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UNIVERSITY



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The Official Weekly Newsletter of **School of Engineering**



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SCHOOL OF ENGINEERING

VISION

- Transform lives through excellence in engineering education, research and innovation with an emphasis on sustainability, inclusive technologies and global needs.

MISSION

- Design and deliver contemporary engineering curricula to address regional and global needs while emphasizing ethics, values, integrity and regional relevance.
- Carryout high impact academic research, industry projects and innovation activities with active student engagement to advance science and engineering knowledge and state-of-the art industry practices.
- Develop regional and national leaders to advance the society and economy.

Student Achievements

Student Achievements - 1

A paper titled "Detection of Tuberculosis Using 2-D Photonic Crystal-Based Biosensor" has been published in the Manipal Journal of Science and Technology. The research was conducted by Mr. Markov Vladimir and Mr. Skobelev Maksim, 6th-semester international exchange students at DSU from MIET, Russia, along with Ms. Neeraja Patil, a 6th-semester student, and other co-authors. Guided by Dr. Saara K, Professor of the ECE Department, the study demonstrates the superior performance of a 2-D photonic crystal-based biosensor using Titanium Dioxide (TiO₂). The biosensor showed significant detection capability with a sensitivity of over 80 nm/RIU and a quality factor of 5000.

- Markov Vladimir
- Skobelev Maksim
- Neeraja Patil

Vladimir et al. Detection of tuberculosis using 2-D photonic crystal based biosen

Research Article

Detection of tuberculosis using 2-D photonic crystal-based biosensor

Markov Vladimir¹, Skobelev Maksim¹, Neeraja Patil², Prathap P B, Saara K*

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Abstract

While there has been a significant increase in healthcare demands and the need for precise diagnosis, it is important to note that the performance enhancement of photonic crystal sensors is not solely attributed to this surge in demand. Instead, photonic crystal-based biosensors have demonstrated improved performance over conventional biosensors. In this study, a 2-D photonic crystal-based biosensor with a square lattice structure, measuring 6 μ m in length and width respectively, was proposed. The biosensor utilizes Titanium Dioxide (TiO₂) as a sensing material, where TiO₂ is employed to attract target molecules present in the sample. The proposed biosensor was designed and simulated using the Finite Difference Time Domain (FDTD) method. In the simulation framework, the immobilization of target molecules on TiO₂ was explicitly modeled, including the definition of TiO₂'s optical properties, implementation of absorption mechanisms related to immobilization, and consideration of surface functionalization processes. Simulation results confirm the detection of target molecules, showing a significant wavelength shift with a sensitivity of more than 80 nm/RIU and a quality factor of 5000.

Keywords: Biosensor, FDTD, Photonic Crystal, Titanium dioxide, Tuberculosis

1. Introduction

Tuberculosis (TB) continues to pose a significant global health challenge, with millions of new cases and fatalities reported annually by the World Health Organization (WHO) [1]. Timely and accurate diagnosis is critical for effective TB management, especially in regions with limited healthcare infrastructure. However,

conventional diagnostic methods such as sputum smear microscopy and culture-based techniques have limitations in terms of sensitivity and speed [2]. Hence, there is a pressing need for innovative diagnostic approaches to improve TB detection, particularly in resource-constrained settings. In recent years, biosensor technology has emerged as a promising tool for the rapid and sensitive detection of infectious diseases, including TB. Biosensors offer several advantages, including real-time monitoring, simplicity, portability, and potential for point-of-care applications [3, 4].

Among biosensor platforms, photonic crystal-based biosensors are gaining attention due to their sensitivity, label-free detection, and compatibility with microfluidic systems. Photonic crystals, nanostructures that manipulate light, provide a unique platform for capturing biomolecular interactions with high specificity and sensitivity [5].

Photonic crystals are periodic nanostructures that manipulate light propagation through

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Student Achievements - 2

Under the guidance of Dr. Saara K, Professor of ECE dept., 8th-semester ECE students published a paper titled "An Affordable Airborne Weather Observation" in the Manipal Journal of Science and Technology. The research, conducted by Ashwin J, Banu Prasad B, Mamillapalli Punith Vinay Rao, and Muheez H J, focuses on the design, development, and evaluation of a low-cost weather monitoring blimp for agricultural applications. This blimp, equipped with a sensor array to measure weather parameters and leveraging IoT technology, provides real-time atmospheric data for precise short-term forecasts, aiding sustainable farming practices in remote and developing regions.

- Ashwin J ENG20EC0016
- Banu Prasad B , ENG20EC0018
- Mamillapalli Punith Vinay Rao , ENG20EC0050
- Muheez H J , ENG20EC0055

Research Article

An Affordable Airborne Weather Observation Platform

Ashwin J, Banu Prasad B, Mamillapalli Punith Vinay Rao, Muheez H J, Saara K*

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Abstract

This paper presents the realization of the "Low-Cost Weather Forecasting Blimp" study focusing on the design, development, and evaluation of a low-cost weather monitoring blimp tailored for agricultural applications. With accurate and reliable weather forecasting being crucial for sustainable farming practices, especially in remote and developing regions, the Low-Cost Weather Forecasting Blimp system aims to address the challenge of providing real-time atmospheric data at an affordable price point. The Low-Cost Weather Forecasting Blimp system is designed as a modular architecture equipped with a customized sensor array to measure essential weather parameters such as temperature, humidity, wind speed, and precipitation. Leveraging IoT technology, the blimp transmits the collected sensor data via cellular networks to a ground station for real-time analysis using machine learning algorithms. These algorithms are specifically tailored to detect trends, anomalies, patterns in the data, enabling the generation of precise short-term forecasts critical to farmers' needs.

Keywords: Agriculture, IoT, Low-cost, weather observation platform, sensor array, weather forecasting

1. Introduction

In today's connected world, with the proliferation of high-speed internet, the Internet of Things (IoT) has become a revolutionary force that transforms how humans interact with the devices. But there is also communication between electronic devices. As the price of IoT-enabled devices continues to drop, adoption of the IoT will accelerate, enabling unprecedented connectivity and data availability. The principle behind the IoT is to connect various electronic devices over the internet to collect and share data generated by sensors. This data can be used to a cloud service such as IBM Bluemix or ThingSpeak for analysis and processing. The

potential of IoT spans many sectors, including transportation, logistics, energy, healthcare, and agriculture.

In the energy sector, the IoT is changing the process by creating intelligent grids that can respond to changes in energy consumption patterns. The IoT holds great promise in many other sectors, including smart homes, technology, and consumer healthcare. The market is expected to grow exponentially as global electronics giants such as Intel, Rockwell Automation, Siemens, Cisco, and General Electric invest heavily in IoT infrastructure. Analysts predict that the number of connected devices worldwide will reach 26 billion, and their devices per person, and the economic value should reach \$19 trillion.

However, with the emergence of this new technology, managing large data collections and begin to use their management and the large amount of data produced by IoT products. The integration of Smart Cities is designed to meet

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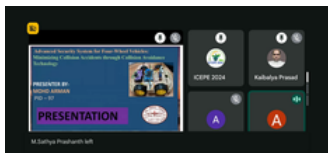
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Faculty Contributions

- Dr. Arun Balodi served as Session Chair for Track: E-Mobility, at the 6th International Conference on Energy, Power, and Environment (ICEPE 2024).
- Dr. Arun Balodi participated in the IEEE Conference Quality and Management Workshop (CQMW) titled 'Planning and Execution of IEEE Conferences' held at Dayananda Sagar Institutions on Saturday, June 22nd, 2024.
- Participated as a reviewer in the 8th edition of the 2024 IEEE Students Conference on Engineering and Systems (SCES-2024), organized by the Department of Electrical Engineering, MNNIT Allahabad.
- Dr. Arun Balodi delivered a talk on "Predictive Analytics in Healthcare: Forecasting Patient Outcomes with Machine Learning," at the Signal Synergy Conclave on June 22, 2024. This event, a collaboration between the IEEE AIT SPS & MTT-S Student Branch Chapters and the IEEE SPS Bangalore Chapter, as part of the ICASSP2025 satellite event was held at the Atria Institute of Technology Institute of Technology, Bangalore.
- Dr. Arun Balodi published a paper "A Novel Method for Illegal Driver Detection and Legal Driver Identification Using Multitask Learning Based LSTM Models for Real-Time Applications Wireless Personal Communications (SCIE Indexed, Impact Factor: 1.9)(2024).
<https://link.springer.com/article/10.1007/s11277-024-11368-w>
- Divyashree H B presented a paper titled "QOS Aware Secure Cluster Based Routing for Wireless Sensor Networks Using a Multi Objective-Trust Centric Artificial Algae Algorithm" at the Scopus-indexed Springer International Conference on Wireless Communication and Internet of Everything (ICWCIE-2024), held on June 21st and 22nd, 2024.
- Dr. Deepthi Chamkur V, Assistant Professor in the ECE Department at Dayananda Sagar University, participated in a one-day faculty development program on "AI Tools for Teaching," organized by the Star International Foundation for Research and Education on June 22, 2024.

- Dr. Manish Kumar Mishra attended an one Days Faculty Development Program on Dated : 6/26/2024 On “FDP on Microgrid System Design & Simulation using HOMER Pro & HOMER Grid Software.” of HOMER Energy by UL, USA in association with M/S DELLSOFT. Technologies Pvt. Ltd. New Delhi. The program focused on the design and simulation of microgrid systems using advanced software tools.
- Shivamma D completed the courses on Introduction to Data Science, Introduction to Artificial Intelligence, Introduction to Natural Language Processing, Introduction to Deep Learning, Introduction to Robotic Process Automation and Computer Vision as part of the Faculty Enablement program on Artificial Intelligence organized by Infosys’s Springboard from 24th June to 28th June 2024.
- Shivamma D completed the certification on Artificial Intelligence Foundation Certification on 27th June 2024 and Artificial Intelligence Primer Certification on 28th June 2024 organized by Infosys’s Springboard.
- Dr. Bipin Kumar Rai presented research paper entitled "Smart Transplants: Blockchain Powered Organ Donation & Analytics" in 5th International Conference on Data Analytics & Management (#ICDAM-2024) (14th to 15th June 2024) Organized By: London Metropolitan University, London, UK.
- Dr. Bipin Kumar Rai, Professor(CSE) contributed as a Paper Reviewer in 2nd International Conference on Computer, Electronics and Electrical Engineering and their Applications (IC2E3-2024), held from 6th & 7th June, 2024 at NIT Uttarakhand, (IEEE, Scopus)





CERTIFICATE OF ACHIEVEMENT

The certificate is awarded to
Shivamma D

for successfully completing
Artificial Intelligence Foundation Certification
on June 27, 2024



Congratulations! You make us proud!



Issued on: Thursday, June 27, 2024
To verify, scan the QR code at <https://certificates.infosys.com>

Thirumala Achli
Executive Director, Artificial Intelligence
Education, Training & Assessment (AIE)
Infosys Limited



CERTIFICATE OF ACHIEVEMENT

The certificate is awarded to
Shivamma D

for successfully completing
Artificial Intelligence Primer Certification
on June 28, 2024



Congratulations! You make us proud!



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A Novel Method for Illegal Driver Detection and Legal Driver Identification Using Multitask Learning Based LSTM Models for Real Time Applications

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5th International Conference on Data Analytics (ICDAM-2024)
14th & 15th June 2024

Smart Transplants: Blockchain-Powered Organ Donation

Presented by
Dr. Bipin Kumar Rai
Dayananda Sagar University, Bengaluru, India.
bipinrai@gmail.com

INTERNATIONAL CONFERENCE ON
COMPUTER, ELECTRONICS AND ELECTRICAL ENGINEERING
AND THEIR APPLICATIONS (ICEEES-2024)

Certificate of Appreciation

This is to certify that **Dr. Bipin Kumar Rai**, Faculty Member, has participated in the 5th International Conference on Computer, Electronics and Electrical Engineering and their Applications (ICEEES-2024) held on 14th & 15th June, 2024 at National Institute of Technology, Tumakuru, India.

Springer

Sri Siddhartha Institute of Technology, Tumakuru
A Government College of Sri Siddhartha Academy of Higher Education

Certificate of Distinction

This Certificate is presented to **Dr. Prof. M. Ms. Divyashree H B**
For Author Paper Title

In the International Conference on Wireless Communication and Internet of Everything (ICWCIE - 2024) organized by the Department of Electronics and Communication Engineering, Sri Siddhartha Institute of Technology, Tumakuru on 21st, 22nd June, 2024.

ICDAM-2024

INTERNATIONAL CONFERENCE ON DATA ANALYTICS & MANAGEMENT (ICDAM-2024)

Certificate

This is to certify that Prof. Dr. M. Ms. Bipin Kumar Rai is a present member of the past 5th International Conference on Data Analytics and Management (ICDAM-2024), organized jointly by London Metropolitan University, London, UK in association with the WGU University, Bangalore, India, Europe, Farapage International University, Farapage, Europe, SCOP Management Institute & IPTI, GGSIPU, Delhi on 14th - 15th June 2024.



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