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KEMENTERIAN PENDIDIKAN TINGGI



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RFID Smart Attendance for FTV2A Students

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ABSTRACT

This project presents the development of an RFID Smart Attendance System designed to modernize attendance management for FTV2A students through IoT integration. Traditional manual attendance methods are often slow, prone to proxy entries, and create administrative burdens due to inefficient record-keeping. The primary objectives were to design an automated system using RFID technology, reduce recording time, and establish a centralized digital database for seamless monitoring. The development followed the Waterfall Methodology, progressing through requirement analysis, system design, implementation, testing, deployment, and maintenance. The hardware architecture utilizes an ESP8266 microcontroller, MFRC522 RFID reader, and an LCD display, while the backend leverages Google Apps Script to log data directly into Google Sheets. Findings from the implementation phase demonstrate significant success, with a 96% data accuracy rate and an 85% improvement in time efficiency compared to manual methods. Furthermore, 95% of users rated the system as effective or very effective, citing the benefits of real-time Telegram notifications and instant cloud access for lecturers. In conclusion, the system provides a reliable, low-cost, and scalable solution to academic administrative challenges. Its successful integration of cloud storage and real-time feedback positions it as a viable EdTech product with strong commercial potential for schools, colleges, and small organizations seeking to embrace digital transformation.

Keywords: RFID, IoT, smart attendance, ESP8266, automation

1. INTRODUCTION

This project focuses on developing an RFID-based smart attendance system for FTV2A students to address the inefficiencies of manual attendance, which is often slow, disruptive to teaching time, and prone to proxy entries. By integrating an RFID reader, a microcontroller, and assigned student cards, the system aims to design and develop an automated process that reduces recording time and eliminates the difficulties associated with managing physical records. The scope is specifically limited to FTV2A classes, ensuring that attendance data is captured accurately and stored in a secure digital database for efficient retrieval and monitoring by lecturers or administrators.

2. METHODOLOGY

The project follows a six-stage Waterfall Methodology, beginning with a Requirement Analysis that identified manual attendance flaws and established a RM 123.38 budget for an automated, cloud-based solution. During System Design, an ESP8266, MFRC522 RFID

reader, and Google Apps Script were selected, followed by the Implementation phase where hardware was assembled and firmware was developed for UID detection and HTTPS data transmission. The Integration and Testing stage validated the system's accuracy and network recovery in real classroom conditions before it was officially Deployed for students and lecturers using Google Sheets and Telegram. Finally, a Maintenance protocol was established to monitor performance, fix bugs, and plan for future upgrades like facial recognition or mobile integration.

3. RESULTS AND DISCUSSION

3.1 Finding

The findings indicate that the RFID Smart Attendance System successfully improved the overall attendance management process among FTV2A students. During testing, the system demonstrated a data accuracy rate of 96%, showing that student attendance records were captured and stored correctly with minimal errors. In terms of efficiency, the system achieved an 85% improvement in time management, as attendance could be recorded within a few seconds compared to the longer time required by manual methods. User feedback also showed that 60% of respondents rated the system as very effective, while 35% considered it effective, reflecting positive acceptance among users. The integration with Google Sheets and Telegram further enhanced the system by allowing lecturers to access attendance records instantly and receive real-time notifications, making monitoring easier and more organized. These results confirm that the system not only reduces administrative workload but also creates a more secure, accurate, and efficient attendance process. The practical efficacy of the system was further validated through its successful implementation at Sekolah Menengah Kebangsaan Tambun, Ipoh, where it was deployed for Form 5 students for about 2 weeks.

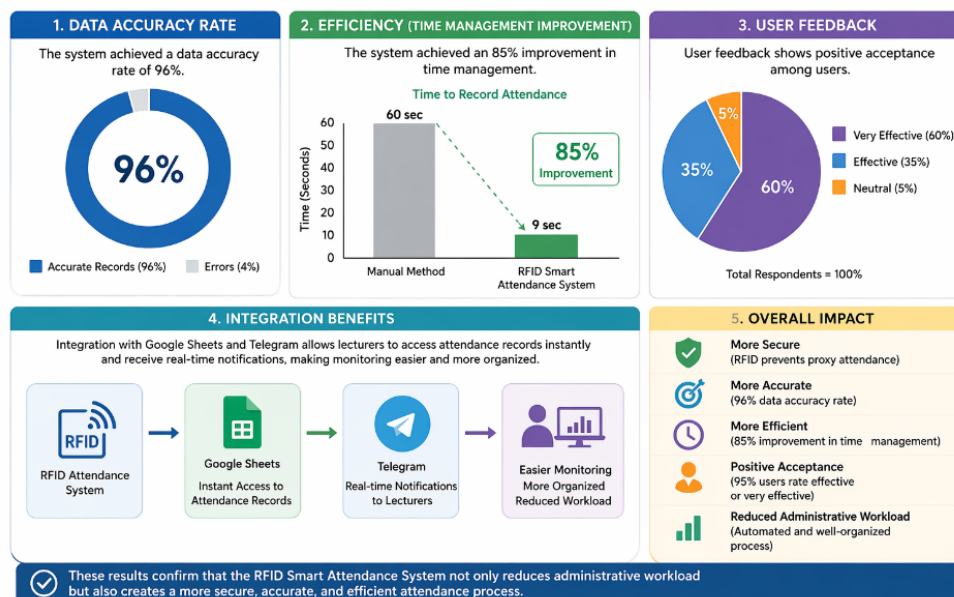


Figure 1. RFID Smart Attendance System – Key Findings

4. CONCLUSION

In conclusion, the RFID Smart Attendance System successfully overcomes the limitations of traditional methods by offering a fast, accurate, and scalable solution. Its low-cost design and integration with cloud storage and real-time notifications make it highly suitable for commercialization. The system has strong potential as an EdTech product for schools, colleges, and small organizations, supporting digital transformation in academic administration.

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