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# License Plate Recognition AI

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**Abstract**: *The application of artificial intelligence (AI) in automated license plate recognition (ALPR) has become an important technology in modern transportation and vehicle systems , This paper presents the design and implementation of a "web-based Automated license plate recognition using AI" using deep learning models for efficient and accurate license plate detection and recognition . applications of this web based automated license plate recognition using AI are traffic management, security surveillance, and automated toll collection from vehicles .The presented system uses a convolutional neural network which is known as (CNN network)-based object detection algorithm for finding the location of license plates in real-time videos and Optical Character Recognition (OCR) to extract numerical information from the given input video . This Web Based license plate recognition using ai also uses YOLOv7 architecture to recognize numerical information . This interface provides a smooth user interaction to the user and it allows user for remote access and real-time processing on edge devices or cloud servers.*

**Keywords**: Traffic monitoring , deep learning , Artificial intelligence , Real-Time Video Processing

## I. INTRODUCTION

The rapid growth of urban infrastructure and traffic of vehicles is mainly responsible for the development of advanced systems for traffic monitoring, and security . This is the technology that automatically identifies the License plate and reads the Number which is on vehicle's license plates from images or video frames . This Automated License Plate Recognition using Ai Is made by using Deep learning and YOLOv4 Architecture And HTML , CSS in this Web Based & Cloud Based Model . This research paper that presents the design and the implementation of a web-based License Recognition using AI, focusing on the architecture, methodology, and performance evaluation . The Automated License Plate Recognition Using Ai approaches to enable remote access, centralized management, and Smooth integration with external systems such as law enforcement databases or automated billing platforms, using secure APIs . The proposed system utilizes deep learning models for license plate detection and Optical Character Recognition Which is Known as (OCR) for character extraction and it is all integrated into a browser-accessible interface for real-time operation and centralized control . This System is a growing need for a cost-effective, easily deployable, and intelligent solution that can be accessed from any location . This platform is accessible via a web interface and includes modules for image capture and pre-processing and detection, recognition, user authentication, data logging, and real-time alerting . This System Or Model Is Designed using modern front-end frameworks (e.g., React.js) and APIs . This System is Integrated with real-time notification systems (e.g., email, SMS, Telegram bots) allows immediate action when blacklisted or suspicious plates are detected.

## II. LITERATURE REVIEW

Recent advances in automatic license plate recognition (ALPR) have been driven by the application of artificial intelligence methods, particularly in machine learning and deep learning. This section reviews four contemporary studies that showcase different AI-based approaches for license plate recognition.

1. Al-Hasan et al. (2024) introduced an ANPR system utilizing the YOLOv8 framework, designed specifically to handle the complexities of Qatari license plates. Their approach combines edge computing with server-side processing to achieve real-time detection. The system effectively manages challenges like multiple detections and poor image

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quality, demonstrating high accuracy (over 93%) even in adverse weather and lighting conditions, outperforming previous YOLO versions.

2. Akhtar and Ali (2023) developed a modular pipeline for license plate recognition that employs a Random Forest classifier for character identification. The system consists of stages including image preprocessing, segmentation, and character recognition, achieving approximately 91% accuracy on datasets containing some noise. This solution emphasizes efficiency and interpretability, making it suitable for deployment in environments with limited computational resources.

3. Göde and Doğan (2023) proposed a technique that combines traditional image processing steps—such as grayscale conversion, morphological filtering, and contour detection—with the use of the OCR engine pytesseract. Their system achieved nearly 92% accuracy on Turkish license plates and is notable for its simplicity and ease of implementation without the need for extensive training data. However, it may face difficulties when processing images with significant noise or distortion.

4. Pujar and Kulkarni (2023) presented a hybrid method blending conventional machine learning and OCR for license plate recognition. Starting from image acquisition using infrared cameras, their approach applies grayscale conversion, edge detection, and segmentation before using OCR to recognize characters. The system is designed to be cost-effective and compatible with available hardware, performing well on Indian license plates under controlled conditions

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## III. AIM & OBJECTIVE

Aim-To develop an AI-powered system that automatically detects and recognizes vehicle license plates for efficient identification and monitoring.

Objectives – While executing this project our objective will be –

• To design a user-friendly and responsive interface that an AI-based system capable of automatically detecting vehicle license plates from images or video feeds

• To develop an accurate OCR module for recognizing alphanumeric characters on license plates.

• To ensure high recognition accuracy under varying environmental conditions, such as lighting, weather, and camera angles.

• To test and evaluate the performance, accuracy, and reliability of the system under real-world scenarios.

• To gather user feedback through surveys or usability testing in order to assess user satisfaction and identify areas for improvement.

• To compare the performance of different machine learning and deep learning models for license plate detection and recognition.

## IV. WORKING

The system begins by capturing real-time footage or static images using CCTV, traffic, or vehicle-mounted cameras. These inputs can vary in resolution and may include multiple vehicles, requiring robust handling of diverse visual data.

Using deep learning-based object detection models such as YOLO (You Only Look Once) or SSD (Single Shot Multibox Detector), the system scans the image to locate and extract the region of interest containing the license plate, even in crowded or cluttered scenes.

The extracted license plate image is preprocessed to enhance quality and readability. This involves converting the image to grayscale, adjusting brightness and contrast, reducing noise, and resizing the image to a standard format for better OCR performance.

Each segmented character is passed through an OCR (Optical Character Recognition) engine, often powered by convolutional neural networks (CNNs). The system then translates the visual characters into digital text, handling different fonts, styles, and language formats.

The final recognized plate number, along with metadata like time, date, and location (if GPS or camera metadata is available), is stored in a database. This information can then be used for tasks such as vehicle tracking, access control, tolling, or law enforcement alerts.

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TABLE:

| Module | Description | Technologies/Frameworks |
|---|---|---|
| 1. User Interface (UI) | Web-based interface for uploading images, viewing results, and interacting with the system. | HTML, CSS, JavaScript, React, Vue.js |
| 2. API Gateway | Receives requests from UI and routes to appropriate backend services. | Flask, FastAPI, Node.js Express |
| 3. Image Pre-processing | Handles image resizing, normalization, and enhancement to improve recognition performance. | OpenCV, Pillow |
| 4. License Plate Detection | Uses AI models (like YOLO, Faster R-CNN) to detect and localize the license plate in images. | TensorFlow, PyTorch, YOLOv5 |
| 5. Optical Character Recognition (OCR) | Recognizes characters from segmented license plates using deep learning. | Tesseract OCR, CNN, RNN, LSTM models |

**ER DIAGRAM :**

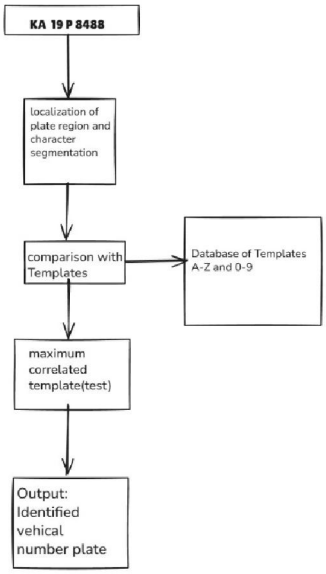


Diagram of website shows how the website will Process. We can understand the process of website by seeing this diagram. Frist the come across the home page of the website, if we already had an account then we can simply be able to log in and if do not have an account then we want to sign up. After signing up we got and get started page here we can create a new account. After log in we have a dashboard in that dashboard we get access to different sharing as well as manipulation tools by using them we can be able to work on document.

**ADVANTAGES OF SOFTWARE-**

1. Improved Accuracy: AI enables highly precise detection and reading of license plates, even in difficult lighting or weather scenarios.
2. Fast Recognition: AI models process images rapidly, allowing instant vehicle identification for traffic control and security purposes.
3. Versatile Adaptation: AI systems can learn from various license plate styles and regional differences, making them flexible for global use.

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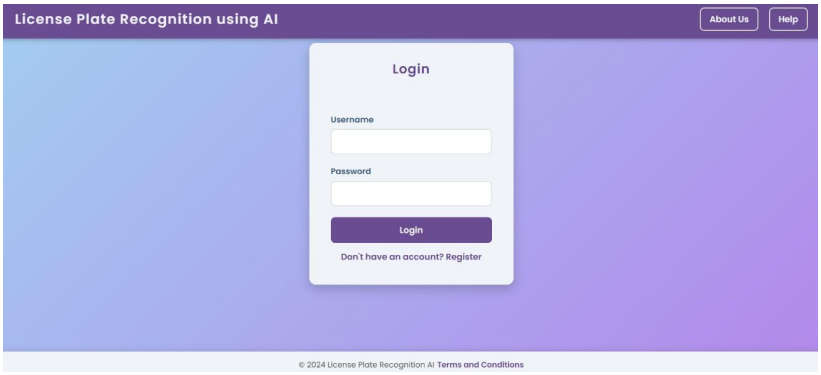
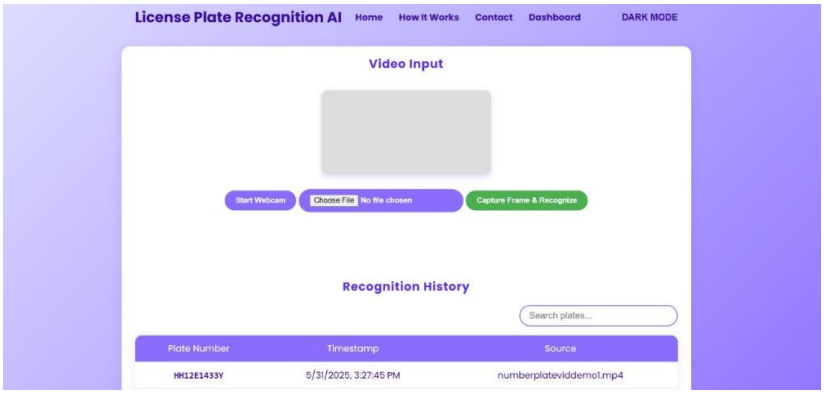
4. Fully Automated: The recognition process runs without manual input, reducing errors and saving time in vehicle monitoring tasks.
5. Easily Expandable: AI-based software can be deployed across numerous cameras and sites, supporting widespread traffic and security networks.
6. Boosted Safety: Combining AI LPR with surveillance enhances law enforcement by quickly identifying stolen or unauthorized vehicles.

## V. RESULT




## VI. CONCLUSION

Our team has developed a web-based AI solution for automatic license plate recognition (LPR), powered by deep learning. This scalable and efficient system accurately identifies license plates in real-time, even in varied environmental conditions. We've found that AI-driven LPR has significant potential for improving traffic management, law enforcement, and smart city infrastructure due to its accessibility and easy integration. Future research will focus on improving performance in challenging situations (e.g., low light, motion blur, non-standard plates) and bolstering data security. This study affirms the efficacy of web-based AI-powered LPR for intelligent transportation systems.

## VII. FUTURE SCOPE

Web-based AI license plate recognition systems have strong potential for future development. Enhancing accuracy under poor lighting, motion, and diverse plate formats is a key focus. Integration with edge computing and cloud services can improve real-time performance and scalability. Expanding to support various regions and ensuring data privacy and security are essential. Future applications may include integration with smart traffic systems, automated tolling, and parking management for smarter urban infrastructure.

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## REFERENCES

**[1].** Al-Hasan, T. M., Bonnefille, V., & Bensaali, F. (2024). Enhanced YOLOv8-Based System for Automatic Number Plate Recognition. Technologies, 12(9), 164. https://www.mdpi.com/2227-7080/12/9/164

**[2].** Akhtar, Z., & Ali, R. (2023). Automatic Number Plate Recognition Using Random Forest Classifier. arXiv. https://arxiv.org/abs/2303.14856

**[3].** Göde, A., & Doğan, A. (2023). License Plate Recognition System Based on Artificial Intelligence with Different Approach. El-Cezeri Journal of Science and Engineering. https://dergipark.org.tr/en/pub/ecjse/issue/75690/1172426

**[4].** Pujar, A. M., & Kulkarni, P. B. (2023). Automatic Number Plate Recognition Using Machine Learning. Atlantis Press. https://www.atlantis-press.com/proceedings/icamida-22/125986270

**[5].** Nashwan, F. M., Al Soufy, K. A. M., Al-Ashwal, N. H., & Al-Badany, M. A. (2023). Design of Automatic Number Plate Recognition System for Yemeni Vehicles with Support Vector Machine. IJISA, 15(4). https://www.mecs-press.org/ijisa/ijisa-v15-n4/v15n4-4.html

**[6].** Mhatre, A., & Sharma, P. (2023). Deep Learning Approach for Vehicle Number Plate Recognition System with Image Enhancement Technique. IJISAE. https://ijisae.org/index.php/IJISAE/article/view/2500