Biotechnology and Applied Biochemistry / Early View

ORIGINAL ARTICLE

Identification of novel inhibitor against human phosphoethanolamine cytidylyltransferase from phytochemicals of *Citrus sinensis* peel extract by in vitro and in silico approach

Priscilla Pushparani Victor, Radhakrishnan Narayanaswamy, Seifedine Kadry, Baskar Gurunathan

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Abstract

Kidney stone is a major global menace that demands research on nonsurgical treatment involving biological compounds for the benefit of the patients. Among the biological extracts, citric acid is traditionally used to dissolve kidney stones. The current research focuses on evaluating the in vitro anti-urolithiatic activity and in silico study of ethanolic extract of *Citrus sinensis* (ECS) peel against c: phosphoethanolamine cytidylyltransferase (PCYT). The diuretic activity was evaluated using in vitro model against the synthesized calcium oxalate crystals and cytotoxicity study in Madin–Darby canine kidney cell lines. The phytochemicals were identified using gas chromatography–mass spectroscopy. The interaction mechanism was studied using computational docking studies to confirm their involvement in the dissolution of calcium oxalate kidney stones. Further molecular properties, drug-likeness, ADME (absorption, distribution, metabolism, and excretion), and toxicity analysis were followed for the ligands using software tools. 5-Hydroxymethylfurfural, 2,4-di-*tert*-butylphenol, 2-methoxy-4-vinylphenol, 6-octen-1-ol, 3,7-dimethyl-, acetate (citronellyl acetate), 3′,5′-dimethoxyacetophenone, and ethyl alpha-D-glucopyranoside showed good binding affinities against PCYT. Moreover, the docking studies showed the ligand 3′,5′-dimethoxyacetophenone has the highest binding energy (−6.68 kcal/mol) for human CTP. The present investigation concludes that these compounds of *C. sinensis* peel extract compounds are responsible as novel inhibitors against human CTP and extend their use in the pharmaceutical drug development process.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interests.

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Electrospun polycaprolactone/chitosan/pectin composite nanofibre: a novel wound dressing scaffold

CHITRAKALA KALIAPERUMAL[1] and ANITHA THULASISINGH[2,*]
[1]Biotechnology Department, St. Peter's College of Engineering and Technology, Chennai 600054, India
[2]Biotechnology Department, Rajalaskhmi Engineering College, Chennai 602105, India
*Author for correspondence (anitha.t@rajalakshmi.edu.in)

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Abstract. The primary objective of the investigation was to synthesize biocomposite nanofibres by electrospinning technique with different weight percentages of polycaprolactone (PCL) with chitosan (CS)–pectin (PEC) blend along with the characterization and antimicrobial activity of the novel electrospun nanofibres. This article for the first time describes the architecture of PCL–CS–PEC electrospun nanofibres along with its antimicrobial activity to the foremost of our information. The present work used CS–PEC, a biocompatible and non-toxic polysaccharide. Electrospinning was used to successfully produce CS–PEC nanofibres coupled with PCL polymer. The structural morphology of the PCL–CS–PEC nanofibres clearly displays the presence of nanofibres. The distinct peaks for the corresponding primary functional groups were clearly identified in the Fourier transform infrared characterization of PCL–CS–PEC nanofibres, as well. TGA confirmed that PCL–CS–PEC nanofibres have greater thermal stability. The antibacterial activity (agar disc diffusion method) of PCL–CS–PEC nanofibres was tested, and it was found to be effective against a wide range of microbial organisms, which aids in wound healing. Nanofibres of 19% PCL–CS–PEC demonstrated better antimicrobial activity against control than 15% and 17%, which might be attributable to concentration. Future studies will be conducted for the validation of the analysed nanofibres using *in vivo* investigations for the purpose of the wound dressing.

Keywords. Antimicrobial; chitosan; electrospinning; pectin; poly ε-caprolactone.

1. Introduction

Nanofibre membranes have gained popularity in recent decades owing to their exclusive features, like huge precise surface areas, great permeability, connected pores and extraordinary functionality. Electrospun composite nanofibres finds its application in tissue engineering [1–3], wound therapeutic [4–6] and delivery of medicine [7–9], apart from other uses magnetism [10], photonics [11], filtration [12], composites [13], shape memory [14], and lithium batteries [15]. It is well known that electrospun nanofibre's diameter has an impact on the biological individualities of non-woven textiles [16,17]. Fibre diameter is critical and important for cell characteristics (adhesion, proliferation and migration) on the scaffold, according to various research [18].

Polycaprolactone (PCL) nanofibres, commonly applied as aliphatic polyester electrospun nanofibres find their application in wider areas (tissue engineering, delivery of drugs and biosensor) due to their remarkable characteristics (mechanical and biodegradability) [19–21]. Biomedical applications of PCL have gained significance due to their relaxed disintegration proportion, harmless biodegradation elements and remarkable physicochemical capabilities for chemical modifications [22]. Electrospun PCL nanofibres are preferred for biomedical applications because of their intrinsic hydrophobicity (surface coating, plasma treatment, poly (dopamine) treatment, copolymer blending, alkali treatment and polymer grafting), resulting in the amplified product in biocompatibility and hydrophilicity [23]. Studies on PCL nanofibres have demonstrated changes in physical properties such as surface roughness to increase protein adsorption, cell adhesion and cell spreading, apart from the detection of single-stranded DNA (polypyrrole-coated) but at the same time, it has limited biological activity [24–26].

A rapidly expanding global population and parallel resource depletion have motivated further research into the usage of sustainable materials such as pectin (PEC) [27–29], lignin [30–32], cellulose [33] and chitosan (CS) in the postindustrial period [34]. CS is a naturally occurring cationic polysaccharide that is composed of glucosamine and *n*-acetylglucosamine residues [35,36]. It is an extensively known material for wound healing initiation process as they have precise biological activity (hemostatic, granulation, epithelization and biodegradability) [37,38], which can be processed into desired materials such as membranes, sponges, meshes and scaffolds. Studies have proved already that CS is biodegradable into non-toxic oligomers by a series of enzymes such as lysozymes, chitinase, and

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ORIGINAL PAPER

In-vitro and in-vivo assessment of Polycaprolactone-Chitosan-Pectin imbibed nanofiber potentials as a wound healing biomaterial

Chitrakala Kaliaperumal[1] · Anitha Thulasisingh[2]

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Abstract
The goal of the current study was to evaluate the wound healing potential of electrospun Polycaprolactone—Chitosan—Pectin (PCL-CS-PEC composite nanofiber under in vitro and in vivo conditions in order to determine their appropriateness for its use as wound dressings. 15%, 17%, and 19% PCL-CS-PEC scaffolds were fabricated individually and subjected to various investigations such as hemolysis, swelling, porosity, cell viability, and in-vivo wound healing activity. The collected parameters were subjected to statistical analysis using SPSS version 25 for statistical significance. The current study highlighted that the studied different concentrations of PCL-CS-PEC were hemocompatible since their hemolysis value was found to be less than 5% which is acceptable for any scaffolds or biomaterials universally. The 19% (w/v) PCL-CS-PEC-based scaffold demonstrated the maximum porosity of above 80% across the analyzed concentrations, making it the best choice for tissue engineering applications. The swelling index revealed that 19% of PCL-CS-PEC scaffolds are identified to be superior as it showed 301.7 ± 1.5%, 652.0 ± 2.0%, 902.3 ± 2.1%, and 1151 ± 1.5% for the different time interval of 6,12,18 and 24 h correspondingly than 15% and 17% PCL-CS-PEC nanofiber. Acute dermal toxicity analysis was found to be normal. Wound contraction rate was also found to be superior with 19% PCL-CS-PEC scaffolds than other analyzed concentrations. Our study employed the synthesis of nanofiber with PCL, with an add-on of CS and PEC because PCL has already proven to be wound healing material.

Keywords Chitosan · Hemolysis · Pectin · Poly-caprolactone · Wound healing

Introduction

The wound-healing process is highly regulated with four integrated and overlapping phases such as hemostasis, inflammation, proliferation, and Extracellular Matrix (ECM) remodeling or resolution which must occur in the proper sequence, at a specific time, and continue for a specific duration at optimal intensity. The interaction of various undesired local (oxygenation, infection, etc.) and systemic factors (age, gender, stress, ischemia, diabetes, medications, alcoholism &/smoking, nutrition, etc.) with any one of the above phases might result in impaired tissue repair [1]. Currently, the preferred strategy of wound dressing has been focused on preventing, eradicating infections, and quickening up recovery time through structural and functional skin regeneration [2]. An effective wound treatment dressing should be biocompatible along with mechanically flexible apart from maintaining a moist environment, possess permeability and exudate absorption which offer effective protection against bacterial infections and external stress, as well as be easily removable without any adhesion [3, 4]. Among the wound types, chronic wounds are well known to result in incomplete skin regeneration with compositions, outspreads impairment to the muscle, tendon, and bone, and as a consequence poses an economic burden to patients. In spite of multiple wound dressings currently available, there is indeed a critical necessity to enhance wound dressing quality and reliability. Electrospun fibers as multifunctional wound dressings are currently getting a lot of popularity in advanced wound treatment of research [5, 6].

Artificial extracellular nanofibrous scaffolds owing to their elevated surface-to-volume ratio promote cell adhesion,

✉ Anitha Thulasisingh
anitha.t@rajalakshmi.edu.in

[1] Biotechnology Department, St. Peter's College of Engineering and Technology, Avadi, Chennai 600054, TamilNadu, India

[2] Biotechnology Department, Rajalakshmi Engineering College, Chennai 602105, TamilNadu, India

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Automated food grain monitoring system for warehouse using IOT

Lydia J [a], Leones Sherwin Vimalraj S [b,*], Monisha R [b], Murugan R [c]

[a] Department of Electrical and Electronics Engineering, Easwari Engineering College, Chennai, 600089, India
[b] Department of Electronics and Communication Engineering. Panimalar Engineering College. Chennai. 600123. India
[c] Department of Electrical and Electronics Engineering, St.Peter's College of Engineering and Technology, Chennai, 600054, India

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ABSTRACT

One of the most significant sources of income in a developing nation like India is agriculture. Good food storage is essential for ensuring food security, which is impacted by both food loss and wastage. Therefore, if losses can be decreased, there will be more food available. To maintain good storage facilities and stop food losses in this project, an IoT-enabled monitoring system will be deployed in remote locations with restricted access. This proposed system tracks and controls warehouse variables like grain level, temperature, humidity, vibration, CO, motion and smoke, all of which have a big impact on grains and their weight. If any of the sensors in this parameter falls below or above the threshold value, the control action will be initiated. The data from the sensors is collected by the PIC microcontroller, which then sends it to the cloud via the Global System for Mobile Communications (GSM) module. Multiple sensor nodes will be deployed throughout the warehouse, and each of which provides information on the warehouse environment via Short Message Service (SMS) and mobile application.

1. Introduction

1.1. Background of study

In general, the agriculture industry's warehouse is regarded as the important sector for maintaining food security. In the past, there were antiquated ways for storing foods and grains that necessitated high physical labor, which was time-consuming and not efficient [1]. Once food and grains are gathered, they begin to deteriorate. Harvested yields must be stored in a location that ensures that the yield has access to high-quality, safe, and nutritious food. Food waste reduction is one of the most important aspects of improving food security. Foods are protected in a warehouse from loss and damage caused by extreme moisture, heat, wind, dust and cold. The primary goal is to keep the crop in good shape for the maximum period. Crop storage is one of the tasks of warehousing, and crop protection and risk management are critical factors. Furthermore, it guards against catastrophes such as theft or loss. According to a study, the greater the temperature, the lower the grain moisture should be in order to ensure excellent crop conservation. Food loses weight slowly as a result of the high temperature and eventually becomes wrinkled and rotting [2]. High moisture content causes problems since it fosters the growth of fungus and insects. Food grains could be lost due to a lack of suitable handling. As a result, a significant amount of money is lost. The main objective of this project is to develop an Internet of Things (IoT)-enabled Warehouse Traceability System that will offer real-time moisture, temperature, and other parameter data at a lower cost, enabling real-time monitoring. Additionally, it makes ranches easier to store and minimises the number of workers. The installation of hardware using software platforms has allowed for the study and validation of several elements, including smoke sensor, temperature sensor, LDR, humidity sensor, and fire sensor.

2. Survey of literature

1 Using this [3] monitoring system, the internal atmosphere of bagged grain stored in warehouses was evaluated. The device features eight on-board temperature and relative humidity sensors that are connected to a customised Arduino-based data collection system that logs the temperature, relative humidity, and time stamp to a microSD card. A total of four units were stationed at two warehouses in Nigeria from May 3 to September 9, 2019. Tede had 4000 bags of paddy rice, compared to 54 bags of maize in Ilorin. Varying portions of the warehouse had drastically different monthly average temperatures (p0.05). Measurements of temperature and relative humidity both exhibited

* Corresponding author.
E-mail addresses: lydia.jeec@gmail.com (L. J), sherwin_leo@yahoo.com (L.S.V. S), monishamadhu96@gmail.com (M. R), ramumurugan_r@rediffmail.com (M. R).

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Enhancement of natural fiber-reinforced plastics by polyester and seaweed waste fibers

T. Surulivel rajan [a], G. Vijayasekaran [b], M. Kamal [c], M. Gopi [d], S. Nanthakumar [e], R. Girimurugan [f,*]

[a] Department of Mechanical Engineering, Prince Shri Venkateshwara Padmavathy Engineering College, Chennai 600 127, Tamilnadu, India
[b] Department of Mechanical Engineering, Rathinam Technical Campus, Coimbatore 641 021, Tamilnadu, India
[c] Department of Mechanical Engineering, St.Peter's College of Engineering and Technology, Chennai 600 054, Tamilnadu, India
[d] Department of Mechanical Engineering, Velalar College of Engineering and Technology, Erode 638 012, Tamilnadu, India
[e] Department of Mechanical Engineering, PSG Institute of Technology and Applied Research, Coimbatore 641 062, Tamilnadu, India
[f] Department of Mechanical Engineering, Nandha College of Technology, Perundurai 638 052, Tamilnadu, India

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ABSTRACT

A bio-based composite material made from wastes from Posidonia oceanica (PO) and sugar cane polyester (SCPES) has been developed in the current work. DSC and TGA have been used to investigate the thermal deterioration of composites, and the results demonstrate an improvement. Using dynamic mechanical analysis (DMA) data, it has been found that the storage modulus (G) increases significantly as the Posidonia oceanica concentration rises. There has been a 60 % increase in stiffness in 40 % composites compared to unfilled materials in tensile test results. Flexural modulus of polyester, when unloaded is more than twice that of polyester, when fully loaded. In addition, Shore D hardness as well as Charpy impact test findings reveals that HDPE's intrinsic high impact energy absorption is intact in HDPE-PO composites, confirming this improvement in mechanical properties. As a result of the low water absorption rate (less than 8 %) and the long immersion time, these composites are assured to preserve their dimensional stability.

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1. Introduction

Mediterranean endemic seaweed Posidonia oceanica covers around ~ 60% of the seabed up to 40 m deep [1]. Furthermore, it covers an area of 2,800 km^2 [2] on Spain's coast in the Mediterranean Sea. In order to keep the erosive process from progressing, Posidonia oceanica performs an important function as a natural bottom barrier. More than 400 plant and 1,000 animal species can be found here [3]. Considering its role in protecting the maritime environment, coast and seabed conservation, and biodiversity, it should be protected by legal means. When it comes to European flora, for example, it is a protected species. The Posidonia oceanica meadows have been designated as a conservation area at the national level by countries like France and Spain [4–5]. Posidonia oceanica releases rhizomes seasonally, ranging from 500 to 2,000 g dry wt m^{-2} every year, dependent on weather circumstances like winds, storms, or maritime currents [6–8]. Posidonia oceanica wastes can be seen on beach in the shape of leaves and stalks, as well as typical fibrous balls throughout the fall and winter [9]. Since Posidonia oceanica wastes decompose and attract insects, beaches must be cleaned each year to remove them, which has a detrimental influence on tourism and the odours they produce [10–11]. The beach tourist industry is well-developed in Mediterranean countries. This comes at a significant financial cost [12]. Although Posidonia oceanica waste has traditionally been used as fodder for livestock and as a source of traditional medicine and glass packaging, these traditional uses result in an insignificant usage of this waste, which is plentiful and expensive to remove from beaches; this surplus, that can be originate in huge density, has anti-inflammatory properties, and it is difficult to remove from beaches [13–15]. Several writers have looked into the possibility of Posidonia oceanica being used as an environmentally friendly dye adsorbent or for the manufacturing of pulp and paper using lignocellulosic fibres in the recent years [16–17]. It's also possible to use these waste materials to make natural-fiber reinforced plastic

* Corresponding author.
E-mail address: dr.r.girimurugan@gmail.com (R. Girimurugan).

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Section A-Research paper

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Development and Analysis of an IoT-Enabled Smart Home Automation System for Enhanced Energy Efficiency

K Paul Joshua[1*], Somu K[2], Shivani Gupta[3], Arul N[4], B Shanthi Saravana[5], Prashant Agrawal[6], Gurkirpal Singh[7], D Suganthi[8]

[1]Department of Electronics and Communication Engineering, St. Peter's College of Engineering and Technology, Chennai, Tamil Nadu

[2]Department of Electronics and Communication Engineering, Maha Barathi Engineering College, Chinnasalem, Kallakurichi, Tamil Nadu

[3]School of Computer Science and Engineering, Vellore Institute of Technology, Chennai, Tamil Nadu

[4]Department of Mechatronics Engineering, Sona College of Technology, Salem, Tamil Nadu

[5]Department of Electrical and Electronics Engineering, Adhiparasakthi College of Engineering, Kalavai, Tamil Nadu

[6]Department of Computer Applications, KIET Group of Institutions, Delhi-NCR, Ghaziabad, Uttar Pradesh

[7]Department of Architect, Planner, Civil Engineer, Chandigarh-160014

[8]Department of Computer Science and Engineering, Rajalakshmi Institute of Technology, Chennai.

Corresponding Author: k.pauljoshua@gmail.com

Abstract

This research article presents the development and analysis of an IoT-enabled smart home automation system aimed at enhancing energy efficiency. The proposed system integrates various sensors, a Raspberry Pi as a central controller, and utilizes the Message Queuing Telemetry Transport (MQTT) protocol for efficient data transmission. The system architecture comprises multiple layers, including the device layer, broker layer, service layer, application layer, and cloud layer, each serving specific functions such as sensor data collection, communication, data management, and user interface. Real-time monitoring and control are facilitated through the application layer, which enables users to interact with the system using Node-Red Authentication. The system demonstrates fast response times of less than 15 ms, ensuring prompt and accurate actions in controlling home appliances. Moreover, the system effectively reduces energy consumption by optimizing the operation of appliances based on sensor inputs and user preferences. The proposed system showcases significant

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Original Article

Cascaded ANN Based Clustering and Optimized Routing Path Selection in Mobile Adhoc Networks

K. Paul Joshua[1], D. Srinivasa Rao[2], Govinda Patil[3], Mohit Kadwal[4], Jitendra Choudhary[5]

[1]*Department of Electronics and Communication Engineering, St. Peter's College of Engineering and Technology, Chennai, Tamil Nadu, India.*
[2]*Department of Computer Applications, Medi-Caps University, Indore, Madhya Pradesh.*
[3, 5]*Department of Computer Science, Medi-Caps University, India.*
[4]*Department of Computer Applications, Govindram Seksaria Institute of Management and Research (GSIMR), Indore, India.*

[1]*Corresponding Author : k.pauljoshua@gmail.com*

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Abstract *- Mobile Ad Hoc Networks (MANETs) permit wireless communication terminals that establish communication networks at any time and from any location because they do not require any established infrastructure. As a result, MANETs have a high application potential and have become a popular study area in recent years. However, MANETs continue to confront many hard issues that significantly impact their performance and use in real-world scenarios. The two problems involved in handling MANET topology are scalability and energy limitation. In this proposed system, clustering and routing mechanism are employed to resolve these issues. The novel clustering algorithm based on Cascaded Artificial Neural Network and routing path selection uses hydridized Ant Colony Optimization (ACO), and Salp Swarm Optimization (SSO) is proposed to support massive mobile ad hoc networks. A novel clustering technique assists in solving routing protocol issues and improving scalability. Clustering in MANETs offers a robust technique that optimally deploys resources while ensuring network architectural integrity. To examine the proposed system, MATLAB software is used to run simulations. According to the simulation results, the MANET network performance factors such as throughput, Packet delivery ratio, delay, and Average energy have improved.*

Keywords *- Cascaded Artificial Neural Network (CANN), Ant Colony Optimization (ACO) and Salp Swarm Optimization (SSO).*

1. Introduction

MANET is one of the confidential network topologies that enable a collection of wireless devices to communicate without any supporting facilities. Due to its quick expansion, this technique is frequently utilised in many sectors, including the industrial and education sectors. Moreover, it is also used in the field of military and civil. The nodes in MANET are portable, and the connections are made in a wireless topology. Nonetheless, there are several restrictions on the network, such as the nodes' transmission capabilities, limited energy, erratic node connections, bandwidth, and so many others. To boost the data transmission capacity of MANET and extend its lifespan, it is essential to choose an optimal routing and node for information processing and transmission. Commonly, MANET structures are classified into two categories, distributed and cluster network structures. Each node's obligations are fair in a distributed network structure, and the network layout can be flexibly altered based on node mobility. However, in a clustering network, choosing the cluster-head node is a critical issue as cluster-head nodes perform superior to regular nodes, which calls for more powerful processing power and greater energy. Therefore, choosing cluster-head nodes are crucial in a clustering network. Clustering can solve issues with routing protocols, enhance the calibre of data transmission, and increase network scalability [1], [2]. In a MANET, clusters offer a dependable way to link mobile nodes and effectively distribute resources, as well as a network-layered basis to ensure the integrity of the MANET structure. A MANET's primary characteristic is that it may be joined using a cluster-based hierarchy and the division of a more extensive network into smaller subgroups.

Clusters are the divisions of nodes into separate groupings. Data collection from one cluster's members and transmission to another cluster are the responsibility of a cluster leader. In network administration as well as control, cluster heads are crucial. By performing clustering, the essential three issues are solved (a) network expansion, (b) communication staying within the cluster such that other

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Original Article

CNN with BI-LSTM Electricity Theft Detection based on Modified Cheetah Optimization Algorithm in Deep Learning

G. P. Dimf[1], P. Kumar[2], K. Paul Joshua[3]

[1, 2]*Centre for Information Technology and Engineering, Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India.*
[3]*St. Peter's College of Engineering and Technology, Chennai,Tamil Nadu, India,*

[1]*Corresponding Author: dimfgp02@gmail.com*

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Abstract *- The theft of electricity is a serious problem that all energy distribution businesses face, and it is only becoming worse. Thus, there has been an upsurge in recent years in research into techniques for identifying electricity theft. During production, incorrect and illegal energy metre calibrations could cause losses in addition to technical ones. In this paper, a bi-LSTM and convolutional neural network (CNN) are combined to propose a system for detecting electricity theft. To identify the actual daily electricity use statistics for the dataset, a Long Short-Term Memory (LSTM) based deep learning algorithm has been developed. Data classification, feature extraction, and pre-processing are a few of the techniques that have been developed. In the pre-processing stage, we prepare the data for the training model using a data pre-processing technique before removing unnecessary information. In order to enhance performance, synthetic data is also produced during the pre-processing stage. The Modified Cheetah Optimization Technique (MCHOA)-based new feature selection approach is used to choose the appropriate features for a base classifier during the feature extraction phase of the model's analysis of the voltage, current, and electric energy collected. In the classification stage, the extracted data are classified using the suggested CNN with Bi-LSTM after the feature extraction stage is completed. Whether a customer steals electricity or not, the results obtained when some techniques are combined with CNN and Bi-LSTM attain high-quality values comparable to those obtained by other methods.*

Keywords *- CNN with Bi-LSTM, Cheetah optimization technique, Deep learning, Electricity theft detection.*

1. Introduction

A major issue for the Smart Grid right now is electricity theft. The high cost of acquiring energy and the limited supply of energy sources are issues that require attention. To advance economically and socially, a nation must be energy efficient. It is, therefore, necessary to develop a model to identify electricity theft. Finding unexpected usage or activity is the main objective of Singapore's Electricity Theft Detection (ETD). By examining usage trends and looking for anomalies, it is possible to identify electricity theft. SG has emerged as a crucial tool for energy use monitoring. Computers are utilised to monitor and manage energy usage in the SG power system substructure. Additionally, it has a highly sophisticated monitoring system that keeps track of a connected consumer's usage patterns. SG offers utilities and customers the ability to monitor.

Additionally, it provides control and energy usage prediction, both of which aid in meeting user needs. The primary goal of SG is to deliver consistent energy supplies with a minimum amount of energy loss. The loss of electricity is currently the main issue impacting both conventional power networks and SGs. According to statistics, transmission and distribution losses in electricity are rising, and these losses vary by country.

Electrical power is stolen from power grids, which is considered a criminal act. This nefarious behaviour can be carried out by hacking, manipulating, or passing the power metre. Due to the capacity to access readings from smart metres and information on power use from smart grids, data-driven approaches to detecting electricity theft have recently attracted a lot of attention because they can lead to anomalous electricity consumption patterns. Next, we show how data on energy thieves' irregular electricity use may be able to be detected by machine learning algorithms. Non-technical and Technical loss (TL) loss are the two basic classifications for electricity loss (NTL). Transformer loss

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Article

Heartbeat and Respiration Rate Prediction Using Combined Photoplethysmography and Ballisto Cardiography

Valarmathi Ramasamy[1,*], Dhandapani Samiappan[2] and R. Ramesh[3]

[1]Department of Electronics and Communication Engineering, St. Peter's College of Engineering, Chennai, 600054, Tamilnadu, India
[2]Department of Electronics and Communication Engineering, Saveetha Engineering College, Chennai, 602104, Tamilnadu, India
[3]Department of Electronics and Communication Engineering, Tagore Engineering College, Chennai, 600127, Tamilnadu, India
*Corresponding Author: Valarmathi Ramasamy. Email: nitish_mathi@yahoo.com
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Abstract: Owing to the recent trends in remote health monitoring, real-time applications for measuring Heartbeat Rate and Respiration Rate (HARR) from video signals are growing rapidly. Photo Plethysmo Graphy (PPG) is a method that is operated by estimating the infinitesimal change in color of the human face, rigid motion of facial skin and head parts, etc. Ballisto Cardiography (BCG) is a non-surgical tool for obtaining a graphical depiction of the human body's heartbeat by inducing repetitive movements found in the heart pulses. The resilience against motion artifacts induced by luminance fluctuation and the patient's mobility variation is the major difficulty faced while processing the real-time video signals. In this research, a video-based HARR measuring framework is proposed based on combined PPG and BCG. Here, the noise from the input video signals is removed by using an Adaptive Kalman filter (AKF). Three different algorithms are used for estimating the HARR from the noise-free input signals. Initially, the noise-free signals are subjected to Modified Adaptive Fourier Decomposition (MAFD) and then to Enhanced Hilbert vibration Decomposition (EHVD) and finally to Improved Variation mode Decomposition (IVMD) for attaining three various results of HARR. The obtained values are compared with each other and found that the EHVD is showing better results when compared with all the other methods.

Keywords: Heartbeat rate and respiration rate; photoplethysmography; Ballistocardiography; adaptive kalman filter

1 Introduction

With the rapid growth of remote medical monitoring, it is unsurprising that video-based heart rate monitoring is gaining popularity [1]. The signals for photoplethysmography and ballistocardiography are estimated in most cases using video images taken during the procedure. They must estimate either microscopic color changes or rigid head/face motion to function correctly [2]. Remote health monitoring is a relatively new concept in biomedical engineering. When physiological parameters could be measured using a digital camera, the development of remote sensing technology accelerated significantly [3]. The researchers extracted BCG signals by exploiting the uncontrollable head movement caused by increased

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(REVIEW ARTICLE)

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Calibration of employees through corporate social responsibility, environmental sustainability and ethics in IT sector

M. NISHANTHI and M. MOHAN KUMAR

Department of Management Studies, St. Peter's College of Engineering and Technology, Chennai- 54, India.

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Abstract

The aim of the study is to explore opportunity, preference and knowledge skills of service sector industry. It is a form of corporate self-regulation integrated into a business model. Academics in general management, applied psychology, corporate social performance, ethics and marketing have studied employee preference, with each fields taking different approaches and using different surveying techniques.

Keywords: Corporate social responsibility; Ethics; Environment sustainability; Technology; Career; Employees

1. Introduction

A company's sense of responsibility towards the community and environment) both ecological and social) in which it operates. Companies express this citizenship (1) through their waste and pollution reduction processes, (2) by contributing educational and social programs, and (3) by earning adequate returns on the employed resources. See also corporate citizenship.

Environmental sustainability involves making decisions and taking action that are in the interests of protecting the natural world, with particular emphasis on preserving the capability of the environment to support human life.

Ethics are about what is right and what is wrong. Business ethics (also corporate ethics) is a form of applied ethics or professional ethics that examines ethical principles and moral or ethical problems that arise in a business environment. It applies to all aspects of business conduct and is relevant to the conduct of individuals and entire organizations.

In sum our contribution is to use appropriate technology to provide graduates job preference calibration in a more holistic context than has heretofore been done. Thus both managers and researches should have a more considered appraisal of the importance of not only financial issues and job challenge, but also of CSR, environmental sustainability, and ethics.

Objectives

- To study and find out the career direction and career plan of employees
- To find out the factor which are linked or associated with career preferences
- To study and find out the influences and affecting factors for preferring ones career.

* Corresponding author: M. nishanthi

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Research Article

An experimental investigation of papaya oil methyl ester (POME) blends as potential alternate fuel for CI engine application

V. Dinesh Kumar, Vinayak B. Hemadri, M. Chinnapandian & K. M. Mrityunjayaswamy

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Abstract

When reliance on fossil fuels increased and costs escalated as a consequence of the precipitous decline in oil security and increased emissions, encourage green energy alternatives such as renewable fuels. The papaya seed, a second generation feedstock in this study, is used to produce papaya biodiesel by methanolysis. The properties of the test biodiesel and its mixtures are measured using a CI diesel engine at 1500 rpm.

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Esterified Papaya Oil and Flamboyant Oil as a Fuel on Single Cylinder Diesel Engine

Dinesh Kumar Venkatesan[1,*], Vinayak Bhimsen Hemadri[2], Chinnapandian Marimuthu[3], Khathanahalli Mathada Mrityunjayaswamy[4]

[1] Department of Mechanical Engineering, Dayananda Sagar University, Bangalore, India
[2] Department of Mechanical Engineering, School of Engineering, Dayananda Sagar University, Bangalore, India
[3] Department of Aeronautical Engineering, St. Peter's College of Engineering and Technology, Avadi, Chennai, Tamil Nadu, 600054, India
[4] Department of Aeronautical Engineering, AMC Engineering College, Bangalore, India

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ABSTRACT

The future demand, increase in the price and environmental issues of fossil fuels necessitated the search of renewable alternate called biodiesel which reduces the dependence of fossil fuel import from other countries. The present research investigation outlines a detailed vision on the performance parameters and the exhaust characteristics of the methyl esters of papaya oil (POME) and flamboyant oil (FOME) and its blends on water cooled diesel engine comprising single cylinder running at 1500 rpm. The collected seeds are processed and found to contain oil percentage of 37% and 35% and they are esterified in a reactor to enhance its properties. From the result it is concluded that at maximum load, the blend B25 of papaya biodiesel accounted in better brake thermal efficiency than that of diesel with relatively less exhaust emission, such that the specific fuel consumption, brake thermal efficiency, exhaust gas temperature, smoke density, carbon monoxide emission, hydrocarbon emission and nitrous oxide emission are 0.27 kg/kW-hr, 31.46 %, 318°C, 49.02 Hsu, 0.095 %, 55 ppm and 988 ppm respectively.

1. Introduction

A country's national resilience is governed by its energy security. Fossil fuels, that are owned by a limited few nations and are sold at variable values that contribute to climate change, provide the majority of the world's energy. Many countries employ renewable energy to minimize environmental destruction and overcome energy dependence [37]. In the year 2015 the Worlds Total Primary Energy Consumption was above 150,000,000 Gigawatt-hour (Gwh) and it is said to increase about 57% in the next 40 years [1]. Fossil oils in general are produced from sources such as buried animals belonging to ancient times and from micro-organisms and hence, they are said to be non-renewable sources. It requires millions of years for the formation of fossil fuel [2]. The need for the use of renewable resources has indeed been facilitated by concerns with energy security, increasing energy

* *Corresponding author.*
E-mail address: jv.dhinesh@yahoo.com

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