

ABSTRACT

The management of laboratory equipment at the Faculty of Electrical Engineering, Telkom University, particularly in the Smartlab Automation, is currently performed manually using Google Forms or borrowing logbooks. This method is time-consuming, prone to errors, and inefficient in ensuring the availability and condition of the equipment. To address these issues, this research aims to design and develop an IoT-based laboratory equipment management information system that can facilitate the borrowing process and inventory management. The research method employed is Research and Development (R&D), which involves designing both hardware and software using an ESP32 microcontroller connected to Firebase for real-time data management. The system was tested using a black box approach to evaluate its functionality. The test results indicate that the system functions well, achieving an accuracy rate of 98.03% in performing various functions. The implementation of this IoT-based system can make laboratory equipment management more efficient, accurate, and responsive to user needs, thereby improving the quality of service and operational performance of the laboratory.

Keywords: *Internet of Things, Laboratory Equipment Management, ESP32, Firebase, Information Systems, Black Box Testing.*