

“SISTEM SMART HOME MENGGUNAKAN INTERNET OF THINGS (IOT) BERBASIS ARDUINO MEGA DAN ESP32”

Nama : Idrus Shahab
NIM : 200431100023
Program Studi : Teknik Elektro
Dosen Pembimbing : 1. Achmad Fiqhi Ibadillah, S.T., M.Sc.
2. Achmad Ubaidillah Ms. S.T., M.T.

ABSTRAK

Sistem *Smart Home* berbasis *Internet of Things (IoT)* menawarkan solusi modern untuk meningkatkan efisiensi, kenyamanan, dan keamanan dalam mengelola peralatan rumah tangga. Penelitian ini bertujuan untuk mengembangkan sistem smart home menggunakan *Arduino Mega* sebagai pengontrol utama dan modul *ESP32* sebagai konektor jaringan *Wi-Fi*. Sistem dirancang untuk dapat mengontrol perangkat seperti lampu, kipas angin, pintu otomatis, dan sistem penyiraman tanaman, melalui *web server* berbasis *Apache* yang terhubung ke *database MySQL*. Metode yang digunakan meliputi perancangan perangkat keras miniatur rumah pintar, pengembangan antarmuka web untuk kontrol manual dan otomatis, serta integrasi fitur *voice command* berbasis *Google Text-to-Speech*. Pengujian dilakukan dengan mengukur parameter *Quality of Service (QoS)* seperti *delay*, *throughput*, *packet loss*, dan *jitter*, serta pengujian fungsi perangkat secara manual, otomatis, dan melalui perintah suara. Hasil pengujian menunjukkan bahwa sistem dapat berfungsi dengan baik dengan tingkat akurasi 100%, rata-rata delay 4–5 detik untuk kontrol perangkat, dan rata-rata indeks *QoS* sebesar 1.5. Pada pengujian terdapat sedikit keterlambatan akibat penggunaan *web server* dan *koneksi internet*. Dengan biaya pengembangan yang terjangkau, sistem ini menjadi solusi praktis untuk penerapan smart home berbasis *IoT* skala kecil.

Kata Kunci: *Smart Home, Internet of Things, Arduino Mega, ESP32, Web Server, Database MySQL, Quality of Service.*

“SMART HOME SYSTEM USING INTERNET OF THINGS (IOT) BASED ON ARDUINO MEGA AND ESP32”

Name : Idrus Shahab
NIM : 200431100023
Study Program : Electrical Engineering
Supervisors : 1. Achmad Fiqhi Ibadillah, S.T., M.Sc.
2. Achmad Ubaidillah Ms. S.T., M.T.

ABSTRACT

Smart Home systems based on the Internet of Things (IoT) offer modern solutions to enhance efficiency, comfort, and security in managing household appliances. This research aims to develop a smart home system using Arduino Mega as the main controller and the ESP32 module as a Wi-Fi network connector. The system is designed to control devices such as lights, fans, automatic doors, and a plant watering system through an Apache-based web server connected to a MySQL database. The methods used include the design of a smart home miniature hardware prototype, the development of a web interface for manual and automatic control, as well as the integration of a voice command feature based on Google Text-to-Speech. Testing was conducted by measuring Quality of Service (QoS) parameters such as delay, throughput, packet loss, and jitter, along with functional testing of devices through manual, automatic, and voice command operations. The results show that the system can operate properly with an accuracy rate of 100%, an average delay of 4–5 seconds for device control, and an average QoS index of 1.5. Some minor delays were observed, mainly due to the use of a web server and internet connection. With affordable development costs, this system provides a practical solution for small-scale IoT-based smart home implementation.

Keywords: Smart Home, Internet of Things, Arduino Mega, ESP32, Web Server, MySQL Database, Quality of Service.