ABSTRAK

PERANCANGAN DAN IMPLEMENTASI SMART DOOR LOCK DI LABORATORIUM TEKNIK ELEKTRO MENGGGUNAKAN MODUL RFID RC522 BERBASIS IOT

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Muhammad Regi Pratama; dibimbing oleh, Yudi Wijanarko, S.T., M.T. dan Niksen Alfarizal, S.T., M.Kom. xv + 71 halaman, 8 tabel, 28 gambar, 9 lampiran

Perkembangan teknologi smart home mendorong terciptanya sistem keamanan otomatis yang efisien dan terintegrasi. Salah satu pendekatan yang diimplementasikan adalah integrasi teknologi Radio Frequency Identification (RFID) dengan Internet of Things (IoT). Penelitian ini bertujuan merancang dan menerapkan sistem pengamanan pintu otomatis berbasis modul RFID RC522 yang terhubung melalui IoT di Laboratorium Teknik Elektro. Metode yang digunakan adalah Research and Development (RnD), mencakup tahap perancangan, pembuatan, dan pengujian prototipe. Sistem dikendalikan oleh mikrokontroler ESP32, memanfaatkan RFID RC522 sebagai perangkat autentikasi, serta relay dan solenoid door lock sebagai aktuator kunci. Hasil pengujian menunjukkan jarak baca optimal RFID 1–4 cm, dengan maksimum 5 cm. Sistem mencatat aktivitas akses secara real-time melalui platform IoT dan mampu membedakan kartu sah dan tidak sah. Analisis konsumsi daya menunjukkan solenoid door lock memiliki daya puncak 7,2 W saat aktif, sementara komponen lainnya hemat energi. Implementasi sistem ini terbukti meningkatkan keamanan dan mempermudah pemantauan akses ruang secara otomatis dan terintegrasi.

Kata kunci : RFID RC522, Internet Of Things (IoT), ESP32, Smart Door Lock.

ABSTRACK

DESIGN AND IMPLEMENTATION OF SMART DOOR LOCK IN ELECTRICAL ENGINEERING LABORATORY USING IOT-BASED RFID RC522 MODULE

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Muhammad Regi Pratama*; supervised by,* Yudi Wijanarko, S.T., M.T. *and* Niksen Alfarizal, S.T., M.Kom.

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The advancement of smart home technology has fostered the development of more efficient and interconnected automated security systems. This study aims to design and implement an RFID RC522-based automatic door security system integrated with the Internet of Things (IoT) network for use in the Electrical Engineering Laboratory. The Research and Development (RnD) method was employed, encompassing the stages of design, prototyping, and system testing. The system is controlled by an ESP32 microcontroller, utilizing the RFID RC522 module for authentication, with a relay and solenoid door lock serving as locking actuators. Testing results indicate that the RFID module performs optimally at a reading distance of 1–4 cm, with a maximum effective range of 5 cm. The system successfully records all access activities in real time via the IoT platform and differentiates between authorized and unauthorized cards. Power consumption analysis shows the solenoid door lock reaches a peak power of 7.2 W when active, while other components remain energy-efficient. The implementation of this system has been proven to enhance security and facilitate automated, integrated access monitoring within the laboratory environment.

Keywords : RFID RC522, Internet Of Things (IoT), ESP32, Smart Door Lock.