DESIGN AND DEVELOPMENT OF AN IoT-BASED PASSENGER TICKET VALIDATION SYSTEM PROTOTYPE AT BANDAR SRI LAKSAMANA PORT

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ABSTRACT

The Bandar Sri Laksamana Bengkalis Port currently implements a manual passenger ticket validation process through visual inspection by officers, which potentially leads to data recording errors, financial losses, and passenger overcrowding risks due to weak access control. This research aims to design and develop an Internet of Things (IoT)-based passenger ticket validation system prototype by utilizing Radio Frequency Identification (RFID) technology with e-KTP (electronic identity cards) as the identification medium. The system was developed by integrating an MFRC522 RFID reader, ESP8266 and ESP32 microcontrollers as the primary controllers, a servo motor as the automatic gate actuator, and a PHP-based web application paired with a MySQL database for managing passenger, ticket, schedule, and validation log data. The research methodology encompasses system design, hardware and software implementation, and functional testing to ensure overall system connectivity and performance. The test results indicate that all application features function according to design based on black box testing, with the registration and validation devices achieving a 100% accuracy rate in reading and mapping UIDs. The system is also proven capable of conducting offline ticket validation using a LittleFS-based local cache when the internet connection is disrupted, and possesses sufficient storage capacity to support long-term operations. Consequently, this system effectively improves data collection accuracy and provides a more structured approach to controlling passenger access.

Keywords: Ticket Validation, Internet of Things, RFID, e-KTP, ESP32.