Helmet&Vehicle Number Plate Recognition With Transfomer-Based Realtime Yolo Deep Learning

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***Abstract*—**Road safety continues to be a major concern, especially in regions with a high number of two-wheeler users. One of the most common and dangerous traffic violations is riding without a helmet, which significantly increases the risk of severe injuries and fatalities during accidents. Traditional methods of monitoring such violations rely heavily on manual surveillance, which is time-consuming, inefficient, and prone to human error.To address these challenges, this paper presents a real-time intelligent system for helmet detection and vehicle number plate recognition using a Transformer-based YOLO deep learning framework. The proposed system leverages advanced object detection techniques to accurately identify motorcyclists and determine whether they are wearing helmets. In cases where a violation is detected, the system automatically captures the vehicle's number plate and applies Optical Character Recognition (OCR) to extract the registration details.The integration of Transformer-based enhancements with YOLO improves detection accuracy, especially in complex real-world conditions such as varying lighting, motion blur, and occlusions. The system processes video streams in real time and stores violation data, including images, timestamps, and license plate numbers, in a structured database for further analysis and enforcement.

Keywords— Helmet Detection, Number Plate Recognition, YOLO, Transformer-Based Deep Learning, Computer Vision, Optical Character Recognition (OCR), Real-Time Surveillance, Traffic Violation Detection, Smart Traffic Management, Deep Learning

I. INTRODUCTION

Road safety has become a critical global issue, particularly in countries with a high number of two-wheeler users. Among the various safety measures, wearing a helmet is one of the simplest yet most effective ways to reduce the severity of injuries during accidents. Despite strict traffic regulations and awareness campaigns, many riders continue to ignore helmet laws, leading to a significant increase in preventable fatalities. Monitoring such violations manually is not only labor-intensive but also inefficient and prone to human error, especially in densely populated urban areas.

With the rapid advancement of Artificial Intelligence (AI) and Computer Vision, there is a growing opportunity to automate traffic surveillance systems. Intelligent monitoring solutions can help detect violations accurately, reduce dependency on manual enforcement, and improve overall road safety. In this context, deep learning-based object detection models have shown remarkable performance in identifying objects in real-time video streams.

This paper proposes a smart and automated system for detecting helmet violations and recognizing vehicle number plates using a Transformer-based YOLO deep learning approach. The system is designed to process real-time video input from surveillance cameras and identify whether a motorcyclist is wearing a helmet. If a

Doi:10.48047/ijiee.2026.16.2.25

rider is detected without a helmet, the system automatically captures the vehicle's number plate and extracts the registration details using Optical Character Recognition (OCR).

The integration of Transformer mechanisms with YOLO enhances detection accuracy and robustness under challenging real-world conditions such as poor lighting, occlusion, and motion blur. The system not only detects violations but also records essential information, including images, timestamps, and license plate numbers, in a database for further analysis and enforcement.

By combining helmet detection and number plate recognition into a unified framework, the proposed system offers an efficient, scalable, and reliable solution for modern traffic management. It has the potential to support smart city initiatives by enabling automated law enforcement, reducing human workload, and promoting safer driving behavior among citizens.

II. REVIEW &LITERATURE SURVEY

In recent years, significant research has been carried out in the field of intelligent traffic monitoring using Artificial Intelligence (AI), Computer Vision, and Deep Learning. Various approaches have been proposed to address traffic violations such as helmetless riding and vehicle identification. This section reviews some of the key contributions in this domain.

Early research primarily focused on helmet detection using traditional image processing techniques and basic machine learning models. However, these methods often lacked robustness and failed to perform well under real-world conditions such as poor lighting, occlusion, and dynamic backgrounds. With the advancement of deep learning, more accurate and efficient approaches have emerged.

Aditya Kharat et al. developed a system based on the YOLOv3 algorithm to detect motorcyclists not wearing helmets. Their approach utilized a custom dataset and demonstrated promising results in real-time detection scenarios. The study highlighted the effectiveness of single-stage object detection models for traffic surveillance applications.

Md. Shahin Hossain et al. proposed an Automatic Number Plate Recognition (ANPR) system that combines image preprocessing, segmentation, and Optical Character Recognition (OCR). Their system used Haar cascade classifiers for plate detection and Tesseract OCR for character extraction. The results showed reliable performance across varying environmental conditions, making it suitable for practical deployment.

D. Kumari et al. introduced an integrated system that combines helmet detection and number plate recognition using Convolutional Neural Networks (CNNs). The system employed YOLO for object detection and EasyOCR for extracting license plate details. Their work demonstrated that combining multiple deep learning techniques can significantly improve the efficiency of traffic violation detection systems.

R. S. Bansal and A. N. Gupta focused on improving helmet detection accuracy using the YOLOv5 model. By training the model on a well-balanced and diverse dataset, they achieved higher precision and faster detection speeds compared to traditional CNN-based approaches. Their research emphasized the importance of dataset quality in improving model performance.

Sneha Patil et al. proposed a comprehensive AI-based traffic monitoring system capable of detecting multiple violations, including helmetless riding and signal violations. Their system integrated object detection, tracking, and OCR techniques, and also discussed scalability for smart city applications. The study highlighted the potential of AI in automating traffic law enforcement and reducing manual intervention.

Although these studies have made significant progress, most existing systems focus either on helmet detection or number plate recognition independently. Few solutions provide a fully integrated, real-time framework that combines both functionalities efficiently. Additionally,

Doi:10.48047/ijiee.2026.16.2.25

challenges such as low-light conditions, motion blur, and occlusion still affect system accuracy.

To overcome these limitations, the proposed system integrates Transformer-based enhancements with YOLO for improved detection accuracy and robustness. By combining helmet detection and number plate recognition into a single pipeline, the system aims to provide a more reliable, scalable, and real-time solution for modern traffic management.

III. RESEARCH METHODOLOGY

The proposed Helmet and Vehicle Number Plate Recognition system is developed as a comprehensive, real-time intelligent surveillance framework that integrates deep learning, computer vision, and Optical Character Recognition (OCR) techniques to automatically detect traffic violations. The system begins by acquiring input in the form of live video streams or recorded footage from traffic surveillance cameras. These video inputs are processed frame-by-frame using image processing libraries, where each frame is treated as an independent data sample for analysis. To improve the reliability and accuracy of detection, preprocessing techniques such as image resizing, normalization, noise reduction, and contrast enhancement are applied. These steps play a crucial role in handling real-world challenges such as poor lighting conditions, motion blur, weather disturbances, and partial occlusions.

At the core of the system lies a Transformer-enhanced YOLO (You Only Look Once) deep learning model, which is trained on a custom dataset consisting of images of motorcyclists with and without helmets, along with vehicle number plates. The YOLO model performs real-time object detection by dividing the input image into grids and predicting bounding boxes along with class probabilities. The integration of Transformer-based mechanisms further improves the model's ability to capture contextual relationships and fine-grained features, resulting in higher detection accuracy and robustness in complex traffic environments. The model is capable of simultaneously detecting multiple objects such as motorcycles, riders, helmets, and number plates within a single frame.

Once object detection is completed, the system performs helmet classification by analyzing the detected rider region to determine whether a helmet is present. If the system identifies a rider without a helmet, it flags the instance as a violation and triggers the next stage of processing. The number plate detection module is then activated, where the system localizes the license plate region using bounding box detection. The identified Region of Interest (ROI) is extracted and further processed using OCR techniques such as Tesseract or EasyOCR to convert the visual information into machine-readable alphanumeric text.

Following successful recognition, the system logs all violation-related information into a structured database. Each record includes the captured image of the violation, extracted number plate number, date and time stamp, and other relevant metadata. This stored data can be utilized for automated report generation, violation tracking, and integration with traffic management systems for issuing e-challans or alerts. Additionally, the system is designed with scalability in mind, allowing it to handle multiple detections simultaneously in high-traffic scenarios.

To ensure efficient real-time performance, the system incorporates optimization techniques such as GPU acceleration, model tuning, and efficient frame processing to maintain a high frame-per-second (FPS) rate. The modular architecture of the system allows for easy upgrades and integration of additional features such as face recognition or detection of other traffic violations in the future. Overall, the proposed methodology provides a robust, scalable, and automated solution that significantly reduces manual intervention while improving the accuracy and efficiency of traffic rule enforcement systems.

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IV. EXISTING SYSTEM

The existing traffic monitoring systems primarily rely on manual surveillance and basic camera-based observation to identify traffic violations. In most cases, traffic police personnel monitor CCTV footage or physically observe road conditions to detect offenses such as helmetless riding. This approach is highly labor-intensive, time-consuming, and prone to human error. Factors such as fatigue, lack of continuous attention, and increasing traffic density further reduce the efficiency and accuracy of manual monitoring systems.

Some automated solutions have been developed in the form of Automatic Number Plate Recognition (ANPR) systems, which are capable of detecting vehicle license plates and extracting alphanumeric information using basic image processing and Optical Character Recognition (OCR) techniques. While these systems are useful for vehicle identification, they are limited in functionality as they do not address other important traffic violations, such as helmet detection for two-wheeler riders. Moreover, traditional ANPR systems often struggle in real-world conditions due to challenges like poor lighting, motion blur, occlusion, and varying camera angles.

In addition, a few earlier research-based systems attempted to detect helmet usage using conventional machine learning algorithms or simple Convolutional Neural Networks (CNNs). However, these systems lacked robustness and failed to deliver consistent performance in complex environments, especially in crowded traffic scenes. They were often unable to handle multiple object detection simultaneously and showed reduced accuracy when objects were partially visible or moving at high speeds.

Another major limitation of existing systems is the lack of integration. Most solutions focus on either helmet detection or number plate recognition independently, rather than providing a unified system that can handle both tasks efficiently in real time. Furthermore, existing systems often lack proper data management and automation capabilities, requiring manual verification and processing of detected violations.

Overall, the current traffic monitoring approaches are either manual, partially automated, or limited in scope, making them inefficient for large-scale deployment in modern smart city environments. These limitations highlight the need for a more advanced, fully automated, and integrated system that can accurately detect helmet violations and identify vehicles in real time.

V. PROPOSED METHODOLOGY

The proposed system introduces an advanced and fully automated approach for detecting helmet violations and recognizing vehicle number plates using a Transformer-based YOLO deep learning framework. The system is designed to operate in real time by processing video input obtained from traffic surveillance cameras or recorded footage. Initially, the video stream is divided into individual frames, and each frame undergoes preprocessing techniques such as resizing, normalization, noise reduction, and contrast enhancement to improve image quality and ensure reliable performance under challenging real-world conditions like low illumination, motion blur, and environmental disturbances.

At the core of the methodology lies a deep learning-based object detection model, specifically YOLO (You Only Look Once), enhanced with Transformer mechanisms. This combination enables the system to perform high-speed and accurate detection of multiple objects within a single frame, including motorcycles, riders, helmets, and number plates. The Transformer component improves contextual understanding and feature extraction, allowing the model to achieve better accuracy even in complex traffic scenarios with occlusions and crowded backgrounds. The trained model processes each frame and generates bounding boxes around detected objects along with their corresponding class labels.

Doi:10.48047/ijiee.2026.16.2.25

Following object detection, the system performs helmet classification by analyzing the detected rider region to determine whether a helmet is present. If a rider is identified without a helmet, the system marks it as a violation and triggers the number plate recognition module. In this stage, the system isolates the vehicle's license plate by extracting the Region of Interest (ROI) using detection techniques. The extracted plate image is then processed using Optical Character Recognition (OCR) tools such as Tesseract or EasyOCR to convert the visual text into machine-readable alphanumeric data.
Once the number plate information is successfully extracted, the system records all relevant details into a structured database. This includes the captured image of the violation, the recognized license plate number, timestamp, and additional metadata if required. The stored data can be used for generating automated reports, issuing e-challans, and assisting traffic authorities in monitoring and enforcement. The system is designed to handle multiple detections simultaneously, making it suitable for deployment in high-density traffic environments.

To ensure efficient real-time performance, the proposed methodology incorporates optimization techniques such as GPU acceleration, model fine-tuning, and efficient frame processing to maintain a high processing speed and accuracy. The modular architecture of the system allows easy scalability and future enhancements, such as integrating additional traffic violation detection features or connecting with smart city infrastructure. Overall, the proposed methodology provides a robust, accurate, and scalable solution for automated traffic monitoring, significantly reducing manual effort and improving road safety enforcement.

VI. RESULT AND OUTCOMES

The proposed Helmet and Vehicle Number Plate Recognition system was successfully implemented and evaluated using both image datasets and real-time video inputs. The system demonstrated effective performance in detecting motorcycles, identifying helmet usage, and recognizing vehicle number plates under various conditions. During testing, the deep learning model showed high accuracy in distinguishing between helmet and non-helmet cases, even in moderately complex traffic environments. The integration of the Transformer-based YOLO model improved detection precision and consistency, particularly in scenarios involving multiple objects, partial occlusion, and dynamic backgrounds.

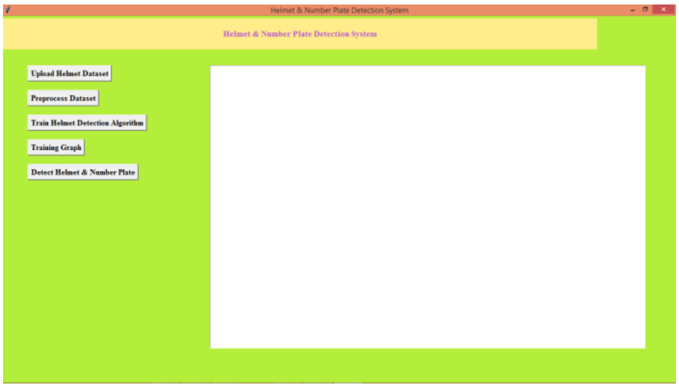

Fig:7.1: Output 1

The system was able to process video streams in real time with a satisfactory frame rate, ensuring smooth and continuous monitoring without significant delay. In cases where a rider was not wearing a helmet, the system successfully triggered the number plate recognition module and extracted alphanumeric details using OCR techniques. The OCR module performed well when the number plate was clearly visible, achieving good accuracy in text extraction. However, minor inaccuracies were observed in situations where the number plate was blurred, partially occluded, or captured at extreme angles.

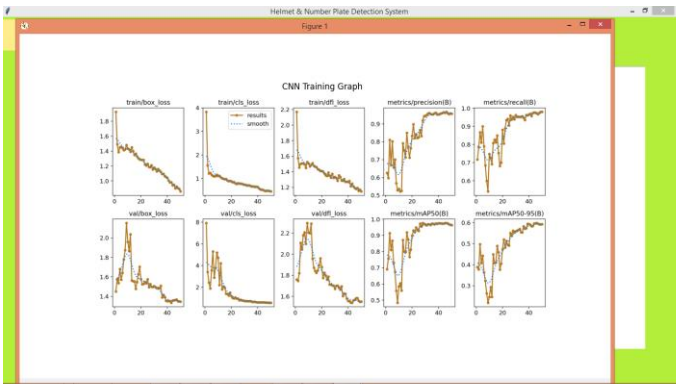

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Fig:7.2: Output 2

All detected violations were logged efficiently into the system database along with supporting details such as captured images, timestamps, and extracted license plate numbers. This enabled easy retrieval, analysis, and reporting of violations. The training results also indicated that the model's performance improved over time, with increasing precision and recall values and decreasing loss during the training process. Graphical analysis of the training phase showed a stable learning curve, indicating that the model was well-optimized and capable of generalizing to new data.

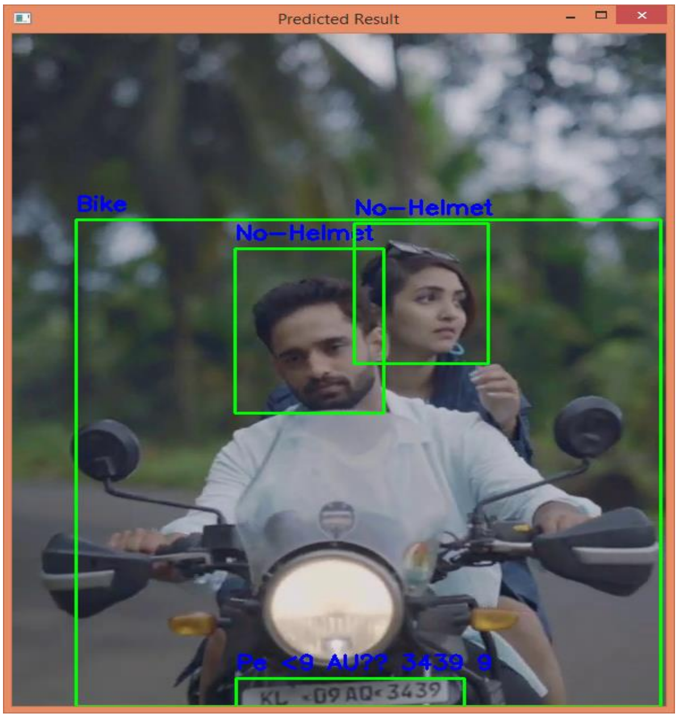

Fig: 7.3: Output 3

Overall, the system achieved reliable and consistent results in real-time traffic monitoring scenarios. It effectively reduced the need for manual supervision while maintaining a high level of accuracy in detecting violations. The outcomes of this project demonstrate that the proposed approach is practical, scalable, and suitable for deployment in smart traffic management systems. The system not only enhances enforcement efficiency but also contributes to promoting road safety by encouraging compliance with helmet regulations.

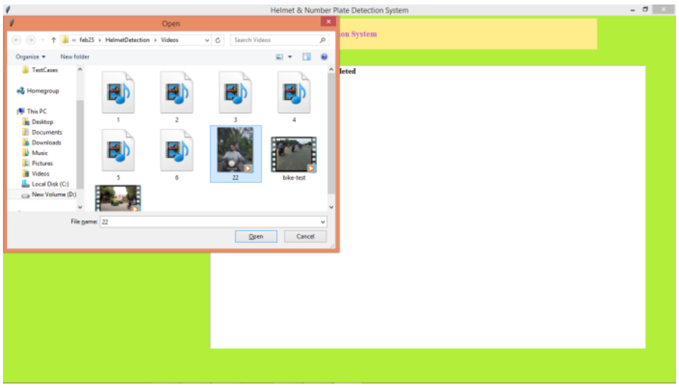

Fig : 7.4: Output 4

VII. CONCLUSION

The proposed Helmet and Vehicle Number Plate Recognition system presents an effective and intelligent solution to address the growing challenges of road safety and traffic rule enforcement. With the increasing number of two-wheeler users and frequent violations of helmet regulations, there is a strong need for automated monitoring systems that can operate efficiently and accurately without continuous human intervention. This project successfully demonstrates how advanced technologies such as deep learning, computer vision, and Optical Character Recognition (OCR) can be combined to build a robust and scalable traffic surveillance system.

By utilizing a Transformer-based YOLO model, the system achieves high accuracy in detecting motorcycles, identifying riders, and determining helmet usage in real time. The integration of Transformer mechanisms enhances the model's ability to understand contextual features and improves detection performance even in complex scenarios such as crowded traffic, low-light environments, and partial occlusions. The system further extends its functionality by incorporating number plate recognition, which

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enables automatic identification of vehicles involved in violations. The use of OCR techniques allows the system to extract alphanumeric information efficiently, making it suitable for real-world deployment.

The results obtained from the implementation confirm that the system is capable of performing real-time detection with good accuracy and speed. It effectively identifies helmetless riders and captures their corresponding number plate details, which are then stored along with timestamps and image evidence in a structured database. This automated logging mechanism simplifies the process of monitoring, reporting, and enforcing traffic rules, thereby significantly reducing the workload on traffic authorities. Although minor limitations were observed in OCR accuracy under challenging conditions such as blurred or partially visible number plates, the overall performance of the system remains reliable and practical.

Another key advantage of the proposed system is its scalability and adaptability. The modular design allows easy integration with existing CCTV infrastructure and smart city platforms, making it a cost-effective solution for large-scale deployment. Furthermore, the system can be extended in the future to detect additional traffic violations such as triple riding, signal jumping, or over-speeding, thereby enhancing its utility in intelligent transportation systems.

In conclusion, the developed system not only improves the efficiency and accuracy of traffic violation detection but also contributes significantly to promoting road safety and responsible driving behavior. By reducing dependency on manual monitoring and enabling automated enforcement, the system supports the vision of smart and safe cities. Future enhancements such as cloud-based data storage, real-time alert systems, integration with e-challan platforms, and advanced recognition techniques can further improve the system's performance and usability. Overall, this project highlights the potential of AI-driven solutions in transforming traditional traffic management into a more intelligent, automated, and reliable system.

VIII.REFERENCES

1. Vellela, S. S., & Balamanigandan, R. (2024). Optimized clustering routing framework to maintain the optimal energy status in the wsn mobile cloud environment. Multimedia Tools and Applications, 83(3), 7919-7938.
2. Vellela, S. S., & Balamanigandan, R. (2023). An intelligent sleep-awake energy management system for wireless sensor network. Peer-to-Peer Networking and Applications, 16(6), 2714-2731.
3. Vellela, S. S., & Balamanigandan, R. (2024). An efficient attack detection and prevention approach for secure WSN mobile cloud environment. Soft Computing, 28(19), 11279-11293.
4. Vellela, S. S. (2023). Enhanced speckle noise reduction in breast cancer ultrasound imagery using a hybrid deep learning model. Ingénierie des Systèmes d'Information.
5. Polasi, P. K., Vellela, S. S., Narayana, J. L., Simon, J., Kapileswar, N., Prabu, R. T., & Rashed, A. N. Z. (2026). Data rates transmission, operation performance speed and figure of merit signature for various quadurature light sources under spectral and thermal effects. Journal of Optics, 55(1), 633-643.
6. Praveen, S. P., Nakka, R., Chokka, A., Thatha, V. N., Vellela, S. S., & Sirisha, U. (2023). A novel classification approach for grape leaf disease detection based on different attention deep learning techniques. International Journal of Advanced Computer Science and Applications (IJACSA), 14(6), 2023.
7. Vellela, S. S., Rao, M. V., Mantena, S. V., Reddy, M. J., Vatambeti, R., & Rahman, S. Z. (2024). Evaluation of Tennis Teaching Effect Using Optimized DL Model with Cloud Computing System. International Journal of Modern Education and Computer Science (IJMECS), 16(2), 16-28.

Doi:10.48047/ijiee.2026.16.2.25

8. Vellela, S. S., & Krishna, A. M. (2020). On Board Artificial Intelligence With Service Aggregation for Edge Computing in Industrial Applications. Journal of Critical Reviews, 7(07).
9. Madhuri, A., Jyothi, V. E., Praveen, S. P., Sindhura, S., Srinivas, V. S., & Kumar, D. L. S. (2024). A new multi-level semi-supervised learning approach for network intrusion detection system based on the 'goa'. Journal of Interconnection Networks, 24(supp01), 2143047.
10. Raju, V. V. K., Bhavani, Y. V. K. D., Nandikonda, P., Kareemunnisa, F. N. U., Brahmeswara, K. B., & Sindhura, S. (2026). Iterative and Statistical Analytical Review of Predictive Modeling Approaches in Educational Systems: A Comprehensive Benchmark of AI-Driven Methods. International Journal of Innovative Technology and Interdisciplinary Sciences, 9(1), 490-522.
11. Biyyapu, N., Veerapaneni, E. J., Surapaneni, P. P., Vellela, S. S., & Vatambeti, R. (2024). Designing a modified feature aggregation model with hybrid sampling techniques for network intrusion detection. Cluster Computing, 27(5), 5913-5931.
12. Praveen, S. P., Vellela, S. S., & Balamanigandan, R. (2024). SmartIris ML: harnessing machine learning for enhanced multi-biometric authentication. Journal of Next Generation Technology (ISSN: 2583-021X), 4(1).
13. Vuyyuru, L. R., Purimetla, N. R., Reddy, K. Y., Vellela, S. S., Basha, S. K., & Vatambeti, R. (2025). Advancing automated street crime detection: a drone-based system integrating CNN models and enhanced feature selection techniques. International Journal of Machine Learning and Cybernetics, 16(2), 959-981.
14. Vellela, S. S., Roja, D., Purimetla, N. R., Thalakola, S., Vuyyuru, L. R., & Vatambeti, R. (2025). Cyber threat detection in industry 4.0: Leveraging GloVe and self-attention mechanisms in BiLSTM for enhanced intrusion detection. Computers and Electrical Engineering, 124, 110368.
15. Vellela, S. S., Pushpalatha, D., Sarathkumar, G., Kavitha, C. H., & Harshithkumar, D. (2023). Advanced intelligence health insurance cost prediction using random forest. ZKG International, 8.
16. Vellela, S. S., Babu, B. V., & Mahendra, Y. B. (2024). IoT-based tank water monitoring systems: enhancing efficiency and sustainability. International Journal for Modern Trends in Science and Technology, 10(02), 291-298.
17. Vellela, S. S., Varshini, K., Jeevana, M., Kadheer, S. K., & Kumar, T. P. (2024). Iot based smart irrigation and controlling system. IoT Based Smart Irrigation and Controlling System, International Journal for Modern Trends in Science and Technology, 10(02), 77-85.
18. Vellela, S. S., Chaganti, A., Gadde, S., Bachina, P., & Karre, R. (2022). A Novel Approach for Detecting Automated Spammers in Twitter. Mukt Shabd, 11, 49-53.
19. Vellela, S. S., Narapasetty, S., Somepalli, M., Merikapudi, V., & Pathuri, S. (2022). Fake News Articles Classifying Using Natural Language Processing to Identify in-article Attribution as a Supervised Learning Estimator. Mukt Shabd Journal, 11.
20. Vellela, S. S., Vineeth, S., & Suresh, V. (2024). IoT Based ICU Patient Monitoring System. IoT Based ICU Patient Monitoring System, International Journal for Modern Trends in Science and Technology, 10(02), 265-273.
21. Vellela, S. S., & Balamanigandan, R. (2025). Designing a Dynamic News App Using Python. Available at SSRN 5250912.
22. Vellela, S. S., Rao, M. V., Krishna, C. V. M., Rao, T. S., & Dasthavejula, R. (2026). Piezoelectric and Shape-Memory Materials for Actuators and Energy Harvesting in Mechanical, Electronics, and Biomedical Engineering Using AI-Based Design. In Advanced Materials for Biomedical Devices (pp. 195-206). CRC Press.
23. Vellela, S. S., Singu, K., Kakarla, L. S., Tadikonda, P., & Sattenapalli, S. N. R. (2025). NLP-Driven Summarization: Efficient

Doi:10.48047/ijiee.2026.16.2.25

Extraction of Key Information from Legal and Financial Documents. Available at SSRN 5250908.

24. Vellela, S. S., Anusha, P., Vullam, N. R., Jala, J., Bellapu, V. S., & Vindhya, A. S. (2025, October). Quantum Cryptography and Key Distribution for Secure Communication in the Post Quantum World. In 2025 International Conference on Sustainable Communication Networks and Application (ICSCN) (pp. 619-624). IEEE.
25. Roja, D., Jidugu, S. K., Rao, T. S., Vuyyuru, L. R., Vellela, S. S., & Ranjani, B. S. (2025, December). High-Fidelity Image Synthesis using Enhanced Generative Adversarial Networks with Attention Mechanisms. In 2025 International Conference on NexGen Networks and Cybernetics (IC2NC) (pp. 885-890). IEEE.
26. Vellela, S. S., Vuyyuru, L. R., Jidugu, S. K., Rao, M. P., & Srinivas, B. R. (2025, November). The Impact Of Quantum Computing On Blockchain Security And Quantum Resistant Protocols. In 2025 2nd International Conference on Intelligent Systems for Cybersecurity (ISCS) (pp. 1-6). IEEE.
27. Yanamadala, N., & Vellela, S. S. (2025, June). Ensuring Authenticity and Confidentiality in Images using SHA-ECC Fusion. In 2025 Second International Conference on Networks and Soft Computing (ICNSoC) (pp. 684-689). IEEE.
28. Vellela, S. S. (2024). A Comprehensive Review of AI Techniques in Serious Games: Decision Making and Machine Learning.
29. Burra, R. S., APCV, G. R., & Vellela, S. S. (2024). Strategic Insights: Unleashing the Power of Big Data Analytics for Credit Investigation and Risk Mitigation in Commercial Banking. International Journal of Progressive Research in Engineering Management and Science, 4(01), 458-464.
30. Vellela, S. S., Purimetla, N. R., Vindhya, A. S., Vullam, N. R., Srinivas, B. R., & Vuyyuru, L. R. (2025, October). Design and Simulation of Quantum Error Correction Codes for Scalable Quantum Architectures. In 2025 7th International Conference on Innovative Data Communication Technologies and Application (ICIDCA) (pp. 1570-1575). IEEE.
31. Vellela, S. S., Purimetla, N. R., Rao, P. V., Daniel, V. A. A., Koppolu, H. K. R., & Janani, B. (2025). AI-Enabled Wearable Hemodynamic Monitoring System for Early Identification of Thrombotic Events. Vascular and Endovascular Review, 8(16s), 321-336.
32. Venkatesh, N., Maheswari, S., & Triveni, P. (2024). Harnessing IoT for Real-Time Plant Health Monitoring: Challenges and Opportunities.
33. Reddy, B. V., Kumar, A. H., Gopi, C., Prasad, Y. V. D., Vellela, S. S., & Roja, D. (2025, April). Machine learning based automated liver fibrosis stage diagnosis with prediction. In 2025 International Conference on Advances in Modern Age Technologies for Health and Engineering Science (AMATHE) (pp. 1-6). IEEE.
34. Rao, M. V., Sreeraman, Y., Mantena, S. V., Gundu, V., Roja, D., & Vatambeti, R. (2024). Brinjal Crop yield prediction using Shuffled shepherd optimization algorithm based ACNN-OBDLSTM model in Smart Agriculture. Journal of Integrated Science and Technology, 12(1), 710-710.
35. Haritha, K., Geethika, N. S., Venkateswarlu, K., Kumar, R. H., & Ramakrishna, Y. Enhancing Public Safety with AI & ML-Based CCTV Surveillance.
36. Haritha, K., Prakash, P. B., Pravallika, D., Venkatesh, K., & Venkatesh, G. Enhancing Object Detection in Autonomous Vehicles Under Low-Light Conditions Using Federated Learning and YOLOv5.
37. Ram, C. S., Vellela, S. S., Sravanthi Javvadi, D. V., Rashid, S. Z., & Madhumathi, S. M. (2025). Integrated Robotic–Imaging Platforms in Endovascular Surgery: Current Capabilities and Future Directions. Vascular and Endovascular Review, 8(16s), 285-298.
38. Roja, D., Navya, G., Srujana, B. S., Mamatha, P., & Sai, C. Y. K. Deep Learning for Hotel Reviews: A Framework for Sentiment Classification and Fake Review Detection.

Doi:10.48047/ijiee.2026.16.2.25

39. Pakalapati, S., Rani, C. J., Vellela, S. S., Thanuja, N., & Bindu, M. N. H. (2025, November). Progressive GAN-based Framework for Realistic Image Generation and Style Transfer. In 2025 5th International Conference on Evolutionary Computing and Mobile Sustainable Networks (ICECMSN) (pp. 474-479). IEEE.
40. Balamanigandan, R., Vellela, S. S., Gorintla, S., Vuyyuru, L. R., Thanuja, N., & Rao, T. S. (2025, September). Quantum-Enhanced Data Security for Electronic Health Records: A Framework for Post-Quantum Cryptography in Healthcare Systems. In 2025 6th International Conference on Smart Electronics and Communication (ICOSEC) (pp. 1924-1929). IEEE.
41. Roja, D., Amulya, P., Nagasai, M., Prasad, D. D., & Babu, A. V. Machine Learning-Based Early Diagnosis of Fish Diseases via Water Quality Data.
42. Sai, M. B., & Vellela, S. S. (2025, December). Hybrid ML Driven Multi-Cloud Service Work Load Prediction For Financial Systems. In 2025 1st International Conference on Advancement in Futuristic Technologies (ICAFT) (pp. 1-6). IEEE.
43. Kareemunnisa, D., Haritha, K., Ranjani, B. S., Venkateswarlu, K., & Bindu, M. N. H. DUAL-STAGE PRIVACY PROTECTION FOR GRAPH NEURAL NETWORKS AGAINST INFERENCE ATTACKS.
44. Mandava, R., Haritha, K., Vellela, S. S., Purimetla, N. R., Mohan, B. K., & Harinadh, T. (2025, June). Analysing User Perceptions of Trust in Financial Systems Using Explainable AI. In 2025 Second International Conference on Networks and Soft Computing (ICNSoC) (pp. 26-30). IEEE.

Doi:10.48047/ijiee.2026.16.2.25