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Komarapalayam - 637303

Centre for Industrial Relation and Research Projects (IRRP)

Date 23.05.2022

FACULTY INCENTIVE FORM

| | | | | |
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| Staff Name | Dr. K. TAMILARASI | | | |
| Designation/Department | ASP/ECE | | | |
| Publication Category | SCI/SCIE/WoS | 1st Author (Rs.5,000) | 2nd Author (Rs.3,500) | 3rd Author (Rs.1,500) |
| | Scopus/AU-Annexure I | 1st Author (Rs.2,500) | 2nd Author (Rs.1,500) | 3rd Author (Rs.1,000) |
| | Patent-Published ✓ | Applicant (First) (Rs.5,000) | | Inventor (Rs.2,500) |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
| Research Grants | Upon Receiving Fund | PI / Co PI | 10% | |
| Program Fund | Greater than Rs.50,000/- | Coordinator | 5% | |
| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | |
| Participation | IITs/NITs/up to NIRF Top 100 colleges | Registration Fee - Actual (Max.Rs.5,000) | | |
| Additional details (Attach supporting documents) | Impact Factor | DOI / Patent No. / Scheme | | NIRF Ranking |
| | | 2022A1026586 | | |
| Approved amount in Rs. | R.S. 5000/- (Rupees Five thousand only) | | | |

K. Om 23/5/22
Investigator / Coordinator

K. Om 23/5/22
Dept. IRRP Coordinator

P. Karan 23/5/22
HOD

SUBMITTED TO THE PRINCIPAL

The details were checked and updated. The above mentioned incentive amount is recommended for approval.

K. Om 23/5/22
R&D Coordinator

P. Karan 23/5/22
IRRP Chief-Coordinator

P. Karan 23/5/22
Director - IRRP

P. Karan 23/5/22
Director (Admin.) / Principal

P. Karan 23/5/22
Executive Director

Amount Received
Already - NIL

K. Om 23/5/22

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241026586 A

(19) INDIA

(22) Date of filing of Application :08/05/2022

(43) Publication Date : 20/05/2022

(54) Title of the invention : PERFORMANCE AND ACCURACY ANALYSIS OF SIGNATURE VERIFICATION USING INTEGER WAVELET TRANSFORM AND BACK PROPAGATION NEURAL NETWORK

(51) International classification :G06K0009000000, G06N0003080000, G06T0001000000, G07C0009350000, H04L0009320000

(86) International Application No :PCT//
Filing Date :01/01/1900

(87) International Publication No :NA

(61) Patent of Addition to Application Number :NA
Filing Date :NA

(62) Divisional to Application Number :NA
Filing Date :NA

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3)M.Ramya

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5)A.Parimala

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7)Dr.V.Nivedita

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(57) Abstract :

The biometric system is an accurate, reliable and rugged tools with traditional identification techniques for various applications. A person uses signature verification to avoid automatic entries of forgers. The proposed handwritten signature verification system is initially pre-processed for the reduction of unwanted noise and the features like angle, pressure, input vector and sequence of impulses are extracted using Integer Wavelet Transform (IWT)finally the obtained values are evaluated with the proposed Back Propagation Neural Network (BPNN)classifier for the identify of genuine and forgery signature. The IWT with BPNN approach will produces the error ratio of the signature verification system at 0.0882 for SVC 2004 and 0.0921 for GPDS data set.

No. of Pages : 10 No. of Claims : 1

TAMILARASI K

Joint Holder :-
 EXCEL ENGINEERING COLLEGE SALEM MAIND RD NEW
 NH-47 PALLAKKAPALAYAM KOMARAPALAYAM
 NAMAKKAL
 TAMIL NADU-INDIA

Customer No :836990360
 Scheme :EASY ACCESS SALARY
 ACCOUNT
 Currency :INR

638183

Statement of Axis Account No :910010047131645 for the period (From : 01-06-2022 To : 10-06-2022)

| Tran Date | Chq No | Particulars | Debit | Credit | Balance | Init. Br |
|------------|--------|--|---------------|-----------------|-----------------|----------|
| | | OPENING BALANCE | | | 3019.24 | |
| 06-06-2022 | | Dr Card Charges ANNUAL 6522XXXXXXXXX1374 | 236.00 | | 2783.24 | 170 |
| 07-06-2022 | | SRI RENGASWAMY /Excel Bill Payment | | 5000.00 | 7783.24 | 170 |
| 09-06-2022 | | INB/894871355/RELIANCE JIO INFOCOM(BILLDESK)/NA | 666.00 | | 7117.24 | 170 |
| 09-06-2022 | | SRI RENGASWAMY /EXCEL SALARYMAY 22 | | 27657.00 | 34774.24 | 170 |
| | | TRANSACTION TOTAL | 902.00 | 32657.00 | | |
| | | CLOSING BALANCE | | | 34774.24 | |

Unless the constituent notifies the bank immediately of any discrepancy found by him/her in this statement of Account, it will be taken that he/she has found the account correct.

The closing balance as shown/displayed includes not only the credit balance and / or overdraft limit, but also funds which are under clearing. It excludes the amount marked as lien, if any. Hence the closing balance displayed may not be the effective available balance. For any further clarifications, please contact the Branch.

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- AUTOSWEEP - Transfer to linked fixed deposit
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- CWDR - Cash Withdrawal through ATM
- PUR - POS purchase
- TIP/ SCG - Surcharge on usage of debit card at pumps/railway ticket purchase or hotel tips
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- SETU - Seamless electronic fund transfer through AXIS Bank
- Int.pd - Interest paid to customer
- Int.Coll - Interest collected from the customer



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Komarapalayam - 637303

Centre for Industrial Relation and Research Projects (IRRP)

Date: 19/05/2022

FACULTY INCENTIVE FORM

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| Staff Name | V. ARUN ANTONY | | | |
| Designation/Department | AP / ECE | | | |
| Publication Category | SCI/SCIE/WoS | 1st Author (Rs.5,000) | 2nd Author (Rs.3,500) | 3rd Author (Rs.1,500) |
| | Scopus/AU-Annexure I | 1st Author (Rs.2,500) | 2nd Author (Rs.1,500) | 3rd Author (Rs.1,000) |
| | Patent-Published | Applicant (First) (Rs.5,000) / Inventor (Rs.2,500) | | |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
| Research Grants | Upon Receiving Fund | PI / Co PI | 10 % | — |
| Program Fund | Greater than Rs.50,000/- | Coordinator | 5 % | — |
| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | — |
| Participation | IITs/NITs/up to NIRF Top 100 colleges | Registration Fee - Actual (Max.Rs.5,000) | | — |
| Additional details (Attach supporting documents) | Impact Factor | DOI / Patent No./ Scheme | | NIRF Rank |
| | — | 202241013634 A | | — |
| Approved amount in Rs. | 2,500/- | | | |

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The details were checked and updated. The above mentioned incentive amount is recommended for approval.

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Already Amount
Received - 5000/-

V. Arun Antony
20/05/22

V. Arun Antony
20/05/22

V. Arun Antony
20/05/22

M-Passbook Account

ARUN ANTONY VARGHESE

3B-857 11330

Available Balance ₹ 168.56

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Last updated: 14 Jun 2022, 03:33:14 pm

Advance Search

| Date | Particulars | Withdrawals | Deposits | Balance |
|------------|---|----------------|----------|--------------|
| 07/06/2022 | SRI RENGASWAMY E/ AXISP00294010753 NEFT/ | | 2500.00 | ₹ 3212.86 CR |
| 06/06/2022 | IB-PMSBY PREMIUM COLLECTION A/C 9 | | 12.00 | ₹ 712.86 CR |
| 04/06/2022 | DATE -(MMDD) 0604 -(HHMMSS) 204224 | TIME 901.60 | | ₹ 700.86 CR |
| 04/06/2022 | UPI TRANSFER/ 015510750760 UPI | | 1000.00 | ₹ 1602.46 CR |



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Centre for Industrial Relation and Research Projects (IRRP)

Date: ...07/06/2022

FACULTY INCENTIVE FORM

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| Staff Name | M. Sambathkumar | | | |
| Designation / Department | AP / Mechanical Engineering | | | |
| Publication Category | SCI/SCIE/WoS | 1st Author (Rs.5,000) | 2nd Author (Rs.3,500) | 3rd Author (Rs.1,500) |
| | Scopus/AU-Annexure I | 1st Author (Rs.2,500) | 2nd Author (Rs.1,500) | 3rd Author (Rs.1,000) |
| | Patent-Published | Applicant (First) (Rs.5,000) | | Inventor (Rs.2,500) |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
| Research Grants | Upon Receiving Fund | PI / Co PI | 10 % | — |
| Program Fund | Greater than Rs.50,000/- | Coordinator | 5 % | — |
| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | — |
| Participation | IITs/NITs/up to NIRF Top 100 colleges | Registration Fee - Actual (Max.Rs.5,000) | | — |
| Additional details (Attach supporting documents) | Impact Factor | DOI / Patent No./ Scheme | | NIRF Ranking |
| | — | 202241029669 A | | — |
| Approved amount in Rs. | 2500/- | | | |

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The details were checked and updated. The above mentioned incentive amount is recommended for approval.

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R&D Coordinator

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IRRP Chief-Coordinator

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Director (Admin.) / Principal

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Executive Director

Amount Received
 Ahead - NIR

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May 20/22

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(21) Application No.202241029669 A

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(22) Date of filing of Application :24/05/2022

(43) Publication Date : 03/06/2022

(54) Title of the invention : MACHINE LEARNING AND IOT BASED APPROACH MONITORING AND PREDICTION OF AIR QUALITY POLLUTION

(51) International classification : G06N0020000000, G01N0020000000, G06N0003080000, G06K0009620000, G05B0013040000

(86) International Application No : PCT/ Filing Date : 01/01/1900

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(61) Patent of Addition to Application Number : NA Filing Date : NA

(52) Divisional to Application Number : NA Filing Date : NA

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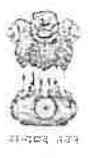
(57) Abstract
 Machine learning and IOT based approach monitoring and prediction of Air Quality Pollution is the proposed invention. The invention focuses on implementing the algorithm of machine learning to analyze the quality of air. The IOT unit is integrated to monitor the air pollution and its impact on the particular geographical location.

No. of Pages : 11 No. of Claims : 4



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
4



Office of the Controller General of Patents, Designs & Trade Marks
Department of Intellectual Property & Public Health
Ministry of Commerce & Industry,
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Application Details

| | |
|----------------------------------|---|
| APPLICATION NUMBER | 202241014639 |
| APPLICATION TYPE | ORDINARY APPLICATION |
| DATE OF FILING | 24/05/2022 |
| APPLICANT NAME | 1. Dr. SAJ VENU PRATHAP KATARI 2. SEEMA RANI 3. VIRENDRA KUMAR VERMA 4. DR. HARISHCHANDER ANANDARAM 5. DR SURENDRA KUMAR YADAV 6. DR. S. DARWIN PAUL EDISON 7. SHEIK ANIL AHMED 8. TRILOK SUTHAR 9. DR.P.ARULPRAKASH 10. SATAM SACHIN BAJIRAO 11. <u>M.SAMBATHKUMAR</u>  12. DR. N. VENKATACHALAM |
| TITLE OF INVENTION | MACHINE LEARNING AND IOT BASED APPROACH MONITORING AND PREDICTION OF AIR QUALITY POLLUTION |
| FIELD OF INVENTION | COMPUTER SCIENCE |
| E-MAIL (As Per Record) | sgowthami12@gmail.com |
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| E-MAIL (UPDATED Online) | |
| PRIORITY DATE | |
| REQUEST FOR EXAMINATION DATE | |
| PUBLICATION DATE (U/S 11A) | 03/06/2022 |



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Centre for Industrial Relation and Research Projects (IRRP)

Date : ...22/6/22...

FACULTY INCENTIVE FORM

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|--|---|---|------------------------------|-----------------------|
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| Designation / Department | Prof / CSE | | | |
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| | Scopus/AU-Annexure I | 1st Author (Rs.2,500) | 2nd Author (Rs.1,500) | 3rd Author (Rs.1,000) |
| | Patent-Published | Applicant (First) (Rs.5,000) | | Inventor (Rs.2,500) |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
| Research Grants | Upon Receiving Fund | PI / Co PI | 10 % | - |
| Program Fund | Greater than Rs.50,000/- | Coordinator | 5 % | - |
| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | - |
| Participation | IITs/NITs/up to NIRF Top 100 colleges | Registration Fee - Actual (Max.Rs.5,000) | | - |
| Additional details (Attach supporting documents) | Impact Factor | DOI / Patent No./ Scheme | | NIRF Ranking |
| | 0.6 | https://doi.org/10.1007/978-3-030-96305-7-8 | | |
| Approved amount in Rs. | Rs.1,500/- One Thousand Five hundred only | | | |

(Signature)
Investigator / Coordinator

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Dept. IRRP Coordinator

(Signature)
HOD

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The details were checked and updated. The above mentioned incentive amount is recommended for approval.

(Signature)
R&D Coordinator

Added in Google Scholar



(Signature)
IRRP Chief-Coordinator

(Signature)
Director-IRRP

(Signature)
Director (Admin)/Principal

(Signature)
Executive Director

Amount Received Already - NIL *(Signature)*

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[International Conference on Hybrid Intelligent Systems](#)
HIS 2021: [Hybrid Intelligent Systems](#) pp 76–87

An Optimized Data Replication Algorithm in Mobile Edge Computing Systems to Reduce Latency in Internet of Things

[N. Saranya](#), [K. Geetha](#) & [C. Rajan](#)

Conference paper | [First Online: 04 March 2022](#)

96 Accesses

Part of the [Lecture Notes in Networks and Systems](#) book series (LNNS, volume 420)

Abstract

The actual amount of data that was created applying the actuators, the sensors, and some other devices for the Internet of Things (IoT) has been showing a substantial level of increase in recent years. The data of IoT are handled using the cloud utilizing computing resources that are located in the data centers at a distance. As a result, the bandwidth of the network and the latency of communication have become major bottlenecks. The technology is known as Mobile Edge Computing (MEC) primarily seeks at



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14



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Document type: 1 of 1

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Article Notes in Networks and Systems - 2022, 12(1):1-10
An Optimized Data Replication Algorithm in Mobile Edge Computing Systems to Reduce Latency in Internet of Things

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DOI

ISSN

ISSN

An Optimized Data Replication Algorithm in Mobile Edge Computing Systems to Reduce Latency in Internet of Things

Resource allocation based on

offloading in mobile edge

Resource allocation based on

Abstract
The data of IoT are handled through the Internet of Things (IoT) and mobile edge computing (MEC) systems. The data of IoT are handled through the Internet of Things (IoT) and mobile edge computing (MEC) systems. The data of IoT are handled through the Internet of Things (IoT) and mobile edge computing (MEC) systems.

- 2, 15:15
- unflashed
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Komarapalayam - 637303

Centre for Industrial Relation and Research Projects (IRRP)

Date: 23/06/2022

FACULTY INCENTIVE FORM

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| Staff Name | Dr. N. TAMILSELVAN | | | |
| Designation / Department | Associate Professor / Mechanical Engineering | | | |
| Publication Category | SCI/SCIE/WoS | 1st Author (Rs.5,000) | 2nd Author (Rs.3,500) | 3rd Author (Rs.1,500) |
| | Scopus/AJ Annexure-I | 1st Author (Rs.2,500) | 2nd Author (Rs.1,500) | 3rd Author (Rs.1,000) |
| | Patent-Published | Applicant (First) (Rs.5,000) | | Inventor (Rs.2,500) |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
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| Additional details (Attach supporting documents) | Impact Factor | DOI / Patent No./ Scheme | | NIRF Ranking |
| | - | 20.18001-GSJ-2022-V94 .82.39154 | | |
| Approved amount in Rs. | Rs. 2,500/- | | | |

[Signature]
Investigator / Coordinator

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Dept. IRRP Coordinator

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SUBMITTED TO THE PRINCIPAL

The details were checked and updated. The above mentioned incentive amount is recommended for approval.

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R&D Coordinator
29/6/22

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IRRP Chief-Cordinator
29/6/22

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Director - IRRP

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Amount Received Ahead - NIL

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29/6

HEAT TRANSFER ENHANCEMENT IN SPIRAL TYPE HEAT EXCHANGER USING NON-NEWTONIAN NANOFUIDS

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ABSTRACT

Nanofluids with their improved thermal conductivity are held to be a promising coolant in heat transfer applications. Heat transfer by nanofluids gained incredible interest among researchers due to its enhanced thermal conductivity. The efficiency of nanofluids such as alumina dispersed in sodium alginate (SA) non-newtonian fluid in spiral type heat exchanger resulting in enhancement of turbulent heat transfer was investigated. The experiment was carried out for various flow rates and for various Reynolds number. Results show that heat transfer enhancement is promoted due to the presence of alumina but enhancement is minimized due to increase in concentration of Sodium Alginate (SA).

KEYWORDS - Nanofluids, non-Newtonian, heat transfer, turbulent flow, spiral type heat exchanger.

I. INTRODUCTION

Efficient energy transfer is vital to render processes economically viable. More efficient heat exchangers is essential to make this possible. Various engineering techniques have been proposed since 1950's to reduce the size and cost of the equipment, to enhance the heat transfer rate thus saving up energy. One of the innovative techniques recently proposed is the use of 'nanofluids'. The concept that thermal conductivity for solids is higher than liquids, it is expected that thermal performance will be enlarged significantly by addition of nanoparticles to heat transfer fluids. Such fluids containing well dispersed nanoparticles into the base fluid is termed as 'nanofluids'. Main reason for higher thermal conductivity of nanofluids is due to Brownian motion and better effective mixing. It should be noted that the size of nanoparticles plays an important role in the enhancement of thermal conductivity of nano fluid. Nanofluid is prepared by adding metals, metal oxides, carbon nanotubes or any other solid nanomaterials to a base fluid like water, ethylene glycol or engine oil. Solid nanoparticles can be directly produced in a base fluid through chemical techniques [1 -5].

Enhancement characteristics for various nanoparticles have been studied by various researchers. Amirhossein Zamzamian et al investigated the forced convective heat transfer coefficient in nanofluids of Al₂O₃/EG and CuO/EG in a double pipe and plate heat exchangers under turbulent flow and also calculated the forced convective heat transfer coefficient of the nanofluids using theoretical correlations in order to compare the results with the experimental data [6]. Kamali.R, and A.R. Binesh, Numerically studied the convective heat transfer of multi-wall carbon nanotube (MWCNT)-based nanofluids in a straight tube under constant wall heat flux condition [7]. Wen and Ding [8] have experimented Al₂O₃/water nanofluid heat transfer in laminar flow under constant wall heat flux and found an increase in nanofluid heat transfer coefficient with Reynolds number and nano articles concentration particularly at the entrance region. They expressed that thermal developing length for nanofluid was greater than pure water. The reason for heat transfer enhancement for nanofluids is the decreased thermal boundary layer thickness due to non-uniform distribution of thermal conductivity and viscosity resulting from Brownian motion of nanoparticles. Palm et al. [9] numerically investigated the laminar flow heat transfer of Al₂O₃/ethylene glycol (EG) and Al₂O₃/water nanofluids in a radial flow system and reported

Heat Transfer Enhancement in Spiral Type Heat Exchanger Using Non-Newtonian NanoFluids

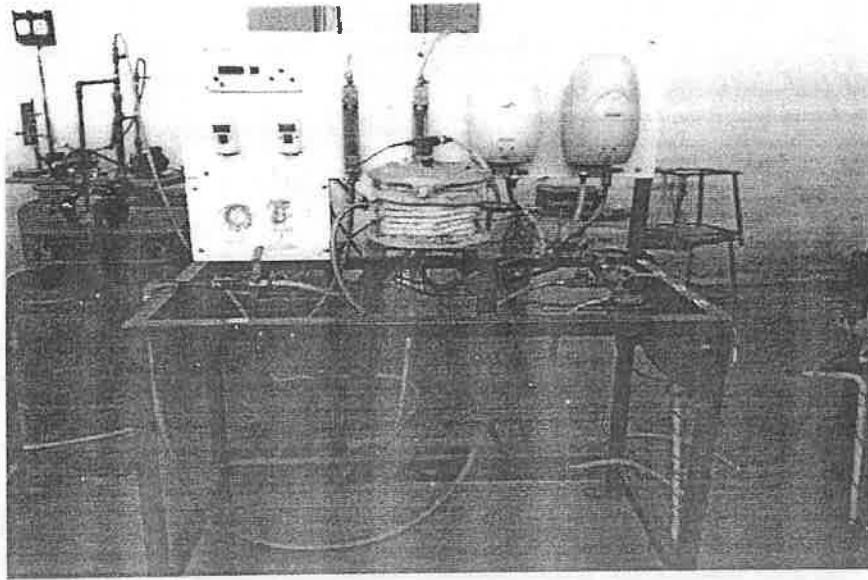


Fig. 1 : Spiral Type Heat Exchanger Experimental Set up

Cold fluid (Sodium Alginate) is pumped at a inlet temperature of $31 \pm 3^\circ\text{C}$ and hot fluid (Water) is pumped at a inlet temperature of $60 \pm 3^\circ\text{C}$. Constant hot water flow rate of 4LPM is maintained throughout the experiment. Flow rate of cold fluid is varied from 2 LPM to 8 LPM and corresponding inlet and outlet temperatures are noted. Times taken for filling definite volume are noted at the exit to reduce uncertainty in flow measurements. The system is allowed to reach steady state condition before the temperatures are noted. For each test fluids, the experiments are repeated for few readings to minimize the uncertainty in measured experimental parameters and reproducibility were found to be within $\pm 2\%$.

V. DATA ANALYSIS

Thermo-physical properties of test fluids are assumed to be constant along the length of the spiral and evaluated at the average temperature. Physical properties of non-newtonian fluids such as density, thermal conductivity and specific heat were taken to be same as that of water, as taken by Rajasekharan et. al.[14]

All nanofluids used exhibit shear thinning behavior. Physical Properties of nanofluids at average bulk temperatures are calculated from base fluids and nanofluids properties by following correlation [15]

$$\rho_{nf} = \phi \rho_p + (1 - \phi) \rho_{bf}$$

$$(\rho C_p)_{nf} = \phi (\rho C_p)_p + (1 - \phi) (\rho C_p)_{bf}$$

Their base fluids follow power law model. The base fluids and all nanofluids employed in this study exhibiting the power-law rheological behavior expressed as

$$\tau = K \dot{\gamma}^n$$

For purely non-newtonian fluid (pseudoplastic), dimensionless numbers are defined as follows:

$$\text{Re} = \frac{\rho u^{2-n} D^n}{K}$$



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Exploration of mechanical properties of jute fiber and copper wire reinforced hybrid polymer composites

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ABSTRACT

Fibers like coir, jute, sisal and hemp are used for thousands of years, but fiber-resin composites have only recently been investigated. The superior sustainability properties of these materials when compared to traditional building materials are a major motivator for such applications. Nonetheless, there has been a huge increase in interest in composite materials reinforced with natural fibers in recent years. Natural fibers are a better alternative to glass or carbon fiber reinforced composites due to their ease of fabrication and low cost of raw materials, as well as the possibility of recycling, decomposability, and safe production and processing. Natural composites usage as construction materials is limited, however, due to their poorer mechanical qualities. While there is a lot of information available about natural fiber composites materials, few studies have looked into their structural applications. The main aim of this work to study the mechanical performance of jute fiber and copper wire reinforced composites in polyester matrix. The mechanical characteristics of composite specimens were investigated using a hand layup approach and various tests such as compression, impact, flexural, and tensile. According to the findings, jute fiber with 5% copper wire reinforced polyester composites produce 15.38 % high compression strength, 66.67 % better flexural strength and 34.50 % higher tensile strength than pure jute fiber composites. The impact test values of jute with copper is 0.7 J where as that of jute without copper is 0.4 J.

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1. Introduction

A composite is a material with superior properties obtained by combining two or more dissimilar materials. Fiber-reinforced composites are widely used in a variety of fields due to their superior properties, including defence, aerospace, engineering applications, sports goods, and so on.

The characteristics of composites in polymer matrix were investigated by Asheesh Kumar et al [1]. Composites with natural fiber reinforcement are gaining importance than synthetic fiber reinforcements due to their environmental friendliness, biodegradability, and sustainability. Milanese et al [2] examined the mechanical performance and the tensile behaviour of four composites in their work. The influence of moisture content on sisal fiber physico-mechanical characteristics was examined. They discovered that the tensile strength at yield of castor oil-based polyurethane is 2.5 MPa, with a corresponding elongation of 29 %, indicating ductile behaviour. Madhavi et al [3] focused on the mechanical prop-

erties of polyester composites reinforced with coconut fibers. Chemical treatment of coconut fibers modified the surface of the fiber and they are used in polyester matrix. A 1 percent wt/v sodium hydroxide solution was applied to coconut fibers for 1 h. The properties of hybrid glass fiber-sisal/jute reinforced epoxy composites were examined by M. Ramesh et al [4]. In a range of engineering and technology disciplines, natural fibers such as sisal/jute are increasingly being employed in glass fiber composites. Rana et al. [5] demonstrated that using a compatibilizer improves the mechanical properties of jute fibers. At 60 percent by weight of fiber load, the compatibilizer increased flexural strength to 100 percent, tensile strength to 120 percent, and impact strength to 175 percent. The mechanical characteristics of jute-reinforced fibers and glass-reinforced fibers are compared by Shah and Lakkad et al [6]. The findings reveal that adding jute fibers as reinforcement to the resin matrix improves mechanical characteristics significantly. Vivek Mishra et al examined the Physico-Mechanical of Bi-Directional Jute Polymer Composites [7]. There has been an increase in interest in employing natural fibers as polymer reinforcement in recent years. M.S. Sreekantaiah et al [8] investigated the properties of oil palm fibers

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Exploration of mechanical properties of jute fiber and copper wire reinforced hybrid polymer composites

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Abstract

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Keywords

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Materials Today: Proceedings

Available online 23 May 2022

In Press, Corrected Proof

Experimental analysis on evaporative emission from ceramic coated fuel tank

B. Saravanan ¹ & N. Natarajan ², S. Deepankumar ³, S. Dhayaneethi ⁴, S.M. Praveen ⁵, S. Neha ⁶

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<https://doi.org/10.1016/j.matpr.2022.05.214>

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Abstract

Variations in the ambient temperature cause a type of emission called Diurnal emissions. When the fuel in a vehicle fuel tank vaporizes, they give rise to these emissions. To control the fuel evaporation at the most possible level, this research work deals with the coating of the fuel tank at its exterior with low heat-conducting ceramic materials which in turn lead to controlled evaporation due to external heat sources. Modeling of the coated fuel tank is done using modeling software, SOLIDWORKS, and the model is subjected to thermal analysis so as to choose a better material for the ceramic coating. Hence, the research work aims in determining the effects of ceramic coating over the fuel tank and compare the emission test results such as permeability test and break out fuel test with conventional fuel tank.

Keywords

Evaporative emission; Ceramic coating; Transient thermal analysis; Fuel evaporation

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Last 10 Transaction Details

(845639252)

Account Number 912010043732367

Transactions List

| Date | Description | Transactional Amount |
|-------------|--|----------------------|
| 09 Sep 2022 | ATM-CASH- AXIS/TWAW1450/809/090922/SAKTHI | - Rs.1000.00 |
| 09 Sep 2022 | ATM-CASH- AXIS/TWAW1450/808/090922/SAKTHI | - Rs.2000.00 |
| 09 Sep 2022 | POS/BHAVANI KOMARAPAL/ERODE/090922/08:50 | - Rs.300.00 |
| 07 Sep 2022 | ATM-CASH- AXIS/SWCW17009/6782/070922/NAMA | - Rs.500.00 |
| 07 Sep 2022 | ATM-CASH- AXIS/SWCW17009/6781/070922/NAMA | - Rs.3000.00 |
| 07 Sep 2022 | INB/NEFT/AXIR222502134663/N NATARA/STATE | - Rs.37000.00 |
| 07 Sep 2022 | Dr Card Charges ANNUAL 5346XXXXXXXX1580 | - Rs.354.00 |
| 06 Sep 2022 | INB/905937640/ELECTRICITY BOARD OF TAMIL | - Rs.627.90 |
| 05 Sep 2022 | SRI RENGASWAMY /Excel Salary Aug 22 | + Rs.75862.00 |
| 05 Sep 2022 | SRI RENGASWAMY /EXCEL PAYMENT | + Rs.1500.00 |

M RAMESH

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Customer No :849744754
 Scheme :LIBERTY SALARY ACCOUNT
 Currency :INR

Statement of Axis Account No :913010034960220 for the period (From : 16-08-2022 To : 20-08-2022)

| Tran Date | Chq No | Particulars | Debit | Credit | Balance | Init. Br |
|------------|--------|--|--------------|----------------|-----------------|----------|
| | | OPENING BALANCE | | | 11633.30 | |
| 16-08-2022 | | NEFT/IOBAN2228199121/CHIEF CON/INDIAN OV//REF/ | | 2000.00 | 13633.30 | 248 |
| 16-08-2022 | | SRI RENGASWAMY /Excel Tnsct payemnt | | 7500.00 | 21133.30 | 170 |
| 18-08-2022 | | ATM-CASH/MUNIAPPAN KOVIL/Kumarapalayam/180822 | 500.00 | | 20633.30 | 170 |
| 18-08-2022 | | IMPS/P2A/223020524850/RAMACH/INDIANO/ X036529/ | 3005.90 | | 14621.50 | 170 |
| 18-08-2022 | | INB/903765263/INDIAN INSTITUTE OF TECHNOLOGY(BILL | 1117.70 | | 13504.30 | 170 |
| 18-08-2022 | | INB/903767539/INDIAN INSTITUTE OF TECHNOLOGY(BILL | 1117.70 | | 12386.60 | 170 |
| 18-08-2022 | | IMPS/P2A/223021958809/ISMAIL/KARNATA/ X953101/ | 4505.90 | | 7880.70 | 170 |
| 20-08-2022 | | UPI/P2A/223246881588/GAYATHRI /Bank of B/marriag | 3000.00 | | 4880.70 | 170 |
| | | TRANSACTION TOTAL | 13247 | 9500.00 | | |
| | | CLOSING BALANCE | | | 4880.70 | |

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- VMT - Visa Money Transfer through ATM



Payment Complete

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IS ismail
07425000000000000000

AMOUNT
₹ 4,500.00

BRANCH

BELLARY

IFSC

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913010034960220

Payment Details

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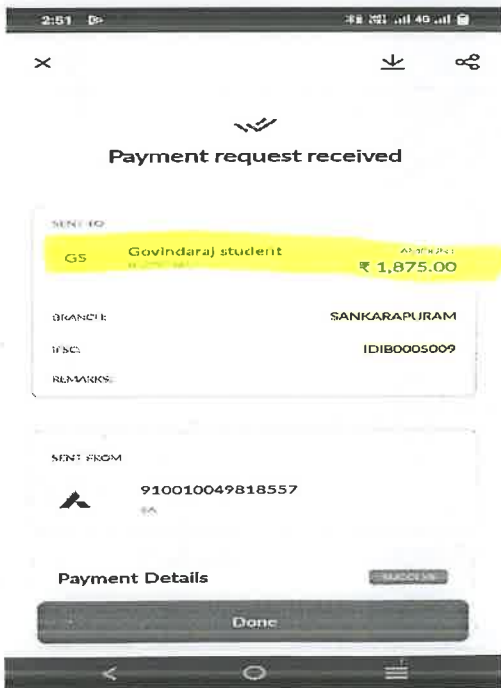
Customer No :837194766

Scheme :PRIME SALARY ACCOUNT

Currency :INR

Statement of Axis Account No :910010049818557 for the period (From : 15-08-2022 To : 24-08-2022)

| Tran Date | Chq No | Particulars | Debit | Credit | Balance | Init. Br |
|------------|--------|--|---------|---------|-----------------|----------|
| | | OPENING BALANCE | | | 34426.09 | |
| 15-08-2022 | | UPI/P2M/222777274630/Chatraram/Paytm Pay/Slepers | 1050.00 | | 33376.09 | 170 |
| 15-08-2022 | | UPI/P2A/222702746326/P. AUGUS/State Ban/Belt | 550.00 | | 32826.09 | 170 |
| 15-08-2022 | | UPI/P2M/222758145141/ANTHONYSA/Paytm Pay/Lunch b | 400.00 | | 32426.09 | 170 |
| 15-08-2022 | | UPI/P2M/222751581356/ANTHONYSA/Paytm Pay/Travel | 700.00 | | 31726.09 | 170 |
| 15-08-2022 | | UPI/P2M/222765717899/RAVINDRAN/Paytm Pay/Juice | 210.00 | | 31516.09 | 170 |
| 15-08-2022 | | UPI/P2M/222711182797/V ANAND/Paytm Pay/Lunch | 146.00 | | 31370.09 | 170 |
| 15-08-2022 | | ATM-CASH/RN PUDUR NEW/Rn Pudur New/150822 | 1000.00 | | 30370.09 | 170 |
| 15-08-2022 | | UPI/P2A/222725204732/SINIVASAN/State Ban/Tea | 33.00 | | 30337.09 | 170 |
| 16-08-2022 | | UPI/P2M/222802528352/PhonePe/Axis Bank/Payment | 481.00 | | 29856.09 | 170 |
| 16-08-2022 | | ATM-CASH-AXIS/LWCW17024/5519/160822/NAMAKKAL | 3800.00 | | 26056.09 | 170 |
| 16-08-2022 | | SRI RENGASWAMY /Excel Tnscst payemnt | | 7500.00 | 33556.09 | 170 |
| 17-08-2022 | | UPI/P2A/222970444128/Sathyadev/State Ban/UPI | 8000.00 | | 25556.09 | 170 |
| 17-08-2022 | | UPI/P2A/222955584308/SELVARAJU/Tamilnad /Soup | 80.00 | | 25476.09 | 170 |
| 17-08-2022 | | UPI/P2A/222984763482/SEKH SAJ/State Ban/Briyani | 180.00 | | 25296.09 | 170 |
| 18-08-2022 | | ATM-CASH/KON THEATRE/Kumarapalayam/180822 | 1000.00 | | 24296.09 | 170 |
| 21-08-2022 | | POS/K C P AGENCIES/ERODE/210822/08:24 | 450.00 | | 23846.09 | 170 |
| 21-08-2022 | | ATM-CASH-AXIS/TWCW14493/8555/210822/ERODE | 1000.00 | | 22846.09 | 170 |
| 21-08-2022 | | ATM-CASH-AXIS/TWCW14493/8557/210822/ERODE | 500.00 | | 22346.09 | 170 |
| 21-08-2022 | | UPI/P2M/223325862140/SAKTHE KR/Paytm Pay/Wife sa | 1300.00 | | 21046.09 | 170 |
| 21-08-2022 | | ATM-CASH/RN PUDUR NEW/Rn Pudur New/210822 | 500.00 | | 20546.09 | 170 |
| 21-08-2022 | | ATM-CASH/R N PUDUR ERODE/Erode/210822 | 500.00 | | 20046.09 | 170 |
| 22-08-2022 | | NEFT/MB/AXMB222345036804/JAGAN R/BANK OF/ | 1.00 | | 20045.09 | 170 |
| 22-08-2022 | | NEFT/MB/AXMB222345116070/JAGAN R/BANK OF/ | 1875.00 | | 18170.09 | 170 |
| 22-08-2022 | | NEFT/MB/AXMB222345119834/GOWTHAM /INDIAN / | 1875.00 | | 16295.09 | 170 |
| 22-08-2022 | | NEFT/MB/AXMB222345119285/GOVINDAR/INDIAN / | 1875.00 | | 14420.09 | 170 |
| 23-08-2022 | | PTLSCG/21.08.22/K C P AGENCIES | 2.12 | | 14417.97 | 100 |
| 23-08-2022 | | NEFT/MB/AXMB222355656866/DINESH K/UNION B/ | 1875.00 | | 12542.97 | 170 |





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| Staff Name | Dr. M. P. MURUGESAN | | | |
| Designation / Department | ASSOCIATE PROFESSOR / FOOD TECHNOLOGY | | | |
| Publication Category | SCI/SCIE/WoS ✓ | 1st Author (Rs.5,000) | 2nd Author (Rs.3,500) | 3rd Author (Rs.1,500) |
| | Scopus/AU-Annexure I | 1st Author (Rs.2,500) | 2nd Author (Rs.1,500) | 3rd Author (Rs.1,000) |
| | Patent-Published | Applicant (First) (Rs.5,000) | | Inventor (Rs.2,500) |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
| Research Grants | Upon Receiving Fund | PI / Co PI | 10 % | |
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| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | |
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| Additional details (Attach supporting documents) | Impact Factor | DOI / Patent No. / Scheme | | NIRF Ranking |
| | 3.38 | 10.1156/2022/483313 | | |
| Approved amount in Rs. | 5000/- | | | |

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[Signature]
Dept. IRRP Coordinator

[Signature]
HOD

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The details were checked and updated. The above mentioned incentive amount is recommended for approval.

[Signature] 21/11/22
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Research Article

Treatment of Municipal Wastewater in a Fixed Aerated Bed: Use of Natural Fibrous Materials

Murugesan Manikkampatti Palanisamy¹,² Minar Mohamed Lebbai,²
and M. Venkata Ratnam³

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²Department of Chemical Engineering, Erode Sengunthar Engineering College, Erode, Tamil Nadu, India

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The municipal wastewater may be treated using a number of different types of fixed beds that have a larger surface area. Since the fibrous materials have such a large specific surface area, they are frequently considered to be the best option for greater microbiological support and treatment efficacy. In this research, natural fibre materials such as coir fibre and areca husk were investigated for their potential to function as fixed aerated beds for the treatment of municipal wastewater. During the experiment, variations in the chemical oxygen demand (COD), biological oxygen demand (BOD), total dissolved solids (TDS), and total suspended solids (TSS) of the effluent were used to determine how well the aerated fixed bed work in treating the wastewater. The most efficient operating parameters for the successful treatment of wastewater were determined to be a contact period of 72 hrs, a filter medium depth of 5 cm, and a packing density of 10 kg/m³. The reductions in BOD, COD, TDS, and TSS for coir fibre are 55%, 58.8%, 57.8%, and 51.89%, respectively, whereas the reductions for areca husk are 38.3%, 37.78%, 31.76%, and 30.56%, respectively. In the course of this experiment, the coir fibre was discovered to be marginally more effective in comparison to the areca husk.

1. Introduction

Water is an essential component of the planet and is one of its most vital substances. Water is essential to the survival of all living things, including plants and animals. The availability of clean water for drinking and several other uses is a major concern for people all around the world. Many people believe that the growth of modern industry and the destruction of the natural environment are two sides of the same coin, which highlights the need of having stricter rules for the management of pollutants [1, 2]. The quality of the water is being put in jeopardy by a number of different variables, some of which include recurrent droughts, seasonal and geographical changes in precipitation, excessive use of groundwater, and an absence of uniform distribution of groundwater [2]. The water that is used for drinking must

not include any microbes or contaminants. Monitoring the quality of the water is essential in order to maintain a sanitary and risk-free atmosphere [3, 4]. Wastewater is a word that is used to represent liquid waste that is disposed of by a variety of sources, including households, companies, industries, and agriculture, and which frequently contains toxins as a result of the mixing of wastewater from multiple sources [5]. Wastewater is a word that is used to represent liquid waste that is disposed of by a variety of sources, including households, companies, industries, and agriculture.

It is imperative that the wastewater collected from a variety of sources be thoroughly cleaned and disinfected before being released back into the environment. A problematic situation will develop in the event that adequate plans for the collection, treatment, and disposal of all of the

SREENIVASARAJA

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 Currency :INR

Statement of Axis Account No :911010000462398 for the period (From : 27-08-2022 To : 10-09-2022)

| Tran Date | Chq No | Particulars | Debit | Credit | Balance | Init. Br |
|------------|--------|---|----------|----------|-----------------|----------|
| | | OPENING BALANCE | | | 87642.84 | |
| 27-08-2022 | | POS/SRI M R S PETROL/TIRUCHENGODE/270822/12:45 | 500.00 | | 87142.84 | 170 |
| 27-08-2022 | | INB/NEFT/AXIR222397348189/HARIHARA/CANARA /TNSCST | 1875.00 | | 85267.84 | 170 |
| 27-08-2022 | | INB/NEFT/AXIR222397348620/ARJUN PR/CANARA /TNSCST | 1875.00 | | 83392.84 | 170 |
| 27-08-2022 | | INB/NEFT/AXIR222397348424/ASHIR AZ/STATE B/TNSCST | 1875.00 | | 81517.84 | 170 |
| 27-08-2022 | | INB/NEFT/AXIR222397348823/AJITH M/CANARA /TNSCST | 1875.00 | | 79642.84 | 170 |
| 28-08-2022 | | UPI/P2M/224023854432/PhonePe/Axis Bank/Payment | 255.00 | | 79387.84 | 170 |
| 28-08-2022 | | UPI/P2A/224006497665/Bank Acco/EQUITAS S/Payment | 400.00 | | 78987.84 | 170 |
| 29-08-2022 | | POS/AARTHI AGENCIES I/SALEM/280822/23:18 | 500.00 | | 78487.84 | 170 |
| 29-08-2022 | | POS/BALAJI TRADERS/SALEM/290822/08:29 | 500.00 | | 77987.84 | 170 |
| 30-08-2022 | | UPI/P2A/224255247487/Bank Acco/State Ban/Payment | 1750.00 | | 76237.84 | 170 |
| 30-08-2022 | | UPI/P2M/224234303349/Bharti Ai/Yes Bank /Payment | 267.00 | | 75970.84 | 170 |
| 30-08-2022 | | UPI/P2M/224279672639/Aruljothi/Paytm Pay/Payment | 1300.00 | | 74670.84 | 170 |
| 30-08-2022 | | UPI/P2M/224225181827/CAUVERY S/HDFC BANK/Payment | 92.00 | | 74578.84 | 170 |
| 31-08-2022 | | POS/ANANYA FUELS/NAMAKKAL/310822/12:52 | 150.00 | | 74428.84 | 170 |
| 01-09-2022 | | UPI/P2A/224428753804/Mr NAGARA/Indian Ba/Payment | | 10000.00 | 84428.84 | 170 |
| 01-09-2022 | | UPI/P2M/224441768414/NANDHAKUM/Paytm Pay/Payment | 280.00 | | 84148.84 | 170 |
| 02-09-2022 | | UPI/P2M/224537275656/SRI MRS P/Yes Bank /Payment | 100.00 | | 84048.84 | 170 |
| 03-09-2022 | | UPI/P2M/224606557227/SRI MRS P/Yes Bank /Payment | 100.00 | | 83948.84 | 170 |
| 03-09-2022 | | UPI/P2M/224645482497/Aruljothi/Paytm Pay/Payment | 307.00 | | 83641.84 | 170 |
| 03-09-2022 | | UPI/P2A/224641756020/MEENASHI /Indian Ov/Payment | 500.00 | | 83141.84 | 170 |
| 04-09-2022 | | UPI/P2A/224772394859/Bank Acco/Karur Vys/Payment | 15000.00 | | 68141.84 | 170 |
| 04-09-2022 | | UPI/P2M/224718495786/Flipkart /Axis Bank/Payment | 299.00 | | 67842.84 | 170 |
| 05-09-2022 | | UPI/P2A/224881196925/SANJAY MU/Axis Bank/UPI | | 7500.00 | 75342.84 | 170 |
| 05-09-2022 | | UPI/P2M/224803140760/SRI MRS P/Yes Bank /Payment | 100.00 | | 75242.84 | 170 |
| 05-09-2022 | | SRI RENGASWAMY /Excel Salary Aug 22 | | 26025.00 | 101267.84 | 170 |
| 07-09-2022 | | UPI/P2M/225039229173/SRI MRS P/Yes Bank /Payment | 100.00 | | 101167.84 | 170 |



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Centre for Industrial Relation and Research Projects (IRRP)

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| | | | | |
|---|--|--|---------------------------------|-----------------------|
| Staff Name | Dr. S. BALAKRISHNAN | | | |
| Designation/Department | Assistant Professor / Mechanical / EEC | | | |
| Publication Category | SCI/SCIE/WoS | 1st Author (Rs.5,000) ✓ | 2nd Author (Rs.3,500) | 3rd Author (Rs.1,500) |
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| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
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| Program Fund | Greater than Rs.50,000/- | Coordinator | 5 % | — |
| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | — |
| Participation | IITs/NITs/up to NIRF Top 100 colleges | Registration Fee - Actual (Max.Rs.5,000) | | — |
| Additional details (Attach supporting documents) | Impact Factor | DOI / Patent No. / Scheme | | NIRF Ranking |
| | 2.028 | doi.org/10.1016/j.ijpvp.2021.104526 | | |
| Approved amount in Rs. | Rs. 5000/- [Rupees five thousand only] | | | |

Investigator / Coordinator

Dept. IRRP Coordinator

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The details were checked and updated. The above mentioned incentive amount is recommended for approval.

R&D Coordinator

IRRP Chief-Coordinator

Director - IRRP

Director (Admin.) / Principal

Executive Director

May be approved
18/9/21
issue cheque/DD

15/09/21



Development of a new improved structural integrity assessment correlation for throughwall axially cracked 90° shape imperfect pipe bends under in-plane opening bending moment

S. Balakrishnan^{a,*}, AR. Veerappan^b, S. Shanmugam^b

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^b Department of Mechanical Engineering, National Institute of Technology, Tiruchirappalli, 620 015, Tamil Nadu, India

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Keywords:

Shape imperfection
Ovality
Throughwall axial crack
Plastic collapse load
In-plane opening bending

ABSTRACT

In the present work, a systematic and detailed investigation on the plastic collapse load of 90° structurally defected pipe bends under in-plane opening bending was performed using three-dimensional finite element (FE) analyses. The analysis considers the material behavior as elastic-perfectly plastic (EPP) with a large strain formulation option. The structural defects in the pipe bend models included were ovality at mid-portion and throughwall axial crack (TAC) at the crown portion. Ovality varied from 0 to 20 % with 5 % increment at each step while the normalized throughwall axial crack (TAC) parameter length a/D from 0 to 1 with an increment of 0.2 in each step. As per the recommendation of clause NB-3213.25 in Section III of ASME B&PV code, Twice-elastic slope (TES) technique was extensively used to determine the plastic collapse moment (PCM) for all simulated pipe bend models from their corresponding reaction moment versus angular rotation curve. The analysis illustrated that both ovality and throughwall axial crack (TAC) significantly affected PCM load of pipe bends and when combined, the effect was almost double. In pipe bend models with thin walls and short bend radius, both ovality and TAC were found to be more vulnerable and the effect decreased with an increase in bend radius and thickness. The experimental results for pipe bend's plastic collapse moment available in open literature were used to validate the present finite element (FE) procedure and a new improved structural assessment correlation proposed for pipe bends with ovality and TAC defects.

1. Introduction

Right-angled (90°) pipe bends or elbows are commonly employed in a variety of technical applications such as petroleum refineries, chemical processing plants, pharmaceuticals, food processing plants, conventional and nuclear power plants [1]. Elbows are most vulnerable to failure among other piping components due to the complexities of loading and geometric structure. Mourad and Younan [2] proved that elbows and pipe bends have nearly 5–20 times more flexibility than straight pipes with identical geometry and material properties. Hence pipe bends offer necessary flexibility (cushion-like effects) to the piping system and protect the pipeline by reducing reaction forces and moments caused within the pipeline by local deformation [3]. Plastic collapse occurs in the structure when the pipe bend deformation exceeds the elastic limit and should be avoided. To establish the allowable limit

of plastic loads on structures, the concepts of plastic limit load analysis are used [4]. Maximum load carrying capacities are estimated for structures with respect to failure and therefore knowledge on plastic limit loads is essential. Crack like defects occur not only during the manufacturing and installation stages but also as a result of prolonged normal continuous operation with cyclic loading and material degradation. These are the major causes for crack or flaw initiation and propagation that greatly reduce the pipe bend's failure load [5]. Hence in a pressurized piping system, assessment of structural integrity of pipe bends with crack is a primary safeguard task and the measurement of plastic loads for cracked pipe bends plays an important role in integrity assessment technology. Further, accidents in power plants can occur due to complex loads and weak parts in pipe bends resulting in significant losses. The leak-before-break (LBB) concept employs the analysis of throughwall cracks on the principal heat transport piping systems of pressurized reactors in nuclear industries [6]. The presence of large

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(57) Abstract :

For the driver's benefit, the present invention incorporates an anti-glare coat sheet visor into the front glass. In order to enhance driving safety and reduce glare, the anti-glare thin coat visor filters the quantity of incident light entering the vehicle. The primary goal of this idea is to improve the driver's field of vision by incorporating an anti-reflective thin film into the front glass. It becomes opaque when this thin film is exposed to sunshine or the opposing vehicle's light and remains so during the remainder of the time. Using the size of the front window as a guide, the system was designed to fit any car.

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PV Systems based High Gain Converter using CI and SCC Techniques

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ABSTRACT

In this paper, new techniques for a CI (coupled inductor) and SCC (Switched Clamp Capacitor)-based stepup higher-level voltage DC-DC converter were implemented. The CI and SC, charge and discharge the energy, respectively, to attain higher gains. Using the clamp circuitry, the stress on the switching volt level and inductance leakage are removed. The reversed retrieval problem in the diode was eradicated with the help of a coupled inductor (CI). The new topology is to get more gain from the voltage and improve efficacy. The steady-state examination of novel DC-DC converter operation procedures are discussed here. The proposed model has an input voltage of 24V and an output voltage of 410V. P_{max} of 150W was given to get a maximum of 96.4%.

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1. INTRODUCTION

Our country is deeply concerned about the energy crisis and environmental issues [1]. In this concern, the global warming problem will occur, and this will in turn increase the level of the sea by about 2 meters. This has a greater impact on the lives of all human beings. Non-conventional energy sources are used to resolve the air pollution and energy crises and global warming problems. Non-conventional energy sources like sun energy, energy from the wind, and wave energy is widely used. [2], [3], [4]. Non-conventional energy sources produce a lower voltage level and it must be increased by using a converter named step-up boost DC-DC. This higher voltage output is transferred through the inverter to convert DC into AC [5] [6] [7] [8]. The step-up boost DCDC converter ratio disturbs entire system efficacy. The existing converter circuit topology is not suitable for Steper-Up Boost dc-to-dc converter ratio applications. In existing Steper-Up Boost dc-to-dc converter circuit, the duty cycle is increased to 1. During ideal conditions, the Steper-Up boosting conversion ratio should reach its maximum value. The Steper-Up Boost DC-DC Converter circuits EMI and Converse retrieval problems are issued to limit the high voltage gain by using the C, L, R, and switches. The leakage of the transformer affects the huge amount of power dissipation and a large amount of voltage spike problems occur on switch.

Selection of power switches with high voltage stress is the main consideration because of redundant cost and more space problems. To introduce the new architecture, the existing method of the boost converter circuit problems is overcome. The new architecture of the switched capacitor [9], [10], [11], [12], [13] coupled inductor [14 to 21], and lifting of voltage techniques [22] [23] are proposed. The minimum amount of energy strain in switching circuits with an upsurge in alteration ratio of voltage is achieved by using an inductive structure of a coupled inductance step-up boosting converter circuit. This type of technique is mostly used,



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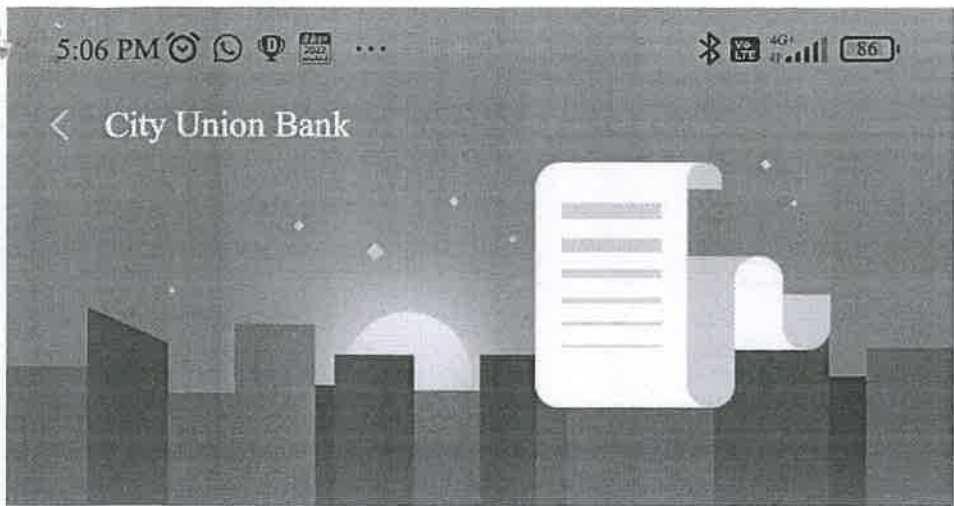
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SCIENTIFIC PAPER

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TWO-PHASE LEACHING FOR METAL RECOVERY FROM WASTE PRINTED CIRCUIT BOARDS: STATISTICAL OPTIMIZATION

Article Highlights

- Two-stage leaching was employed for the efficient recovery of heavy metals from PCBs
- Optimization by RSM results in a leaching efficiency of 97.06% Cu, 94.66% Sn, 96.64% Zn, and 96.89% Pb
- Simultaneous extraction has proved to be successful in separating and recovering heavy metals

Abstract

The rapid growth of technology is inevitable in humankind's life and has a significant stint in electronic waste (e-waste) generation. Electronic waste possesses tremendous environmental and health effects, and one such major contributor to it is printed circuit boards (PCBs). The present work deals with the recovery of heavy metals from PCBs by using aqua regia as a leaching reagent in two stages (first stage HCl and HNO₃ and second stage HCl and H₂SO₄). The response surface methodology was used to determine the optimal recovery conditions for the heavy metal ions: the recovery time of 5 h, the pulp density of 25 g/L, and the temperature of 90.1 °C with desirability 0.761. These optimized values provide a maximum recovery rate of Cu (97.06%), Sn (94.66%), Zn (96.64%), and Pb (96.89%), respectively. EDXs are used to analyze the metal concentrations of the sample before and after treatment.

Keywords: aqua regia, e-Waste, printed circuit board, response surface methodology, two-step leaching.

Electronic waste (e-waste) means electrical or electronic waste. Technological advancement, business expansion, economic growth, and shorter electrical and electronic equipment (EEE) have contributed to a significant rise in e-waste. PCBs are the main components of this e-waste, which typically includes 40% metals, 30% ceramics, and 30% plastics [1,2]. The metallic composition consists primarily of 10–30 % of Cu and other metals such as Sn, Zn, Pb, Ni, Fe, Ag, Cd, Au, etc., in different proportions based on PCB sources [3]. The recovery of metals from PCBs is very difficult due to the heterogeneous distribution of materi-

als in PCBs. An analysis of PCBs by atomic adsorption spectroscopy shows that 2 kg of PCBs contains 5.94% of Sn, 21.3% of Cu, 3.2% of Pb, and 2.24% of Fe [4]. Informal processing of e-waste in developing countries can lead to adverse effects on human health and environmental pollution. In 2016, 44.7 million metric tons of e-waste were produced worldwide [1,2]. An estimated 3.8 tons of e-waste were produced annually in India, of which only 19,000 tons were recycled. India faces a considerable challenge to dispose of an estimated 4.5 tons of e-waste per year produced domestically and imports from abroad [5]. If the e-waste was directly disposed of by filling the soil without removing metal ions from PCBs, the pollution of land and water supplies would result.

E-waste recycling has been accomplished through formal and informal techniques in several countries [6]. While formal recycling techniques ensure protection and efficient separation but are costly to install and

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Child Safety Wearable and Visually Impaired Assistive Device with Location Tracking System Using IoT

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Article Info

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Abstract

The idea of a smart wearable system for children and visually impaired is discussed in this paper. The key advantage of this wearable above others is that it can be used with any cell phone and does not required an expensive smart phone are a very tech-savy individual to operate. The GPS, GSM, Wi-Fi and Arduino technologies were used to create a smart wearable gadget for kid safety and to assist visually impaired people with a location tracking system. The prototype system uses a heartbeat and temperature sensor to monitor the health of children. The child will be safe from threads as a result of this. There are many wearable's available now a days that crack children's everyday habits and activities and also assist in locating them utilizing Wi-Fi and Bluetooth services. However, it appears that both the parent and the child are communicating in securely. As a result, the goal is to create a text and Email enabled link in between child's wearable and the relevant parent via SMS. Global System for Mobile Communication is the primary concept behind this. For issuing an emergency alarm, the proposed solution is wearable gear with cellular network and Wi-Fi connectivity. When the push button is touched, an alarm is sent in variety of ways, including SMS and Email, in the event of emergency.

Keywords: GPS, GSM, Wi-Fi, Arduino, Wearable device.

Article History

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I. INTRODUCTION

Security becomes an important issue. In 2020 there were 31.6 million in population are visually impaired and 34.33 percent were children. Basically children or blind persons cannot able to complaint about their abuse ment which they face their daily life to their parents and



Source details

Mathematical Statistician and Engineering Applications

Scopus coverage years: from 2015 to Present

Publisher: Philippine Statistical Association

ISSN: 2094-0343

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|--------------------------|--------|---|----------------|-----------------|---------|----------|
| OPENING BALANCE | | | | | | |
| 04-09-2022 | | ATM-CASH/THIRUNAGAR BR SALE/SALEM/040922 | 2000.00 | | | |
| 05-09-2022 | | SRI RENGASWAMY /EXCEL PAYMENT | | 2500.00 | | |
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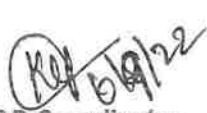
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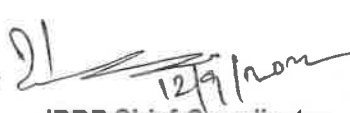
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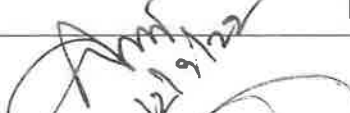
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Study on the use of selective catalytic reduction technique for NOx emission reduction in an diesel engine fuelled with Methyl ester of Water Hyacinth

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Performance and Emission studies

ABSTRACT

The emission standard is a big challenge to Automobile Manufacturers in bringing down the diesel engine emissions. Use of renewable fuel which substitutes conventional fuel in diesel engine which results in enhanced pollution levels, specifically NOx. In the present work an initiative is made to analyse the efficacy and pollution attributes of diesel power train propelled with Methyl Ester of water Hyacinth(B20) was investigated. Magnesium Oxide (MgO) and Zinc oxide (ZnO) nano additives at various proportions were added to Water Hyacinth biodiesel (B20). To reduce the NOx emission levels an improved methodology named as selective catalytic reduction (SCR) system was used. The experiment was performed with and without SCR to study the NOx emission characteristics. The results revealed that Methyl Ester of Water Hyacinth was found to be proper alternate instead of Diesel fuel without any engine alterations. The Brake thermal Efficiency(BTE) for diesel fuel was 28.4% and for B20 it was 27.1%. for B20 with 100 ppm NAM it was 27.3%. For B20 blend with 100 ppm NAM, the NOx emission was 786 ppm, and this NOx emission reduced to 596 ppm when SCR was used for B20 blend with 100 ppm NAM.

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1. Introduction

Trial was performed on a mono barrel CI engine to check the variation in Thermal Efficiency and exhaust emission for various combinations of Kapok Methyl Ester (KME). NOx emission, Exhaust Outlet Temp. and Specific fuel usage (SFC) improved for mixtures of Kapok Methyl Ester (KME), BTE, CO, HC and smoke viscosity inclined combinations of B20 and B40 of KME to charge the requirements[1]. The consequences of blending nanoparticles with create some important properties to biodiesel. The nanoparticles behaves as oxygen contributing agent and supplies oxygen through CO oxidation and distracts the O₂ through NOx. The mixtures of nanoparticles can perform as both catalyst and an energy source where it is used along base fuel in diesel engines[2]. Many people investigated the impact of blending Zinc oxide nanoparticles to biodiesel. The facts reveal that the rate of rise in fuel consumption, BTE, NOx, EGT and decline in CO, HC and smoke emissions is significant. The fuel consumption improved by 5.2%, carbon

monoxide and smoke discharges dropped by 13% and 9%, NOx discharges raised by 5%. The BTE, pressure rise, heat release rate, NOx discharge will be improved due to the presence of particles [3,4]. Karthikeyan et al. [5] analysed the impact of blending ZnO₂ nano additives in palm oil biofuel. Results revealed that the BTE, EGT, NOx increased, and CO, HC and smoke pollution dropped tremendously. Sajith et al. [6] studied the impact on certain physical characteristics of biofuel by blending cerium nanoparticles to it. It can be noted that adding nanoparticles enhances the fluid flow resistance consequences in the rise in absolute viscosity of the mixture. The presence of nanomaterials in the mixtures encourages comprehensive burning equated to the diesel and increases the efficiency of fuel.

2. Materials and methods

2.1. Manufacturing of biofuel

2.1.1. Transesterification process

The process of producing biofuel from any oil extracted from seed is named as transesterification. The process of production of

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Heat transfer enhancement in oblique finned curved microchannel using hybrid nanofluid

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ABSTRACT

The significant development of power converters in electric vehicles demands higher energy consumption and in turn larger heat generation. To prevent overheating of power converters, a newly designed curved microchannel is being developed with different cooling fluids. The objective of present experimental study is to analyze the heat transfer characteristics of oblique finned curved microchannel heat sink (MCHS) with various working fluids like Deionized water, nanofluid and hybrid nanofluid. Here heat sink has been designed with cross sectional area of $80 \times 53 \text{ mm}^2$. The DI water, $\text{Al}_2\text{O}_3/\text{water}$ nanofluid and $\text{Al}_2\text{O}_3+\text{CuO}/\text{water}$ hybrid nanofluid was utilized separately with rate of mass flow varied between 0.1 and 0.5 lpm maintaining steady heat flux of 25.5 kW/m^2 . Investigational output exposed that the rate of heat transfer, PEC and fall in pressure for the curved MCHS enhanced by 11.98%, 16.5% and 30.1% respectively in comparison to the heat sink which has straight channel. Also using hybrid nanofluid, the rate of heat transfer increased by 3.5% and 2.1% with curved MCHS in comparison to water and nanofluid. This is endorsed to the secondary flow generated by curved MCHS which improved the rate of heat transfer significantly. Overall, the curved MCHS with hybrid nanofluid is suggested as a preferred cooling medium for power converter in electric vehicles.

1. Introduction

To avoid environmental pollution, conserve energy and also to solve the problem of energy crisis, internal combustion engine vehicles are converted in to dedicated electric vehicles (EV) and hybrid electric vehicle (HEV) by automobile giants. During this technological change, the problem of overheating of power converters comes in to picture. Battery with power converters which acts as power source plays major role in converting the conventional vehicles into EV's and HEV's. The power electronic control device is being widely used to convert and to control electrical energy in both domestic and industrial appliances. The efficiency, size of the power control unit has been optimized to have high heat dissipation rate and heat density significantly. Because of less area of contact with atmospheric air, the power converters produce more heat flux. Due to overheating of the power converters there has been a surge in the failure rate of element. These demands led to the invention of MCHS by Tuckerman (1981). To achieve higher cooling rate in front of the present generation, some modification needs to be done in the existing MCHS or a novel cooling fluid may be developed.

Since conventional fluids have poor thermal conductivity as compared to nanofluids and hybrid nanofluid. So it is not suitable for larger cooling applications. In addition to prevent overheating of power converters they are cooled using high thermal conductivity fluid and forced flow required. A Hybrid nanofluid is the one where more than one nanoparticle is added to the nanofluid.

Many attempts were made for the design modification of the MCHS for electric vehicle application which are discussed as follows. Hong et al. [1] developed a heat exchanger with plain louvered fins to improve the frosting and defrosting property of air source heat pump in the electric vehicles. It was found that the plain louvered fin was found to be a favourite open-air heat exchanger in the air source heat pump for electric vehicles. Lyu et al. [2] analyzed the battery thermal management system through forced air cooling, thermoelectric cooling and liquid cooling. Results revealed that the shell temperature falls by 430°C with TEC-based aqua cooling medium with 40 V supply to the heater and 12 V supply to the TEC module for single cell along copper holder. Krishnadas et al. [3] investigated the heat proliferation by utilizing a combined PCM and MC plate cooling system in the electric vehicle

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Experimental Study of Thermal Performance on Waste In-filled Building Wall Construction

M. Venkatesan¹ · M. Raja² · S. Sivalaksmi² · P. Dineshkumar² ·
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Abstract

Energy spent on buildings accounts for 40 % of world energy in which, the walls alone consume 50 %. To reduce the energy consumption, different materials are studied for construction of building walls. The waste material generation is also increasing rapidly world-wide. This research attempts to utilize such suitable wastes effectively in wall construction. In this study, three wastes were used as fill-in materials namely sago pith waste (SPW), crushed asbestos waste (CAW) and areca nut husk waste (AHW). The heat transfer rate across the walls was found for five test conditions from 30 °C to 50 °C in steps of 5 °C each. Apart from reduction in energy consumption, the total heat flux decreased by 21.35 %, 14.26 % and 24.85 % compared to conventional red clay brick wall for SPW, CAW and AHW in-filled walls, respectively. The average value of total heat transfer coefficients were 7.86 $\text{Wm}^{-2}\cdot\text{K}^{-1}$, 7.94 $\text{Wm}^{-2}\cdot\text{K}^{-1}$ and 7.82 $\text{Wm}^{-2}\cdot\text{K}^{-1}$ for SPW, CAW and AHW in-filled walls, respectively. Also the lowest values of total heat transfer coefficient were found in the AHW in-filled wall in all the cases. From the experimental results, new correlations of total heat flux are proposed for heating/cooling load calculations. The results revealed that the waste in-filled walls are energy-saving wall structure. The waste in-filled walls provide a waste management method that result in reduced pollution for sustainable environment.

Keywords Building wall · Energy saving · Heat transfer coefficient · Red clay brick · Total heat flux · Waste materials

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Date : 13/9/22

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| Staff Name | Dr. S. Anbu Karuppusamy | | | |
| Designation / Department | Professor / ECE | | | |
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| | Scopus/AU-Annexure I | 1st Author (Rs.2,500) | 2nd Author (Rs.1,500) | 3rd Author (Rs.1,000) |
| | Patent-Published | Applicant (First) (Rs.5,000) | | Inventor (Rs.2,500) |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
| Research Grants | Upon Receiving Fund | PI / Co PI | 10 % | - |
| Program Fund | Greater than Rs.50,000/- | Coordinator | 5 % | - |
| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | - |
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Research Article

Design and Fabrication of Flexible Nanoantenna-Based Sensor Using Graphene-Coated Carbon Cloth

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Carbon nanomaterials have attracted significant consideration and concern due to the unique chemical and physical properties. Recently, nanodiamonds, graphene, and carbon nanotubes are served as electrodes, hydrogen storage elements, and composite materials. In this work, a 5 GHz graphene nanoantenna that falls inside the very-small-aperture terminal (VSAT) C-band range has been fabricated. A graphene substrate with a thickness of $h = 0.5$ cm is formed which is then used for fabricating a graphene nanoantenna working at 5 GHz. To design and simulate the antenna, Analysis System (ANSYS) electromagnetic desktop software was used. Using the designed graphene antenna, the parameters such as voltage standing wave ratio, three-dimensional radiation pattern, and directivity were obtained. After designing of the antenna using ANSYS software, it was physically fabricated. The graphene was used as a dielectric, copper sheet acted as a patch over as well as ground. Finally, the design was tested using Vector Network Analyzer (Model: N9925A) and the transmission range was found as 5 GHz.

1. Introduction

Nanotechnology refers to scientific and technical domains in which nanoscale phenomena are utilized in the production, characterization, design, and application of nanomaterials, nanodevices, and systems. Nanotechnology has emerged as one of the most important and exciting frontier subjects in

physics, chemistry, engineering, and biology in recent years. It has the potential to provide substantial breakthroughs in the near future, impacting the direction of technological growth in a variety of applications. Nanotechnology, in all of its forms, has the potential to make a tremendous impact on society. Nanotechnology goods are expected to have an environmental effect due to the dispersion and permanence



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| | Patent-Published | Applicant (First) (Rs.5,000) | | Inventor (Rs.2,500) ✓ |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
| Research Grants | Upon Receiving Fund | PI / Co PI | 10 % | — |
| Program Fund | Greater than Rs.50,000/- | Coordinator | 5 % | — |
| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | — |
| Participation | IITs/NITs/up to NIRF Top 100 colleges | Registration Fee - Actual (Max.Rs.5,000) | | — |
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| | — | AP.No: 202241050110 | | — |
| Approved amount in Rs. | RS. 2500 /— | | | |

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The details were checked and updated. The above mentioned incentive amount is recommended for approval.

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(12) PATENT APPLICATION PUBLICATION
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(43) Publication Date : 09/09/2022

(54) Title of the invention : MACHINE LEARNING APPROACHES TO FOR IMPROVING THE AUTOMATIC SOLAR LIGHT TRACKING SYSTEM FOR ENERGY EFFICIENCY

(51) International classification :C07D0411040000, H04N0005225000, A61B0001000000, A61B0005000000, B29L0031300000
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(61) Patent of Addition to Application Number :NA
Filing Date :NA
(62) Divisional to Application Number :NA
Filing Date :NA

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(57) Abstract :

Machine Learning approaches to for Improving the Automatic Solar Light Tracking System for Energy Efficiency is the proposed invention. The proposed invention focuses on designing and implementing a framework of machine learning to predict the area of high intensity solar rays. Based on the prediction from machine learning unit, the solar panel is tilted to absorb more and more solar energy and thus increasing the efficacy of solar systems.

No. of Pages : 13 No. of Claims : 4

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Date 08.10.2022

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| | Scopus/AU-Annexure I | 1st Author (Rs.2,500) | 2nd Author (Rs.1,500) | 3rd Author (Rs 1,000) |
| | Patent-Published | Applicant (First) (Rs.5,000) | | Inventor (Rs 2,500) |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs 10,000) |
| Research Grants | Upon Receiving Fund | PI / Co PI | 10 % | - |
| Program Fund | Greater than Rs.50,000/- | Coordinator | 5 % | - |
| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | |
| Participation | IITs/NITs/up to NIRF Top 100 colleges | Registration Fee - Actual (Max.Rs.5,000) | | |
| Additional details (Attach supporting documents) | Impact Factor | DOI / Patent No./ Scheme | | NIRF Ranking |
| | | 202241052856A | | |
| Approved amount in Rs. | Rs. 5000 (Five thousand) | | | |

Investigator / Coordinator

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The details were checked and updated. The above mentioned incentive amount is recommended for approval.

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Date : 19.10.2022

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| Publication Category | SCI/SCIE/WoS | 1st Author (Rs.5,000) | 2nd Author (Rs.3,500) | 3rd Author (Rs.1,500) |
| | Scopus/AU-Annexure I | 1st Author (Rs.2,500) | 2nd Author (Rs.1,500) | 3rd Author (Rs.1,000) |
| | Patent-Published | Applicant (First) (Rs.5,000) | | Inventor (Rs.2,500) |
| | Patent-Granted | Applicant (Rs.15,000) | | Inventor (Rs.10,000) |
| Research Grants | Upon Receiving Fund | PI / Co PI | 10 % | — |
| Program Fund | Greater than Rs.50,000/- | Coordinator | 5 % | — |
| Consultancy | Greater than 2 Lakhs | Coordinators | 50% Faculty + 50% Management | — |
| Participation | IITs/NITs/up to NIRF Top 100 colleges | Registration Fee - Actual (Max.Rs.5,000) | | — |
| Additional details (Attach supporting documents) | Impact Factor | DOI / Patent No./ Scheme | | NIRF Ranking |
| | | 202241051460 | | |
| Approved amount in Rs. | Rs 5000/- (Repres Five thousand only) | | | |

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(21) Application No.202241051460 A

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(22) Date of filing of Application :08/09/2022

(43) Publication Date : 16/09/2022

(54) Title of the invention : ANALYSIS OF MECHANICAL BEHAVIOR OF CONCRETE WITH DIFFERENT TYPES OF ADDING FIBRE THROUGH THE PROPAGATION OF ULTRASOUND WAVES

(51) International classification :A61P0025280000, A61P0043000000, A61P0035000000, A61P0009120000, H04W0052020000

(86) International Application No Filing Date :PCT// :01/01/1900

(87) International Publication No : NA

(61) Patent of Addition to Application Number Filing Date :NA :NA

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(57) Abstract :

[05] The addition of steel, polypropylene and rubber fibers to concrete can change mechanical properties such as flexural strength, compression and elasticity, in addition to preventing cracking. There is also a change in physical properties, for example, absorption of temperature, sounds and blocking of moisture. Taking into account that currently the evaluation of the resistance of structures is carried out through destructive methods, the ultrasound test allows evaluating the integrity of materials through ultrasonic pulses. The joint analysis of ultrasound data with destructive testing data allows for data reliability. The purpose of the present research was to analyze samples of conventional concrete and with 2% addition of different types of fibers (steel, rubber and polypropylene). With the intention of comparing the interference of the fibers in the propagation speeds of waves (V), for the frequencies of 45 kHz and 80 kHz and in the mechanical properties of the concrete through the tests of compressive strength (fc) and modulus of elasticity (Eci). Correlations were performed between the parameters obtained by destructive tests and wave propagation, demonstrating that the ultrasound test is capable of inferring the quality of concrete parts. Accompanied Drawing [FIG. 1] [FIG. 2][FIG. 3]

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(19) INDIA

(22) Date of filing of Application :08/09/2022

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(54) Title of the invention : ANALYSIS OF MECHANICAL BEHAVIOR OF CONCRETE WITH DIFFERENT TYPES OF ADDING FIBRE THROUGH THE PROPAGATION OF ULTRASOUND WAVES

(51) International classification :A61P0025280000, A61P0043000000, A61P0035000000, A61P0009120000, H04W0052020000

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Address of Applicant :Assistant Professor, Erode Sengunthar Engineering College (Autonomous), Erode - Perundurair Rd, Post, Thuduppathi, Tamil Nadu- 638057 Thuduppathi -----

(57) Abstract :

[05] The addition of steel, polypropylene and rubber fibers to concrete can change mechanical properties such as flexural strength, compression and elasticity, in addition to preventing cracking. There is also a change in physical properties, for example, absorption of temperature, sounds and blocking of moisture. Taking into account that currently the evaluation of the resistance of structures is carried out through destructive methods, the ultrasound test allows evaluating the integrity of materials through ultrasonic pulses. The joint analysis of ultrasound data with destructive testing data allows for data reliability. The purpose of the present research was to analyze samples of conventional concrete and with 2% addition of different types of fibers (steel, rubber and polypropylene). With the intention of comparing the interference of the fibers in the propagation speeds of waves (V), for the frequencies of 45 kHz and 80 kHz and in the mechanical properties of the concrete through the tests of compressive strength (fc) and modulus of elasticity (Eci) . Correlations were performed between the parameters obtained by destructive tests and wave propagation, demonstrating that the ultrasound test is capable of inferring the quality of concrete parts. Accompanied Drawing [FIG. 1] [FIG. 2][FIG. 3]

No. of Pages : 22 No. of Claims : 4

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Experimental investigation on the wear behavior of low-cost composite made from industrial wastes

S.P. Venkatesan

Excel Engineering College, Komarapalayam, India

K. Ramachandran

N.S.N. College of Engineering and Technology, Manalmedu, India

A. John Presin Kumar

Hindustan Institute of Technology and Science, Chennai, India, and

Balamurugan G.M.

Solamalai College of Engineering, Veerapanjan, India

Abstract

Purpose – Aluminum alloy AA5083 is applicable in ship building, military, railway and industry because of its excellent properties like resistance to chemical and sea water attack. However, its performance is affected by weak wear resistance. Hence, this should be solved to improve the performance of AA5083 alloy in the aforementioned fields. The purpose of this research is to enhance the wear properties of AA5083 alloy.

Design/methodology/approach – In this research, AA5083 alloy was reinforced with industrial wastes such as red mud and granite particles using stir casting method. Totally, four types of composites were fabricated, namely, AA5083/3 Wt.% red mud (C1), AA5083/3 Wt.% granite (C2), AA5083/1 Wt.% red mud-2Wt.% granite (C3) and AA5083/2 Wt.% red mud-1Wt.% granite (C4). Wear properties such as mass loss and coefficient of friction (COF) were analyzed for different wear parameters. Further, the mechanical properties like hardness and tensile strength were investigated.

Findings – Results showed that the inclusion of reinforcement particles improved the wear and mechanical properties of AA5083 alloy (C0). The C2 sample displayed the maximum hardness of 87 HV and tensile strength of 317 MPa owing to the inclusion of 3 Wt.% granite particles. Furthermore, the wear study results showed that the C2 sample displayed the minimum mass loss and COF. It was concluded from this research that C2 sample could be a good candidate to be applicable in marine, military, railway and industrial applications with improved performance.

Originality/value – This work is original as the industrial waste is used as reinforcements in the performance improvement of AA5083 aluminum alloy.

Keywords Aluminum alloy, Industrial waste, Wear, Mechanical properties, Metal matrix composites

Paper type Research paper

1. Introduction

Aluminum alloy AA5083 is a soft material attracted in marine and industrial applications owing to its superior properties like resistance to chemical attack and sea water. Further, it has added advantages like light weight and low cost. However, it suffers with inadequate hardness and wear resistance. Hence, it is necessary to enhance the aforementioned properties to make broad application of AA5083 alloy. To improve the wear performance of composites, several attempts have been made by earlier researchers using different types of fillers (Chelladurai *et al.*, 2021; Samal *et al.*, 2020; Reddy *et al.*, 2020). Generally, the aluminum alloy composites showed

better performance while adding different reinforcement elements (Akbari *et al.*, 2021, 2018). For example, Ganagar *et al.* (2021) fabricated AA5083/fly ash composites and studied the tribological properties. Results showed that the hardness of AA5083 alloy was increased from 50 BHN to 70 BHN while adding 8 Wt.% fly ash content. Moreover, minimum sliding wear was noted while maintaining the optimum sliding velocity of 1.047 m/s and load of 15 N.

Anandaraj *et al.* (2021) examined the tribological properties of AA5083/MoO₃ composites fabricated by stir casting method. Increased MoO₃ weight percentage showed minimum wear rate and coefficient of friction (COF). Sudherson *et al.* (2020) investigated the wear behavior of AA5083/cadmium composites at dry sliding conditions. Results showed that wear loss was declined with increased weight percentages of cadmium. Maximum wear resistance was observed for AA5083/5 Wt.% cadmium.

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Experimental Investigation on the Mechanical Properties of Indian Almond Fiber - Reinforced Composites Prepared by Different Types of Resins

Venkatesan Saradha Paramashivaiah, Padmavathi Kuppusamy Ramamoorthy, Ganesamoorthy Raju & Velmurugan Duraisamy

To cite this article: Venkatesan Saradha Paramashivaiah, Padmavathi Kuppusamy Ramamoorthy, Ganesamoorthy Raju & Velmurugan Duraisamy (2022): Experimental Investigation on the Mechanical Properties of Indian Almond Fiber - Reinforced Composites Prepared by Different Types of Resins, Journal of Natural Fibers, DOI: 10.1080/15440478.2022.2134261

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A Trustworthy Platform for Safeguarding and Validating Educational Credentials using Blockchain Technology

DR. P. C. SENTHIL MAHESH

*Associate Professor,
Department of Computer Science and Engineering,
Excel Engineering College, Namakkal, Tamilnadu, India.*

DR. K. MUTHUMANICKAM

*Professor, Kongunadu College of Engineering and Technology,
Department of Information Technology, Tiruchirappalli, Tamilnadu, India*

Abstract:

In one way or another, education serves as the soul of society growth. Aspirants who earn their degrees honestly will use their knowledge and abilities to benefit society. While the number of universities and graduates continues to rise year after year, the need to simply validate degree credentials creates new business prospects. Students seek a low-cost, easy-to-understand evidence of certification, while companies demand quick and reliable verification of degrees when hiring. Because a large number of students graduate each year, the issue of fake credentials could become a major problem. In this case, an overlay method based on blockchain technology is used to keep legitimate certificates in digital form and quickly verify them when needed. The proposed approach ensures that the certifications, once verified, are available in an irretrievable form for immediate verification with future reference and that the existing certification system is kept tamperproof. A prototype of a blockchain-based credential security and verification system is constructed in the Ethereum test network to confirm the legitimacy of the suggested method. The results of the implementation and testing reveal that it is a safe, secure and practical solution for online credential management.

Keywords: *Blockchain, Document Verification, Digital Certificate, distributed, Preprocessing.*

INTRODUCTION

The basic pattern of a student's education in India is as follows: admittance to preschool, then constant changes in faculty for primary, secondary, and high school studies. Students who have completed high school must now apply for college entrance. In addition, there is a constant rotation of instructors for graduation. This is frequently the basic cycle for a student's academic years. Some pupil continues their education after that. As a result, the disadvantage of this cycle is that a student must submit all of his/her certificates for validation at each level. The certificate may be lost or damaged as a result of this. It's also time-consuming for the validator to show each certificate. According to survey of All India Higher Education 2019-20 [1], in recent years with around 93 lakh students graduating each year as shown in Figure 1 which is extremely difficult to keep track of and validate such a big number of records.

Associate degree undesirable state of affairs, such as change of state and the manufacture of fake or duplicate certificates, is on the rise. Fake universities are issuing certifications, as well as forged certificates from existing trustworthy universities. This phoney credential problem has become a pain in the neck for both colleges and recruiting businesses as a result of centralization and digitization, and it requires a swift response. Since technology has progressed so far, distinguishing



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An Efficient Android Malware Detection Using Adaptive Red Fox Optimization Based CNN

P. C. Senthil Mahesh¹ · S. Hemalatha²

Accepted: 5 May 2022

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Abstract

Android smartphones are employed widely due to its flexible programming system with several user-oriented features in daily lives. With the substantial growth rate of smartphone technologies, cyber-attack against such devices has surged at an exponential rate. Majority of the smartphone users grant permission blindly to various arbitrary applications and hence it weakens the efficiency of the authorization mechanism. Numerous approaches were established in effective malware detection, but due to certain limitations like low identification rate, low malware detection rate as well as category detection, the results obtained are ineffective. Therefore, this paper proposes a convolutional neural network based adaptive red fox optimization (CNN-ARFO) approach to detect the malware applications as benign or malware. The proposed approach comprising of three different phases namely the pre-processing phase, feature extraction phase and the detection phase for the effective detection of android malware applications. In the pre-processing phase, the selected dataset utilizes Minmax technique to normalize the features. Then the malicious APK and the collected benign apps are investigated to identify and extract the essential features for the proper functioning of malware in the extraction phase. Finally, the android mobile applications are detected using CNN based ARFO approach. Then the results based on detecting the benign and malicious applications from the android mobiles are demonstrated by evaluating certain parameters like model accuracy rate, model loss rate, accuracy, precision, recall and f-measure. The resulting outcome revealed that the detection accuracy achieved by the proposed approach is 97.29%.

Keywords Android phones · Malware applications · Convolution neural network · Red fox · Databases · Detection rate

✉ P. C. Senthil Mahesh
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SWEEP TRF - Transfer from Linked Fixed Deposit / Account

VMT - Visa Money Transfer through ATM

CWDR - Cash Withdrawal through ATM

PUR - POS purchase

TIP/SCG - Surcharge on usage of debit card at pumps/railway ticket purchase or hotel tips

RATE.DIFF - Difference in rates on usage of card internationally

CLG - Cheque Clearing Transaction

EDC - Credit transaction through EDC Machine

SETU - Seamless electronic fund transfer through AXIS Bank

Int.pd - Interest paid to customer

Int.Coll - Interest collected from the customer

++++ End of Statement ++++

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| Designation / Department | Prof / CSE | | | |
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An Optimized Machine Learning Framework for Detecting Alzheimer's Disease By MRI

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ABSTRACT

Machine learning has extensive application in diverse medical fields. With advancements in medical technologies, access has been given to data for the identification of diseases in their early stages. Alzheimer's Disease (AD) is a chronic illness that will cause degeneration of the brain cells and ultimately will lead to memory loss. AD caused cognitive mental problems like forgetfulness and confusion, as well as other symptoms such as psychological and behavioral problems. are further recommended to undergo test procedures using neuroimaging techniques. This work's objective is to utilize the machine learning algorithms for processing the data acquired via neuroimaging technologies for early-stage AD detection. The framework extracts features using curvelet transform from MRI brain image. This work will also present the Decision Tree, the Adaptive Boosting (AdaBoost), and the Extreme Gradient Boosting (XGBoost) classifiers. In machine learning, Population-Based Incremental Learning (PBIL) is an optimization algorithm, in spite of being simpler than a conventional genetic algorithm, the PBIL algorithm is able to achieve much better results in several cases. PBIL is used to optimize the AdaBoost and XGBoost classifiers to improve AD classification. The experimental outcomes will demonstrate the proposed approach's superior performance over that of other existing approaches.

Keywords: Alzheimer's disease (AD), Machine Learning, Curvelet Transform, Decision Tree, Adaptive Boosting (AdaBoost), Extreme Gradient Boosting (XGBoost), and Population-Based Incremental Learning (PBIL).

1 INTRODUCTION

Alois Alzheimer, a German physicist and neuro-pathologist, was the first person to identify as well as to discuss about the Alzheimer's Disease (AD). As per the World Alzheimer Report, around 50 million people across the globe were affected by dementia in the year 2018, and about two-third of that population were suffering from AD. There will be about 152 million AD patients in the year 2050, and this disease's cost has been forecasted to be USD 2 trillion in the year 2050. At present, the AD treatment is predominantly involved with the usage of either Alzheimer's disease-modifying or delaying drugs instead of drugs which are able to either reverse or permanently stop the disease's progression. Hence, it is a need for an early-stage AD prediction, so as to make it feasible to delay the effects of the disease [1].

AD is characterized by the loss of neurons as well as synapses within the cerebral cortex, and also specific subcortical regions, that will result in gross atrophy of the affected regions, which is inclusive of degeneration in the temporal lobe and parietal lobe, and also portions of the frontal cortex as well as the cingulate gyrus. Earlier studies have shown the correlation between several impairments in the AD as well as the atrophy in many regions such as the amygdala, the temporal lobe, and the hippocampus. These characteristics are used for delineating the AD patients from the normal patients.

The key focus of the researchers is to monitor the change in a patient's health, the disease's clinical progression as well as reaction to the therapy. However, they find it most cumbersome to identify relevant bio-markers which are good representations of the AD as well as the Mild Cognitive Impairment (MCI). The researchers' objective is inclusive of diagnosing early-stage AD as well as identifying the individuals who are at most risk for AD development. Magnetic Resonance Imaging (MRI) is employed by physicians to diagnose AD. The multi-class classification of AD, MCI as well as Normal Control (NC) will employ as biomarkers the individual or combined structural MRI biomarkers like the hippocampus's shape as well as texture, cortical measurements, and volume measurements [2].

The MRI's key role in the AD analysis is to assess the volume alteration in the characteristic positions so as to provide up to 87% of analytical accuracy of up to 87%. Quite often, the appraisal is carried out on the mesial temporal lobe atrophy and the temporoparietal cortical atrophy. Direct or indirect estimation is done for the mesial temporal lobe atrophy. While the direct estimation is based on measuring the volume loss of hippocampal or parahippocampal tissue, the indirect estimation is dependent on the parahippocampal fissures' magnification. Normally, analysis of these estimations is done along with the medial temporal atrophy score, that has been proved to be predictive of the progression from MCI to dementia [3].

About the Journal

JOURNAL OF ALGEBRAIC STATISTICS

e-ISSN: 1309-3452 | **Frequency:** Bimonthly (6 Issue Per Year) | **Nature:** Online | **Language of Publication:** English | **Article Processing Charges:** 500 USD

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The Journal of Algebraic Statistics offers an avenue for researchers and practitioners to present contemporary issues associated with Algebraic Statistics and Engineering Computing Applications. The journal publishes peer-reviewed papers, case studies, technical notes, and discussions of interest to the practice of Algebraic Statistics and Engineering Computing Applications. Interdisciplinary studies and collaborations are encouraged. Theoretical papers submitted for publication should preferably include real-world applications of the techniques.

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Experimental study of heat transfer and pressure drop characteristics of microtube condenser using R134a

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ABSTRACT

The condensation heat transfer coefficient and the pressure drop were investigated experimentally and numerically in a microtube condenser using R134a. The microtube condenser comprises of trapezoidal oblique finned microchannel at the top and rectangular fins at the bottom of the tube. Water and air are used as cooling fluids on both sides of the microtube condenser. The experimental setup is validated initially with the existing work of Shah. The condensations effect included the vapour quality and mass flux ranging from 0.25 kg/m²s to 0.9, 99 to 468 kg/m²s, respectively. The results indicate that the condensation heat transfer coefficient and pressure drop enhance with mass flux and vapour quality. The experimental and numerical results are compared with existing experimental work. The microtube condenser enhances the heat transfer coefficient to 22.4% and a pressure drop of 5.6% more than the existing model. The heat transfer coefficient and pressure drop obtained from the numerical study is in superior agreement with the experimental results.

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KEYWORDS

Microtube condenser;
trapezoidal microchannel;
R134a; heat transfer
coefficient; pressure drop

Nomenclature

| | |
|----------------|---|
| A | Area [m ²] |
| C _p | Constant pressure specific heat [J/kg-K] |
| d | Tube diameter [m] |
| G | Mass velocity [kg/m ² s] |
| h | Heat transfer coefficient [W/m ² K] |
| k | Thermal conductivity [W/m K] |
| i | Length [m] |
| m [*] | Mass flow rate [kg/s] |
| Re | Reynolds number = $\rho u d / \mu$ |
| Nu | Nusselt number = $h d / k$ |
| p | Pressure [N/m ²] |
| Q | Heat transfer [W] |
| q | Heat flux [W/m ²] |
| T | Temperature [°C, K] |
| u | Velocity [m/s] |
| x | Vapour quality |
| μ | Dynamic viscosity [Pa-s] |
| ν | Kinematic viscosity = μ / ρ [m ² s] |
| ρ | Density [kg/m ³] |
| f | Fluid |
| g | Gas phase |
| l | Liquid phase |

1. Introduction

The drift towards the miniaturisation and advancement in micro-technology led to the development of microtube condenser. Also, getting higher demand for the compact refrigeration system has been increased, which accelerates the manufacturers

to improve the design of condenser that explores approaches, opportunities and solutions already having an impact. Moreover, the strategies focus on increasing the effectiveness of the condenser by decreasing the vapour quality from 1 to 0.65 over the length of the tube. The effects of reducing the pressure drop on the airside cause a raise in the heat transfer coefficient on the refrigerant. The refrigerant used here is R134a which is eco-friendly and safe to use. The impact of miniaturisation of the condenser is, by drop the tube diameter in the condenser that leads to boost in the heat transfer coefficient and enhances the condensation effect. The main applications of the microtube condensers include the compact refrigeration system and compact heat exchangers in the electronics industry. Several types of research have investigated the condensation effect in microtube condenser with microchannel by experimentally and numerically. Goss and Passos (2013) carry out a study on heat transfer coefficient (condensation) using R134a in an eight parallel microchannel through 0.77 mm hydraulic diameter. The heat flux and mass velocity ranging from 17 to 53 kW/m² to 230–445 kg/m²s respectively. The result shows the heat transfer coefficient raise with mass velocity and the vapour quality. Also, they study the pressure drop through convective condensation of R134a in eight circular microtube condensers. The result shows that the pressure drop augments with a raise in mass flux. The maximum pressure drop was obtained in a microtube condenser is 10 kpa at 445 kg/m²s. Melanie Derby et al. (2012) proceeds the study on the condensation heat transfer in the triangular, square and semi-circular mini-channels to found the mass flux and vapour quality which have an influence on condensation effects. The experimental and numerical studies

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(57) Abstract :

In the not-too-distant future, photovoltaic (PV) technology will play an essential role in the production of energy. Improvements in processing power, data storage, and data-driven algorithms have all contributed to the rise of machine learning. We take a look at machine learning strategies for PV systems. To begin, PV electrical and thermal models are introduced. Following this, PV systems are analyzed using machine learning. We take a look at how machine learning may aid in the worldwide effort to achieve carbon neutrality and a cleaner environment. In this paper, we look at the challenges and opportunities that lie ahead for machine learning in PV system analysis. In terms of system efficiency and economic sustainability, many small-scale PV technologies, such as building integrated photovoltaic thermal systems (BIPV/T), have not yet reaped the full benefits of machine learning. Solar photovoltaic (PV) systems may benefit from machine learning in terms of generating more eco-friendly.

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(54) Title of the invention : PRESENT AND FUTURE ROLE PLAYED BY AI IN SUPPLY CHAIN PROCESS GREEN CLOUD COMPUTING ENERGY EFFICIENCY

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| <p>(51) International classification G06F0009500000, H04L0067100100, H04L0067100000, G06Q0020140000, H04L0047700000</p> <p>(86) International Application No PC// Filing Date 01/01/1900</p> <p>(87) International Publication No NA</p> <p>(61) Patent of Addition to Application Number NA Filing Date NA</p> <p>(62) Divisional to Application Number NA Filing Date NA</p> | <p>(71)Name of Applicant :</p> <p>1)Dr. T. Habeebur Rahman Address of Applicant :Assistant professor, Petrochemical technology, Excel engineering college, Excel boys hostel, Pallakkapalayam, Tamilnadu Namakkal, 637303, India, Pallakkapalayam -----</p> <p>2)Mr. Surrya Prakash Dillibabu</p> <p>3)Mr. Ameer Al-khaykan</p> <p>4)Mrs. A Priya</p> <p>5)Mr. Hemalatha Selvaraj</p> <p>6)Mr. Vidit Kumar</p> <p>Name of Applicant : NA Address of Applicant : NA</p> <p>(72)Name of Inventor :</p> <p>1)Dr. T. Habeebur Rahman Address of Applicant :Assistant professor, Petrochemical technology, Excel engineering college, Excel boys hostel, Pallakkapalayam, Tamilnadu Namakkal, 637303, India, Pallakkapalayam -----</p> <p>2)Mr. Surrya Prakash Dillibabu Address of Applicant : Associate Professor, Mechanical Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, 400feet outer ring road, Avadi, Chennai, Tamil Nadu-600062, India Chennai -----</p> <p>3)Mr. Ameer Al-khaykan Address of Applicant :Lecturer, Ameer Al-khaykan : Air conditioning and Refrigeration Techniques Engineering Department, Ameer Al-khaykan -Al-Mustaqbal University College, 51001 Hillah, Babylon, Iraq, -----</p> <p>4)Mrs. A Priya Address of Applicant Associate Professor, School of Architecture, Koneru Lakshmaiah Educational Foundation, Block B, Flat no 211, Aarnika, Pathur Road, Tadepalli, Guntur, Andhra Pradesh-522501, India Tadepalli -----</p> <p>5)Mr. Hemalatha Selvaraj Address of Applicant Associate Professor Department of Pharmacy Practice,NandhaCollege of Pharmacy,Koorapalayam Pirivu ,Pitchandampalatum Post,Erode, Erode, Tamilnadu-638052, India , Erode -----</p> <p>6)Mr. Vidit Kumar Address of Applicant Assistant Professor, Computer Science and Engineering, Graphic Era deemed to be University, Dehradun, Uttarakhand-248002, India, Dehradun -----</p> |
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(57) Abstract

Today cloud computing became an impressive solution to address the challenges in the storage and process of high-volume data, with low-cost, high-speed, on-demand and pay-per-use characteristics. Although rapid progress has been recorded in the area of cloud computing and its services, attaining the implementation of green clouds is still under development due to a lack of research and several barriers to its implementation. Green clouds are committed to designing as eco-friendly, energy efficient, max resource utilizable, low carbon emissions, long-lasting and recyclable. In order to satisfy the ever-growing enterprise data storage and processing needs, the cloud service providers are coming up with cutting-edge technologies like Green Cloud Computing in cloud architecture design to reduce the huge power consumption, water consumption, need for physical hardware peripherals, infrastructure and harmful carbon emissions etc. To protect our environment from negative cloud impacts, service providers must adopt and update their cloud infrastructure towards green computing. Green computing research widely focuses on designing efficient clouds with green characteristics like Power Management, Virtualization, High-Performance Computing, Load balancing, Green data centre, Reusability, Recyclability etc. As part of my research on green clouds, this paper presents an analysis report about green cloud computing and its characteristics in a detailed manner. This paper thoroughly discusses the former green computing achievements, current trending concepts of green computing and future research challenges as well. This comprehensive green cloud analysis report helps the naive green research fellows to learn about green cloud topics and to understand the future green cloud research challenges.

No. of Pages : 13 No. of Claims : 7



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An in-tire-pressure monitoring SoC using FBAR resonator-based ZigBee transceiver and deep learning models

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ABSTRACT

In automobiles, tires play an important role in ensuring safe driving. Hence tire pressure monitoring system (TPMS) has become the most important safety system in automobile vehicles. In this work, a new indirect TPMS is proposed that measures the pressure of all the tyres indirectly using the available sensors already mounted for typical vehicle dynamics control purposes. The available sensors in vehicles usually contain a power supply module, a microcontroller, and transceiver and resonator circuitry. The available wheel speed sensor is modified by reducing the wireless receiver system in communication protocols to minimize the power consumption. The transceiver structure is modified using a suitable local oscillator (LO) frequency plan based on a temperature-compensated thin film bulk acoustic wave resonator (FBAR). In addition, the proposed TPMS SoC uses a deep-stacked autoencoder to detect the adherence conditions of the tires and a pressure loss based on wheel speed. This module will initially pre-process the speed signals to remove the speed error caused by manufacturing error. After pre-processing, different features such as statistical, frequency-domain and the fitted frequency-domain characteristics are extracted from the wheel speed signal and fed to the Learning model for the judgment of the tire state. The proposed system was designed in Verilog synthesis and layout were made in cadence tool. For ASIC implementation, we use TSMC 65nm CMOS Library for LNA/hybrid mixer design. The performance measures of the pressure detection model in terms of accuracy and errors are evaluated. Also, the performance metrics of the transceiver architecture in terms of gain, NF, IIP3, S11 and FOM are evaluated. The experimental evaluation describes that the model procures a maximum gain of 58 dB, NF of 2.15 dB and IIP3 of 6.6 dBm respectively. The die area is 0.45 mm² with 0.8 supply voltage and 0.83 mW power. In addition to this, the relationship between peak amplitude and speed vehicle regarding time and frequency domain features are evaluated.

1. Introduction

With the rapid advancements in automobile vehicles, traffic safety increases quickly [1]. Hence tire pressure monitoring system (TPMS) has become the most important safety system in automobile vehicles [2]. The TPMS is the monitoring system that continuously monitors the air pressure and immediately reports the warning information to the driver [3]. Most people do not give importance to considering the convergence of the tires. Moreover, the tires are considered the safety equipment for maintaining the proper motion of the vehicle [4]. The tire's pressure gets continuously changed due to outside conditions like rocky roads and fast driving [5]. Thus, the tire's friction increases and results in a

lack of robustness of the vehicle [6]. Due to this, a sudden failure of tires arises while driving on the highways. Generally, in other countries like the US and Korea, the TPMS system has become more important in recent years [7].

The TPMS is commonly divided into direct TPMS and indirect TPMS [8]. Direct TPMS directly estimates the tire pressure with an antilock braking system (ABS). It mainly depends on the barometric pressure sensors and temperature sensors. In some other systems, accelerometers are used to examine the centrifugal acceleration obtained by the tire movement without sensors [9]. An indirect TPMS system does not estimate the tire pressure directly. Instead, it calculates the angular speed of the tire to understand the present status of the tire. In the indirect

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TPMS approach, the vehicle needs to be in a motion state to detect the vehicles' pressure. This can be done with the aid of the re-learn approach [10].

The TPMS approach uses controllers, the Simulink model, wake-up circuitry, transmitter and power source for a better system evaluation [11]. This approach helps to detect the dimension of the tire, acceleration, and wheel angle and it works based on the input information of each wheel rotation [12]. The android application is implemented to provide information to the vehicle driver to display the detected data. Pressure sensors, microcontrollers, transmitters, and lithium-based batteries detect tire pressure during stationary and motion states [13]. For efficient communication, Zigbee based transceivers are widely used. The solenoid valves in the Zigbee inflate and deflate the information easily [14]. It captures the tire pressure mechanism and warns the drivers if any problems occur. Normally, pressure sensors emit high-frequency signals that affect the tire pressure and overcome this resonator [15].

Recently, researchers have been keen on resonators that generate waves of a particular frequency and remove unwanted noisy frequencies from the signal [16]. The resonators are widely used in several applications that emit a frequency of about 100 MHz to 20 GHz [17]. These resonators can even act as a sensor or as a filter. It is widely used in radio frequency (RF) front-end circuits like RF filters to produce a high Q-factor [18]. In recent years, researchers have been interested in AI-based techniques such as ML and DL approaches. The smartphone based vehicular tire pressure and condition monitoring [19] are introduced to monitor the pressure changes rapidly. A design approach is developed to handle tire pressure monitoring in autonomous vehicles [20] to estimate tire pressure without any sensors. The frequency analysis based TPMS [21] approaches are emphasized to remove unwanted frequency from the signals. But the approaches above are highly suffered due to multiple drawbacks such as high-frequency emission, error occurrence, poor sensing quality etc.

A lot of researches are fascinated with the tremendous outcome of the DL approach. Only peripheral studies have been reported based on the TPMS approach. But, the capability of such approaches remains a challenging task. Hence, an efficient approach is highly required to improve the robustness of automobile vehicles. Even though peripheral research was undertaken, multiple drawbacks arise, such as noisy outcomes, high error, cost complexity, etc. These major drawbacks motivate us to develop an enhanced TPMS method for automobile vehicles.

2. Related work

Liu et al. [22] proposed noise cancelling common gate (CG) common source (CS) low noise amplifier (LNA) to enhance the gain and noise performance. Here, the current-bleeding (CBLD) circuit is introduced to provide DC current of the auxiliary amplifier. At the output the passive network had been added to eliminate the noise of the CBLD circuit. Also, to assist the gain and noise performance over the desired band the passive network provides shunt peaking. The amplifier was designed in TSMC 40 nm CMOS technology and it attains a gain of 16.5–19.5 dB, noise figure (NF) of 3.2–5.2 dB and IIP (third input intercept point) of –3.5 dBm. The compact area is 0.092 mm² with supply voltage of 1.2 V respectively. Barzgari et al. [23] had defined current reuse LNA amplifier with mixer and oscillator for low power applications. The proposed receiver architecture attains low power consumption and it is implemented in CMOS technology. The experimental evaluation describes that the model procures a maximum gain of 57 dB, NF of 10.5 dB and IIP3 of –15.5 dBm respectively. The die area is 0.75 mm² with 0.8 V supply voltage.

Mauludin et al. [24] proposed a Balun low-noise amplifier (LNA) to achieve low NF. The proposed LNA is an integration of a common-gate (CG) to attain wideband input matching and a common-source (CS) to eliminate distortion and noise. At the CS stage a feedback connection is

given to the gate of the CG to improve the transconductance of phase. Also, a complementary transistor with a current reuse technique are employed to improve the overall transconductance of the LNA without maximizing power consumption by the phase. The proposed LNA was constructed using TSMC 65 nm technology. The simulation results of the proposed LNA shows a maximum power gain of 20 dB, NF of 4 dB, and IIP3 of –10 dBm by consuming a power of 5 mW from 1.2 V supply. The area covered by the entire circuit is 475 × 366 μm². The design does not possess balanced condition for the noise cancellation technique.

Eskandari et al. [25] proposed balun inductorless wideband LNA along with active loads for multi-standard radio applications. Current reuse and noise cancelling techniques are integrated to reduce the requirement for high energy consumption. A common gate structure is employed in which it process without decreasing the input matching allowing a large scaling metric for the CS phase in noise cancellation approach. The proposed LNA was constructed using RF CMOS 180 nm technology. The simulation results of the proposed LNA circuit show a voltage gain of 20.2 dB, NF of 2.37 dB, bandwidth of –3 dB, return loss of –13 dB, and IIP3 of –2.1 dBm by utilizing a power of 6 mW from 1.2 V supply. The area covered by the entire circuit is 0.026 mm². The design can also compensate gain and phase imbalances by utilizing a passive capacitor between differential outputs.

Tiwari et al. [26] proposed wideband inductorless LNA along with single to differential conversion for multi-standard radios and multiband. A dual shunt feedback is utilized to decrease the bias current of CG phase while the current is reused by CS phase. To gain maximum transconductance complementary CS phase is used. Two shunt feedbacks are used to reduce the bias current of CG phase. The circuit is implemented using CMOS technology in 180 nm with an area of 0.18 mm². The simulation results of the proposed LNA circuit achieve a maximum voltage gain of 18.5 dB, low NF of 2.8 dB, and –13 dBm IIP3. The implemented circuit draws a power of 5.58 mW from 1.2 V power supply.

Tiwari et al. [27] proposed CS and CG-based balun LNA for smart IoT applications. The proposed circuit uses pMOS-nMOS configuration to gain efficiency and double the transconductance. Noise cancellation technique is employed using CS-CG pair. Loads of CG and CS phase are coupled to eliminate the tradeoff between voltage headroom and voltage gain. The proposed LNA is implemented using RFCMO technology in 0.18 μm. The LNA circuit achieves a maximum of 18.5 dB voltage gain, minimum of 3.6 dB NF, bandwidth of 3 dB, minimum of –8.5 dBm of IIP3, and minimum of 12 dBm of IIP2. The LNA covers an area of 0.18 mm² and utilized 3 mW of total power from 1.8 V supply. The proposed design is only for a single-ended LNA and not suitable for single to differential conversion.

Kim et al. [28] proposed a broadband temperature (PVT)-insensitive noise cancellation balun LNA for wireless communication applications. The proposed LNA is based on CS-CG topology and it uses diode-connected loads to decrease the noise contribution raised by CGCS transistors and improves linearity due to post linearization. It reduces NF an auxiliary CS amplifier with a diode-connected load is implemented with the LNA. The proposed LNA is designed using RFCMO technology in 0.13 μm. The experimental results shows that the proposed LNA attains NF of 4 dB, and return loss of 10 dB. The power consumed by the LNA circuit is 2.7 mW from 1.2 V supply voltage. The proposed design unaware of input matching.

Abbasi et al. [29] proposed low-power and wideband RF-to-baseband-current-reuse receivers (CRR). The proposed design shares a single supply and bias current between the LNTA and balun circuits to decrease power consumption. The components of the proposed design are LNTA, active-inductor (AI), down-conversion active-mixer, noise cancellation technique, and transimpedance amplifier (TIA) circuits. The technology used to design the proposed LNA is in 130 nm that occupies an area of 0.025 mm². The LNA achieves wideband input matching of –10 dB, 39.5 dB of conversion-gain



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Systolic optimized adaptive filter architecture designs for ECG noise cancellation by Vertex-5

S. Jayapoorani¹ · Digvijay Pandey² · N. S. Sasirekha³ · R. Anand⁴ · Binay Kumar Pandey⁵

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Abstract

The adaptive sign least mean square (SLMS) filter may change dynamically depending on the filter output. Noise cancellation is one of the most common adaptive filter applications. In real-time applications such as medical computing, the speed of the process producing hardware is critical, hence, this study proposes the hardware implementation of the SLMS adaptive filter utilizing the Xilinx System Generator. The suggested design seeks to improve performance while decreasing convergence rate and route latency. In this paper, (i) we proposed a modified architecture for an 8-tap SLMS adaptive filter and (ii) multiplier-less structure for a Modified DLMS Filter is introduced and compare the same. The ECG signal was evaluated using the intended architecture. The algorithm's functionality is tested in MATLAB using varied ECG data from the MIT-BIH database as input. Using Xilinx system generator, the LMS and SLMS are developed, simulated, synthesized, and implemented on a Virtex-5 FPGA. When comparing Systolic Sign LMS Filter to LMS Filter, the result reveals a 5% drop in total real-time router completion and a drop in the number of adders and subtractors, as well as a 48.8% reduction in maximum combinational path latency.

Keywords Xilinx · System generator · Least mean square · Sign least mean square

S. Jayapoorani and Binay Kumar Pandey have contributed equally to this work.

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1 Introduction

Adaptive filters are mainly used in the field such as digital signal processing such as adaptive equalization, system identification, noise cancellation, etc. All these applications are based on the LMS, because it has easy calculation and high performance [1]. Thus Roy et al., developed the Delay Least Mean Square (DLMS) algorithm for the Very Large-Scale Integrated (VLSI) design of LMS adaptive digital filter. It is observed from this paper that the path delay and convergence rate problems are present due to the feedback error term. It is needed for updating all the corresponding weights of the adaptive filter. In case, the hardware implementation, it is essential to reduce path delay, area and power and increase the speed of the structure.

Van and Feng [2], developed the efficient tree structure for real time digital signal processor using Systolic Architecture for the DLMS Adaptive Filter. With the advancement in VLSI technology, it is possible to perform hardware realization

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et al., 2007) and flavonoids (Zhu et al., 2013). Furthermore, antioxidants also have the potential to inhibit α -Syn oligomer formation. Since 2001, many researchers have reported their work on DA (Mates et al., 2003). The current article reviews the recent works reported on the interaction of DA metabolites with α -Syn oligomers, and its promotive effect by divalent metal ions as well as preventive effect by antioxidant GSH.

2. Dopamine and α -Syn in PD

DA can have many fates within the DAergic neurons which include the synthesis, storage, release, re-uptake and degradation (Fahn and Cohen, 1992; Jenner and Olanow, 1996; Stokes et al., 1999; Best et al., 2009; Elsworth and Roth, 1997; Lawlor and Durling, 2006; Kaufman, 2013; Jose et al., 2013; Sotnikova and Gainetdinov, 2009; Vorwieser et al., 1998; Yeh et al., 2016; Kuriakose and Stoessl, 2010; Ravan et al., 2014). This whole process can be controlled by the presynaptic protein called α -Syn as shown in Fig. 2 (Cheng et al., 2011; Emanuele and Chiragatti, 2015). α -Syn modulates DA synthesis and controls the formation and re-clustering of synaptic vesicles for DA storage (Perez et al., 2002). α -Syn also controls DA release and reuptake process by modulating DA transporter (DAT) and expression activity (Abeliovich et al., 2000; Yavich et al., 2004). Thus, α -Syn also controls the auto-oxidation of DA by modulating vesicular monoamine transporter 2 (VMAT2) activities. Therefore, both DA and α -Syn levels have significant role in the presynaptic DAergic neurons and their abnormal levels may lead to neuronal death in PD (Eiden, 2000; Parsons, 2000; Weihe and Eiden, 2000; Lotharius et al., 2002; Guo et al., 2008; Graham, 1978).

3. Dopamine in α -Syn oligomer formation

α -Syn is a neuro protein which is highly expressed in the central nervous system and only a small amount is released from nerve cells. α -Syn release increases under cellular stress conditions which causes more α -Syn aggregates (Lashuel et al., 2013; Hamilton, 2000; Giguere et al., 2018; Spillantini et al., 1997). α -Syn is a protein with 140 amino acids (mass range = 14.4 kDa or 4.7 pKa) which is terminated into three regions (Hashimoto et al., 2000). Amino acid residues 1-64 is an amphipathic Lys-rich amino terminus that contains the mutation sites of familial PD (A30P, E46K, A53T) which can form amphiphilic alpha-helix structure. An amino acid residue 65-90 is a central region that contains a highly hydrophobic motif (NAC region) (Gjasson et al., 2001; Ulmer et al., 2005). Amino acid residues 91-140 is a disordered acidic carboxy-terminal tail (C-terminal) (Heise et al., 2005) α -Syn can assume various conformations from monomer to β -sheets, oligomers, fibrils and LBS (Hashimoto et al., 2000; Rodriguez et al., 2015; et al., 2015).

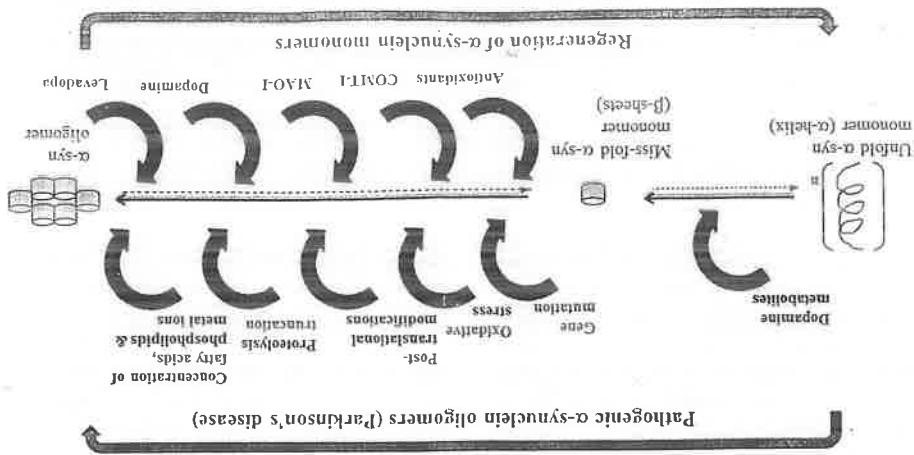
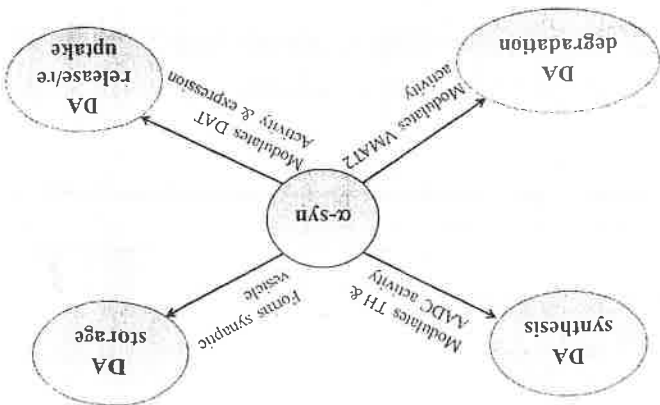


Fig. 1. Pathogenic and regeneration features of α -Syn structure.

Fig. 2. Role of α -Syn on the molecular pathway of DA.



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amino acid Lys to make covalent interaction with DOPAL for forming pyrrole ring after eliminating water as side product. This pyrrole ring formation can be inhibited by adding antioxidant GSH. GSH can reduce divalent Cu^{2+} into monovalent Cu^+ ion by forming GSH- Cu^+ complex which cannot interfere with α -Syn structure (Binolfi et al., 2006; Lawson et al., 2016; Outeiro et al., 2009). Moreover, Fe also plays a cellular role in the DAergic degeneration in PD. For example, Cappai et al., found that DA can inhibit Fe induced α -Syn amyloidogenic aggregates (Pham et al., 2014).

α -Syn-lipid interaction can inhibit the formation of DA-induced oligomers by altering the actions of α -Syn which requires membrane association (Cappai et al., 2005). DOPAL can induce α -Syn oligomers but DOPAL- α -Syn adduct inhibits the formation of oligomers in N-terminal lipid-binding domain into lipid vesicles or detergent micelles (Chan et al., 2012). Outeiro et al., studied that, DA and its agonists cannot induce conformational changes in α -Syn structure which can be prevented by blocking DA transport into the cell (Jethva et al., 2011). Jethva et al., studied the modulation of α -Syn aggregation by DA in the presence of MPTP, and found that the conversion of MPTP to MPP^+ is not required for the aggregation of α -Syn (Palanisamy et al., 2014, 2016; Sivakumar et al., 2020; Prabu et al., 2018).

9. Summary and future perspectives

It seems Lys side chain of α -Syn sequence has major impact in the formation of oligomers and fibrils in PD patients. It is because Lys has higher affinity with quinone containing DA metabolites like DAQ and DAC. However, DAC has higher amount of quinone sites than DAQ, and the quinone binding sites of DAC can further be multiplied through the polymerization of DAC into neuromelanin. As a dark pigment naturally found in brain, neuromelanin has less toxic effect than DAC. Due to this reason α -Syn fibrils formed through the interaction of neuromelanin with α -Syn monomer has less toxic effect than the oligomers formed by DAQ and/or DAC. The toxic DA metabolites such as DAQ and DAC can be converted into non-toxic DA and leucoaminochrome through the reduction of toxic quinone adduct into non-toxic catechol adduct by adding antioxidant GSH. The transformation of α -Syn oligomers into fibrils can also be naturally protected by human brain through lysosomal CMA decomposition pathway. The lysosomal CMA activity also protects human brain from the formation of neurotoxic α -Syn oligomers by decomposing them into monomers. Moreover, DA metabolites induced α -Syn oligomers can be further promoted by excess divalent metal ions especially Cu^{2+} , and it can be successfully inhibited by reducing toxic Cu^{2+} into non-toxic Cu^+ in the presence of antioxidant GSH.

The previous studies on DA metabolites induced α -Syn oligomers are mainly focused on *in-vitro* methods. The researchers have widely used recombinant proteins and tissue extracts for their investigation. The limitation in this research is that, 'no *in-vivo* works' have been done for clinical use. It is because their lack of understanding about the interaction between α -Syn and DA metabolites. The current review highlights the mechanism between α -Syn and DA metabolites interaction, binding sites, promotive and inhibition effect. It is believed that, the information provided in this review can help the readers to understand the chemistry behind α -Syn-DA interaction for their future endeavors especially in *in-vivo* experiments.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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interaction of DAC with the 125YEMPS129 residues (Kim and Kang, 2005). Mazzulli et al., discovered the cell free and cellular prevention of α -Syn aggregates by DA (Whitehead et al., 2001). While Leong et al., held an opposite opinion that the 125YEMPS129 residue acted as an antioxidant to prevent DA oxidation (Rekas et al., 2010b). Various binding sites of α -Syn and its interaction with DA metabolites are described in Fig. 7.

All of the modifications on amino acid residues of α -Syn by DA induce the conformational change in α -Syn structure which leads to misfold of α -Syn and further formation of α -Syn oligomers in PD (Ebrahimi-Fakhari et al., 2012). So, the neurons can survive themselves by two ways either by transferring the toxic oligomers into non-toxic mature fibers or start-up of autophagy system. Expression of α -Syn in intracellular region may be caused by the following two major α -Syn degradation pathways of ubiquitin-proteasome system and autophagy-lysosomal pathway (Martinez-Vicente et al., 2008). Martinez et al., found that, only a small quantity of DA-modified α -Syn oligomers is degraded by CMA (Kawamoto et al., 2002), which is also consistent with their previous findings (Cappai et al., 2005). 14-3-3 protein is one of the chaperones that related to α -Syn aggregation (Xu et al., 2002). Xu et al., reported 54–83 kDa mediated DA-dependent neurotoxicity that contain α -Syn and 14-3-3 protein (Colapinto et al., 2006). And Colapinto et al., found that DA regulated redox chaperones increased the level of 14-3-3 protein by 60% (Alberio et al., 2010).

DA-induced α -Syn aggregation may also generate inflammation stress to the neurons. For example, Lee et al., reported that the neuroinflammation caused by DA mediated α -Syn oligomers other than DAergic degeneration (Lashuel et al., 2013). DA itself is able to upregulate α -Syn expression, α -Syn significantly reduces NF- κ B activation which is completely quenched by DA treatment (Chartier-Harlin et al., 2004).

8. Promoter and inhibitor effect on dopamine induced α -syn oligomers

Metal ions are known to be a potential candidate in the pathogenesis of PD and forms a complex with the DA induced α -Syn aggregation (Brown, 2009) and it has been proposed that a unique Cu can induce toxic α -Syn oligomers (Wright et al., 2009; Kim et al., 2002). α -Syn oligomers expressed by the incubation of Cu^{2+} ions (Lucas and Lee, 2011; Paik et al., 2000; Wang et al., 2010a; Jinsmaa et al., 2014). Burke et al., have investigated that oxidized catecholamine-mediated α -Syn aggregation was enhanced by Cu ions and it was significantly prevented by scavengers, azide and N-cysteine (Hattoria et al., 2009). In Colapinto's study, the effect of DA reduced DJ-1 level was enhanced by Cu^{2+} . However, expression of α -Syn oligomer was not found in PD *in-vivo* studies. It is because there is around 65% of reduction in Cu^{2+} within the substantia nigra in PD (Genoud et al., 2020). On the other hand, Fe^{2+} is increased and the interaction between Fe^{2+} and DA has recently been comprehensively reviewed (Hare and Double, 2016).

DOPAL induced α -Syn oligomers are considerably higher in the presence of divalent metal ions than the monovalent and trivalent metal ions. Other DA metabolites, DA itself and metal ions alone or in combination with DA also had no effect (Bisaglia et al., 2009). The interaction of divalent Cu^{2+} with DOPAL is dominant than Fe^{2+} and Mn^{2+} in α -Syn oligomerization (Wang et al., 2010b).

The divalent Cu^{2+} promoted DOPAL interaction with MK amino acid repeats of α -Syn are shown in Fig. 8. Cu^{2+} ions are usually located in the binding sites of Met-1 and histidine-50 in α -Syn sequence. However, here we have considered Met-1 as a model site to explain the Cu^{2+} promoted α -Syn oligomers. It is already well discussed that, the divalent Cu^{2+} ions can oxidize Met and Tyr amino acid sequence of α -Syn. In Fig. 8, Cu^{2+} acted as catalyst to remove the electron from aldehyde adduct of DOPAL by breaking hydrogen atom. During this reaction, Cu^{2+} gets reduced to Cu^+ state. This process catalyzes the oxidation of

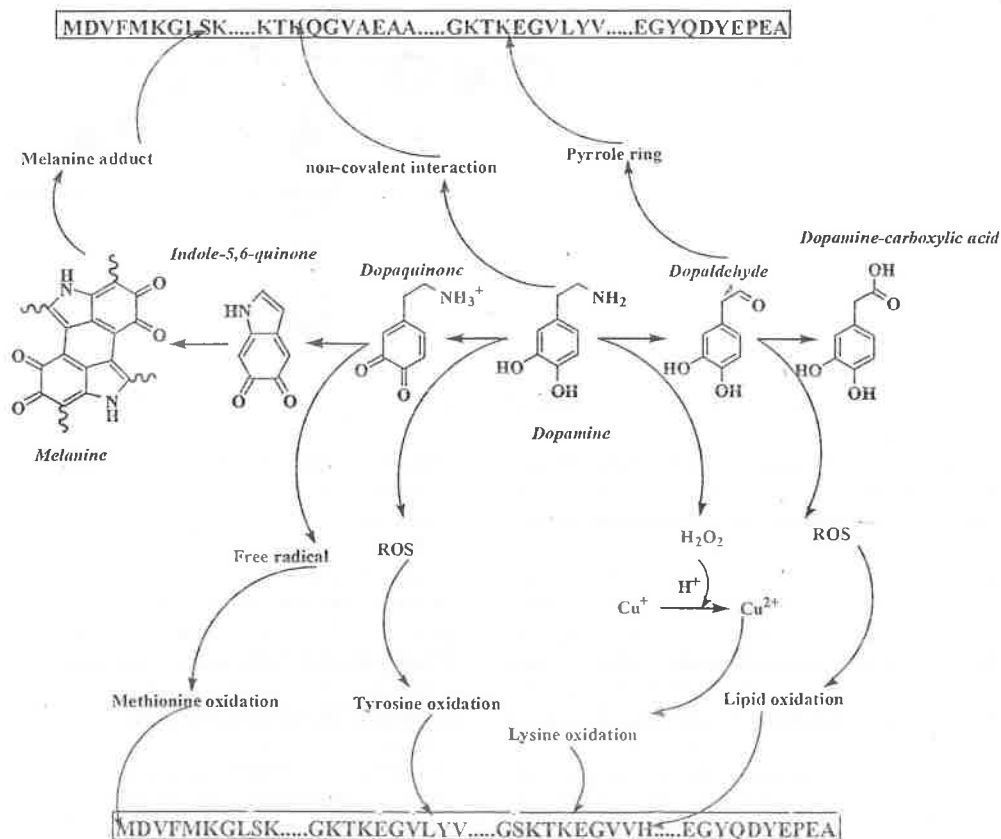


Fig. 7. Mechanism for the modification of α -Syn with DA adducts.

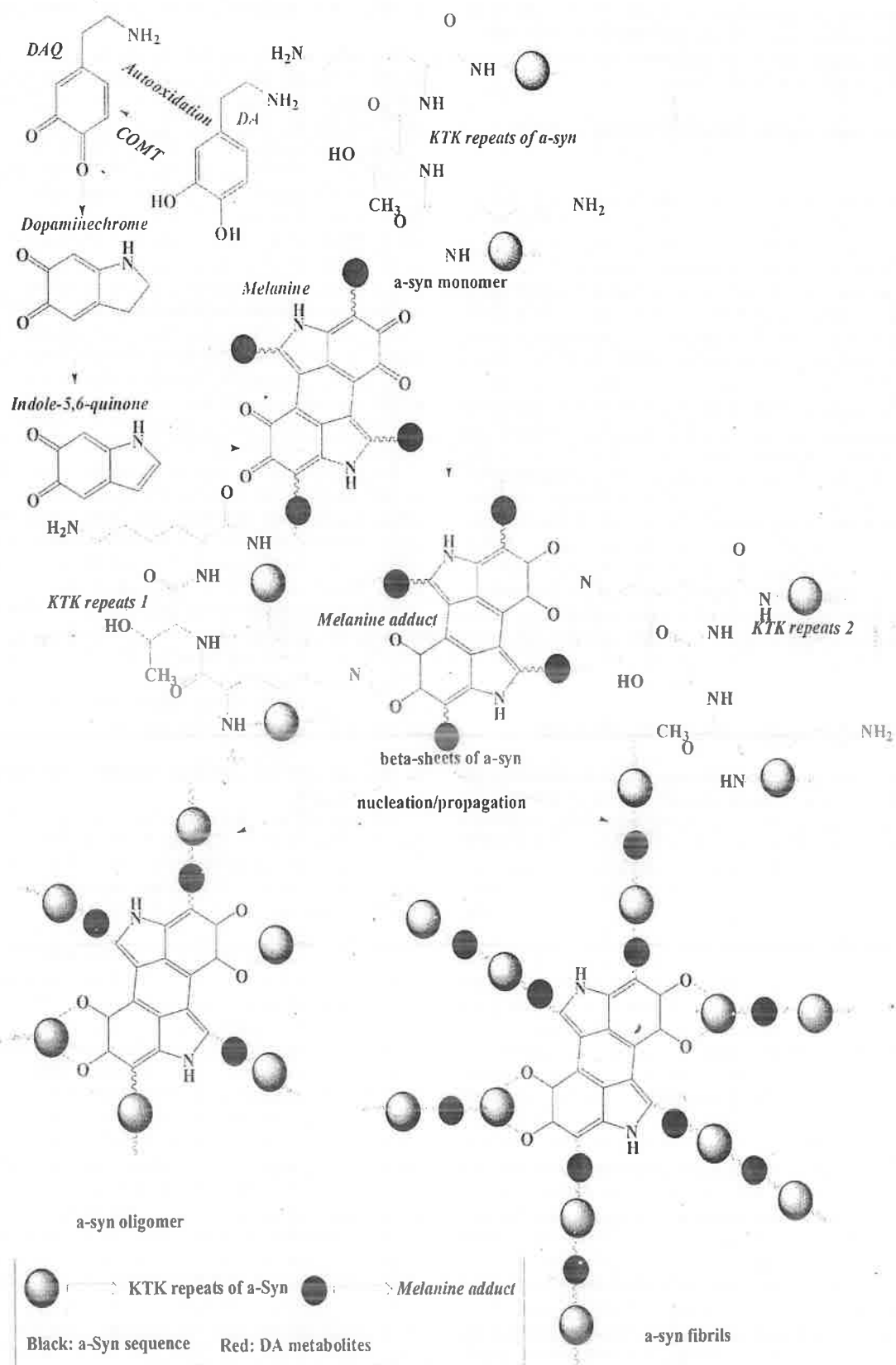


Fig. 5. Mechanism for the formation of melanin induced α -Syn oligomer and fibrils.

adducts (Herrera et al., 2017). In addition, Tyr from VV repeats of α -Syn amino acid sequence was oxidized by ROS produced during the oxidation of DA, and the oxidized Tyr interacts with DA through covalent interaction (Masarik et al., 2004; Bryan et al., 2012; Warner et al.,

contributed by the presynaptic enzymes such as COMT and MAO (Lopes et al., 2014). The DAQ produced further interacts with Lys side chain of KT amino acid repeats to form α -Syn-DA complex through covalent bonding (Hamilton, 2000), while DOPAL forms catechol pyrrole

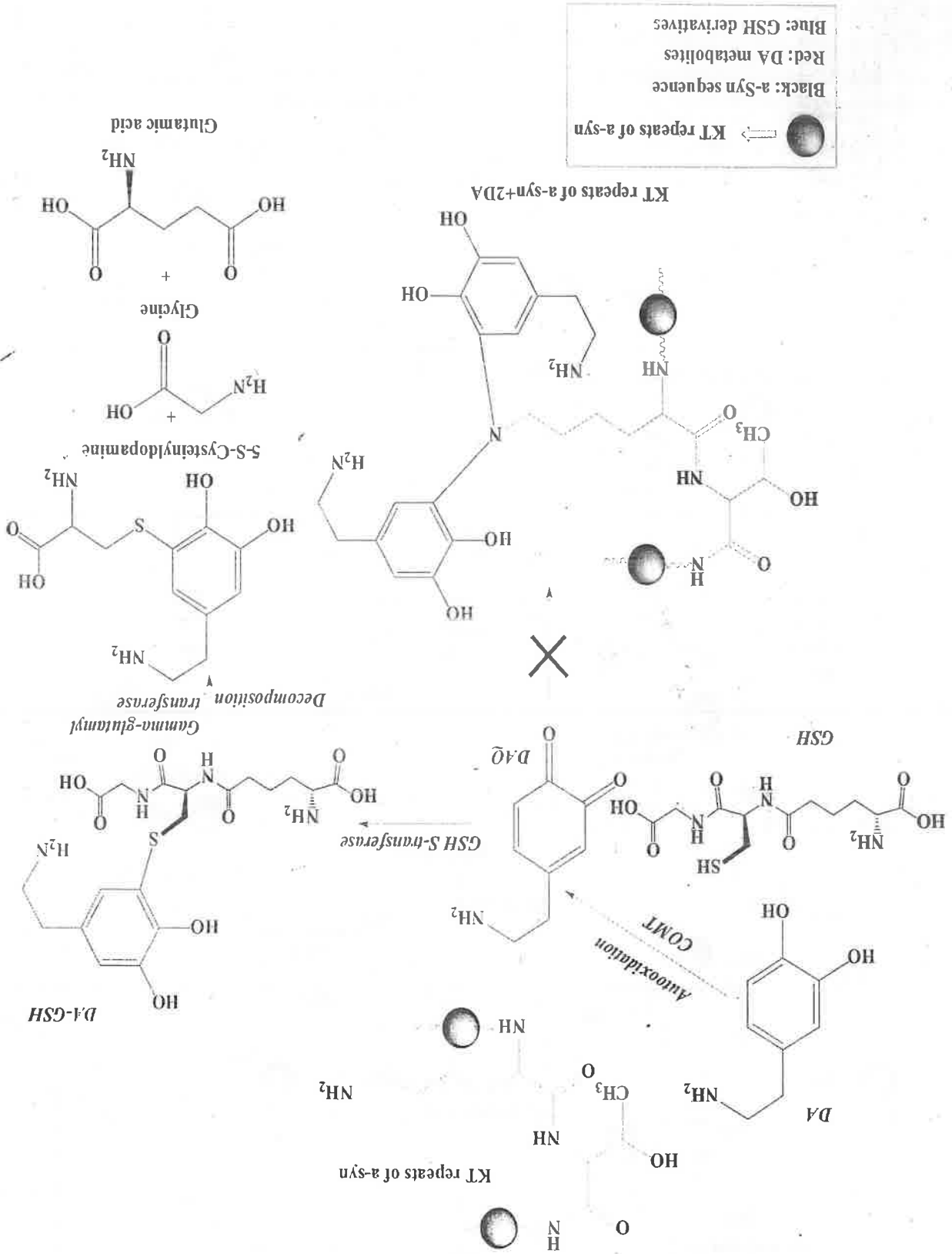


Fig. 4. Mechanism for the formation of GSH-DA complex from DAQ and its decomposition into 5-S-cysteinyl-dopamine, glycine and glutamic acid.

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Confinement effectiveness of 2900psi concrete using the extract of *Euphorbia tortilis cactus* as a natural additive

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ABSTRACT

Concrete with cactus is a new type of concrete with high fluidity, strength, and durability with more remarkable advantages. The present paper discusses the role of *Euphorbia tortilis cactus* (ETC) to achieve the strength, durability, and corrosion resistance properties of concrete specimens. In this work, M_{20} (2900psi) concrete was designed as per Indian standards, and cactus were used as an additive. ETC extracts from Tamilnadu (India) were replaced with water (1%, 3%, 5%, 7%, 9%) by weight. The performance of cactus concrete was analyzed through destructive and non-destructive tests to investigate strength properties. In addition to that, specific tests such as sorptivity, permeability, half-cell potential test, etc. have been performed further for durability and corrosion resistance. ETC concrete improves the fluidity, thereby enhancing the workability of the mixture. Concrete was analyzed through Scanning Electron Microscopy (SEM) to identify the particle distribution. Experimental investigation shows that the strength properties of concrete have been enhanced by 29% due to Polysaccharides at optimum level. However, durability is achieved at a high, which stimulates the effective filling of voids in concrete. It shows that better performance of concrete gives at optimum dosage. On *Euphorbia tortilis cactus* concrete, no literature has been discovered.

Keywords: concrete; euphorbia tortilis cactus; bio additive; destructive test; non-destructive test.

1. INTRODUCTION

In the construction Division, cement composite is the most extensively utilized construction material. A potential problem with concrete is its strength and durability, which is governed by several factors such as lower values of compressive strength, high chance of clogging, and less resistance to corrosion in severe environments. Various alterations in concrete are made nowadays, like changing mix proportions, adding admixtures, replacing with alternative waste products, and changing composition to achieve good results (Workability, Viscosity of concrete, high performance, and high strength). Present advancement in concrete construction technology demonstrates the possibility of improving concrete quality by altering its composition with fibers. Cement acts as the main role in concrete for binding. While manufacturing cement in industry, more amount of carbon-di-oxide emission happens which is detrimental to the environment. Lime was used as a binding material in ancient times in place of cement, but it was not durable. To modify the properties, Chemical additives are being used in concrete. The use of synthetic polymer additives will emit more toxic species to nature. Moreover, the usage of chemical admixtures is expensive. To cut down these downsides in concrete, the adoption of low-cost natural additives (*Euphorbia tortilis cactus*) is in the light of current research.

AL-JABRI *et al.* [1] used copper slag with sand and achieved good strength in high-performance concrete. Starch admixtures were tested with cement by AKINDHAET and UZOEGBO [2], an improvement in durability was observed. Bio-superplasticizer had a small impact on porosity said by BEZERRA [3]. As per Chandra's research [4], the cactus extract is giving good plasticity and improves water holding capacity. CARDENAS *et al.* [5]



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Research Article

Mechanical performance of ETC RC beam with U-framed AFRP laminates under a static load condition

P. Loganathan^{1*}, R. Mohanraj², S. Senthilkumar³, K. Yuvaraj⁴

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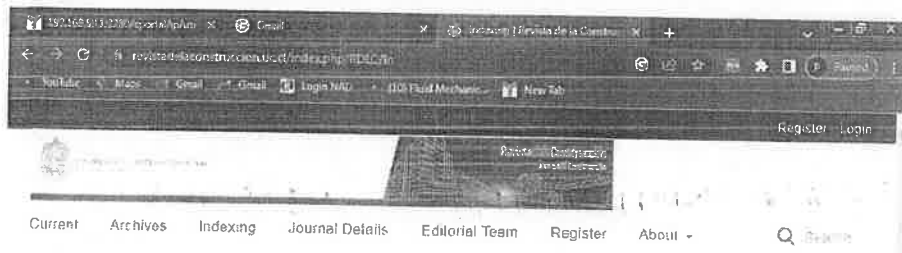
Citation: Loganathan, P., Mohanraj, R., Senthilkumar, S., and Yuvaraj, K. (2022). Mechanical performance of ETC RC beam with U-framed AFRP laminates under a static load condition. *Revista de la Construcción. Journal of Construction*, 21(3), 678-691. <https://doi.org/10.7764/RDLC.21.3.678>.

Abstract: In the presented paper, an attempt has been made to first find the permeability of the *Euphorbia tortilis* cactus (ETC) concrete by the water permeability method and infiltration method. After that, the flexural strength of the ETC RC beam wrapped with AFRP kelvar 149 is carried out by a 2-point load test. This research aimed to develop a more durable, flexural, and sustainable beam under static load. Based on the state-of-the-art information available in the literature, 3-layer Kelvar 149 AFRP is considered as a laminate to solve the deflections of the ETC beam. In this project, RCC beams were strengthened by ETC and aramid FRP sheets. Novel results are obtained by different layers and patterns of Aramid FRP sheets. Based on the investigation 3-layers Kelvar 149 perform well than a normal concrete beam. As no result based on hydraulic conductivity and drying shrinkage of a beam with AFRP laminates are available in the literature, the obtained results are validated with the finite element method (ABAQUS) under static load conditions.

Keywords: Aramid fiber reinforced polymer, kelvar 149, rehabilitation, hydraulic conductivity test, *euphorbia tortilis* cactus.

1. Introduction

Cement composite is the most extensively utilized construction material in the construction division. Throughout their projected lifetime, concrete structures are supposed to withstand physical, chemical, and weathering impacts while still keeping the desired technical qualities (Hanehara & Yamada, 1999). Often, degradation and failure occur before the predicted lifetime due to micro cracks development and fluids' subsequent entry into these structures. The setting and curing characteristics of the concrete, cement paste, or mortar at the time of production affect durability performance. Though concrete strength and durability is a potential problem, which is governed by several factors such as lower values of compressive strength, a high chance of clogging, and less resistance to corrosion in severe environments.



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Research Article

Torsional performance of reinforced concrete beam with carbon fiber and aramid fiber laminates

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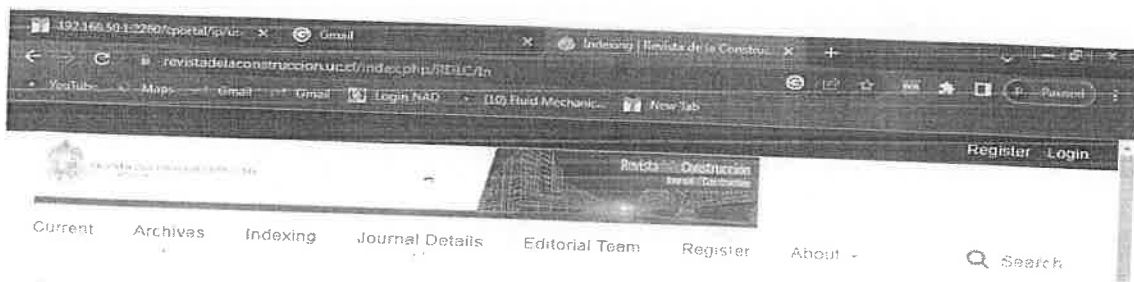
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Abstract: In the presented research paper, investigated the torsional performance of reinforced concrete beams with light emissions grade of cement utilizing Carbon fiber and its relative investigation with aramid fiber, for its torsional conduct, utilizing both exploratory and insightful strategies. A distinctive example of its strips folded over RC beams and the torsional conduct of these restrengthened beams is considered. Carbon fiber (CF) is utilized as outside support. Reinforced concrete beam retrofitted with CF tried for torsional disappointment utilizing lever arms exposed to torque. The beams have dimensions of 150mm in width and 200mm in depth and 1 m long, as planned according to IS456-2000. Three bars are intended for a twist. Steel has a stronger ultimate strength but a lower density than aramid FRP, as well as being easier to install and requiring no interim support until it reaches its full strength. The impact of various sorts and designs of CF on the initial stage of breaking load, extreme load conveying limit, and disappointment method of the beam are thought about and its relative examination utilizing finite element programming with aramid fiber gives a better outcome for additional investigation.

Keywords: carbon fiber, aramid fiber, retrofitting, torsional analysis, ANSYS.

1. Introduction

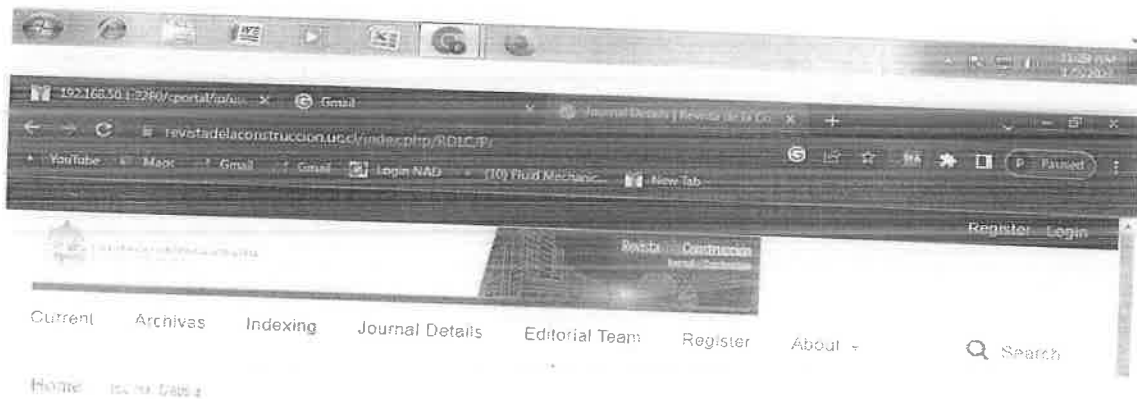
The utilization of strands to work on post strength of considerable conduct is exceptionally well known nowadays. Since the most recent 4 decades, a few diverse fiber types and materials have been utilized to further develop the solidness of concrete and furthermore its actual properties (Abed, El-Chabib, & AlHamaydeh, 2012). Demonstrating such different free examination results shows the capacity of such filaments, which further develop the toughness of concrete and its actual properties. Notwithstanding the beginning, cracking, when initiated by a few cycles like mechanical, chemical, and natural cycles, brings about disintegrated and less-strong concrete (Al-Mahmoud, Castel, & François, 2013). Likewise, the expanded penetrability brought about by breaking can speed up other disintegration measures bringing about less-strong concrete (Askandar, Mahmood, & Kurda, 2020). The greater part of RCC structures have experienced extreme degradation since their



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(57) Abstract

Artificial Intelligence-Based Approach Integrated with IoT Powered by Solar Energy for Unmanned Air Filing of Tires of Vehicles is the proposed invention. The invention focuses on implementing techniques of Artificial Intelligence for supporting the monitor of tires. The proposed invention aims at achieving the unmanned air filing aspect along with Internet of Things (IoT) techniques powered by solar energy.

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