Implementation of an IoT-Based Car Showroom Access Security System with a 4x4 Keypad and RFID Using Telegram

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ABSTRACT

Security is crucial, especially in car showrooms that store high-value assets. Unfortunately, many showrooms still use conventional security systems such as manual keys or PINs, which are vulnerable to theft and access misuse. This research aims to design an IoT-based access security system using a 4x4 keypad and RFID sensors, controlled by an ESP8266 microcontroller, and equipped with real-time notifications to Telegram and access data storage to Google Spreadsheet. The method used includes designing a dual authentication system, where the user must attach an RFID card and enter the corresponding PIN to open the door lock solenoid. The entire system is integrated using a Wi-Fi connection, and access data such as time, authentication method, and access status will be automatically sent to Google Spreadsheet. In addition, every access activity will also be sent to a Telegram Bot as a direct notification to the showroom owner. Test results show that the system runs well and is responsive. Valid input can unlock the door, while incorrect input will be rejected and recorded. This system successfully provides a more modern, efficient, and easily monitored security solution remotely. This system not only enhances physical security but also facilitates access management and digital activity documentation.

Keywords*: IoT, RFID, 4x4 Keypad, ESP8266, Telegram, Google Sheets, Showroom Security*