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Fingerprint Based Attendance System

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Abstract: *Today's digital age requires secure yet effective attendance management for organizations, schools, and workplaces. As such, the project describes an IoT-based Fingerprint Attendance System employing biometric authentication and internet connection capabilities for real-time tracking of attendance. The unit comprises an ESP8266 WiFi module, an Adafruit Fingerprint Sensor, and an OLED display to facilitate smooth automated attendance management. Thanks to the ESP8266 WiFi module, the connectivity of the chain such as credentials-for instance SSID (motorola) and password (12345678)-allows this passive flow of information to happen through HTTP POST requests, so always keeping attendance updated and accessible remotely. After that, the system also monitors the WiFi connection while allowing it to automatcially reconnect in case of disconnection. Critical components are fingerprint enrollment and authentication. The user will enroll with their fingerprinting by saving that template as unique. The system will take a scan of the fingerprint when the user attempts to authenticate and match the data against the stored data. When a match is found, a fingerprint ID is given, and then attendance is taken. During this time, the OLED display provides informing feedback to the program, telling messages like "Welcome User" and "Goodbye User." To manage users, this system has the option of fingerprint deletion, which will be periodically checking in from the server for requests to remove old records. Large error handling mechanisms will make communication drops, invalid scans, and process exceptions detectable for consistent operation and security. As each person's fingerprints are unique, marking fraudulent attendance becomes nearly impossible. This project represents the application of IoT-based biometric solutions in modern attendance tracking. With features such as real-time connectivity, automation, and security, the system promises enhanced efficiency and automatic error avoidance. Its scalability enabled the extension of features to include cloud storage, mobile app integration, and other means such as multifactor authentication to make secure and automated attendance an optimal solution.*

Keywords: Biometric verification,Real-time synchronization,ESP8266 WiFi module, Arduino technology