

ABSTRACT

Indonesia, with a population of approximately 275 million and 164 million registered motor vehicles as of August 2024, faces significant challenges in traffic safety. The high number of vehicles, particularly motorcycles contributes substantially to the rate of traffic violations, especially helmet-related offenses that increase the risk of fatal accidents. Although the electronic ticket system has been introduced as a technology-based solution, it still faces several limitations, such as inaccurate violation detection, high operational costs for sending confirmation letters, and limited payment channel options.

This study aims to develop a backend electronic ticketing information system for traffic violation management that is able to support the processing of violation data and automatic notification delivery to users via multi-channel. The development was carried out using the iterative incremental method consisting of the stages of initial planning, planning, requirements, analysis & design, implementation, testing, evaluation, and deployment.

The developed system was successfully integrated with a detection camera that uses YOLO11 technology and Optical Character Recognition (OCR) to detect helmet violations and recognize vehicle license plates. The backend architecture provides a RESTful API endpoint to support efficient data communication with the frontend. In addition, the multi-channel notification delivery feature via email, WhatsApp, and SMS was successfully implemented to provide violation notifications to vehicle owners. Based on the test results, all endpoints were successfully accessed through API testing, and the load testing results showed that the average response time was below 2 seconds.

Keywords - *backend, electronic ticketing, iterative incremental, multi-channel*