IOT-BASED STUDENT ATTENDANCE SYSTEM WITH RFID AND FACIAL RECOGNITION INTEGRATION

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ABSTRACT

The student attendance system plays a crucial role in supporting the effectiveness of teaching and learning activities. At Gemawang Public Elementary School, attendance is still done manually, making it inefficient, time-consuming, error-prone, and not providing direct access for parents to monitor their children's attendance. This study aims to develop an Internet of Things (IoT)-based student attendance system by integrating RFID and facial recognition technology to address the shortcomings of the manual attendance method. The research method involves problem identification, literature review, system design, system implementation, system testing, evaluation and improvement, and report preparation. The system uses an RFID card as initial identification, followed by facial verification using an ESP32-CAM camera. The facial recognition process is carried out using the MTCNN algorithm for face detection, FaceNet InceptionResNetV1 for feature extraction, and Euclidean Distance calculation to match user faces. Attendance data is stored in a MySQL database, displayed through a website interface, and equipped with automatic attendance notification delivery to parents' Telegram. Test results show that the system can record student attendance accurately and quickly, with an average duration of 1.9 seconds. The system is capable of recognizing faces well under various conditions, such as wearing glasses, varying expressions, and gaze direction, and works optimally in lighting of at least 10 lux. The system has a facial recognition accuracy rate of 100% and operates optimally within a distance of 20-220 cm. Furthermore, the system can still accurately recognize the RFID cardholder's face even when multiple other faces are in the same camera frame. Overall, this system has successfully improved the efficiency, accuracy, and transparency of attendance, while also simplifying attendance data monitoring for schools and parents.

Keywords*: Attendance, Internet of Things, RFID, facial recognition, FaceNet*