IEI Epitome

Volume 8 | Issue 11 | November 2023

A Century of Service to the Nation

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announcements ...

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Notification for IEI R&D Grant-in-Aid

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To promote appropriate technology, assist in building up design & research talents and, most importantly, to help in nurturing potential R&D venture amongst engineering students pursuing Diploma/UG/PG/PhD courses. The Institution of Engineers (India) had instituted the R&D Grant-in-Aid program way back in 2001.

Every year, the Institution invites applications for funding industry-oriented R&D projects and research initiatives aimed at improving the life-style of common people from engineering students pursuing full time Diploma/UG/PG/PhD engineering program in AICTE/UGC/NAAC approved Institutions / Colleges / Universities. The application form and guidelines are available in our website https://www.ieindia.org. The projects should be carried out under the guidance of faculty members who are Corporate Members of IEI. Membership criteria for student(s), guide(s) and institution(s) are as follows:

Project Category	Student/Applicant Membership	Guide(s) Membership	Institutional Membership
1. Diploma	Exempted [Membership of Student Chapter is desirable]	AMIE/MIE/FIE	Not Mandatory
2. UG (BE/BTech/ Equivalent)	'Student Member' (SMIE)	AMIE/MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank
3. PG (ME/MTech/ Equivalent)	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank
4. PhD	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA/NAAC Accreditation or valid NIRF Rank

The soft copy of the duly filled-up applications (in editable format), as per the proforma available on our website www.ieindia.org, should be sent through email to **research@ieindia.org** and one printed copy of the same should reach the following address:

The Director (Technical)
The Institution of Engineers (India)
8 Gokhale Road, Kolkata 700 020

Kindly go through the guidelines (visit link: **https://www.ieindia.org/webui/IEI-Activities.aspx#RnD-Initiative**) before filling up the application.

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Dr Amit Krishan, MIE
Senior Engineer (Environment)
LEA Associates South Asia Pvt Ltd, New Delhi
amitkrishan001@gmail.com

Dr Amit Krishan was declared eligible for Award of Degree of Doctor of Philosophy (PhD) in Environmental Engineering during the period 2015-2023 on the thesis entitled "**Water Quality Management of Gomti River (India)**" by Delhi Technological University (Formerly Delhi College of Engineering), Delhi on 04 October 2023.

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BOOK CHAPTER

Prof (Dr) C M Narayanan, MIE
Retired Professor
Chemical Engineering, National Institute of Technology, Durgapur, West Bengal
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Title of Paper: Liquid Membrane Permeation: The Green Technology for Economic Recovery of Valuable Products from Waste Streams / Industrial Effluents — A Review

Part 3, Chapter 11, Concept of Zero Liquid Discharge - Innovations and Advances for Sustainable Wastewater Management, Elsevier, July 2023, pp 245-292, Paperback ISBN: 9780323917452, eBook ISBN: 9780323972567

DOI: https://doi.org/10.1016/B978-0-323-91745-2.00013-9

Co-author: Vikas Narayan

***Abstract**: This chapter reviews all the developments that have taken place in the area of liquid membrane permeation (LMP) technology till this date, highlights its prospects as an efficient, green technology for waste utilization (recovery of valuable products from waste streams/industrial effluents). Mathematical modeling and simulation of LMP processes have also been surveyed and analyzed. The chapter covers basic principles of LMP technology, types of LMP systems and their characteristics, industrial applications of LMP technology, mathematical modeling and analysis of LMP systems/processes, conclusions and future recommendations. The specific advantages of LMP systems have been emphasized and illustrated in detail (with examples) and their limitations and areas that are required to be explored in future are also outlined.*

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Papers published in the Journals / Proceedings ....

Er Ritu Raj Lamsal, FIE
Research Scholar
University of Malaga, Spain
✉ lamsal.raj@gmail.com

Title of Paper: Design and Implementation of Internet of Things (IoT) Platform Targeted for Smallholder Farmers: From Nepal Perspective

Agriculture, Special Issue 'Internet of Things (IoT) and Agricultural Unmanned Aerial Vehicles in Smart Agriculture', 2023, 13(10), ISSN: 2077-0472

DOI: https://doi.org/10.3390/agriculture13101900

Co-authors: P Karthikeyan,Pablo Otero & Alfonso Ariza

Abstract*: Nepal, a lower-middle-income country in South Asia, predominantly features smallholder farming communities operating on modest land holdings. These smallholders often adhere to traditional farming methods, relying on familial labor, which has become increasingly inefficient in contemporary agricultural landscapes. To enhance their productivity and efficiency, smallholder farmers require affordable and accessible Internet of Things (IoT)-based systems. However, the prevailing IoT solutions in the market primarily cater to large-scale commercial enterprises, rendering them unsuitable for the specific needs and constraints faced by smallholder farmers. In response to this gap, we have introduced a cost-effective, customizable, scalable, and dependable IoT platform tailored expressly for smallholder farmers. This platform empowers them to visualize, monitor, and control real-time data pertaining to their crops, livestock, and other agricultural assets. To ascertain the efficacy and suitability of our proposed platform, we conducted a comparative analysis with existing counterparts such as Blynk IoT and ThingSpeak IoT, evaluating their respective features and application services against standard requirements. Additionally, we subjected our platform to rigorous server load testing, assessing crucial performance parameters including throughput, response time, user capacity, and data sampling rates. Over an observation period spanning an average of 339 days, our platform successfully processed and stored a substantial volume of data, encompassing 817,633 sensor messages, averaging 2412 messages per day, with a cumulative storage size of 14,238.28 KB. Extrapolating from these results, it is noteworthy that an A0 instance with 20 GB of cloud space can adequately accommodate 200 users at a rate of 100 MB per user, which is adequate for the smallholder needs. Furthermore, the purposed platform was deployed inside a polyhouse to perform off-season grafting of citrus plants. The achieved success rate of 84% closely approached the success rate of 90–95% observed during on-season grafting. These empirical findings, coupled with the extensive data gathered during our research, underscore the reliability and performance of our proposed IoT platform for smallholder farmers.*

Keywords: *Internet of Things (IoT); Custom IoT Architecture; Smart Agriculture; Smallholder; Sensor and Actuators; Grafting*

Know-Your-Member (KYM)

The Institution of Engineers (India) is updating the database of all its **Corporate Members** along with their achievements for which a **Know-Your-Member** (KYM) form has been introduced.

Every Corporate Member is requested to kindly fill up the form and forward it along with the self-attested copy of photo ID proof to the address given below:-

The Director (Membership)
The Institution of Engineers (India),
8 Gokhale Road, Kolkata 700020
Email: datamemb@ieindia.org

The form can be accessed & downloaded at :
https://www.ieindia.org/WebUI/ajax/Downloads/WebUI_PDF/HIGHLIGHTS_DOCUMENT-3332.pdf

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Dr Raj Kumar Goswami, FIE
Professor of Electronics & Communication Engineering & Principal
Gayatri Vidya Parishad College of Engineering for Women, Visakhapatnam, Andhra Pradesh
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Title of Paper: A Novel Paddy Leaf Disease Detection Framework using Optimal Leaf Disease Features in Adaptive Deep Temporal Context Network

International Journal on Recent and Innovation Trends in Computing and Communication, 11(6), 2023, ISSN: 2321-8169
DOI: https://doi.org/10.17762/ijritcc.v11i6.7293

Co-authors: Rongali Divya Kanti, G Sasibhusana Rao & S Aruna

Abstract: *Since paddy has become the staple food for all human beings, crop productivity is highly demanded. Nowadays, the agriculture industry faces the leaf disease issue as the insect or pests affects the plant leaves to hinder further growth. Owing to this, the productivity gets affected that makes the farmers have economic loss. In earlier time, several methods have been explored to detect the disease significantly. However, such methods become more time consuming, structure complexity and other issues. To alleviate such complex, a new paddy leaf disease detection model is proposed using adaptive methodology. Initially, images related with paddy leaf are gathered from standard resources and offered as the input to segmentation region. Here, segmentation is performed by Fuzzy C-Means (FCM) to get the abnormal regions. Then, the segmented images are fed to ensemble feature extraction region to attain different features like deep, textural, morphological, and color features. Further, the acquired ensemble features are provided to concatenation phase to obtain the concatenate features and the optimal features are selected by the Fire Hawk Optimizer (FHO). Finally, the optimal features are subjected to paddy leaf detection phase, where leaf disease will be detected by Adaptive Deep Temporal Context Network (ADTCN), where the parameters are tuned by the FHO. Hence, the developed model secures efficient leaf disease detection rate than the classical techniques in the experiential analysis.*

Keywords: *Paddy Leaf Disease Detection; Fuzzy C-Means; Ensemble Features; Optimal Feature Selection; Fire Hawk Optimizer; Adaptive Deep Temporal Context Network*

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Er Anand Vikram, FIE
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Indian Oil Corporation Limited
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Title of Paper: Detecting Accurate Parametric Intrusions using Optical Fiber Sensors for Long-distance Data Communication System

Optical Fiber Technology, Elsevier, 80, 2023, Print ISSN: 1068-5200, Online ISSN: 1095-9912
DOI: https://doi.org/10.1016/j.yofte.2023.103453
Co-authors: Shobhit K Patel, Abhay Chaturvedi, Osamah Alsalman & Juveriya Parmar

Abstract: *The intrusion detectors and warning devices have been aided by advancements in the fields of optical fiber, integrated circuit fabrication technology, and devices. This paper describes a system of long-distance intrusion and a warning system for monitoring third-party physical intrusion in long-distance sensitive Areas. It provides around-the-clock third-party intrusion detection. The signals of the external sensors are influenced by vegetation and external natural conditions, but not in the case of optical cable sensors. A workflow algorithm has been developed in this research paper where Fast Fourier transform (FFT) is used and mathematical interpretation is made. Long-distance data communication for optical perimeter intrusion detection and warning systems is demonstrated using a block diagram. Intrusion detection system range of detection has been demonstrated pictorial also. The higher the magnitude of vibration of equipment or human being, the higher will be the range of the detection by the system. Real-Time intrusion simulation performed during the research work is depicted for a better understanding. We have conducted three simulations namely manual digging, vehicle traversing the fiber and mechanical digging which is depicted with amplitude vs. channel graph and also by waterfall display. The controller employs the distributed acoustic sensing (DAS) principle which is based on interrogating the scattering of light from nanoparticles on the optical fiber in response to changes in refractive index or molecular binding events in the surrounding environment.*

Keywords: *Intrusion; Detection; Optical Sensors; Data; Interrogation; DAS*

Dr A Lakshmi, AMIE
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Title of Paper: Hybrid Optimized Verification Methodology using Deep Reinforcement Neural Network

Journal of Intelligent & Fuzzy Systems, IOS Press, 45(3), 2023, pp 3715–3728, ISSN: 1064-1246
DOI:https://doi.org/10.3233/JIFS-232132
Co-authors: N Bhuvaneswary & J Deny

Abstract: *Universal Verification Methodology (UVM) caters to an essential role in verifying the different categories of circuits ranging from small-scale chips to complex system-on-chip architectures. Constrained random simulations are an indispensable part of UVM and are often used for design verification. However, the effort and time spent manually updating and analyzing the design input constraints result in high time complexity, which typically impacts the coverage goal and fault verification ratio. To overcome this problem, this paper proposes a novel hybrid optimized verification framework that combines Reinforcement Learning (RL) and Deep Neural Networks (DNN) for automatically optimizing the input constraints, accelerating faster verification with a high coverage ratio. The proposed algorithm uses reinforcement learning to generate all possible vector sequences needed for testing the target devices and corresponding outputs of the target devices and potential design errors. Furthermore, the framework intends to use high-speed deep-feedforward neural networks to automate and optimize the constraints during runtime. The proposed framework was developed using Python interfaced with the TCL environment. Extensive experimentation was carried out using several circuits, including multi-core designs, and performance parameters such as coverage accuracy, speed, and computational complexity were calculated and analyzed. The experiment demonstrated the proposed framework remarkable results, showing its superior performance in faster coverage and fewer misclassification errors. Furthermore, the proposed framework is compared with existing verification frameworks and other classical learning models. Good results demonstrate that the proposed framework increases the 4.5x speed for verifying multi-core designs and the 99% accuracy of detection and coverage.*

Keywords: *Universal Verification Methodology, Reinforcement Learning, Deep Feed Forward Neural Network, Multi-Core Designs*

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We would like to thank our erudite members for sharing their professional achievements through the IEI Epitome and making the content more abounding and at the same time inspiring many others to share their accomplishments as well. To streamline the process and make it convenient for the member to give their inputs we would like to obtain the information in a more structured and comprehensive manner. We would request our members to send the details of their achievements as per the appended formats only.

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(xi)	Supporting Documents/links [which are clearly indicative of the incumbent's achievement(s)]	

 # Reporting of Award of stipend/fellowship at PG/PhD level and awards from esoteric events/communities may be avoided.

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(xiii) Date of filing (DD/MM/YYYY)	
(xiv) Date of Grant (DD/MM/YYYY)*	
(xv) Patentee	
(xvi) Details of Patent	
(xvii) Term for which the above (ix) has been granted	

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(ix)	Title of Paper	
(x)	Name of Journal/Proceeding/Technical Volume	
(xi)	Volume No (Not required for Indian Engineering Congress)	
(xii)	Issue No (Not required for Indian Engineering Congress/Annual Technical Volumes of IEI)	
(xiii)	Theme (Only for Technical Volumes of IEI)	
(xiv)	DOI: (Not required for Indian Engineering Congress/Annual Technical Volumes of IEI)	
(xv)	ISSN	
(xvi)	Date of Publication (Date-Month-Year)	
(xvii)	Co-authors (if any)	
(xviii)	Abstract in full	
(xix)	5/6 Keywords	
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** publications in local seminar, conference and symposia will not be accounted*

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(xi) Book Chapter Number	
(xii) Publisher Details	
(xiii) ISBN	
(xiv) Date of Publication (Date-Month-Year)	
(xv) Co-authors (if any)	
(xvi) About the book (100-150 words)	
(xvii) Supporting Documents (complimentary copies for IEI Headquarters)/links [which are clearly indicative of the incumbent's achievement(s)]	

** accommodate works published in journals/reputed conference proceedings/books for the last one year*

Notification for Advertisement in IEI Epitome

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