

ABSTRAK

RANCANG BANGUN SISTEM PERANGKAT KERAS DAN KOMUNIKASI IOT PADA SMART ROOM DI PERUMAHAN SURYA AKBAR

(2025 : 75 Halaman + 40 Gambar + 40 Tabel + Daftar Pustaka + Lampiran)

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Perkembangan teknologi *Internet of Things* (IoT) telah mendorong inovasi dalam sistem otomatisasi rumah, salah satunya adalah *Smart Room*. *Smart Room* merupakan sistem yang mengintegrasikan berbagai sensor dan aktuator untuk menciptakan lingkungan yang nyaman, aman, dan hemat energi. Laporan akhir ini membahas rancang bangun sistem perangkat keras dan komunikasi IoT pada *Smart Room* di Perumahan Surya Akbar. Sistem dibangun menggunakan mikrokontroler Arduino Mega sebagai pusat kendali utama, ESP32 dan ESP32-CAM untuk koneksi nirkabel serta pengawasan visual, dan Raspberry Pi sebagai pendukung pemrosesan tambahan. Sensor yang digunakan meliputi LDR, DHT22, *fingerprint*, RFID, flame, getaran, dan gas, sementara aktuator berupa *relay*, *solenoid door lock*, lampu, kipas, dan *buzzer*. Komunikasi antar-mikrokontroler dilakukan melalui protokol UART, SPI, dan I2C. Hasil pengujian menunjukkan sistem mampu merespons input sensor secara otomatis dan sinkron, serta memberikan kontrol akses dan pengaturan perangkat elektronik secara efisien. Sistem juga mampu mengatur pencahayaan dan pendingin ruangan berdasarkan kondisi lingkungan. Rancang bangun ini diharapkan dapat menjadi solusi dalam pengembangan sistem otomasi ruangan berbasis IoT yang andal dan mudah diterapkan di lingkungan perumahan.

Kata Kunci : Smart Room, IoT, Arduino Mega, ESP32, Sensor, Aktuator, Otomatisasi.

ABSTRACT

DESIGN AND DEVELOPMENT OF IOT-BASED HARDWARE AND COMMUNICATION SYSTEM FOR SMART ROOM IN SURYA AKBAR HOUSING

(2025 : 75 Pages + 40 Picture + 40 Tables + Bibliography + Appendix)

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The development of Internet of Things (IoT) technology has driven innovation in home automation systems, one of which is the Smart Room. A Smart Room integrates various sensors and actuators to create a comfortable, secure, and energy-efficient environment. This final project discusses the design and implementation of hardware systems and IoT communication in a Smart Room at Surya Akbar Housing. The system is built using Arduino Mega as the main controller, supported by ESP32 and ESP32-CAM for wireless communication and visual monitoring, as well as Raspberry Pi for additional processing tasks. The sensors used include LDR, DHT22, fingerprint, RFID, flame, vibration, and gas sensors, while actuators include relays, solenoid door locks, lamp, fans, and buzzers. Communication between microcontrollers utilizes UART, SPI, and I2C protocols. Testing results show that the system responds automatically and synchronously to sensor inputs, enabling efficient access control and device automation. The system is also capable of managing lighting and ventilation based on environmental conditions. This design is expected to offer a reliable and easily implemented IoT-based room automation solution, particularly for residential environments.

Keywords : Smart Room, IoT, Arduino Mega, ESP32, Sensor, Actuator, Automation.