

DESIGN OF A LIBRARY BOOK LENDING SYSTEM USING RFID AND NODEMCUESP8266 IN ELEMENTARY SCHOOLS

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ABSTRACT

This research aims to design and implement a book lending system based on RFID, NodeMCU ESP8266, and ESP32-CAM to improve the efficiency and security of library management in elementary schools. This system was developed as a solution to the problems faced by manual methods, such as recording errors, service delays, and inaccurate borrower identification. By utilizing Internet of Things (IoT) technology, the system is expected to provide faster and more integrated book lending and return services. In the designed system, an RFID card serves as a unique student ID, while a NodeMCU ESP8266 serves as the main controller, connecting the RFID reader to a web-based database server. An ESP32-CAM is used during the student registration phase to capture a photo as supporting identity data, which is stored on the server. The photo is then displayed on the loan summary page, allowing each transaction to be verified based on the RFID card, student data, and previously stored photos. Test results show that the system is capable of reading RFID cards quickly and accurately, stably storing student data and photos, and recording book borrowing and return transactions in real time. Implementation of this system demonstrates significant improvements in service time efficiency compared to manual methods. The ESP32-CAM integration helps staff verify student identities and reduces the potential for card misuse. Furthermore, the developed web interface facilitates administrators in monitoring student data, borrowing history, and book collections in a structured manner, making this system suitable for implementation as a modern solution for elementary school library management.

Keywords: RFID, NodeMCU ESP8266, ESP32-CAM, Book Borrowing, School Library, IoT.