



Evaluation of apoptosis in human breast cancer cell (MDA-MB-231) induced by ZnO nanoparticles synthesized using *Piper betle* leaf extract as bio-fuel

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Abstract

In this investigation, zinc oxide nanoparticles (ZnO NPs) were produced by solution combustion-assisted technique utilising aqueous leaf extract of *Piper betle* (betel leaf) (PB). Phase formation and the particle size of ZnO-PB-NPs were ascertained by using X-ray diffraction. It was observed that the ZnO-PB-NPs crystallize in the hexagonal phase with an average crystallite size of 24 nm. The morphology, shape, and size of the NPs were studied by Scanning Electron Microscope and Transmission Electron Microscope (TEM). The elemental composition was analysed using energy-dispersive advanced X-ray spectroscopy. Further, Fourier-Transform Infrared (FTIR) spectroscopy confirmed the formation of ZnO bonding. Anticancer activity of ZnO-PB-NPs was evaluated in the MDA-MB-231, human breast cancer cells by MTT [3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyl tetrazolium bromide] assay. The study findings demonstrated that the ZnO-PB-NPs were able to induce significant cytotoxicity in human breast cancer cells in a dose-dependent manner. ZnO-PB-NPs treatment impaired the Clonogenic potential cells of breast cancer. Additionally, the biocompatibility with blood components of ZnO-PB-NPs was evaluated by blood hemolysis assay. It was observed that, ZnO NPs inhibited breast cancer cell growth and increased the induction of early apoptosis cell population.

Keywords ZnO nanoparticles · *Piper betle* · Solution combustion · Anticancer activity · Antioxidant · Clonogenic assay · Apoptosis · Biocompatibility

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Room Temperature Columnar Liquid Crystalline Perylene Bisimide as a Novel Corrosion Resistant Surface Film for Mild Steel Surface

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Abstract

The corrosion process can be seen as a widespread phenomenon, which is both pervasive and unstoppable. This is an undesirable phenomenon that reduces the life of materials and takes away their beauty. Potentiodynamic and electrochemical impedance tests are used to explore the corrosion inhibition abilities of a room temperature columnar liquid crystalline perylene bisimide (PBIO10) on mild steel (MS) samples in 1 M HCl. The inhibitor PBIO10 was demonstrated to be an outstanding corrosion inhibitor, with a maximum inhibition efficiency of 76%. In light of potentiometric polarization results, corrosion inhibition was achieved as the inhibitor getting adsorbed on the metal, and they fit into the category of anodic inhibitors. The protective layer was examined from SEM to confirm the protective coating generated on the MS surface. The increase in contact angle confirms the formation of a uniform layer on the MS surface. Analysis of the optical textures observed in POM, the nature of the mesophase under examination to columnar rectangular (Colr) phase. From the TGA, it was found that PBIO10 exhibits higher thermal stability up to 370 °C. The density functional theory (DFT) and Monte Carlo simulation approach were used to investigate the relationship between molecular structure and inhibitory efficacy. The thermal behavior of PBIO10 was investigated by polarizing optical microscopy (POM), differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), and X-ray diffraction (XRD) studies. The phase transition from crystal to LC phase was at first examined with the help of POM observation.

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Photocatalytic Activity Induced by Metal Nanoparticles Synthesized by Sustainable Approaches: A Comprehensive Review

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Nanotechnology is a fast-expanding area with a wide range of applications in science, engineering, health, pharmacy, and other fields. Among many techniques that are employed toward the production of nanoparticles, synthesis using green technologies is the simplest and environment friendly. Nanoparticles produced from plant extracts have become a very popular subject of study in recent decades due to their diverse advantages such as low-cost synthesis, product stability, and ecofriendly protocols. These merits have prompted the development of nanoparticles from a variety of sources, including bacteria, fungi, algae, proteins, enzymes, etc., allowing for large-scale production with minimal contamination. However, nanoparticles obtained from plant extracts and phytochemicals exhibit greater reduction and stabilization and hence have proven the diversity of properties, like catalyst/photocatalyst, magnetic, antibacterial, cytotoxicity, circulating tumor deoxy ribo nucleic acid (CT-DNA) binding, gas sensing, etc. In the current scenario, nanoparticles can also play a critical role in cleaning wastewater and making it viable for a variety of operations. Nano-sized photocatalysts have a great scope toward the removal of large pollutants like organic dyes, heavy metals, and pesticides in an eco-friendly and sustainable manner from industrial effluents. Thus, in this review article, we discuss the synthesis of several metal nanoparticles using diverse plant extracts, as well as their characterization via techniques like UV-vis (ultraviolet-visible), XRD (X-ray diffraction),



Sustainable Paver Block using Waste Plastic and Construction Demolition Waste

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Abstract – This study is aimed at utilizing plastic and construction demolition waste in production of convention concrete paver blocks. In India on an average 26,000 Tonnes of Plastic waste is generated per day, majority of this remains uncollected. According to the statistics, only 5% of the Construction & Demolition waste are processed. In this study an attempt has been made to use plastic waste and construction demolition waste in producing paver blocks and their behavior in compression is studied. The density test and the water absorption tests also have been performed on these paver blocks to study their suitability for the practical usage of the blocks. The study indicates that utilization of plastic waste results in reduced compressive strength and water absorption but it showed an increase in the density.

Index Terms – Paver Blocks, Construction Demolition Waste, Plastic Waste.

I. INTRODUCTION

Conventional paver block production uses cement as a binder material natural resources such as crushed stone as fine aggregates coarse aggregates which are depleting fast. In order to avoid the use of cement and natural resources we have studied using the plastic which is constantly generated as a binder and Inorganic municipal waste such as construction demolition waste and waste glass powder as fine aggregates and coarse aggregates. This will help in reducing the impacts of waste disposal on environment and wastage of land for Landfill.



Fig. 1 Plastic deposited in land and water



Evaluation of Mechanical Behavior of Concrete with Recycled Aggregate and Silica Fume

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Abstract – The increasing gap between the demand and supply of ingredients that are used in production of concrete is driving researchers to identify newer and more sustainable sources in the construction industry. Recycling of concrete is gaining popularity in terms of protecting natural resources and also providing sustainable construction solution. Several investigations have been carried out in order to study and evaluate the effects of using recycled aggregate on the behavior of hardened concrete. In the current study, cubical and cylindrical specimen have been cast and tested for compressive strength and split tensile strength for concrete of grade M25 that was made of recycled aggregates, manufactured sand and silica fume.

Index Terms – Recycled concrete aggregate, Artificial sand, Manufactured Sand, M-sand, Silica Fume.

I. INTRODUCTION

Concrete is a material that is extensively used throughout the world, the consumption of concrete by the construction industry is increasing day by day. This increase in consumption of this product has led to increase in the demand of the ingredients that the concrete is made up of. This results in enormous exploitation of these natural materials. While some of these materials are getting exhausted worldwide, some of these are even banned in few countries and states. Every year thousands of building are demolished in the construction industry and this generates tons of demolition waste. This creates a large disposal problem in this sector. Researches are continuously working in an effort to minimize this disposal by trying to find its utilization in various civil engineering products. Using recycled aggregate results environmentally sustainable concrete, however results have shown that using recycled aggregates in conventional concrete have resulted in reduced strength as the recycled aggregates are more porous due to the coating of mortar over the surface of the aggregate, which increases the water absorption and permeability of the concrete resulting in reduced strength, in this current research, attempts have been made to add silica fume is percentage of 0, 5 and 10 as replacement for cement. Silica fume particles have very fine particles with particle size as 100 times smaller than that of ordinary Portland cement, this helps in reducing the porosity of concrete resulting in increased strength of the hardened concrete. M25 Grade is attempted here with admixture silica fume.



HYDROCHEMICAL ANALYSIS OF GROUNDWATER QUALITY IN DAKSHINA PINAKINI RIVER BASIN, KARNATAKA, INDIA

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Abstract: Dakshina Pinakini river basin is a sub basin of River Kaveri, located in the north eastern corner of Karnataka state. The study area is spreads over an area of 2185 sq. km falling within the semi-arid region and frequently facing water scarcity as well as quality problems. To analyses the water quality parameters, 184 samples are collected from different locations during pre-monsoon and post-monsoon period. The type of water that predominates in the study area is Ca-Mg-HCO₃ type both in pre- and post-monsoon seasons based on hydro-chemical facies. Besides, suitability of water for domestic and irrigation purposes are evaluated based on sodium adsorption ratio, residual sodium carbonate, sodium percent, salinity hazard and USSL diagram.

Keywords: Groundwater, chemical characters, chemical classification, SAR, RSC.

Introduction

Water quality analysis is one of the most important aspects in groundwater studies. The hydro chemical study reveals quality of water that is suitable for drinking, agriculture and industrial purposes. Further, it is possible to understand the change in quality due to chemistry of rock water interaction or any type of anthropogenic influence (Kelley 1940, Wilcox 1962) Groundwater often consists of seven major chemical elements- Ca²⁺, Mg²⁺, Cl⁻, HCO₃⁻, Na⁺, K⁺, and SO₄²⁻. The chemical parameters of groundwater play a significant role in classifying and assessment of water quality. Considering the individual and/or paired ionic concentration, certain indices are proposed to find out the alkali hazards. Residual Sodium Carbonate (RSC) can be used as a criterion for finding the suitability of irrigation waters. It was observed that the criteria used in the classification of waters for a particular purpose considering the individual concentration may not find its suitability for other purposes and better results can be obtained only by considering the combined chemistry of all the ions rather than individual or paired ionic characters (Handa 1964, 1965; Hem 1985). Chemical classification also throws light on the concentration of various predominant cations, anions and their interrelationships. A number of techniques and methods have been developed to interpret the chemical data. Zaporozee (1972) has summarized the various modes of data representation and has discussed their possible uses. Presentation of chemical analysis in graphical form makes understanding of complex groundwater system simpler and quicker. Subramanian (1994) followed a series of methods to interpret and classify the chemistry of groundwater in hard rock, including coastal zones in the southern parts of India. The objective of the present work is to discuss the major ion chemistry of groundwater of study basin. In the present study various methods proposed by Piper, Back, Wilcox, Eaton, Todd and USSL (US Salinity Laboratory) classification have been used to study critically the hydro chemical characteristics of groundwater of the basin.



Experimental Study on effect of Introducing Bacteria into Self-Healing Concrete

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Abstract – With ever increasing emissions from the construction industry, Biological construction material offer are being looked upon to offer a technology to that would combat these emissions. Researchers in the field of civil engineering and biotechnology have turned to the microorganisms for the production of bio-construction materials which are not only environment friendly, having lesser social impact, and economically feasible but can also produce high strength. However, the cracks in the hardened concrete pose a major concern regarding the durability. Corrosion is initiated when moisture and other chemicals present in the environment, seep through these cracks, and result in reduced life of concrete. Hence there is an ardent requirement in the construction industry to develop a bio-material, that has self-repairing properties, which can remediate the cracks and fissures developed in the concrete. Researchers are continually working on bacterial concrete, which can successfully remediate cracks developed in concrete. The current paper is a review of various researches which have been conducted in the area of developing bacterial concrete for use in crack repairing in existing buildings.

Index Terms – bacillus subtilis, self-healing concrete, minor cracks.

I. INTRODUCTION

Concrete in its fresh and hardened form is one of the most widely consumed materials for in the field of civil engineering. Concrete in its fresh phase can be molded into any shape and once it hardens into a rock like structure which can take a large load bearing capacity for compression load. However, concrete can develop cracks due to various reasons like shrinkage, freeze-thaw reactions, low tensile strength of concrete, improper mixing and placing etc., cracks thus occurring can be doors to the entry of moisture and other hazardous chemicals present in the environment that can reduce the durability and hence the life span of the concrete structures. Synthetic coatings are sometime given on the surface of reinforcement bars, that protect the reinforcement bars from being corroded, but they are costly and require regular maintenance. Use of chemicals like epoxy also has an environmental impact and should be avoided. The immediate need for an environment friendly and cost effective alternate crack remediation technique has led to the development in the research in the area of bio-materials in concrete. This paper presents an extensive review of various researches that have been done in the recent times in the field of bacterial concrete.

Bacterial concrete produces limestone biologically and this limestone helps in healing the cracks that appear on the surface of concrete structures. Few of the specially selected types of the bacteria Bacillus, along with a nutrient that is calcium based along with nitrogen and phosphorus, are mixed with the ingredients of concrete during the process of mixing. Whenever the concrete structure develops cracks and the spores of the bacteria get in contact with the moisture and other nutrients, the bacteria gets activated and feeds on the calcium lactate. In the process of bacteria starting to feed, the oxygen gets consumed and the calcium lactate which is found in the soluble form is then converted to CaCO₃ (limestone) in insoluble form. In this process the limestone thus developed gets solidified on the cracked surface, leading to it getting sealed up. During the conversion of calcium lactate to limestone oxygen is consumed and this has an extra advantage. As the oxygen is a vital element during the corrosion process of steel its consumption leads to an increased durability of steel in RCC structures.

Leaf disease severity classification with explainable artificial intelligence using transformer networks

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Abstract

Agribusiness is the main source of income for roughly 70% of people who reside in rural areas. India is the world's second-largest producer of pulses, textile raw materials, spices, coconuts, and other agricultural products. India's gross domestic product (GDP) is significantly impacted by the agriculture industry. Technology advancements help the agricultural industry to forecast various elements, such as soil quality, crop quality, and, disease detection to boost crop yield. Disease detection is one of the essential tasks that have to be carried out in agriculture. The early identification of the leaf disease helps to prevent further spread to other leaves in the plant by which the yield can be improved. In this work, plant leaf disease detection and stage classification are performed based on the severity of leaf infection. A deep learning model, you only look once version5 (YOLOv5) is used to detect plant leaf disease then background of the diseased leaf is removed using U2-Net architecture followed by stage classification performed using vision transformer (ViT) for classifying it as different stages such as low, moderate, and high. A recommendation solution has been provided to mitigate the leaf disease. YOLOv5 was trained using different open-source datasets namely 1) PlantDoc and 2) Plantvillage. This work mainly concentrates on the apple leaf for performing stage classification. The YOLO v5 gives a maximum f1-score of 0.57 at a confidence score of 0.2 and the vision transformer with a background image gives an f1-score of 0.758 and without a background image, 0.908 f1-score is achieved.

Keywords

You only look once version5(YOLOV5), Vision transformer (ViT), Computer-aided disease detection system (CADS), Region proposal network (RPN), Natural language processing (NLP), Explainable artificial intelligence (XAI), Deep convolutional neural network (DCNN).

1.Introduction

The agricultural sector is considered India's most crucial sector. In India, farming is the most common occupation and a significant source of revenue [1]. India is second in the world in terms of population, with 70% of its people living in villages and relying primarily on agriculture for their subsistence. Farmers cultivate a wide variety of crops based on numerous factors such as crop conditions, the environment, soil conditions, local farming practices, new variants of pathogens and various illnesses, etc.

Presently farmers are incurring losses due to changes in climatic conditions, plant disease is one of the main challenges to food security since it significantly lowers crop quality and output [2].

Therefore, it has been difficult to diagnose diseases correctly and discover them early. A variety of methods, including soil management, crop rotation, irrigation, genetic modification, harvesting methods, precision farming, weed control, and pest and disease control, are used to boost the yield. So, it is crucial to identify pesticides and diseases early if you want to boost a crop's production. The traditional method of identifying plant diseases is by visual inspection [3]. This can result in incorrect disease identification, and

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SECURITY ASSESSMENT FOR AN APPLICATION USING A SPAM FILTER AND A PATTERN CLASSIFIER

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Abstract: In hostile applications like biometric authentication, network intrusion detection, and spam filtering, where data may be deliberately altered by humans to impede function, pattern classification algorithms are frequently used. Because traditional design methods do not account for this adversarial scenario, pattern categorization systems may contain flaws that could be exploited to significantly lower their performance and, as a result, their usefulness in real-world applications. As a result, extending pattern classification theory and design methods to adversarial situations is a novel and highly pertinent research subject that hasn't been thoroughly explored before.

Keywords: Pattern Classifiers, Data Mining, Spam Filter, Data Sets

I. INTRODUCTION

In this work we address issues above by developing a framework for the empirical evaluation of classifier security at design phase that extends the model selection and performance evaluation steps of the classical design cycle. We summarize previous work, and point out three main ideas that emerge from it. We then formalize and generalize them in our framework.

First, to pursue security in the context of an arms race it is not sufficient to react to observed attacks, but it is also necessary to proactively anticipate the adversary by predicting the most relevant, potential attacks through a what-if analysis; this allows one to develop suitable countermeasures before the attack actually occurs, according to the principle of security by design.

Second, to provide practical guidelines for simulating realistic attack scenarios, we define a general model of the adversary, in terms of her goal, knowledge and capability, which encompass and generalize models proposed in previous work.

Third, since the presence of carefully targeted attacks may affect the distribution of training and testing data separately, we propose a model of the data distribution that can formally characterize this behavior, and that allows us to take into account a large number of potential attacks; we also propose an algorithm for the generation of training and testing sets to be used for security evaluation, which can naturally accommodate application-specific and heuristic techniques for simulating attacks.

We make use of the concept of data mining to achieve these ideas. Generally, data mining (sometimes called data or knowledge discovery) is the process of analyzing data from different perspectives and summarizing it into useful information - information that can be used to increase revenue, cuts costs, or both. Data mining software is one of a number of analytical tools for analyzing data. It allows users to analyze data from many different dimensions or angles, categories it, and summarize the relationships identified. Technically, data mining is the process of finding correlations or patterns among dozens of fields in large relational databases.

While large-scale information technology has been evolving separate transaction and analytical systems, data mining provides the link between the two. Data mining software analyses relationships and patterns in stored transaction data based on open-ended user queries. Several types of analytical software are available: statistical, machine learning, and neural networks.

II. RELATED WORK

Ribeiro, P.B., et al., 2015 [1], The authors of this paper employ data mining methods to precisely pinpoint spam detection anomalies. In this case, Weka is used to compare the effectiveness of several machine learning methods. The SPAMBASE dataset, which is a collection of emails divided into spam and non-spam categories, is used in this. The results of the experiment have been evaluated using the ROC theory. The findings of this study demonstrated that tactics that emphasized trees and forests were more successful than others.



FOREST FIRE DETECTION USING DEEP LEARNING

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Abstract: A forest fire is an unplanned fire that breaks out in a wilderness setting like a forest or prairie. Forest fires have proven to be a threat to humans and wildlife creatures. Early detection of forest fires will decrease the severity preventing huge loss of ecosystems and its effect on global conditions. The forest fire detection model that is developed can be set up to analyze and process images from security cameras, drones, and satellites. Dataset consisting of various images of forests and surroundings resembling forests is used and the images are classified into two categories: "fire" and "smoke". To identify the existence or onset of a forest fire in an image efficiently, a deep-learning model is created and trained. In this study, we propose a forest fire detection system that makes use of YOLOv5 for detection and classification and DenseNet for feature extraction. Further the nearest authorities will soon be informed after the specifics of the incident are known.

Keywords: Machine learning, deep learning, convolutional neural network, forest fire detection, object detection, YOLO, DenseNet.

I. INTRODUCTION

The uncontrollable burning of vegetation, animals, meadows, and bushes in their path is known as a forest fire. The wind significantly increases air pollution while rapidly fueling the fire. As a rule, long-lasting and highly flammable fires are caused by climate change. There are also examples of man-made wildfires, lightning strikes and extreme droughts. As a result of the tremendous loss of lives and properties caused by wildfires, this issue has spread to every nation. In addition, lung and skin illnesses in people are brought on by the carbon dioxide that forest fires emit into the atmosphere. Wildfires typically break out in India between the months of March and April when the land is covered in parched timber, dried grass, woodlands, and leaves. In most instances, the rubbing of branches can cause wildfires in hot or severely dry conditions.

Since most households rely on woods for food, fuel, and other necessities, wildfires can have an economic impact. It causes landslides and habitat loss as it ignites through grasses and small shrublands. Harmful gas pollutants and smoke from burning forests cause major health issues for people. Wildfires destroy animal habitats, spread across communities, and claim many lives because they are out of control. All flora vegetation, wildlife and soil health are destroyed by these flames. Persistent fires erupted on the borders of Himachal Pradesh with Nagaland and Manipur. Also massive wildfires erupted in Simlipal National Park in Orissa. The Indian Express said the areas of southern Chhattisgarh, central Orissa, Telangana, western Maharashtra and Andhra Pradesh are highly susceptible to wildfires.

For efficient fire control and prevention, forest fires must be identified quickly and accurately classified. We can develop a forest fire detection model that can be designed to assess and process images from security cameras, drones, and satellites in order to analyse and process images to detect forest fires. The photographs will be divided into two categories: "fire" and "smoke" using a dataset made up of diverse images of fire and smoke in forest-like settings. DenseNet will be used by the suggested system to extract features from input photographs of data from forest fires. The YOLOv5 model will then be used with the collected features to detect and classify objects, specifically detecting areas of the image that contain forest fires. A convolutional neural network (CNN) architecture called DenseNet has demonstrated higher performance in image classification tasks while enabling effective feature reuse. The object detection algorithm YOLOv5, which stands for "You Only Look Once," is capable of concurrently detecting and classifying things in real-time. To enable a quick and efficient response to forest fires, the system will generate real-time alerts and warnings for relevant authorities and stakeholders.

A reliable and effective forest fire detection system with high accuracy and real-time capabilities is anticipated as a result of the integration of DenseNet for feature extraction with YOLOv5 for detection and classification. The technology has the potential to dramatically improve efforts to manage and prevent forest fires, helping to safeguard forests, wildlife, and people's lives.

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Abstract—The term Pneumonia refers to a type of infection that increases the alveoli sacs in lungs. There are various types of bacteria can cause pneumonia. Streptococcus pneumoniae is one of the most common bacteria. Viruses that contaminate our lungs and airways can cause pneumonia. Influenza virus and rhinovirus are the most common viruses that causes viral pneumonia for people above age group of 20. Fungi such as Pneumocystis jirovecii is liable to cause pneumonia, particularly for people who have weak immune systems. When a person is suffering from bronchopneumonia, then air sacs are occupied with fluid and pus, which makes inhaling and exhaling painful also limits the oxygen intake. These kinds of infections usually spread when infected people come in direct contact with normal people. People with prior health issues and adult above age group of 65 are at higher risk of getting infected. There are several imaging modalities that can be applied for the detection of pneumonia in hospitals and clinics which includes computed tomography, chest radiography, magnetic resonance imaging etc. Chest radiography is one of the most used methods for detecting pneumonia worldwide due to its lower cost and they are easily accessible. Chest radiographs is challenging for detecting pneumonia even though it provides significant amount of information about a patient's condition, because images have similar opaqueness when compared with images of other lung defects such as lung cancer, and excess fluid which leads to uncertainty.

Keywords— CNN; Chest X-Ray; Feature Extraction; organizing map algorithm; Pneumonia Detection

I. INTRODUCTION

Pneumonia is one the common disease, especially found among children below five. Therefore, it is very much necessary to reduce the mortality of children thereby many research and tests are conducted to prevent the cause. Low-cost procedures and better facilities are being developed as to make it available to the people around the world, keeping in mind the poverty. And to make it affordable to all types of people. Pneumonia discovery is

analyzed using usability, goodness factors, and computational complexities of the algorithms. This study discusses additionally regarding the quality, usability and size of the obtainable chest X-ray datasets and techniques for coping with unbalanced datasets.

CXR (Chest X-ray), is a powerful tool for detection of pneumonia and its radiological findings are abundantly used for many medical decisions. It is also cost effective and many people can afford it. Using artificial neural network and natural language processing, automatic detection of pneumonia works has been done. Yet these tools need elaborate software and hardware setups.

When explicating chest X-Rays for detection of pneumonia, the infection is detected by radiologist looking for white spots in the X-Ray images of lungs. However, even in severe cases of bronchitis, TB pneumonia such cloud patterns are observed. There are many factors that alters the appearance of CXR, some of them are depth of inspiration and positioning of patient.

II. RESEARCH OBJECTIVE

The objective of this research is to develop a reliable and accurate pneumonia detection system using various neural network algorithms. The research aims to achieve the following specific objectives:

1. To collect a large dataset of chest X-ray images of patients with and without pneumonia.
2. To preprocess the dataset to remove noise, adjust image contrast, and resize the images to a standard size.
3. To develop various neural network architectures
4. To train the neural network models using the preprocessed dataset.
5. To test and evaluate the performance of the trained models using different evaluation metrics such as accuracy, sensitivity, specificity, F1-score, and ROC curve.
6. To compare the performance of the different neural network models and identify the most effective one for pneumonia detection.



MUSIC INFORMATION RETRIEVAL USING SIMILARITY BASED RELEVANCE RANKING TECHNIQUES

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Abstract. The purpose of this proposed study activity is to construct a system for the job of automatically assessing the relevance of music datasets, which will be used in future work. Determine item similarity is an important job in a recommender system since it determines if two items are similar. Participants' systems must provide a list of suggested music that may be added to a given playlist based on a set of playlist characteristics, which will work along with the algorithms designed to provide other similar songs. Specifically, in this study, the challenges of detecting music similarity only on the basis of song information and tags given by users have been addressed. The proposed technique has been tested using a variety of machine learning algorithms to see how well it performs. tf-idf and Word2Vec are the methods used to model the dataset and generate feature vectors. It has also been found we that machine learning techniques, including Collaborative Filtering, KNN, Frequent Pattern Growth, and Matrix Factorization, have a greater influence on relevance ranking than traditional methods.

Key words: Music Information Retrieval, Machine Learning, Collaborative Filtering, Spotify

AMS subject classifications. 68P20, 68T05

1. Introduction and examples. It is the search and organization of enormous collection of music, or musical information, as per their relevance to particular queries that is the subject of Music Information Retrieval (MIR). This is especially significant in light of the large amounts of musical information that is now accessible in digital format, as well as the widespread use of music-related digital services. Aside from that, given its apparent commercial appeal, the majority of media content owners as well as distributors (e.g., Philips and Sony), as well as major technology companies (e.g., Apple and IBM), are actively engaged in research in the area, and a growing number of libraries are attempting to integrate some form of support for MIR into their on-line digital services. This results in an analysis of the text against the text data connected with album and songs, making the system practically identical to any text-based search engine in terms of functionality (e.g. Google, Yahoo). Although this is the case, systems that are capable of receiving "musical" enquiries, like musical scores, whistling melodies (query by humming), or audio recording segments are necessary due to the nature of the content being retrieved.

The phrase "song similarity" refers to the measurement of how close two songs are close in terms of how probable it is that user really want listening to them when they are compared side by side. Yes, the process of developing an objective similarity measure is subjective, and researchers have taken two approaches to accomplish this: Both the objective technique, in which likeness is identified related to the raw data, such as spectral or rhythmic analysis of songs, and the subjective approach, wherein user-generated data, such as tags (also known as collaborative filtering), are used, are discussed further. For the sake of this research, we shall use the subjective technique to determine the extent to which two tracks are comparable to one another. We would then create a resemblance level among two songs scale from 0 (totally distinct) to one (identical), and then we will determine it using the co-occurrences of pairs of things in users' histories by using cosine metric to determine how similar two songs are to one another. For more information, please see the following link. This measure will also serve as our model of reality and, as a result, as our source of truth in the future. Such a concept is realistic, as shown by the fact that researchers in the area have utilized it successfully [1].

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DETECTION OF DISEASES FROM CROP LEAF IMAGES USING MACHINE LEARNING TECHNIQUES: A REVIEW

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Abstract - Agriculture plays a vital role in our day-to-day life. Identification of the disease of plant leaves is very important to prevent the losses in the yield. The plant diseases such as fungi, bacteria and viruses. The leaf diseases completely destroy the quality of the leaf. In this review we present some critical survey on the challenges which we are currently facing and also various methodology which includes Machine learning, deep learning and image processing algorithms which are tested on various plant leaves to detect diseases which helps to increase the yield.

Finally, we identify the challenges and some opportunities for future developments in this area

Key Words: Image processing; Machine Learning; classification; SVM, CNN, Deep Learning, Disease, Neural network

1. INTRODUCTION

India is a land of agriculture and the role of agriculture in our country is very essential because a lot of the people are dedicated to the agricultural industry. Crop production is one of the major factors which affects the domestic market in our country[15].The most important component is identifying crop diseases, which have a direct impact on the economy and food security. Earlier farmers generally used naked eye observation to judge the diseases. But sometimes this may be inaccurate. So, many times farmers used to call the experts for detecting the diseases which was time consuming in big large farms. Therefore, for analysis in various agricultural applications, digital image processing techniques have been established as an effective way such as plant recognition, soil quality estimation, crop yield estimation etc. Image Processing is one of the widely used techniques which is adopted for the plant leaf diseases detection purposes[16].

Thus, disease detection in leaves is an important topic that provides many benefits in monitoring large fields of crops. To detect the diseases properly we use deep learning so, basically the idea of deep learning is: using neural network for data analysis and feature learning, data features are extracted by multiple hidden layers, each hidden layer can be regarded as a perceptron, the

perceptron is used to extract low-level features, and then combine low-level features to obtain abstract high-level features, which can significantly alleviate the problem of diseases in crop[16].

Identifying plant disease wrongly will lead to huge loss of yield, time, money and quality of product. Hence, identifying the condition of the plant plays an important role for successful cultivation.[17]. Therefore, some main steps for disease detection need to be consider. The below fig[2] shows the steps in the training and testing phase.

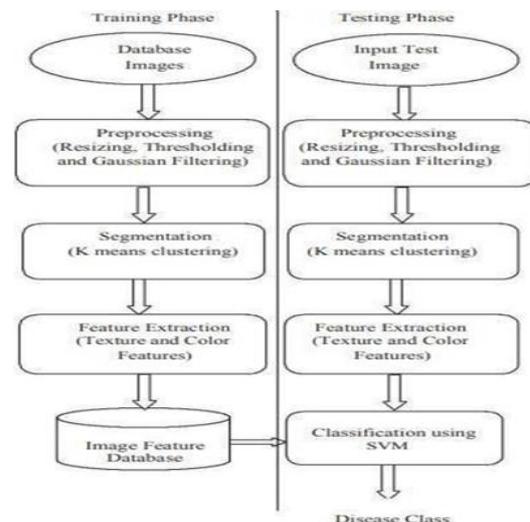


Figure 1. System Block Diagram [16]

2. LITERATURE REVIEW

Sagar Vetal and R.S. Khule [1] has proposed Tomato Plant Disease Detection using Image Processing for detecting 4 commonly occurring diseases like Early Blight, Septoria Leaf Spot, Bacterial Spot, Iron Chlorosis in Tomato. They followed some steps like Image acquisition, smoothing of images using filters and Kurtosis, image segmentation using inverse difference method and feature extraction. And they gave equations for features like energy entropy, correlation, and homogeneity. Using the SVM model they achieved percentage accuracy of 93.75%.



Smart AI-Based Traffic control System

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1. ABSTRACT

The limited ever-increasing facilities and ever-increasing demand for vehicular transportation have led to the development of Automated traffic management systems. Automated traffic management systems are cost-effective and require less human interaction in the management of traffic. Video processing/Image processing captures and processes real-world traffic scenarios such as a traffic signal at the junction. Various object detection algorithms are trained to count the number of vehicles struck in the traffic in each direction and an ML model is designed to output which direction of vehicles must be allowed to move first, based upon the weight of vehicles detected in the traffic in each direction. Most of the energy and time of human beings is spent on roads struck by traffic and thereby increasing air pollution as well. Therefore an efficient Automated transport management system helps in the management of traffic and overcomes the above-said problems.

General Terms

Image Processing, object detection, Machine learning, Artificial Intelligence, Deepstream, Automated Traffic management system, Intelligent transport systems, Traffic Congestion, Identification, Classification, YOLO.

2. INTRODUCTION

Traffic congestion is one of the major concerns at the global level. Ever increasing population and growing demands for vehicular transport has led to the idea of developing smart AI-based traffic controller. According to the intensity of traffic congestion. The ML model performs decision-making on which direction vehicles should be given the green signal earlier. The larger the traffic congestion, the faster will be the clearance rate. Implementation of the above-mentioned can be done using image processing, object detection algorithms, and machine learning models. Thus the model focuses on decreasing traffic congestion at bottleneck points, peak traffic hours, etc. Traffic research has the goal to optimize the traffic flow of people and goods. As the number of road users constantly increases, and resources provided by current infrastructures are limited, intelligent control of traffic will become a very important issue in the future.

However, some limitations to the usage of intelligent traffic control exist. Avoiding traffic jams for example is thought to be beneficial to both the environment and the economy, but improved traffic flow may also lead to an increase in demand. There are several models for traffic simulation.

Driver Drowsiness Detection Using Facial Features

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ABSTRACT:

One of the main causes of car accidents is drowsy driving. Using a combination of techniques for detecting eye closure and yawning, we provide a robust and intelligent strategy for detecting driver tiredness in this work to address this growing problem. This method involves installing a camera inside the car to record the driver's facial look. The first phase involves using computer vision algorithms to identify and track the face region in the recorded video sequence. The driver's state is finally assessed, and if drowsiness is found, a warning message and an alert are given to the driver. Our tests provide strong support for the proposed theory. The major goal of this research is to create a non-intrusive system that can recognize driver weariness and deliver a prompt warning.

I. INTRODUCTION:

A safety feature in automobiles called driver drowsiness detection prevents accidents by detecting when the driver is about to doze off. Most people close their eyes and sleep for 5–6 seconds. In this instance, is referring to complete slumber. On the other hand, micro sleep is seen when a motorist does a little period of sleeping (2-3 seconds). Driver sleepiness, in contrast to driver distraction, lacks a cause and is instead characterised by a gradual loss of focus on the road and traffic demands. However, both driver indolence and distraction may result in a reduction in attention, response time, psychomotor

coordination, and information processing.

According to several studies, tiredness may be a factor for up to 48% of some specific types of streets and up to 22% of all vehicle related accidents. According to data from the Society of Automotive Engineers in the USA, there is one driver fatigue-related mortality for every eight people killed in traffic accidents.



The block diagram of the entire system is displayed in the above figure. Based on the video captured by the front-facing camera, real-time processing of an incoming video stream is done to determine the driver's degree of exhaustion. If the level of fatigue is determined to be high, the output is transmitted to the alarm, and the alarm system is triggered.

II. LITERATURE SURVEY:

In [5], an embedded system for detecting driver intoxication is presented in this paper. The authors suggest an effective and low-cost approach for measuring a driver's state of tiredness utilizing accelerometers, infrared sensors, and other gear connected to a microcontroller. The technology is made to be installed in cars as a preventative measure against collisions brought on by tired or intoxicated drivers.

In [6], the study introduces a new technique for detecting lane compliance and driver fatigue. The

IOT-AUTOMATED AGRICULTURE MANAGEMENT SYSTEM FOR SMART IRRIGATION

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ABSTRACT: In agriculture, water is a valuable but finite resource, and it is becoming increasingly difficult to manage it effectively. The Internet of Things (IoT) and artificial intelligence (AI) are combined in this research to provide an automated irrigation system to decrease water consumption in agriculture. For a very long time, agriculture has been the main line of work in our nation. In India, 70% of the population is dependent on agriculture, while farming accounts for 0.33 of the country's total capital. However, the migration of people from rural to urban areas has created a challenge for agriculture to overcome. IOT is used in advanced agriculture tactics to solve this problem. The internet of things (IOT) is changing agriculture by enabling farmers to use a variety of tactics, including precision and sustainable farming, to deal with challenging situations in the industry. IOT enables remote sensing and control of the devices using the current community version. The document includes sensors that sense several industry characteristics, such as temperature, humidity, wetness, and farm fertility. The sensed values are confirmed, then forwarded to the GSM module. From the wireless module, the confirmed statistics are sent over the cloud to the farmer's PC or mobile device. If the field requests care, the farmers are also informed by SMS. A node MCU is directly programmed with a complex algorithm that controls the amount of water that is used, along with threshold values for temperature, humidity, wetness, and fertility. In the entire world, the farmer has access to automate the motor.

Keywords: natural resources, Internet of Things ecosystem, green technology, sustainable agriculture, and food security

INTRODUCTION

Water is a very valuable resource that needs to be used carefully. One of those industries that uses a lot of water is agriculture. Runoff, wind, and evaporation squander around half of all irrigation water. This is so because the majority of irrigation systems rely on basic controllers and timers for scheduling. Applying the proper amount of water only when necessary is a considerably more effective strategy. Irrigation is a labor-intensive activity that needs to be completed promptly. This project aims to create an automatic irrigation system that detects soil moisture and automatically turns on or off the water supply. Once completed, the project requires relatively little human interaction. A soil moisture sensor and a PIC microprocessor are both components of the circuit. Up to 60% of irrigation water can be saved with a properly installed soil moisture sensor. Valves are used in irrigation systems to turn irrigation ON and OFF.

Real-time monitoring of these parameters and corrective action based on sensed data might improve resource use. The Internet of Things (IoT) has emerged as a facilitator of farm automation against this background. The Internet of Things (IoT) enables new applications and services by utilising recent advancements in sensor, networking, and computing technology.

Numerous scientists have also looked into the significance of IoT in regulating water use for irrigation.

The suggested structure made it possible for users to comfortably engage with the data and consult. The usage of Zigbee for communication between sensor nodes and base stations in a planned Internet of Things-based smart agricultural irrigation system.

The following are the paper's main contributions:

- 1) An IT and IoT-based smart irrigation system.
- 2) Design considerations for IoT software, hardware, and integration with networking and AI are highlighted.
- 3) Show the hardware and procedure for controlling the system.

I. PROPOSED WORK

We suggest a cutting-edge approach to the issue of water and energy waste. In addition to decreasing the need for labour, our IoT-based irrigation system will also aid in predicting the cost of water and electricity.

Basically, there are two ways that our irrigation system can operate: automatically and manually. The user might choose to turn on and off the pump and fan using the manual mode. Real-time data from the sensors would be made available to the user, aiding in decision-making.

In order to gather data in automatic mode, the user will be prompted to enter a threshold value. The proper function would be run if the value exceeded the threshold value. Additionally, the data collected by the sensors might be utilised to analyse the cost of electricity and water. Farmers might analyse their investments and revenues with the use of this. The information from weather forecasting systems can also be used to use water more effectively. More than one field can be controlled by our irrigation system. Better hardware utilisation would follow from this. This system can be used in a greenhouse or an open field. With the aid of a temperature sensor, this method might be used for a greenhouse with ease. LDR, fan, (LM-35). Plant growth could be aided by artificial lights. The sensors' collected data will be sent to the cloud-based Thing Speak platform. The consumer will then receive this information via an Android app. The data will be updated by the app on a regular basis.



Implementation of Green Infrastructures using machine learning to Mitigate Climate Change Impacts

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Abstract

The threat posed by climate change to mankind must be addressed via changes in both governmental policy and individual behaviour. Even though they may occasionally appear distant and hazy, understanding the implications of climate change is essential for taking action.

Urban regions account for more than two thirds of worldwide energy use and more than 70% of CO₂ emissions. To better appreciate carbon emissions and suggest a viable approach to minimise them, a knowledge of urban geometry is essential. the detection of deforestation using satellite sensor pictures. A workable infrastructure option provided by an ML model allows for the cohabitation of buildings and trees while reducing carbon footprint.

Keywords

Machine learning, Energy production, Prediction, Energy management system, Climate change, Ecosystem sustainability, Innovation, Carbon footprints, CO₂ emissions, Sustainability and Greenhouse gas (GHG)

1.Introduction

Governmental and private policy changes are required to counter the threat that climate change poses to humanity. Understanding the effects of climate change is crucial for taking action, even if sometimes they may seem far-off and vague.

More than two thirds of the world's energy consumption and more than 70% of CO₂ emissions are produced in urban areas. An understanding of urban geometry is necessary to more accurately assess carbon emissions and propose a workable strategy to reduce them. utilising satellite sensor images to identify deforestation An ML model's viable infrastructure solution enables the coexistence of buildings and trees while lowering carbon footprint. One of the human-caused adversities, respiratory disorders, is also experienced by those who cause it.

The transportation sector is the main source of carbon emissions. The transportation sector's GHG emissions are being reduced through EPA programmes. GHG emissions have grown far more in the transportation sector than in any other between 1990 and 2020. The global CO₂



Parkinson's Disease Detection Using Machine Learning

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Abstract— Parkinson's disease (PD) is a serious neurological ailment that impairs human motion, movement capabilities. Because it affects middle-aged and older individuals, who typically have uncoordinated cognitive and neuromuscular activities, it is one of the most frequent chronic neurological diseases. Speech difficulties are seen in and around 90% of those who have this illness. Information is produced in real-world applications utilizing a variety of machine learning approaches. The use of machine learning algorithms to identify diseases in their earliest stages helps older people live longer. With regard to the word "Parkinson's," speech characters are the key idea. In this study, the author employs a number of machine learning algorithms, includes KNN, Naive Bayes, Random Forest and XGBoost and how these algorithms are implemented in order to predict Parkinson's based on the input taken from the individual and the input for algorithms i.e., the dataset. Prediction is crucial to treating patients when they are still in the early stages. Machine learning can be used to complete this procedure.

Keywords – Parkinson's disorder, Machine Learning, Speech disorders, KNN, Naive Bayes, Random Forest, XGBoost.

I. INTRODUCTION

Parkinson's disease (PD) appears to be among the top three serious illnesses in the globe. Seniors over 65 are frequently found to have it. Since the symptoms can be

reduced once the disease is identified in its initial stages, the primary cause of PD is still unknown. Most experiments shown that the majority of PD patients display vocal impairment symptoms. Voice data can therefore be effectively used for PD diagnosis. According to a recent WHO report, the number of Parkinson's disease patients and their health issues are both fast rising. This disease is spreading so quickly in China that it may affect half the population within the next ten years, according to estimates. Most often, classification algorithms are employed and used in the medical field to divide data into groups based on a variety of variables:

Motor disorders: It denotes problems of voluntary muscle movement, such as tremors, rigidity, freezing, or Bradykinesia.

Non-Motor disorders: Apathy, mood and affect disorders, cognitive dysfunction, and complicated behavioral disorders are examples of non-motor symptoms. There are two other PD groups into which doctors have placed patients:

Primary predicts: Movement slowness, tremor, and rigidity are the main symptoms.

Secondary predicts: Reduced olfaction, micrographic and postural instability, weariness, sluggish digestion, constipation, weakness, and hypotension are some of these symptoms. Parkinson's disease is mostly brought on by an accumulation of protein molecules in neurons that are misfolded. So far, experts have identified the primary origins of the disease as well as its symptoms. Finding a method to identify Parkinson's disease in its earliest stages is crucial given that the disease is now developing at a double-quick rate.



Multi Objective Energy Based Improved Jellyfish Swarm Optimization for Effective Cluster Head Discovery in UWSN

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Abstract: Underwater wireless sensor networks (UWSNs) have a huge amount of sensors located underwater to collect data from the underwater scenario. UWSN is considered a promising method for monitoring and exploring an underwater scenario. Energy-efficient and reliable data broadcasting are considered challenging tasks, because of the limited energy source of sensors. To address this issue, an energy-efficient cluster head (CH) selection and multi-hop routing are developed in UWSN. The multi objective energy based improved jellyfish swarm optimization (MOEIJSO) is proposed to select optimal CHs from normal sensors. The input parameters of MOEIJSO are residual energy, neighbor node distance, sink distance, and CH balancing factor. Next, multi-hop routing is developed by using ant colony optimization (ACO) for delivering the data packets. Therefore, the proposed MOEIJSO-ACO method is used to improve energy efficiency while increasing data delivery. The proposed MOEIJSO-ACO method is evaluated by using the alive and dead nodes, total energy consumption, data received in base station (BS), and life expectancy. The existing researches such as metaheuristics-based clustering with a routing (MCR) for UWSN, modified low energy adaptive clustering hierarchy (MLEACH) and cooperative energy-efficient routing (CEER) approach are used to compare the MOEIJSO-ACO method. The alive nodes of the MOEIJSO-ACO are 399 for 800 rounds, which is high when compared to the MCR-UWSN.

Keywords: Ant colony optimization, Energy efficiency, Life expectancy, Multi-hop routing, Multi-objective energy based improved jellyfish swarm optimization, Underwater wireless sensor networks.

1. Introduction

Earth is occupied by a 3/4 ratio of water using seas, lakes, canals, rivers and streams. Since a huge amount of unexplored and hidden resources exist underwater which require to be discovered whereas underwater environments are highly sophisticated for humans to discover. Accordingly, an exploration of the underwater environment is possible with the use of wireless technology [1, 2]. UWSN is developing technology that is utilized for observing and discovering the changes in an aqueous environment [3]. UWSN is a wireless network that comprises a group of sensors and autonomous underwater vehicles for collecting and sensing data. These

sensors accomplish direct or indirect transmission of information to the surface sensor (i.e., sink). Next, the data from the sink is transmitted to an offshore monitoring center to analyze and study the gathered data [4]. The sensors of UWSN are located underwater for evaluating the monitoring features such as density, temperature, pressure and so on [5]. UWSN is extensively used in diverse fields such as military target tracking, oil/gas spill monitoring, submarine detection, offshore exploration, disaster prevention and so on [6]. The UWSN faces various issues such as strong network dynamics, expensive deployment, less available bandwidth and restricted battery energy [7].

The battery energy of underwater sensors is restricted whereas these batteries cannot be simply

Distributed resource allocation model with presence of multiple jammer for underwater wireless sensor networks

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ABSTRACT

Underwater-wireless sensor network (WSN) are prone to the jamming attacks; mainly in case of reactive jamming. Reactive jamming has emerged as one of the critical security threat for underwater-WSN; this occurs due to the reactive jammer capabilities of controlling and regulating jamming duration. Further reactive jammer possesses low detection probability and high vulnerability; moreover the existing model has been designed in consideration with terrestrial-WSN. Hence these models possesses limited capabilities of detecting the jamming and distinguish among uncorrupted and corrupted packets; also it fails to adapt with the dynamic environment. Furthermore co-operative mechanism of jamming model is presented for utilizing the resources in efficient way; however only few existing work has been carried out through the co-operative jamming detection; especially under presence of multiple jammer nodes. For overcoming research issues this paper presents distributed resource allocation (DRA) model adopting cross layer architecture under presence of multiple jammer. DRA algorithm is designed for allocating resource to jammer user in optimal manner. Experiment outcome shows the proposed DRA model achieves much better detection rate considering multi-jammer environment. Thus aid in achieving much better detection accuracy, packet drop, packet transmission and resource utilization performance.

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1. INTRODUCTION

Underwater-wireless sensor network (WSN) plays vital role for many applications that offers ubiquitous computing namely environment monitoring, weather forecasting; in here sensor devices gets placed throughout the environment which offers continuous services and connectivity. This further leads to improvisation in human life; however traditional WSN gets easily compromised through the jamming technology since wireless link are exposed in nature. Moreover jamming induces several attacks such as sybil attack, denial-of-service attack which directly affect the performance of underwater-WSN [1], [2]. Jamming is firmly defined as the specific interference induced in wireless network through the malicious nodes by reducing the signal-to-noise ratio of receiver side through transmission of interfering wireless signals; further it is observed that jamming is different from the interference or regular noise since it causes the degrade in network performance. Further interference is defined as the unintentional noise form which disrupt the network performance. Moreover unintentional interference occurs mainly due to the communication of other device namely microwave and controller or communication among the same network. Similarly intentional interference occurs through the malicious device that are intended to affect the underwater-WSN. Jamming are induced at various level i.e. from hampering communication to alter information in given legitimate communication. Furthermore to understand the attack on underwater-WSN or to

Resource allocation optimization for mitigating multi-jammer in underwater sensor network

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ABSTRACT

Wireless underwater sensor networks (UWSNs) are used for coastal area monitoring and military monitoring applications, such as tsunami prevention and target tracking. In UWSNs, jamming is considered to be a serious problem where the intruder affects the lifetime of sensor nodes and impacts the performance of the packet transmission. This paper considers that the jammer device is capable of reducing battery life and preventing the trustworthy UWSN node from communication. Considering the presence of multiple jammers, the existing resource utilization model is not effective. This work presents an efficient resource allocation design to mitigate multiple jammers in UWSNs to overcome research problems. The resource allocation (ERA) model adopts a cross-layer design and can interact in a cooperative manner using direct and hop-based communication to maximize the quality of resource use. Compared to existing resource allocation methodologies, considering the presence of multiple jammer nodes, the ERA achieves a much better detection rate, resource utilization, packet drop, and energy efficiency performance.

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1. INTRODUCTION

Extreme attenuation of underwater scenarios makes Wireless communication very challenging and it is possible only with microwave bands of short-range broadband channels [1], [2]. Acoustic waves are used in underwater communication environment for increasing the communication range. The presence of noise underwater such as wind, shipping activities, marine life affect these signals highly. Narrow band, propagation delay, multipath fading, reflection, and also effect these waves. Despite such complex propagation scenarios, various industries and military applications use the underwater wireless sensor network (UWSN). In addition, it is also used for tsunami and soil erosion monitoring. It is important to provide an effective safety mechanism in view of these applications as it is used for environment and surveillance monitoring. For the compromised system, which already faces the challenges of a hostile environment, a denial of service (DoS) or jamming attack can have catastrophic magnitudes [3], [4].

Jamming is clearly defined as the specific interference induced by the malicious nodes in the wireless network by reducing the receiver side's signal-to-noise ratio by transmitting interfering wireless signals; furthermore, it is observed that jamming differs from interference or regular noise as it causes the degradation in network performance. At various levels, jamming is induced from hampering communication to altering information in the legitimate communication given. In addition, to understand the underwater-WSN attack or to prevent jamming for efficient communication. There are various types of jammer, such as reactive jammer, proactive jammer, hybrid smart jammer, and specific jammer function; it is also very important to know the

IMPLEMENTATION OF SMART POLE UNIVERSAL BATTERY CHARGING SYSTEM USING SOLAR POWER AND IOT

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Abstract - In most of the countries the battery-operated vehicles are introduced, it requires recharging the battery. Here design of a smart pole system for automatic unmanned charging system for four and two-wheeler vehicles, while this system is also used to capture the number plate of the vehicle and send it to nearest police station to monitor the theft, vehicle safety and security purpose. This project describes how to use a hybrid power system to charge a vehicle's battery. The vehicle battery charger industry is worth billions of dollars, and it supports millions of vehicles. The need to provide a public charging service is essential. Many critics argued that a public charging service is not a lucrative business because most users can charge their vehicle at home, or in their office. Vehicle battery charger booth using hybrid power (solar and grid power) system is new business milestone because many are travelling through highway.

Keywords - Smart LED Street light, Solar charging system, IOT based payments, EV charging system

I. INTRODUCTION

The design and implementation of solar tracking generating power system is done. In This Model of Implementing a Smart Pole Universal battery charging system using solar power and IOT, two power sources are used.

The design and implementation of the solar tracking power generation system is Y.analysed by J. Huang. Here, the tracking mechanism is integrated with the expert controller, sensors, and input / output interfaces to increase the energy generation efficiency of the solar cell. To track the sun, cadmium sulphide light sensitive resistors are used. A fuzzy algorithm is then developed and implemented to achieve the best tracking results.

A field programmable gate array is used to design the controller so that the solar cells always face the sun in the daytime. According to Robert Weiss Bach, renewable energy is quickly gaining importance as an energy resource, as oil prices fluctuate. The global environmental change research has encouraged the use of more efficient and energy-saving technologies in many sectors of daily life. There has been an increase in energy consumption in the transportation sector recently. This is especially true in the automobile industry.

Thus, the need for more efficient use of Electric Vehicle Charging Stations (EVC) is becoming more competitive due to the improvement of embedded information systems and modes of operation of electric vehicle (EV) battery chargers in smart grids. In addition, power conversion device topologies have received much attention due to their various

advantages such as improved accuracy, stability, and reduced power loss during charging operations. Several different topologies for energy converters have been discussed and compared in literature.

II. METHODOLOGY

Four main parts have been discussed under this topic. Design architecture is the main block function for the proposed design. While, the hardware specifications of each component is given below. Flow of the system is also explained.

A. Design Architecture

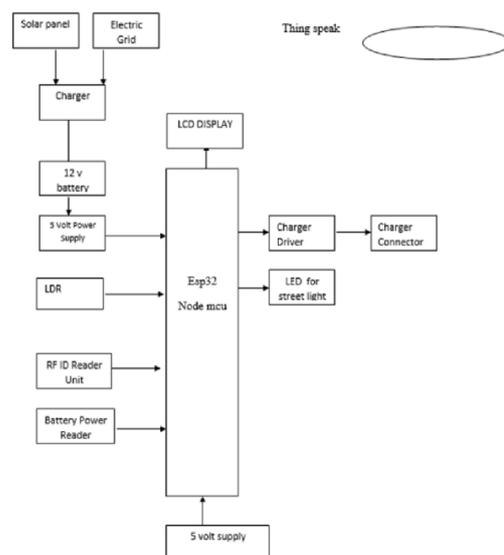


Figure 1: Block Diagram of Proposed System

IR WIRE LESS UNDER WATER COMMUNICATION SYSTEM

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Abstract - Wireless communication permits data to be transmitted between 2 devices while not victimization wire or cable. the information is being transmitted and received victimization nonparticulate radiation, the spectrum orders magnetism energy in step with wavelength or frequency, the spectrum ranged from energy waves having very Low Frequency (ELF) to energy waves having a lot of higher frequency, e.g. x-rays. Information is transmitted and received, the sufferer of non-particle radiation, and the spectrum ranks magnetic electricity in line with wavelength or frequency. A sign that contains virtual information over an underwater channel measures sound waves for touring lengthy distances. Therefore, radio indicators as magnetic waves do now no longer appear for use to cowl brief distances.

Keywords - Underwater Communication, Wireless Infrared Communication, Skin-Dive, Temperature Device

I. INTRODUCTION

Underwater wireless communications system comprising 1st and second communications modules that transmit and receive knowledge utilizing infrared light. every module features a transmitter / receiver that converts every received knowledge. The actinic radiation detection unit then provides a logic zero at its output once it receives a periodical burst of infrared light for period of roughly 600 microseconds and a logic one once the unit fails to sight a periodical burst of infrared light for a period of 600 microseconds. Wireless infrared (IR) communication system is supposed to use free area propagation of sunshine waves as a transmission medium in close to infrared band. Message communication is enforced by victimization IR as a supply that's established a light-weight communication (link to transmit and receive knowledge via actinic radiation)[1]. The end result of this planned work is to style and implementation an optical wireless system to transmit knowledge over a precise distance. this technique has several blessings like can be a coffee price and therefore the transmitter or receiver could also be showed to a distinct location with least distraction. this method is utilized communication with transmitter and receiver in underground water. if they need any facilitate means the transmit the signal pattern IR transmitter remote the signal transfer to IR receiver circuit. So thus, why they will merely establish the data.

II. RELATED WORK

Although because of the truth that cutting-edge severa decades, artificial scattering agent's region unit conditioned to recreate below water optical communiqué channels below really fantastic water high-quality conditions, a piece similar to the similarity in frequency region characteristics. Associate acoustic communiqué has been advanced

for the underwater. But the records live in the underwater acoustic channel is restricted, Underwater sensors can't percent facts with those on land, as every use really fantastic Wi-Fi signs that most effective labor in their severa mediums[2]. So the used an area of the spectrum in device communication system is split into various bands supported the type of the sunshine sources, transmitting\absorbing materials (fibers) and detectors. throughout this project, short distance transmission of signal is accomplished by the look and action of infrared communication link. Associate acoustic communication has been developed for the underwater wireless detector network as results.

III. EXISTING SYSTEM

Various authors have planned and mentioned loads of advancement in tutorial field victimization technology that has helped in rising tutorial field . Node pattern simulation of associate degree submarine device network victimization RF magnetism communications[3]. In RF communications, researchers art work with clearly Low Frequency (VLF), reducing the frequency for this reason on personal a pretty some practical variety of communiqué. Concretely, some researchers of the port Metropolitan University, U.K AR none, S. Underwater optical wireless conversation network. Many underwater conversation deployments use acoustic or low frequency technologies, that's why the quantity of works in better frequencies may be very scarce. We've had been given have been given decided a few papers displaying comparative research concerning the transmission dispositions of the acoustic, optical and magnetism indicators in underwater environments. There may be a large kind of articles describing the propagation of acoustic waves. Partner diploma instance of a path loss evaluation given thru way of way of the pondered image and refraction of the waves is furnished in.

Review Article

Comprehensive Review on State of Charge Estimation in Battery Management System

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Abstract - This paper describes the latest methods and enhanced techniques used to determine the precise State of Charge (SOC). The three primary factors influencing SOC accuracy are the environmental temperature, current, and open-circuit voltage for a typical battery. It is essential to know the SOC that judges the battery's life. This paper analyzes five different methods to estimate the SOC using different Algorithms and Neural networks. These methods are state-of-the-art methods that can be used to check the correctness of the measurement of SOC in batteries. This paper discusses and analyses the Regression algorithm, time series algorithm, K nearest neighbor algorithm, AGA-based RBF neural network, and Back Propagation neural network to determine the precised SOC. Each method's advantages and disadvantages were discussed and compared with other models to show their superiority. A sample of data was fed to these models, and the result was noted for all five methods. Later, the data were analyzed for their accuracy.

Keywords - AGA-based RBF neural network, Backpropagation neural network, K nearest neighbor algorithm, Regression algorithm, State of charge, Time series algorithm.

1. Introduction

The government recommends using electric vehicles to avoid environmental pollution and the fossil fuel crisis[1]. These environmentally friendly vehicles do not depend on fossil fuels[2]. These vehicles use batteries to function. Off-late, many companies are investing in manufacturing electric vehicles. These include two-wheelers and Four-Wheeler. Few companies have already manufactured and sold these vehicles to users. However, they fine-tun the batteries for their long-lasting mileage[3]. The main component of electric vehicles is batteries. In the overcharged battery of an electric vehicle, the electrolyte inside the battery gets heated, and the battery's temperature increases for a long time which may cause a fire. If an over-voltage/over-current occurs during cell balancing, a power surge could be inside the battery, leading to a breakdown. So, it is important to take care of the batteries from over-charging, under-charging, over current, under-voltage, short circuit, and temperature variations so that it gives long life to the batteries[4]. The Battery Management System (BMS) helps monitor the battery packs, charge status, and health status and helps optimize the battery. Cell balancing technology will improve the battery's life for a long time. The Battery Management System (BMS) helps monitor the battery packs, charge status, and health status and helps optimize the battery. Monitoring voltage, temperature parameters, and coolant

flow are achieved thru BMS. The components of BMS are shown in Fig. 1.

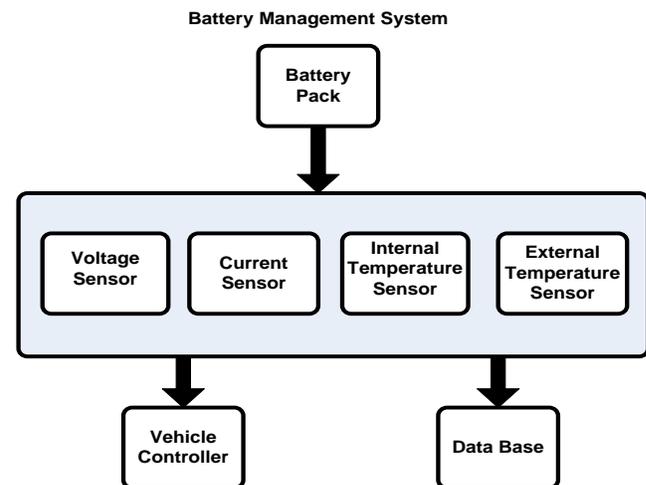


Fig. 1 Components of BMS

1.1. Components of BMS

1.1.1. Obtain temperature data from the battery

- To measure a precise temperature inside the battery is challenging. If the accurate temperature of the battery is not measured, the battery life is decreased. Hence, sensors are used to measure the temperature[5].





Simulation and analysis of suspension based single axis mems capacitive accelerometer

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Serpentine-Beam Suspension.

ABSTRACT

This paper reports a comparison of different types of springs used in MEMS based capacitive accelerometers. In this work MEMS based Single-axis accelerometers are designed using different Suspension systems. Analysis of the structure is done for resonant frequency of 2kHz. Analytical modeling of the different suspensions is presented for the specified frequency. Stress, displacement and capacitive analysis of the accelerometer is done. The sensitivity of the accelerometer with parallel beam suspension is 70nm/g, 50nm/g for folded beam suspension and 35nm/g for serpentine beam suspension. Hence parallel beam suspension has 0.7 times improved sensitivity than folded beam and 2 times better than serpentine suspension accelerometer. Whereas the stress obtained for folded beam is better than the other two. Hence Parallel beam suspension is preferred for higher sensitivity and accuracy whereas Folded beam suspension is preferred for greater structural stability. By comparing these devices, it is concluded that a compromise on certain parameters is required in order meet the requirements. If there is higher displacement sensitivity then there is lower mechanical stability and vice versa. The simulations are carried out using COMSOL Multiphysics.

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1. INTRODUCTION

Micro Electro-Mechanical systems is known as MEMS. Other names associated with it include micro-systems technology (MST) and micro-machines. A broad range of micro fabrication designs, techniques, and mechanisms that involve the tiny realization of moving mechanical parts are together referred to as MEMS[1].

A moving system's acceleration is measured with accelerometers, which are electromechanical devices. Measurement of acceleration is essential for many applications. Applications requiring motion sensing, such as vibration detection, shock, tilt, etc., can also benefit

A comparative study on energy efficient clustering based on metaheuristic algorithms for WSN

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Abstract

One of the important technologies in wireless sensor networks (WSN) is an efficient and dependable routing system. In WSN, energy is the key resource for extending network lifespan. Nowadays, WSN is utilized for a variety of applications, and there is always an issue with energy consumption. As a result, to find out the best energy efficiency model is the primary focus of this research in order to extend the life of the network. Different energy-efficient clustering (EEC) methods based on artificial bee colony optimization (ABC) are applied for the WSN in this comparative research to increase the network's energy efficiency. To increase energy efficiency during the communication process, the enhanced memetic artificial bee colony (EMABC), global artificial bee colony algorithm based on the cross over and tabu search (CGTABC), Energy-efficient clustering using artificial bee colony (EC-ABC), memetic artificial bee colony algorithm (MeABC), and randomized memetic artificial bee colony algorithm (RMABC) are implemented. The EEC method involves forming the appropriate quantity of clusters and selecting cluster heads in a dynamic manner. Furthermore, relay nodes are chosen with energy efficiency objectives, and they are computed afterwards. The implemented methods perform EEC. In terms of assessment and validation, the implemented models are compared. As a consequence, the proposed EMABC model performed well in terms of energy efficiency, with an efficiency of 82.44%, an end-to-end delay of 99.68ms, a packet drop rate of 152, a throughput of 680.28Kbps, packet delivery ratio of 98.05%, and network lifetime of 91%.

Keywords

WSN, Energy efficiency, Network lifetime, Clustering, Routing, Enhanced memetic artificial bee colony.

1. Introduction

A wireless sensor network is a network that connects sensor units wirelessly to observe and monitor environmental factors [1]. Wireless sensor networks (WSNs) are a subset of ad-hoc networks. The energy limitation on WSN nodes is critical, and it is thoroughly analyzed to make WSN robust, reliable, and useful in real-world cases. Sensor nodes operate on a limited quantity of energy supplied by a small direct current (DC) source within the sensor node unit, which cannot be changed once the network is deployed.

In addition to energy, other important restrictions of WSN include limited sensing range, transmission range, sensor node processing capabilities, and sensor node memory capacity [2]. A sensor node's sensing range describes the location around the sensor that it can observe or monitor. In contrast, the transmitting range defines the location around the sensor till the sensor node may communicate data gathered by it. Because detecting and transmitting are the two most costly activities of a sensor node, these two restrictions are critical. The design of the network has a serious effect on the scalability and performance of the WSN. The architecture of WSN can be designed on two types: flat and two-tier or hierarchical [1].

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Kinetics of immobilized alpha amylase impregnated with silver nanoparticles in Egg membrane for enhanced starch hydrolysis

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Abstract

In this study, α -amylase, an industrially important enzyme was successfully immobilized on a porous egg membrane impregnated with silver nanoparticles and has been used for starch hydrolysis reaction. The immobilized alpha-amylase impregnated with silver nanoparticles on an egg membrane (IAmy/IAG-Np/ESM) was studied for its catalytic efficacy using starch as a substrate under variable reaction conditions viz. pH, temperature, and substrate concentration. The results were compared with that of reaction with free nanoparticles and free amylase enzyme. IAmy/IAG-Np/ESM showed highest K_m and V_{max} values (2.2 and 1.7-fold) and lower V_{max}/K_m ratio (1.4-fold), respectively in comparison to the free enzyme. The enzyme with free nanoparticles showed higher K_m and V_{max} values (1.7 and 1.1-fold) and lower V_{max}/K_m ratio (1.2-fold), respectively in comparison to free enzyme. IAmy/IAG-Np/ESM and the enzyme with free nanoparticles the free enzyme, exhibited lower activation energy, higher D-values, higher half-life, lower deactivation constant rate, and higher energy for denaturation in comparison with free enzyme. Immobilization of α -amylase increased enthalpy & free energy and decreased entropy of thermal inactivation. Similar behavior was exhibited by the enzyme with free nanoparticles. A significant increase in pH stability of IAmy/IAG-Np/ESM was observed especially at alkaline pH values. IAmy/IAG-Np/ESM membrane was characterized by SEM and FTIR for structural properties. In addition, IAmy/IAG-Np/ESM preserved 100% of its initial activity after 15 consecutive usages in the reaction. The residual activity of enzyme was 80% at 4 °C after 21 days of storage. The enzyme with free nanoparticles improved the kinetic properties. The immobilization process improved the catalytic properties and stabilities, thus increasing the suitability for industrial processes with lower cost and time.

Keywords : Green synthesis, immobilized silver nanoparticles, Egg membrane, Enzyme kinetics, stability of membrane

1. Introduction

Enzymes are slowly but steadily gaining relevance as biocatalysts in a variety of industries, from food to pharmaceuticals. The enzymatic method has a number of advantages, including low toxicity, selectivity, and the acceleration of mild reaction conditions with high yield and exclusivity towards the target products [1]. α -amylase catalyses the breakdown of the starch molecule's α -D-1,4 glucosidic bonds, resulting in dextrin and other glucose-based polymers. Textile, culinary, baking, detergent, brewing, pharmaceutical, and clinical chemistry are just a few of the areas where α -amylases are used [2,3]. Despite their importance, amylases face challenges such as high sensitivity to harsh industrial process conditions, limited stability, short lifetime, and difficulties in recovery, all of these raise manufacturing costs. Enzyme immobilization is one of the most effective strategies for resolving

these issues since it not only stabilizes enzymes under operational circumstances but also allows for easy recovery and reusability for multiple times [4]. Covalent binding, physical adsorption, entrapment, and cross linking to solid carriers are all techniques for immobilizing enzymes. Covalent binding is regarded to be the most successful method. The establishment of covalent connections between the enzyme and the carrier surface may be a helpful approach for generating enzymes and preventing their leaching and subsequent leakage [5]. Physical adsorption is the most common, easiest to do, and oldest method. Because of the weak connections between the enzyme and the carrier surface (as van der Waals, hydrogen bonding, hydrophilic/hydrophobic, and electrostatic interactions), the immobilised enzyme through physical adsorption has low stability after repeated use. To improve the stability of immobilised enzymes, a technique

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Nano-Enzymatic Hydrolysis and Fermentation of Waste Starch Sources for Bioethanol Production: An Optimization Study

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Abstract

With the inevitable depletion of the world's energy supply and the rising pollution issues, there has been an increasing worldwide interest in alternative energy sources. One of the best options to beat this energy crisis is biofuel. Bio-ethanol is the best biofuel that can be produced by simply converting the sugar content of any starchy material into alcohol with the evolution of CO₂ under controlled environmental conditions. More quantitative ethanol production can be carried out using a hydrolyzed starchy source. The hydrolysis of the starch is achieved through various methods, viz. acid hydrolysis, heat treatment, and enzymatic treatment, out of which the enzymatic method of hydrolysis shows prevalence. In the present study, the hydrolysis of starch sources is carried out by a nano-enzyme bio-conjugate. The enzyme used is α -amylase in association with silver nanoparticles. Previous studies indicate the efficacy of nano-enzymatic bio-conjugate, i.e., silver nanoparticles in association with α -amylase, showed a 2-fold increase in its efficacy in reaction mixtures over converting the substrates to products. Thus the usage of the catalys, silver nanoparticles- α -amylase bio-conjugate in the reaction mixture enhances the reaction rate in hydrolyzing the starch sources, thereby, more breakdowns of the sources be enabled in lesser time. The waste starch sources used in the current study are corn waste, rice husk, and potato peels which can reduce the economy of biofuel production. In this study, pretreatment of waste starch sources for hydrolysis was carried out using nano-enzyme bio-conjugate. Further to this, the efficacy of the hydrolyzed starch source in producing bioethanol was assessed in comparison with the non-hydrolyzed starch source when subjected to fermentation of hydrolyzed and non-hydrolyzed sources using baker's yeast for 16hrs. The percentage of ethanol produced from hydrolyzed and non-hydrolyzed sources is estimated by gas chromatography. The factors affecting the bioethanol production are estimated by optimizing various ethanol process parameters, viz. time, pH, temperature, concentrate of starch source, and biomass concentration by the yield of bio-ethanol produced. The maximum percentage of bioethanol produced using hydrolyzed starch sources using nano-enzyme catalyst under the optimized condition is 63% in comparison with non-hydrolyzed sources, which was 13%.

Keywords: Bioethanol, biofuel, α -amylase, silver nanoparticles, optimization, cost estimation

1.0 Introduction

Global warming and an ever-growing need for liquid fuels in recent years have made bioethanol a possible gasoline

substitute¹⁻⁴. First-generation bioethanol produced from edible crops has sparked debate about various social concerns, including food security and rivalry with food sources⁴. The majority of the carbohydrates used as a source to produce bioethanol come from plants that contain more amount of sugar or starch, viz. maize, sugarcane, sweet

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Antineoplastic Effects of *Mucuna pruriens* Against Human Colorectal Adenocarcinoma

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Abstract

Mucuna pruriens (MP) which is commonly known as “Velvet Bean” is an underutilized legume traditionally used to treat Parkinson’s disease and male fertility issues. Extracts of MP have also been identified for their antidiabetic, antioxidant, and antineoplastic effects. Commonly, the antioxidant and anticancer properties of a drug are linked together as antioxidants scavenge free radicals and prevent the cellular DNA damage which could result in cancer development. In this investigation, comparative assessment of the anticancer and antioxidant potentials of methanolic seed extracts from two common varieties of MP, *Mucuna pruriens* var. *pruriens* (MPP) and *Mucuna pruriens* var. *utilis* (MPU) against human colorectal cancer adenocarcinoma cells COLO-205, was carried out. The highest antioxidant potential was recorded with MPP with an IC₅₀ of 45.71 µg/ml. The in vitro antiproliferative effects of MPP and MPU on COLO-205 showed an IC₅₀ of 131.1 µg/ml and 246.9 µg/ml respectively. Our results revealed intervention of the MPP and MPU extracts in growth kinetics of the COLO-205 cells in concomitance with apoptosis induction up to 8.73- and 5.58-folds respectively. The AO/EtBr dual staining and the flow cytometry results also confirmed the better apoptotic efficacy of MPP over MPU. MPP at a concentration of 160 µg/ml exhibited highest apoptosis and cell cycle arrest. Furthermore, effect of the seed extracts on p53 expression was investigated by quantitative RT-PCR and a maximum upregulation of 1.12-fold was recorded with MPP.

Keywords *Mucuna pruriens* · Human colorectal carcinoma · Anticancer · Antioxidant · p53 gene · Apoptosis

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Interactions of amyloid precursor protein intracellular domain (AICD) with copper and DNA fragment reveal conformational changes that trigger AD

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ABSTRACT

Neurofibrillary tangles and Amyloid plaques are central to the progression of Alzheimer's disease [AD]. It has been well substantiated that the Amyloid precursor protein is cleaved enzymatically at its C terminal end yielding the APP intracellular domain [AICD]. It has been shown that AICD is an intrinsically unstructured molecule involved in AD pathology and appears to be a potential candidate in understanding the complexity of this disease. However, the relevance of AICD mechanism in neurodegeneration is poorly understood. Recent evidences reveal that AICD is localized in the nucleus, and upon binding to DNA, gene expression appears to get altered, and this could be regarded as the third hallmark of AD. Reports have highlighted that higher concentrations of copper induces a neurotoxic effect, which could enhance the AD pathogenesis. Hence, our work using circular dichroism and computational studies focuses on the interactions of AICD with copper and DNA which indicates that AICD-Cu complex interacts with the DNA and triggers conformational perturbations leading to AD.

KEYWORDS: Alzheimer's disease (AD), copper, AICD, circular dichroism, docking studies, DNA.

INTRODUCTION

Alzheimer's disease (AD) is considered as a neurodegenerative disorder primarily characterized by progressive impairment of memory, decreased cognitive function, paranoia and decline in language function. According to the World Alzheimer's Report (2019) over 50 million people are affected by dementia. This according to the reports is said to reach 152 million by 2050. The current cost of dementia care is estimated at US \$1trillion which may double by 2030. The pathogenesis of (AD) is extremely complex and involves the formation of neuropathological lesions, amyloid plaques (A β) and neurofibrillary tangles (NFTs) [1]. Recent evidences [2, 3] reveal that the amyloid precursor-protein (APP) is cleaved by gamma-secretase through proteolysis in a controlled manner at the C terminal end. Through this an additional 58 amino acid residue catabolite, the APP intracellular domain (AICD) is formed in the cytosol [4]. This is in-turn cleaved by epselon cleavage and caspase3 into JCASP (VMLKKKQYTSIHGVEVDA) and C31 (AVTPEERHLSKMQQNGYENPTYKFFEQMQN) fragments, and the C31 is believed to be involved in neuronal death [5, 6]. It is also well evidenced that the 656I-667V hydrophobic cluster, the 667-VTPEER-672 which is the helix capping box at the N terminal end, and the 684-NPXY-687 which is the type I β -turn are known to make up the structure of AICD.

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Replacement of Soyabean Meal in Poultry Feed with De-Oiled Silkworm Pupa Cake obtained through Pilot-Scale Supercritical Fluid Extraction Technology

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ABSTRACT

Surge in price of soyabean in the domestic and international market has led to a hunt for potential alternative for protein sources in poultry feed. Silkworm pupa is a rich nutrient reservoir of fats, protein, minerals, essential amino acids etc., which is underutilized for its potential nutritional applications. Despite its rich nutritional value, it is considered as a waste and discarded unscientifically resulting in serious environmental concerns. Therefore, in the present study De-oiled Silkworm Pupa Cake (DOSPC) rich in protein (64.88%), obtained from defatting the discarded silkworm pupa through a pilot scale Supercritical Fluid Extraction technology, was used as a sustainable alternative to soyabean meal in poultry feed. For the present study, 1500 numbers of broiler chicks (day old chicks) of COBB variety were selected and divided into 5 experimental groups and 10 replicates per group with 30 birds per replicate, which were fed in amounts Control Diet comprising 100% Soyabean meal and 0% DOSPC (Group 1), Diet with 25% DOSPC and 75% Soyabean meal (Group 2), Diet with 50% DOSPC and 50% Soyabean meal (Group 3), Diet with 75% DOSPC and 25% Soyabean meal (Group 4) and Diet with 100% DOSPC and 0% Soyabean meal (Group 5). Experimental trials were conducted for 6 weeks and details of average body weight gain, feed consumption and FCR was collected for each week. The results from this study suggested that Soyabean meal can be replaced with DOSPC upto 50% and/or 75% for optimum FCR and Body weight gain in the birds. Both group 3 and 4 reported similar output with no significant variation. Body weight gain of 2610 g/bird was observed in the treatment group 3 compared to the control group which was 2324 g/bird, FCR of 1.36 was observed in Group 3 which was significantly better than the FCR of the control group which was 1.52. The immunological assay against Newcastle Disease (ND) and Infectious Bursal Disease (IBD) revealed improved immune response in treatment groups supplemented with DOSPC in their feed. The organometry, histopathological, gut health and overall growth performance of the treatment group was on par with the control group and this suggested that replacement of Soyabean Meal with 50% and/or 75% is beneficial for poultry farming in terms of better nutritional intake for the birds and profitability for the poultry farmers.

Keywords: De-oiled silkworm pupa cake, Supercritical fluid extraction, Poultry, Broiler, Feed, FCR, Growth, Omega 3 Fatty Acid, ELISA, Immunological Assay and Carcass traits etc.,

1. INTRODUCTION

Poultry industry is highly sensitive to price fluctuations of the feed ingredients. Feed contributes to 60%-70% of the cost in poultry rearing (TNAU Agri portal Animal Husbandry, 2015), wherein maize comprises 55-60% of the feed and soyabean meal comprises 30-35% approximately. In India, poultry meat contributes to 37% of the total animal protein consumption (Ahmed and Islam, 1990), but the poultry industry has been facing setbacks due to the prices and availability of key ingredients of the feed. Soyabean meal contributes to 30% of the poultry feed composition. COVID19 related logjams have resulted in a sudden jump in the prices of soyabean meal. The prices of soyabean meal was INR 30/kg in March, 2020 which plunged to a record high of INR 92.5/kg in July, 2021. This has gravely impacted the poultry sector.



CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY STUDIES OF CALCITE-ZINCATE NANOPARTICLES BY GREEN SYNTHESIS

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Abstract: Nanoparticles (Nps) are extremely useful in a extensive choice of industries, together with electronics, the environs, cosmetics, material science, and medicinal systems, among others. Calcium Carbonate (CaCO_3) and Zinc Oxide (ZnO) nanomaterials have long been popular research topics. It is frequently used in dentistry applications due to its biocompatibility. The purpose of this study was to produce and describe calcium carbonate/zinc oxide nanoparticles (CaCO_3/ZnO -NPs) prepared via precipitation method. The precipitation method has many advantages, including being more controllable and reproducible, as well as allowing for easy particle size control. Temperature and the calcination process both have an impact on the formation of nanoparticles. The calcination at high temperatures resulted in spherical-shaped particles, a reduction in aggregate size, and an increase in the crystalline nature of the NPs. Nitrates of calcium and zinc, sodium hydroxide were used, along with silk washed waste water containing sericin as a capping agent. CaCO_3/ZnO -NPs were produced at 60°C using calcination (500°C). The antibacterial activities of the nanoparticles against gram-positive bacteria *Staphylococcus aureus* and *Enterococcus faecalis*, as well as gram-negative bacteria *Escherichia coli* and *Klebsiella pneumoniae*, also, Fungus - *Candida albicans* were investigated, via the disk diffusion method. CaCO_3/ZnO -NPs were successfully produced and exhibited a crystalline nanostructure, confirmed the elements of CaCO_3/ZnO -NPs, and revealed that the CaCO_3/ZnO -NPs obtained had an irregular spherical shape. The nanoparticles were found to be void of contaminants and organic. The absorption group at nm points out the occurrence of CaCO_3 , and the absorption group at 380 nm confirm the existence of ZnO . In addition, these CaCO_3/ZnO -NPs have improved antimicrobial activity with potential applications in dentistry.

Keywords: precipitation method; green synthesis; characterization; antibacterial; antifungal; disc diffusion method;

I. INTRODUCTION

Nanotechnology is defined as "the meticulous and precise employment, accuracy employment, exhibiting, size, and synthesis of ingredients at the nanoscale to a variety of material, arrangements, and maneuvers by basically unique features and tasks" [1]. Humans have long been interested in "nano"-sized existence. Richard P. Feynman, a physicist and well-known Nobel Prize winner was generally credited with developing the idea of nanotechnology [2].



Photocatalytic Activity Induced by Metal Nanoparticles Synthesized by Sustainable Approaches: A Comprehensive Review

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Nanotechnology is a fast-expanding area with a wide range of applications in science, engineering, health, pharmacy, and other fields. Among many techniques that are employed toward the production of nanoparticles, synthesis using green technologies is the simplest and environment friendly. Nanoparticles produced from plant extracts have become a very popular subject of study in recent decades due to their diverse advantages such as low-cost synthesis, product stability, and ecofriendly protocols. These merits have prompted the development of nanoparticles from a variety of sources, including bacteria, fungi, algae, proteins, enzymes, etc., allowing for large-scale production with minimal contamination. However, nanoparticles obtained from plant extracts and phytochemicals exhibit greater reduction and stabilization and hence have proven the diversity of properties, like catalyst/photocatalyst, magnetic, antibacterial, cytotoxicity, circulating tumor deoxy ribo nucleic acid (CT-DNA) binding, gas sensing, etc. In the current scenario, nanoparticles can also play a critical role in cleaning wastewater and making it viable for a variety of operations. Nano-sized photocatalysts have a great scope toward the removal of large pollutants like organic dyes, heavy metals, and pesticides in an eco-friendly and sustainable manner from industrial effluents. Thus, in this review article, we discuss the synthesis of several metal nanoparticles using diverse plant extracts, as well as their characterization via techniques like UV-vis (ultraviolet-visible), XRD (X-ray diffraction),

IoT- Based Smart Farming

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Abstract: *This paper mainly describes the IoT's scope in the smart farming field and its applications. The main aspiration of the proposed system is to develop a robot that gives a helping hand to farmers by reducing the labor work by implementing the multi-doing tasks like plowing, seed sowing, rolling, cutting, and harvesting, which require a massive amount of human resources. The robot is also developed to check for the soil moisture and water level using their respective sensors for better crop yield. The ESP8266 nodeMCU is used along with a variety of sensors to monitor the actions on the field and the factors influencing it. A Blynk app which is a mobile application is used to remotely control and monitor the field and help in the management and control of the robot in the farm field.*

Keywords: Smart Farming, ESP8266 nodeMCU, 1 channel Relay module, DC driver circuit, Blynk, Sensors, Arduino

I. INTRODUCTION

For many decades now, technologies have been rapidly evolving and developers all over the world are attempting to make this world smarter and simpler with each passing moment to make our daily lives easier and simpler. Iot technology plays a pivotal role in establishing connection between objects. The internet of things is one of the domains in computer science that assists in connecting real-life objects using intelligent networks such as the internet. The primary motivation for working on IoT-based smart farming is to raise public awareness about the expected deterioration of natural resources in the coming years. It is estimated by the United Nations Food and Agricultural Organisation, that by 2050 there is an emergency and the need to produce 70 percent of agricultural resources for the world with a finite amount of exhaustible resources. The project is mainly concerned with implementing smart robots in the agricultural fields to increase better quality crop yield and making robots to do tasks that require massive amounts of manpower which plays a significant role in helping farmers.

II. PROBLEM STATEMENT

The main motivation behind our research is to bring about a improvement in the technical aspects in the existing traditional farming to develop a network-based wireless sensors, efficient decision support system that can manage agriculture-related pursuit by hand over felicitous agriculture facts because of the forecast and rebel water levels there are several distractions for cultivator which is detrimental to cultivating farmers use mobile applications manually or autonomously which check the water level and also the soil ph level farmers will discover it extra comfortable and useful as just consequence agriculture requires much time to perform and it is also known as a time-consuming method

III. LITERATURE REVIEW

We have referred multiple research papers to carry out this project for fabricating the smart farm robot we briefly took some of the ideas from various authors who had made recent research regarding this. We learned that the smart vehicle or tractors are emerging and evolving making the processes of farming less time-consuming saving manpower and energy and also increasing the production of crop yields annually. Specialists in this area of research have addressed that sensors are widely used in this field of study and analyses they believe that these sensors play a vital role in managing irrigation systems in the agricultural field various other sensors are also implemented to work based on their designs. We have taken a bit of the theory and implemented our methodologies based on their analysis and surveys.

IV. PROPOSED SYSTEM

The system proposed consists of a soil moisture sensor, Dc driver motor, One channel relay module, Water pump and Power supply. The sensor is the interface for sensor data acquisition. The dc driver motor aid in the motion of the robot