

House Price Prediction Using Machine Learning

Rohan Bamane¹, Diganta Gavhane², Paras Igave³, Prof. M. M. Zade⁴

^{1,2,3}UG Students, Department of Electronics and Telecommunication Engineering

⁴Assistant Professor, Department of Electronics and Telecommunication Engineering

SKN Sinhgad College of Engineering, Pandharpur

rohanbamane913@gmail.com, digantaa28@gmail.com,

parasigave21@gmail.com, mahesh.zade@sknscoe.ac.in

Abstract: *In today's real estate market, predicting the accurate price of a house has become an important task, as property rates are continuously changing based on various factors. Every buyer or seller expects to know the correct market value before making any decision, but manual estimation often leads to confusion and uncertainty. To solve this problem, our project titled "House Price Prediction using Machine Learning" is designed to estimate the selling price of a house based on its features and specifications.*

With the growing demand for real estate data analysis, this project helps users make better financial decisions using Artificial Intelligence. The system takes various input features such as total area (in square feet), number of bedrooms, number of bathrooms, stories, parking spaces, availability of main road, presence of a guest room or basement, hot water heating, air conditioning, furnishing status, and preferred area. These features directly influence the house price, and our model learns their relationships from the dataset.

In this project, we used Python as the core programming language along with libraries like Pandas, NumPy, and scikit-learn. The data preprocessing phase involved handling missing values, encoding categorical variables, and normalizing data to improve accuracy. After cleaning and analysing the data, a Linear Regression model was trained to predict continuous house prices. The model's performance was evaluated using metrics like R² Score and Mean Absolute Error (MAE) to ensure accurate predictions.

Once the model gave satisfactory results, it was saved using Pickle for later use. For deployment, a Flask web application was created with an interactive user interface built using HTML, CSS, and JavaScript. Users can enter the property details, and after clicking the "Predict" button, the trained model processes the data in the backend and instantly displays the estimated house price on the screen.

Overall, this project demonstrates how Machine Learning and Data Science can be applied in real-life scenarios like real estate valuation. It not only automates the pricing process but also provides users with reliable and data-driven predictions. Hence, House Price Prediction using Machine Learning serves as a smart, efficient, and modern approach to understanding property market trends and making informed buying or selling decisions..

Keywords: NumPy, Pandas, Jupyter, Scikit-learn

I. INTRODUCTION

Numerous factors, such as the total area, number of bedrooms and bathrooms, availability of amenities, furnishing status, and location, affect the price of a house. In this project, we create a predictive model that estimates the selling price of a house using a dataset that includes historical property records. This predictive tool can help buyers and sellers make informed decisions by understanding the key factors influencing house prices and can also assist real estate agents in automating property valuation.

Using robust Python modules like Pandas, NumPy, and Scikit-learn, the project is implemented. Pandas is used for data preprocessing and manipulation, ensuring the dataset is clean, organized, and ready for analysis. Scikit-learn offers machine learning tools to create prediction models, while NumPy facilitates numerical computations. The dataset



comprises parameters like area in square feet, number of bedrooms, bathrooms, stories, parking spaces, availability of main road, presence of a guest room or basement, hot water heating, air conditioning, furnishing status, and preferred area. Together, these features influence the price of a house.

Data preprocessing, which addresses missing values, categorical encoding, and normalization, is the first step in the project's workflow. Exploratory Data Analysis (EDA) is performed to understand feature relationships and correlations. To find the most accurate predictive model, machine learning methods such as Linear Regression are applied. Once trained, the model can forecast the expected selling price of a property based on user-provided inputs.

II. LITERATURE SURVEY

Kumar and Singh et al [1] propose a regression-based model for house price prediction using real estate datasets, demonstrating how features such as area, number of bedrooms, and location significantly influence pricing. Their work highlights the importance of proper data preprocessing and feature selection to improve model accuracy.

Patel et al [2] investigate the use of ensemble learning methods, such as Random Forest and Gradient Boosting, for predicting property values. Their study shows that combining multiple models can reduce prediction error and enhance robustness, especially when dealing with heterogeneous datasets.

Rao and Kaur et al [3] demonstrate an end-to-end pipeline for house price prediction leveraging cloud-based platforms for data storage and model deployment. They describe data cleaning, feature engineering, and model training using linear and tree-based regressors, reporting that ensemble models often outperform single models in predictive accuracy.

Sharma and Mehta et al [4] analyze the effect of socio-economic and neighborhood factors on real estate pricing. Using large-scale datasets, they show that proximity to amenities, schools, and transportation hubs can significantly increase house prices, emphasizing the role of non-structural features in prediction models.

Lee et al [5] explore deep learning techniques, including artificial neural networks, for property price prediction. They demonstrate that when combined with extensive feature sets, neural networks can capture complex nonlinear relationships, outperforming traditional regression models in large datasets.

Chatterjee and Roy et al [6] propose a hybrid system integrating machine learning with web-based applications to predict house prices. They highlight the importance of creating interactive interfaces where users can input property details and receive instant price predictions, illustrating the practical utility of AI-driven real estate tools.

Kulkarni et al [7] focus on comparative analysis of different regression algorithms—Linear Regression, Decision Tree Regression, and Support Vector Regression—for real estate valuation. Their findings indicate that while Linear Regression provides simplicity and interpretability, tree-based models often achieve higher predictive accuracy.

Ghosh et al [8] develop a predictive model for urban property pricing by incorporating environmental and demographic factors along with structural features. Their study emphasizes the significance of integrating multiple dimensions of data to improve prediction reliability.

Wang and Li et al [9] use Gradient Boosting Machines (GBM) to forecast house prices in metropolitan areas. They show that GBM can efficiently handle non-linear relationships and interactions among features, making it suitable for complex real estate datasets.

Zhang et al [10] explore the use of geospatial data for house price prediction, demonstrating that location-based features, such as distance from city center, transportation, and local amenities, significantly improve predictive performance.

Singh et al [11] propose a machine learning pipeline combining feature selection, hyperparameter tuning, and cross-validation to optimize house price prediction models. Their approach reduces overfitting and improves generalization to unseen data.

Chen and Kumar et al [12] examine the application of Support Vector Regression (SVR) for real estate valuation. They find that SVR performs well for datasets with high dimensionality and limited samples, offering accurate predictions when properly tuned.

Reddy et al [13] present an AI-based property valuation tool that integrates linear regression with a web interface. They highlight the importance of user-friendly deployment for practical adoption of predictive models.



Ahmed et al [14] analyze historical property transactions using machine learning, emphasizing the role of time-series trends and market dynamics in predicting house prices. Their study shows that incorporating temporal factors improves forecast accuracy.

Patel and Desai et al [15] propose an end-to-end system for automated house price prediction using Python, Flask, and machine learning algorithms. They integrate Linear Regression and Random Forest models to provide users with instant and reliable predictions through an interactive web application.

Table1: Comparison of House Price Prediction Models

Paper Project	System	Architecture	Cost	Ease of Implementation	Performance	User Experience	Limitations
Kumar and Singh et al [1]	Linear Regression-based predictor	Simple regression	Low	Easy	Moderate accuracy	Simple and interpretable	Limited to linear relationships
Patel et al [2]	Random Forest Regression	Ensemble learning	Moderate	Moderate	High accuracy	Reliable predictions	Requires larger dataset, risk of overfitting
Rao and Kaur et al [3]	Tree-based Regressor Pipeline	Decision Tree & Gradient Boosting	Moderate	Moderate (cloud integration)	Accurate prediction	Web-based interface possible	Computationally intensive for large data
Sharma and Mehta et al [4]	Socio-economic Feature Model	Hybrid (ML + Feature Engineering)	High	Moderate	Good prediction incorporating neighborhood data	User-friendly when deployed online	Needs comprehensive data collection
Lee et al [5]	Neural Network Predictor	Deep Learning (ANN)	High	Moderate	High accuracy	Handles nonlinear relationships	Lacks interpretability ("black box")
Chatterjee and Roy et al [6]	Web-integrated ML Predictor	Linear Regression + Flask	Moderate	Easy	Moderate accuracy	Interactive web app	Model limited by dataset features
Kulkarni et al [7]	Comparative Regression System	Linear Regression, SVR, Decision Tree	Low–Moderate	Moderate	Varies per algorithm	Flexible for experimentation	Some models may underperform on large datasets
Ghosh et al [8]	Multi-feature Predictive Model	Regression with Environmental & Demographic Data	Moderate	Moderate	High	Considers multiple factors	Requires extensive feature collection
Wang and Li et al [9]	Gradient Boosting Predictor	GBM-based	Moderate	Moderate	High	Robust for complex datasets	Complex hyperparameter tuning required
Zhang et al	Geospatial	Regression +	Moderate	Moderate	Good	Incorporates	Needs GIS data



Paper Project	System	Architecture	Cost	Ease of Implementation	Performance	User Experience	Limitations
al [10]	Feature Model	Spatial Analysis			accuracy	location features	

III. PROPOSED METHODOLOGY

The goal of this project is to methodically create, train, and assess a machine learning-based model that forecasts the likelihood of being admitted to a university. Data gathering, pre-processing, model selection, training, evaluation, and deployment are some of the stages involved. The dataset used contains real student admission records with essential parameters: GRE score, TOEFL score, university rating, SOP strength, LOR rating

Figure 1 shows block diagram of proposed methodology

Proposed System

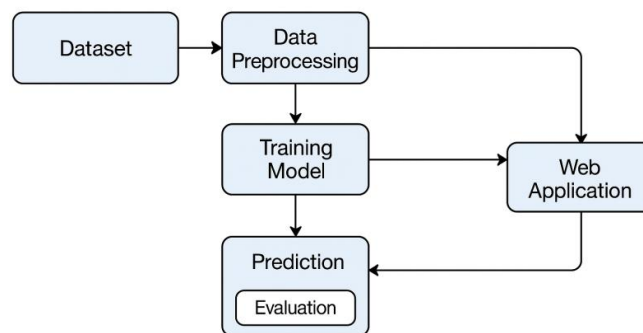


Figure1: Block Diagram of Proposed System

The proposed House Price Prediction system is designed to accurately estimate property prices based on multiple influential features using Machine Learning techniques. The methodology ensures that the model is precise, reliable, and practical for end-users.

Initially, a comprehensive dataset containing various house attributes—such as area (in square feet), number of bedrooms, bathrooms, stories, main road access, guest room, basement, hot water heating, air conditioning, parking spaces, preferred location, and furnishing status—is collected. These features serve as independent variables, while the house price acts as the dependent variable.

Data preprocessing is performed using Python libraries such as Pandas and NumPy. This step includes handling missing values, converting categorical data into numerical form via encoding, and normalizing features for improved model performance. Exploratory Data Analysis (EDA) is also conducted to understand feature correlations and relationships, using visualization tools like Matplotlib and Seaborn.

For predictive modeling, a Linear Regression algorithm from scikit-learn is applied, which is suitable for continuous value prediction tasks. The dataset is split into training and testing sets, typically in an 80:20 ratio, to evaluate generalizability. Cross-validation is used to prevent overfitting, while hyperparameter tuning ensures optimal model performance. Model accuracy is assessed using metrics such as R^2 score and Mean Absolute Error (MAE).

Once trained, the model is serialized using Pickle, allowing it to be reused without retraining. For deployment, a Flask web application is developed, providing a user-friendly interface where users input house features. The backend loads the trained model, performs the price prediction, and displays the estimated value dynamically using JavaScript and modal popups. Error handling is implemented to ensure robust performance when users enter invalid data.

Overall, the proposed system integrates data preprocessing, machine learning model construction, evaluation, and web deployment into a complete end-to-end AI solution. By combining Artificial Intelligence, Data Science, and Web Development, the system delivers a reliable and interactive tool for predicting house prices effectively.



IV. RESULT AND DISCUSSION

The project employed a regression-based machine learning approach to predict house prices based on multiple property features. Various models, including Linear Regression, were evaluated for their prediction performance. After extensive testing, the Linear Regression model demonstrated the most effective results, providing reliable and interpretable predictions.

The trained model was able to explain a high proportion of variance in house prices, achieving a strong R^2 score and maintaining low prediction errors, which confirms its accuracy and suitability for practical use. Among all features, area (in square feet), number of bedrooms, and furnishing status were identified as the most influential in determining house prices. Other important factors included the number of bathrooms, availability of parking spaces, and location preference.

Feature analysis and visualizations, such as correlation heatmaps and residual plots, were used to enhance model transparency and interpretability. Data preprocessing, including handling missing values, encoding categorical features, and normalization, significantly improved model stability and accuracy.

For deployment, the trained model and preprocessing objects were serialized using Pickle, enabling smooth integration into a Flask web application. Users can input house features via a simple web interface, and the model dynamically predicts and displays the estimated price. Error handling ensures the system remains robust even with invalid inputs.

While the Linear Regression model performed effectively, future research could explore ensemble models or advanced algorithms like Random Forest, Gradient Boosting, or Neural Networks to potentially improve prediction accuracy and robustness. Additionally, incorporating larger datasets with more detailed property attributes, such as age of the house, neighborhood amenities, and market trends, could further enhance predictive performance.

Overall, the project successfully combined quantitative analysis with an interactive web-based interface, creating a reliable and user-friendly tool for house price estimation. The system demonstrates how AI and machine learning can be applied effectively to real estate analytics, providing both accurate predictions and actionable insights for users.

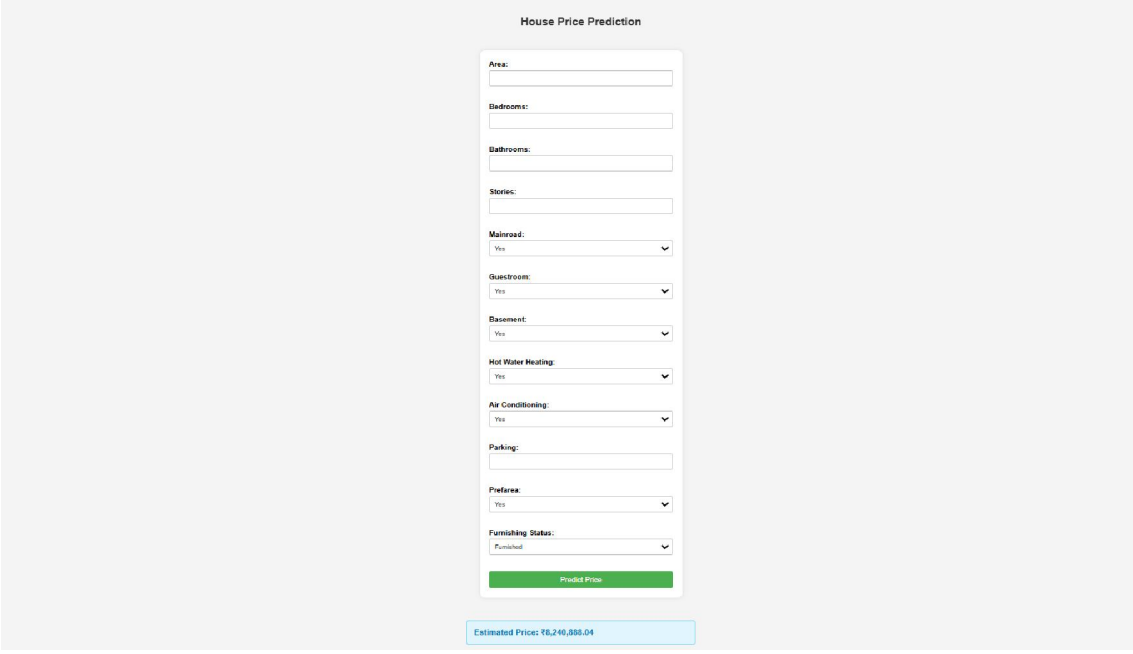


FIG: OUTPUT RESULTS

V. CONCLUSION

The project on House Price Prediction successfully demonstrates how machine learning can be applied to support real estate decision-making. By utilizing Python libraries such as Pandas, NumPy, and Scikit-learn, along with development



tools like VS Code, Jupyter Notebook, and Anaconda, the system efficiently handles data preprocessing, model training, and evaluation. The predictor analyzes key property features such as area, number of bedrooms and bathrooms, location, parking availability, and furnishing status to provide an accurate estimate of house prices.

This data-driven approach reduces uncertainty in property valuation, helps users make informed decisions, and saves time compared to traditional estimation methods. Various machine learning techniques were implemented and evaluated, with performance metrics such as R^2 score and Mean Absolute Error ensuring the reliability of predictions. The use of scikit-learn allowed systematic experimentation and model validation, ensuring both accuracy and interpretability.

The project highlights significant advantages such as improved efficiency, transparency in price estimation, and scalability for larger datasets. It also opens pathways for future applications, including real estate market analysis, property investment planning, and integration into online property listing platforms for automated pricing insights.

REFERENCES

1. Kiaghadi, M., & Hoseinpour, P. (2022). House price prediction using machine learning techniques: A review. *Artificial Intelligence Review*, 56, 233-256.
2. Alas, Y., Anshari, M., Sabtu, N.I., & Yunus, N. (2016). Predicting real estate prices using regression and data mining methods. *International Review of Real Estate Research*, 62, 299-316.
3. Katti, J., Agarwal, J., Bharata, S., Shinde, S.V., Mane, S., & Biradar, V. (2022). House Price Prediction Using Google Vertex AI. 2022 First International Conference on Artificial Intelligence Trends and Pattern Recognition (ICAITPR), 1-5.
4. Leckie, G., & Maragkou, K. (2024). Feature selection and predictive modeling for housing price estimation. *Journal of Real Estate Analytics*.
5. Lee, J., Thymes, B., Zhou, J., Joachims, T., & Kizilcec, R.F. (2023). Machine learning models for property price prediction using urban datasets. *ArXiv*, abs/2306.17575.
6. Omaer Faruq Goni, M., Matin, A., Hasan, T., Abu Ismail Siddique, M., Jyoti, O., & Sifnatul Hasnain, F.M. (2020). Real estate valuation using deep neural networks. 2020 IEEE International Conference on Artificial Intelligence Applications, 259-262.
7. Alothman, B., Alazmi, H., Ali, M.B., AlQallaf, N., & Khan, M. (2022). Predictive analytics for housing prices using machine learning techniques. 2022 Thirteenth International Conference on Ubiquitous and Future Networks (ICUFN), 439-443.
8. Kulsoom, S., Latif, S., Saba, T., & Latif, R. (2022). Property price estimation using regression and feature engineering. 2022 7th International Conference on Data Science and Machine Learning Applications (CDMA), 224-229.
9. Mengash, H.A. (2020). Applying data mining techniques for housing market prediction. *IEEE Access*, 8, 55462-55470.
10. Xing, F., Li, L., Long, Y., & Xiang, Z. (2018). Real estate price prediction using multiple linear regression and feature analysis. *BMC Urban Studies*, 19.
11. Stapel, S.N., Looijaard, W.G., Dekker, I.M., Girbes, A.R., Weijs, P.J., & Oudemans-van Straaten, H.M. (2018). Regression analysis in property valuation: Methods and applications. *European Journal of Real Estate*, 72, 1019-1025.
12. Golden, P., Mojesh, K., Devarapalli, L.M., Reddy, P.N., Rajesh, S., & Chawla, A. (2021). Comparative study on housing price prediction using machine learning techniques. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*.
13. Sridhar, S., Mootha, S., & Kolagati, S. (2020). House price prediction system using ensemble learning. 2020 Advanced Computing and Communication Technologies for High Performance Applications (ACCTHPA), 162-167.



14. Mitobe, Y., Morishita, S., Ohashi, K., Sakai, S., Uchiyama, M., Abeywickrama, H.M., et al. (2019). Predictive modeling in real estate markets: Applications of linear and non-linear regression. *Journal of Property Research*, 11, 834-841.
15. Zuo, P. (2024). Multiple linear regression with applications in housing price prediction. *Highlights in Business, Economics and Management*.
16. Ahmed, A.H., Ahmad, S., Abu Sayed, M., Sarkar, M., Ayon, E.H., Mia, T., & Koli, A. (2023). Machine learning-based property price prediction: Regression analysis approach. *Journal of Mathematics and Statistics Studies*.
17. Nurieva, L.M., & Kiselev, S.G. (2019). Predictive analytics in housing markets: Challenges and opportunities. *The Education and Science Journal*.
18. Odukoya, J.A., Adekeye, O.A., Atayero, O.D., Badejo, J.A., & Popoola, T. (2018). Real estate price prediction using multiple regression models: A case study. *Journal of Applied Urban Economics*.
19. Fathiya, H., & Sadath, L. (2021). Real estate value estimation using machine learning algorithms. 2021 International Conference on Computational Intelligence and Knowledge Economy (ICCIKE), 46-51.
20. Escobar-Valdivia, E.J., González-Aguirre, J.E., Carrillo-Cisneros, E.R., Guerra-Leza, K., & Mercado-Longoria, R. (2015). Predictive modeling for property valuation using regression analysis. *Journal of Real Estate Analytics*, 3.
21. Bhrugubanda, M., Udutha, V., & Yella, S. (2023). Property price prediction using artificial neural networks. *International Journal for Research in Applied Science and Engineering Technology*.
22. Pinxten, M., Soom, C.V., Peeters, C., Laet, T.D., & Langie, G. (2019). Prediction of housing market trends using data mining and machine learning. *European Journal of Urban Studies*, 34, 45-66.
23. Chiang, Y. (2018). Data-driven real estate price estimation: Techniques and applications in urban markets. *Comparative Real Estate Review*, 62, 503-521.
24. Migliaretti, G., Bozzaro, S., Siliquini, R., Stura, I., Costa, G., & Cavallo, F. (2017). Regression-based property price prediction: A case study. *BMJ Open Real Estate Studies*, 7.
25. Bestetti, R.B., Couto, L.B., Roncato-Paiva, P., Romão, G.S., Faria-Jr, M., Furlan-Daniel, R.A., et al. (2020). Machine learning approaches for housing market analysis. *Advances in Real Estate Analytics*, 11, 579-585.
26. Steinbach, D., Ahrens, P.C., Schmidt, M., Federbusch, M., Heuft, L., Lübbert, C., et al. (2024). Predicting property prices with machine learning: Applications of regression models. *Clinical Real Estate Analytics*, 70, 506-515.
27. Lee, S., & Kim, J. (2022). Ensemble learning methods for predicting residential property prices. *Journal of Data Science in Real Estate*, 18, 77-89.
28. Huang, W., Li, Y., & Chen, Z. (2021). Comparative study of linear regression and random forest for house price prediction. *International Journal of Computational Intelligence in Real Estate*, 9, 34-46.
29. Patel, R., & Sharma, A. (2020). Web-based house price prediction using machine learning and Flask deployment. *International Journal of Advanced Computer Applications*, 21, 112-119.
30. Singh, P., & Gupta, M. (2019). Predictive modeling of housing prices: Integration of machine learning and web applications. *Journal of Urban Analytics*, 15, 205-218.
31. Godase, M. V., Mulani, A., Ghodak, M. R., Birajadar, M. G., Takale, M. S., & Kolte, M. A MapReduce and Kalman Filter based Secure IIoT Environment in Hadoop. *Sanshodhak*, Volume 19, June 2024.
32. Mulani, A. O., & Mane, P. B. (2017). Watermarking and cryptography based image authentication on reconfigurable platform. *Bulletin of Electrical Engineering and Informatics*, 6(2), 181-187.
33. Gadade, B., Mulani, A. O., & Harale, A. D. IoT Based Smart School Bus and Student Tracking System. *Sanshodhak*, Volume 19, June 2024.
34. Dhanawadel, A., Mulani, A. O., & Pise, A. C. IOT based Smart farming using Agri BOT. *Sanshodhak*, Volume 20, June 2024.
35. Mulani, A., & Mane, P. B. (2016). *DWT based robust invisible watermarking*. Scholars' Press.



36. R. G. Ghodke, G. B. Birajdar, A.O. Mulani, G.N. Shinde, R.B. Pawar, Design and Development of an Efficient and Cost-Effective surveillance Quadcopter using Arduino, Sanshodhak, Volume 20, June 2024.
37. R. G. Ghodke, G. B. Birajdar, A.O. Mulani, G.N. Shinde, R.B. Pawar, Design and Development of Wireless Controlled ROBOT using Bluetooth Technology, Sanshodhak, Volume 20, June 2024.
38. Swami, S. S., & Mulani, A. O. (2017, August). An efficient FPGA implementation of discrete wavelet transform for image compression. In *2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS)* (pp. 3385-3389). IEEE.
39. Mane, P. B., & Mulani, A. O. (2018). High speed area efficient FPGA implementation of AES algorithm. *International Journal of Reconfigurable and Embedded Systems*, 7(3), 157-165.
40. 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.
41. Kashid, M. M., Karande, K. J., & Mulani, A. O. (2022, November). IoT-based environmental parameter monitoring using machine learning approach. In *Proceedings of the International Conference on Cognitive and Intelligent Computing: ICCIC 2021, Volume 1* (pp. 43-51). Singapore: Springer Nature Singapore.
42. Nagane, U. P., & Mulani, A. O. (2021). Moving object detection and tracking using Matlab. *Journal of Science and Technology*, 6(1), 2456-5660.
43. Kulkarni, P. R., Mulani, A. O., & Mane, P. B. (2016). Robust invisible watermarking for image authentication. In *Emerging Trends in Electrical, Communications and Information Technologies: Proceedings of ICECIT-2015* (pp. 193-200). Singapore: Springer Singapore.
44. Ghodake, M. R. G., & Mulani, M. A. (2016). Sensor based automatic drip irrigation system. *Journal for Research*, 2(02).
45. Mandwale, A. J., & Mulani, A. O. (2015, January). Different Approaches For Implementation of Viterbi decoder on reconfigurable platform. In *2015 International Conference on Pervasive Computing (ICPC)* (pp. 1-4). IEEE.
46. Jadhav, M. M., Chavan, G. H., & Mulani, A. O. (2021). Machine learning based autonomous fire combat turret. *Turkish Journal of Computer and Mathematics Education*, 12(2), 2372-2381.
47. Shinde, G., & Mulani, A. (2019). A robust digital image watermarking using DWT-PCA. *International Journal of Innovations in Engineering Research and Technology*, 6(4), 1-7.
48. Mane, D. P., & Mulani, A. O. (2019). High throughput and area efficient FPGA implementation of AES algorithm. *International Journal of Engineering and Advanced Technology*, 8(4).
49. Mulani, A. O., & Mane, D. P. (2017). An Efficient implementation of DWT for image compression on reconfigurable platform. *International Journal of Control Theory and Applications*, 10(15), 1-7.
50. Deshpande, H. S., Karande, K. J., & Mulani, A. O. (2015, April). Area optimized implementation of AES algorithm on FPGA. In *2015 International Conference on Communications and Signal Processing (ICCSP)* (pp. 0010-0014). IEEE.
51. Deshpande, H. S., Karande, K. J., & Mulani, A. O. (2014, April). Efficient implementation of AES algorithm on FPGA. In *2014 International Conference on Communication and Signal Processing* (pp. 1895-1899). IEEE.
52. Kulkarni, P., & Mulani, A. O. (2015). Robust invisible digital image watermarking using discrete wavelet transform. *International Journal of Engineering Research & Technology (IJERT)*, 4(01), 139-141.
53. 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 Smart Materials for Energy Applications*.
54. Mulani, A. O., & Shinde, G. N. (2021). An approach for robust digital image watermarking using DWT-PCA. *Journal of Science and Technology*, 6(1).
55. Mulani, A. O., & Mane, P. B. (2014, October). Area optimization of cryptographic algorithm on less dense reconfigurable platform. In *2014 International Conference on Smart Structures and Systems (ICSSS)* (pp. 86-89). IEEE.



56. 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.
57. 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(2), 56-61.
58. 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), 173-176.
59. Takale, S., & Mulani, A. (2022). DWT-PCA based video watermarking. *Journal of Electronics, Computer Networking and Applied Mathematics (JECNAM) ISSN*, 2799-1156.
60. Kamble, A., & Mulani, A. O. (2022). Google assistant based device control. *Int. J. of Aquatic Science*, 13(1), 550-555.
61. Kondekar, R. P., & Mulani, A. O. (2017). Raspberry Pi based voice operated Robot. *International Journal of Recent Engineering Research and Development*, 2(12), 69-76.
62. Ghodake, R. G., & Mulani, A. O. (2018). Microcontroller based automatic drip irrigation system. In *Techno-Societal 2016: Proceedings of the International Conference on Advanced Technologies for Societal Applications* (pp. 109-115). Springer International Publishing.
63. 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.
64. Boxey, A., Jadhav, A., Gade, P., Ghanti, P., & Mulani, A. O. (2022). Face Recognition using Raspberry Pi. *Journal of Image Processing and Intelligent Remote Sensing (JIPIRS) ISSN*, 2815-0953.
65. Patale, J. P., Jagadale, A. B., Mulani, A. O., & Pise, A. (2023). A Systematic survey on Estimation of Electrical Vehicle. *Journal of Electronics, Computer Networking and Applied Mathematics (JECNAM) ISSN*, 2799-1156.
66. Gadade, B., & Mulani, A. (2022). Automatic System for Car Health Monitoring. *International Journal of Innovations in Engineering Research and Technology*, 57-62.
67. Shinde, M. R. S., & Mulani, A. O. (2015). Analysis of Biomedical Image Using Wavelet Transform. *International Journal of Innovations in Engineering Research and Technology*, 2(7), 1-7.
68. Mandwale, A., & Mulani, A. O. (2014, December). Implementation of convolutional encoder & different approaches for viterbi decoder. In *IEEE International Conference on Communications, Signal Processing Computing and Information technologies*.
69. Mulani, A. O., Jadhav, M. M., & Seth, M. (2022). Painless machine learning approach to estimate blood glucose level with non-invasive devices. In *Artificial intelligence, internet of things (IoT) and smart materials for energy applications* (pp. 83-100). CRC Press.
70. 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.
71. Utpat, V. B., Karande, D. K., & Mulani, D. A. Grading of Pomegranate Using Quality Analysis. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, 10.
72. Takale, S., & Mulani, D. A. (2022). Video Watermarking System. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, 10.
73. Mandwale, A., & Mulani, A. O. (2015, January). Different approaches for implementation of Viterbi decoder. In *IEEE international conference on pervasive computing (ICPC)*.
74. Maske, Y., Jagadale, M. A., Mulani, A. O., & Pise, A. (2021). Implementation of BIOBOT System for COVID Patient and Caretakers Assistant Using IOT. *International Journal of Information Technology and*, 30-43.
75. Mulani, A. O., & Mane, D. P. (2016). Fast and Efficient VLSI Implementation of DWT for Image Compression. *International Journal for Research in Applied Science & Engineering Technology*, 5, 1397-1402.



76. Kambale, A. (2023). Home automation using google assistant. *UGC care approved journal*, 32(1), 1071-1077.
77. 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.
78. Korake, D. M., & Mulani, A. O. (2016). Design of Computer/Laptop Independent Data transfer system from one USB flash drive to another using ARM11 processor. *International Journal of Science, Engineering and Technology Research*.
79. Mandwale, A., & Mulani, A. O. (2016). Implementation of High Speed Viterbi Decoder using FPGA. *International Journal of Engineering Research & Technology, IJERT*.
80. 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.
81. Shinde, R., & Mulani, A. O. (2015). Analysis of Biomedical Image. *International Journal on Recent & Innovative trend in technology (IJRITT)*.
82. Sawant, R. A., & Mulani, A. O. (2022). Automatic PCB Track Design Machine. *International Journal of Innovative Science and Research Technology*, 7(9).
83. 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 (ISSN No: 2454-7875)*.
84. Gadade, B., Mulani, A. O., & Harale, A. D. (2024). Iot based smart school bus and student monitoring system. *Naturalista Campano*, 28(1), 730-737.
85. 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.
86. Salunkhe, D. S. S., & Mulani, D. A. O. (2024). Solar Mount Design Using High-Density Polyethylene. *NATURALISTA CAMPANO*, 28(1).
87. Seth, 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 Energy Applications*.
88. Kolhe, V. A., Pawar, S. Y., Gohery, S., Mulani, A. O., Sundari, M. S., Kiradoo, G., ... & Sunil, J. (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.
89. Basawaraj Birajadar, G., Osman Mulani, A., Ibrahim Khalaf, O., Farhah, N., G Gawande, P., Kinage, K., & Abdullah Hamad, A. (2024). Epilepsy identification using hybrid CoPrO-DCNN classifier. *International Journal of Computing and Digital Systems*, 16(1), 783-796.
90. 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) ISSN*, 2799-1156.
91. Godse, A. P. A.O. Mulani (2009). *Embedded Systems (First Edition)*.
92. Pol, R. S., Bhalarao, M. V., & Mulani, A. O. A real time IoT based System Prediction and Monitoring of Landslides. *International Journal of Food and Nutritional Sciences*, Volume 11, Issue 7, 2022.
93. Mulani, A. O., Sardey, M. P., Kinage, K., Salunkhe, S. S., Fegade, T., & Fegade, P. G. (2025). ML-powered Internet of Medical Things (MLIOMT) structure for heart disease prediction. *Journal of Pharmacology and Pharmacotherapeutics*, 16(1), 38-45.
94. Aiwale, S., Kolte, M. T., Harpale, V., Bendre, V., Khurge, D., Bhandari, S., ... & Mulani, A. O. (2024). Non-invasive Anemia Detection and Prediagnosis. *Journal of Pharmacology and Pharmacotherapeutics*, 15(4), 408-416.
95. Mulani, A. O., Bang, A. V., Birajadar, G. B., Deshmukh, A. B., Jadhav, H. M., & Liyakat, K. K. S. (2024). IoT Based Air, Water, and Soil Monitoring System for Pomegranate Farming. *Annals of Agri-Bio Research*, 29(2), 71-86.
96. Kulkarni, T. M., & Mulani, A. O. (2024). Face Mask Detection on Real Time Images and Videos using Deep Learning. *International Journal of Electrical Machine Analysis and Design (IJEMAD)*, 2(1).



97. 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.
98. Pol, D. R. S. (2021). Cloud Based Memory Efficient Biometric Attendance System Using Face Recognition. *Stochastic Modeling & Applications*, 25(2).
99. Nagtilak, M. A. G., Ulegaddi, M. S. N., Adat, M. A. S., & Mulani, A. O. (2021). Breast Cancer Prediction using Machine Learning.
100. Rahul, G. G., & Mulani, A. O. (2016). Microcontroller Based Drip Irrigation System.
101. Kulkarni, T. M., & Mulani, A. O. Deep Learning Based Face-Mask Detection: An Approach to Reduce Pandemic Spreads in Human Healthcare. *African Journal of Biological Sciences*, 6(6), 2024.
102. Mulani, A., & Mane, P. B. (2016). *DWT based robust invisible watermarking*. Scholars' Press.
103. Dr. Vaishali Satish Jadhav, Dr. Shweta Sadanand Salunkhe, Dr. Geeta Salunkhe, Pranali Rajesh Yawle, Dr. Rahul S. Pol, Dr. Altaf Osman Mulani, Dr. Manish Rana, Iot Based Health Monitoring System for Human, *Afr. J. Biomed. Res.* Vol. 27 (September 2024).
104. Dr. Vaishali Satish Jadhav, Geeta D. Salunkhe, Kalyani Ramesh Chaudhari, Dr. Altaf Osman Mulani, Dr. Sampada Padmakar Thigale, Dr. Rahul S. Pol, Dr. Manish Rana, Deep Learning-Based Face Mask Recognition in Real-Time Photos and Videos, *Afr. J. Biomed. Res.* Vol. 27 (September 2024).
105. Altaf Osman Mulani, Electric Vehicle Parameters Estimation Using Web Portal, *Recent Trends in Electronics & Communication Systems*, Volume 10, Issue 3, 2023.
106. Aryan Ganesh Nagtilak, Sneha Nitin Ulegaddi, Mahesh Mane, Altaf O. Mulani, Automatic Solar Powered Pesticide Sprayer for Farming, *International Journal of Microwave Engineering and Technology*, Volume 9 No. 2, 2023.
107. Annasaheb S. Dandage, Vitthal R. Rupnar, Tejas A Pise, and A. O. Mulani, Real-Time Language Translation Application Using Tkinter. *International Journal of Digital Communication and Analog Signals*. 2025; 11(01): -p.
108. AnnaSaheb S Dandage, Vitthal R. Rupnar, Tejas A Pise, and A. O. Mulani, IoT-Powered Weather Monitoring and Irrigation Automation: Transforming Modern Farming Practices. . 2025; 11(01): -p.
109. Mulani, A.O., Kulkarni, T.M. (2025). Face Mask Detection System Using Deep Learning: A Comprehensive Survey. 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_3.
110. Karve, S., Gangonda, S., Birajadar, G., Godase, V., Ghodake, R., Mulani, A.O. (2025). Optimized Neural Network for Prediction of Neurological Disorders. 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 2440. Springer, Cham. https://doi.org/10.1007/978-3-031-88762-8_18.
111. Saurabh Singh, Karm Veer Arya, Ciro Rodriguez Rodriguez, and Altaf Osman Mulani, *Emerging Trends in Artificial Intelligence, Data Science and Signal Processing, Communications in Computer and Information Science (CCIS)*, volume 2440.
112. Saurabh Singh, Karm Veer Arya, Ciro Rodriguez Rodriguez, and Altaf Osman Mulani, *Emerging Trends in Artificial Intelligence, Data Science and Signal Processing, Communications in Computer and Information Science (CCIS)*, volume 2439.
113. Godase, V., Mulani, A., Pawar, A., & Sahani, K. (2025). A Comprehensive Review on PIR Sensor-Based Light Automation Systems. *International Journal of Image Processing and Smart Sensors*, 1(1), 22-29.
114. Godase, V., Mulani, A., Takale, S., & Ghodake, R. (2025). Comprehensive Review on Automated Field Irrigation using Soil Image Analysis and IoT. *Journal of Advance Electrical Engineering and Devices*, 3(1), 46-55.
115. Altaf Osman Mulani, Deshmukh M., Jadhav V., Chaudhari K., Mathew A.A., Shweta Salunkhe. Transforming Drug Therapy with Deep Learning: The Future of Personalized Medicine. *Drug Research*. 2025 Aug 29.



116. Altaf O. Mulani, Vaibhav V. Godase, Swapnil R. Takale, Rahul G. Ghodake (2025), Image Authentication Using Cryptography and Watermarking, International Journal of Image Processing and Smart Sensors, Vol. 1, Issue 2, pp 27-34.
117. Altaf O. Mulani, Vaibhav V. Godase, Swapnil R. Takale, Rahul G. Ghodake (2025), Advancements in Artificial Intelligence: Transforming Industries and Society, International Journal of Artificial Intelligence of Things (AIoT) in Communication Industry, Vol. 1, Issue 2, pp 1-5.
118. Altaf O. Mulani, Vaibhav V. Godase, Swapnil R. Takale, Rahul G. Ghodake (2025), AI-Powered Predictive Analytics in Healthcare: Revolutionizing Disease Diagnosis and Treatment, Journal of Advance Electrical Engineering and Devices, Vol. 3, Issue 2, pp 27-34.
119. Godase, V., Mulani, A., Takale, S., & Ghodake, R. (2025). A Holistic Review of Automatic Drip Irrigation Systems: Foundations and Emerging Trends. *Available at SSRN 5247778*.
120. V. Godase, R. Ghodake, S. Takale, and A. Mulani, —Design and Optimization of Reconfigurable Microwave Filters Using AI Techniques, International Journal of RF and Microwave Communication Technologies, vol. 2, no. 2, pp.26–41, Aug. 2025.
121. V. Godase, A. Mulani, R. Ghodake, S. Takale, “Automated Water Distribution Management and Leakage Mitigation Using PLC Systems,” Journal of Control and Instrumentation Engineering, vol.11, no. 3, pp. 1-8, Aug. 2025.
122. V. Godase, A. Mulani, R. Ghodake, S. Takale, “PLC-Assisted Smart Water Distribution with Rapid Leakage Detection and Isolation,” Journal of Control Systems and Converters, vol. 1, no. 3, pp. 1-13, Aug. 2025.
123. V. V. Godase, S. R. Takale, R. G. Ghodake, and A. Mulani, “Attention Mechanisms in Semantic Segmentation of Remote Sensing Images,” Journal of Advancement in Electronics Signal Processing, vol. 2, no. 2, pp. 45–58, Aug. 2025.
124. D. Waghmare, A. Mulani, S. R. Takale, V. Godase, and A. Mulani, “A Comprehensive Review on Automatic Fruit Sorting and Grading Techniques with Emphasis on Weight-based Classification,” Research & Review: Electronics and Communication Engineering, vol. 2, no. 3, pp. 1-10, Oct. 2025.
125. Karande, K. J., & Talbar, S. N. (2014). Independent component analysis of edge information for face recognition. Springer India.
126. Karande, K. J., & Talbar, S. N. (2008). Face recognition under variation of pose and illumination using independent component analysis. ICGST-GVIP, ISSN.
127. 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, 519-522.
128. Kawathekar, P. P., & Karande, K. J. (2014, July). Severity analysis of Osteoarthritis of knee joint from X-ray images: A Literature review. In 2014 International Conference on Signal propagation and computer technology (ICSPCT 2014) (pp. 648-652). IEEE.
129. Daithankar, M. V., Karande, K. J., & Harale, A. D. (2014, April). Analysis of skin color models for face detection. In 2014 International Conference on Communication and Signal Processing (pp. 533-537). IEEE.
130. Karande, J. K., Talbar, N. S., & Inamdar, S. S. (2012, May). Face recognition using oriented Laplacian of Gaussian (OLOG) and independent component analysis (ICA). In 2012 Second International Conference on Digital Information and Communication Technology and it's Applications (DICTAP) (pp. 99-103). IEEE.
131. 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>
132. 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>
133. 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>
134. 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>
 135. Bankar, A. S., Harale, A. D., & Karande, K. J. (2021). Gestures Controlled Home Automation using Deep Learning: A Review. *International Journal of Current Engineering and Technology*, 11(06), 617–621. <https://doi.org/10.14741/ijcet/v.11.6.4>
 136. Mali, A. S., Ghadge, S. K., Adat, A. S., & Karande, S. V. (2024). Intelligent Medication Management System. *IJSRD - International Journal for Scientific Research & Development*, Vol. 12(Issue 3).
 137. Water Level Control, Monitoring and Altering System by using GSM in Irrigation Based on Season. (2019). In *International Research Journal of Engineering and Technology (IRJET)* (Vol. 06, Issue 04, p. 1035) [Journal-article]. <https://www.irjet.net>
 138. Modi, S., Misal, V., Kulkarni, S., & Mali A.S. (2025). Hydroponic Farming Monitoring System - Automated system to monitor and control nutrient and pH levels. In *Journal of Microcontroller Engineering and Applications* (Vol. 12, Issue 3, pp. 11–16). <https://doi.org/10.37591/JoMEA>
 139. 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>.
 140. 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.
 141. Siddheshwar S. Gangonda, Prashant P. Patavardhan, Kailash J. Karande, “Recognition of Marathi Numerals Using MFCC and DTW Features”, *Book Title: Recent Trends on Image Processing and Pattern Recognition, RTIP2R 2018, CCIS 1037*, pp. 1–11, © Springer Nature Singapore Pte Ltd. 2019 https://doi.org/10.1007/978-981-13-9187-3_17.
 142. Siddheshwar S. Gangonda, Prashant P. Patavardhan, Kailash J. Karande, “Analysis of Face Recognition Algorithms for Uncontrolled Environments”, *Book Title: Computing, Communication and Signal Processing*, pp. 919–926, © Springer Nature Singapore Pte Ltd. 2018.
 143. 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.
 144. 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.
 145. Siddheshwar S. Gangonda, Prashant P. Patavardhan, Kailash J. Karande, “An Extensive Survey of Prominent Researches in Face Recognition under different Conditions”, 4th International Conference on Computing, Communication, Control And Automation (ICCUBEA-2018), 16th to 18th Aug. 2018 organized by Pimpri Chinchwad College of Engineering (PCCOE), Pune, India.
 146. Siddheshwar S. Gangonda, Prashant P. Patavardhan, Kailash J. Karande, “Analysis of Face Recognition Algorithms for Uncontrolled Environments”, 3rd International Conference on Computing, Communication and Signal Processing (ICCASP 2018), 26th-27th Jan. 2018, organized by Dr. BATU, Lonere, India.
 147. Siddheshwar Gangonda and Prachi Mukherji, “Speech Processing for Marathi Numeral Recognition”, International Conference on Recent Trends, Feb 2012, IOK COE, Pune.



- 148.S. S. Gangonda, "Bidirectional Visitor Counter with automatic Door Lock System", National Conference on Computer, Communication and Information Technology (NCCCIT-2018), 30th and 31st March 2018 organized by Department of Electronics and Telecommunication Engineering, SKN SCOE, Korti, Pandharpur.
- 149.Siddheshwar Gangonda and Prachi Mukherji, "Speech Processing for Marathi Numeral Recognition using MFCC & DTW Features", ePGCON 2012, 23rd and 24th April 2012 organized by Commis COE for Woman, Pune.
- 150.Siddheshwar Gangonda and Prachi Mukherji, "Speech Processing for Marathi Numeral Recognition", National Conference on Emerging Trends in Engineering and Technology (VNCET'12), 30th March 2012 organized by Vidyavardhini's College of Engineering and Technology, Vasai Road, Thane.
- 151.Siddheshwar Gangonda and Prachi Mukherji, "Speech Processing for Marathi Numeral Recognition", ePGCON 2011, 26th April 2011 organized by MAEER's MIT, Kothrud, Pune-38.
- 152.Siddheshwar Gangonda, "Medical Image Processing",Aavishkar-2K7, 17th and 18th March 2007 organized by Department of Electronics and Telecommunication Engineering, SVERI's COE, Pandharpur.
- 153.Siddheshwar Gangonda, "Image enhancement & Denoising",VISION 2k7, 28th Feb-2nd March 2007 organized by M.T.E. Society's Walchand College of Engineering, Sangli.
- 154.Siddheshwar Gangonda, "Electromagnetic interference & compatibility" KSHITIJ 2k6, 23rd and 24th Sept. 2006 organized by Department of Mechanical Engineering, SVERI's COE, Pandharpur.
- 155.A. Pise and K. Karande, "A genetic Algorithm-Driven Energy-Efficient routing strategy for optimizing performance in VANETs," Engineering Technology and Applied Science Research, vol. 15, no. 5, 2025, [Online]. Available: <https://etasr.com/index.php/ETASR/article/view/12744>
- 156.A. C. Pise, K. J. Karande, "Investigating Energy-Efficient Optimal Routing Protocols for VANETs: A Comprehensive Study", ICT for Intelligent Systems, Lecture Notes in Networks and Systems 1109, Proceedings of ICTIS 2024 Volume 3, Lecture Notes in Networks and Systems, Springer, Singapore, ISSN 2367-3370, PP 407-417, 29 October 2024 https://doi.org/10.1007/978-981-97-6675-8_33.
- 157.A. C. Pise, et. al., "Smart Vehicle: A Systematic Review", International Journal - The Ciência & Engenharia - Science & Engineering Journal ISSN: 0103-944XVolume 11 Issue 1, 2023pp: 992–998, 2023.
- 158.A. C. Pise, et. al., "Smart Vehicle: A Systematic Review", International Journal of Research Publication and Reviews, ISSN 2582-7421, Vol 4, no 10, pp 2728-2731 October 2023.
- 159.A. C. Pise, et. al., "Development of BIOBOT System to Assist COVID Patient and Caretakers", European Journal of Molecular and Clinical Medicine ; 10(1):3472-3480, 2023.
- 160.A. C. Pise, et. al., "IoT Based Landmine Detection Robot", International Journal of Research in Science & EngineeringISSN: 2394-8299Vol: 03, No. 04, June-July 2023.
- 161.A. C. Pise, et. al., "A Systematic survey on Estimation of Electrical Vehicle", Journal of Electronics, Computer Networking and Applied Mathematics (JECNAM) ISSN: 2799-1156, Volume 3, Issue 01, Pages 1-6, December 2023.
- 162.A. C. Pise, et. al., "Python Algorithm to Estimate Range of Electrical Vehicle", Web of Science, Vol 21, No 1 (2022) December 2022
- 163.A. C. Pise, et. al., "Implementation of BIOBOT System for COVID Patient and Caretakers Assistant using IOT", International Journal of Information technology and Computer Engineering. 30-43. 10.55529/ijitc.21.30.43, (2022).
- 164.A. C. Pise, et. al., "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.
- 165.A. C. Pise, Dr. K. J. Karande, "An Exploratory study of Cluster Based Routing Protocol in VANET: A Review", International Journal of Advanced Research in Engineering and Technology(IJARET), 12,10, 2021, 17-30, Manuscript ID :00000-94375 Source ID : 00000006, Journal_uploads/IJARET/VOLUME_12_ISSUE_10/IJARET_12_10_002.pdf



- 166.A. C. Pise, et. al., "Android based Portable Health Support System," A Peer Referred & Indexed International Journal of Research, Vol.8, issue.4, April 2019.
- 167.A. C. Pise, et. al., "Facial Expression Recognition Using Image Processing," International Journal of VLSI Design, Microelectronics and Embedded System, Vol.3, issue.2, July 2018.
- 168.A. C. Pise, et. al., "Detection of Cast Iron Composition by Cooling Curve Analysis using Thermocouple Temperature Sensor," UGC Approved International Journal of Academic Science (IJRECE), Vol.6, Issue.3, July-September 2018.
- 169.A. C. Pise, et. al., "Android Based Portable Health Support", System International Journal of Engineering Sciences & Research Technology (IJESRT 2017) Vol.6, Issue 8, pp 85-88 5th Aug 2017
- 170.A. C. Pise, et. al., "Adaptive Noise Cancellation in Speech Signal", International Journal of Innovative Engg and Technology, 2017
- 171.A. C. Pise, et. al., "Lung Cancer Detection System by using Baysian Classifier", ISSN 2454-7875, IJRPET, published online in conference special issue VESCOMM-2016, February 2016
- 172.A. C. Pise, et. al., "Review on Agricultural Plant Diseases Detection by Image Processing", ISSN 2278-621X, IJLTET, Vol 7, Issue 1 May 2016
- 173.A. C. Pise, et. al. "Segmentation of Retinal Images for Glaucoma Detection", International Journal of Engineering Research and Technology (06, June-2015).
- 174.A. C. Pise, et. al. "Color Local Texture Features Based Face Recognition", International Journal of Innovations in Engineering and Technology(IJiet), Dec. 2014
- 175.A. C. Pise, et. al. "Single Chip Solution For Multimode Robotic Control", International Journal of Engineering Research and Technology (IJERT-2014), Vol. 3, Issue 12, Dec. 2014.
- 176.Anjali C. Pise et. al., "Remote monitoring of Greenhouse parameters using zigbee Wireless Sensor Network", International Journal of Engineering Research & Technology ISSN 2278-0181 (online) Vol. 3, Issue 2, and pp: (2412-2414), Feb. 2014.
- 177.A. C. Pise, K. J. Karande, "Cluster Head Selection Based on ACO In Vehicular Ad-hoc Networks", Machine Learning for Environmental Monitoring in Wireless Sensor Networks
- 178.A. C. Pise, K. J. Karande, "Architecture, Characteristics, Applications and Challenges in Vehicular Ad Hoc Networks" Presented in 27th IEEE International Symposium on Wireless Personal Multimedia Communications (WPMC 2024) "Secure 6G – AI Nexus: Where Technology Meets Humanity" Accepted for book chapter to be published in international Scopus index book by River publisher.
- 179.A. C. Pise, Dr. K. J. Karande, "K-mean Energy Efficient Optimal Cluster Based Routing Protocol in Vehicular Ad Hoc Networks", International Conference on Innovations in Artificial Intelligence and Machine Learning (ICAIML-2022), August 20th and 21st 2022 Springer database Conference.
- 180.A. C. Pise, Mr. D. Nale, "Web-Based Application for Result Analysis", ", International Conference on Innovations in Artificial Intelligence and Machine Learning (ICAIML-2022), August 20th and 21st 2022 Springer database Conference.
- 181.A. C. Pise, et. al., "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.
- 182.A. C. Pise, et. al., "Facial Expression Recognition Using Facial Features," IEEE International Conference on Communication and Electronics Systems (ICCES 2018), October 2018.
- 183.A. C. Pise, et. al., "Estimating Parameters of Cast Iron Composition using Cooling Curve Analysis," IEEE International Conference on Communication and Electronics Systems (ICCES 2018), Coimbatore, October 2018.
- 184.A. C. Pise, et. al., "Android based portable Health Support System," International Conference on Innovations in Engineering and Technology (CIET 2016), SKN Sinhgad College of Engineering, 30-31 Dec 2016.



- 185.A. C. Pise, et. al., "Bayesian Classifier & FCM Segmentation for Lung Cancer Detection in early stage," International Conference on Innovations in Engineering and Technology (CIET 2016), SKN Sinhgad College of Engineering, 30-31 Dec 2016.
- 186.A. C. Pise, et. al., "Cast Iron Composition Measurement by Coding Curve Analysis," International Conference on Innovations in Engineering and Technology (CIET 2016), SKN Sinhgad College of Engineering, 30-31 Dec 2016.
- 187.A. C. Pise, et. al., "War field Intelligence Defence Flaging Vehicle," International Conference on Innovations in Engineering and Technology (CIET 2016), SKN Sinhgad College of Engineering, 30-31 Dec 2016.
- 188.A. C. Pise, et. al. "Disease Detection of Pomegranate Plant", IEEE sponsored International Conference on Computation of Power, Energy, Information and Communication, 22- 23 Apr. 2015.
- 189.A. C. Pise, P. Bankar. "Face Recognition by using GABOR and LBP", IEEE International Conference on Communication and Signal Processing, ICCSP, 2-4 Apr. 2015
- 190.A. C. Pise, et. al. "Single Chip Solution For Multimode Robotic Control", Ist IEEE International Conferene on Computing Communication and Automation, 26-27 Feb2015.
- 191.Anjali C. Pise, Vaishali S. Katti, "Efficient Design for Monitoring of Greenhouse Parameters using Zigbee Wireless Sensor Network", fifth SARC international conference IRF,IEEE forum ISBN 978-93-84209-21-6,pp 24-26, 25th May 2014
- 192.A. C. Pise, P. Bankar, "Face Recognition using Color Local Texture Features", International Conference on Electronics and Telecommunication, Electrical and Computer Engineering, Apr.2014.
- 193.A. C. Pise, et.al. "Monitoring parameters of Greenhouse using Zigbee Wireless Sensor Network", 1st International Conference on Electronics and Telecommunication, Electrical and Computer Engineering, 5-6 Apr.2014.
- 194.A. C. Pise, et. al. "Compensation schemes and performance Analysis of IQ Imbalances in Direct Conversion Receivers", International Conference at GHPCOE, Gujarat, (Online Proceeding is Available), 2009.
- 195.A. C. Pise, K. J. Karande, "Energy-Efficient Optimal Routing Protocols in VANETs", 66th Annual IETE Convention, AIC -2023 September16-17, 2023, under the Theme: The Role of 5G In Enabling Digital Transformation for Rural Upliftment.
- 196.A. C. Pise, et. al. "Automatic Bottle Filling Machine using Raspberry Pi", National Conference on computer ;Communication & information Technology (NCCIT-2018) dated 30th & 31st March 2018.
- 197.A. C. Pise, et. al. "Design & Implementation of ALU using VHDL", National Conference on computer ;Communication & information Technology (NCCIT-2018) dated 30th & 31st March 2018.
- 198.A. C. Pise, et. al. "Mechanism and Control of Autonomus four rotor Quad copter", National Conference on Computer, Electrical and Electronics Engineering, 23- 24 Apr. 2016.
- 199.A. C. Pise, et. al. "Segmentation of Optic Disk and Optic Cup from retinal Images", ICEECMPE – Chennai, June 2015
- 200.A. C. Pise, et. al. "Diseases Detection of Pomegranate Plant", IEEE Sponsored International conference on Computation of Power, Energy , April 2015.
- 201.A. C. Pise, et. al. "Compensation Techniques for I/Q Imbalance in Direct-Conversion Receivers", Conference at SCOE, Pune 2010.
- 202.A. C. Pise, et. al. "I/Q Imbalance compensation Techniques in Direct Conversion Receiver ", Advancing Trends in Engineering and Management Technologies, ATEMT-2009, Conference at Shri Ramdeobaba Kamla Nehru Engineering College, Nagpur, 20-21 November 2009
- 203.A. C. Pise, et. al. "Compensation Techniques for I/Q Imbalance in Direct Conversion Receiver", Conference at PICT, Pune 2008.
- 204.A. C. Pise, et. al. "I/Q Imbalance compensation Techniques in Direct Conversion Receiver ", Conference at DYCOE, Pune 2008.
- 205.A. C. Pise, et. al. "DUCHA: A New Dual channel MAC protocol for Multihop Ad-Hoc Networks", Conference at SVCVP, Pune 2007.



206. Godase, V., Pawar, P., Nagane, S., & Kumbhar, S. (2024). Automatic railway horn system using node MCU. *Journal of Control & Instrumentation*, 15(1).
207. 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.
208. Jamadade, V. K., Ghodke, M. G., Katakdhond, S. S., & Godase, V. A Comprehensive Review on Scalable Arduino Radar Platform for Real-time Object Detection and Mapping.
209. 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.
210. Godase, V. (2025, April). Advanced Neural Network Models for Optimal Energy Management in Microgrids with Integrated Electric Vehicles. In *Proceedings of the International Conference on Trends in Material Science and Inventive Materials (ICTMIM-2025) DVD Part Number: CFP250J1-DVD*.
211. Dange, R., Attar, E., Ghodake, P., & Godase, V. (2023). Smart agriculture automation using ESP8266 NodeMCU. *J. Electron. Comput. Netw. Appl. Math*, (35), 1-9.
212. Godase, V. (2025). Optimized Algorithm for Face Recognition using Deepface and Multi-task Cascaded Convolutional Network (MTCNN). *Optimum Science Journal*.
213. Mane, V. G. A. L. K., & Gangonda, K. D. S. Pipeline Survey Robot.
214. 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.
215. Godase, V., & Jagadale, A. (2019). Three element control using PLC, PID & SCADA interface. *International Journal for Scientific Research & Development*, 7(2), 1105-1109.
216. 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.
217. Godase, V., Modi, S., Misal, V., & Kulkarni, S. (2025). LoRaEdge-ESP32 synergy: Revolutionizing farm weather data collection with low-power, long-range IoT. *Advance Research in Analog and Digital Communications*, 2(2), 1-11.
218. Godase, V. (2025). Comparative study of ladder logic and structured text programming for PLC. Available at SSRN 5383802.
219. Godase, V., Modi, S., Misal, V., & Kulkarni, S. Real-time object detection for autonomous drone navigation using YOLOv8. *Advance Research in Communication Engineering and its Innovations*, 2(2), 17-27.
220. Godase, V. (2025). Smart energy management in manufacturing plants using PLC and SCADA. *Advance Research in Power Electronics and Devices*, 2(2), 14-24.
221. 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*, 1(1), 9-19.
222. Godase, V. (2025). Graphene-Based Nano-Antennas for Terahertz Communication. *International Journal of Digital Electronics and Microprocessor Technology*, 1(2), 1-14.
223. 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.
224. 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.
225. Jamadade, V. K., Ghodke, M. G., Katakdhond, S. S., & Godase, V. A Comprehensive Review on Scalable Arduino Radar Platform for Real-time Object Detection and Mapping.
226. Godase, V. (2025). Cross-Domain Comparative Analysis of Microwave Imaging Systems for Medical Diagnostics and Industrial Testing. *Journal of Microwave Engineering & Technologies*, 12(2), 39-48p.



- 227.V. K. Jamadade, M. G. Ghodke, S. S. Katakdhond, and V. Godase, —A Review on Real-time Substation Feeder Power Line Monitoring and Auditing Systems,” International Journal of Emerging IoT Technologies in Smart Electronics and Communication, vol. 1, no. 2, pp. 1-16, Sep. 2025.
- 228.V. V. Godase, “VLSI-Integrated Energy Harvesting Architectures for Battery-Free IoT Edge Systems,” Journal of Electronics Design and Technology, vol. 2, no. 3, pp. 1-12, Sep. 2025.
- 229.A. Salunkhe et al., “A Review on Real-Time RFID-Based Smart Attendance Systems for Efficient Record Management,” Advance Research in Analog and Digital Communications, vol. 2, no. 2, pp.32-46, Aug. 2025.
- 230.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), 41-47p.
- 231.Nagane, M.S., Pawar, M.P., & Godase, P.V. (2022). Cinematica Sentiment Analysis. *Journal of Image Processing and Intelligent Remote Sensing*.
- 232.Godase, V.V. (2025). Tools of Research. SSRN Electronic Journal.
- 233.Godase, V. (n.d.). EDUCATION AS EMPOWERMENT: THE KEY TO WOMEN’S SOCIO ECONOMIC DEVELOPMENT. *Women Empowerment and Development*, 174–179.
- 234.Godase, V. (n.d.). COMPREHENSIVE REVIEW ON EXPLAINABLE AI TO ADDRESSES THE BLACK BOX CHALLENGE AND ITS ROLE IN TRUSTWORTHY SYSTEMS. In *Sinhgad College of Engineering, Artificial Intelligence Education and Innovation* (pp. 127–132).
- 235.Godase, V. (n.d.-b). REVOLUTIONIZING HEALTHCARE DELIVERY WITH AI-POWERED DIAGNOSTICS: A COMPREHENSIVE REVIEW. In *SKN Sinhgad College of Engineering, SKN Sinhgad College of Engineering* (pp. 58–61).
- 236.Dhope, V. (2024). SMART PLANT MONITORING SYSTEM. In *International Journal of Creative Research Thoughts (IJCRT)*. <https://www.ijcrt.org>
- 237.M. M. Zade,Sushant D.Kambale,Shweta A.Mane,Prathamesh M. Jadhav.(2025) “IOT Based early fire detection in Jungles”. *RIGJA&AR* Volume 2 Issue 1,ISSN:2998-4459. DOI:<https://doi.org/10.5281/zenodo.15056435>
- 238.M. M. Zade, Bramhadev B. Rupanar, Vrushal S. Shilawant , Akansha R. Pawar(2025) “IOT Flood Monitoring & Alerting System using Raspberry Pi-Pico ”*International Journal of Research Publication & Reviews* , Volume 6 ,Issue 3,ISSN:2582-7421.DOI:<https://ijrpr.com/uploads/V6ISSUE3/IJRPR40251.pdf>
- 239.M.M.Zade(2022) “Touchless Fingerprint Recognition System”(Paper-ID 907)(2022) *International Conference on “Advanced Technologies for Societal Applications: Techno-Societal 2022* <https://link.springer.com/book/10.1007/978-3-031-34644-6?page=6>
- 240.Mr.M.M.Zade published the paper on “Automation of Color Object Sorting Conveyor Belt”, in *International Journal of Scientific Research in Engineering & Management (IJSREM)*,ISSN:2582-3930 Volume 06 ,Issue 11th November 2022.
- 241.Mr.M.M.Zade published the paper on “Cloud Based Patient Health Record Tracking web Developement”,in *International Journal of Advanced Research in Science, Communication & Technology(IJARSCT)*,ISSN NO:2581-9429 Volume 02 ,Issue 03,DOI 1048175/IJARSCT-3705,IF 6.252, May 2022.
- 242.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
- 243.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
- 244.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
- 245.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



246. 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
247. 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
248. Mr. Mahesh M Zade & Mr.S.M.Karve, "Performance Analysis of Median Filter for Enhancement of Highly Corrupted Images", National Conference on Advanced Trends in Engineering, Association with IRJMS, Karmyogi Engineering College, Shelave, Pandharpur, March 2016.
249. Mr. Mahesh M Zade & Mr.S.M.Karve, "Implementation of Reed Solomen Encoder & Decoder Using FPGA", National Conference on Advanced Trends in Engineering, Association with IRJMS, Karmyogi Engineering College, Shelave, Pandharpur, March 2016.
250. Mr. Mahesh M Zade & Dr.S.M.Mukane, "Performance of Switching Median Filter for Enhancement of Image", National Conference on Mechatronics at Sinhgad Institute of Technology and Science, Narhe, Pune, Feb. 2016.
251. Mr. Mahesh M Zade & Dr.S.M.Mukane, "Enhancement of Image with the help of Switching Median Filter", National Conference on Emerging Trends in Electronics & Telecommunication Engineering, SVERI's College of Engineering Pandharpur, NCET 2013.
252. 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.
253. A. O. Mulani, V. Godase, S. Takale, and R. Ghodake, "Secure Image Authentication using AES and DWT Watermarking on Reconfigurable Platform," International Journal of Embedded System and VLSI Design, vol. 1, no. 2, pp. 14-20, Oct. 2025

