Hindawi

Research Article

Performance Analysis of Solar Still by Using Octagonal-Pyramid Shape in the Solar Desalination Techniques

Bipin Kumar Singh,[1] C. Ramji,[2] P. Ganeshan,[1] V. Mohanavel,[3,4,5] T. Balasundaram,[6] V. Vignesh Kumar,[7] B. Balasubramanian,[8] P. Ramshankar,[9] Adireddy Ramesh,[10] and Subash Thanappan [11]

[1]Department of Mechanical Engineering, Sri Eshwar College of Engineering, Coimbatore, 641202 Tamil Nadu, India
[2]Department of Rubber and Plastic Technology, MIT Campus, Anna University, Chennai, 600 025 Tamil Nadu, India
[3]Centre for Materials Engineering and Regenerative Medicine, Bharath Institute of Higher Education and Research, Chennai-600073, Tamil Nadu, India
[4]Department of Mechanical Engineering, Chandigarh University, Chandigarh, Mohali-140413, Punjab, India
[5]Department of Mechanical Engineering, School of Technology, Glocal University, Delhi-Yamunotri Marg, Uttar Pradesh 247121, India
[6]Department of Mechanical Engineering, Medak College of Engineering and Technology, Siddipet, Telangana, India
[7]Department of Mechanical Engineering, St. Joseph College of Engineering, Chennai, Tamil Nadu, India
[8]Department of Mechanical Engineering, Chettinad College of Engineering and Technology, Karur, 639114 Tamil Nadu, India
[9]Department of Civil Engineering, University College of Engineering, Dindgul-624622, India
[10]Department of Electrical and Electronics Engineering, Aditya College of Engineering, Surampalem 533437, Andhra Pradesh, India
[11]Department of Civil Engineering, Ambo University, Ambo, Ethiopia

Correspondence should be addressed to Subash Thanappan; subash.thanappan@ambou.edu.et

This research work explored and compared the experimental performance of a solar still having novel octagonal-pyramid shape with a single slope solar still. It is found that the novel still provides twice distillation compared with conventional still. The experiments also evaluated the desalination productivity of octagonal-pyramid solar still by varying the depth of saline water inside the basin and angle of inclination of glass cover. It is observed that the optimum condition for high distillation is obtained when depth of water inside the basin is 5 cm with angle of inclination of glass cover which is 30°. Four types of water, i.e., underground borewell water, sea water, leather industry effluent, and plastic industry effluent were also used to see the effect on distillation. Results showed that underground borewell water provides high distillation due to low density. Furthermore, the performance of the octagonal-pyramid solar still is enhanced by adding different latent heat and sensible heat materials in the octagonal-pyramid solar still. Hence, the addition of brick to the octagonal-pyramid still yields the highest productivity compared to incorporation of paraffin wax. Hence, it can be concluded that the octagonal design of the solar still has shown an increased productivity when compared to a single slope solar still (conventional still) under all the conditions.

1. Introduction

The fresh water resources are getting polluted alongside the demand for fresh water which is increasing day by day due to modernization. Water reclamation could bring the com-plete solution for this problem. There are numerous ways to desalinate sea water and waste water into fresh water [1, 2]. The simplest and cost-effective method is using solar still for distillation. Since the daily productivity of a conventional single slope solar still is very low, hence, in this paper,

Article

P2P Coordinated Control between SPV and STATCOM in a Microgrid for Power Quality Compensation Using LSTM–Genetic Algorithm

Durgamadhab Swain [1,2], Meera Viswavandya [3], Ritesh Dash [4], Kalvakurthi Jyotheeswara Reddy [4], Dhanamjayulu Chittathuru [5,*], Arunkumar Gopal [5], Baseem Khan [6,*] and Manam Ravindra [7]

[1] Research Scholar, Department of Electrical Engineering, Biju Patnaik University of Technology, Rourkela 769015, India; durgamadhab17@gmail.com
[2] Department of Electrical Engineering, Ajay Binay Institute of Technology, Cuttack 753014, India
[3] Department of Electrical Engineering, Odisha University of Technology and Research, Bhubaneswar 751029, India; mviswavandya@outr.ac.in
[4] School of Electrical and Electronics Engineering, REVA University, Bengaluru 560064, India; rdasheee@gmail.com (R.D.); jyothireddy.kalvakurthi@gmail.com (K.J.R.)
[5] School of Electrical Engineering, Vellore Institute of Technology, Vellore 632014, India; g.arunkumar@vit.ac.in
[6] Department of Electrical and Computer Engineering, Hawassa University, Hawassa P.O. Box 05, Ethiopia
[7] Department of Electrical and Electronics Engineering, Aditya College of Engineering, Surampalem 533437, India; ravieecjntu@gmail.com
* Correspondence: dhanamjayulu.c@vit.ac.in (D.C.); baseemkh@hu.edu.et (B.K.)

Abstract: The deployment of a static synchronous compensator within a microgrid can facilitate voltage and reactive power regulation, leading to enhanced stability and reliability. Within a microgrid setting, the effectiveness of a STATCOM in balancing the power supply is influenced by several factors, including the system configuration, the operating conditions, and the specific requirements of the power grid. The capacity, response time, and magnitude of system disturbances also play a role in determining the STATCOM's ability to balance the power supply. To ensure the successful integration of a STATCOM within a microgrid, coordinating the control system with other distributed energy resources (DER), especially when multiple control strategies are employed, can be a challenging task. Therefore, a meticulously designed control system is indispensable to guarantee the microgrid's efficient and effective operation. The use of GA in LSTM tuning can accelerate the process of identifying the optimal hyperparameters for a specific task, obviating the need for time-consuming and computationally expensive grid searches or manual tuning. This method can be particularly advantageous when handling large data sets and complex models. In this paper, an attempt has been made to model the STATCOM to communicate with the microgrid, tuned using LSTM–GA, for the effective calculation of real and reactive power support during grid disturbances.

Keywords: algorithm; GA; PSO; PSO–LSTM; search space

1. Introduction

A microgrid is a type of electrical system that can operate independently or in coordination with the main grid. It consists of one or more distributed energy resources (DERs), such as solar panels, wind turbines, batteries, or generators, which are used to generate or store electricity [1]. Microgrids are designed to provide reliable, efficient, and eco-friendly power to local communities, businesses, and institutions, particularly in remote or off-grid areas where access to the main grid is limited or unreliable. Additionally, they can function as a backup source of power during emergencies, such as grid outages or natural disasters.

Voltage fluctuations are a common power quality issue in microgrids, especially those that incorporate renewable energy sources such as solar and wind. These sources have variable outputs, causing voltage fluctuations that can negatively impact the stability

Bidirectional Power Flow Between Solar-Integrated Grid To Vehicle, Vehicle To Grid, And Vehicle To Home

Swarupa Rani Bondalapati[1], Baddu Naik Bhukya[2*], G.V. Prasanna Anjaneyulu[3], Manam Ravindra[4], and B. Sarath Chandra[3]

[1] Department of Electrical and Electronics Engineering, Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada, India.
[2] Department of Electrical and Electronics Engineering, Prasad V. Potluri Siddhartha Institute of Technology, Vijayawada, India.
[3] Department of Electrical and Electronics Engineering, R.V.R. & J.C. College of Engineering, Guntur, Andhra Pradesh, India.
[4] Department of Electrical and Electronics Engineering, Aditya college of Engineering Surampalem, Andhra Pradesh, India.
*Corresponding author. E-mail: baddunaik@gmail.com

The increasing adoption of renewable energy sources, such as solar power, coupled with the growing popularity of electric vehicles (EVs), has opened up new opportunities for bidirectional power flow between various energy systems. This research paper explores the bidirectional power flow between a solar-integrated grid, electric vehicles, and residential homes. Specifically, it focuses on the benefits, challenges, and potential applications of power exchange between these entities. The paper discusses the technical aspects, economic implications, and environmental considerations of bidirectional power flow, highlighting the potential for enhanced grid stability, energy efficiency, and carbon footprint reduction. Additionally, the study addresses the impact of bidirectional power flow on grid infrastructure, smart grid technologies, and policy frameworks. By shedding light on the interplay between the solar-integrated grid, electric vehicles, and residential homes, this research paper aims to contribute to the advancement of sustainable and intelligent energy systems.

Keywords: Electric vehicles (EVs), Bidirectional power flow, Solar-integrated grid, Smart grid technologies, and intelligent energy systems.

1. Introduction

The global energy landscape is undergoing a significant transformation due to the increasing need for sustainable and clean energy sources. Renewable energy, particularly solar power, has gained substantial attention as a viable solution to mitigate greenhouse gas emissions and reduce dependence on fossil fuels. Simultaneously, the rise in electric vehicle (EV) adoption has presented an opportunity to revolutionize transportation by transitioning from internal combustion engines to electric propulsion systems. The convergence of these two trends has opened up new possibilities for bidirectional power flow between solar-integrated grids, EVs, and residential homes [1].

The primary objective of this research paper is to explore the bidirectional power flow between a solar-integrated grid, vehicles, and residential homes. The paper aims to investigate the benefits, challenges, and potential applications of power exchange between these entities [2]. Specifically, it will analyze the technical aspects, economic implications, and environmental considerations associated with bidirectional power flow. Moreover, the study will address the impact of such power flow on grid infrastructure, smart grid technologies, and policy frameworks.

The scope of this research paper encompasses the bidi-

Taylor & Francis
Taylor & Francis Group

Check for updates

An Improved Metaheuristic Method-Based Neural Network for Predicting Wind Turbine Power

T. Ahilan[a], S. Yoganand[b], and D. V. S. S. S. V. Prasad[c]

[a]Department of Mechanical Engineering, St. Joseph College of Engineering, Chennai, Tamil Nadu, India; [b]Computer Technology, Anna University, Chennai, Tamil Nadu, India; [c]Aditya College of Engineering, Surampalem, Andhra Pradesh, India

ABSTRACT

Wind power production has advanced rapidly in recent years as a supreme renewable energy source that is safe, reliable, pollution-free, and simple to integrate into the power grid. Furthermore, employing data acquisition and supervisory control to predict wind turbine power may not result in the best governing approach, as non-calibrated data may be generated due to sensor degradation. Hence, to solve the adverse impact, it's planned to incorporate the wind turbine Supervisory Control and Data Acquisition (SCADA) data into the improved optimization based NN, resulting in the development of a highly accurate prediction model. Thus, SCADA data of the wind turbine such as active power, bearing shaft, gear box shearing, gear box oil temperature, generator rpm, generator windings 1 and 2, hub temperature, reactive power, rotor rpm and wind speed are fed as input features to the predictive model. In order to achieve better prediction, the NN will be trained by using a new Coefficient Factor Updated Coyote Optimization Algorithm (CFU-COA), which is the conceptual advancement of traditional Coyote Optimization Algorithm (COA). Finally, the supremacy of the presented approach is proved with respect to varied error measures.

Introduction

With the reduction of conventional fossil fuels and the environmental pollutions, extracting energy from renewable sources like solar energy, wind energy, and other forms of renewable energy is becoming increasingly popular as a means of addressing the global energy crisis and pollution (Neshat et al. 2021). Furthermore, with full-fledged technology and least cost for development, wind power has emanated as the most promising energy source (Li et al. 2018). In grid-connected wind power generation, the unpredictability, instability, and inconsistency of wind energy plays a major role (Karakuş, Kuruoğlu, and Altınkaya 2017). As a result,

| Research Paper

A Self-Improved Optimizer-Based CNN for Wind Turbine Fault Detection

T. Ahilan, Andriya Narasimhulu, and D. V. S. S. S. V. Prasad

Abstract

In comparison to other alternative energy sources, wind power is more affordable and environmentally friendly, making it one of the most significant energy sources in the world. It is vital to monitor the condition of each wind turbine in the farm and recognize the various states of alert since difficulties with the operation as well as maintenance of wind farms considerably contribute to the rise in their overall expenses. The Supervisory Control and Data Acquisition (SCADA) data-based continuous observation of wind turbine conditions is the most widely used existing strategy to detect the fault early by preventing the wind turbine from reaching a shutdown stage. Several parameters irrelevant to the faults are saved in the SCADA system while the wind turbine is operating. To increase the efficacy of wind turbine fault diagnostics, optimally selected SCADA data parameters are required for fault prediction. Hence, this paper introduces an optimized Convolutional Neural Network (CNN)-based wind turbine fault identification method. For more precise detection, a Self-Improved Slime Mould Algorithm (SI-SMA) is used for the optimal selection of SCADA parameters as well as weight optimization of CNN. The proposed SI-SMA method is an enhanced form of the standard Slime Mould Algorithm (SMA). Eventually, an error analysis and a stability analysis are carried out to check the overall effectiveness of the suggested approach. In particular, the root mean square error (RMSE) of the implemented algorithm is lower, and it is 0.69%, 1.58%, 0.81% and 1.71% better than the existing FF, GWO, WOA and SMA models.

FUZZY LOGIC-BASED CLUSTER FORMATION AND OPTIMISED ROUTING FOR MOBILE AD HOC NETWORKS IN ENVIRONMENT PROTECTION

RAMESH G., PRIYA S. G., SUBRAMANIAN M., PRASAD D. V. S. S. S. V.

Data collected from the environment may be transferred and exchanged through a WSN's network of nodes, which are composed of various materials. Target monitoring and remote monitoring of the environment are two of the most essential applications. These days, sensors may be found everywhere serving a variety of purposes. Sensors are low-cost, compact, and intelligent. Connectable wireless sensors that can be integrated into a larger system. Densely distributed sensor nodes in a potentially dangerous environment need a lot of power to track, identify, and evaluate physical phenomena. A longer networking lifetime is desirable, however, replacing the battery is inconvenient and often impossible. Because of this, battery life is finite, and saving energy is a difficult problem to solve. One such problem that has the potential to significantly cut down on energy use is selecting the right cluster head (CH). The most popular hierarchical routing system, Low-energy adaptive clustering hierarchy (LEACH), selects a new cluster head at random based on a probabilistic threshold value, and only CHs are allowed to send data to the base station. The protocol uses fuzzy logic with a competitive radius to choose who will serve as cluster heads in groups of uneven size. The concentration, remaining energy, and node's distance from the base station are all inputs.

WSN; cluster head; fuzzy logic; low-energy adaptive clustering hierarchy

RAMESH, G., PRIYA, S. G., SUBRAMANIAN, M., & PRASAD, D. V. S. S. S. V. (2023). FUZZY LOGIC-BASED CLUSTER FORMATION AND OPTIMISED ROUTING FOR MOBILE AD HOC NETWORKS IN ENVIRONMENT PROTECTION. In *Journal of Environmental Protection and Ecology* (Vol. 24, Issue 6, pp. 1900–1909).

Effect of Backing Mediums During TIG Welding: A Case Study

Akhilesh Kumar Singh[1] · B. Marxim Rahula Bharathi[1] · Pramod Kumar[2] ·
M. Zubairuddin[3] · Sandip Kunar[3]

Abstract This study explores the crucial aspect of achieving successful welding procedures, where proper heating and fusion of components are essential for creating a unified piece. While TIG welding boasts numerous advantageous features, a notable limitation lies in its lack of penetration. To address this challenge, the authors investigated the efficacy of using non-metallic backing mediums to see the effect of thermal conductivity and specific heat capacity of backing medium on weld penetration in TIG welding processes. By employing these backing mediums, the study aims to shed light on the potential impact of these non-metallic backing mediums on weld quality and penetration depth. This case study focuses on Bead-on-plate TIG welding performed on plates with the same material thickness. In contrast to previous studies that utilized plates as backing mediums (Singh et al. in Sādhanā 46:203, 2021). However, for this case study, water and ice were adopted as alternative backing mediums. The study replicated previous experimental conditions, facilitating a rapid transfer of heat input to the non-metallic backing medium. Apart from evaluating weld penetration, the research also examined the grain size of TIG welds assisted by the backing medium, comparing it with the grain size obtained in standard TIG welding procedures. The findings shed light on the potential impact of these backing mediums on weld quality and microstructural characteristics, contributing valuable insights to the field of TIG welding.

Keywords BMTIG · TIG welding · Weld microstructure · Geometric dimensions · Bead geometry · Grain size

Introduction

During welding, the baking medium plays a vital role in supporting the material, and due to direct contact with the weld sample, it also transfers some amount of weld heat with it. Generally, the welding back/support medium is of the same weld materials that bond with the base metal and are called permanent backing. Sometimes, the back weld plates are of dissimilar material, which is not allowed to fuse with the parent material and are removed after welding is completed; it is called temporary backing. Backing materials are generally metallic but can also be non-metallic, ceramics and composites. Modern non-metallic materials like heat-resistant silica aerogels [1] and asbestos [2] have also been successfully used in welding.

In fusion welding, backing plates are primarily used for full penetration welding. However, in friction stir welding (FSW), they serve a more significant purpose than simply providing support during welding. Utilizing a welding backing medium during FSW alters the welding specimen's temperature, which leads to modifications in the properties of the resulting weld specimen [3–5]. It has been observed that backing material may influence the fatigue strength, tensile strength [6, 7] and hardness of welds. Moreover, it regulates the welding process's conditions during welding [8]. In addition, the usage of a pre-heated backing plate can be found in the literature. Studies have shown that using a backing medium during welding helps dissipate heat from

✉ Akhilesh Kumar Singh
akhileshkr.singh@hotmail.com

1 Department of Mechanical Engineering, Aditya College of Engineering, Surampalem 533437, Andhra Pradesh, India

2 Department of Mechanical Engineering, Aditya College of Engineering and Technology, Surampalem 533437, Andhra Pradesh, India

3 Department of Mechanical Engineering, Aditya Engineering College, Surampalem 533437, Andhra Pradesh, India

⑤

Improving speech communication in the age of face masks: A study on EMD denoising method by subjective speech comparison

Marxim Rahula Bharathi B [a], Balaji N . S [b,*], Akhilesh Kumar Singh [a], Rajarajan Sundaramurthi [c], Raja Chandra Sekar M [d]

[a] Department of Mechanical Engineering, Aditya College of Engineering, Surampalem, Andhra Pradesh 533437, India
[b] Department of Mechanical Engineering, National Institute of Technology, Andhra Pradesh, India
[c] 4G/5G Development Team, Capgemini Engineering, Bengaluru, Karnataka, India
[d] Department of Mechanical Engineering, Velammal College of Engineering and Technology, Madurai, Tamil Nadu 625009, India

ARTICLE INFO

ABSTRACT

The widespread use of face masks during the COVID-19 pandemic has posed challenges to effective communication. This study investigates the application of the Empirical Mode Decomposition (EMD) denoising method to enhance the quality of acoustic signals affected by face masks. The EMD technique utilizes a Fast Fourier transform (FFT) of the intrinsic mode function to distinguish noise from the signal and improve the acoustic signal. The EMD-enhanced speech signal is compared to the acquired speech signal using Comparison Mean Opinion Scores (CMOS), and the spectral subtraction speech enhancement signal is also evaluated using CMOS. The results from various experimental conditions consistently demonstrate the superior performance of EMD denoising in producing enhanced signals. Specifically, the EMD method outperforms the spectral subtraction method in improving speech signal quality affected by face masks. These findings underscore the effectiveness of the EMD denoising method in improving the quality of speech signals impacted by face masks, highlighting its potential for enhancing communication in challenging acoustic environments.

1. Introduction

The COVID-19 pandemic has drastically altered the way people interact with each other, with face masks playing a significant role in limiting the spread of the virus. These protective measures have undoubtedly saved millions of lives but have also made communication between people more challenging. Some people have difficulty understanding others' speech when wearing masks, particularly in the classroom, where students must focus on the masked teacher's speech for an extended period. Several studies have been conducted to explore the impact of respirator masks on speech intelligibility. Palmiero et al. [1] have examined the influence of respirator masks on speech intelligibility. From various experiments, Corey, R.M et al. [2] observed that face masks attenuate high-frequency sound before the talker. Bottalico, P et al. [3] explored the influence of face masks on classroom communication and recommended using surgical or N95 masks in teaching environments to minimize the effects on speech intelligibility. B. T. Balamurali et al [4] studied the design and material choice of various face masks, their impact on frequency response, and the implications of

how speech sounds produced at the speaker's lips may be affected by these masks. The material choice has a more significant impact on transmission than may be predicted by mask geometry and design.

Several speech enhancement methods are available to enhance speech signals' clarity, intelligibility, and understanding ability. These methods can be divided into single-channel and multi-channel enhancing methods. For real-time applications such as hearing aids, mobile communications, and classroom audio systems, the single-channel enhancing method is utilized. Multi-channel speech enhancement is used for multiple signal input conditions systems. One of the most popular speech enhancement methods is the spectral subtraction method, where the time-domain signal is converted into a frequency-domain signal using Fourier transform. Boll proposed a spectral subtraction method to eliminate background noise [5]. In speech signals, noise can be removed by periodic noise removal, wideband noise removal, and interfering speech techniques.

Paliwal et al. proposed a short-time modulation domain-based spectral subtraction method to enhance musical noise [6]. The noise cancellation adaptive spectral subtraction method is also proposed to

Emission analysis of esterified mahua oil fuelled with DTBP blends in conventional diesel engine

Nalla Bhanu Teja

Department of Mechanical Engineering,
Aditya College of Engineering,
Surampalem – 533437, E.G. Dist, A.P., India
Email: bhanuteja_mech@acoe.edu.in

Karthikeyan Natarajan*

Department of Mechanical Engineering,
National Engineering College,
Kovilpatti – 628503, Tuticorin, Tamilnadu, India
Email: Karthikeyan-mech@nec.edu.in
*Corresponding author

Ramesh Adireddy

Department of Mechanical Engineering,
Aditya College of Engineering,
Surampalem – 533437, E.G. Dist., A.P, India
Email: ramesh_153@acoe.edu.in

Rajendra Prasad Arani and Sudhakar Meganathan

Department of Mechanical Engineering,
Sri Sairam Engineering College,
Chennai-600044, India
Email: sudhakar.mech@sairam.edu.in
Email: rajendraprasad@sairam.edu.in

Tien Anh Tran

Department of Marine Engineering,
Vietnam Maritime University,
Haiphong, Vietnam
Email: anhtt.mtb@vimaru.edu.vn

Abstract: The experiments are conducted with mahua oil methyl ester 1% DTBP enhancer and compared with standard diesel. The methyl ester was prepared from mahua oil by transesterification process. The produced fuel was blended with 1% DTBP along mineral diesel in various proportions for conducting experiments in conventional diesel engine. Generally, emissions

Optimization enabled deep residual neural network for motor imagery EEG signal classification

Dr T. Rajesh Kumar [a,*], U.S.B.K. Mahalaxmi [b], Ramakrishna MM [c], Dr Dhowmya Bhatt [d]

[a] Associate Professor, Department of Information Technology, Sri Krishna College of Technology, Coimbatore.
[b] Associate professor, Department of ECE, Aditya College of Engineering, Surampalem, Andhra Pradesh, India.
[c] Assistant Professor, Department of ECE, Wolaita Sodo University, Wolaita Sodo Town, Ethiopia.
[d] Associate Professor, Department of Computer Science and Engineering, SRM Institute of Science And Technology, Delhi NCR Campus, India

ARTICLE INFO

ABSTRACT

The brain computer interface (BCI) aimed to offer an improved and quality life for people having disabilities. Various physiological sensors are utilized for designing the BCI application. Here, the electroencephalogram (EEG) is well-known for modeling the brain signals. However, the existing techniques based on EEG signal classification are computationally expensive and not so accurate. This paper devises Competitive Swarm Dragonfly Algorithm (CSDA) for classifying the EEG signals. In this model, the input EEG signal artifacts are discarded in pre-processing phase. The feature extraction is done to extract imperative features that include spectral-based features, like Amplitude modulation spectrogram, frequency-based features, like spectral flux, tonal power ratio, spectral centroid, spectral spread, Power Spectrum Density, logarithmic band power, and statistical features like kurtosis, entropy and skewness. Here, data augmentation is performed for making the data suitable for further processing. Deep Residual Network (DRN) is used to classify the motor imagery EEG signal. The suggested CSDA is used to train DRN, which is obtained by combining the competitive Swarm Optimizer and Dragonfly Algorithm. The performance of the adapted approach is determined using motor imagery multi-class dataset and motor imagery small training sets, in which the motor imagery multi-class dataset offers the highest specificity, accuracy, and sensitivity of 91.9% 91.6%, and 92.3%, respectively.

1. Introduction

The human brain is termed a black box by several researchers. Even though one can model and elaborate some phenomenon, the majority of the working condition of the brain is considered as ambiguous. The activities of the brain can be evaluated with the discovery of electro-chemical signals, and the flow of blood. While looking at electro-chemical signals, a huge issue is linking of signals using particular activity in such a way that the activation of motor functions or addressing math equations with mental computations [9,19,47]. The BCI technique offers an undeviating pathway amongst brain and exterior tool by avoiding actual pathway [42,43]. It provides communication way to people using serious disabilities of motor, which are not able to utilize its muscles to deal with daily tasks [10], which are attained by classifying brain signals [44,15,44], which indicate the neural activities, which are linked to thoughts of particular motor actions or throughout several mental errands [1,40,41]. There exist persistent and non-

invasive techniques for attaining brain signals, which help to design the BCI model [1,12].

BCI is a communication model, which helps users with serious disabilities in cooperating with the platforms by interpreting the activities of the brain using EEG signals. Complicated processing of the signal is modelled with codes for converting it to false actuator signal for managing exterior tools based on the flow of design as defined in [13]. The recorded EEG signal is buried by several artifacts based on physiological and non-physiological sources [14]. Thus, these artifacts must be eliminated carefully without destroying the beneficial data with filtering techniques [15]. In addition, the EEG signal comprises an EEG spectrum based on the body parts for present learning, and the spectrum of attention is determined in bands. Various techniques are utilized for preserving the beneficial data like wavelet filter and FFT [4]. The abnormalities in the brain called epileptic seizure are determined using EEG [5].

Classification of EEG [20] is one of the imperative techniques for BCI. Some of the classical techniques for the multiclass classification of EEG

* Corresponding author.
E-mail address: (D.T Rajesh Kumar).

WILEY

Hybrid optimization algorithm for optimal designing of microstrip patch antenna

Ramakrishna Guttula[1] | Ramesh Adireddy[2] | Venkateswarlu Mannepally[1]

[1]Department of Electronics and Communication Engineering, Aditya College of Engineering, Surampalem, Andhra Pradesh, India

[2]Department of Electrical and Electronics Engineering, Aditya College of Engineering, Surampalem, Andhra Pradesh, India

Correspondence
Ramakrishna Guttula, Department of Electronics and Communication Engineering, Aditya College of Engineering, Surampalem, Andhra Pradesh 533437, India.
Email: grkjosh643@gmail.com

Abstract

Microstrip Patch Antennas (MPAs) are generally renowned for their adaptability regarding feasible geometries, which makes them appropriate for numerous diverse conditions. The suitability to integrate and the trivial structure with microwave incorporated circuits was said to be the major advantage among several advantages. MPA poses constricted bandwidth; thus it has a complication while tuning. In addition, MPAs are renowned for their reduced gain. As a result, there is a necessity to raise the gain and bandwidth of MPA. This work intends to put forward a novel approach that gets a non-linear objective for assisting the modeling of solution spaces for antenna constraints. Thus, "Salp Swarm based Shark Smell Optimization (SS-SSO) that hybrids the concepts of Salp Swarm Algorithm (SSA) and Shark Smell Optimization (SSO)" is developed that tuned the constraints of MPA. The implication of the developed approach is to boost the antenna gain by optimal electing of dielectric value, patch length, substrate width, and thickness of MPA.

KEYWORDS

antenna gain, dielectric value, MPA, SS-SSO algorithm, thickness

1 | INTRODUCTION

Because of their small size, low cost, and lightweight, micro-strip patch antennas are more popular in the mobile phone market. With technological advancements, antennas are taking on a larger role. The advancement of "wireless communication systems" has increased the demand for small, low profile antennas with a high gain and wider frequency range.[1-3] Because of these benefits, they were utilized in a wide range of appliances, including communications, satellite, biomedical, and radar. Because the demand for antennas that can emit over a wider variety of frequencies is rising in modern communication, bandwidth augmentation is a major concern. The design of antennas that combine several capabilities such as high gain over a wide impedance bandwidth, directional beam formation, and functionality has piqued researchers' interest in response to the growing needs for wireless communication.[4-6] An MPA includes a conducting ground and radiating patch, separated by a dielectric substrate, and a feed connected to the radiating patch. When an electric field is applied to a dielectric substance, bound charges can only travel within the molecules of the latter.[7,8] In contemporary era of wireless communiqué applications and service, low and compacted antennas are regarded as the most important alternative in wireless devices.[9] MPA is quite widespread among antenna design researchers and engineers owing to several benefits presented by them. Patch antenna was easier for designing, light weighted and every the areas/fields are distributed over the substrate, which is not costly.[10,11] With compacted dimensions and size, wide or broad bandwidth has to turn out to be a basic necessity in communiqués due to the rising count of users.[12,13]

Owing to the rising utilization of MPA in wireless communiqué, it includes a wider configuration range.[14,15] Multiple input multiple output systems provide the same capabilities and performance improvements while significantly reducing this complexity.[16] Moreover, radar devices are

Hammer-shaped slotted antenna design and analysis for wireless applications

Gajendran Srihari[1], Raman Ramamoorthy[2], Shanmuganantham Thangavelu[3], Nimmagadda Padmaja[1]
[1]Department of Elecrtonics and Communication Engineering, Sree Vidyanikethan Engineering College, Tirupathi, India
[2]Department of Elecrtonics and Communication Engineering, Aditya College of Engineering, Surampalem, India
[3]Department of Electronics Engineering, Pondicherry University, Puducherry, India

Article Info

ABSTRACT

The method for creating a two-element multiple-input and multiple-output (MIMO) ultra-wideband hammer antenna is presented in this paper. It has been suggested to investigate characteristics of this ultra-wideband antenna design. Split-ring resonators (SRR), made of metamaterial, have enhanced performance of antenna in terms of multiplexing effectiveness, S parameters, radiation characteristics, envelope correlation coefficient, and diversity gain. Reduced weight and size of this antenna technology make it easier to integrate into a 5G and linked object receiver. Because the outputs from the previous designer to the target entity did not satisfy the standards, we thoroughly researched design attributes and made parametric changes to the design to reach the precise outcomes.

Corresponding Author:

Gajendran Srihari
Department of Elecrtonics and Communication Engineering, Sree Vidyanikethan Engineering College
Tirupathi, Andhra Pradesh-517 102, India
Email: srihari.g@vidyanikethan.edu

1. INTRODUCTION

High channel capacities and data transmission speeds became major research concerns as wireless communication systems advanced. Limiting the transmission's data rate and channel multipath fading are the two difficulties encountered. A strong resistance to the idea of high-speed transmission and multipath fading ability may be seen in ultra-wideband technology (UWB) [1]. For high-speed wireless communication and short-range transmission, UWB is regarded as the optimal information carrier due to its benefits of great penetration capabilities, low power spectrum density and precise location. Multiple-input and multiple-output (MIMO) technology achieves an important increase in high transmission rate and channel capacity comparative to the number of antennas employing multiple antennas at the transmitter and receiver using spatial diversity and multipath transmission impact of the channel. Large channel capacity and high data transmission rates can be attained while preventing multipath fading effects by combining UWB with MIMO technologies [2].

The poor coupling of the antennas is the fundamental issue with UWB MIMO antennas. Portable terminals and wireless devices are getting smaller and more integrated as a result of the quick development of modern mobile communications. UWB MIMO miniaturisation allows UWB MIMO antennas get smaller, their physical separation gets closer, and their mutual coupling gets stronger. This causes electromagnetic interference to get worse and worse, which breaks down the antenna. Therefore, one of the main concerns in UWB MIMO antenna development is how to improve cell-to-cell isolation. Creating decoupling structures [3], [4], cutting slits [5] loading metamaterials, decoupling frequency-selective surfaces [6], electromagnetic bandgap structures [7]-[9], neutralisation lines [10]-[13], and parasitic cell decoupling [14], as well as

⊙

Enhanced microwave absorption of g-C₃N₄/poly(vinylidene difluoride)/carbon black composites

Inamul Hussain [a] ✉ , Sebina Yesmin [b] ✉

Show more ∨

⤴ Share ,, Cite

Abstract

The two-dimensional (2D) nanostructures have been widely applied as microwave absorption materials due to their unique structural features towards electromagnetic wave absorption. Herein, we have prepared graphitic carbon nitride (g-C₃N₄) nanosheets with a facile synthesis process, and then it was composited with a minimal amount of polyvinylidene difluoride (PVDF) and carbon black (CB) to enhance the microwave attenuation of g-C₃N₄ and to present an eco-friendly and cost-effective microwave absorbing material (MAM) as g-C₃N₄/PVDF/CB. The designed g-C₃N₄/PVDF/CB composite delivers a maximum return loss of −30.93dB at 11.44GHz, corresponding to an absorption efficiency of over 99.92%, with an average return loss of −17.29dB. However, the dielectric performances were also elucidated with independent contributions of dielectric constant, tangent loss, and conductivity towards the microwave absorption performances. The integration of absorption medium PVDF and conductive medium CB to g-C₃N₄ offers the excellent absorption ability of g-C₃N₄/PVDF/CB. Hence, in the exploration of new MAM, g-C₃N₄/PVDF/CB may be an attractive microwave-absorbing material with strong dielectric parameters and excellent absorption effects.

Graphical abstract
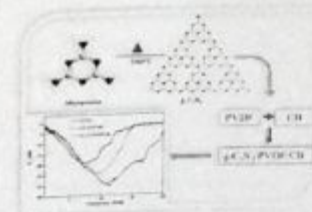
Download : Download high-res image (222kB)
Download : Download full-size image

Introduction

The scientific community has seen an explosion in technological development over the last few decades, mainly based on high-power electronic devices, which provide great convenience to day-to-day life [[1], [2], [3], [4]]. With the rapid growth of wireless technology, the World Health Organization has classified electromagnetic pollution as the fourth most polluting source. Because of the ever-increasing usage of electronic equipment, the growth rate of electromagnetic waves (EMW) is reported to be about 7–14% per year. The widespread use of EMW in various applications like mobile communication, military applications, and radar communication contributes to environmental electromagnetic pollution. Excessive electromagnetic radiation seriously harms the physical and mental health of humans [3,4]. Apart from this, electronic equipment's performance and durability are also harmed by electromagnetic pollution. As a result, this pollution has become a primary global concern, and it is critical to reduce it through either a shield mechanism or an absorption mechanism. EMW absorbing materials, when compared to EMW shielding materials, are more effective at dissipating microwave energy

A HIGH GAIN CIRCULARLY POLARIZED (CP) ANTENNA ARRAY USING SEQUENTIAL PHASE (SP) ROTATION TECHNIQUE FOR WLAN APPLICATIONS

Penchala Reddy Sura,[1] Tathababu Addepalli,[2,]
Samineni Peddakrishna,[3] M. Satish Kumar,[4] &
M. Kishore Kumar[5]*

[1]Department of ECE, PBR Visvodaya Institute of Technology & Science, Kavali,
Andhra Pradesh, India

[2]Department of ECE, Aditya Engineering College, Surampalem, India

[3]School of Electronics Engineering, VIT-AP University, Amaravati, Andhra
Pradesh, India

[4]Department of ECE, SRKR Engineering College, Bhimavaram, Andhra Pradesh,
India

[5]Department of ECE, Aditya College of Engineering, Surampalem, Andhra
Pradesh, India

*Address all correspondence to: Tathababu Addepalli, Department of ECE, Aditya
Engineering College, Surampalem, India, E-mail: babu.478@gmail.com

This paper designs and investigates a high gain circularly polarized 2 × 2 antenna array for wireless applications using the sequential phase rotation technique. The feed network utilizes four rectangular lines of equal width and three 90° arcs. The length of all elements is equal to λ/4 to provide 0°, 90°, 180°, and 270° phase differences at the four outputs of feed network to increase the axial ratio(AR) bandwidth and purity. Four corner truncated patch elements are connected to the feed network to fulfill the 2 × 2 antenna array design. The proposed design operates with an impedance bandwidth of 1.1 GHz from 4.9 GHz to 6 GHz bandwith and an AR bandwidth of 0.8 GHz from 5 GHz to 5.8 GHz band. The maximum measured gain of the antenna array is observed as 8.9 dBic in the operating band. The antenna array was prototyped and tested to validate its performance. This array is well suitable for high gain WLAN applications.

KEY WORDS: *axial ratio, quarter-wave, sequential rotation, CP antenna, WLAN band*

1. INTRODUCTION

The design of circularly polarized (CP) planar antennas operating at high gain has gained widespread popularity in modern wireless systems such as WLAN, Wi-Fi, and satellite communication (Gengqi and Sun, 2018; Squadrito et al., 2019). The CP antennas are designed by exciting two orthogonal equal amplitude electric fields or modes

DESIGN AND IMPLEMENTATION OF A SMART TRAFFIC MANAGEMENT SYSTEM USING INTERNET OF THINGS (IOT) TECHNOLOGY

Yogendra narayan[1]

[1]Associate professor, ECE Department Chandigarh university Mohali
narayan.yogendra1986@oksbi

Dr.R.RAMAN[2]

[2]Associate Professor, Department of ECE, Aditya College of Engineering, Surampalem, East Godavari district, Andhra Pradesh, ramanphdr@gmail.com

Mr. Anuj Kumar Sharma[3]

[3]Assistant Professor, Department of Electronics & Communication Engineering , Faculty of Engineering & Technology ,Gurukul Kangri Deemed to be University Haridwar,
anujsharma@gkv.ac.in

Dr. Santosh Soni[4]

[4]Assistant Professor, Department of Information Technology, University with City and state - Guru Ghasidas Vishwavidyalaya Bilaspur, Chhattisgarh, santoshsoni.77@gmail.com

Pankaj Chandra[5]

[5]Assistant Professor, Department of Information Technology, University with City and state - Guru Ghasidas Vishwavidyalaya Bilaspur, Chhattisgarh, pankaj2684@gmail.com

Mrs. Akanksha Gupta[6]

[6]Assistant Professor , Department of Information Technology, University with City and State - Guru Ghasidas Vishwavidyalaya Bilaspur, Chhattisgarh ,akanksha.me2011@gmail.com

Abstract

The quantity of autos out and about has out of nowhere expanded consistently. All metropolitan regions battle with traffic as a result of the remarkable ascent in the quantity of vehicles out and about, in spite of the way that the framework for street transportation has not changed. Everybody presently needs to manage the developing issue of traffic clog consistently. The adequacy of traffic cops physically coordinating traffic has not been laid out. Besides, the foreordained set time for the sign under all circumstances (low and high traffic thickness) has not given an answer for this issue. The Internet of Things (IoT) is introduced as an answer for the previously mentioned issues. By actually overseeing signalized intersections in urban areas, we desire to diminish traffic. Keeping that in mind, we've fostered a calculation that utilizes IOT to look at continuous information from various sources.

Keywords: Smart traffic management system, Internet of things, Autonomous management.

Eur. Chem. Bull. 2023,12(Special Issue 5),417-434

426

ROLE OF IMAGE PROCESSING IN MODERN HEALTHCARE: A REVIEW OF TECHNIQUES AND APPLICATIONS

Dr.R.RAMAN[1], Associate Professor, Department of ECE, Aditya College of Engineering, Surampalem, East Godavari district, Andhra Pradesh, ramanphdr@gmail.com

Dr.W.Deva Priya[2], Professor, Department of Computer Science and Engineering, Saveetha School of Engineering, SIMATs University, w.devapriyya@gmail.com

Ms Indhumathi G[3], Assistant, Rajalakshmi Engineering College, Chennai, Indhumathi.g@rajalakshmi.edu.in

A Hariom prakash rao[4], Associate professor, PNR Collge of pharmacy, Shamshabad, hp0696513@gmail.com

Anju Asokan[5], Assistant professor, Computer and communication Engineering , Sri Eshwar college of engineering, Kinathukadavu, anjuasokan@sece.ac.in

Dr K T Vigneswara Rao[6], Assistant Professor NICMAR Business School, NICMAR University, Pune - 411045, ktvraofpm@gmail.com

ABSTRACT:

Image processing has emerged as a critical technology in modern healthcare, revolutionizing various aspects of medical diagnosis, treatment, and research. This paper presents a comprehensive review of the role of image processing techniques and their applications in healthcare. The paper begins by highlighting the fundamental importance of medical imaging in diagnosing diseases and guiding treatment decisions. It then delves into the various image processing techniques that are employed to enhance and analyze medical images. These techniques include image enhancement, segmentation, registration, and classification. Image enhancement techniques aim to improve the visual quality of medical images by reducing noise, enhancing contrast, and improving spatial resolution. Various filtering algorithms, such as median filtering and wavelet transforms, are commonly employed for noise reduction. Contrast enhancement techniques, such as histogram equalization and adaptive filtering, are used to enhance the visibility of structures within the images. Segmentation plays a crucial role in extracting relevant information from medical images. It involves partitioning an image into meaningful regions, such as organs or lesions. Numerous segmentation algorithms, including thresholding, region-growing, and active contours, have been developed to accurately delineate anatomical structures or identify abnormalities within images. Image registration techniques enable the alignment of multiple images acquired at different times or from different modalities. By aligning images, clinicians can compare changes in a patient's condition over time or fuse complementary information from different modalities, such as magnetic resonance imaging (MRI) and computed tomography (CT). Registration algorithms utilize features such as landmarks, intensity-based methods, or deformable models to achieve accurate alignment. Classification techniques utilize machine learning algorithms to classify medical images into different categories, such as identifying cancerous tumors or classifying

4463

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN FOOD AND AGRICULTURE INDUSTRY

Dr.R.RAMAN[1], Associate Professor, Department of ECE, Aditya College of Engineering, Surampalem, East Godavari district, Andhra Pradesh. ramanphdr@gmail.com

K.Priya[2], Assistant Professor, Computer Science, P.B Siddhartha College of Arts and Science, Vijayawada. pppriyamca@gmail.com

Dr.P.RENGARAJAN[3], Assistant professor of Commerce, Poompuhar College (Autonomous), Melaiyur 609107, Mayiladuthurai District, Tamilnadu. trydrraj@gmail.com

Dr.S.Jaya Bharathi[4], Professor, Department of Management Studies, Coimbatore Institute of Engineering and Technology, Narasipuram, 641109. jmn2kin@gmail.com

Dr.Anu K M[5], Assistant Professor, Department Of Commerce, Christ University, Bangalore. anu.km@Christuniversity.In

Dr. Deepak Janardhan Gadeka[6], Assistant professor, Department of Geography, Padmashri Vikhe Patil College Of Arts Science & Commerce, Pravaranagar Tal-Rahata Dist-Ahmednagar, 413713 Maharashtra, India. deepak.gadekar007@gmail.com

ABSTRACT

Because human labor is essential from the cultivation of raw materials to the final packing of finished products, the food processing and handling industry is the largest employer globally and in the manufacturing sector as a whole. Human intervention has led to the collapse of global food systems. poor demand-supply forecasting, leading to food insecurity. Industrial automation on a large scale is the only solution for the food industry's problems. A.I., M.L., and DL are the pillars upon which automation rests (various machine learning and artificial intelligence techniques). With an AI-based system in place, food production and distribution are simplified and improved. In this piece, we'll investigate how artificial intelligence (AI) is being utilized to displace human labor in the food business in order to cut costs, increase production, and minimize waste. AI and data science working together might boost productivity in the food service business, which includes restaurants, cafes, online meal delivery chains, hotels, and more. Using a more open and transparent supply chain management

Innovative Strategies for Automated Water-Body Segmentation:
Harnessing Deep Learning in Satellite Image Analysis

Vasamsetty Lakshmi Prasanna
Student, M Tech in Embedded systems
Department of ECE
Aditya College of Engineering, Surampalem, AP
Vasamsettylaxmiprasanna99@gmail.com

Dr. R. Raman
Associate Professor
Department of ECE
Aditya College of Engineering, Surampalem, AP
ramanphdr@gmail.com

ABSTRACT: Automatic segmentation of water bodies from high-resolution satellite images is of great importance in various fields, including environmental monitoring, urban planning, and disaster management. Traditional techniques for water body segmentation often rely on manual or semi-automatic methods, which are time-consuming and prone to human errors. Recently, deep learning approaches have shown remarkable success in computer vision tasks, leading to their adoption for water body segmentation. This study presents a comprehensive investigation into the development of a deep learning framework for automatically segmenting water bodies from high-resolution satellite images. The proposed framework leverages convolutional neural networks (CNNs) to learn distinctive features and achieve precise segmentation outcomes. To assess the framework's performance, a diverse dataset is employed, and the obtained results are compared with state-of-the-art methods. The experimental findings demonstrate the efficacy and efficiency of the proposed approach, offering encouraging possibilities for automating water body segmentation from high-resolution satellite images.

Keywords: automatic segmentation, deep learning, convolutional neural networks, high-resolution satellite images, water-body segmentation.

I. INTRODUCTION

1.1 Background:

In this section, the background of the research topic is presented to provide context and rationale for conducting the study on automatic water-body segmentation from high-resolution satellite images via deep networks. The increasing availability of high-resolution satellite imagery has opened up new possibilities for various applications, including environmental monitoring, urban planning, and disaster management. Accurate identification and segmentation of water bodies within these images are crucial for analyzing changes in water resources, understanding urban development patterns, and responding effectively to natural disasters. Traditional methods for water-body segmentation often rely on manual or semi-automatic techniques, which are labor-intensive and prone to errors. Therefore, there is a need for automated approaches that can handle the analysis of large-scale satellite images efficiently and accurately.

1.2 Problem Statement:

Within this section, a precise articulation of the targeted issue addressed by the research is provided. The problem statement elucidates the constraints and obstacles entailed by conventional methodologies employed in water-body segmentation, emphasizing the necessity for an automated approach utilizing advanced deep learning techniques. The problem statement may encompass factors such as the intricacy inherent in satellite imagery, the imperative for precise demarcation of water boundaries, and the potential repercussions arising from erroneous segmentation in subsequent applications.

1.3 Objectives:

The objectives of the research are outlined in this section. The main objective is to develop a deep learning-based framework for automatic water-body segmentation from high-resolution satellite images. The sub-objectives may include:

1.3.1 Investigating state-of-the-art deep learning techniques for image segmentation.

Image segmentation plays a crucial role in various computer vision tasks, including object detection, image recognition, and scene understanding. With the rapid advancements in deep learning, particularly convolutional neural networks (CNNs), there has been significant progress in achieving accurate and efficient image segmentation. In this section, we delve into the investigation of state-of-the-art deep learning techniques for image segmentation, highlighting their key concepts, methodologies, and contributions. U-Net, DeepLab, Mask R-CNN, PSPNet, FCN

II. LITERATURE REVIEW

2.1 Overview of Water-Body Segmentation:

In this section, an overview of water-body segmentation is provided. It discusses the significance of water-body segmentation in various applications such as

Revolutionizing Traffic Control : The Internet of Things in overspeeding detection

MSV Krishna Reddy
Sudent, MTech in Embedded systems
Aditya College of Engineering, Surampalem, A.P
krishnareddym1998@gmail.com

Kalesh Busa
Sr. Asst Professor, MTech(Ph.D)
Aditya College of Engineering, Surampalem, A.P
kalesh.busa@gmail.com

Abstract— Overspeeding has become a common traffic violation, often resulting from reckless and irresponsible driving. To address this issue and prevent accidents from occurring, it is essential to implement a system that can detect and report instances of overspeeding to traffic control authorities quickly. Although speed limits are clearly marked on roads, some drivers habitually disregard them. With technological advancements, manual or semi-automatic systems have been replaced with automated ones. This study proposes a novel approach by utilizing the Internet of Things (IoT) to identify and report instances of overspeeding on vehicles equipped with the device. IoT is a method of interconnecting diverse devices to exchange data among them. The proposed system involves designing, developing, and deploying a smart device that detects and alerts relevant authorities whenever a vehicle surpasses the prescribed speed limit. The device uses GSM, GPS technology and employs Arduino hardware. We tested the device in real-time by installing it in a vehicle. The proposed system involves designing, developing, and deploying a smart device that detects and alerts relevant authorities whenever a vehicle surpasses the prescribed speed limit. The device records the speed of the vehicle and compares it with the speed limit of the road. If the vehicle exceeds the speed limit, the device sends an alert to the relevant authorities, including the vehicle's location and speed. This system allows for prompt action to be taken to prevent accidents and ensure the safety of drivers and passengers.

Keywords— Over speeding, Internet of Things, GPS Technology, Arduino, Vehicle Over Speed Detection, Smart Vehicle

I. INTRODUCTION

Reckless driving is a major contributor to accidents worldwide. Despite the significant increase in traffic, the monitoring system for vehicle speed has been compromised. Such reckless driving poses a significant risk to not only the driver and passengers but also to the general public. Although it is a severe problem, the present method of detecting reckless driving through patrol officers lacks efficiency [1]. As stated in [2], increasing speed multiplies the risk of accidents and the potential for injury. A vehicle traveling at high speeds requires a longer distance to come to a stop. It is crucial to develop a system that can detect and report instances of overspeeding. Other factors such as weather conditions and driving at night also affect the accuracy of manual systems.

Based on [5], the number of deaths in India due to road accidents on a daily basis is over four times greater than the total annual death toll from terrorism. In 2022, 139,671 people lost their lives on Indian roads, which amounts to 382 deaths per day. If 57,844 people lost their lives due to overspeeding, approximately 6,969 individuals died due to speeding after consuming alcohol in 2022. The figure below illustrates the number of deaths caused by road accidents.

Death due to Road Accidents

■ Speeding ☐ Drunken Driver

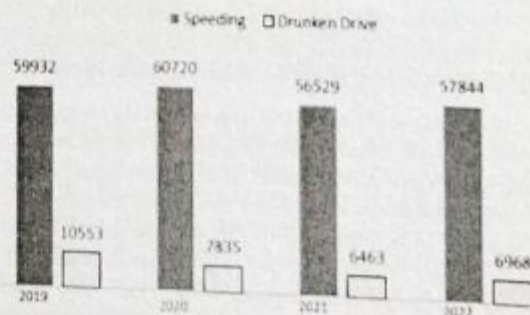Figure 1: Deaths caused due to accidents in roads
Source: [5]

As depicted in the preceding figure, it is clear that overspeeding is the leading cause of death in road accidents between 2019 and 2022. According to reference [3], overspeeding accounted for 41% of fatalities in accidents, while dangerous or reckless driving was responsible for 32% of fatalities. Other factors that contribute to fatalities in

Creating an Intelligent Living Environment: Home Automation with Amazon Echo

Ashok Tetakala
Department of ECE
Aditya College of Engineering, Surampalem, AP
Ashokteja2222@gmail.com

Kiran Venneti
Department of ECE
Aditya College of Engineering, Surampalem, AP
Venneti.kiran49@gmail.com

ABSTRACT: Home automation systems have gained significant popularity in recent years, revolutionizing the way people interact with their living spaces. This paper presents a comprehensive exploration of home automation using the Amazon Echo, a popular voice-controlled smart speaker powered by Alexa, the intelligent voice assistant developed by Amazon. The integration of Amazon Echo with home automation devices enables users to control various aspects of their homes simply by using voice commands. The paper examines the underlying technology and architecture of the Amazon Echo, highlighting its ability to connect and communicate with a wide range of smart devices, including lighting systems, thermostats, security cameras, door locks, and entertainment systems. The seamless integration of these devices through the Amazon Echo creates a centralized control hub that simplifies home management and enhances convenience for users.

Keywords: Home automation, Amazon Echo, automation devices.

I. INTRODUCTON

The development of Machine Interaction has revolutionized voice recognition technology. By utilizing algorithms and programs, speech recognition enables users to interact with devices and execute specific commands. This advancement has paved the way for home automation, allowing control over lighting and various appliances. When appropriately calibrated, this technology can also be implemented in industrial settings. However, it's important to note that automation calibration and settings may vary depending on the application. Engineers rely on intricate algorithms and calibrations to meet specific requirements. Automation plays a crucial role in the construction of smart cities, facilitating processes like traffic monitoring, water management, and sewage control.

A smart home system encompasses various aspects such as appliance control, security measures, and monitoring parameters like light intensity and moisture levels within the house. To achieve intelligent functionality, these household appliances need to be interconnected through IoT or other means. One notable example is the Amazon Echo Dot, a smart speaker created by Amazon. It is equipped with an interactive artificial intelligence called "Alexa."

The device has the capability to play music,

podcasts, provide weather forecasts, and facilitate interactions. It is not limited to just appliance control but can also be utilized for home monitoring within smart home systems. In India, the cost of automation systems for homes is generally high. However, integrating Alexa into the system offers a more affordable option for automation in households and buildings. By using the Alexa app and server, users can register their devices as smart devices and enable home automation functionalities.

The Amazon Echo, a smart speaker created by Amazon, serves as a versatile control hub for numerous smart devices. In our paper, we leverage the Amazon Echo to create a skill that communicates with our circuit, enabling control over our devices. The Node-Mcu functions as the central controller for automation in this project. When a user commands Alexa, the Node-Mcu reads the data via Wi-Fi and determines the appropriate switching action for the electrical devices connected to it via relays, effectively acting as a fuse.

1.1 Objective

The aim of this paper is to create an automated floor or room system that eliminates the need for human presence in potentially hazardous areas. By utilizing the Internet of Things (IoT), we will develop an autonomous robotics system and design floor/room automation that integrates with Alexa, thereby removing the requirement

Performance Analysis of Energy Efficiency and Security Solutions of Internet of Things Protocols

Manjunath Itagi[1], Dankan Gowda V[2*], KDV Prasad[3], Pullela SVVSR Kumar[4], Shekhar R[5] and B. Ashreetha[6]

[1]Associate Professor, Department of Civil Engineering, Nagarjuna college of Engineering and Technology, Devanahalli, Bangalore, Karnataka, India, drmanjunath.itagi@ncetmail.com

[2]Department of Electronics and Communication Engineering, BMS Institute of Technology and Management, Bangalore, Karnataka, India, dankan.v@bmsit.in

[3]Assistant Professor (Research), Symbiosis Institute of Business Management, Hyderabad, Symbiosis International (Deemed University), Pune, India, Kdv.prasad@sibmhyd.edu.in

[4]Aditya College of Engineering, Surampalem, Andhra Pradesh, India, pullelark@yahoo.com

[5]Professor, Department of Computer science and Engineering, Alliance University, Bangalore, Karnataka, India, shekhar.r@alliance.edu.in

[6]Assistant Professor, Department of Electronics & Communication Engineering College, School of Engineering & Technology, Mohan Babu University (Erst while Sree Vidyanikethan Engineering College), Tirupati, Andhra Pradesh, India, ashreetha.b@vidyanikethan.edu

*Correspondence: Dankan Gowda V; dankan.v@bmsit.in

ABSTRACT- The scientific and business communities are showing considerable interest in wireless sensor networks (WSN). The availability of low-cost, small-scale components like CPUs, radios, and sensors, which are often combined into a single chip, is crucial. Parallel to the evolution of WSNs, the concepts of the IoT have been evolving in recent years. Wireless communication technologies may play a significant role in the implementation of IoT, despite the fact that IoT does not need or require any particular technology for communication. WSN assisted IoT networks can drive several applications in many industries. The proposed research explores the possibility of enhancing energy efficiency in WSN-assisted IoTN by balancing various challenging sensor network performance metrics. The base station's current placement inside the sensing field is predetermined by the preexisting routing algorithms. Our study examines the impact of base station placement outside and within the prescribed sensing domains on energy consumption and network longevity. In addition, methods for transferring data from the distributed source sensor to the base station while minimizing energy consumption are investigated. In this preliminary study, we focus on developing an algorithm for WSN-Assisted IoTN that can balance network factors such as hop count, communication distance, and residual energy. To further optimize the routing route between local cluster heads and the base station, a novel network architecture is built based on the Ant-optimization model, which uses centroid routing to balance energy consumption among local clusters. An open-source Network Simulator (NS-3) is used to model the behaviour of the proposed routing protocols and compare them to comparable existing network protocols. All of the suggested protocols have the same fundamentals for creating networks, however they vary in terms of routing, optimization, and performance depending on the development effort under consideration.

Keywords: Internet of Things, Security, Protocols, Efficiency, Simulator and Optimization.

1. INTRODUCTION

Companies in a wide range of sectors are increasingly using IoT, a network of linked devices, for a variety of uses. In view of digital transformation of businesses, the IoT adoption has become essential for human and societal activities. To automate and collect data, many IoT devices are being deployed across the world. Many breakthrough innovations are achieved and supported by IoT in modern world. IoT technologies are being used to mitigate global warming, saving water and increasing yield in smart farming.

IoT is always a booming concept as its information processing capability became more reasonable due to its high computation power and cheap storage price [1]. As the available bandwidth of the network increased rapidly, sensors evolved to be smaller, affordable and more accurate. However, unlocking full potential of IoT generates key issues such as lowering the resolution complexity, solving security concerns and fighting the communication flaws in diverse environments.

Perception, the network, and applications are the three tiers that make up the Internet of Things. The perception layer consists of

Crime Motivation Factors Estimation from FIR Transgression Sheet

[1]Dr. B.V. Rama Krishna, [2]B.Sushma

[1]AssociateProfessor, CSE, Aditya College of Engineering, Surampalem, AP, India

Assistant Professor, MLR Institute of Technology, Dept. of IT, Hyderabad, INDIA

Abstract

There is a demand for investigating systems in crime zones to detect crime patterns with intelligence. To improve the national security detecting the crime factors that influence crimes is needed. The analysis over these crime factors improves the police and judicial departments in planning precautions to reduce the crime effectiveness in any territory across the globe. In this paper an effort has been made to identify Crime Motivation Factors (CMFs) by applying data mining techniques on FIR transgression (charge) sheet. Also a comparative analysis performed among British and Indian CMFs to measure the territorial based CMFs similarity. The CMFs identified can be used to estimate the typical motivations that influence a specific crime.

Keyword: Crime Motivation Factors, British, Indian, Territory.

1. INTRODUCTION

The security of nation depends on the law and order of specific authorities within territory [1]. The maintenance of criminal records by police department required knowledge mining in order to retrieve interesting crime patterns [2] from crime data to support Information Retrieval Systems. The knowledge extracted from this mining process greatly support police department to prevent crimes. The motivation factors of crimes are helpful to legal stakeholders in understanding the cases, identifying similarities among offenses regarding a specific crime. The application of Data Mining techniques over Criminology identifies the characteristics of crimes and their inter relationships and motivation factors of specific crime [3].

Identification of crimes using modern techniques requires highly knowledge extraction with inference engines [4] support. Knowledge engineering methodologies applied over crime patterns improves the services offered by police departments in modern era. Primed factors to be identified for specific crimes by KDD approach discovers the necessary precautions to avoid crimes globally, locating crime sensitive zones, rate of crime factor influences among territories[6][7]. In Section 2 crime factors for various crimes discussed along with traditional techniques to detect crime patterns. In Section 3 data description about training data used in this paper done. In Section 4 experimental study and result analysis conducted followed by conclusion of the work.

2. CRIME FACTORS

2.1 Crime Factors

In various territories various laws influences the detecting techniques which investigate crime factors. Traditional methods like scene investigation, local enquiries, witness identification and evidence collection are common to any territory. A 'Crime Factor' is a factor which stimulates the criminal activities in specific crimes. Some major crime factors are listed in Table 1 given below.

Table1. Crime Factors

Crime Factor	Crimes Influenced
Property	Murder, kidnapping, Threatened calls, harmful attacks

An Overview of Next Generation User Interfaces

[1]**B. Sushma**
Assistant Professor
IT-Department
Marri Laxman Reddy Institute
of Technology
Hyderabad

[2]**Konala Padmavathi**
Assistant Professor
AI&ML Department
Aditya College of Engineering
Surampalem
Kakinada

[3]**Dr B.V. Rama Krishna**
Associate Professor
CSE-Department
Aditya College of Engineering
Surampalem

Abstract

Modern User Interface technologies are highly integrated with wide range of electronic and sensor devices to support seamless experience to users during interaction with systems. The modern techniques fuse the code and design into UI tools aligning latest technologies of communication with program driven UI tools. The web User Interfaces are highly adopting semantic, NLP and sensor based interaction. The Input and Output are from audio, visuals, bio-metrics and touch panels enhancing the User Interaction experience. Haptic technologies introduced brain inputs to AI programmed systems. In this paper various modern UI techniques and devices are observed which changing the future of User Interfaces in modern world. The ease of access improved with flexible and sophisticated UI tools suitable for modern computing systems design.

Keywords: Sensors, biometrics, touch panel, natural interfaces, HCI.

I. Introduction

Modern communication systems highly influenced with electronic revolution. Various communication systems introduced to digital world ranging from common radio wave systems to Wi-Fi broadband systems [1]. A major noticeable change in user interfacing devices transformed input devices from traditional keypad devices to biometric contact less devices [4]. The natural User Interfaces are a combination of common user interfaces with speech and gesture recognition services [2]. During recent years public safety organizations improving their services to citizens using HCI, VR and Voice based user interfaces [6]. The user requirements must be completely satisfied in designing user interfaces to achieve high reliability of applications [3]. Data objects representation with XML improving the extendibility of web pages to multidisciplinary data handling [8]. MVC (Model View Controller) improving interface designing with an emphasize of software business logic and display separations [7]. Customized Component Modeling highlights the user preferences and requirements and builds the prototypes in more customized fashion [5]. Rich Human Agent Interaction introduced intelligent agent based multi perception routines to support user interfaces in handling complex tasks and projects [8]. The display technologies are currently designed in perspective of low power consummation and more echo friendly [5].

DATA MINING BASED RFID TRAFFIC MANAGEMENT SYSTEM

[1]Dr. B.V. RamaKrishna, [2]B. Sushma,[3]Badipati SivaGanga

[1]Associate Professor, Aditya College of Engineering,

Surampalem~533437

[2]Assistant Professor, Marri Laxman Reddy Institute of Technology,
Hyderabad – 110012

[3]Assistant Professor, Ramachandra College of Engineering,
Eluru – 534001

Abstract

The communication and data sharing among smart devices is becoming vital part of today's digital life. The interaction between electronic devices and computational devices made effectively easy with IoT technology. In Metro cities managing the traffic and avoiding traffic congestions becoming a serious issue for police department. In this paper RFID based communication among IoT devices of Traffic Management System and its governance overviewed. Automation of major traffic management system highlighted with RFID technology perspective. The economic benefits and limitations of RFID application over Traffic Systems are coined in this paper. The data mining technologies empowering the data analysis over RFID systems improved the automation process of traffic management systems. The decision support system is boosted with data mining interface provides more reliable assistance with RFID technology based traffic management systems.

Key words: *RFID, IoT, Sensors, Transmitters, Receivers, Data Mining Techniques.*

Introduction

In populated countries like India the roads are flooded with vehicles daily. The increased usage of transport vehicles and personal vehicles resulting traffic jams [2]. The Raspberry Pi-3 supports user friendly Python language to develop software for data processing for data received from RFID tags [3]. The RFID tag system allows detecting congestion locations in city traffic map. The ability to detect the emergency vehicles allows communication with surrounding IoT devices to manage the traffic signals automatically [4]. The high end micro controllers like ATMAL, ARDUINO and INTEL 8051 support dynamic coordination and effective data transmission support for RFID systems [7]. Two varieties of RFID Tags widely used in traffic management systems. One is self power supported tags which continuously transmit data to specific range. When receivers pass through the range collects the data from tags. Secondary tags are static data supported without any self power source. When a receiver or scanner approaches to their range tags acquire power from scanners and submit data to them [8]. Many areas like product monitoring, item dispenser coding, manufacturing catalogs, object mappings and animal tracking automated effectively using RFID tag systems [5]. In this paper an overall layout of RFID based traffic management system proposed with functional overview of various activities [9]. The adoption of Data Mining module supporting knowledge engineering and decision support highlighted. The advantages of proposed system projected in perspective of automation of traffic activities.

RFID Technology

"IoT Enabled Cotton Mill Management System"

Authors
Dr Bh.V. RamaKrishna
Associate Professor
Department of Computer Science & Engineering
Aditya College Of Engineering, Kakinada

Kale Naga Venkata Srinivas
Assistant Professor
Department of Computer Science & Engineering
Aditya College Of Engineering, Kakinada

Manikonda Vijaya Sudha
Assistant Professor
Department of Computer Science & Engineering
Ramachandra College of Engineering, ELURU

Abstract:
The advancements in Information Technology changed the environments of industries into sophisticated smart zones. IoT introduced into textile industries integrated information processing, electronic automation and computerization. In this paper IoT enabled cotton mill management system functional model described. The mobile app operated system can support various factory units monitoring and controlling interfaces. The scalability and performance in perspective of time and cost analyzed. The proposed system showed better performance with good computational services over traditional cotton mills. The Textile Pro2.0 is a mobile app developed for organizing textile mills using cellular mobiles. Flexibility and Features enriched in this application to handle IoT enabled machineries very efficiently. Secured data transmission allows users to safeguard industrial data assets during business transactions. Marketing Analysis is also a remarkable service offered by this mobile app to assist management.

Key Words: IoT, Production, Manufacturing, Supply Chain

1. INTRODUCTION

The IOT (internet of Things) is trending upward in multi sectors improving the technology efficiency and productivity of modern industries. In the consumer electronic industries customized electronic devices are manufactured using IoT based technology. Textile Industries are classified as Textile Mills, Textile Product Mills and Apparel manufacturing mills. These industries provide raw materials to create textiles. IoT provides solutions for industrial processing and manufacturing units automation with integrated things such as data acquisition, data analytics and communication techniques. The computer technology enables in enhancing productivity, quality and reducing costs across enterprise. The mobile apps supporting industrial IoT management depends on mobile computing technology to access machines, plants and supply chains can be operated anytime from anywhere.

2. INDUSTRIAL REVOLUTION

Industry revolution changed the technology and machinery application in product manufacturing industries. The industrial revolution starting from 1.0 to 5.0 brought new dimensions in industries. The major focus is upon work efficiency, time and productive rate.

Industry 1.0

This revolution is around 1760 and named as first industrial revolution. The manufacturing process uses highly machines that run on water and steam. The larger volumes of production encouraged with better standards. Textile industries used fuels like water, coal and wood. These machines are faster and produce more variety of goods in less time compared to human power based industries.

Review Article

Recent trends in the electrochemical sensors on β- and calcium channel blockers for hypertension and angina pectoris: A comprehensive review

Ayyappa Bathinapatla [a,b], Suvardhan Kanchi [c,*], Rajasekhar Chokkareddy [d,e], Reddy Prasad Puthalapattu [f], Mulpuri Ravi Kumar [g]

[a] Department of Chemistry, CMR Institute of Technology, Bengaluru 560037, India
[b] Centre of Excellence- Sensors & Nanoelectronics, CMR Institute of Technology, Bengaluru 560037, India
[c] Department of Chemistry, CHRIST (Deemed to be University), Bengaluru 560 029, India
[d] Department of Chemistry, Durban University of Technology, Durban 4001, South Africa
[e] Department of Chemistry, Aditya College of Engineering, East Godavari Dist, Andhra Pradesh 533437, India
[f] Department of Chemistry, Institute of Aeronautical Engineering, Dundigal, Hyderabad 500043, Telangana, India
[g] Department of Chemistry, Raghu Engineering College (Autonomous), Dakamarri (v), Bheemunipatnam, Visakhapatnam 531162, Andhra Pradesh, India

ABSTRACT

Stress, ingrained human behaviors, an inactive lifestyle, and poor dietary decisions are the primary causes of hypertension and the related coronary artery disease (CAD), which is also commonly referred to as angina pectoris. Effective high blood pressure (BP) treatment represents a substantial approach to reducing the burden of hypertension-related cardiovascular and renal diseases. A group of drugs known as β-blockers and calcium channel blockers (CCBs) are frequently used to treat diseases like hypertension (high blood pressure), cardiac arrhythmias and heart failure. For efficient therapeutic use and to reduce potential side effects, β-blocker concentration monitoring is essential. Chromatographic techniques are employed in a wide range to detect β-blockers and CCBs without interference, among other analytical methods that have been described. For the detection of β-blockers and CCBs, electrochemical sensors provide numerous benefits including sensitivity, selectivity, rapidity, and cost-effectiveness. These sensors can help with patient monitoring in clinical settings, ensuring that the prescription β-blocker dosage is within the therapeutic range. Since β-blockers are frequently consumed by people, the contamination can be occurred through discharge of wastewater. The presence and measurement of β-blockers in water samples enables researchers to evaluate potential risks to aquatic life and public health. In this regard, this review addresses recently developed electrochemical (voltammetric) methodologies and measurement protocols for the determination of both β-blockers and CCBs in pharmaceuticals, biological fluids, and environmental samples. Additionally, this review also provides an overview of the various advanced nanomaterials such as carbon nanotubes, graphene oxide, metal and metal oxide nanoparticles,

Abbreviations: ATN, Atenolol; PRN, Propranolol; FA, Folic acid; CRD, Carvedilol; ACT, Acetaminophen; TML, Timolol; AML, Amlodipine; AMI, Amiloride; TRI, Triamterene; ACB, Acebutolol; MET, Metoprolol; LAB, Labetalol; NBV, Nebivolol; SOT, Sotalol; TIM, Timolol*; TRA, Tramadol; NFD, Nifedipine; NIM, Nimodipine; DTZ, Diltiazem; VER, Verapamil; GCE, Glassy carbon electrode; SPE, Screen printed electrode; SPCE, screen printed carbon electrode; CPE, Carbon paste electrode; BDDE, Boron doped diamond electrode; PGE, Pencil graphite electrode; ITO, Indium tin oxide; PCAu, Poly crystalline gold; HMDE, Hanging mercury dropping electrode; EPPG, Edge plane pyrolytic graphite; DPV, differential pulse voltammetry; AMP, Amperometry; SWV, square wave voltammetry; LSV, Linear sweep voltammetry; CA, Chronoamperometry; MWCNTs, Multi-walled carbon nanotube; SWCNT, Single-walled carbon nanotube; QDs, Quantum dots; Gr, Graphene; GO, Graphene Oxide; rGO, reduced graphene oxide; MIP, Molecular imprinted polymer; SDS, sodium dodecyl sulfate; Cys, Cysteine; AuNPs, Gold nanoparticles; HgS, Mercuric sulfide; CdS, Cadmium sulfide; ZnS, Zinc sulfide; IL, Ionic liquid; GN, Graphene*; γ-CD, γ-Cyclodextrin; Pt NPs, Platinum nanoparticles; ZrO₂ NPs, Zirconium oxide nanoparticles; CB, Carbon black; CuNPS, Copper nanoparticles; BSA, Bovine serum albumin; PdNPs, Palladium nanoparticles; Ag NPs, Silver nanoparticles; NFN, Nafion; NiFe₂O₄, Nickel ferrate; YMoO₄, Yittrium molybdate; Sb₂O₃, Antimony Oxide; MoS₂, Molybdenum disulfide; CeO₂, Cerium Oxide; CuO NPs, Copper oxide nanoparticles; Fe₂O₃, Iron oxide; MCM-41, Mobil Composition of Matter No. 41; BiVO₄-Bi₂O₃, Bismuth Vanadate-Bismuth Oxide; MgO, Magnesium Oxide; CoFe₂O₄, Cobalt Ferrate; DyMnO₃, Dysprosium Manganese oxide; ZnO, Zinc Oxide; Lac, Laccase; PAZ, Polyaziridine; Bi₂Se₃, Bismuth Selenide; WO₃, Tungsten Oxide; PPy, Polypyrrole; Ag₂O, Silver Oxide; BaFe₁₂O₁₉, Barium hexaferrite; La, Lanthanum; DNA, Deoxyribonucleic acid; NdFeO₃, Neodymium ferric oxide; Ce₂(WO₄)₃, Cerium tungstate; CHIT-PB, Chitosan-Prussian Blue; PANI, Polyaniline; CTAB, Cetyl Trimethyl Ammonium Bromide; SrCeO₃, Strontium cerate; PVP, Polyvinylpyrrolidone; PFF, Polyfurfural; Sm₂O₃, Samarium oxide; TiC, Titanium carbide.

* Corresponding author at: Department of Chemistry, CHRIST (Deemed to be University), Bengaluru 560 029, India.
  E-mail addresses: ayyappa.b@cmrit.ac.in (A. Bathinapatla), ksuvardhan@gmail.com (S. Kanchi).

A novel electron transfer kinetic for terbutaline detection using Tio$_2$-MWCNTs-IL modified GCE

Rajasekhar Chokkareddy [a,b,*], Joan Chepkoech Kilele [a], Gan G. Redhi [a,**]

[a] Department of Chemistry, Durban University of Technology, Durban, 4001, South Africa
[b] Department of Chemistry, Aditya College of Engineering, Surampalem, 533437, Andhra Pradesh, India

HIGHLIGHTS

- TiO$_2$-MWCNTs-IL acted as electrode material to load more TBS and showed good enhancement in the electrochemical response.
- A novel electrochemical sensor was developed for Terbutaline detection
- The limit of detection was 0.0162 μM in real pharmaceutical samples.
- Results will facilitates the range of suitable substrates for futures uses.
- The electrochemical sensor showed good repeatability and stability

GRAPHICAL ABSTRACT
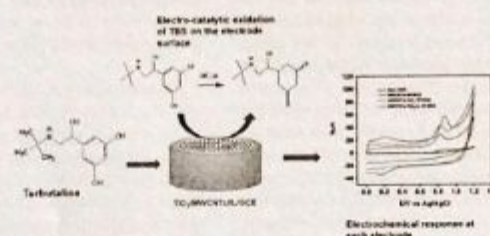
ARTICLE INFO

ABSTRACT

Herein, we report a novel electrochemical detection method based on nanocomposite modified glassy carbon electrode (GCE) nano-sensor for terbutaline (TBS). Titanium oxide nanoparticles (TiO$_2$NPs) were synthesized and the respective titanium oxide nanoparticles-multi walled carbon nanotubes-ionic liquid (TiO$_2$-MWCNTs-IL) nanocomposite was successfully prepared. Subsequently, the surface morphology, functional groups and thermal stability of the synthesized TiO$_2$NPs and the nanocomposite aspects were analysed using scanning electron microscopy (SEM), transmission electron microscopy (TEM), Fourier-transform infrared spectroscopy (FTIR) and thermal gravimetric analysis (TGA), respectively. In addition, electrochemical characterization of the fabricated TiO$_2$-MWCNTs-IL-GCE was examined using electrochemical impedance spectroscopy (EIS) in order to ensure the material's suitability in electro-catalytic sensing by investigating the electron transfer kinetics of the redox probe at the modified electrode-solution interface. TiO$_2$-MWCNTs-IL-GCE exhibited excellent significant electro-catalytic activity for the electro-oxidation of TBS at optimized electrochemical experimental conditions. The reproducibility, stability as well as the detection limits were determined. A wide linear range of 0.5 μM–3.0 μM as well as limit of detection (LOD) and limit of quantification (LOQ) of 0.016 μM and 0.214 μM, respectively, were obtained and the results were compared with similarly reported electrodes for terbutaline detection. In addition, the TiO$_2$-MWCNTs-IL-GCE sensor has superb stability, selectivity and repeatability. Moreover, the fabricated electrode was also used for determination of TBS in its drug formulation with good percentage recovery performance (93.0%–100.2%).

* Corresponding author. Department of Chemistry, Durban University of Technology, Durban, 4001, South Africa.
** Corresponding author.
  E-mail addresses: chokkareddys@gmail.com (R. Chokkareddy), redhigg@dut.ac.za (G.G. Redhi).

RESEARCH ARTICLE

Quantum Dwarf Mongoose Optimization With Ensemble Deep Learning Based Intrusion Detection in Cyber-Physical Systems

LAILA ALMUTAIRI[1], RAVURI DANIEL[2], SHAIK KHASIMBEE[3], E. LAXMI LYDIA [4], SRIJANA ACHARYA [5], AND HYUN-IL KIM [5,6]

[1]Department of Computer Engineering, College of Computer and Information Sciences, Majmaah University, Al Majma'ah 11952, Saudi Arabia
[2]Department of Computer Science and Engineering, Prasad V. Potluri Siddhartha Institute of Technology, Vijayawada 520007, India
[3]Department of CSE, Aditya College of Engineering, Surampalem 533437, India
[4]Department of Computer Science and Engineering, Vignan's Institute of Information Technology, Visakhapatnam 530049, India
[5]Department of Convergence Science, Kongju National University, Chungcheongnam-do, Gongju-si 32588, South Korea
[6]Basic Science Research Institution, Kongju National University, Chungcheongnam-do, Gongju-si 32588, South Korea

Corresponding author: Hyun-Il Kim (hyunil89@kongju.ac.kr)

ABSTRACT Cyber-physical systems (CPS) combine computational and physical elements to enable effective and intelligent control of several applications. However, the increasing connectivity and complexity of CPS introduce new security challenges, making intrusion detection a critical aspect for maintaining the integrity and reliability of these systems. The rise in artificial intelligence (AI) techniques assists in addressing security problems related to CPS environments. Therefore, this study proposes a Quantum Dwarf Mongoose Optimization with Ensemble Deep Learning Based Intrusion Detection (QDMO-EDLID) technique in the CPS environment. The presented QDMO-EDLID technique aims to recognize the presence of intrusions by the feature selection (FS) and ensemble learning process. For feature subset selection purposes, the QDMO-EDLID technique employs the QDMO algorithm. Moreover, an ensemble of Convolution Residual Networks (CRN), Deep Belief Networks (DBN), and Deep Autoencoder (DAE) models are applied for the intrusion classification process. The experimental outcome of the QDMO-EDLID technique was tested employing benchmark intrusion databases. The simulation results highlighted the improved efficiency of the QDMO-EDLID approach concerning different performance measures.

INDEX TERMS Cyber-physical system, deep learning, feature selection, intrusion detection, ensemble learning.

I. INTRODUCTION

Cyber-Physical systems (CPS) are heterogeneous, large-scale, geographically distributed, life-critical, federated mechanisms encompassing control and networking components, sensors, and actuators [1]. A few examples of CPSs are smart grids, first responder situational awareness systems, unmanned aircraft systems, and pervasive health care systems. Such systems have legacy components, many

The associate editor coordinating the review of this manuscript and approving it for publication was Engang Tian.

control loops, predictable network traffic, possibly wireless network segments, and strict timing requirements [2]. CPS merges cyber (containing commodity servers and network components) and physical (containing actuators and sensors) fields. The attack method for CPS includes long and short-duration assaults [3]. A complicated adversary can take care not to disturb normal system functions for propagating and setting up dispersed attacks launched at specific times [4]. So, detection latency becomes the main difficulty in CPS Intrusion Detection System (IDS) model [5]. Fig. 1 demonstrates the infrastructure of CPS.

REVIEW ARTICLE

Electrochemical Sensors for the Detection of Anti-asthma Drugs in Pharmaceutical and Biological Fluids: A Review

BENTHAM SCIENCE

Rajasekhar Chokkareddy[1,2,3], Joan Chepkoech Kilele[1], Suvardhan Kanchi[4,5,*] and Gan G. Redhi[1]

[1]*Department of Chemistry, Durban University of Technology, Durban 4001, South Africa;* [2]*Department of Chemistry, Aditya College of Engineering, Surampalem-533437, Andhra Pradesh, India;* [3]*Jawaharlal Nehru Technological University Kakinada, Kakinada, East Godavari District, India;* [4]*Department of Chemistry, Sambhram Institute of Technology, MS Palya, Bengaluru 560097, India;* [5]*Department of Chemistry, Sambhram University, Khamraqul Street, Jizzakh City 130100, Republic of Uzbekistan*

Abstract: ***Background:*** Worldwide, the prescriptions for asthma drugs are on the rise. However, anti-asthma drugs have side effects and can lead to fatal death at higher doses. Quite often, these drugs are abused as growth promoters in poultry/livestock as well as by athletes to enhance their performance. Consequently, it is vital to design uncomplicated, portable, rapid and highly sensitive means of detecting these anti-asthma drugs in pharmaceutical formulations and other sample matrices. This review highlights the use of electrochemical sensors as alternative methods to conventional analytical techniques for detecting anti-asthma drugs in pharmaceuticals and biological fluids.

Methods: Literature covering diverse detection methods for anti-asthma drugs were reviewed to provide background information in this area of research. Next, the literature survey focused primarily on the emergence of the nanotechnology platform, including the strengths and weaknesses of this approach. Finally, a perspective on the future direction of this method was summarized.

Results: Electrochemical sensors offer several advantages over conventional methods, which require long and tedious extraction, pre-concentration and clean up steps. Moreover, electrochemical sensor techniques are less expensive, easy to operate and avoid the need for harmful reagents known to generate a huge amount of non-environmental friendly chemicals.

Conclusion: Nanotechnology-based electrochemical sensors represent a promising platform for analysing anti-asthma drugs in pharmaceuticals and biological fluids given their beneficial effects such as low cost, use of less health hazardous materials, and compatibility with environmental health.

Keywords: Electrochemical methods, sensors, anti-Asthma drugs, pharmaceuticals, biological fluids, bronchial inflammation.

1. INTRODUCTION

Asthma is a chronic respiratory disease that affects people of all ages, often for the rest of their lives [1]. This disorder is distinguished by bronchial inflammation and airway hypersensitivity, resulting in frequent episodes of airway obstruction. Cough, shortness of breath, and wheezing are the main symptoms of this disease [2]. Nowadays, it is commonly reported among children globally and is projected to affect approximately 339 million people worldwide [3]. In addition, it is predicted to increase by the year 2025 owing to the rising effects of urbanization [4-6]. Recently published reports show that South Africa's asthma commonness rate ranks 25th in the world and 5th in terms of asthma fatality [7, 8]. The alarming prevalence and severity (both in developing and developed countries) is a major concern because it causes long-term health problems for asthmatic patients as well as a significant economic burden [9]. Allergens, air pollution, strong odours, cigarette smoke, seasonal changes, and medications such as beta-blockers and nonsteroidal anti-inflammatory drugs can all trigger asthma attacks [10]. Previous research in South Africa found that some diseases, such as obesity, appear to be risk factors for asthma development [7]. Early diagnosis and medication of asthma significantly reduce the related morbidity and fatality rates. Use of anti-asthma drugs is still the most efficient preference for the management of both mild and chronic asthma conditions. Currently, the key asthma therapy is classified into two categories [11, 12]:

a) Relievers such as methylxanthines and β_2-adrenoceptor agonists.

b) Controllers such as corticosteroids and antileukotrienes.

*Address correspondence to this author at the Department of Chemistry, Sambhram Institute of Technology, MS Palya, Bengaluru 560097, India; E-mail: ksuvardhan@gmail.com

Data Article

Tribology and pitting corrosion behavior of Al6061 / nano-ZrB$_2$ metal matrix composites prepared via powder metallurgy process

Priyadarsini Morampudi [a], Venkata Ramana V.S.N. [b], Prasad Chitrada [c,d,*], Sriram Vikas K [e], Rahul R [f]

[a] Department of Mechanical Engineering, VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad, Telangana, India
[b] Department of Mechanical Engineering, GITAM Institute of Technology, GITAM (Deemed to be University), Visakhapatnam, Andhra Pradesh, India
[c] Department of Physics, Aditya College of Engineering, Surampalem, Andhra Pradesh, India
[d] Jawaharlal Nehru Technological University, Kakinada, Andhra Pradesh, India
[e] Department of Mechanical Engineering, Visakaha institute of Engineering and Technology, Visakhapatnam, Andhra Pradesh, India
[f] Department of Mechanical Engineering, Chaitanya Bharathi Institute of Technology (A), Gandiper, Hyderabad, Telangana, India

ARTICLE INFO

ABSTRACT

Aluminum Metal Matrix Composites (AMMNC) are widely utilized in the aerospace, vehicle, defense, and marine sectors because of their exceptional strength, high wear and corrosion resistance, and superior thermal stability. The exceptional qualities of AMMCs reinforced with ceramic particles, such as their low weight, high stiffness, strength, high thermal stability, and improved wear and corrosion resistance, make them appealing. The current research focuses on improving the tribology and corrosion resistance characteristics of Al6061 alloy by introducing nano-ZrB$_2$ particles as reinforcement range from 0 to 2 Wt.% with a 0.5 Wt.% increase step. The process involves utilizing a powder metallurgy route for composite preparation. The effect of nano-ZrB$_2$ particles on the evolution of microstructure, wear, and corrosion resistance properties was studied and discussed in detail. Surface structure in microns and X-ray diffraction tests demonstrate that nano-ZrB$_2$ particles are evenly dispersed in AMMNCs, and distinct phases occur. ZrB$_2$ reinforcements improve the composite materials' toughness, resulting in a decreased wear rate for 2 Wt.% of reinforcement -the static immersion corrosion tests of AMMNCs in 3.5 Wt. % NaCl aqueous solution showed that the corrosion potential shifted from -684 to -462 mV, reducing corrosion current density. An increase in the content of ZrB$_2$ to 2 Wt.% in Aluminum Metal Matrix composites reduces the corrosion damage and wear rate.

Specifications table

Subject area	Nanocomposites, Mechanical engineering, powder metallurgy, Corrosion, etc.
Compounds	Al6061, ZrB$_2$, acetone, NaCl
Data category	synthesized, Powder metallurgy, crystallographic, etc.
Data acquisition format	SEM, X-ray diffraction, tensile strength, yield strength and compression strength, wear rate.

* Corresponding author at: Department of Physics, Aditya College of Engineering, Surampalem, Andhra Pradesh, India.
E-mail address: chitrada.prasad@gmail.com (P. Chitrada).

Investigational Study on Influencing Parameters for Flexural Strength and Hardness of NITINOL-Based Aluminum Matrix Composites

Section A-Research paper

INVESTIGATIONAL STUDY ON INFLUENCING PARAMETERS FOR FLEXURAL STRENGTH AND HARDNESS OF NITINOL-BASED ALUMINUM MATRIX COMPOSITES

Javvadi Eswara Manikanta[1*], Naveen Kumar Gurajala[2], Chitrada Prasad[3], D. Santha Rao[4], Adina Srinivasa Vara Prasad[5], B.S.S. Phani Sankar[6]

Abstract

Growing demand for advanced materials with outstanding properties focused on the development of various metal matrix composites in recent years. The practical complexities and obstacles encountered during their development affect the enhancement of desired properties. The analysis of parameters influencing the enhancement and decrement of desired properties can provide insight into understanding the phenomena. In this study, a metal matrix composite is fabricated through a stirring process by using aluminum (Al),and nickel-titanium (Ni-Ti) as base material and reinforcing elements. The number of experiments required to perform on the castings is minimized by designing a central composite rotatable design with a four-factors such asstirring speed, casting temperature, casting time, the weight fraction of reinforcement material,and five levels.The influence of factors on the properties such as flexural strength and hardness are studied through experiments. The phenomena forthe enhancement and decrement due to porosity, coagulation, and bulk deposition of Ni-Ti are discussed by analysing the resultsand characterization of the microstructure.

Keywords: Flexural strength, hardness, aluminium composites, Ni-Ti alloys, design of experiments

[1,5]Department of Mechanical Engineering, Shri Vishnu Engineering College for Women, Bhimavaram, India, 5342022
[2]Department of Mechanical Engineering, Sasi Institute of Technology & Engineering, Tadepalligudem, India, 534101
[3]Department of Physics, Aditya College of Engineering, Surampalem, India, 533437
[4]Department of Mechanical Engineering, Godavari Institute of Engineering and Technology, Rajahmundry, India, 533296
[6]Department of Mechanical Engineering, BVC Institute of Technology and Sciences, Amalapuram, Andhra Pradesh, India,533221

Corresponding Author Email: [1*]manikantame@svecw.edu.in

Eur. Chem. Bull. 2023, 12 (S3), 683 – 691

683

INTERPRETATION OF RADIUS OF INVESTIGATION IN COMPOSITE RESERVOIR

V.V. Srimannarayana, M.Shyam Sundar Mohan Kumar ,Ghatty Pavan Siddharth,

Sai Deepika Kalisipudi , Ch. Durga Seshu , Pulla Venkata Satyanarayana

1.Assistant Professor, Department of Petroleum Technology, Aditya Engineering College, Surampalem, A.P.
2.Associate professor, Department of Humanities and Basic Sciences, Aditya College of Engineering, Surampalem, A.P.

3. Student, Department of Petroleum Technology, Aditya Engineering College, Surampalem, A.P.

4. Student, Department of Petroleum Technology, Aditya Engineering College, Surampalem, A.P.

5. Student, Department of Petroleum Technology, Aditya Engineering College, Surampalem, A.P.

6. Student, Department of Petroleum Technology, Aditya Engineering College, Surampalem, A.P.

Abstract

The radius of investigation is one of the primary parameters that provide us with a fundamental understanding of a reservoir in petroleum reservoir engineering or in oil and well testing. Therefore, the investigation radius is a fundamental, useful, and significant parameter to assess the well's-controlled region. In homogeneous reservoirs, the radius of inquiry is essentially considered. In homogeneous reservoirs, the investigation radius is typically calculated using an explicit function linked to the square root of time. In this study, the issue of estimating the radius of inquiry in composite reservoirs is addressed. Commercial software Saphir is used, but it is unable to interpret the radius in multi-composite zones. Then, using the calculation method for the investigation radius in a multi-zone composite reservoir derived from the investigation radius in homogeneous reservoirs, we first assumed that each zone's properties were homogeneous.

The formula for multi-zone composite reservoirs is more complex and exhibits a nonlinear implicit function in time when compared to the homogeneous reservoir's formula. We numerically calculated the dynamical investigation radii with the passage of time for both 2-zone and 3-zone composite reservoirs using the newly developed formula of the investigation radius, given a set of reservoir parameters.

For the study radii were affected over time by model parameters like permeability, porosity, and total compressibility, we therefore plotted a number of relationship curves. The relationship graphs unmistakably display a reservoir's multi-zone characteristics. The relationship graphs of N-zone composite reservoirs may show (N-1) inflection points. An inflection point is a location where a pressure wave responds to the boundary between two nearby zones. Finally, to determine the investigation radius, we used actual reservoir parameters from an

Hindawi

Research Article

Design and Development of Polymer-Based Optical Fiber Sensor for GAIT Analysis

Mamidipaka Hema [1], Jami Venkata Suman [2], Boddepalli Kiran Kumar [3], and Adisu Haile [4]

[1] Department of ECE, JNTU-GV College of Engineering, Vizianagaram, India
[2] Department of ECE, GMR Institute of Technology (A), Rajam, India
[3] Department of CSE, Aditya College of Engineering, Surampalem, India
[4] Department of Mechanical Engineering, WOLLO University, Kombolcha Institute of Technology, P.O. Box no: 208, Kombolcha, Ethiopia

Correspondence should be addressed to Adisu Haile; adisu.haile@wu.edu.et

In the present scenario like COVID-19 pandemic, to maintain physical distance, the gait-based biometric is a must. Human gait identification is a very difficult process, but it is a suitable distance biometric that also gives good results at low resolution conditions even with face features that are not clear. This study describes the construction of a smart carpet that measures ground response force (GRF) and spatio-temporal gait parameters (STGP) using a polymer optical fiber sensor (POFS). The suggested carpet contains two light detection units for acquiring signals. Each unit obtains response from 10 nearby sensors. There are 20 intensity deviation sensors on a fiber. Light-emitting diodes (LED) are triggered successively, using the multiplexing approach that is being employed. Multiplexing is dependent on coupling among the LED and POFS sections. Results of walking experiments performed on the smart carpet suggested that certain parameters, including step length, stride length, cadence, and stance time, might be used to estimate the GRF and STGP. The results enable the detection of gait, including the swing phase, stance, stance length, and double supporting periods. The suggested carpet is dependable, reasonably priced equipment for gait acquisition in a variety of applications. Using the sensor data, gait recognition is performed using genetic algorithm (GA) and particle swarm optimization (PSO) technique. GA- and PSO-based gait template analyses are performed to extract the features with respect to the gait signals obtained from polymer optical gait sensors (POGS). The techniques used for classification of the obtained signals are random forest (RF) and support vector machine (SVM). The accuracy, sensitivity, and specificity results are obtained using SVM classifier and RF classifier. The results obtained using both classifiers are compared.

1. Introduction

Utilizing biometric information, identity recognition is being done in many scenarios. Even gender recognition and age estimation are being done by such information. Human age estimation has emerged as an important area of research [1], such that minors can be prevented from purchase of banned items and also access of inappropriate web pages. Further, elderly monitoring and human–computer interaction are feasible. Initially, age estimation was done on facial features. At distance, the facial features have low resolution on constrained details [2]. Every gait cycle consists of two steps and spans the time between the first time an event occurs with a particular foot and the next time it occurs with the same foot. Due to their superior elasticity, reduced Young's modulus, better strain limitations, impact strength, and shock resistance, polymer optical fibers (POFs) outperform silica optical fibers [3]. The use of POF for gait

Optimizing the Load Frequency of a Two-Area Interlinked Power System using Artificial Intelligence Techniques

Vasupalli Manoj[1], Subuddi Nagaraju[2], K.Durga Syam Prasad[3], Bathula Vineela Rathan[4], Boddepalli Kiran Kumar[5],
Jami Venkata Suman[6]

[1]Assistant Professor, Department of EEE, GMR Institute of Technology, Rajam, Vizianagaram, India
manoj.v@gmrit.edu.in

[2]Associate Professor, Department of EEE, Aditya Institute of Technology and Management, Tekkali, Srikakulam, India
snraju@adityatekkali.edu.in

[3]Professor, Department of EEE, Vignan's Institute of Engineering for Women, Kapujaggarajupeta, Visakhapatnam
vieweeehod@gmail.com

[4]Asstistant Professor, Department of Mechanical Engineering, Vignan's Institute of Information Technology, Visakhapatnam, India
vineelarathan16dec@gmail.com

[5]Associate Professor, Department of CSE, Aditya College of Engineering, Surampalem, Andhra Pradesh, India
kirankumar_cse@acoe.edu.in

[6]Assistant Professor, Department of ECE, GMR Institute of Technology, Rajam, Vizianagaram, India
venkatasuman.j@gmrit.edu.in

Abstract—Power costs are increasing on a daily basis, generating changes in system frequency and causing serious concerns with system stability. It has become a major problem to offer customers with uninterrupted and high-quality power. To mitigate these issues, a linked power system's load distribution and network frequency should be constantly reviewed. Load frequency control adjusts the generator's energy output and tie line power between prescribed limits. As well as regulating generator output power, load frequency control also adjusts tie line power. The disturbance in the frequency due to different load changes is regulated using the proposed scheme. In this article, a two-area load frequency control system is constructed and evaluated using various control approaches, including a proportional integral derivative (PID) controller, a proportional integral (PI) controller, a fuzzy logic-based controller, and an Artificial Neural Network (ANN). The goal is to assess the power system's resilience under different loading conditions with these control schemes. The performance of the controllers is compared based on peak-undershoot, peak-overshoot, and settling time, focusing on tie line power and frequency response. To achieve this, the design is implemented using MATLAB/SIMULINK software.

Keywords- LFC, PI controller, PID Controller, Fuzzy logic control, ANN control.

I. INTRODUCTION

The efficient and reliable operation of power systems is crucial for meeting the ever-increasing energy demands and ensuring a seamless supply of electricity to consumers. Among the myriad challenges faced in maintaining power system stability, load frequency control (LFC) plays a pivotal role. Load Frequency Control (LFC) plays a crucial role in maintaining the power system's frequency by continuously adjusting the generated power to meet the real-time load demand. This process becomes even more critical in interconnected power systems that encompass multiple control areas with distinct sets of generators.

This research centers on enhancing load frequency control within a two-area interconnected power system by incorporating state-of-the-art artificial intelligence (AI) methodologies. The two-area configuration represents a typical setup in large-scale power networks where power generation and distribution are managed in separate geographical regions, interconnected through tie-lines.

In the past, load frequency control (LFC) has relied on conventional control methods such as Proportional-Integral (PI) and Proportional-Integral-Derivative (PID) controllers. Nevertheless, due to the increasing complexity of contemporary power systems and the demand for faster and more precise control, researchers have shifted their focus towards employing AI-based approaches.

Fuzzy Logic Control (FLC) and Artificial Neural Network (ANN) Control are artificial intelligence methods that have shown promising capabilities in effectively addressing the nonlinear and dynamic features of power systems. Fuzzy Logic Control mimics human reasoning, allowing it to deal effectively with imprecise and uncertain data, while Artificial Neural

346