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Vidarbha Bahu-uddeshiya Shikshan Sanstha's

**TULSIRAMJI GAIKWAD-PATIL**  
College of Engineering & Technology

An Autonomous Institute



Department of  
**Artificial Intelligence &  
Machine Learning**

# TECHNICAL MAGAZINE



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Odd Sem



Volume: 1



Issue: 1



**AI is the future**



## VISION OF INSTITUTE

“

To emerge as a learning Centre of Excellence in the National Ethos in domains of Science, Technology and Management.

”



## MISSION OF INSTITUTE

01

To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.

02

To provide facilities and services to meet the challenges of Industry and Society.

03

To facilitate socially responsive research, innovation and entrepreneurship.

04

To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.



## VISION OF DEPARTMENT

“

To emerge as a learning Centre of Excellence in the National Ethos in the domains of Artificial Intelligence & Machine Learning.

”



## MISSION OF DEPARTMENT

01

To provide quality technical education that equips students with practical skills and knowledge aligned with current industry standards and emerging technologies.

02

To address societal and industrial challenges by fostering collaboration between academia, industry, and communities for inclusive development.

03

To nurture innovation and entrepreneurial thinking by encouraging creativity, problem-solving, and the development of impactful solutions.

04

To promote a culture of research, critical thinking, and continuous learning to empower, stakeholders to adapt and thrive in a dynamic global landscape.





## PROGRAM EDUCATIONAL OBJECTIVES

The Program Educational Objectives (PEOs) describe the accomplishments that our graduates are expected to achieve within a few years after graduation.



PEO 1



Develop strong analytical, predictive, and decision-making skills to formulate and solve complex problems in intelligent computing and interdisciplinary domains.

PEO 2



Pursue advanced studies, engage in research, and drive innovation in Machine Learning and related fields, contributing to technological and scientific progress.

PEO 3



Apply technical knowledge with a commitment to ethical standards and professional integrity, ensuring stakeholder satisfaction and making a positive societal impact.

PEO 4



Embrace lifelong learning while upholding values of professional ethics, social responsibility, and environmental sustainability.



## PROGRAM SPECIFIC OUTCOMES

The Program Specific Outcomes (PSOs) describe the skills and knowledge specific to the AI & ML program that graduates will acquire by the time of graduation.



PSO 1



Develop and apply AI/ML competencies using domains such as Computer Vision, Deep Learning, and MLOps to address real-world challenges across various sectors.

PSO 2



Design and implement intelligent solutions by leveraging Natural Language Processing, Reinforcement Learning, and Robotics.

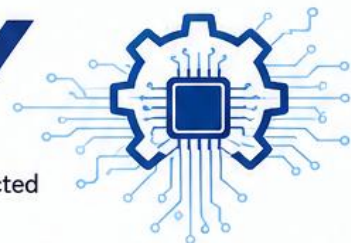
PSO 3



Adopt engineering best practices and industry exposure to develop practical software systems and engage in impactful research activities.



# PROGRAM OUTCOMES (PO)



The Program Outcomes (POs) are the graduate attributes that our students are expected to attain by the time of graduation.

P01

**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.



P02

**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)



P03

**Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/ components/ processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)



P04

**Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8)



P05

**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)



P06

**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)



P07

**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)



P08

**Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.



P09

**Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.



P010

**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.



P011

**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)





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College of Engineering & Technology

DTE  
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# ABOUT COLLEGE



- **Tulsiramji Gaikwad-Patil College of Engineering and Technology (TGPCET)** was established in the year **2007** by **Vidarbha Bahuuddeshiya Sheshan Sanstha (VBSS)**, a registered society. It is a self-financed Private Engineering College, which is affiliated to **Rashtrasant Tukadoji Maharaj Nagpur University (RTMNU) Nagpur** and is approved by **All India Council for Technical Education, New Delhi**. Also, college is approved by **Directorate of Technical Education (DTE), Mumbai**, and **Maharashtra State**. The Institute is Accredited with **A+ (3.32 CGPA)** by **NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC)** and **NBA**. An **Autonomous Institute** affiliated to **RTM Nagpur University, Nagpur**.



**NAAC ACCREDITED**

A+ Grade  
(3.32 CGPA)



**NBA ACCREDITED**

National Board of  
Accreditation



**AUTONOMOUS INSTITUTE**

Affiliated to  
RTM Nagpur University



**AICTE APPROVED**

All India Council for  
Technical Education,  
New Delhi



**DTE APPROVED**

Directorate of Technical  
Education, Mumbai  
Maharashtra State



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## ABOUT US



### Department of Artificial Intelligence and Machine Learning of

Tulsiramji Gaikwad-Patil College of Engineering and Technology Founded in **2024**, has swiftly become a prominent centre for advanced learning and research in this rapidly evolving field. The department offers a **B.Tech.** program in **AIML** with an annual intake of **150** students. Our core mission is to nurture young talent and prepare them to excel in the dynamic and fast-paced world of AI.



The B.Tech. program is designed to meet the increasing demand for skilled professionals capable of leveraging data, creating intelligent systems, and driving innovation across industries. **AI** and **ML**, as interdisciplinary fields, focus on building systems that enable intelligent decision-making and problem-solving.



Aligned with the **National Education Policy (NEP)**, our curriculum ensures a strong balance between theoretical foundations and hands-on practical skills. We regularly conduct skill development workshops and training sessions in collaboration with industry experts to bridge the gap between academia and industry.



Students benefit from annual **industry visits** and a compulsory **six-month internship**, providing real-world experience and exposure to current industry challenges.



Additionally, the department has established **MoUs** with leading organizations to foster collaborative learning and innovation.



# MESSAGE FROM THE DESK OF MANAGEMENT



**Dr. Mohan Gaikwad-Patil**  
Chairman, Gaikwad-Patil Group

“ *Education is the passport to the future,  
for tomorrow belongs to those who prepare for it today.* ”

**Dr. Mohan Gaikwad-Patil**, with more than **35 years of experience** in the education system to his credit, established the **Gaikwad- Patil Group of Institutions** in Nagpur to cater to the quality education needs of the youth in Vidarbha. His early experience teaching in an engineering college made him acutely aware of the dissonance between engineering education in the country and the requirements of the industry. He therefore began with the dream of starting an engineering college that equips students with knowledge, skills, and attitudes relevant to the industry.

That dream has manifested today in the form of an educational group well known in the region for its constant striving to impart quality and industry-relevant education to the students by teaching courses like **B.Tech, M.Tech, Architecture, Polytechnic, MBA, MCA, Pharmacy, BAMS, Physiotherapy and Nursing.**

Hardly in his early forties, Dr. Mohan Gaikwad-Patil is the young and dynamic face of the group. His **contagious enthusiasm** and **unflinching drive** are truly inspiring.



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LEADERSHIP**



**QUALITY  
EDUCATION**



**INDUSTRY  
RELEVANT**



**INNOVATION &  
EXCELLENCE**



**COMMITMENT TO  
SOCIETY**

# MESSAGE FROM THE DESK OF MANAGEMENT



**Mr. Akash Gaikwad-Patil**  
Vice Chairman, Gaikwad-Patil

“ *Education is not preparation for life;  
education is life itself.* ”

In a world brimming with challenges, the need for brilliant engineers who can **think critically**, **solve problems creatively**, and **adapt** to a rapidly evolving technological landscape has never been greater.

At TGPCET, we are committed to providing an education that goes beyond textbooks. Our curriculum is meticulously crafted to equip students with the **technical expertise**, **soft skills**, and **design thinking abilities** necessary to thrive in the ever-changing engineering landscape.

We believe in nurturing well-rounded individuals with a strong foundation in **ethics**, **social responsibility**, and a **passion for making a positive impact** on the world. Our state-of-the-art facilities, coupled with a dedicated and experienced faculty, provide a stimulating learning environment that ignites curiosity and encourages exploration.

We don't just produce engineers; we empower future **leaders**, **innovators**, and **entrepreneurs** who will shape the world of tomorrow.

We are confident that our graduates will be at the forefront of **technological advancements**, tackling **global challenges**, and building a future brimming with possibilities.



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# MESSAGE FROM THE DESK OF MANAGEMENT



**Dr. Anjali Patil-Gaikwad**  
President, Gaikwad-Patil Group

Welcome to **TGPCET**, a premier institution dedicated to **nurturing exceptional engineers** who can shape the world of tomorrow. Here, we believe in cultivating a stimulating learning environment that fosters **creativity, critical thinking, and a passion for innovation**.

Our vision is to provide a holistic learning experience that equips you with the **technical expertise, leadership skills, and innovative thinking** needed to thrive in a dynamic industry.

With a rich legacy of **academic excellence**, we offer a **diverse range of engineering and management programs** designed to equip you with the knowledge, skills, and experiences needed to thrive in the ever-evolving engineering landscape.

Our **dedicated faculty, state-of-the-art facilities, and strong industry partnerships** ensure you receive a **well-rounded education** that prepares you for success in your chosen field.

We invite you to join our vibrant community and embark on a **journey of excellence**.



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# MESSAGE FROM THE DESK OF MANAGEMENT



**Dr. Sandeep Gaikwad**  
Treasurer, Gaikwad-Patil Group

“ *“Creating a Brighter Tomorrow, One Investment at a Time: Your Pathway to Engineering Excellence.”* ”

The essence of life is to live a life for others and die for a noble cause. We express our gratitude for receiving an opportunity to serve the nation. We have a crystal- clear vision of enlightening the student brain with a sound and technology-rich academic curriculum. We pledge to ensure that the students will not only progress in their respective fields but will also become **responsible citizens** by abiding by the rules and will live **disciplined life**.

Our college has state-of-the-art facilities for teaching, research and development. The students who have passed out of our college have already proved their mettle in various fields.

I personally appeal to all the students to make use of the facilities here and improve their skills to have a glorious career ahead.



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# MESSAGE FROM THE DESK OF PRINCIPAL



**Dr. P. L. Naktode**  
Principal



“*“Nurturing Innovation, Empowering Leaders -  
Engineering Education Redefined.”*”

It is my privilege to warmly welcome you to our college—an autonomous institution committed to quality education. We work on the principle of “**Learn to Grow.**” With this inspiring thought, Vidarbha Bahu Uddeshiya Shikshan Sanstha, Nagpur laid the foundation to provide education in the field of engineering, enabling students to become **skilled engineers, capable managers**, and above all, **responsible human beings** dedicated to building a stronger, vibrant, and skilled India.

We envision **TGPCET** playing a significant role in shaping the careers of **tomorrow’s leaders** and developing individuals who will make a meaningful impact on global development.

Looking at our track record, TGPCET has achieved many milestones in terms of consistently **excellent academic results, successful placements**, and **vibrant extracurricular activities**. We are continuously striving to impart quality education to our budding engineers, and this journey is becoming more glorious year after year—empowering our graduates to make their mark across the globe.

**Success depends on opportunity**—make the most of the resources available to you.

I wish you the very best in all your endeavors.



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# MESSAGE FROM THE DESK OF DIRECTOR ADMINISTRATION



**Dr. Pragati Patil**  
Director Administration



“*Dreams are not those which we see while sleeping, but dreams are those which do not let us sleep.*”  
– Dr. A.P.J. Abdul Kalam

Welcome to Tulsiramji Gaikwad Patil College of Engineering and Technology (TGPCET), Nagpur, Maharashtra—a leading educational institution.

Inspired by the words of Dr. A.P.J. Abdul Kalam, *“Dreams are not those which we see while sleeping, but dreams are those which do not let us sleep,”* TGPCET pursues ambitious goals through knowledge acquisition, hard work, and perseverance.

Our institution has rapidly emerged as one of Maharashtra’s premier centers for technical education. We emphasize **academic excellence** and the development of **technical skills** to meet industry demands while instilling values of **integrity, morality, and sustainability**.

At TGPCET, we harness **cutting-edge technology** to create an innovative learning environment that encourages **critical thinking and exploration**. Our students participate in **national and international competitions**, tackling real-world challenges with the support of faculty who remain updated with the latest technological advancements.

Professional organizations such as **IEEE, CSI, ISTE, SAE-India, and SESI** offer robust platforms for skill enhancement and professional growth. Beyond academics, we promote **holistic development** through **sports, cultural activities, and social initiatives**—nurturing students into **responsible, well-rounded citizens**.

Join TGPCET to **excel, innovate, and lead** in a supportive environment where growth and transformation know no bounds.



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# MESSAGE FROM THE DESK OF HoD



Our objective is to develop graduates who possess not only technical expertise but also a deep understanding of the domain-specific applications of **AI and ML** solutions. The curriculum is continuously updated to include the latest advancements, tools, and technologies. Students gain comprehensive knowledge in areas such as **deep learning, neural networks, natural language processing, generative AI, robotics, and computer vision**, preparing them to address real-world problems using cutting-edge AI models.



The ongoing digital revolution is reshaping every facet of business, from innovation and operations to customer engagement and financial strategy. To thrive in this environment, organizations must embrace **data-driven approaches**. Our **AI & ML** program equips students to design intelligent algorithms and scalable solutions that support this digital transformation.



Our experienced faculty bring a blend of academic excellence and industry insight, ensuring high-quality education and mentorship. Our graduates enjoy **excellent placement opportunities** with reputed companies worldwide, reflecting the department's strong industry connections.



To enhance global exposure, the department actively participates in **international conferences** and initiatives, offering students opportunities to interact with **global experts** and stay informed about emerging trends and breakthroughs in AI.



The department is in the process of establishing an **IEEE student chapter** to further encourage research, innovation, and the development of technical and leadership skills. These initiatives aim to prepare students not just for employment but to become pioneers and leaders in the AI field. Beyond academics, the department promotes holistic growth by supporting cultural, sports, and extracurricular activities through vibrant platforms such as the **AI & ML Club** and the **Algnite Forum**.



In summary, the Department of Artificial Intelligence and Machine Learning at Tulsiramji Gaikwad-Patil College of Engineering and Technology is dedicated to **academic excellence, industry collaboration, global engagement**, and the comprehensive development of students. We are committed to shaping **skilled, innovative, and future-ready AI professionals** poised to lead in this transformative field.

Thank you everyone who has been a part of this incredible journey, and I invite you to delve into the pages of this magazine to explore the depth of our achievements and the promising future that lies ahead.



Warm Regards,

**Prof. Suraj Mahajan**

Head, Artificial Intelligence & Machine Learning Department  
(BE, ME, PG Cert. AIML IIIT)

✉ [hod.aiml@tgpacet.com](mailto:hod.aiml@tgpacet.com)





# EDITORIAL COMMITTEE



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Assistant Professor,  
Artificial Intelligence &  
Machine Learning Department



**CHIEF EDITOR**



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Machine Learning Department



**MAGAZINE COORDINATOR**





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**Mr. Bhushan Bhaishwar**

Student Co-ordinator



**Mr. Krish Makde**

Student Co-ordinator

# MESSAGE FROM THE DESK OF EDITOR



It gives me immense pleasure to present to you the latest edition, i.e., **Volume 1, Issue 1**, of the Technical Magazine of the Department of Artificial Intelligence and Machine Learning. This magazine serves as a vibrant platform to showcase the innovative thinking, technical expertise, and creative problem-solving abilities of our students and faculty members. Through this publication, we aim to highlight the remarkable journey of learning, exploration, and innovation taking place within our department.



A special mention must be made of the outstanding contributions by our students, whose enthusiasm for AI-driven innovation is reflected in every article and project featured in this issue. Their curiosity, perseverance, and ability to apply theoretical concepts to real-world challenges are truly commendable. Equally deserving of appreciation are our dedicated faculty members, who continuously guide, mentor, and inspire students, fostering a culture of research, creativity, and lifelong learning.



This magazine also celebrates the spirit of collaboration within our department—between students and teachers, academia and industry, and theory and practical implementation. It is this synergy that empowers our graduates to confidently step into the professional world, ready to solve real-life problems using intelligent and responsible AI solutions.



Let us continue to learn, innovate, and excel—together.



I would like to extend my sincere gratitude to the editorial team, faculty coordinators, student contributors, and everyone who supported the creation of this magazine. Your hard work, creativity, and commitment have made this publication a true success.



*Warm Regards,*

**Prof. Pranay Dongarwar**

Editor-in-Chief





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AI





# 1. TECHNICAL ARTICLE FACULTY

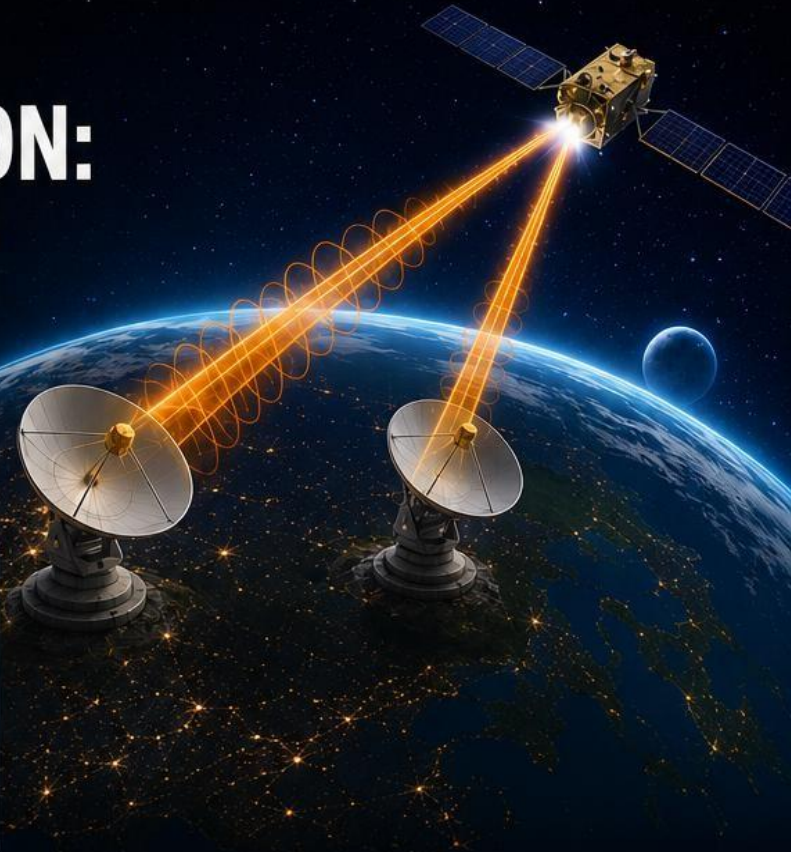


Sr. No.	Name of Faculty	Name of Artical
1.	Prof. Suraj Mahajan	Quantum Communication: The Future of Secure Data Transmission
2.	Prof. Sanghpal Sarkate	Iterative Bio Inspired Load Prediction and Balancing Framework for Smart Healthcare IoT Using Multi-Objective Optimizations
3.	Prof. Pranay Dongarwar	Artificial Intelligence: The Dawn of a New Era in Human Innovation

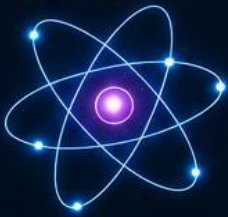
# QUANTUM COMMUNICATION:

## THE FUTURE OF SECURE DATA TRANSMISSION

In an era dominated by digital data, the importance of secure communication is greater than ever. As traditional encryption methods face growing threats from advancing technologies, especially quantum computers, researchers and engineers are turning to quantum communication — a field that leverages the principles of quantum mechanics to enable ultra-secure data transmission.



### WHAT IS QUANTUM COMMUNICATION?



Quantum communication is the use of quantum mechanics to transmit information in a way that is fundamentally secure.

At its core, this technology utilizes quantum bits (qubits) instead of classical bits that are either 0 or 1, qubits can exist in a superposition of both states simultaneously.

### UNBREAKABLE SECURITY



The most remarkable aspect of quantum communication is its ability to detect any attempt at eavesdropping.

This is made possible by the no-cloning theorem and the Heisenberg Uncertainty Principle, which state that any measurement of a quantum system inevitably disturbs it.

Therefore, if a third party tries to intercept a quantum message, it changes the message itself—revealing the intrusion.

### QUANTUM ENTANGLEMENT



Entanglement is a phenomenon where two or more qubits become linked, such that the state of one instantly influences the state of the other, regardless of the distance between them.

This “spooky action at a distance,” as Einstein called it, is crucial for quantum communication protocols like Quantum Teleportation and Quantum Key Distribution (QKD).

### QUANTUM KEY DISTRIBUTION (QKD)



QKD is the most well-developed application of quantum communication.

It allows two parties to generate a shared, secret cryptographic key that can be used to encrypt and decrypt messages.

The most famous QKD protocol is BB84, proposed by Charles Bennett and Gilles Brassard in 1984.

With QKD, any attempt to eavesdrop on the key exchange is detectable, ensuring that the communication remains secure.

### APPLICATIONS OF QUANTUM COMMUNICATION



SECURE BANKING & FINANCE



GOVERNMENT & DEFENSE



SATELLITE COMMUNICATIONS



SECURE CLOUD COMPUTING



HEALTHCARE DATA SECURITY

### AUTHOR NAME

Prof. Suraj Mahajan

Head of Department

Artificial Intelligence & Machine Department

# Iterative Bio Inspired Load Prediction and Balancing Framework for Smart Healthcare IoT Using Multi-Objective Optimizations

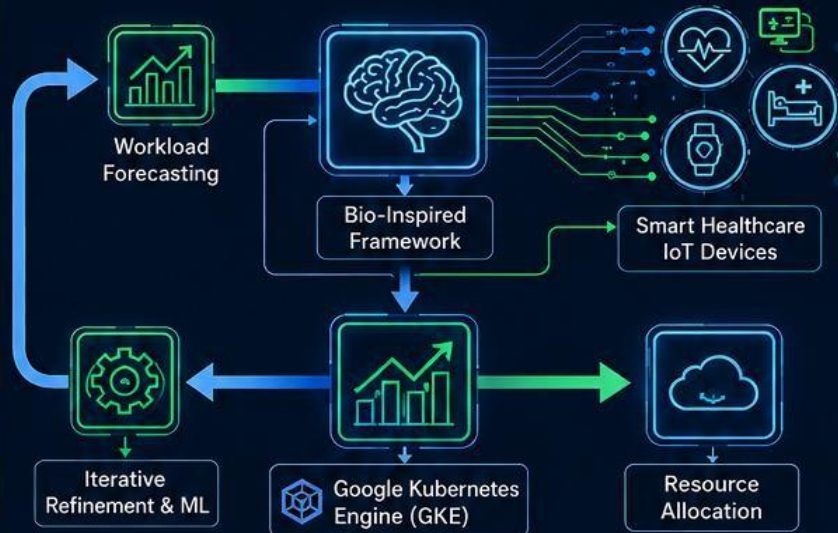
## ABSTRACT

The rapid growth of smart healthcare Internet of Things (IoT) ecosystems has introduced unprecedented computational load variability, driven by continuous patient monitoring, real-time bio signal processing, and heterogeneous device integration. Traditional load balancing and prediction techniques, although effective in specific domains, often lack the adaptability, responsiveness, and multi-objective optimization required for mission-critical healthcare applications. This research proposes an iterative bio inspired framework for predictive load balancing in smart healthcare IoT systems deployed on Google Kubernetes Engine (GKE).

The framework integrates bio inspired metaheuristics for workload forecasting, machine learning-based iterative refinement, and Kubernetes-native resource allocation to enable adaptive, low-latency performance under fluctuating loads.

Using synthetic and real-world healthcare IoT datasets, the system will be validated against baseline load balancing algorithms, with performance metrics including prediction accuracy, latency reduction, throughput improvement, and scalability. The proposed approach aims to establish a robust, feedback-driven method for real-time load management in healthcare IoT environments, ensuring resilience, efficiency, and service continuity in critical care scenarios.

## ITERATIVE BIO INSPIRED LOAD PREDICTION AND BALANCING FRAMEWORK



## FRAMEWORK FEATURES

- ✓ Bio Inspired Metaheuristics for accurate workload forecasting
- ✓ Machine Learning-based iterative refinement for continuous model improvement
- ✓ Kubernetes-native deployment on Google Kubernetes Engine (GKE)
- ✓ Dynamic resource allocation based on real-time load estimation
- ✓ Multi-objective optimization for balanced performance across multiple metrics
- ✓ Feedback-driven adaptation for changing workload patterns
- ✓ Scalable and resilient architecture for healthcare IoT environments

## MULTI-OBJECTIVE OPTIMIZATION GOALS

- Prediction Accuracy**  
 Maximize the accuracy of workload prediction models
- Latency Reduction**  
 Minimize response time for critical healthcare services
- Throughput Improvement**  
 Maximize system throughput and resource utilization
- Scalability**  
 Ensure the system can handle increasing IoT workloads efficiently

## KEY BENEFITS

- ✓ Improved reliability and resilience in critical healthcare IoT systems
- ✓ Efficient utilization of computational resources
- ✓ Reduced latency for real-time patient monitoring and alerts
- ✓ Enhanced scalability for heterogeneous device environments
- ✓ Ensures continuity of care with adaptive load management

## DATASETS

- Synthetic Datasets**  
 Generated IoT healthcare workloads simulating varying patient and device scenarios
- Real-World Datasets**  
 Collected from healthcare IoT platforms (e.g., wearable devices, vital sign monitors, etc.)

## PERFORMANCE METRICS

- ✓ Prediction Accuracy (%)
- ✓ Latency Reduction (ms)
- ✓ Throughput Improvement (%)
- ✓ Scalability (Number of IoT Devices Supported)
- ✓ Resource Utilization Efficiency (%)

## VALIDATION & COMPARISON

The proposed framework will be validated against baseline load balancing algorithms such as:

- Round Robin
- Least Connections
- Weighted Least Connections
- Kubernetes Horizontal Pod Autoscaler (HPA)
- Custom Heuristic Approaches



## DEPLOYMENT ARCHITECTURE (GKE)



**Prof. Sanghpal Sarkate**

Assistant Professor

Artificial Intelligence & Machine Learning

# ARTIFICIAL INTELLIGENCE: THE DAWN OF A NEW ERA IN HUMAN INNOVATION

Artificial Intelligence (AI) has transitioned from the realm of science fiction to a tangible reality that is fundamentally reshaping our world.

At its core, AI refers to the development of computer systems capable of performing tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages. This transformative technology is not a singular invention but a constellation of fields, including machine learning, deep learning, and natural language processing, all working in concert to create intelligent systems.



## THE ENGINE DRIVING MODERN AI



### MACHINE LEARNING (ML)

A subset of AI that empowers computers to learn from vast amounts of data without being explicitly programmed for a specific task. By identifying patterns and insights within data, ML algorithms can make predictions and decisions with increasing accuracy over time.



### DEEP LEARNING (DL)

A more advanced branch of ML inspired by the structure of the human brain's neural networks. It has been instrumental in achieving breakthroughs in areas like image and voice recognition, powering the digital assistants and facial recognition technologies we use daily.

## THE IMPACT OF AI ACROSS INDUSTRIES



### HEALTHCARE

AI-powered diagnostic tools assist radiologists in identifying diseases from medical scans with unprecedented precision, while also accelerating the process of drug discovery.



### FINANCE

AI is used for algorithmic trading, fraud detection, and providing personalized financial advice to customers.



### TRANSPORTATION

The dream of autonomous vehicles is becoming a reality, promising to make our roads safer and more efficient.



### GLOBAL IMPACT

AI is a critical tool in tackling global challenges, from optimizing energy consumption to modelling climate change scenarios.

## KEY ENABLERS OF AI



### BIG DATA

Vast amounts of data fuel AI algorithms and improve their accuracy.



### COMPUTING POWER

High-performance hardware and cloud computing enable complex AI models.



### ADVANCED ALGORITHMS

Innovative algorithms in ML, DL, and NLP drive intelligent predictions and decisions.



### HUMAN INNOVATION

Human creativity, domain expertise, and ethical guidance shape responsible AI.



### ETHICS & GOVERNANCE

Ensuring fairness, transparency, privacy, and security in the development of AI systems.

## BENEFITS OF AI

- ✓ Increases efficiency and productivity
- ✓ Enhances accuracy and decision-making
- ✓ Enables personalization and better user experiences
- ✓ Drives innovation and economic growth
- ✓ Helps solve complex global problems



## CHALLENGES TO ADDRESS

- ⚠ Data privacy and security concerns
- ⚠ Bias and fairness in AI systems
- ⚠ Job displacement and workforce adaptation
- ⚠ High computational and energy demands
- ⚠ Ethical use and accountability of AI

— AUTHOR NAME —

**Prof. Pranay Dongarwar**

Assistant Professor

Artificial Intelligence & Machine Learning



## 2. TECHNICAL ARTICLE STUDENT



Sr. No.	Name of Student	Name of Artical
1.	Bhushan Dipak Bhaiswar	Sahaayata: NGO Donation Hub – A Transparent Web-Based Donation Management System

# Sahaayata: NGO Donation Hub

NGO DONATION DIGITAL PLATFORM

A Transparent Web-Based Donation Management System



## ! PROBLEM STATEMENT

Many NGOs rely on manual and fragmented donation processes involving paper-based records, limited communication, and inadequate tracking. This leads to operational inefficiencies, lack of transparency, donor mistrust, and ineffective resource utilization.

- Donors are unaware of how and where their contributions are used.
- NGOs face challenges in verifying donations, managing inventories, coordinating logistics, and analyzing donation trends.
- Increasing household food wastage and uneven distribution of essential resources highlight the need for a unified digital solution.

## 💡 PROPOSED SOLUTION

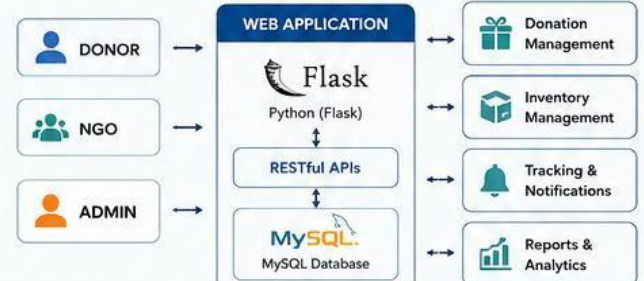
Sahaayata: NGO Donation Hub is a comprehensive web-based platform that digitizes and streamlines the entire donation lifecycle by connecting donors, NGOs, and administrators on a single transparent platform.

- ✓ Donors can register, donate essential items, and track real-time status.
- ✓ NGOs can authenticate donations, manage inventory, allocate resources, and generate analytical reports.
- ✓ Administrators manage users and ensure transparency and accountability across the platform.

## ⚙️ KEY FEATURES

- User Registration**  
Donors, NGOs, and Admins can register securely.
- NGO Dashboard**  
Manage donations, inventory, and resource allocation.
- Donate Items**  
Donate food, clothes, books, and other essential items.
- Analytics & Reports**  
Generate insights and reports for decision-making.
- Real-Time Tracking**  
Track donation status from pickup to delivery.
- Transparency & Trust**  
Ensure transparency and build donor confidence.

## 🏗️ SYSTEM ARCHITECTURE



Centralized • Scalable • Secure • Efficient Data Handling

## ✓ BENEFITS

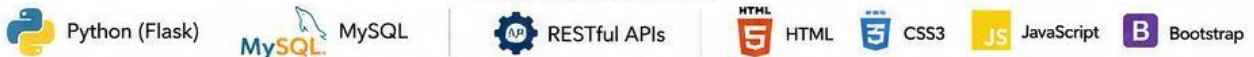
- ✓ Improves operational efficiency for NGOs
- ✓ Enhances donor confidence through transparency
- ✓ Enables real-time tracking and accountability
- ✓ Reduces delays, duplication, and resource wastage
- ✓ Provides data-driven insights for better decision-making
- ✓ Strengthens collaboration among donors, NGOs, and administrators



## 🚀 FUTURE ENHANCEMENTS

- Mobile Application Integration**  
Extend platform accessibility to mobile users.
- AI & Machine Learning**  
Predict donation demand and optimize resource allocation.
- Blockchain Integration**  
Ensure immutable and transparent donation records.
- IoT-Based Logistics Tracking**  
Real-time tracking of donations and deliveries.

## TECHNOLOGY STACK















— AUTHOR NAME —

**Bhushan Dipak Bhaiwar**  
Department: AI & ML



### 3. Insights of Student Edu-skill / Internships



Sr. No.	Name	Domain	Cohort	Status
1.	Bhushan Bhaiwar	 Google AI-ML Virtual Internship	Cohort 10	 Completed
2.	Shruti Bangde	 Internship on "Web Development"	--	 Completed
3.	Prajakta Akhud	 Internship on "Fronted Development"	--	 Completed
4.	Siddhi Deotare	 Internship on "Fronted Developer"	--	 Completed
5.	Akansha Ghagi	 Internship on "Web Development"	--	 Completed
6.	Dolly Diwate	 Google AI-ML Virtual Internship	Cohort 14	 Completed



Congratulations to all the students for successfully completing their internships and enhancing their skills!





# All Certificates



**NATIONAL INTERNSHIP PORTAL**

**EduSkills**  
Nation Building Through Skills

**Certificate of Virtual Internship**

This is to certify that

**BHUSHAN DIPAK BHAIWAR**  
Tulsiramji Gaikwad-Patil College of Engineering and Technology

has successfully completed 10 weeks  
**AI-ML Virtual Internship**  
During Oct - Dec 2024

Supported By : India Edu Program  
**Google for Developers**

**Karthik Padmanathan**  
Developer Ecosystem Lead  
MEINA & India, Google

**Anil Budhia Chandrasekhar**  
Chief Coordinating Officer (CCO)  
NEAT Cell, AICTE

**Dr. Satya Ranjan Biswal**  
Chief Technology Officer (CTO)  
EduSkills

Certificate ID : f6b70f85566b743732be9f11876d0bee1  
Student ID : STU972260908e0 782673321

Reg. No DGT74242

**Digitalशख्वा**  
Think · Innovate · Design  
ISO 9001:2015 Certified Company

**Certificate of Completion**

This is to certify that

Mr./Ms. **Akansa Gangadhar Ghagi**

has successfully completed  
**WEB DEVELOPMENT**  
From 06 Jul.2024 To 15 Nov 2024  
at **Digitalshakha**  
Issue Date : 15 - Nov - 2024

**DIGITALSHAKHA**  
ISO 9001 : 2015  
- CERTIFIED COMPANY -  
MSME

**Digitalshakha**

**CSI** An ISO 9001:2015 Certified Company

**ConnectSoft® Infotech**  
Beyond the Success!

**Certificate of Excellence**

**Course Completion Certificate**

This is to certify that

Mr./Miss **Shruti Shrikant Bangde**

has successfully completed the course  
**Internship on "Web Development"**  
from June-2024 to July-2024

Certified Id : ST2540 Date : 15/07/2024

**Madhuri Tiwari**  
Director

**WIDE S@FTECH** ID No: L16215YWC0397C232A27

Date: 16/05/2024 To 31/07/2024

Name **Siddhi M. Deotare**

has Successfully completed

Internship in **Front End Developer**

on Online/Offline Internship Conducted By: Widesoftech Pvt Ltd.

**Madhuri Tiwari**  
Director

**Internship Certificate**

Get Ready To Excel Your Career.  
**WIDE S@FTECH**  
Internship Certificate

Certificate Number : WS-ING- 399

**MINISTRY OF EDUCATION**

**NATIONAL INTERNSHIP PORTAL**

**EduSkills**  
Nation Building Through Skills

**Certificate of Virtual Internship**

This is to certify that

**Dolly Ramesh Diwate**  
Tulsiramji Gaikwad-Patil College of Engineering and Technology

has successfully completed the 10-week  
**AI-ML Virtual Internship**  
During October - December 2025

May this Internship learning propel you toward a bright and successful career.

Supported By : India Edu Program  
**Google for Developers**

**Karthik Padmanathan**  
Developer Ecosystem Lead  
MEINA & India, Google

**Dr. Budhia Chandrasekhar**  
Chief Coordinating Officer (CCO)  
AICTE, Ministry of Education

**Chaitanya Jiloooby**  
Chief Technology Officer (CTO)  
EduSkills

Certificate ID : f6379cf8566b743732be9c04ec2117cfcb04  
Student ID : STU972260908e0 1013424046



## 4. Faculty Conference



Sr. No.	Name of Faculty	Name of Conference	Title of Paper	Conference Date
1.	Prof. Suraj Mahajan	International conference on Research & Innovative Perspectives in Engg.(ICRIPE 2025)	Revolutionizing Air Pollution Control	24-01-2025
2.	Prof. Suraj Mahajan	5th International conference on recent trends in Science Engineering and Technology	Revolutionizing Air Pollution Control	29-03-2025
3.	Prof. Suraj Mahajan	Indian Journal of Tuberculosis,	Addressing diagnostic resource imbalance in pulmonary tuberculosis detection from chest radiographs through cost- aware learning	11/10/2025
4.	Prof. Suraj Mahajan	ICACEBD-25	A Comparative Analysis of Human Activity Recognition Models Using Deep Learning	05/06/2025
5.	Prof. Chetan Jambhulkar	PII: S2772-6835(25)00058-5	Advanced optimization strategies for resilient and cost-efficient hydrogen-based AC/DC microgrids with integrated RES and BESS	15/11/2025
6.	Prof. Chetan Jambhulkar	IJRASET	Multi-Port DC-DC Power Converter for Renewable Energy Application, International Journal for Research in Applied Science & Engineering Technology	-
7.	Prof. Sanghapal Sarkate	ICFIC 2025	Iterative Bio Inspired Load Prediction and Balancing Framework for Smart Healthcare IoT Using Multi-Objective Optimization	21/11/2025



# FACULTY CONFERENCE & PUBLICATIONS



## CERTIFICATE OF PARTICIPATION

3<sup>rd</sup> International Conference on  
Advanced Communication, Energy and Big Data (ICACEBD-25)

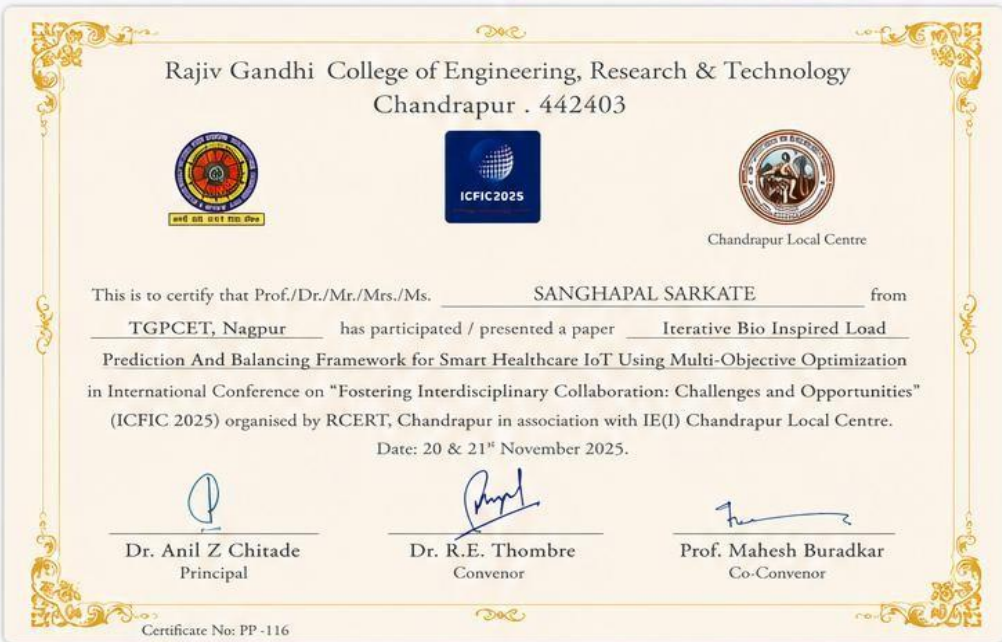
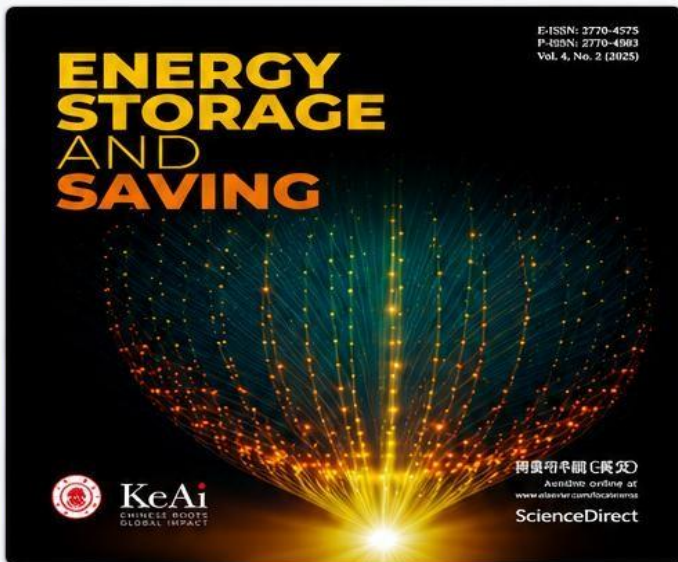
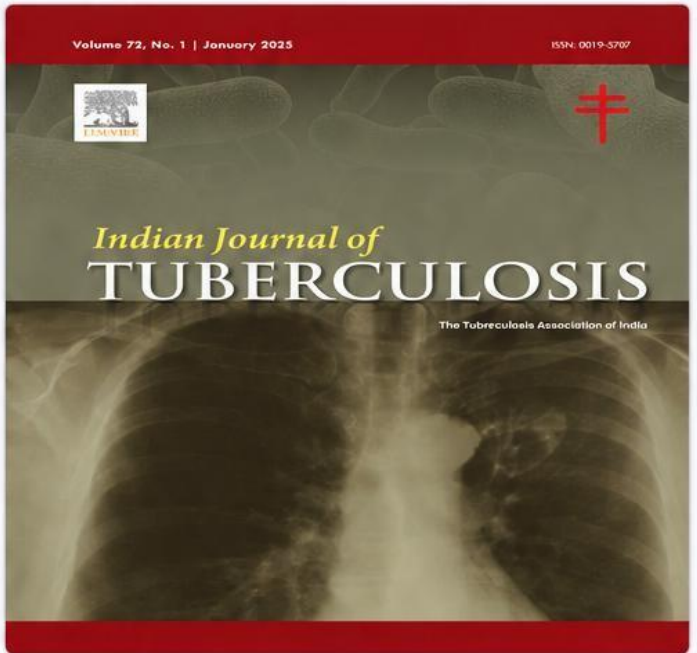
Organized by  
Department of Computer Science & Engineering, Department of Electronics & Telecommunication Engineering,  
Department of Electrical Engineering and Department of Data Science

This is to certify that Dr./Mr./Ms. SURAJ MAHAJAN  
from TULSIRAMJI GAIKWAD-PATIL College of Engineering and Technology, Nagpur has presented paper entitled as

*"A Comparative Analysis of Human Activity Recognition Models Using Deep Learning, in International Conference on Advanced STGAN, and Secure Sense Frameworks"*  
Communication, Energy and Big Data (ICACEBD-25) held on 5<sup>th</sup> & 6<sup>th</sup> June 2025.

Dr Madhuri Toyal General Chair  
Dr Bhupendra Kumar General Chair  
Dr Devadree Marotkar General Chair  
Dr Sonali Rithorikar General Chair  
Dr Vivek Kapur Honorary Chair

**raisoni** EDUCATION Nagpur | Pune | Jalgaon | Amravati | Pandhurna | Bhandara





## 5. FACULTY PATENT



Sr. No.	Patent Application No.	Title of Patent	Applicant(s) Name	Patent Filed Date	Patent Published/Grant Date	Status (Published/Granted)
1.	202521073733	Indian Skin Tone Adaptive Dermatology Assistant (ISTADA): AI- Powered Skin Cancer Detection and Management System	Prof. Suraj Mahajan	02/08/2025	15/08/2025	Published
2.	202521091501	Power Pulse IoT Enabled Electricity Theft Monitoring System (IEMS)	Prof. Suraj Mahajan	24/09/2025	10/10/2025	Published
3.	202521077933	Smart Neural Dust Simulator (SNDS): AI- Driven Brain-Computer Interface and Emergency Neuro-Health Monitoring	Prof. Suraj Mahajan	15/08/2025	29/08/2025	Published
4.	202521087118	AI Driven AtmosGuard Environmental Monitoring and Alert System (AAEMAS)	Prof. Suraj Mahajan	13/09/2026	26/09/2025	Published
5.	202521092917	Aeromind predictive maintenance for Enhanced aviation safety	Prof. Suraj Mahajan	27/09/2025	17/10/2025	Published
6.	202521089719	AI powered Smart Guardance of the Wildlife Intrusion Detection (SGWID)	Prof. Suraj Mahajan	19/09/2025	03/10/2025	Published
7.	202521045685	A system and method for automated human resource Recruitment using natural language processing and machine learning algorithms	Prof. Suraj Mahajan	12/05/2025	30/05/2025	Published
8.	202521053103	Intelligent iot-integrated supply chain management system and method for real-time monitoring and optimization	Prof. Suraj Mahajan	31/05/2025	27/06/2025	Published



# FACULTY PATENT



Office of the Controller General of Patents, Designs & Trade Marks  
Department for Promotion of Industry and Internal Trade  
Ministry of Commerce & Industry,  
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details	
APPLICATION NUMBER	202521073733
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	02/08/2025
APPLICANT NAME	1 . Prof. Suraj Mahajan 2 . Dr. Pravin Tajane 3 . Prof. Mayuri Harde 4 . Prof. Pallavi Rokade 5 . Mr. Md Kalif Molla 6 . Ms. Gayatri Ghode 7 . Mr. Akash Sonkamble 8 . Ms. Vaishnavi Fulluke 9 . Mr. Sameer Bagde 10 . Ms. Sayali Lutte
TITLE OF INVENTION	Indian Skin Tone Adaptive Dermatology Assistant (ISTADA): AI-Powered Skin Cancer Detection and Management System
FIELD OF INVENTION	BIO-MEDICAL ENGINEERING
E-MAIL (As Per Record)	as.mahesh.ec@gmail.com
ADDITIONAL-EMAIL (As Per Record)	
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	15/08/2025

Application Status	
APPLICATION STATUS	Awaiting Request for Examination

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➡ Filed ➡ Published ➡ RQ Filed ➡ Under Examination ➡ Disposed

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Ministry of Commerce & Industry,  
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details	
APPLICATION NUMBER	202521053103
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	31/05/2025
APPLICANT NAME	1 . Prof. Mayuri Harde 2 . Prof. Suraj Mahajan 3 . Ms. Pallavi Rokade 4 . Ms. Pallavi Wasnik 5 . Ms. Shital Hulke 6 . Mr. Mayur Borkar 7 . Ms. Ruchika Morey 8 . Mr. Nikhil Lingait 9 . Ms. Mrunali Gaidhane 10 . Ms. Bhagyashri Raula 11 . Ms. Sakshi Sahare 12 . Ms. Sakshi Ukey 13 . Mr. Prajwal Jangade
TITLE OF INVENTION	Intelligent IoT-Integrated supply chain management system and method for real-time monitoring and optimization
FIELD OF INVENTION	COMPUTER SCIENCE
E-MAIL (As Per Record)	as.mahesh.ec@gmail.com
ADDITIONAL-EMAIL (As Per Record)	
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	27/06/2025

Application Status	
APPLICATION STATUS	Awaiting Request for Examination

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➡ Filed ➡ Published ➡ RQ Filed ➡ Under Examination ➡ Disposed

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Department for Promotion of Industry and Internal Trade  
Ministry of Commerce & Industry,  
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details	
APPLICATION NUMBER	202521087118
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	13/09/2025
APPLICANT NAME	1 . Prof. Mayuri Harde 2 . Prof. Suraj Mahajan 3 . Prof. Amol Dhenge 4 . Prof. Pallavi Rokade 5 . Prof. Sandip Thakre 6 . Mr. Krushnakant Dhurve 7 . Ms. Palash Galkwad 8 . Ms. Payal Makade 9 . Ms. Kashish Mawale
TITLE OF INVENTION	AI Driven AtmosGuard Environmental Monitoring and Alert System (AAEMAS)
FIELD OF INVENTION	COMPUTER SCIENCE
E-MAIL (As Per Record)	as.mahesh.ec@gmail.com
ADDITIONAL-EMAIL (As Per Record)	
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	26/09/2025

Application Status	
APPLICATION STATUS	Awaiting Request for Examination

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➡ Filed ➡ Published ➡ RQ Filed ➡ Under Examination ➡ Disposed

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Department for Promotion of Industry and Internal Trade  
Ministry of Commerce & Industry,  
Government of India

(<http://ipindia.nic.in/index.htm>)



(<http://ipindia.nic.in/index.htm>)

Application Details	
APPLICATION NUMBER	202521077933
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	15/08/2025
APPLICANT NAME	1 . Prof. Pallavi Rokade 2 . Prof. Sandeep Thakre 3 . Prof. Rohini Pochhi 4 . Prof. Mayuri Harde 5 . Prof. Suraj Mahajan 6 . Ms. Mayuri Rangari 7 . Ms. Dhanashri Kathane 8 . Ms. Manali Biranwar
TITLE OF INVENTION	Smart Neural Dust Simulator (SNDS): AI-Driven Brain-Computer Interface and Emergency Neuro-Health Monitoring
FIELD OF INVENTION	COMPUTER SCIENCE
E-MAIL (As Per Record)	as.mahesh.ec@gmail.com
ADDITIONAL-EMAIL (As Per Record)	
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	29/08/2025

Application Status	
APPLICATION STATUS	Awaiting Request for Examination

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➡ Filed ➡ Published ➡ RQ Filed ➡ Under Examination ➡ Disposed

In case of any discrepancy in status, kindly contact [ipo-helpdesk@nic.in](mailto:ipo-helpdesk@nic.in)



## 6. FACULTY FDP



Sr. No.	Name Of Faculty	Title Of Workshop/FDP/STTP	Date of Conduction	Attended/Organized
1	Prof. Suraj Mahajan	NEP 2020 Orientation & Sensitization Programme	25 Nov-2024 to 4 Dec 2025	UGC-Malaviya Mission Teacher Training Centre, Sant Gadge Baba Amravati University, Amravati,
2	Prof. Suraj Mahajan	Data Analytics for Smart Mobility	3 Feb 2025 to 8 Feb 2025	AICTE Training and Learning (ATAL) Academy
3	Prof. Suraj Mahajan	AI-Powered Education Platforms & Tools	25 Aug 2025 to 30 Aug 2025	AD.Y. Patil College of Engineering, Akrurdi
4	Prof. Suraj Mahajan	Capacity Building Workshop	13Oct 2025	Chintamani Mahavidyalay, Ghugus
5	Prof. Sanghpal Sarkate	Capacity Building Workshop	13Oct 2025	Chintamani Mahavidyalay, Ghugus
6	Prof. Shital Dandade	Capacity Building Workshop	13Oct 2025	Chintamani Mahavidyalay, Ghugus



# FACULTY FDP



1FQLRG-CE00021

10/13/2025

CHINTAMANI SHIKSHAN PRASARAK  
MANDAL, BALLARPUR'S



PRADHAN MANTRI UCHCHATAR SHIKSHA  
ABHIYAN (PM-USHA)



## Chintamani Mahavidyalaya, Ghugus & Gondwana University, Gadchiroli



Jointly organizes  
One Day State Level Capacity Building Workshop on  
Academic Bank of Credits (ABC ID)

### Certificate of Participation

This is to certify that, Dr/ Prof/Mr./Mrs /Miss **Suraj Mahajan** of **Tulsiramji Gaikwad Patil college of engineering and technology** has (online/offline) attended one-day state-level Capacity Building Workshop on "Academic Bank of Credits" (ABC ID) for students, teachers & non-teaching staff jointly organised by Gondwana University, Gadchiroli & Chintamani Mahavidyalaya, Ghugus, Dist. Chandrapur on 13/10/2025.

**Dr. Shriram S. Kawale**  
Pro- Vice Chancellor  
Gondwana University Gadchiroli

**Dr. Sanjay M. Asutkar**  
Principal  
Chintamani Mahavidyalaya, Ghugus

**Dr. Nitin B. Kawadkar**  
Coordinator  
Professor & Head, Dept. of Economics  
Chintamani Maha., Ghugus

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1FQLRG-CE00023

10/13/2025

CHINTAMANI SHIKSHAN PRASARAK  
MANDAL, BALLARPUR'S



PRADHAN MANTRI UCHCHATAR SHIKSHA  
ABHIYAN (PM-USHA)



## Chintamani Mahavidyalaya, Ghugus & Gondwana University, Gadchiroli



Jointly organizes  
One Day State Level Capacity Building Workshop on  
Academic Bank of Credits (ABC ID)

### Certificate of Participation

This is to certify that, Dr/ Prof/Mr./Mrs /Miss **Sanghpal Sarkate** of **Tulsiramji Gaikwad Patil College of Engineering and Technologies** has (online/offline) attended one-day state-level Capacity Building Workshop on "Academic Bank of Credits" (ABC ID) for students, teachers & non-teaching staff jointly organised by Gondwana University, Gadchiroli & Chintamani Mahavidyalaya, Ghugus, Dist. Chandrapur on 13/10/2025.

**Dr. Shriram S. Kawale**  
Pro- Vice Chancellor  
Gondwana University Gadchiroli

**Dr. Sanjay M. Asutkar**  
Principal  
Chintamani Mahavidyalaya, Ghugus

**Dr. Nitin B. Kawadkar**  
Coordinator  
Professor & Head, Dept. of Economics  
Chintamani Maha., Ghugus

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ABHIYAN (PM-USHA)



## Chintamani Mahavidyalaya, Ghugus & Gondwana University, Gadchiroli



Jointly organizes  
One Day State Level Capacity Building Workshop on  
Academic Bank of Credits (ABC ID)

### Certificate of Participation

This is to certify that, Dr/ Prof/Mr./Mrs /Miss **Shital Ganesh Dandade** of **Tulsiramji Gaikwad Patil College of Engineering and technologies** has (online/offline) attended one-day state-level Capacity Building Workshop on "Academic Bank of Credits" (ABC ID) for students, teachers & non-teaching staff jointly organised by Gondwana University, Gadchiroli & Chintamani Mahavidyalaya, Ghugus, Dist. Chandrapur on 13/10/2025.

**Dr. Shriram S. Kawale**  
Pro- Vice Chancellor  
Gondwana University Gadchiroli

**Dr. Sanjay M. Asutkar**  
Principal  
Chintamani Mahavidyalaya, Ghugus

**Dr. Nitin B. Kawadkar**  
Coordinator  
Professor & Head, Dept. of Economics  
Chintamani Maha., Ghugus


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# 7. FACULTY BOOK CHAPTER



Sr. No.	Title of Chapter	Title of Book	Publisher Name	Author(s) Name	Date of Publication	ISBN No.
1	Intelligent object detection using bio inspired convolutional Kalman Neural Network	Book Chapter 1st Edition	CRC Press	Prof. Suraj Mahajan	2025	eBook ISBN 9781003567653



Book

## Technological Innovations & Applications in Industry 4.0

*Edited By Dinesh Seth, Sushant S. Satputaley, Minhaj Ahemad A. Rehman, Amit R. Bhende*

Edition: 1st Edition  
 First Published: 2025  
 eBook Published: 27 January 2025  
 Pub. Location: London  
 Imprint: CRC Press  
 DOI: <https://doi.org/10.1201/9781003567653>  
 Pages: 328  
 eBook ISBN: 9781003567653  
 Subjects: Computer Science, Engineering & Technology

Share

Citation

**ABSTRACT**

The conference offered an international forum for discussion and exchange of knowledge on opportunities and challenges related with all facets and aspects of technological innovations & applications in Industry 4.0, its challenges and way ahead. The objective of this international conference was to provide a platform for policy makers, academicians and researchers to share their experiences and knowledge by presentation of scientific advances made in the field of Industry 4.0.

**TABLE OF CONTENTS**

Chapter 1 | 5 pages

Intelligent object detection using bio inspired convolutional Kalman neural network

By Pragati Patil, Ritesh Banpurkar, Suraj Mahajan

Abstract ▾

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## TECHNOLOGICAL INNOVATIONS & APPLICATIONS IN INDUSTRY 4.0

Edited by  
Dinesh Seth, Sushant S. Satputaley, Minhaj Ahemad A. Rehman and Amit R. Bhende







# 8. FACULTY BOOK PUBLISHED



Sr. No.	Title of Book	Publisher Name	Author(s) Name	Date of Publication	ISBN No.
1.	Microprocessor and Microcontroller fundamental & application	SPI Publications	Prof. Suraj Mahajan	21/08/2025	978-81-990408-0-09
2.	AI And ChatGPT	Infinite Research	Prof. Sanghpal Sarkate	-	978-93-48897-72-5

### Overview

Microprocessors and microcontrollers are the backbone of modern electronic systems, empowering intelligent automation across industries. While microprocessors serve as high-performance CPUs for computation, microcontrollers are compact, integrated systems that combine processing power, memory, and I/O capabilities—all on a single chip.

### Fundamentals

This book provides a strong foundation in microprocessor and microcontroller technologies, exploring core concepts such as:

- **Instruction Sets:** Architecture, assembly language, and execution flow
- **Memory Organization:** ROM, RAM, addressing, and data management
- **Input/Output Operations:** Real-world interfacing with LEDs, keyboards, ADCs, DACs, and more

### Applications

Readers will gain insights into practical implementations in:

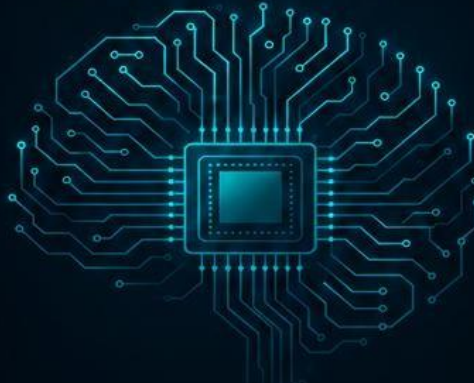
- **Embedded Systems:** Robotics, IoT, and industrial automation
- **Consumer Electronics:** Smart appliances, handheld devices, and gaming platforms
- **Automotive Electronics:** Engine control, safety modules, and infotainment systems

Whether you're a student, educator, or engineering enthusiast, this book serves as a comprehensive guide to understanding, programming, and applying microprocessors and microcontrollers in real-world systems.

Microprocessor and Microcontroller Fundamentals and Application

## MICROPROCESSOR AND MICROCONTROLLER

### FUNDAMENTALS AND APPLICATION



Dr. Pragati Patil | Prof. Suraj Mahajan  
Prof. Mayuri Harde | Prof. Pallavi Rokade

SPI Publications



### About the Authors



**Dr. Amit Kisan Bhosale** is currently serving as a Manager of Flowmatic Engineering Pvt. Ltd., an ISO 9001:2015 certified organization. He holds a Master's degree in Quality Control from PCCO, Pune. He has extensive experience in process automation, machine vision, and data analysis. He has published several research papers in national and international journals and conferences. His research papers are published in process automation, machine vision, and data analysis. He has published several research papers in national and international journals and conferences. His research papers are published in process automation, machine vision, and data analysis.



**Dr. Vishal Madhusudan Tiwari** is an Assistant Professor in the Department of Information Technology, Tatyasaheb Kore Institute of Technology, Warananagar. He holds a Master's and Ph.D. in Computer Science. His research focuses on AI, machine learning, and cloud computing. He has published in reputed journals and conferences and has received the Best Paper Award at IC-2024, Mysore. With over 10 years of industry experience, he has his finger on the pulse of the latest trends in AI and cloud computing, ensuring the content is relevant and practical.



**Dr. Lovkesh Nandkishor Yadav** is an Associate Professor and Head of the Department of Computer Science with over 10 years of academic and administrative experience. He holds a Ph.D. in Computer Science and is a recognized academician. A member of professional bodies like IEEE, he has published on various topics in teaching, research, and academic management. His work in research, innovation, and academic growth and leadership excellence and institutional growth.



**Prof. Sanghpal Sarkate** working as an Assistant Professor in the Department of Artificial Intelligence & Machine Learning. Currently, she is pursuing a Doctorate (Ph.D.) from the University of Mumbai, India. She has a Master's in Computer Science (M.Sc.) and a Bachelor's in Computer Science (B.Sc.). She has published several research papers in national and international journals and conferences. She has also presented her research at various international conferences. She is currently working on her Ph.D. thesis on the topic of AI and Machine Learning. She is also involved in various academic and research activities. She is a member of several professional organizations and is actively participating in various academic and research activities.



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A TEXTBOOK ON AI AND CHATGPT

## A TEXTBOOK ON AI AND CHATGPT

Mr. Amit Kisan Bhosale  
Dr. Vishal Madhusudan Tiwari  
Dr. Lovkesh Nandkishor Yadav  
Prof. Sanghpal Sarkate





# 9. FACULTY AWARDS



Sr. No.	Name of Faculty	Award
1.	Prof. Suraj Mahajan	Project Guide-Best innovative project degree award, ISTE Maharashtra -Goa section
2.	Prof. Suraj Mahajan	Research award odd semester 2025 15August





## 10. OUR STAR STUDENTS



Sr. No	Name of Student	Competition	Award	Organized by
1.	1. Palak Sakharkar 2. Kshitija Nipane	AICTE- VAANI National Conference	1 <sup>st</sup>	Tulsiramji Gaikwad-Patil College of Engineering
2.	Dolly Diwate	Poster Presentation in BIO-FAIR 2K25	3 <sup>rd</sup>	Tulsiramji Gaikwad-Patil College of Engineering



# AWARDS AND CERTIFICATES



**AICTE- VAANI National Conference  
(1<sup>st</sup> Award)  
Palak Sakharkar & Kshitija Nipane**



**Poster Presentation in BIO-FAIR 2K25  
(3<sup>rd</sup> Award)  
Dolly Diwate**



**Certificate – Palak Sakharkar  
(AICTE- VAANI National Conference)**



**Certificate – Kshitija Nipane  
(AICTE- VAANI National Conference)**



**Certificate – Dolly Diwate  
(BIO-FAIR 2K25 – Poster Presentation)**



# 11. STUDENT PAPER



Sr. No.	Name of Student	Title of Paper	Name of Journal	Publication Date
1.	Dolly Raghorte	Smart Waste Management	IJRPR	15/10/2025
2.	Krish Makde	Sahaayata: NGO Donation HUB- A Comprehensive Platform for Donors to Connect with NGOs	SEMCCC	15/10/2025
3.	Yuvraj Timande	AI in Medical and Healthcare	IJARESM	13/10/2025
4.	Aditi Dhakunkar	Real Time Traffic Prediction with Deep Reinforcement Learning and Meteorology Data	IJPRA	—
5.	Jyoti Patle	Improving Students Assessment in E-learning	IJSRET	1/08/2025
6.	Sudhir Baghel	Prospect of Generative AI: Techniques, Evaluation, and Defence-Relevant Applications	JETIR	14/10/2025
7.	Yash Ghate	An Ethical Framework and Governance Model for Community AI	IJRPR	18/10/2025
8.	Vipul Kalambe	AI-Based Crop Monitoring and Yield Prediction	IJARESM	10/10/2025
9.	Arya Kohapare	Smart Web Solutions for online Growth	IJCT	07/07/2025
10.	Astha Daiwalkar	Community Data Analysis for Social Change	IJRPR	28/10/2025



# STUDENT PAPER CERTIFICATES




**Journal of Emerging Technologies and Innovative Research**  
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[www.jetir.org](http://www.jetir.org) | [editor@jetir.org](mailto:editor@jetir.org) An International Scholarly indexed Journal

## Certification of Publication

The Board of  
Research Journal of Emerging Technologies and Innovative Research (ISSN: 2349-5162)  
Is hereby awarding this certificate to

**Sudhir R. Baghel**

In recognition of the publication of the paper entitled

**PROSPECT OF Generative AI: Techniques, Evaluation, and Defence-Relevant Applications**

Published In JETIR ([www.jetir.org](http://www.jetir.org)) ISSN UGC Approved (Journal No: 63975) & 7.95 Impact Factor  
Published in Volume 12 Issue 10, October-2025 | Date of Publication: 2025-10-14



*Pasim P*  
EDITOR  
JETIRS70380

*Baghel*  
EDITOR IN CHIEF

Research Paper Weblink <http://www.jetir.org/view?paper=JETIRS70380> Registration ID : 570380

An International Scholarly Open Access Journal, Peer-Reviewed, Refereed Journal Impact Factor Calculated by Google Scholar and Semantic Scholar | AI-Powered Research Tool, Multidisciplinary, Monthly, Multilingual Journal Indexing in All Major Database & Metadata, Citation Generator



## Certificate of Publication



This is to confirm that

**Miss. Aditi Dhakunkar**

Published following article


**Real Time Traffic Prediction with Deep Reinforcement Learning and Meteorology Data**  
Volume 10, Issue 05, pp: 1146-1153  
[www.ijprajournal.com](http://www.ijprajournal.com)

International Journal of Pharmaceutical Research and Applications



ISSN: 2456-4494

Publication Head




**International Journal of Research Publication and Reviews**  
(Open Access, Peer Reviewed, International Journal)  
(A+ Grade, Impact Factor 6.844) Sr. No: *IJRPR* 137691-7

ISSN 2582-7421

## Certificate of Acceptance & Publication

This certificate is awarded to "Yash Gajanan Ghate", and certifies the acceptance for publication of paper entitled "An Ethical Framework and Governance Model for Community AI" in "International Journal of Research Publication and Reviews", Volume 6, Issue 10.

Signed *Yash Ghate*  Date 18-10-2025

Editor-in-Chief  
International Journal of Research Publication and Reviews



**International Journal of Scientific Research and Engineering Trends (IJSRET)**

This is to certify that

**Ms. Jyoti Patle**  
has published a paper entitled  
**"Improving Students Assessment in E-learning"**  
in International Journal of Scientific Research and Engineering Trends, in Volume 11, Issue 4,  
July-Aug-2025



Editor-in-Chief  
IJSRET

[www.ijret.com](http://www.ijret.com)  
ISSN - 2395-566X



## CERTIFICATE OF COMPLETION


# Arya P. Kohapare

Published "SMART WEB SOLUTIONS FOR ONLINE GROWTH" in  
the International Journal of Comperch Techniques, Volume 12  
Issue 4, July - August 2025 Paper ID: IJCT-V12I4P19

July 2025  
DATE



*Galal Ali Hassan*  
SIGNATURE


  
WWW.IJRPR.COM

## International Journal of Research Publication and Reviews


(Open Access, Peer Reviewed, International Journal)  
(A+ Grade, Impact Factor 5.536) Sr. No: IJRPR. 182498

### Certificate of Acceptance & Publication

This certificate is awarded to "Asta Daiwalkar", and certifies the acceptance  
for publication of research paper entitled "COMMUNITY DATA ANALYSIS FOR  
SOCIAL CHANGE" in "International Journal of Research Publication and  
Reviews". Volume 5, Issue 3.

Signed Arunabh Agarwal  Date 28-10-2025  
Editor-in-Chief

International Journal of Research Publication and Reviews



## IJARESM


ISSN: 2455-6211, New Delhi, India  
International Journal of All Research Education & Scientific Methods  
An ISO & UGC Certified Peer-Reviewed & Refereed Multi-disciplinary Journal  
UGC Journal No. 7647


### Certificate of Publication


Vipul Kalambe  
Department of Artificial Intelligence and Machine Learning Tulsiramji Gaikwad Patil College of Engineering and  
Technology, Nagpur

**TITLE OF PAPER**  
**AI-Based Crop Monitoring and Yield Prediction**  
has been published in  
IJARESM, Impact Factor: 8.536, Volume 13 Issue 10, October-2025

Certificate Id: IJ- 2510250237  
Date: 25-10-2025

 Website: [www.ijaresm.com](http://www.ijaresm.com)  
Email: [editor.ijaresm@gmail.com](mailto:editor.ijaresm@gmail.com)

  
Authorized Signatory



## IJARESM


ISSN: 2455-6211, New Delhi, India  
International Journal of All Research Education & Scientific Methods  
An ISO & UGC Certified Peer-Reviewed & Refereed Multi-disciplinary Journal  
UGC Journal No. 7647


### Certificate of Publication

Vipul Kalambe  
Department of Artificial Intelligence and Machine Learning Tulsiramji Gaikwad Patil College of Engineering and  
Technology, Nagpur

**TITLE OF PAPER**  
**AI in Medicine and Healthcare**  
has been published in  
IJARESM, Impact Factor: 8.536, Volume 13 Issue 13, October-2025

Certificate Id: IJ- 141035421  
Date: 26-10-2025

 Website: [www.ijaresm.com](http://www.ijaresm.com)  
Email: [editor.ijaresm@gmail.com](mailto:editor.ijaresm@gmail.com)

  
Authorized Signatory



## 12. FACULTY COPYRIGHT



Sr.no.	Application No.	Authors Name	Date of Filing	Address
1.	LD-37261/2025-CO	SURAJ MAHAJAN	15/09/2025	TGPCET, MOHGAON, NAGPUR- 441108
2.	LD-37585/2025-CO	SURAJ MAHAJAN	17/09/2025	TGPCET, MOHGAON, NAGPUR- 441108
3.	11944/2025-CO/L	SURAJ MAHAJAN	29/03/2025	TGPCET, MOHGAON, NAGPUR- 441108



# FACULTY COPYRIGHTS



प्रमाणपत्र सं. / Certificate No.: LD-20250178842



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जर्नियलिनियम नियम, भाग 13 के Copyright Rules  
जर्नियलिनियम नियम, भाग 13 के Copyright Rules

आवेदन सं. / Application No.: LD-37261/2025-CO दिनांक करने की तिथि / Date of Filing: 15/09/2025

यह प्रमाणपत्र यह दर्शाता है कि उल्लिखित कार्य/कार्यक्रम पंजीकृत है।  
This is to certify that a copyright has been registered for the work titled "drowsiness detection for road safety using artificial intelligence" as disclosed in the below mentioned application in accordance with the provisions of the Copyright Act, 1957.

**लेखक / Authors:**

सं. / SNO.	नाम / Name	पता / Address
1	SURAJ MAHAJAN	MOHGAO, TGPCET, 441108-441108
2	SHRAVANI BUIVE	MOHGAO, TGPCET, 441108-441108
3	VISHAKHA KHAPRE	MOHGAO, TGPCET, 441108-441108

**स्वामी / Owners:**

सं. / SNO.	नाम / Name	पता / Address
1	SURAJ MAHAJAN	MOHGAO, TGPCET, 441108-441108
2	SHRAVANI BUIVE	MOHGAO, TGPCET, 441108-441108

प्रकाशक विवरण / Publisher Details: N.A.

कार्य का भाषा / Language of the Work: English

कार्य का विवरण / Description of the Work: ESP32 camera detects eye open and close status. It sends eye status to ESP32 controller. If Eye open and Alcohol not detected and ignition key ON then engine motor will be ON

धारा / शर्तें / टिप्पणियाँ / (Conditions/Remarks, if any): ok

प्रति की तारीख लेने की तिथि / Date of ROC: 22/12/2025



*Signature*  
सुरज माहाजन  
रेजिस्ट्रार के पी. सी. ऑफिस

For Additional details please see next page.

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प्रमाणपत्र सं. / Certificate No.: LD-20250177531



प्रतिनिष्ठाधिकार कार्यालय, भारत सरकार | Copyright Office, Government Of India  
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आवेदन सं. / Application No.: LD-37585/2025-CO दिनांक करने की तिथि / Date of Filing: 17/09/2025

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This is to certify that a copyright has been registered for the work titled "Electricity Generator speed controller unit" as disclosed in the below mentioned application in accordance with the provisions of the Copyright Act, 1957.

**लेखक / Authors:**

सं. / SNO.	नाम / Name	पता / Address
1	MR.SURAJ MAHAJAN	MOHGAON BUTIBORI NAGPUR-441108
2	SHIVAM DHULASE	MOHGAON BUTIBORI NAGPUR-441108
3	SHIVAM KUSHWAHA	MOHGAON BUTIBORI NAGPUR-441108

**स्वामी / Owners:**

सं. / SNO.	नाम / Name	पता / Address
1	MR.SURAJ MAHAJAN	MOHGAON BUTIBORI NAGPUR-441108
2	SHIVAM DHULASE	MOHGAON BUTIBORI NAGPUR-441108

प्रकाशक विवरण / Publisher Details: N.A.

कार्य का भाषा / Language of the Work: English

कार्य का विवरण / Description of the Work: The electricity generator speed breaker is an innovative mechanism designed to harness kinetic energy from vehicles passing over speed bumps and convert it into electrical energy.

धारा / शर्तें / टिप्पणियाँ / (Conditions/Remarks, if any): N.A.

प्रति की तारीख लेने की तिथि / Date of ROC: 18/08/2025



*Signature*  
सुरज माहाजन  
रेजिस्ट्रार के पी. सी. ऑफिस

For Additional details please see next page.

Page 1 of 2



प्रमाणपत्र सं. / Certificate No.: LD-20250171863



प्रतिनिष्ठाधिकार कार्यालय, भारत सरकार | Copyright Office, Government Of India  
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जर्नियलिनियम नियम, भाग 13 के Copyright Rules

आवेदन सं. / Application No.: 11944/2025-CO/L दिनांक करने की तिथि / Date of Filing: 29/03/2025

यह प्रमाणपत्र यह दर्शाता है कि उल्लिखित कार्य/कार्यक्रम पंजीकृत है।  
This is to certify that a copyright has been registered for the work titled "Electricity Generation System using Rain Water" as disclosed in the below mentioned application in accordance with the provisions of the Copyright Act, 1957.

**लेखक / Authors:**

सं. / SNO.	नाम / Name	पता / Address
1	SURAJ MAHAJAN	TGPCET, MOHGAON, 441108-441108
2	UJWALA TILAKARE	TGPCET, MOHGAON, 441108-441108
3	SHRUTI TIMBIAPRE	TGPCET, MOHGAON, 441108-441108

**स्वामी / Owners:**

सं. / SNO.	नाम / Name	पता / Address
1	SURAJ MAHAJAN	TGPCET, MOHGAON, 441108-441108
2	UJWALA TILAKARE	TGPCET, MOHGAON, 441108-441108

प्रकाशक विवरण / Publisher Details: N.A.

कार्य का भाषा / Language of the Work: English

कार्य का विवरण / Description of the Work: This project presents an alcohol sensing alert with an engine locking system to prevent drunk driving.

धारा / शर्तें / टिप्पणियाँ / (Conditions/Remarks, if any): ok

प्रति की तारीख लेने की तिथि / Date of ROC: 11/08/2025



*Signature*  
सुरज माहाजन  
रेजिस्ट्रार के पी. सी. ऑफिस

For Additional details please see next page.

Page 1 of 2



# 13. STUDENT COPYRIGHT



Sr.no.	Application No.	Authors Name	Date of Filing	Address
1.	LD-32722/2025-CO	PALAK SAKHARKAR	14/08/2025	TGPCET, MOHGAON, NAGPUR- 441108
2.	LD-32722/2025-CO	KSHITIJA NIPANE	14/08/2025	TGPCET, MOHGAON, NAGPUR- 441108

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 प्रमाणपत्र सं. / Certificate No. :  
LD-20250177803



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कॉपीराइट प्रमाणपत्र | Copyright Certificate  
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प्रतिलिप्याधिकार रजिटर से उखरण | Extracts from the Register of Copyrights

अवेदन सं. / Application No. : LD-32722/2025-CO दाखिल करने की तिथि / Date of Filing : 14/08/2025

सत्यापित एवं प्रमाणित किया जाता है कि "अल्गोरिथम इन एडवांस इन अल्गोरिथम " शीर्षक के इस अर्ध संघ में इस कार्यालय के अभिलेखों में अंतिम पंजीकरण विवरण मौजूद हैं।  
This is to certify that a copyright has been registered for the work titled "Advance in Algorithm" System using Rain Water" as disclosed in the below mentioned application in accordance with the provisions of the Copyright Act,1957.

**लेखक / Authors:**

क्र. / SNO:	नाम / Name	पता / Address
1	SAKSHI M KALAMKODALE	TGPCET, MOHGAON, NAGPUR-441108
2	PALAK SAKHARKAR	TGPCET, MOHGAON, NAGPUR-441108
3	KSHITIJA NIPANE	TGPCET, MOHGAON, NAGPUR-441108

**स्वामी / Owners:**

क्र. / SNO:	नाम / Name	पता / Address
1	SAKSHI M KALAMKODALE	TGPCET, MOHGAON, NAGPUR-441108
2	PALAK SAKHARKAR	TGPCET, MOHGAON, NAGPUR-441108
3	KSHITIJA NIPANE	TGPCET, MOHGAON, NAGPUR-441108

**प्रकाशक विवरण / Publisher Details** : N.A.

**कार्य की भाषा / Language of the Work** : English

**कार्य का विवरण / Description of the Work** : This is to certify that a copyright has been registered for the work titled "Advance in Algorithm" System using Rain Water.

**शर्तें / टिप्पणी / (Conditions/ Remarks, if any):** N.A.

प्राप्ति की तारीख से प्रभावी वर्ष / Date of ROC: 29/11/2023



  
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