



REVIEW ON RENEWABLE ENERGY-BASED SMART FERTIGATION CONTROLLER USING NPK SENSOR

Niharika Bodake

*UG Student, Department of Electronics and Telecommunication Engineering
SKN Sinhgad College of Engineering, Pandharpur, India
niharikabodke@gmail.com*

Akshata Gaurkar

*UG Student, Department of Electronics and Telecommunication Engineering
SKN Sinhgad College of Engineering, Pandharpur, India
akshatagaurkar@gmail.com*

Vaishnavi Chavan

*UG Student, Department of Electronics and Telecommunication Engineering
SKN Sinhgad College of Engineering, Pandharpur, India
cvaishnavi1020@gmail.com*

Prof. S. K. Godase

*Assistant Professor, Department of Electronics and Telecommunication Engineering
SKN Sinhgad College of Engineering, Pandharpur, India
sonali.karche@sknscoe.ac.in*

Abstract:

Agriculture will require efficient management of water, fertilizers, and energy to improve crop productivity and support sustainable farming practices. Traditional fertilizer application methods will often depend on manual observation and fixed schedules, which will lead to improper nutrient management, nutrient imbalance, and unnecessary fertilizer usage. Smart fertigation systems will provide an effective approach for addressing these limitations by integrating IoT, soil nutrient sensing, and real-time monitoring technologies. In this review, NPK-based soil monitoring and IoT-enabled fertigation approaches will be studied with emphasis on nitrogen, phosphorus, and potassium monitoring for precision agriculture. The proposed system will use an ESP32 microcontroller, NPK sensor, soil moisture sensor, and DHT11 sensor to monitor soil nutrient and environmental conditions in real time. The collected data will be displayed on an LCD and transmitted through Wi-Fi to the Blynk IoT platform for remote monitoring. Based on real-time NPK readings, the fertilizer requirement will be determined, and the appropriate fertilizer-supply motor will be manually operated. Solar energy will be integrated with a solar charge controller and rechargeable battery to reduce dependence on conventional electricity and support sustainable operation. The reviewed approaches will indicate that the integration of NPK sensors, IoT monitoring, fertigation, and renewable energy will provide a promising solution for improving fertilizer utilization, reducing resource wastage, minimizing manual effort, and supporting sustainable precision agriculture.



Keywords: Renewable Energy, Smart Fertigation, NPK Sensor, Internet of Things (IoT), ESP32, Soil Moisture Sensor, DHT11 Sensor, Blynk IoT Platform, Precision Agriculture, Solar Energy.

1. INTRODUCTION:

Agriculture will require efficient management of water, fertilizers, and energy to improve productivity and promote sustainable utilization of resources. Traditional irrigation and fertilizer application methods will often depend on manual observation and fixed schedules. These practices will lead to improper fertilizer application, nutrient imbalance, water wastage, and increased operational effort. Smart fertigation technologies will provide an effective approach for improving agricultural resource management by combining irrigation, fertilizer application, sensing, and monitoring technologies. The Internet of Things (IoT) will enable continuous monitoring of soil and environmental conditions through sensors and wireless communication. NPK sensors will be used to monitor the levels of nitrogen, phosphorus, and potassium in soil, which will help in assessing nutrient requirements for crops. Soil moisture sensors will provide information about soil water conditions, while temperature and humidity sensors will help monitor the surrounding environmental conditions. Real-time nutrient monitoring will support more informed fertilizer-management decisions and will contribute to

precision agriculture. IoT-based fertigation systems will allow the collected sensor data to be processed and transmitted to monitoring platforms. An ESP32 microcontroller will be used as the main processing unit, while Wi-Fi connectivity will allow the monitored parameters to be transmitted to the Blynk IoT platform. The system will display real-time soil and environmental parameters and will allow the user to determine fertilizer requirements based on the monitored NPK values. Similar IoT-based approaches will be studied for automated irrigation and fertilization in precision agriculture. Renewable energy will also play an important role in developing sustainable agricultural monitoring systems. Solar-powered fertigation will reduce dependence on conventional electrical power and will support energy-efficient agricultural operations. The proposed approach will therefore integrate solar energy, NPK sensing, soil-moisture monitoring, environmental sensing, and IoT-based communication to support efficient fertilizer and resource management. The review will focus on existing and proposed approaches for smart fertigation, NPK-based soil monitoring, IoT-enabled agricultural systems, and renewable energy-based fertigation. The integration of these technologies will be expected to reduce unnecessary fertilizer applications, improve resource utilization, minimize manual monitoring efforts, and support sustainable precision agriculture.

2. LITERATURE SURVEY:

M. Zulkhairi et al. [1] proposed an IoT-based fertigation system for agriculture using an ESP32 controller. The system monitors electrical conductivity (EC), temperature, humidity, and water level to automate fertilizer and irrigation management, reducing fertilizer wastage and improving crop productivity.



P. Tondhare et al. [2] presented a review on the use of soil NPK sensors in smart agriculture. The study highlights the importance of real-time soil nutrient monitoring for precision farming and discusses different NPK sensing technologies and their applications.

S. Adak et al. [3] developed a smart agriculture system using NPK sensors for fertilizer optimization in guava farming. The proposed system improves soil health assessment and enables efficient fertilizer management, resulting in enhanced crop productivity.

L. Kumar et al. [4] designed a soil nutrient monitoring system using Arduino and an NPK sensor. The system measures nitrogen, phosphorus, and potassium levels in real time, helping farmers make informed fertilizer management decisions.

R. Adhikari et al. [5] proposed a real-time soil nutrient monitoring system using NPK sensors for precision agriculture. The system integrates sensor data with predictive analysis to improve nutrient management and crop monitoring.

V. Vidanapathirana et al. [6] developed a pomegranate farming monitoring system using machine learning and IoT technologies. The system monitors environmental conditions, detects diseases, and recommends suitable agricultural practices to improve pomegranate yield and quality.

U. Ahmad et al. [7] proposed a solar-powered IoT-based fertigation system for smart irrigation and fertilizer management. The system automatically controls irrigation and nutrient supply while improving water-use efficiency and supporting sustainable agriculture.

D. Sonal et al. [8] evaluated the impact of integrating real-time NPK sensors into smart farming systems. Their research demonstrated that continuous nutrient monitoring enhances fertilizer efficiency, crop productivity, and environmental sustainability.

M. Cefola et al. [9] investigated the effects of low-input fertigation treatments on pomegranate fruit quality. Their study showed that optimized fertigation strategies improve fruit quality while reducing water

consumption and fertilizer input.

S. Hiranur et al. [10] reviewed the application of NPK and moisture sensors for soil nutrient detection. The study emphasizes the importance of real-time monitoring for improving irrigation scheduling, fertilizer application, and crop yield.

R. Tricabo-Colón et al. [11] studied the effects of drip irrigation and fertigation on carbon and nitrogen dynamics in pomegranate orchards. Their findings indicate that optimized fertigation practices improve nitrogen use efficiency while minimizing nutrient losses.

A. Rezaei et al. [12] proposed an IoT-based automated irrigation and fertilization system for precision agriculture. The system combines multiple environmental sensors with wireless communication to automate

irrigation and nutrient delivery, reducing water consumption and labor requirements.



V. Sakle et al. [13] presented a comprehensive review of NPK sensor technologies for smart agriculture. Their study discusses different sensing techniques, challenges, and future developments in soil nutrient monitoring systems.

T. Adamo et al. [14] proposed an IoT-based microservices framework for optimizing irrigation and fertigation in smart agriculture. The framework enables efficient resource management through cloud computing, sensor networks, and real-time decision-making.

P. Mohan et al. [15] developed an IoT-based crop recommendation system using NPK sensors. The system analyzes soil nutrient levels and recommends suitable crops and fertilizer requirements, improving precision farming practices.

N. Zulkahairi et al. [16] proposed a smart fertigation system integrated with a mobile application and fuzzy logic optimization. The system automates fertilizer scheduling and irrigation control, improving efficiency while minimizing resource wastage.

N. Tanari et al. [17] investigated the effect of fertigation of primary nutrients on pomegranate fruit productivity and quality. The study concluded that balanced nutrient application through drip fertigation significantly enhances fruit yield and quality.

L. Ricci et al. [18] investigated the qualitative and biochemical characteristics of pomegranate fruits grown under reclaimed water and low-input fertigation treatments. Their study demonstrated that optimized fertigation strategies can maintain fruit quality while improving water-use efficiency and supporting sustainable pomegranate cultivation.

T. Adamo et al. [19] proposed an IoT-based microservices framework for optimizing irrigation and fertigation in smart agriculture. The framework integrates IoT sensors, cloud computing, and real-time monitoring to automate irrigation and nutrient management, resulting in efficient resource utilization and improved crop productivity.

Jain et al. [20] reviewed various IoT applications in precision agriculture and concluded that IoT technologies, including smart irrigation, soil monitoring, environmental sensing, and cloud-based monitoring, improve resource utilization, increase crop productivity, reduce manual effort, and support sustainable farming practices.

Table 1 Literature Review

Ref. No.	Paper / Project	System Architecture	Methodology	Key Findings	Advantages
[1]	IoT-Based Fertigation System	ESP32, EC, temperature, humidity, water level sensors	Automated fertigation using IoT	Reduced fertilizer wastage and improved crop productivity	Automatic irrigation and remote monitoring



[2]	Review of Soil NPK Sensors	NPK sensing technologies	Literature review	Real-time nutrient monitoring is essential for precision farming	Covers different NPK sensor technologies
[3]	Smart Agriculture using NPK Sensors	NPK sensor, IoT controller	Soil nutrient monitoring and fertilizer optimization	Improved soil health and crop productivity	Accurate fertilizer management
[4]	Arduino-Based Soil Nutrient Monitoring	Arduino, NPK sensor	Real-time measurement of NPK	Helps farmers make fertilizer decisions	Low-cost and simple design
[5]	Real-Time Soil Nutrient Monitoring	NPK sensor with predictive analysis	Data acquisition and nutrient prediction	Improved nutrient management	Supports precision agriculture
[6]	Pomegranate Farming Monitoring System	IoT sensors, Machine Learning	Environmental monitoring and disease detection	Improved pomegranate yield and quality	Crop-specific monitoring
[7]	Solar-Powered IoT Fertigation System	Solar panel, IoT controller, irrigation unit	Automated irrigation and fertilizer control	Improved water-use efficiency	Renewable energy and automation
[8]	NPK Sensor Integration in Smart Farming	NPK sensor, IoT	Continuous soil nutrient monitoring	Improved fertilizer efficiency and crop productivity	Real-time nutrient monitoring
[9]	Low-Input Fertigation for Pomegranate	Drip fertigation system	Experimental fertigation study	Improved fruit quality with reduced water and fertilizer	Saves water and fertilizer
[10]	Review of NPK and Moisture Sensors	Soil moisture and NPK sensors	Literature review	Real-time sensing improves irrigation scheduling	Explains sensor applications
[11]	Drip Irrigation and Fertigation in Pomegranate	Drip irrigation and fertigation	Field experiment	Improved nitrogen use efficiency	Reduced nutrient losses
[12]	Automated Irrigation and Fertigation	IoT sensors, wireless communication	Automated irrigation and fertigation	Reduced labor and water consumption	Fully automated operation
[13]	Review of NPK Sensor Technologies	Various NPK sensing methods	Literature review	Discusses challenges and future trends	Comprehensive review
[14]	IoT Microservices Framework	IoT sensors, cloud computing, microservices	Cloud-based irrigation and fertigation	Efficient resource utilization	Scalable cloud architecture



[15]	IoT Crop Recommendation System	NPK sensor, IoT platform	Soil nutrient analysis and crop recommendation	Improved crop selection	Supports precision farming
[16]	Smart Fertigation using Fuzzy Logic	IoT, mobile application, fuzzy logic	Intelligent irrigation scheduling	Improved fertigation efficiency	Remote monitoring and control
[17]	Fertigation in Pomegranate	Drip fertigation system	Nutrient application experiment	Increased fruit yield and quality	Optimized nutrient management
[18]	Low-Input Fertigation using Reclaimed Water	Reclaimed water with drip fertigation	Fruit quality analysis	Maintained fruit quality with reduced water usage	Sustainable cultivation
[19]	IoT Microservices Framework	IoT sensors, cloud platform	Real-time irrigation and fertigation management	Efficient resource utilization and crop productivity	Cloud-based monitoring
[20]	ML-enabled IoT System for Soil Nutrients Monitoring and Crop Recommendation	NPK, FC-28, DHT11, JXBS-3001 Sensors, IoT, MQTT, Machine Learning	Sensor data is uploaded to the cloud where ML predicts crops and fertilizer requirements.	Improves productivity through intelligent crop recommendations.	Remote monitoring, real-time analysis, precision farming.

Table 2 Research Analysis

Ref. No.	Existing Research	Pros	Cons	Research Gap
[1], [13], [15]	IoT-based smart fertigation and automated irrigation systems using ESP32, cloud technologies, and wireless communication.	Enables automatic irrigation, remote monitoring, and efficient resource management.	Limited or no integration of real-time NPK sensing and renewable energy.	Develop an ESP32-based Wi-Fi smart fertigation system integrated with Blynk Cloud, NPK sensor, and solar power.
[3], [5], [8], [17]	NPK sensor-based smart agriculture for fertilizer optimization and nutrient	Improves soil nutrient monitoring and fertilizer efficiency.	Most systems lack complete automation, pomegranate-specific	Integrate real-time NPK sensing with automated fertigation for



	monitoring.		implementation, or renewable energy support.	pomegranate farming using solar energy.
[6], [18], [19]	Smart monitoring and fertigation techniques for pomegranate cultivation.	Improves crop yield, fruit quality, and water-use efficiency.	Limited IoT automation and absence of integrated NPK- based smart fertigation.	Develop a complete IoT- enabled pomegranate monitoring and fertigation system with real-time NPK sensing.
[7]	Solar-powered IoT-based fertigation system.	Supports sustainable and energy-efficient irrigation.	Does not include real- time NPK monitoring or pomegranate- specific implementation.	Integrate solar- powered operation with NPK-based automated fertigation for sustainable pomegranate farming.
[2], [14]	Reviews on NPK sensor technologies for smart agriculture.	Explains NPK sensing methods, applications, and future trends.	No practical implementation or integrated IoT prototype.	Develop a practical low-cost IoT system using NPK sensors, Wi-Fi, Blynk Cloud, and solar energy.

3. RESEARCH GAP:

Based on the identified research gaps, the proposed Renewable Energy-Based Smart Fertigation Controller Using NPK Sensor provides an integrated solution for sustainable pomegranate farming. The system studies the soil requirements of the pomegranate crop by monitoring soil moisture, temperature, humidity, and NPK nutrient levels in real time. It connects to Wi-Fi and sends sensor data to the Blynk Cloud, allowing farmers to view live readings on a mobile dashboard. The NPK sensor enables accurate fertilizer management, while automated irrigation improves water-use efficiency. Additionally, the use of a solar panel provides renewable energy, making the system energy-efficient and suitable for remote agricultural areas. Overall, the

proposed system enhances irrigation and fertilizer management, reduces resource wastage, and supports sustainable pomegranate cultivation.

4. PROPOSED METHODOLOGY:

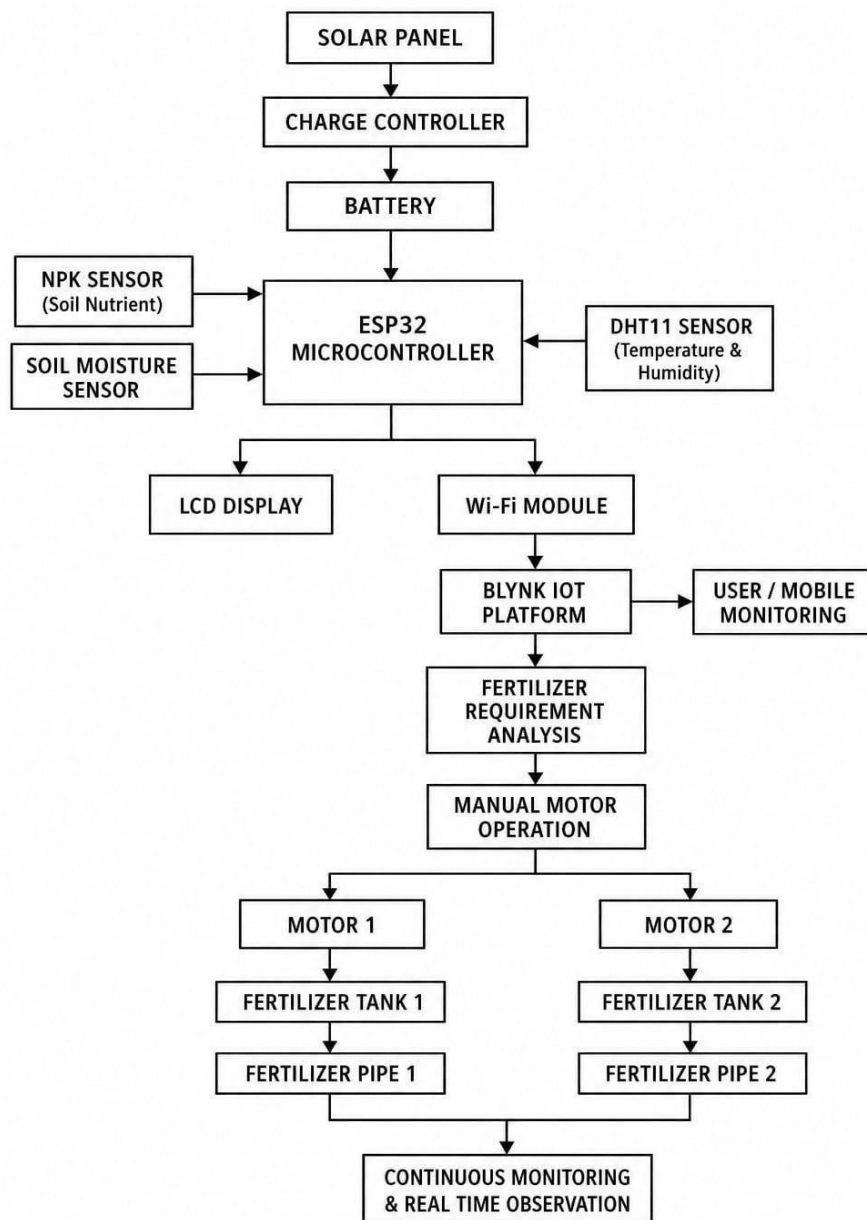


Figure 1 Block Diagram of Proposed System

Above Fig shows the proposed methodology system. The proposed methodology will integrate IoT technology, NPK sensing, environmental monitoring, and renewable solar energy to develop a smart fertigation monitoring system. A solar panel will be used to generate electrical energy, which will be regulated through a solar charge controller and stored in a rechargeable battery to power the



system. The NPK sensor will monitor nitrogen, phosphorus, and potassium levels in the soil, while the soil moisture sensor will measure soil moisture, and the DHT11 sensor will monitor temperature and humidity.

The collected sensor data will be processed by the ESP32 microcontroller, which will act as the main control unit. The processed parameters will be displayed on an LCD and will be transmitted through Wi-Fi to the Blynk IoT platform, allowing the user to monitor the readings remotely. Based on the real-time NPK values, the user will determine the fertilizer requirement. Two motors will be connected to separate fertilizer containers, and when fertilizer application is required, the user will manually operate the appropriate motor to supply fertilizer through the respective pipe. After fertilizer application, the system will continue monitoring the soil and environmental parameters, allowing the user to observe changes in real time and make further fertigation decisions when required.

5. CONCLUSION:

The reviewed Renewable Energy-Based Smart Fertigation approach will provide a promising solution for sustainable and precision agriculture. The system will monitor soil NPK levels, soil moisture, temperature, and humidity in real time using suitable sensors and an ESP32 microcontroller. The collected information will be displayed on an LCD and transmitted through Wi-Fi to the Blynk IoT platform, which will enable remote monitoring and support fertilizer-management decisions. The integration of NPK sensing will help the user identify fertilizer requirements based on real-time soil conditions, while the fertilizer-supply motors will support user-controlled fertilizer applications. Solar energy, together with a charge controller and rechargeable battery, will reduce dependence on conventional electricity and will support sustainable operation. Overall, the proposed approach will be expected to reduce fertilizer wastage, improve resource utilization, minimize manual monitoring effort, and support sustainable precision agriculture. The combination of IoT monitoring, NPK sensing, fertigation, and renewable energy will therefore provide an effective foundation for future smart agricultural systems.

6. REFERENCES:

1. Badage, R. N., & Karande, K. J. (2016). Use of Information and Communication Technologies (ICT) in career planning of rural youth of India. Proc. the Annual International Conference on Intelligent Computing, Computer.
2. Bhushan, S., & Karande, K. J. (2021). Advancing Social Media Analytics: A Robust Multi-Criteria Decision-Making Model-Based Framework. Webology 18 (6), 9339-9343.
3. Bhushan, S., & Karande, K. J. (2023). ENHANCING RESEARCH IN SOCIAL MEDIA ANALYTICS WITH AN ADVANCED ROBUST MULTI-CRITERIA DECISION MAKING MODEL. Webology.



4. Bokefode, J. D., Swapnaja A, U., Subhash V, P., Kailash J, K., & Sulabha S, A. (2015). Developing secure cloud storage system by applying AES and RSA cryptography algorithms with role based access control model. International Journal of Computer Applications 118 (12), 46-52.
5. Burje, P. R., Karande, K. J., & Jagadale, A. B. (2014). Embedded on-board diagnostics system using CAN network. 2014 IEEE Global Conference on Wireless Computing & Networking (GCWCN), 31-35.
6. Burje, P. R., Karande, K. J., & Jagadale, A. B. (2014). Embedded on-board diagnostics system using CAN protocol. 2014 International Conference on Communication and Signal Processing, 734-737.
7. Daithankar, M. V., & Karande, K. J. (2014). Analysis and integration of skin color models used for human face detection. 2014 IEEE Global Conference on Wireless Computing & Networking (GCWCN), 70-74.
8. Deepika, S., & Karande, K. J. (2021). Distance Log Mar Visual Acuity Comparison With Severity Of Diabetic Retinopathy. Webology (ISSN: 1735-188X) 18 (6).
9. Deshmukh, S. G., Karande, K. J., Ogura, K., Kheraj, V., & Deshmukh, R. S. (2022). Post-Annealing Influence on Structural, Surface and Optical Properties of Cu₃BiS₃ Thin Films for Photovoltaic Solar Cells. Artificial Intelligence, Internet of Things (IoT) and Smart Materials for.
10. Deshmukh, S. G., Kheraj, V., Karande, K. J., & Kulkarni, S. G. (2024). Thin Film Nanomaterials: Synthesis, Properties and Innovative Energy Applications. Bentham science publishers.
11. Deshmukh, S. G., Kheraj, V., Karande, K. J., Panchal, A. K., & Deshmukh, R. S. (2019). Hierarchical flower-like Cu₃BiS₃ thin film synthesis with non-vacuum chemical bath deposition technique. Materials Research Express 6 (8), 084013.
12. Deshpande, H. S., & Karande, K. J. (2016). A planar microstrip RF energy harvester 3D cube antenna for multiple frequencies reception. 2016 Conference on Advances in Signal Processing (CASP), 327-331.
13. Deshpande, H., & Karande, K. (2016). Integrated CMOS 3D Microstrip Patch Antenna Prototype for Wireless Energy Harvesting. International Conference on Communication and Signal Processing 2016 (ICCASP).
14. Deshpande, H., & Karande, K. J. (2018). Energy Optimal Radio Harvester for Multi Sensory System. 2018 IEEE Global Conference on Wireless Computing and Networking (GCWCN), 44-48.
15. Deshpande, H., Karande, K. J., & Deshmukh, S. G. (2022). RF energy harvesting multi-frequency receptor model for micropower applications. AIP Conference Proceedings 2494 (1), 060002.



16. Dhotre, V., & Karande, K. (2014). Refinement of data streams using Minimum Variance principle. 2014 International Conference on Contemporary Computing and Informatics.
17. Gade, A. A., Karande, K. J., & Jagadale, A. B. (2015). Space vector modulation based feed control using three phase induction motor. International Journal of Modern Trends in Engineering and Research 2 (7), 44-46.
18. Gaikwad, D. S., & Karande, K. J. (2016). Image processing approach for grading and identification of diseases on pomegranate fruit: An overview. International Journal of Computer Science and Information Technologies 7 (2).
19. Gaikwad, D., Karande, K., & Deshpande, H. (2016). Pomegranate fruit diseases identification and grading. International Conference on Communication and Signal Processing 2016 (ICCASP).
20. Gidde, N. D., Karande, K. A., Jadhav, S. S., Mistry, R., Mhetre, P., & Joshi, S. (2021). Microsponge: An Overview. Journal of University of Shanghai for Science and Technology 23, 671-682.
21. Hofree, G., Ruvolo, P., Reinert, C., Bartlett, M. S., & Winkielman, P. (2012). Why are you smiling? In a strategic context, people's affective responses reflect the meaning of android's facial expressions. 2012 IEEE International Conference on Development and Learning and.
22. Ingole, A. L., & Karande, K. J. (2018). Automatic age estimation from face images using facial features. 2018 IEEE Global Conference on Wireless Computing and Networking (GCWCN).
23. Iyer, B., Nalbalwar, S. L., & Pathak, N. P. (2019). Computing, Communication and Signal Processing: Proceedings of ICCASP 2018. Springer.
24. Jadhav, G. R., & Karande, K. J. (2014). Automatic vehicle number plate recognition for vehicle parking management system. Computer Engineering and Intelligent Systems, ISSN, 2222-1719.
25. Jadhav, G. R., & Karande, K. J. (2015). Extraction of Vehicle Number Plate. International Journal of Innovations in Engineering and Techonology 6 (2).
26. Joshi, A., & Karande, K. (2023). Comprehensive survey on analysis and modelling of femur bone fracture for an operative planning. Computer Methods in Biomechanics and Biomedical Engineering: Imaging.
27. Joshi, A., & Karande, K. (2023). Comprehensive Way for Modeling of Femur Bone Fracture from CT Images. International Conference on Emerging Trends in Artificial Intelligence, Data.
28. Joshi, A., Karande, K., & Gunaki, R. (2025). FEA-based Virtual Operation and Stress Distribution Analysis of DHS Screws in Proximal Femoral Bone Fractures: A Strategic Guide for Orthopedic Surgeons in Operational Planning. Journal of Pharmacology and Pharmacotherapeutics 16 (2), 202-213.



29. Kailash J Karande, N. V. I. (2021). Multimodal Image Fusion Technique for Automated Correlation Identification in Medical Images. AU Patent 2,021,105,871.
30. Kailash J, K. (2012). Modified Modular Independent Component Analysis (ICA) Approach for Face Recognition. INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY, ELECTRONICS AND.
31. Kailash, K., Raza, A., Mahalingham, S., & Talwalkar, S. (2012). Outcome of universal-2 total wrist arthroplasty for rheumatoid arthritis: our experience at Wrightington. Orthopaedic Proceedings 94 (SUPP_XXXIX), 143-143.
32. Kale, K. V. (2008). Advances in computer vision and information technology. IK International Publishing House.
33. Karande, J. K., Talbar, N. S., & Inamdar, S. S. (2012). Face recognition using Oriented Laplacian of Gaussian (OLOG) and Independent Component Analysis (ICA). Digital Information and Communication Technology and it's Applications.
34. Karande, K. J. (2012). Multiscale wavelet based edge detection and Independent Component Analysis (ICA) for Face Recognition. 2012 International Conference on Communication, Information & Computing.
35. Karande, K. J. (2013). Localized spatiotemporal modular ICA for face recognition. 2013 IEEE Symposium on Computational Intelligence in Biometrics and Identity.
- 7. KARANDE, K. J. (2020). PREFACE. IOP CONF.SERIES.MATERAIL SCIENCE AND ENGG 814, 011001.**
37. Karande, K. J. (2022). Feed Dispense Monitoring Machine for Accurate Feeding of Hens in Poultry House. IN Patent 202,221,010,527 A.
38. Karande, K. J., & Badage, R. N. (2016). Facial feature extraction using independent component analysis. Proceedings of the Annual International Conference on Intelligent Computing.
- 8. KARANDE, K. J., & PRASAD, P. S. (2020). MODEL DRIVEN METHODOLOGY FOR JAVA. UNPUBLISHED.**
40. Karande, K. J., & Talbar, S. N. (2007). Simplified and modified approach for face recognition using PCA. 2007 IET-UK International Conference on Information and Communication.
41. Karande, K. J., & Talbar, S. N. (2008). Face recognition under variation of pose and illumination using independent component analysis. ICGST-GVIP, ISSN.
42. Karande, K. J., & Talbar, S. N. (2009). Independent component analysis of edge information for face recognition. International Journal of Image Processing IJIP 3 (3), 120-130.
43. Karande, K. J., Katti, V. S., Sambhoji, S. S., Patil, K., Killedar, S., & Chavan, S. (2026). Secure



Image Steganography: Comparing LSB, AES-LSB, and Steghide. 2026 IEEE International Conference on Industry 4.0, Artificial Intelligence.

44. Kasture, A. M., Karande, K. J., & Nawale, S. D. (2024). Optimization of Harmonic Generation in Frequency Multiplying Circuit for Wireless Application. 2024 3rd Edition of IEEE Delhi Section Flagship Conference (DELCON), 1-5.

45. Kasture, A., Karande, K., & Nawale, S. (2024). Performance Analysis of Various Nonlinear Elements in Frequency Multiplying Circuits for Wireless Applications. INTERNATIONAL JOURNAL 12 (4), 1332-1336.

46. Katti, V. S., & Karande, K. J. (2025). Emerging Trends and Innovations in Sentiment Analysis: A Comprehensive Review. International Conference on ICT for Sustainable Development, 158-166.

47. Katti, V., & Karande, K. J. (2025). Personalized depression management system using llms and reinforcement learning: A survey. International Conference on Recent Trends in Machine Learning, IOT, Smart.

48. Kawathekar, P. P., & Karande, K. J. (2014). 2014 International Conference on Signal propagation and computer technology (ICSPCT 2014). IEEE.

49. Kawathekar, P. P., & Karande, K. J. (2014). Severity analysis of Osteoarthritis of knee joint from X-ray images: A Literature review. 2014 International Conference on Signal propagation and computer technology.

50. Kawathekar, P. P., & Karande, K. J. (2015). Use of textural and statistical features for analyzing severity of radio-graphic osteoarthritis of knee joint. 2015 International Conference on Information Processing (ICIP), 1-4.

51. Kendule, J. A., & Karande, K. (2024). A Survey of Internet of Things Frameworks for Crowd Management System. Modern Approaches in Machine Learning and Cognitive Science: A Walkthrough.

52. Kendule, J. A., & Karande, K. J. (2023). Variable Synergic Squeeze Convolutional Equilibrium Network Enabled Crowd Management in IoT. International Journal of Image, Graphics and Signal Processing 15 (4), 69.

53. Lale, D. P., & Karande, K. J. (2016). Gender classification using facial features. Int. J. Adv. Res. Electron. Commun. Eng.(IJARECE) 5 (9), 2227-2231.

54. Mahajan, A. S. B., & Karande, K. J. (2015). PCA and DWT based multimodal biometric recognition system. 2015 International Conference on Pervasive Computing (ICPC), 1-4.

55. Mahesh, K. K., Kishore, P., & Kailash, J. K. (2017). Survey on iris image analysis. Indian J. Sci. Technol 10 (9), 1-15.



56. Mulay, A. V., & Karande, K. J. (2016). Water quality monitoring system based on wireless sensor network. *International Journal of Innovations in Engineering Research and Technology*, 1-4.
57. Mulik, S., Dhobale, N., Pujari, K., & Karande, K. (2022). The Use of Artificial Intelligence-Based Models for Biomedical. *Artificial Intelligence, Internet of Things (IoT) and Smart Materials* for.
58. Nagaswarupa, H. P., Sillanpää, M. E. T., Murthy, H. C. A., & Naik, R. (2024). *Multifunctional inorganic nanomaterials for energy applications*. CRC Press.
59. Nandgaonkar, V. N., & Karande, K. J. (2021). Significance Of Artificial Intelligence and Machine Learning Algorithms in Brain Tumor Diagnosis. *Solid State Technology* 64 (2), 7125-7131.
60. Patil, P. G., & Karande, K. J. (2016). Brain tumor detection techniques: a survey. *Int Res J Eng Technol (IRJET)* 3 (10).
61. Patil, P. G., Karande, K. J., & Surwase, S. V. (2022). Detection of brain tumor using optimized fuzzy C-means and SVM classifier. *AIP Conference Proceedings* 2494 (1), 020007.
62. Shaikh, K. M., Karande, K. J., & Surwase, S. V. (2018). Nested slot suspended patch antenna using CST microwave studio. *2018 International Conference on Information, Communication, Engineering and*.
63. Surwase, S. V., & Karande, K. J. (2014). Technical aspects in development of Marathi calculator using text to speech synthesizer. *2014 IEEE Global Conference on Wireless Computing & Networking (GCWCN)*, 92-96.
64. Unnikrishnan, S., Surve, S., & Bhoir, D. (2011). *Advances in Computing, Communication and Control: International Conference, ICAC3 2011, Mumbai, India, January 28-29, 2011. Proceedings*. Springer Science & Business Media.
65. Unnikrishnan, S., Surve, S., & Bhoir, D. (2013). *Advances in Computing, Communication, and Control: Third International Conference, ICAC3 2013, Mumbai, India, January 18-19, 2013, Proceedings*. Springer.
66. Aasawari Boxey, D. A. O. M., Jadhav, A., Gade, P., & Ghanti, P. (2022). Face Recognition using Raspberry Pi. *Journal of Image Processing and Intelligent Remote Sensing* 2 (4), 15-23.
67. ABHANGRAO, M. R., JADHAV, M. S., GHODKE, M. P., & Mulani, A. (2017). Design And Implementation Of 8-bit Vedic Multiplier. *International Journal of Research Publications in Engineering and Technology*.
68. Aiwale, S., Kolte, M. T., Harpale, V., Bendre, V., Khurge, D., & Bhandari, S., et al. (2024). Non-invasive anemia detection and prediagnosis. *Journal of Pharmacology and Pharmacotherapeutics* 15 (4), 408-416.



69. Altaf O. Mulani, M. S., & Jadhav, M. M. (2022). Painless Machine Learning approach to estimate blood glucose level of non-invasive device. Artificial Intelligence, Internet of Things (IoT) and Smart Materials for.
70. Altaf O. Mulani, P. G. F., Sardey, M. P., Kinage, K., & Sadanand, S., et al. (2024). ML-powered Internet of Medical Things (MLIoMT) Structure for Heart Disease Prediction. Journal of Pharmacology and Pharmacotherapeutics 16 (1), 1-8.
71. Anil, D., & A. O., M. (2024). Smart farming using IOT based Agri BOT. Naturalista Campano 28 (1), 723-729.
72. AnnaSaheb S Dandage, A. O. M., Rupnar, V. R., & Pise, T. A. (2025). IoT-Powered Weather Monitoring and Irrigation Automation: Transforming Modern Farming Practices. International Journal of Telecommunications & Emerging Technologies 11 (1).
73. Aryan Ganesh Nagtilak, A. O. M., Ulegaddi, S. N., & Mane, M. (2023). Automatic Solar Powered Pesticide Sprayer for Farming. International Journal of Microwave Engineering and Technology 9 (2).
74. Babaladi, S. S., & Mulani, A. O. (2026). An Overview on Timely Detection of Plant Leaf Disorder Using Deep Learning and Machine Learning Models. 2026 Contemporary Computing Innovations Conference (CCIC), 1-6.
75. Basawaraj Birajadar, G., Osman Mulani, A., Ibrahim Khalaf, O., & Farhah, N., et al. (2024). Epilepsy identification using hybrid CoPrO-DCNN classifier. University of Bahrain.
76. Bhanvase, T. M., Mulani, A. O., & Pise, A. C. (2025). Guava Disease Detection Using Deep Convolutional Neural Networks. 2025 IEEE 7th International Conference on Cybernetics, Cognition and Machine.
77. Chaudhari, K. R., Mulani, A. O., Gajare, M. P., Jadhav, V., Yawle, P., & Bang, A. V. (2026). Bit error rate analysis of various error correction codes with concatenated RS-convolutional codes. Journal of Discrete Mathematical Sciences and Cryptography 29 (1), 199-214.
78. Deshmukh, A. B., Deshmukh, M. T., Chincholkar, Y. D., Patil, A. S., & Mulani, A. O. (2026). Predictive modeling of drug release kinetics using supervised machine learning algorithms. Int. J. Drug Deliv. Technol 16, 978-986.
79. Gadade, B., & Mulani, A. (2022). Automatic system for car health monitoring. International Journal of Innovations in Engineering Research and Technology.
80. Gadade, B., Mulani, A. O., & Harale, A. D. (2024). Iot based smart school bus and student monitoring system. Naturalista Campano 28 (1), 730-737.
81. Gadade, B., Mulani, A. O., & Harale, A. D. (2024). IoT Based Smart School Bus and Student Tracking System. IoT Based Smart School Bus and Student Tracking System.



82. Ghodake, R. G., & Mulani, A. O. (2016). Microcontroller based automatic drip irrigation system. Techno-societal 2016, international conference on advanced technologies for.
83. Ghodke, R. G., Birajdar, G. B., Mulani, A. O., Shinde, G. N., & Pawar, R. B. (2024). Design and Development of an Efficient and Cost-Effective surveillance Quadcopter using Arduino. Sanshodhak.
84. Ghodke, R. G., Birajdar, G. B., Mulani, A. O., Shinde, G. N., & Pawar, R. B. (2024). Design and Development of Wireless Controlled ROBOT using Bluetooth Technology. Sanshodhak.
85. Jadhav, D. V. S., Salunke, G. D., Chaudhari, K. R., Mulani, D. A. O., & Thigale, D. S. P., et al. (2024). Deep Learning-Based Face Mask Recognition in Real-Time Photos and Videos, Afr. J. Biomed. Res 27.
86. Jadhav, D. V. S., Salunkhe, D. S. S., Salunkhe, D. G., Yawle, P. R., & Pol, D. R. S., et al. (2024). Iot Based Health Monitoring System for Human, Afr. J. Biomed. Res 27.
87. Jadhav, H. M., Mulani, A., & Jadhav, M. M. (2022). Design and development of chatbot based on reinforcement learning. Machine learning algorithms for signal and image processing, 219-229.
88. Jadhav, K. P., Pawar, A., Shinde, A., Salunkhe, R., Sarade, V., & Mulani, A. O. (2024). IOT Based Industrial Power Loss Reducer Using Power Compensation. International Conference on Data Science, Machine Learning and Applications.
89. Jadhav, V. S., Salunkhe, S. S., Salunkhe, G., Yawle, P. R., Pol, R. S., & Mulani, A. O., et al. (2024). IOT based health monitoring system for Human. African Journal of Biomedical Research, 1309-1315.
90. Kalyankar, P. A., Mulani, A. O., Thigale, S. P., Chavhan, P. G., & Jadhav, M. M. (2022). Scalable face image retrieval using AESC technique. Journal Of Algebraic Statistics 13 (3), 173.
91. Kambale, K. S., Sawant, N. M., Mulani, A. O., More, V. P., & Zambare, S. A. (2024). RNN-LSTM Based Model for Automatic Heart Disease Prediction Using the UCI Heart Disease Dataset. International Conference on Data Science, Machine Learning and Applications.
92. Kamble, A., & Mulani, A. O. (2022). Google assistant-based device control. Int. J. of Aquatic Science 13 (1), 550-555.

9. KAPASE, P., SHRIKHANDE, P., & LOKHANDE, S. (2022). IOT BASED PLANT MONITORING SYSTEM.

94. Karche, S. N., & Mulani, A. O. (2023). AESC Technique for Scalable Face Image Retrieval. International Journal of Innovative Research in Computer and Communication ... 52* Electric vehicle parameters estimation using Web portal AO Mulani Recent Trends in Electronics and Communication Systems 10 (3).
95. Kedar, M. S., & Mulani, A. (2021). IoT based soil, water and air quality monitoring system for



pomegranate farming. Journal of Electronics, Computer Networking and Applied Mathematics (JECNAM).

96. Kolekar, S. D., Walekar, V. B., Patil, P. S., Mulani, A. O., & Harale, A. D. (2022). Password Based Door Lock System. Int. J. of Aquatic Science 13 (1), 494-501.

97. Kolhe, V. A., Pawar, S. Y., Gohery, S., Mulani, A. O., Sundari, M. S., & Kiradoo, G., et al. (2024). Computational and experimental analyses of pressure drop in curved tube structural sections of Coriolis mass flow metre for laminar flow region. Ships and Offshore Structures 19 (11), 1974-1983.

98. Kulkarni, P. R., Mulani, A. O., & Mane, P. B. (2016). Robust invisible watermarking for image authentication. Emerging Trends in Electrical, Communications and Information Technologies.

99. Kulkarni, T. M., Mulani, A. O., & Madan, T. (2024). Deep Learning Based Face-Mask Detection: An Approach to Reduce Pandemic Spreads in Human Healthcare. African Journal of Biological Sciences 6 (6).

100. Kutubuddin Sayyad Liyakat, K., O Mulani, A., Ibrahim Khalaf, O., & Algburi, S., et al. (2024). IoT Devices for Monitoring Health Status and Vital Signs in Patients with Cancer. International Journal of Computing and Digital Systems 16 (1), 1-12.

101. Liyakat, K. K. S., Warhade, N. S., Pol, R. S., Jadhav, H. M., & Mulani, A. O. (2022). Yarn quality detection for textile industries using image processing. Journal Of Algebraic Statistics 13 (3), 3465-3472.

102. M., C. J. M. (2021). Machine Learning based Autonomous Fire Combat Turret. Turkish Journal of Computer and Mathematics Education (TURCOMAT) 12 (2).

103. Mandwale, A. J., & Mulani, A. O. (2015). Different Approaches For Implementation of Viterbi decoder on reconfigurable platform. 2015 International Conference on Pervasive Computing (ICPC), 1-4.

104. Mandwale, A. J., & Mulani, A. O. (2016). Implementation of High Speed Viterbi Decoder using FPGA. International Journal of Engineering Research & Technology (IJERT) 5 (2).

105. Mandwale, A., & Mulani, A. O. (2014). Implementation of convolutional encoder & different approaches for viterbi decoder. IEEE International Conference on Communications, Signal Processing Computing.

106. Mane, A. (2015). Area Efficient Technique for implementation of Discrete Wavelet Transform on FPGA. IEEE Conference on Engineering & Technology (ICETECH).

107. Mane, A. (2017). An Efficient implementation of DWT for image compression on reconfigurable platform. International Journal of Control Theory and Applications 10 (15), 7.

108. Mane, A. (2018). High-Speed Area-Efficient Implementation of AES Algorithm on



Reconfigurable Platform. Computer and Network Security.

109. Modi, S., Misal, V., Kulkarni, S., & Mulani, A. O. (2025). Plant Health AI Analyzer Using Supervised Learning. Plant Health 5 (4).

110. More, S. S., & Mulani, A. O. (2024). Deep Learning Assisted Analysis of Ocular Multi Diseases-A Review. International Conference on Data Science, Machine Learning and Applications.

111. More, S. S., & Mulani¹, A. O. (2026). Deep Learning Assisted Analysis of Ocular. Proceedings of the 6th International Conference on Data Science, Machine.

10. MULANI, A. O. (2016). OPTICAL COMMUNICATION. ELECTROTECH PUBLICATIONS, SATARA.

113. Mulani, A. O. (2025). A Robust Image Watermarking Framework Integrated with AES Encryption for Secure Digital Media Protection. Journal of Advancement in Electronics Signal Processing 2 (3), 47-56.

114. Mulani, A. O. (2025). Electric Vehicle Parameters Estimation Using Web Portal, Recent Trends in Electronics & Communication Systems, Volume 10, Issue 3, 2023. International Open-Access, Double-Blind Multidisciplinary Online 5 (4).

115. Mulani, A. O., & Kulkarni, T. M. (2023). Face mask detection system using deep learning: a comprehensive survey. International Conference on Emerging Trends in Artificial Intelligence, Data.

116. Mulani, A. O., & Mane, P. (2018). Secure and area efficient implementation of digital image watermarking on reconfigurable platform. International Journal of Innovative Technology and Exploring Engineering 8.

117. Mulani, A. O., & Mane, P. B. (2014). Area optimization of cryptographic algorithm on less dense reconfigurable platform. 2014 International Conference on Smart Structures and Systems (ICSSS), 86-89.

118. Mulani, A. O., & Mane, P. B. (2016). Area efficient high speed FPGA based invisible watermarking for image authentication. Indian journal of Science and Technology 9 (39), 1-6.

119. Mulani, A. O., & Mane, P. B. (2017). Fast and Efficient VLSI implementation of DWT for image compression. International Journal for Research in Applied Science and Engineering.

120. Mulani, A. O., & Shinde, G. N. (2021). An approach for robust digital image watermarking using DWT-PCA. Journal of Science and Technology 6 (1).

121. Mulani, A. O., Bang, A. V., Birajadar, G. B., Deshmukh, A. B., & Jadhav, H. M., et



- al. (2024). IoT based air, water and soil monitoring system for pomegranate farming.
122. Mulani, A. O., Birajadar, G., Ivković, N., Salah, B., & Darlis, A. R. (2023). Deep learning based detection of dermatological diseases using convolutional neural networks and decision trees. *Traitement du Signal* 40 (6), 2819.
123. Mulani, A. O., Deshmukh, M., Jadhav, V., Chaudhari, K., & Mathew, A. A., et al. (2025). Transforming drug therapy with deep learning: the future of personalized medicine. *Drug Research* 75 (08), 326-333.
124. Mulani, A. O., Jadhav, M. M., & Seth, M. (2022). Painless Non-invasive blood glucose concentration level estimation using PCA and machine learning. The CRC Book entitled Artificial intelligence, Internet of Things (IoT) and.
125. Mulani, A. O., Liyakat, K. K. S., Warade, N. S., Patil, A., Kolte, M. T., Kinage, K., & Rana, M., et al. (2026). Iot sensors in a wireless environment for healthcare monitoring: A framework for fault detection. *Journal of Pharmacology and Pharmacotherapeutics* 17 (1), 94-100.
126. Mulani, A. O., Modi, S. P., Misal, V. M., & Kulkarni, S. R. (2026). Development of an Eco-Efficient Pesticide Spraying Rover for Sustainable Farming. 2026 IEEE International Conference on Emerging Computing and Intelligent.
127. Mulani, A. O., Patil, R. M., & Liyakat, K. K. S. (2023). DISCRIMINATIVE APPEARANCE MODEL FOR ROBUST ONLINE MULTIPLE TARGET TRACKING.
128. Mulani, A. O., Patil, R. M., & Liyakat, K. K. S. (2023). Modelo de apariencia discriminatorio para un sólido seguimiento en línea de múltiples objetivos. *Télématique: Revista Electrónica de Estudios Telemáticos* 22 (1), 24-43.
129. Mulani, A. O., Warade, N. S., Khalaf, O. I., Bsoul, Q., Waghole, D., & Jadhav, M., et al. (2025). Resource management optimisation of OFDM-IDMA system for 5G multi-tier backhaul networks. *Egyptian Informatics Journal* 31, 100756.
130. Mulani, A., & Mane, P. B. (2016). DWT based robust invisible watermarking. Scholars' Press.
131. Mulani, D. (2016). Design of Computer/Laptop independent data transfer system from one USB flash drive to another using ARM 11 processor. *International Journal of Science, Engineering and Technology Research* 5 (12).
132. Mulani, D. A. (2025). Design and Implementation of 256-bit Vedic Multiplier on Reconfigurable Platform. *Journal of Materials & Metallurgical Engineering* 15 (3).
133. Mulani, D. A. O. (2019). Effect of rotation and projection on real time hand gesture recognition system for human computer interaction. *Journal of The Gujrat Research Society* 21 (16), 3710-3718.



134. Mulani, D. A. O. (2024). A comprehensive survey on semi-automatic solar-powered pesticide sprayers for farming. *Journal of Energy Engineering and Thermodynamics (JEET)* ISSN, 2815-0945.

135. Mulani, P. (2018). High Speed Area Efficient FPGA Implementation of AES Algorithm. *Institute of Advanced Engineering and Science* 7 (3), 157-165.

136. Mulani, P. (2019). High throughput and area efficient FPGA Implementation of AES algorithm. *International Journal of Engineering and Advanced Technology* 8 (4), 519-523.

137. Mulani, P. K. (2015). Application of MATLAB for Second Level Discrete Wavelet Transform through Filter Bank. *International Conference on Engineering and Technology (ICETECH)*, 4.

11. MULANI, P. K. (2015). ROBUST INVISIBLE WATERMARKING FOR IMAGE AUTHENTICTION. ICECIT 2015, 4.

139. Mulani, P. R. K. (2015). Robust Invisible Digital Image Watermarking using Discrete Wavelet Transform. *International Journal of Engineering Research & Technology (IJERT)* 4 (01), 3.

140. Mulani, R. (2015). Analysis of Biomedical image using wavelet transformation. *International Journal of Innovations in Engineering Research and Technology*.

141. Mulani, R. A. O., Ganjewar, S. P., Kadu, P. S., & Khadke, R., et al. (2020). Smart Ration Automated Teller Machine For Pandemic Situations. IN Patent App. 202,021,048,830.

142. Mulani, R. G. A. O. (2016). Sensor based Automatic Drip Irrigation System. *Journal for Research* 2 (2), 53-56.

143. Mulani, R. K. A. O. (2017). Raspberry pi based voice operated Robot. *International Journal of Recent Engineering Research and Development* 2 (12).

144. Mulani, T. (2024). Face Mask Detection on Real Time Images and Videos using Deep Learning. *International Journal of Electrical Machine Analysis and Design (IJEMAD)* 2.

145. Nagane, U. P., & Mulani, A. O. (2021). Moving Object Detection and Tracking Using Matlab. *Journal of Science and Technology* 6 (Special Issue 1).

146. Nagrale, M., Pol, R. S., Birajadar, G. B., Mulani, A. O., Kutubuddin, K., & Liyakat, S. (2024). Internet of robotic things in cardiac surgery: an innovative approach. *Afr J Biol Sci* 6 (6), 709-725.

147. Nagtilak, M. A. G., Ulegaddi, M. S. N., Adat, M. A. S., & Mulani, A. O. (2021). Breast Cancer Prediction using Machine Learning. *International Journal of Research in Science and Engineering* 1 (2).

148. Pathan, A. N., Shejal, S. A., Salgar, S. A., Harale, A. D., & Mulani, A. O. (2022). Hand



gesture controlled robotic system. Int. J. of Aquatic Science 13 (1), 487-493.

149. Pol, D. R. S., Deshmukh, A. B., Jadhav, M. M., Liyakat, K. K. S., & Mulani, A. O. (2022). I Button Based Physical Access Grid Based Realistic Optimal Path Planning. Journal of Algebraic Statistics, 11987-12002.

150. Pol, R. S., Bhalerao, M. V., & Mulani, A. O. (2022). A real time IoT based System Prediction and Monitoring of Landslides. International Journal of Food and Nutritional Sciences 11 (7).

151. Rahul, G. G., & Mulani, A. O. (2025). Microcontroller Based Drip Irrigation System. International Open-Access, Double-Blind, Peer-Reviewed, Refereed. Multidisciplinary Online 5 (4).

152. S.Pol, D. D. R. (2021). Cloud Based Memory Efficient Biometric Attendance System Using Face Recognition. Stochastic Modeling & Applications 25 (2), 403-416.

153. Sawant, N. M., Mulani, A. O., Kondooru, S., Linge, S. G., Gawande, P. G., & Koli, M. S. (2024). AgriRent: Renting the Farm Equipment. International Conference on Data Science, Machine Learning and Applications.

154. Shinde, G., & Mulani, A. (2019). A ROBUST DIGITAL IMAGE WATERMARKING USING DWT -PCA. International Journal of Innovations in Engineering Research and Technology.

155. Shinde, M., & Mulani, A. (2021). Effects Of Foot Reflexology On Lactation In Postnatal Mothers At A Tertiary Care Hospital In Karad. International Journal Of Current Research And Review 13 (16), 225-229.

156. Shinde, R., & Mulani, A. O. (2015). Analysis of Biomedical Imagell. International Journal on Recent & Innovative trend in technology (IJRITT).

157. Shinde, R., & Mulani, A. O. (2015). Biomedical Image fusion using Wavelet transform. International Conference On Current Advances in Electronics, Electrical and.

158. Singh, S., Arya, K. V., Rodriguez, C. R., & Mulani, A. O. (2025). Emerging Trends in Artificial Intelligence, Data Science and Signal Processing.

159. Swami, S. S., & Mulani, A. O. (2017). An efficient FPGA implementation of discrete wavelet transform for image compression. 2017 International Conference on Energy, Communication, Data Analytics and.

160. Takale, D. A. M. S. (2023). A video watermarking technique with video and image as watermark using DWT and PCA. Journal of Northeastern University 25.

161. Takale, S., & Mulani, A. (2022). DWT-PCA based video watermarking. Journal of Electronics, Computer Networking and Applied Mathematics (JECNAM).



162. Takale, S., & Mulani, A. (2022). Video Watermarking System. International Journal for Research in Applied Science and Engineering.
163. Thigale, S. P., Jadhav, H. M., Mulani, A. O., Birajadar, G. B., Nagrale, M., & Sardey, M. P. (2024). Internet of things and robotics in transforming healthcare services. Afr J Biol Sci (S Afr) 6 (6), 1567-1575.
164. Ughade, U. R., Gikwad, S. M., Yeole, A. N., & Mulani, D. A. O. (2023). Automatic attendance system using face recognition. Journal of Image Processing and Intelligent Remote Sensing 3 (4), 11-18.
165. Anjali Pise, K. K. (2025). A Genetic Algorithm-Driven Energy-Efficient Routing Strategy for Optimizing Performance in VANETs. Engineering, Technology & Applied Science Research 15 (No. 5, 2025), 27273-27278.
166. Pise, A. C., & Karande, D. K. J. (2021). An exploratory study of cluster based routing protocol in VANET: a review. International Journal of Advanced Research in Engineering and Technology.
167. Pise, A. C., & Karande, K. J. (2023). Energy-Efficient Optimal Routing Protocols in VANETs. 66th Annual IETE Convention, AIC-2023 September 16-17.
168. Pise, A. C., & Karande, K. J. (2024). Investigating Energy-Efficient Optimal Routing Protocols for VANETs: A Comprehensive Study. International Conference on Information and Communication Technology for.
169. Pise, A. C., & Karande, K. J. (2024). K-mean energy efficient optimal cluster based routing protocol in vehicular ad-hoc networks. Modern Approaches in Machine Learning and Cognitive Science: A Walkthrough.
170. Pise, A. C., & Karande, K. J. (2025). Architecture, Characteristics, Applications and Challenges in Vehicular Ad Hoc Networks. 27th IEEE International Symposium on Wireless Personal Multimedia.
171. Pise, A. C., & Karande, K. J. (2025). Cluster head selection based on ACO in vehicular ad-hoc networks. Machine Learning for Environmental Monitoring in Wireless Sensor Networks.
172. Pise, A., & Karande, K. (2025). Hybrid Remora Optimization Algorithm for Energy Efficient Optimal Routing Scheme in VANETs. International Journal of Intelligent Engineering & Systems 18 (9), 584.
173. Shejwal, V., Karande, K. J., & Pise, A. C. (2025). Automated Pomegranate Disease Detection and Classification Using Vision Transformer. International Conference on Recent Trends in Machine Learning, IOT, Smart.
174. Dhanawadel, A., Mulani, A. O., & Pise, A. C. (2024). IOT based Smart farming



using Agri BOT. Sanshodhak.

175. Maske, Y., Jagadale, A. B., Mulani, A. O., & Pise, A. C. (2023). Development of BIOBOT system to assist COVID patient and caretakers. *European Journal of Molecular & Clinical Medicine* 10 (01), 2023.
176. Nale, D., Pise, A. (2025). Web Based – Application for Result Analysis. In: Singh, S., Arya, K.V., Rodriguez, C.R., Mulani, A.O. (eds) *Emerging Trends in Artificial Intelligence, Data Science and Signal Processing. AIDSP 2023. Communications in Computer and Information Science*, vol 2439. Springer, Cham. https://doi.org/10.1007/978-3-031-88759-8_1D.
177. D. Nale and A. C. Pise, Smart Result Analysis-pdf Extractor, 2024 IEEE International Students' Conference on Electrical, Electronics and Computer Science (SCEECS), Bhopal, India, 2024, pp. 1-6, doi: 10.1109/SCEECS61402.2024.10482279.
178. C. Pise, Jadhav P., Detection of Cast Iron Composition by Cooling Curve Analysis using Thermocouple Temperature Sensor, 2nd International Conference on Engineering Technology, Science and Management Innovation (ICETSMI – 2018), 2nd September 2018.
179. C. Pise, Facial Expression Recognition Using Facial Features, IEEE International Conference on Communication and Electronics Systems (ICCES 2018), October 2018.
180. C. Pise, Jadhav P, Estimating Parameters of Cast Iron Composition using Cooling Curve Analysis, IEEE International Conference on Communication and Electronics Systems (ICCES 2018), Coimbatore, October 2018.
181. Pise, A. C. (2016, December). Android based Portable Health Support System. In *International Conference on Innovations in Engineering and Technology (CIET 2016)*, SKN Sinhgad College of Engineering (pp. 30-31).
182. A Pise, A. C. (2016, December). Bayesian Classifier & FCM Segmentation for Lung Cancer Detection in early stage. In *International Conference on Innovations in Engineering and Technology (CIET 2016)*, SKN Sinhgad College of Engineering (pp. 30-31).
183. Pise, A. C. (2016, December). Cast Iron Composition Measurement by Coding Curve Analysis. In *International Conference on Innovations in Engineering and Technology (CIET 2016)*, SKN Sinhgad College of Engineering (pp. 30-31).
184. Pise, A. C. (2016, December). War field Intelligence Defence Flaging Vehicle. In *International Conference on Innovations in Engineering and Technology (CIET 2016)*, SKN Sinhgad College of Engineering (pp. 30-31).

12. C. PISE, SEGMENTATION OF OPTIC DISK AND OPTIC CUP FROM RETINAL IMAGES, ICEECMPE – CHENNAI, JUNE 2015

186. Pise, A. C. (2015, April). Diseases Detection of Pomegranate Plant. In *IEEE sponsored*



International Conference on Computation of Power, Energy, Information and Communication (pp. 22-23).

187. P. V. Bankar and A. C. Pise, Face recognition by using Gabor and LBP, 2015 International Conference on Communications and Signal Processing (ICCSP), Melmaruvathur, India, 2015, pp. 0045-0048, doi: 10.1109/ICCSP.2015.7322425.

188. Lole, A. C. Pise and S. V. Surwase, Efficient implementation of UTAMF Algorithm for edge preservation on FPGA, 2015 International Conference on Green Computing and Internet of Things (ICGCIoT), Greater Noida, India, 2015, pp. 667-670, doi: 10.1109/ICGCIoT.2015.7380547.

189. Pise, A. C. (2014). Single Chip Solution For Multimode Robotic Control. Ist IEEE International Conference on Computing Communication and Automation, 26-27.

190. S. A. Thite, A. C. Pise and A. B. Jagadale, Single Chip Solution for Multimode Robotic Control, 2015 International Conference on Computing Communication Control and Automation, Pune, India, 2015, pp. 555-557, doi: 10.1109/ICCUBEA.2015.114.

191. Lole Bhagyashri A., Pise A.C and Surwase S. V., Area optimized implementation of unsymmetric trimmed adaptive Median Filter for edge preservation on FPGA, 2015 International Conference on Green Computing and Internet of Things (ICGCIoT), Greater Noida, India, 2015, pp. 86-89, doi: 10.1109/ICGCIoT.2015.7380434.

192. Pise, A. C., & Katti, V. S. (2014), Efficient Design for Monitoring of Greenhouse Parameters using Zigbee Wireless Sensor Network. In fifth SARC international conference IRF, IEEE forum ISBN (pp. 978-93).

193. Pise, A. C., & Bankar, P. (2014, April). Face Recognition using Color Local Texture Features. In International Conference on Electronics and Telecommunication, Electrical and Computer Engineering.

194. Pise, A. C. (2014, April). Monitoring parameters of Greenhouse using Zigbee Wireless Sensor Network. In 1st International Conference on Electronics and Telecommunication, Electrical and Computer Engineering (pp. 5-6).

195. Pise, A., & Deshmukh, A. (2010, April). Compensation schemes and performance Analysis of IQ Imbalances in Direct Conversion Receivers. In Proceedings of the 2009 International Conference on Signals, Systems and Automation (ICSSA 2009). Universal-Publishers.

196. Pise A., Nale D. Web Based – Application for Result Analysis, Communications in Computer and Information Science 2439 CCIS 2025, Scopus Indexed

197. Prof. A. C. Pise, Namrata Dabade, Sumitra Deshmane, Puja Gavade, AI Maze Escape Game Using Minmax Algorithm, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429.

[10.48175/IJARSCT-29506](#)

198. Prof. Anjali Pise, Mr. Omkar Kumbhar, Mr. Sujal Mane, Mr. Ruturaj Patil, AI ChatBot Using Python, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429. [10.48175/IJARSCT-29509](#)

199. Prof. Anjali Pise, Mr. Omkar Kumbhar, Mr. Sujal Mane, Mr. Ruturaj Patil, AI ChatBot Using Python – A Systematic Review, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429.

200. Niharika Bodake, Akshata Gaurkar, Vaishnavi Chavan, Vaishnavi Bhosale, Prof. A. C. Pise, A Review on IoT Based Solid Waste Management System, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429. [10.48175/IJARSCT-29434](#).

201. Prof. A. C. Pise, Namrata Dabade, Sumitra Deshmane, Puja Gavade, Smart Wheelchair, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429. [10.48175/IJARSCT-29437](#).

202. Sanket Badave, Prajwal Bhujbal, Aaditya Aradhye, Vishant Bagewadikar, A. C. Pise (2025), “Drowsiness Detection System”, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429. [10.48175/IJARSCT-29405](#)

203. Prof. A. C. Pise, Namrata Dabade, Sumitra Deshmane, Puja Gavade, AI Maze Escape Game Using Minmax Algorithm, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429. [10.48175/IJARSCT-29505](#)

204. Niharika Bodake, Akshata Gaurkar, Vaishnavi Chavan, Vaishnavi Bhosale, Prof. A. C. Pise, IoT Based Solid Waste Management System, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429. [10.48175/IJARSCT-29415](#)

205. Prof. A. C. Pise, Namrata Dabade, Sumitra Deshmane, Puja Gavade, Smart Wheelchair with Automated Breaking and GPS, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429. [10.48175/IJARSCT-29435](#)

206. Sanket Badave, Prajwal Bhujbal, Aaditya Aradhye, Vishant Bagewadikar, A. C. Pise (2025), A Review on Driver Drowsiness Detection Systems Using Image Processing and AI Techniques, International Journal of Advanced Research in Science, Communication and Technology, Volume 5, Issue 4, October 2025, ISSN: 2581-9429. [10.48175/IJARSCT-29403](#).

207. A. C. Pise, Raut S., Smart Vehicle: A Systematic Review, International Journal of Research



Publication and Reviews, ISSN 2582-7421, Vol 4, no 10, pp 2728-2731 October 2023.

208. Sonali P. Raut, & A. C. Pise. (2023). Smart Vehicle. Journal of Electronics, Computer Networking and Applied Mathematics, 4(01), 38–47. <https://doi.org/10.55529/jecnam.41.38.47>
209. Pise, A. C. IoT Based Landmine Detection Robot. International Journal of Research in Science & Engineering ISSN: 2394-8299 Vol: 03, No. 04, June-July 2023.
210. Jayshri Prakash Patale, A. B. Jagadale, A. O. Mulani, & Anjali Pise (2022). A Systematic survey on Estimation of Electrical Vehicle. Journal of Electronics, Computer Networking and Applied Mathematics, (JECNAM) ISSN, 2799-1156. 3(01), 1–6. <https://doi.org/10.55529/jecnam.31.1.6>
211. Pise, A. C. (2022). An IoT Based Real Time Monitoring of Agricultural and Micro irrigation system. International journal of scientific research in Engineering and management (IJSREM), VOLUME: 06 ISSUE: 04 | APRIL – 2022, ISSN: 2582-3930, 6(04).
212. Harale, A. D., & Karande, K. J. (2026). Gabor-Augmented Two-Stream Framework With GoogLeNet-Based Temporal Attention for Semantic Dynamic Hand Gesture Recognition. Computer Animation and Virtual Worlds 37 (3), e70118.
213. Gadade, B., Mulani, A. O., & Harale, A. D. (2024). Iot based smart school bus and student monitoring system. Naturalista Campano 28 (1), 730-737.
214. Gadade, B., Mulani, A. O., & Harale, A. D. (2024). IoT Based Smart School Bus and Student Tracking System. IoT Based Smart School Bus and Student Tracking System.
215. Kolekar, S. D., Walekar, V. B., Patil, P. S., Mulani, A. O., & Harale, A. D. (2022). Password Based Door Lock System. Int. J. of Aquatic Science 13 (1), 494-501.
216. Avinash D. Harale and Kailash J. Karande , “Literature review on Dynamic Hand Gesture Recognition”, AIP Conference Proceeding ,31st Oct 2022, <https://doi.org/10.1063/5.0107577>
217. A. D. Harale and K. J. Karande, “Gabor-Augmented Two-Stream Framework With GoogLeNet-Based Temporal Attention for Semantic Dynamic Hand Gesture Recognition,” Computer Animation and Virtual Worlds 37, no. 3 (2026): e70118, <https://doi.org/10.1002/cav.70118>.
218. A. D. Harale , Amruta S. Bankar and K. J. Karande, “Gestures Controlled Home Automation using Deep Learning: A Review”, International Journal of Current Engineering and Technology, Vol.11, No.6, page no-617-621, Dec 2021
219. D. Harale, Ms. Asma Hakim, Dr.K.J.Karande, “Hand gesture identification system for hearing and speech impairment”, TELEMATIQUE, Volume 23 Issue 1, 2024 page n- 497–501, April 2024
220. A.D. Harale, Atik N. Pathan and A. O. Mulani, “Hand Gesture Controlled Robotic System”



International Journal of Aquatic Science, ISSN: 2008-8019 Vol 13, Issue 01, Jan 2022

221. D. Harale, K. J. Karande, Sagar S. Bhumkar, “Wireless Hand Geture Control Robot with Object Detection”, Journal of Image Processing and Intelligent Remote Sensing, ISSN 2815-0953, Vol. 3 No. 04 (2023), July 2023.
222. A.D.Harale, Ms.Asma Hakim, Altaf Mulani, K.J.Karande, “Implementation of Human Gesture Recognition Using CNN”, June 2024 ,Journal of STM.
223. Dheeraj Muttin and Avinash Harale, “IoT Based Personal Medical Assistant System”, “International Journal of Innovative Research in Technology (IJIRT)”, Volume 8 Issue 5 | ISSN: 2349-6002, October 2021.
224. Vijay Waghmode and Avinash Harale, “Development of Alphanumeric Digital Fuel Gauge for Automotive Applications”, “International Conference on Communication and Signal Processing”, IEEE, April 4-6, 2019.
225. Gorakhnath U. Waghmode and Avinash D. Harale, “A Cloud Computing Based WSNs for Agriculture Management”, Springer International Publishing, Conference: Techno-Societal DOI 10.1007/978-3-319-53556-2_107 December 2018.
226. Sanaha S. Path and Avinash D. Harale, “Silkworm Eggs Counting System Using Image Processing Algorithm”, Springer International Publishing, Conference: Techno-Societal DOI:10.1007/978-3-319-53556-2_32_ December 2018.
227. S. S. Kulkarni and A.D.Harale, “Image Processing for Driver’s Safety and Vehicle Control using Raspberry Pi and Webcam”, “IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI)-IEEE, 2017.
228. Supriya A Salunke and Avinash D Harale, “Vehicle Tracking System for School Bus by Arduino”, International Research Journal of Engineering and Technology (IRJET), ISSN: 2395-0072, Volume: 04 Issue: 03, Mar -2017.
229. Bhakti B.Bhaganagare Avinash.D.Harale, “Iris as Biometrics for Security System”, 2nd International Conference on Electrical, Computer and Communication Technologies, IEEE, 2017.
230. Supriya A Salunke and Avinash D Harale, “Vehicle Tracking System Using GPRS For School Bus”, International Journal of Engineering Research in Electrical and Electronic Engineering (IJEREEE), ISSN-2395-2717, Vol 3, Issue 1, January 2017.
231. Sanaha S. Pathan and Avinash D. Harale, “Automated silkworm eggs count”, IEEE International Conference on Advances in Electronics, Communication and Computer Technology (ICAECCT)”, Rajarshi Shahu College of Engineering, Pune India. Dec 2-3, 2016.
232. Sanaha S. Pathan and Avinash D. Harale, “Silkworm Egg Counting System Using Image Processing Algorithm -A Review”, International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 06, ISSN: 2395-0072, June-2016.



233. Gorakhnath U.Waghmode and Avinash D.Harale , “A survey on: Cloud Enabled Agricultural Management”, International Journal of Research (IJR), e-ISSN: 2348-6848, p- ISSN: 2348-795X Volume 2, Issue 09, September 2015.
234. Mrunmayee V. Daithankar, Kailash J. Karande and Avinash D. Harale, “Analysis of Skin Color Models for Face Detection”, International Conference on Communication and Signal Processing, IEEE April 3-5, 2014.
235. Apurva Sutar, K. J. Karande and A. D. Harale, “Deep Learning based Automated Billing Cart”, International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), ISSN (Online) 2581-9429, Volume 3, Issue 4, April 2023.
236. Apurva Sutar, K. J. Karande and A. D. Harale , “Deep Learning Based Smart Billing Cart Using RFID and Yolo”, Purakala, ISSN: 0971-2143, Vol 32 Issue 1, 2023.
237. Yogesh Jadhav, Kakade Vishal, Virendra Metkari, Siddheshwar S. Gangonda, “IOT Based Greenhouse Monitoring and Controlling System”, IJSRD - International Journal for Scientific Research & Development| Vol. 12, Issue 3, 2024 | ISSN (online): 2321-0613.
238. Akash Lawande, Kishor Mane, Kunal Davad, Siddheshwar S. Gangonda, “Pipeline Survey Robot”, IJSRD - International Journal for Scientific Research & Development| Vol. 12, Issue 3, 2024 | ISSN (online): 2321-0613.
239. Siddheshwar S. Gangonda, Prashant P. Patavardhan, Kailash J. Karande, “VGHN: variations aware geometric moments and histogram features normalization for robust uncontrolled face recognition”, International Journal of Information Technology, <https://doi.org/10.1007/s41870-021-00703-0>.
240. Siddheshwar Gangonda and Prachi Mukherji, “Speech Processing for Marathi Numeral Recognition using MFCC & DTW Features”, International Journal of Engineering Research and Applications (IJERA) pp. 118-122, ISSN: 2248- 9622.
241. Siddheshwar S. Gangonda, Prashant P. Patavardhan, Kailash J. Karande, “Recognition of Marathi Numerals using MFCC and DTW Features”, 2nd International Conference on Recent Trends in Image Processing and Pattern Recognition (RTIP2R 2018), 21th -22th Dec., 2018, organized by Solapur University, Solapur in collaboration with University of South Dakota (USA) and Universidade de Evora (Portugal), India.
242. Siddheshwar S. Gangonda, Prashant P. Patavardhan, Kailash J. Karande, “A Comprehensive Survey of Face Databases for Constrained and Unconstrained Environments”, 2nd IEEE Global Conference on Wireless Computing & Networking (GCWCN-2018), 23th-24th Nov. 2018, organized by STES's Sinhgad Institute of Technology, Lonavala, India.
243. Siddheshwar Gangonda and Prachi Mukherji, “Speech Processing for Marathi Numeral Recognition”, ePGCON 2011, 26th April 2011 organized by MAEER’s MIT, Kothrud, Pune-38.



244. Siddheshwar Gangonda, "Medical Image Processing", Aavishkar-2K7, 17th and 18th March 2007 organized by Department of Electronics and Telecommunication Engineering, SVRI's COE, Pandharpur.
245. Bhaganagare, S., Chavan, S., Gavali, S., & Godase, V. (2025). The vocal cortex of the smart home: A review of esp32-based control and automation architectures. *International Journal of Advanced Research in Science, Communication and Technology*, 1071-1094.
246. Bhaganagare, S., Chavan, S., Gavali, S., & Godase, V. V. (2025). Voice-controlled home automation with esp32: A systematic review of IoT-based solutions. *Journal of Microprocessor and Microcontroller Research*, 2(3), 1-13.
247. Dange, R., Attar, E., Ghodake, P., & Godase, V. (2023). Smart agriculture automation using ESP8266 NodeMCU. *J. Electron. Comput. Netw. Appl. Math.*, (35), 1-9.
248. Dhope, V., Chavan, A., Hadmode, N., & Godase, V. (2024). Smart plant monitoring system. *International Journal of Creative Research Thoughts (IJCRT)*. <https://www.ijcrt.org>.
249. Ghadage, I., Ghadge, P., Kamble, R., Mhamane, R., & Godase, V. V. (2025). Development of a cloud-connected industrial temperature and humidity monitoring system. *Development*, 5(4).
250. Ghadage, I., Ghadge, P., Kamble, R., Mhamane, R., & Godase, V. V. (n.d.). Industrial environment monitoring using IoT: A comprehensive review on temperature and humidity control
251. Godase, V., & Jagadale, A. (2019). Three element control using PLC, PID & SCADA interface. *International Journal for Scientific Research and Development*, 7(2), 1105-1109.
252. Godase, V. (2023). Smart agriculture automation using ESP8266 node MCU. *Journal of Electronics, Computer Networking and Applied Mathematics (JECNAM)* ISSN, 2799(1156), 1.
253. Godase, V., Mulani, A., Ghodak, R., Birajadar, G., Takale, S., & Kolte, M. (2024). A MapReduce and kalman filter based secure IIoT environment in hadoop. *Sanshodhak*, 25, 38-47.
254. Godase, V., Pawar, P., Nagane, S., & Kumbhar, S. (2024). Automatic railway horn system using node MCU. *Journal of Control & Instrumentation*, 15(1).
255. Godase, V., & Godase, J. (2024). Diet prediction and feature importance of gut microbiome using machine learning. *Evolution in Electrical and Electronic Engineering*, 5(2), 214-219.
256. Godase, V., Jadhav, Y., & Kakade, V. (2024). IOT based greenhouse monitoring and controlling system. *International Journal for Scientific Research & Development*, 12(3), 138-140.
257. Godase, V. (2025). A comprehensive review on PIR sensor-based light automation systems. *International Journal of Image Processing and Smart Sensors*, 1(1), 22-29.
258. Godase, V. (2025). A comprehensive review on scalable Arduino radar platform for real-time object detection and mapping. *Journal of Microprocessor and Microcontroller Research e-ISSN*, 3048-6637.



259. Godase, V. (2025). A comprehensive study of revolutionizing EV charging with solar-powered wireless solutions. *Advance Research in Power Electronics and Devices* e-ISSN, 3048-7145.
260. Godase, V., Khiste, R., & Palimkar, V. (2025). Ai-optimized reconfigurable antennas for 6G communication systems. *Journal of RF and Microwave Communication Technologies*, 2(3), 1-12.
261. Godase, V. V. (2025). Artificial intelligence and human society: A double-edged sword. *Impact of Artificial intelligence On Society*.
262. Godase, V. (2025). Automated water distribution management and leakage mitigation using PLC systems. *Journal of Control and Instrumentation Engineering*.
263. Godase, V., Altaf Mulani, S. T., Ghodake, R., & Birajadar, G. (2025). Blockchain for transparent irrigation water allocation and management. *Int. Water Irrig*, 44, 518-521.
264. Godase, V. (2025). Case study: Combating adversarial attacks in AI systems. *Artificial Intelligence Education And Innovation*.
265. Godase, V. (2025). Comparative study of ladder logic and structured text programming for PLC. Available at SSRN.
266. Godase, V. (2025). Comprehensive review on explainable ai to addresses the black box challenge and its role in trustworthy systems. *Sinhgad College of Engineering, Artificial Intelligence Education and Innovation*, 127-132.
267. Godase, V. (2025). Cross-domain comparative analysis of microwave imaging systems for medical diagnostics and industrial testing. *Journal of Microwave Engineering & Technologies*, 12(2), 39-48.
268. Godase, V. (2025). Design and optimization of reconfigurable microwave filters using AI techniques. *Journal of RF and Microwave Communication Technologies*, 2(2), 26-41.
269. Godase, V. V. (2025). Digital governance and the right to information in india: Pathways to transparency. Available at SSRN 5817082.
270. Godase, V. (2025). Edge AI for smart surveillance: Real-time human activity recognition on low-power devices. *International Journal of AI and Machine Learning Innovations in Electronics and Communication Technology*, 1(1), 29-46.
271. Godase, V. V. (2025). Education as empowerment: The key to women's socio-economic development. Available at SSRN 5536520.
272. Godase, V. V. (2025). Fra-polar net: A novel image processing framework for transformer condition monitoring. *Recent Trends in Semiconductor and Sensor Technology*, 2(3), 11-24.
273. Godase, V. (2025). Graphene-based nano-antennas for terahertz communication (source



details not available on Scholar profile).

274. Godase, V. (2025). IoT-MCU integrated framework for field pond surveillance and water resource optimization. *International Journal of Emerging IoT Technologies in Smart Electronics and Communication*.
275. Godase, V. (2025). LoRaEdge-ESP32 synergy: Revolutionizing farm weather data collection with low-power, long-range IoT. *Advance Research in Analog and Digital Communications*.
276. Godase, V. (2025). Navigating the digital battlefield: An in-depth analysis of cyber-attacks and cybercrime. *International Journal of Data Science, Bioinformatics and Cyber Security*, 1(1), 16-27.
277. Godase, V. (2025). Optimized algorithm for face recognition using deep face and multi-task cascaded convolutional network (MTCNN). *Optimum Science Journal*, 66-74.
278. Godase, V., Khiste, R., & Palimkar, V. (2025). Programmable smart surfaces and intelligent reflecting surfaces for enhanced wireless propagation in indoor and outdoor environments. *International Journal of Satellite-Based Communication and Wireless Networks System*, 1(2), 29-41.
279. Godase, V., Modi, S., Misal, V., & Kulkarni, S. (2025). Real-time object detection for autonomous drone navigation using yolov8, ll. *Advance Research in Communication Engineering and its Innovations*, 2(2), 17-27.
280. Godase, V. (2025). Smart energy management in manufacturing plants using PLC and SCADA. *Advance Research in Power Electronics and Devices*, 2(2), 14-24.
281. Godase, V. V. (2025). Vlsi-integrated energy harvesting architectures for battery-free IoT edge systems. *Journal of Electronics Design and Technology*, 2(3), 1-12.
282. Godase, V. (2025). Voice controlled home automation using ESP32 and IoT-Based cloud integration. *International Journal of Advanced Research in Science, Communication and Technology*.
283. Godase, V., Pandhare, A., & Pandhare, S. (2026). Mechanical and thermal characterization of natural fiber-reinforced epoxy composites for structural applications. *International Journal of Composite Materials and Matrices*, 12(1), 37-48p.
284. Hipparkar, J., Mulani, A., Godase, V., Takale, S., & Ghodake, R. (2026). Real-time vision-based disease detection using edge-optimized deep learning models. In *2026 IEEE International Conference on Emerging Computing and Intelligent Technologies (ICoECIT)* (pp. 1-5). IEEE.
285. Jamadade, V. K., Ghodke, M. G., Katakdhond, S. S., & Godase, V. (2025). A review on real-time substation feeder power line monitoring and auditing systems,”. *International Journal of Emerging IoT Technologies in Smart Electronics and Communication*, 1(2), 1-16.



286. Jamadade, V., Ghodake, M., Katakdhond, S., & Godase, V. (n.d.). A comprehensive review of real-time feeder monitoring and auditing systems: Architectures, technologies, and analytics for the smart grid (source details not available on Scholar profile).
287. Jamadade, V., Ghodake, M., Katakdhond, S., & Godase, V. (n.d.). A review on ai-powered image generation system using AI
288. Kumbhar, B., Kokelar, S., Rohidas, K., & Jadhav, S. (n.d.). An overview of real-time bus tracking in smart bus stop system (source details not available on Scholar profile).
289. Nagane, S. K., Pawar, P. S., & Godase, V. V. (2022). Cinematica sentiment analysis. *Journal of Image Processing and Intelligent Remote Sensing*, 2(3), 27-32.
290. Vaibhav, V. G. (2025). A neuromorphic-inspired, low-power VLSI architecture for edge AI in IoT sensor nodes. *Journal of Microelectronics and Solid-State Devices*, 12(2), 41-47.
291. Godase, M. V., Mulani, A., Ghodak, M. R., Birajadar, M. G., Takale, M. S., & Kolte, M. (2024). A MapReduce and Kalman filter based secure IIoT environment in Hadoop. *Sanshodhak*, 25, 38–47.
292. A.H.Shinde, V. V. Sardar, S. M. Ubale, and S. M. Moholkar, “IoT-Based Prepaid Energy Meter with Stealing Alert,” in *Proceedings of the 6th International Conference on Recent Trends in ...*, vol. 1737, 2026, DOI: 10.1007/978-981-95-5082-1_12.
293. K. G. Landage, V. B. Manepatil, R. R. Mokashi, and A. H. Shinde, “IoT Based Smart Electricity Energy Meter,” *International Journal of Progressive Research in Engineering Management and Science (IJPREAMS)*, vol. 05, no. 03, pp. 1298–1302, Mar. 2025.
294. V. Dhage, A. Nagane, R. Menkudale, and A. H. Shinde, “The Evolution of Student Monitoring Systems in School Buses: A Detailed Review,” *International Journal of Electrical Machine Analysis and Design (IJEMAD)*, vol. 2, no. 1, Jan.–Jun. 2024, DOI: 10.37591/IJEMAD.
295. S. Pandhare, S. Mali, K. Sahani, and A. H. Shinde, “Sentiment Analysis Based on Movie Review,” *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)*, vol. 5, no. 4, Oct. 2025, DOI: 10.48175/IJARSCT-29496.
296. S. Pandhare, S. Mali, K. Sahani, and A. H. Shinde, “A Systematic Review – Sentiment Analysis Based on Movie Review,” *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)*, vol. 5, no. 4, Oct. 2025, DOI: 10.48175/IJARSCT-29495.
297. P. Devram, A. Pise, G. Tanwade, and A. H. Shinde, “A Review on Voice Assistant,” *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)*, vol. 5, no. 4, Oct. 2025, DOI: 10.48175/IJARSCT-29487.
298. P. Devram, A. Pise, G. Tanwade, and A. H. Shinde, “Voice Assistant,” *International Journal of Advanced Research in Science, Communication and Technology*



(IJARSCT), vol. 5, no. 4, Oct. 2025, DOI: 10.48175/IJARSCT-29488.

299. P. Devram, A. Pise, G. Tanwade, and A. H. Shinde, “Literature Review on Smart Door Lock Using Keypad & GSM,” *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)*, vol. 5, no. 4, Oct. 2025, DOI: 10.48175/IJARSCT-29452.

300. P. Devram, A. Pise, G. Tanwade, and A. H. Shinde, “Smart Door Lock Using Keypad & GSM,” *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)*, vol. 5, no. 4, Oct. 2025, DOI: 10.48175/IJARSCT-29438.

301. Shubham Salunkhe, Pruthviraj Zambare, Sakshi Shinde, S. K. Godase. (2024). API Development for Cloud Parameter Curation International. Journal of Electrical and Communication Engineering Technology, 2(1). <https://doi.org/10.37591/ijecet>

302. Badave, A., Pawale, A., Andhale, T., Godase, S. K., & STM JOURNALS. (2024). Smart home safety using fire and gas detection system. Recent Trends in Fluid Mechanics, 1, 35–43. <https://journals.stmjournals.com/rtfm>

303. Asabe, H., Asabe, R., Lengare, O., & Godase, S. (2025). IOT- BASED STORAGE SYSTEM FOR MANAGING VOLATILE MEDICAL RESOURCES IN HEALTHCARE FACILITIES. INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS), 05(03), 2427–2433. <https://www.ijprems.com>

304. Karche, S. N., Mulani, A. O., Department of Electronics, SKN Sinhgad College of Engineering, Korti, & University of Solapur, Maharashtra, India. (2018). AESC Technique for Scalable Face Image Retrieval. International Journal of Innovative Research in Computer and Communication Engineering, 6(4), 3404–3405. <https://doi.org/10.15680/IJIRCCE.2018.0604036>

305. Obstacle avoidance and Bluetooth control car. (2025). In International Journal of Advanced Research in Science, Communication and Technology (Vol. 5, Issue 4) [Journal-article]. <https://www.ijarsct.co.in>

306. Ultrasonic and arduino based radar system. (2025). In International Journal of Advanced Research in Science, Communication and Technology (Vol. 5, Issue 4) [Journal-article]. <https://www.ijarsct.co.in>

307. Shitole, M., Thokale, S., Patil, N., Shingare, S., & Godase, S. K. (2025). Review on Ultrasonic Sensor-Based RADAR Systems for object detection and distance Measurement. International Journal of Advanced Research in Science Communication and Technology, 392–408. <https://doi.org/10.48175/ijarsct-29424>

308. Chavan, R., Chavan, S., Gaikwad, O., Gaikwad, K., & Godase, S. K. (2025). Review of smart robotic car systems for obstacle detection and Bluetooth Control. International



Journal of Advanced Research in Science Communication and Technology, 521–536.
<https://doi.org/10.48175/ijarsct-29432>

309. Patil, S., Navale, P., Suryawanshi, V., & Godase, S. K. (2025). Advance solar tracking and automatic sprinkler irrigation system. In SKN Sinhgad College of Engineering, International Journal of Advanced Research in Science, Communication and Technology (Vol. 5, Issue 4) [Journal-article]. <https://www.ijarsct.co.in>

310. Navale, P., Patil, S., Suryawanshi, V., & Prof. S. K. Godase. (2025). Smart Solar-Irrigo System. In International Journal of Advanced Research in Science, Communication and Technology (Vol. 5, Issue 4) [Journal-article]. <https://www.ijarsct.co.in>

311. A Systematic Review- Sugarcane disease prediction. (2025). In International Journal of Advanced Research in Science, Communication and Technology (Vol. 5, Issue 4) [Journal-article]. <https://www.ijarsct.co.in>

312. Zade, M. M., & Mukane, D. S. (2013). Enhancement of image with the help of switching median filter. In National Conference on Emerging Trends in Electronics & Telecommunication.

313. Zade, M. M., Rupanar, B. B., Shilawant, V. S., & Pawar, A. R. (2025). IOT flood monitoring & alerting system using Raspberry Pi-Pico. International Journal of Research Publication & Reviews, 6(3).

314. Zade, M. M. (2019). Performance analysis of PSNR vs. impulse noise for the enhancement of image using SMF. In National Conference on Mathematical Modeling and Computational Intelligence.

315. Zade, M. M. (2019). Dynamic clustering of wireless sensor network using modified AODV. In National Conference on Mathematical Modeling and Computational Intelligence.

316. Zade, M. M. (2019). Classification of power quality disturbances using SVM & their efficiency comparison. In National Conference on Mathematical Modeling and Computational Intelligence.

317. Zade, M. M. (2016). Performance analysis of median filter for enhancement of highly corrupted images. In National Conference on Advanced Trends in Engineering.

318. Zade, M. M. (2016). Implementation of Reed Solomon encoder & decoder using FPGA. In National Conference on Advanced Trends in Engineering.

319. Zade, M. M. (2016). Performance of switching median filter for enhancement of image. In National Conference on Mechatronics at Sinhgad Institute of Technology.

320. Zade, M. M., Kambale, S. D., Mane, S. A., & Jadhav, P. M. (2025). IOT based early fire detection in jungles. RIGJA&AR, 2(1).

321. Zade, M. R. (2017). Finite element analysis and fatigue analysis of crane hook with



different materials. International Research Journal of Engineering and Technology, 4(01).

322. Bansude, V. U., Togrikar, P. S., Karve, S. M., & Zade, M. M. (n.d.). A hybrid model for early PCSO detection using VGG16 CNN and XGBoost on multimodal data. Journal of Technical Education, 342.

323. Mahadev, M., Rahulkumar, D. R., & Shirkande, D. (n.d.). Efficient routing and data fusion in IoT-WSNs for resilient forest fire monitoring.

324. Mr. Zade Mahesh Mahadev published a paper in International Journal of Artificial Intelligence and Machine Learning on “An Iot-Enabled Resilient Wireless Sensor Network Framework For Early Forest Fire Detection And Monitoring” June 2026(SCOPUS)

325. Mr. Zade Mahesh Mahadev published a paper in International Journal of Artificial Intelligence and Machine Learning on “A Reliable, Energy-Efficient And Secure Data Aggregation Framework For Resource Constrained Wireless Sensor Networks” June 2026(SCOPUS)

326. Mr. Zade Mahesh Mahadev published a paper in Shodhkosh-Journal of Visual & Performing Arts on “Visualizing Forest Fire Risks: An Efficient and Resilient IoT-Enabled Wireless Sensor Network Approach” March 2026

327. Mr. Zade Mahesh Mahadev published a paper in Shodhkosh-Journal of Visual & Performing Arts on “The Aesthetics of Data Flow: Enhancing Reliability and Efficiency in Resource-Constrained Wireless Sensor Networks” March 2026

328. Mr. Zade Mahesh Mahadev published a paper in Anveshana’s International Journal of Research in Engineering and Applied Sciences on “EFFICIENT ROUTING AND DATA FUSION IN IOT-WSNS FOR RESILIENT FOREST FIRE MONITORING” AIJREAS VOLUME 10, ISSUE 9 (2025, SEP) (ISSN-2455-6300) ONLINE

329. Mr.M.M.Zade Presented the Paper on “Touchless Fingerprint Recognition System” (Paper-ID 907) in International Conference on “Advanced Technologies for Societal Applications: Techno-Societal 2022 organized by Shri Vithal Education & Research Institute(SVERI), Pandharpur from 9th December 2022 to 10th December 2022.

330. Mr. Mahesh M Zade, “Performance analysis of PSNR Vs. Impulse Noise for the enhancement of Image using SMF”, Journal of Applied Science & Computations (JASC UGC Approved), Volume VI, Issue II, Feb.2019

331. Mr. Mahesh M Zade, “Classification of Power Quality Disturbances Using SVM & their Efficiency Comparison”, Journal of Applied Science & Computations (JASC UGC Approved), Volume VI, Issue II, Feb.2019

332. Mr. Mahesh M Zade, “Dynamic Clustering of Wireless Sensor Network Using Modified AODV”, Journal of Applied Science & Computations (JASC UGC Approved), Volume



VI, Issue II, Feb.2019

333. Mr. Mahesh M Zade, "Performance analysis of PSNR Vs. Impulse Noise for the enhancement of Image using SMF", National Conference on Mathematical Modeling and Computational Intelligence 2K19 (MMCI-2k19), in association with JASC, at S. B. Patil College of Engineering, Indapur, Feb.2019
334. Mr. Mahesh M Zade, "Classification of Power Quality Disturbances Using SVM & their Efficiency Comparison", National Conference on Mathematical Modeling and Computational Intelligence 2K19 (MMCI-2k19), in association with JASC, at S. B. Patil College of Engineering, Indapur Feb.2019
335. Mr. Mahesh M Zade, "Dynamic Clustering of Wireless Sensor Network Using Modified AODV", National Conference on Mathematical Modeling and Computational Intelligence 2K19 (MMCI-2k19), in association with JASC, at S. B. Patil College of Engineering, Indapur Feb.2019
336. Mr.Mahesh M Zade & Dr.S.M.Mukane,"Enhancement of Image with the help of Switching Median Filter", International Journal of Computer Application (IJCA) SVERI's College of Engineering, Pandharpur, Dec.2013.
337. Ghadage, A., Gholave, C., Devkar, A., & Naiknavare, M. V. (2025). Email spam detection with machine learning. *International Journal of Advanced Research in Science, Communication and Technology*.
338. Naiknavare, M. V. (2024). Innovative approaches in greenhouse technology: A critical analysis of spectral data for enhanced plant growth monitoring. *International Journal of Creative Research Thoughts*, 12(5).
339. Rao, P. V. K. J., Madhava, M., Sreedevi, P., Kiranmayi, K., & Lakshmi, M. B. (2023). Optimisation of process parameters for centrifugal clarification of sugarcane juice for quality jaggery. *Journal of Agricultural Engineering (India)*, 60(3), 261–271.
340. Ghadage, A., Gholave, C., Devkar, A., & Naiknavare, M. V. (n.d.). Smart poultry farming with ESP8266: A comprehensive review of monitoring and automation approaches.
341. Khedekar, S., Jadhav, R., Pawar, S., & Naiknavare, M. V. (n.d.). Simplifying travel planning with AI-powered chatbot assistance.
342. Advancements in Real-Time Crack Detection Techniques for Structural Health Monitoring International Journal of Advanced Research in Science, Communication and Technology, International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal, Volume 5, Issue 4, October 2025
343. Intelligent Monitoring of Civil Infrastructure Health Tushar Ghadage, Amit Pandhare, Aaditya Metkari, Prof. V. B. Utpat International Journal of Advanced Research in



Science, Communication and Technology International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal Volume 5, Issue 4, October 2025

344. A Comprehensive Review on IoT-Based Smart Energy Meter with Real-Time Monitoring and Automated Billing System Shubham Tathe¹, Abhishek Savalgi², Amit Thombare³, Ganesh Sarak⁴, Ms. V. B. Utpat⁵, Dr. S. V. Pingale⁶ International Journal of Advanced Research in Science, Communication and Technology International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal Volume 5, Issue 4, October 2025

345. Digital Timetable Automation System Anurag Pawar¹, Prathamesh Aradhya², Akash katte³, Prof. Utpat V. B. International Journal of Advanced Research in Science, Communication and Technology International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

346. Automatic Waste Segregation Mayank Kulkarni¹, Sudesh Godase², Digvijay Khilare³, Prof. V. B. Utpat Advanced Research in Science, Communication and Technology International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal