DESIGNING AND DEVELOPING AN IoT-BASED SMART HOME AUTOMATION SYSTEM

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ABSTRACT

This final project report presents the design and implementation of an Internet of Things (IoT)-based smart home automation system. The system integrates the ESP32 microcontroller with DHT11 and PIR sensors to monitor indoor temperature, humidity, and human presence. Controlled devices include lighting, ventilation fans, and a solenoid door lock, all operated through the Blynk mobile application. The report details both hardware and software components, including wiring diagrams, code snippets, and mechanical design considerations. Testing results demonstrate the system's functionality: the PIR sensor effectively detects motion within a 5-meter range, while the DHT11 sensor exhibits an average error of 1.02% for temperature and 1.70% for humidity readings, as verified against a thermohygrometer. Overall system tests show a 90% success rate in real-world scenarios and 100% reliability in Blynk-based remote monitoring. Future recommendations include integrating fuzzy logic for enhanced sensor management and implementing fire alarms or facial recognition for improved security features.

Keywords: Smart Home Automation System, IoT, ESP32 Microcontroller, DHT11 Sensor, Blynk