

ABSTRAK

RANCANG BANGUN SISTEM PENGENDALIAN *EXHAUST FAN* OTOMATIS UNTUK SIRKULASI UDARA BERBASIS SENSOR MQ-135 (2026 :xvii + 66 halaman + 29 gambar + 9 tabel + Daftar Pustaka + lampiran)

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Kualitas udara dalam ruangan tertutup sangat dipengaruhi oleh akumulasi gas-gas berbahaya seperti karbon dioksida, amonia, dan senyawa volatil lainnya, yang apabila tidak segera disirkulasikan dapat menurunkan kenyamanan serta berdampak pada kesehatan penghuni ruangan. Penelitian ini bertujuan untuk merancang dan membangun sistem pengendalian exhaust fan otomatis berbasis sensor MQ-135 yang mampu mendeteksi konsentrasi gas di udara secara real-time dan mengaktifkan exhaust fan secara otomatis tanpa memerlukan intervensi manual. Sistem ini dibangun menggunakan mikrokontroler ESP32 sebagai unit pengendali utama yang menerima data dari sensor MQ-135 untuk mengukur konsentrasi gas dalam satuan part per million (PPM) serta sensor DHT22 untuk memantau suhu dan kelembaban ruangan. Data hasil pembacaan ditampilkan melalui layar LCD 16x2 dan dikirimkan ke platform Blynk untuk keperluan pemantauan jarak jauh berbasis Internet of Things. Apabila nilai PPM yang terdeteksi melampaui ambang batas yang ditetapkan sebesar 100 PPM, sistem akan mengaktifkan modul relay untuk menyalakan kipas DC 12 volt dan kipas AC 220 volt secara otomatis, disertai indikator peringatan melalui buzzer. Sistem ini diharapkan dapat menjadi solusi otomatisasi sirkulasi udara yang efisien, responsif, dan dapat dipantau dari jarak jauh.

Kata Kunci: *ESP32, MQ-135, exhaust fan otomatis, kualitas udara, Internet of Things, sirkulasi udara.*

ABSTRACT

DESIGN AND CONSTRUCTION OF AN AUTOMATIC EXHAUST FAN CONTROL SYSTEM FOR AIR CIRCULATION BASED ON THE MQ-135 SENSOR

(2026 : xvii + 66 Pages + 29 Pictures + 9 Tables + References + Attachment)

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Indoor air quality in enclosed spaces is significantly affected by the accumulation of harmful gases such as carbon dioxide, ammonia and other volatile compounds, which, if not promptly ventilated, can reduce comfort and adversely affect the health of the occupants. This research aims to design and build an automatic exhaust fan control system based on the MQ-135 sensor, capable of detecting gas concentrations in the air in real time and activating the exhaust fan automatically without the need for manual intervention. The system is built using an ESP32 microcontroller as the main control unit, which receives data from the MQ-135 sensor to measure gas concentrations in parts per million (PPM), as well as a DHT22 sensor to monitor room temperature and humidity. The measured data is displayed on a 16x2 LCD screen and transmitted to the Blynk platform for remote monitoring via the Internet of Things. If the detected PPM value exceeds the set threshold of 100 PPM, the system will activate the relay module to automatically switch on a 12-volt DC fan and a 220-volt AC fan, accompanied by a warning signal via a buzzer. This system is expected to provide an efficient, responsive and remotely monitorable solution for air circulation automation.

Keywords: *ESP32, MQ-135, automatic exhaust fan, air quality, Internet of Things, air circulation.*