

link: <https://jutif.if.unsoed.ac.id/index.php/jurnal/article/view/4873>

A Bluetooth-Based Attendance System for Educational Administration at SMA Muhammadiyah: Cross-Platform Development and Usability Validation

- **Muhyddin A.M. Hayat** Department of Informatics, Universitas Muhammadiyah Makassar, Indonesia
- **Muhammad Fachri Rasyidi** Department of Informatics, Universitas Muhammadiyah Makassar, Indonesia
- **Muhammad Faisal** Department of Informatics, Universitas Muhammadiyah Makassar, Indonesia
- **Rizki Yusliana Bakti** Department of Informatics, Universitas Muhammadiyah Makassar, Indonesia
- **Andi Makbul Syamsuri** Department of Informatics, Universitas Muhammadiyah Makassar, Indonesia

DOI:

<https://doi.org/10.52436/1.jutif.2025.6.5.4873>

Keywords:

Bluetooth Attendance System, Educational Technology, Mobile Application, Software Engineering, System Usability Scale

ABSTRACT

The transformation of educational administration through technology has accelerated significantly, particularly in attendance systems, which have traditionally relied on manual roll calls. These conventional methods are time-consuming, error-prone, and susceptible to manipulation. This study presents a novel Bluetooth-based attendance system that contributes to the field by demonstrating passive MAC address detection for automated attendance recording, eliminating the need for additional software installations on student devices. The system was developed using React Native for cross-platform compatibility, with PostgreSQL for data management and NestJS for backend processing. The software engineering process followed Rapid Application Development (RAD) methodology, combined with comprehensive system validation through experimental testing. Usability evaluation with 133

participants using the System Usability Scale (SUS) yielded a score of 79.85, categorizing the system within the "Good to Excellent" usability range. The findings demonstrate significant improvements in efficiency and a reduction in attendance fraud compared to conventional methods. However, hardware quality and device proximity remain key limitations. Future research should explore the integration of Bluetooth Low Energy (BLE) technology, the implementation of machine learning algorithms for anomaly detection, or the development of hybrid validation models that combine multiple authentication factors. This system demonstrates the potential to modernize educational administration through seamless, device-level integration while maintaining high user acceptance.