

Dept. Of IT

Major Project

Under the Guidance of
Dr.G.L.AnandBabu

Intelligent Traffic Management System (ITMS)

Intelligent Traffic Management System (ITMS) designed to improve road safety and enhance traffic efficiency in urban environments.

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Abstract

The Intelligent Traffic Management System (ITMS) addresses critical challenges in road safety and traffic enforcement through the integration of advanced technologies. Designed as a cutting-edge solution, ITMS incorporates features such as helmet compliance monitoring, traffic signal violation detection, and precise number plate identification, leveraging AI, computer vision. This comprehensive system ensures accurate and real-time enforcement of traffic regulations, promoting safer and more efficient urban mobility.

Introduction

The advent of artificial intelligence has revolutionized various domains, including transportation and urban planning. Intelligent Traffic Management Systems (ITMS), powered by AI and deep learning, demonstrate remarkable capabilities in enhancing road safety, optimizing traffic flow, and ensuring regulatory compliance. However, traditional traffic systems often lack real-time monitoring and efficiency, leading to increased congestion and safety risks. The ITMS project addresses these challenges by integrating AI-driven technologies to monitor helmet compliance, detect traffic signal violations, and identify vehicle number plates in real-time, providing a seamless, data-driven approach to urban traffic management.

Existing System

Disadvantages

- **Inconsistent Enforcement:** Manual monitoring of helmet compliance and traffic signal violations leads to uneven and unreliable enforcement, reducing the effectiveness of safety regulations.
- **Lack of Real-Time Monitoring :** Existing systems are incapable of providing real-time insights, making it difficult to respond promptly to traffic violations or incidents.
- **Slow Response Times:** Without automated mechanisms, law enforcement agencies face delays in detecting and addressing traffic violations, which hampers their ability to manage traffic effectively.
- **Limited Data Analysis:** The absence of advanced analytics tools prevents existing systems from leveraging traffic data for infrastructure improvements and policy decision-making.
- **Relying on human intervention:** Relying on human intervention for enforcement and monitoring increases operational costs and places a heavy burden on law enforcement personnel.

Proposed System

Advantages

- **Helmet Compliance Monitoring:** AI-powered computer vision algorithms automatically detect helmet usage by motorcyclists, ensuring consistent enforcement of safety regulations.
- **Traffic Signal Violation Detection:** Integrated cameras and sensors monitor intersections to detect vehicles running red lights or violating other traffic signals.
- **Automated Number Plate Recognition (ANPR):** High-precision AI algorithms accurately identify vehicle number plates, enabling automated record-keeping and offender tracking.
- **Proximity-Based Alerts:** Real-time alerts are sent to nearby law enforcement agencies when violations occur, enabling swift and efficient responses.
- **Traffic Data Analytics:** The system collects and analyzes traffic patterns to provide actionable insights for optimizing traffic flow, enhancing infrastructure, and shaping policy decisions.
- **User-Friendly Dashboard:** Authorities can monitor and manage traffic violations and incidents through an intuitive interface, improving operational efficiency.

Benefits of ITMS

Enhanced Road Safety

Consistent enforcement of helmet compliance and traffic signal regulations significantly reduces accidents.

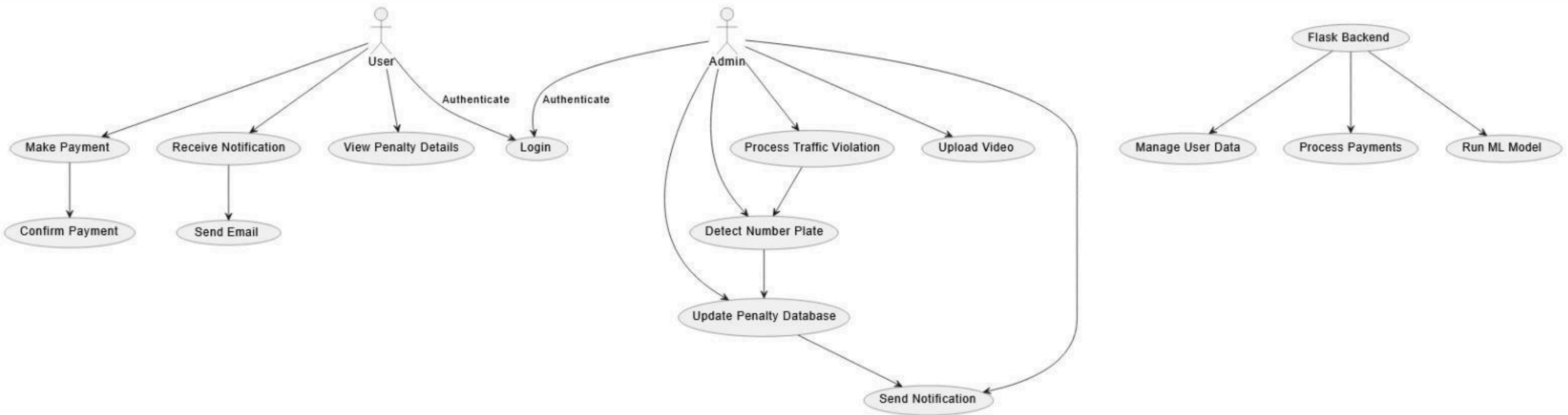
Real-Time Monitoring

AI-powered cameras and sensors provide instant detection of traffic violations, enabling swift responses.

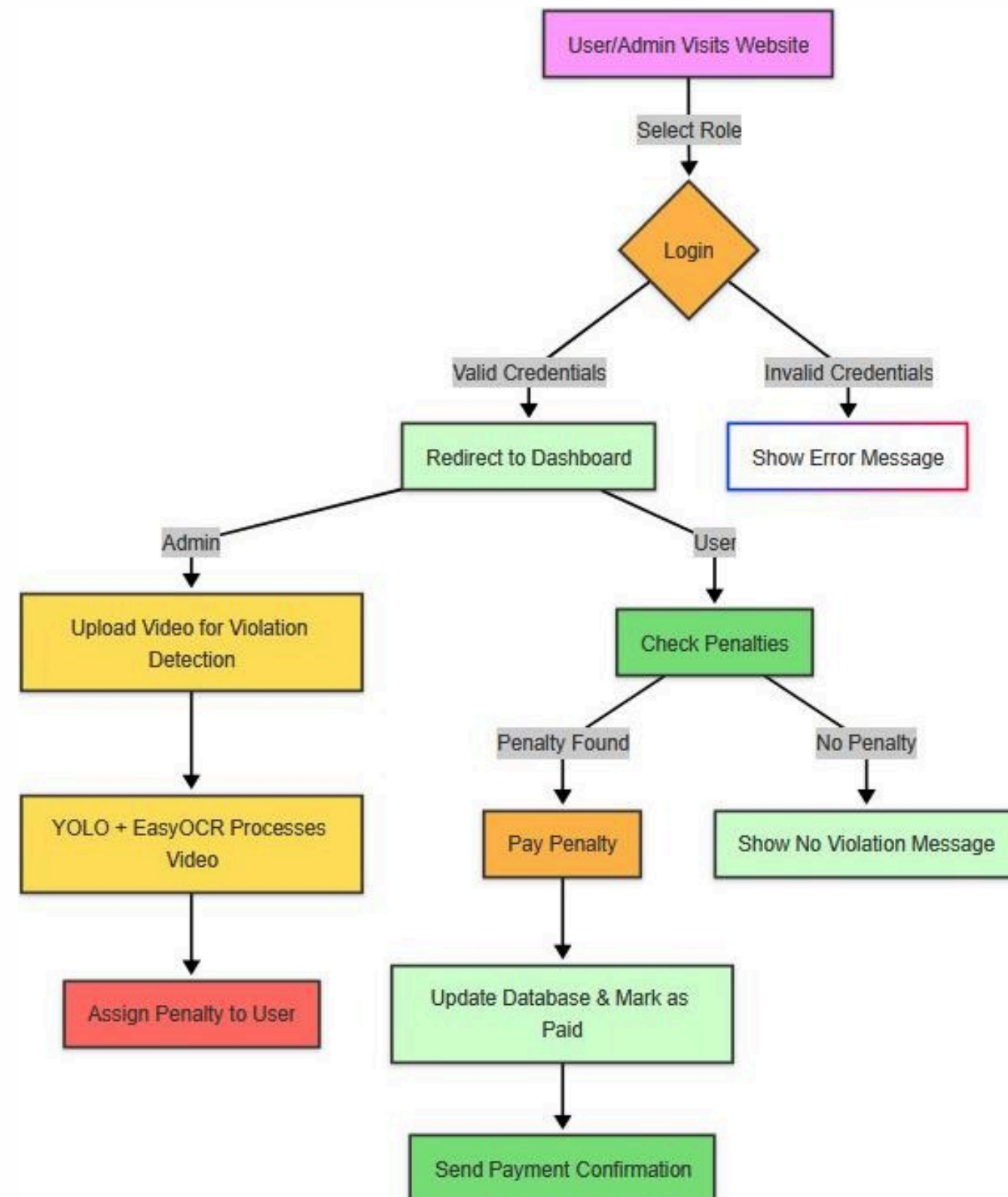
Data-Driven Insights

Traffic data analytics help in identifying patterns, optimizing traffic flow, and supporting informed policy-making.

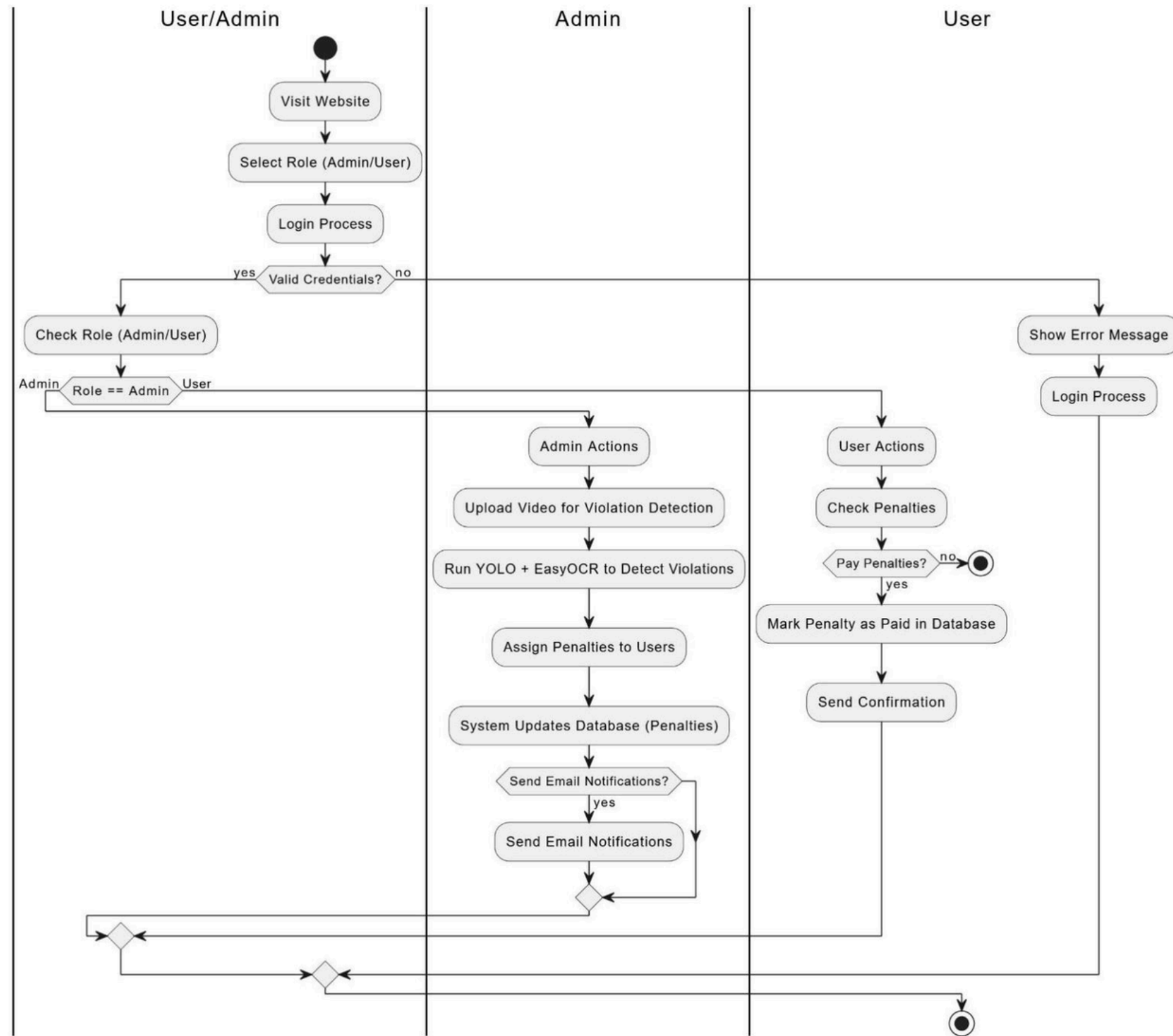
Use Case Diagram



Flow of Events



Activity Diagram

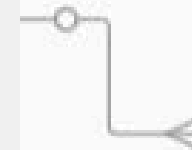


ER Diagram

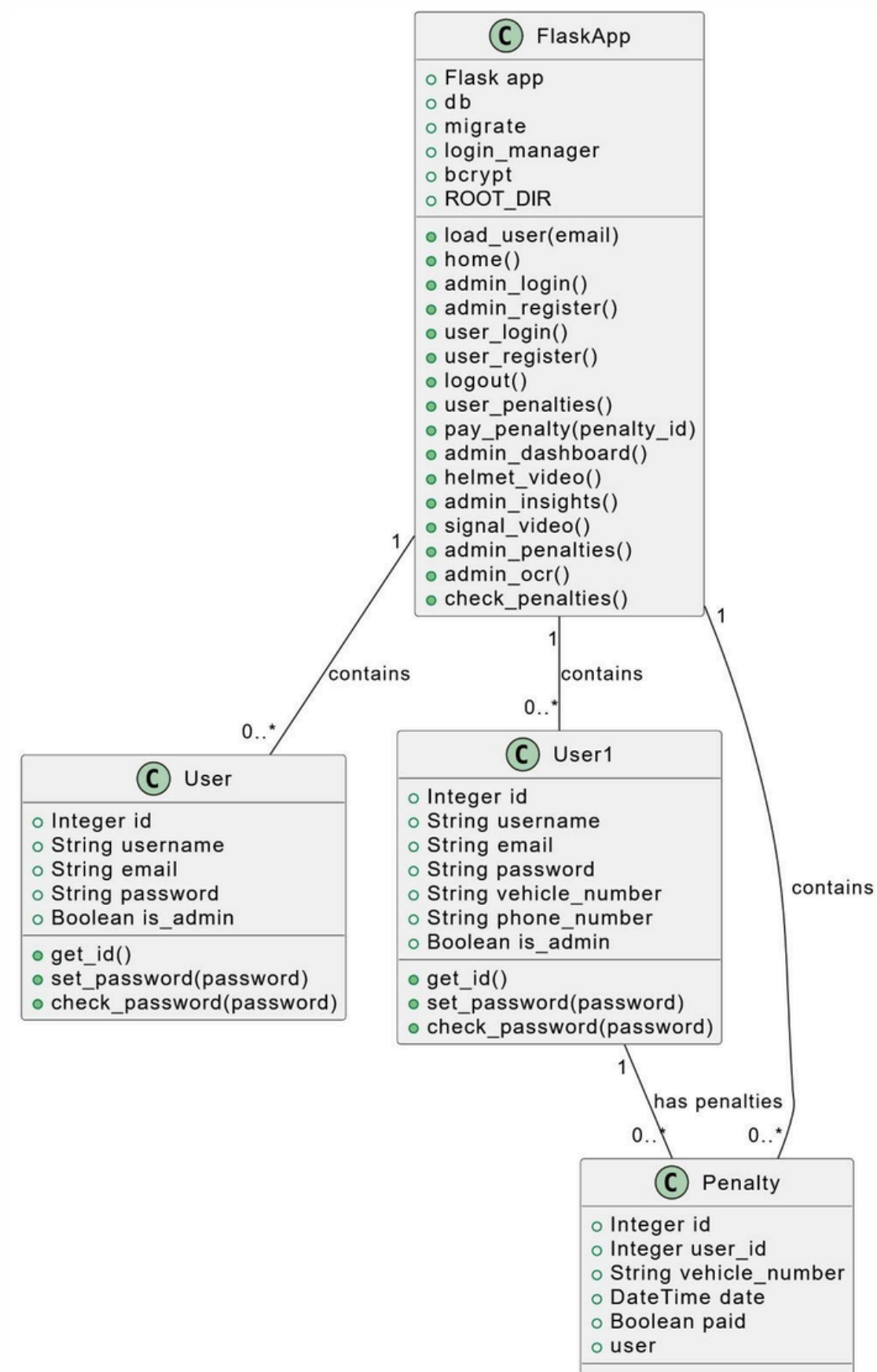
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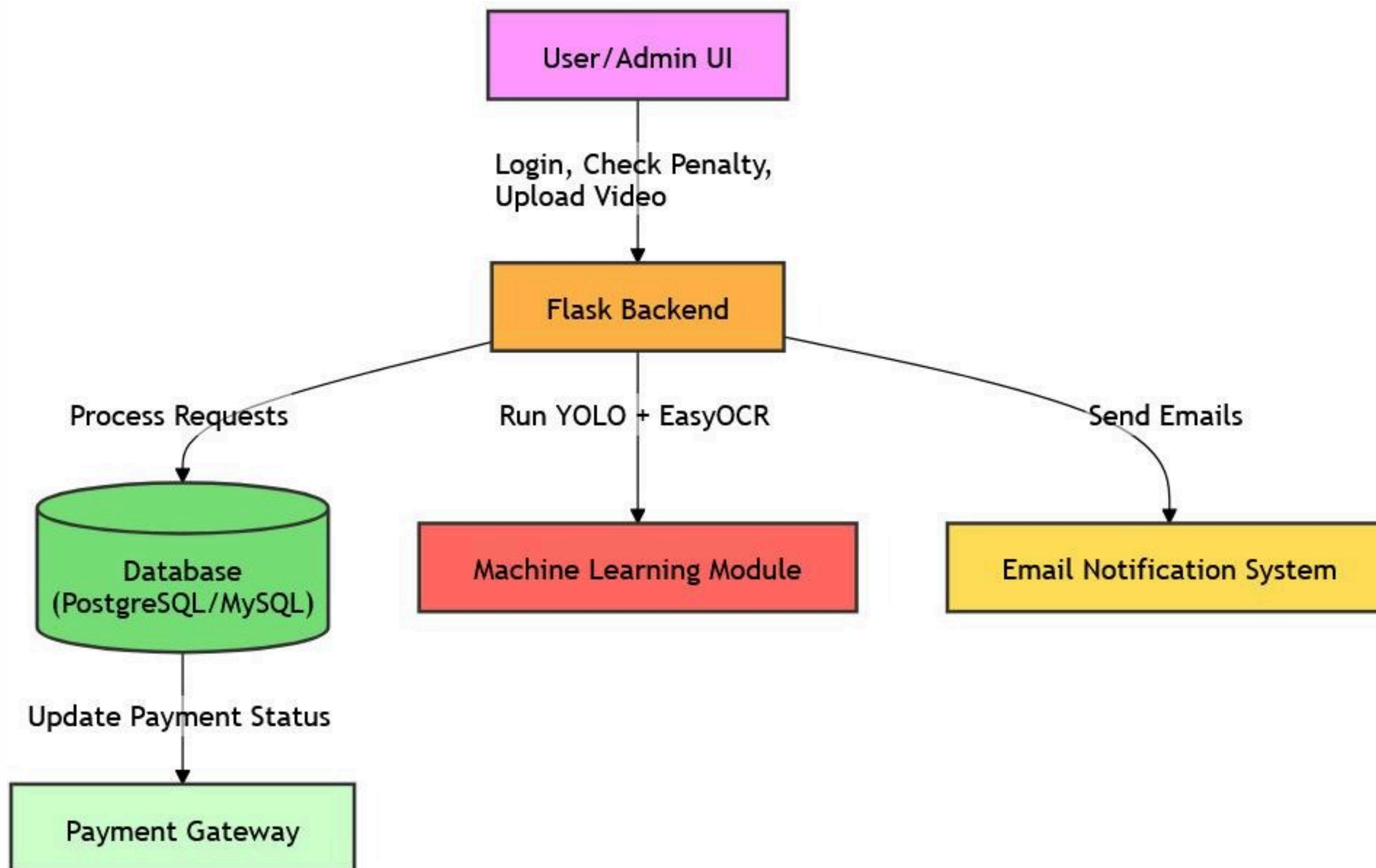
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paid	boolean	



Class Diagram



System Architecture



Software Requirments

- **Operating System:** Windows, macOS, or Linux.
- **Programming Language:** Python 3.x.
- **Libraries and Frameworks:**
 - OpenCV for image processing and computer vision.
 - TensorFlow or PyTorch for AI and machine learning models.
 - NumPy and Pandas for data manipulation and analysis.
 - Flask or Django for developing the user interface/dashboard.
 - MQTT or similar protocols for IoT device communication.
- **Database:** MySQL or PostgreSQL for storing violation data and analytics.
- **Visualization Tools:** Matplotlib or Plotly for data visualization on dashboards.

Hardware Requirments

- **CPU:** Multi-core processor (Intel i5 or equivalent) to handle data processing and application execution.
- **RAM:** Minimum 16 GB for smooth performance, especially during real-time data analysis and image/video processing.
- **Storage:** SSD with at least 256 GB of free space for data storage, including logs, images, and videos.

Conclusion

The Intelligent Traffic Management System (ITMS) represents a crucial advancement in road safety and traffic management. By addressing key issues such as helmet compliance, signal violations, and number plate recognition, ITMS fosters a safer and more efficient urban transportation ecosystem. Its real-time monitoring capabilities and proximity-based alert system enable swift law enforcement responses, paving the way for smarter cities. Future enhancements, including predictive analytics and integration with autonomous vehicle technologies, will further solidify its role in transforming urban mobility.