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Automated Student Flow Counter System

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Abstract: *The Automated Student Flow Counter System is a biometric-based attendance and monitoring solution that leverages fingerprint authentication to enhance accuracy, security, and efficiency in educational institutions. Unlike traditional methods such as manual registers or RFID-only systems, which are prone to errors, misuse, and administrative overhead, this system ensures that each student's identity is uniquely verified through their fingerprint, which cannot be lost, shared, or duplicated. The system operates in three core phases: enrolment, where student fingerprints are captured and securely stored; verification, where real-time fingerprint input is matched with stored data; and data collection, where each authenticated entry is time-stamped using a Real-Time Clock (RTC). The project is built around the PIC 18F4520 microcontroller and incorporates components like a fingerprint module, RFID card reader, HC-12 wireless transceiver, LCD display, DC motor, relay module, and a stable power supply unit. C language is used for system programming, enabling smooth communication between the microcontroller and the hardware modules. The fingerprint module communicates via UART, providing accurate identity verification, while the RTC ensures precise attendance logging. By automating the entire attendance process and eliminating the possibility of proxy entries, this system offers a reliable, cost-effective, and scalable solution for modern educational environments, making it easier for administrators to monitor student movement and maintain accurate records effortlessly.*

Keywords: Fingerprint authentication, Student attendance, Biometric system, PIC microcontroller, Real- Time Clock (RTC)

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