ABSTRAK

Perancangan Dan Implementasi Sistem Smart Home Berbasis Internet Of Things Menggunakan Komunikasi Lora Dan Algoritma Fuzzy Logic

(2026: 74 halaman + 30 gambar + 12 tabel + lampiran)

RAIHAN ALDIANTINO

062240352272

JURUSAN TEKNIK ELEKTRO PROGRAM STUDI SARJANA TERAPAN TEKNIK TELEKOMUNIKASI

POLITEKNIK NEGERI SRIWIJAYA

Perkembangan teknologi *Internet of Things* (IoT) memungkinkan membuat sistem yang dapat melakukan monitoring dan kontrol perangkat secara otomatis dari jarak dekat maupun jauh. Penelitian ini bertujuan untuk merancang dan mengimplementasikan sistem *Smart Home* berbasis IoT menggunakan komunikasi LoRa dan algoritma fuzzy logic. Sistem yang dibuat terdiri dari node *transmitter*, *receiver*, sensor DHT22, sensor MQ-2, sensor tegangan ZMPT101B, kontrol lampu, kipas exhaust, serta *dashboard* Node-RED sebagai media monitoring dan kontrol. Metode fuzzy logic digunakan untuk mengatur kecepatan kipas exhaust berdasarkan nilai suhu yang terbaca oleh sensor DHT22. Data sensor dikirim dari *transmitter* menuju *receiver* menggunakan komunikasi LoRa, kemudian ditampilkan pada *dashboard* berbasis Node-RED. Hasil pengujian menunjukkan bahwa sensor suhu memiliki rata-rata *error* sebesar 1,49% dengan akurasi 98,51%, sensor kelembaban memiliki rata-rata *error* 12,72% dengan akurasi 87,28%, dan sensor tegangan ZMPT101B memiliki rata-rata *error* 0,31% dengan akurasi 99,69%. Komunikasi LoRa mampu mengirimkan data hingga jarak 110 meter, namun delay meningkat seiring bertambahnya jarak. *Dashboard* Node-RED berhasil menampilkan data sensor secara *real-time* dan dapat mengontrol lampu. Hasil pengujian *fuzzy logic* menunjukkan bahwa semakin tinggi suhu, maka nilai PWM kipas semakin besar. Dengan demikian, sistem *Smart Home* yang dirancang dapat bekerja sebagai sistem monitoring dan kontrol berbasis IoT secara *online* maupun *offline.*

Kata kunci: *Smart Home, Internet of Things, LoRa, Node-RED, Fuzzy Logic.*

ABSTRACT

Design and Implementation of a Smart Home System Based on the Internet of Things Using LoRa Communication and Fuzzy Logic Algorithm

(2026: 74 pages+ 30 iamges + 12 tables + appendices)

RAIHAN ALDIANTINO

062240352272

DEPARTMENT OF ELECTRICAL ENGINEERING APPLIED BACHELOR'S PROGRAM IN TELECOMMUNICATION ENGINEERING

SRIWIJAYA STATE POLYTECHNIC

The development of Internet of Things (IoT) technology enables the creation of systems that can monitor and control devices automatically from both near and far distances. This research aims to design and implement an IoT-based Smart Home system using LoRa communication and fuzzy logic algorithms. The system created consists of transmitter nodes, receivers, DHT22 sensors, MQ-2 sensors, ZMPT101B voltage sensors, light control, exhaust fans, and a Node-RED dashboard as a medium for monitoring and control. The fuzzy logic method is used to adjust the speed of the exhaust fan based on the temperature value read by the DHT22 sensor. Sensor data is sent from the transmitter to the receiver using LoRa communication, and then displayed on the Node-RED-based dashboard. Test results show that the temperature sensor has an average error of 1.49% with an accuracy of 98.51%, the humidity sensor has an average error of 12.72% with an accuracy of 87.28%, and the ZMPT101B voltage sensor has an average error of 0.31% with an accuracy of 99.69%. LoRa communication is capable of sending data up to a distance of 110 meters, but the delay increases with distance. The Node-RED dashboard successfully displays sensor data in real-time and can control the lights. The Node-RED dashboard successfully displays sensor data in real-time and can control the lights. The results of the fuzzy logic testing show that the higher the temperature, the greater the PWM value of the fan. Thus, the designed Smart Home system can function as an IoT-based monitoring and control system both online and offline.

Keyword: *Smart Home, Internet of Things, LoRa, Node-RED, Fuzzy Logic.*