S. labor market, with millions of Americans losing their jobs. To this day, many occupations remain below their pre-recession employment levels.
- The recession did not have the same effect on all occupations. Some types of businesses remained stable, or even flourished during those years. In some occupations in the hardest hit industries, however, total employment fell by more than half. Based on data from the Bureau of Labor Statistics (BLS) on occupational employment changes from 2005 through 2014, 24/7 Wall St. reviewed the 10 fastest shrinking jobs in the country
- While the recession may have catalyzed the declines in some of the disappearing occupations and a recovery would likely mean better years ahead for these positions other occupations are not on the verge of bouncing back. As technology improves and business and cultural practices change, some jobs word processors and switchboard operators, for example are simply on the way to becoming obsolete.
- Many countries are banned foreigners (expats) activities and occupations in order to provide more jobs to its citizens, a move that is likely to affect a large number of workers from India and other South Asian countries.
- Like the ambitious crown prince, Mohammed bin Salman, to revamp the Saudi economy and reduce its dependence on oil revenues.
- The unemployment rate in Saudi Arabia crossed 12% last year following the impact of low oil prices.
- Saudi barring expatriates from certain jobs from the next Hijri year under the Islamic calendar that begins on September 11, the state-run Saudi Press Agency reported.
- Australia is scrapping its temporary worker visa, and Indians will lose out most.
- For Indians, doors of opportunities outside India are slamming shut.

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All optical NOT Gate using modified Photonic Crystal Platform

[1] Savita Soma, [2] Dr.Sanjay Gowre
[1] Department of ECE,GNDEC.BIDAR [2] Department of ECE,BKIT.BHALKI

Abstract: -- **This paper deals with designing and simulation of all optical NOT gate constructed by using 2-D modified Photonic Crystal. A typical NOT Gate can be constructed on square lattice of 8 μm*8 μm photonic crystal of silicon rods in doped substrate with refractive index of 3.40 and 1.1 respectively. The lattice constant Λ= 1μm and radius of the rods r= 0.2Λμm. Not gate is realized by combining the cross-waveguide geometries and varying its diameter by pitch (d/Λ). The gate is implemented for the operating wavelength of 1.55μm using Rsoft's Fullwave simulator.**

Index Terms— **Logic gates, Photonic Crystal (PhC), Square cavity, Cross Waveguide, Finite Difference Time Domain (FDTD).**

I. INTRODUCTION

In recent years there is a tremendous increase in communication traffic. Electronic devices used for communication imposes speed limitations. To overcome this problem all optical communication can be used. Optical fiber communication has many advantages like more bandwidth, long distance communication, low losses. To make the system as all optical, all the components used in the optical network such as logic gates, multiplexer, demultiplexer, couplers, signal generation, splitter, storage devices such as buffers, flip-flop and memory should be all- optical elements.

All optical data processing with integrated nano-photonic circuits increases the data-rate capacity and reduces the power consumption as it eliminates the need of optical-to-electrical conversion. All optical data processing can be done by Photonic Crystals (PhC).

Photonic Crystal is a platform on which we can construct several devices operating with several wavelengths which can be integrated on a single chip. These are dielectric media with sporadic variation of the refractive index. Photonic Band gap in a PhC is the range of frequencies through which light cannot propagate. Using this type of structures we can manipulate the light . By removing rods in Photonic Crystal structure we can create defect in the structure through which light is made to propagate. This behavior of Photonic Crystal can be used to design and realize many Photonic Crystal devices.

The organization of this paper is following the introduction, in section 2 structural design for NOT gate is discussed and analyzed. Logic function is maintained by using constructive and destructive interference of light in the cavity. Section 3 discusses about the simulated results for different d/Λ of the cross waveguide followed by conclusion in section 4 .

II. STRUCTURAL DESIGN AND ANALYSIS

All optical logic NOT gate can be constructed using 2-D Photonic Crystal square lattice. Square lattice structure can be constructed by using Silicon rods with refractive index n_1 =3.40 in the doped host with refractive index n_2=1.1. The number of rods in X directions are 13 and 13 respectively. The distance between two adjacent rods (Λ) is 1μm. Cross waveguide is formed by removing some si rods called as line defects. One input waveguide is marked as control signal (C). Another waveguide is main input marked as (I). The output is measured at output waveguide marked as (Y) as shown in figure 1.

III. SIMULATION RESULTS

To maintain the logic operation Gaussian continuous signal with operating wavelength of λ = 1.55μm is launched at control port (C) which is always high and it acts as a reference input. To provide logic 1 signal as input Gaussian continuous signal with operating wavelength of λ = 1.55μm is launched ports I. Output is measured at output port Y. To provide logic 0 input Gaussian continuous signal of 1V with operating wavelength of λ = 1.55μm is launched at control port C and 0V (OFF) optical signal is launched at input port I. When light propagates it can be seen in figure 3 that logic 1 signal from control port couples with cavity and gives the output Y= 0.6 which can be treated as logic 1 (ON state). Figure 3 (a) shows the electrical field distribution and

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GSM Based Automatic Substation Load Shedding

S. Pretpal Singh
IETE Member, Assistant Professor Guru Nanak Dev. Engineering College, Bidar

Abstract- **Aim of this paper is designed to control substation load shedding and sharing using a programmable switching control automatically. In this paper this is demonstrated using a microcontroller. The development of this application requires the configuration of the program through GSM module. In substation, there are many tasks like certain loads need to be switched on/off in specific time intervals. In this, the loads can be operated in three modes: Set mode, Auto mode and Manual mode. In set mode, through timers, the operation is based on input time set by the user where as in auto mode it works on default time settings and finally in manual mode it functions while respective loads are operated depending on the load necessity using GSM. All the modes and status of loads are displayed on LCD. Finally GSM modem which sending SMS to the control system can select the mode and timing remotely.**

Index Terms- **Automatic substation load shedding (ASLS), Global positioning system (GPS), and Global system for mobile (GSM).**

INTRODUCTION

Controlling of electric power substation equipment plays an important role in daily maintenance of electric power system. In an extra high voltage substation, the reliability required from substation components is critical. Applications of controlling base station with the help of mobile of substation equipment could improve the quality of accelerating the process of any substation. Main aim is to control the substation equipment through a mobile phone. Here GSM based modem technology is used and connected end-to-end, with one end to the distribution side and other to the mobile device. The mobile device used here makes the control of equipment of the substation on a global basis. Here the system is going to control the distribution side equipment switch gear and relays.

II. BLOCK DIAGRAM

The functionality of the ASLS system involves in to following steps. Block diagram is shown in figure 1. In this block diagram the GSM sends SMS to the controller through max 232 then the controller performs the operation by reading the message i.e. controller gives signal to the relay driver that controls the feeder.

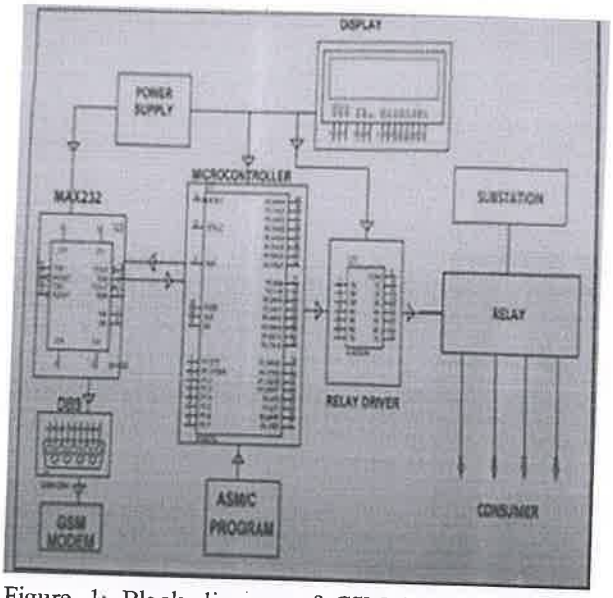

Figure 1: Block diagram of GSM based automatic substation load shedding.

The main blocks of this are:

1. Micro controller (AT89S52)
2. Level Shifter IC MAX232
3. Relay Driver ULN2003
4. Electromagnetic relay
5. LCD
6. GSM modem.
7. EEPROM.
8. MAX232.
9. Power supply.

AT 89S52 Micro controller

It is a low power, high performance, inexpensive CMOS 8-bit microcontroller with 8K bytes of in system programmable flash memory.

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Railway Track Crack Detection

S. Pretpal Singh
Assistant Professor Guru Nanak Dev Engineering College, Bidar

Abstract- **the paper aims in designing robust railway crack detection scheme (RRCDS) using IR sensor which avoids the train accidents. And also capable of controlling the whole system by using the GPS based GSM modem. The GPS is the acronym for Global positioning system. This GPS receiver is capable of identifying the location in which it was present in the form of latitude and longitudes. This information is very useful and can be processed for alerting the boat drivers. The GPS gives the data received from the satellites. For this information the GPS communicates with at least three satellites in the space**

Index Terms **- Robust Railway Crack Detection Scheme (RRCDS), Global positioning system (GPS), Global system for mobile (GSM).**

I. INTRODUCTION

The paper aims in designing robust railway crack detection scheme (RRCDS) using IR sensor which avoids the train accidents. And also capable of controlling the whole system by using the GPS based GSM modem.

The GPS is the acronym for Global positioning system. This GPS receiver is capable of identifying the location in which it was present in the form of latitude and longitudes. This information is very useful and can be processed for alerting the boat drivers. The GPS gives the data received from the satellites. For this information the GPS communicates with at least three satellites in the space

This Paper presents an automotive localization system using GPS and GSM-SMS services. The system permits localization of the automobile and transmitting the position to the authorities on their mobile phone as a short message (SMS) at his request. Also, this system automatically sends alert messages to predefined numbers when accident takes place.

In this paper, let us consider the two tracks; each track will have one IR sensor. Like this two tracks have 2 IR sensors. Whenever there is a crack on the track, then the IR sensor senses that and gives its output to the microcontroller. This tracking system is composed of a GPS receiver, Microcontroller and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. The Microcontroller processes this information and this processed information is sent SMS to the authorities using GSM mode.

The "Robust Railway Crack Detection Scheme (RRCDS) using IR OBSTACLE Assembly" is studied using PIC16F877A microcontroller which is used to find the cracks on track and also capable of controlling the whole system by using the GPS based GSM modem.

An embedded system is a combination of software and hardware to perform a dedicated task. A modern example of embedded system is shown in figure 1.

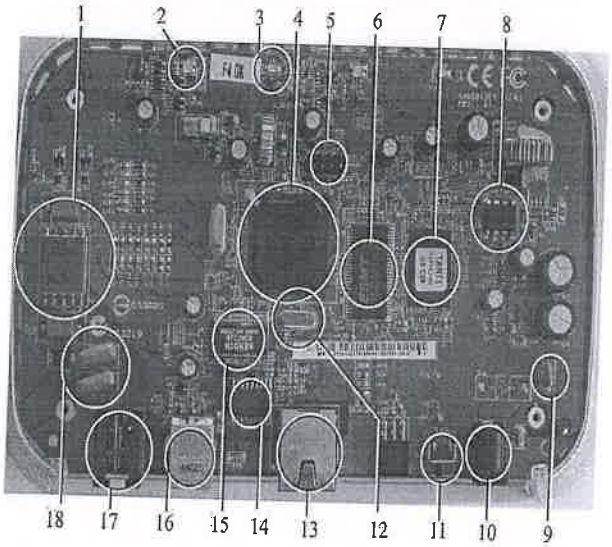

Figure 1:A modern example of embedded system Labeled parts include microprocessor (4), RAM (6), flash memory (7).Embedded systems programming is not like normal PC programming. In many ways, programming for an embedded system is like programming PC 15 years ago. The hardware for the system is usually chosen to make the device as cheap as possible. Spending an extra dollar a unit in order to

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STUDIES ON A CLASSICAL VSI- FED ADJUSTABLE SPEED DRIVES

Neelashettykashappa
Faculty, EEE department, Guru Nanak Dev Engineering College, Bidar
Karnataka-585401.

***Abstract*:** The proposed work deals with simulation of a classical voltage source inverter fed adjustable speed drive system. A classical voltage source inverter fed speed drive system is simulated and the corresponding results are presented. The simulation results of voltage, current, speed and FFT spectrums are presented. FFT spectrums for the outputs are analyzed to study the reduction in Total Harmonic Distortion (THD) of the inverter system.

Index terms: THD, Induction motor, Classical inverter,Multilevel inverter,Matlab Simulink.

I. GENERAL

Adjustable Speed Drives (ASDs) are the essential and endless demand of the industries and researchers. They are playing a dominant role in controlling the speed of conveyor systems, blower speeds, machine tool speeds and other applications that require adjustable speeds. They have a greater impact and playing major role in revolutionizing the control strategies for various industrial processes. Traditionally, DC motors were the work horses in many industrial applications for the Adjustable Speed Drives (ASDs) due to their excellent torque and speed response. But the wear and tear of their commutator and mechanical brushes with the passage of time is the major disadvantage. In most applications, AC motors are preferable to DC motors, particularly, an induction motor due to its reliability, ruggedness, low cost, low maintenance and high efficiency. All these features make the use of induction motor a mandatory in many areas of domestic and industrial applications. The recent development in semiconductor technology and industrial electronics has triggered the development of high speed and high power semiconductor devices in order to achieve continuous and very smooth variation in motor speed. In large spectrum of industrial applications, solid state converters are wide spread due to their excellent speed characteristics.

In a conventional two-level inverter fed induction motor drive system the presence of significant quantity of harmonics makes the induction motor to suffer from severe torque and speed fluctuations, especially at low speeds, which could result in cogging of the shaft. The presence of harmonic also causes electromagnetic interference and undesirable motor heating. Large sized filters are required to reduce the magnitude of harmonicas. This results in larger size and higher cost of the drive system.

II. HARMONIC AND ITS EFFECTS

Harmonics play significant role in deteriorating power quality, called harmonic distortion. Harmonic distortion in electric distribution system is increasingly growing due to the widespread use of nonlinear loads. Large considerations of these loads have the potential to raise harmonic voltage and currents in an electrical distribution system to unacceptable high levels that can adversely affect the system. One of the biggest problems in the power quality aspects is the harmonic content in the electrical systems. Any periodic waveform can be shown to be the superposition of a fundamental and a set of harmonic components. The frequency of each harmonic component is the integral multiple of its fundamental frequency. The term harmonic is normally applied to waveform components that have frequencies other than fundamental

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TOTAL HARMONIC DISTORTION INVESTIGATION ON MULTI LEVEL INVERTER SYSTEMS

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Neelashetty kashappa
Faculty, EEE department, Guru Nanak Dev Engineering College, Bidar, Karnataka-585401.

Abstract: The proposed work deals with simulation and implementation of a multi level inverter fed adjustable speed drive system to analyzeTotal Harmonic Distortion (THD) of the inverter system. 3 level, 5 level, 7 level and 9 level inverter fed induction motor drive systems are modeled, simulated and successfully implemented in the Power Electronics laboratory. Simulation as well as experimental results of current THD and voltage THD are presented. FFT spectrums for the outputs are analyzed to study the reduction in harmonics of the system.

Keywords: THD, Cascaded inverter, Induction motor, Multilevel inverter, Matlab Simulink.

1. GENERAL

Multilevel inverters have become attractive in the power industries and are important for power electronics applications. It can be applied for improvement of the power quality such as in renewable energy sources, flexible AC transmission systems, uninterruptible power supplies and active power filters. In many applications especially for a transformerless battery energy storage system based on a cascaded multilevel inverter, it is used as a measure for voltage and frequency deviations. It results in the system with reduced size, weight, and cost of energy storage system.. The proposed cascaded multilevel inverter generates lower voltage total harmonic distortion (THD) in comparison with conventional cascaded multilevel inverter. Simulations are carried out using Matlab Simulink to validate the hardware results of the proposed multilevel inverter

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The most frequently encountered harmonics in three-phase distribution networks are the odd orders. Harmonic amplitudes normally decrease as the frequency increases. Above order 50, harmonics are negligible and measurements are no longer meaningful. Sufficiently accurate measurements are obtained by measuring harmonics up to order 30. Utilities monitor harmonic orders 3, 5, 7, 11 and 13. Generally speaking, harmonic conditioning of the lowest orders (up to 13) is sufficient. Harmonics in the electric power system combine with the fundamental frequency to create distortion. The level of distortion is directly related to the frequencies and amplitudes of the harmonic current. The contribution of all harmonic frequency currents to the fundamental current is known as "Total Harmonic Distortion" or THD. The harmonics present in the output waveform of the inverter increase motor heating, causes electromagnetic interference and results in torque pulsations

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Preparation, Structural and Dielectric Properties of Polyaniline-Nickel Ferrite Composites

Ajai Kumar S. Molakeri[a] and Dr. Sangshetty Kalyane[b*]

[a] *Research scholar, VTU-RC BKIT, Bhalki, Assistant Professor, Department of Physics, Guru Nanak Dev Engineering College, Bidar, Karnataka. E-mail:*

[b] *Associate Professor, Department of Physics, Bheemanna Khandre Institute of Technology, Bhalki, Dist., Bidar, Karnataka. E-mail:*

Abstract

Conducting polyaniline-nickel ferrite (PANI/$NiFe_2O_4$) composites are synthesized by employing interfacial polymerization method. The composite has been synthesized with various compositions (10, 30 and 50 wt %) of nickel ferrite in PANI. The prepared samples were characterized by FTIR, and the dominant peaks confirmed the formation of PANI/$NiFe_2O_4$ composites. The surface morphology of these composites is studied with scanning electron microscope (SEM) and thermogravimetric analysis (TGA). The ac conductivity (σ_{ac}) and dielectric properties of these composites is investigated in the frequency range of 10^2 Hz to 10^6 Hz. The conductivity of composites found constant up to 10^5 Hz thereafter increased with increasing frequency.

Keywords: Polyaniline, $NiFe_2O_4$, FTIR, Scanning electron microscope, Conductivity, Dielectric properties.

INTRODUCTION

Conducting polymers are attractive materials because they have a wide range of functions from insulators to metals and retain their mechanical properties of polymers and also have many promising technological applications [1-3]. Among the conducting polymers, polyaniline (PANI) gets a great deal of attention due to its good

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RESEARCH ARTICLE

Elastic Properties of Nickel Ferrite Synthesized by Combustion and Microwave Method using FT-IR Spectra

Ajai Kumar S. Molakeri[1], Sangshetty Kalyane[2], Akshay B. Kulkarni[3], Shridhar N.Mathad*[4]

[1]*Guru Nanak Dev Engineering College,Bidar, Karnataka, India*
[2]*Bhemanna Khandre Institute of Technology,Bhalki, Karnataka, India*
[3]*Jain college of engineering, Belagavi, 590014, India*
[4]*K.L.E. Institute of Technology, Hubballi, 580030, India.*

ABSTRACT: Nickel ferrite has been synthesized by microwave and auto combustion method. Crystal structure has been confirmed by XRD. The FT-IR spectra of synthesized ferrites showed two absorption bands (ν_1 and ν_2) in the range 400–600 cm^{-1} belonging to tetrahedral (A) and octahedral (B) interstitial sites in the spinel lattice. From Fourier transform infrared spectroscopy, stiffness constants (for isotropic material, $C_{11}=C_{12}$), longitudinal elastic wave (V_l), transverse elastic wave (V_t), mean elastic velocity (V_{Mean}), rigidity modulus (G), Poisson's ratio(s) and Young's modulus (E) of ferrites has been computed and compared by these two methods.

KEYWORDS: *Nickel ferrite, combustion and microwave method, FTIR.*

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1. INTRODUCTION

Ferrites are expedient magnetic materials owing to their versatility, low cost, and high electromagnetic performance over a wide frequency range. In order to readily integrate ferrites into electronic devices, it is desirable to fabricate thin film of these materials. Soft magnetic thin films with high electrical resistivity are needed for developing micro inductors and micro transformers, monolithic microwave integrated circuits etc [1-4]. $NiFe_2O_4$ is one of the important ferrites used for different technological applications and as a humidity sensor [5]. Nickel ferrite is a well-known soft magnetic material, with moderate coercivity and saturation magnetization in its bulk form. Magnetic properties of nickel ferrite depend on the type of cations and their distribution between tetrahedral and octahedral sites. It has been observed that the resultant magnetic properties of nano-crystalline nickel ferrite are completely different from its bulk counterpart that makes it of great scientific and technological interests [6-8].

There are several methods to obtain nano ferrites powder like sol–gel methods[9], reverse emulsion assisted hydrothermal methods[10], hydrothermal methods [11], microwave processing approaches[12], a polymeric assisted route[13], co-precipitation [14], , micro-emulsions, reverse micelles[15], sucrose precursor technique [16] and solid state method [17]. The aim of this work was the synthesis of nickel ferrite by two different methods (combustion method and microwave method). We report the structural analysis of samples by XRD and FTIR studies. The force constants for tetrahedral (K_t) and octahedral sites (K_o) were determined, as well as Young's modulus (E), rigidity modulus (G), bulk modulus (B), Debye temperature (Θ_D), and velocity of transverse (V_t) and longitudinal (V_l) elastic waves. Thus the elastic properties of nickel ferrites have been compared.

EXPERIMENTAL TECHNIQUES

Nickel ferrite particles were prepared by, known quantity of nickel chloride and iron chloride were mixed thoroughly and is grounded well with polyvinyl alcohol in 1:5 in a pestle and mortar. The reaction mass was transferred in to crucible initially burnt in an electrical oven for complete evolution of the fumes. The resultant residue was heated continuously for complete combustion. The reaction was completed within 30 minutes to form brown colored crystalline $NiFe_2O_4$ is formed. On cooling to room temperature carbon impurities in the ferrite sample is removed by treating with acetone. The carbon flowts on the acetone is decanted and evaporated the acetone [12]. $NiFe_2O_4$ nano-particles are prepared by, known quantity of nickel chloride and iron chloride were dissolved in minimum amount of water and similarly oxalic acid was dissolved in water in a separate container. These two solutions were mixed well to form a metal oxalate a precipitate. The precipitate was filtered through sintered glass and washed with double distilled water. Finally, washed with dry acetone and dried under vacuum. Metal oxalate mixture is grounded well with polyvinyl alcohol (PVA) in 1:5 in a pestle and mortar. The reaction was transferred into crucible and initially it was burnt in an electrical oven for complete combustion of the fumes. The resultant residue was transferred into microwave oven for complete combustion process. The reaction was completed

*Corresponding Author: physicssiddu@gmail.com
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Investigation into Production of Bio diesel from Honge Oil and its use for Compression Ignition Engine

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Abstract

In this paper, an effort is made to prepare bio disel from a non edible oil obtained from Pongamai pinnata (Honge) seeds. Various properties of diesel, neat Honge oil (HO) and methyl ester of Honge oil (HBD) are determined. HBD exhibits better properties in terms of viscosity, calorific value, flash and fire point etc. Experimental investigations have been carried out to evaluate the use of HBD on performance characteristics of a compression ignition engine. Use of HO for diesel engine is limited due to its higher viscosity and poor volatility. The HO shows lower thermal efficiency higher exhaust gas temperature and higher brake specific fuel consumption, etc. Use of HBD indicates improvement in engine characteristics. The engine performance with the HBD is in closer approximation with diesel fuel. It could be concluded that HBD can be a good substitute for diesel.

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Parametric Optimization of CNC End Milling Process on Aluminium 6063 Alloy Using Grey Based Taguchi Method

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Abstract:

This investigation focused on the multi-response optimization of CNC end milling of Aluminium 6063 Alloy material using Grey relational analysis and Taguchi method. Experiments were designed based on L9 Taguchi Orthogonal array, to arrive at an optimum parameter combination within the experimental domain. The spindle speed (S), feed rate (f) and depth of cut (d) which are known to have considerable effect on the selected responses i.e. surface roughness (Ra) and Material removal rate (MRR) and are considered as control parameters. The single objective optimization using Taguchi method more often results in conflicting requirements on control variables. To overcome this challenge, the Taguchi approach followed by Grey relational analysis was applied to solve this multi response optimization problem. The significance of these factors on overall quality characteristics of the milling process has also been evaluated quantitatively with the Analysis of variance method (ANOVA). Optimal results were verified through confirmation experiments. This shows feasibility of the Grey relation analysis in combination with Taguchi technique for continuous improvement in product quality in manufacturing industry and the suitability of the method to optimize the multi objective problems involved in CNC milling.

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