

INTISARI

Rancang Bangun Sistem Pendeteksi Pencemaran Udara Berbasis RobotDyn Arduino Mega 2560 R3 Dengan Wifi ESP8266

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Keberadaan gas oksigen di udara memiliki peran yang sangat penting bagi manusia sebagai sumber utama kehidupan yaitu bernafas, akan tetapi udara yang dihirup manusia tidak murni mengandung oksigen, melainkan bercampur dengan gas-gas lainnya, yang berdasarkan Peraturan Pemerintah Nomor 41 Tahun 1999 parameter udara ambien yang harus dipantau yaitu, Karbon Monoksida (CO), Partikel Tersuspensi (PM10), Nitrit (NO₂), Ozon (O₃), dan Sulfur Dioksida (SO₂). Sehingga dibuat sistem pendeteksi pencemaran udara untuk mengetahui kadar gas yang aman bagi kesehatan dengan tampilan IoT thingspeak dan LCD yang dilengkapi indikator aman, waspada, dan bahaya dengan menggunakan mikrokontroler robotDyn arduino mega 2560 R3 dengan wifi ESP8266.

Alat yang terdiri dari sensor MQ-7 untuk mendeteksi gas CO, MQ-135 untuk mendeteksi gas CO₂, MQ-136 untuk mendeteksi gas SO₂, dan sensor DHT22 untuk mengukur suhu dan kelembaban. Dilakukan pengujian untuk mengetahui karakteristik sensitifitas sensor terhadap udara polutan pada sensor MQ-7 dan MQ-135 dengan memberikan variabel bebas 1, 3, dan 5 batang rokok dan sensor MQ-136 dengan larutan 250 gr, 500 gr, 750 gr, dan 1000 gr bubuk belerang serta dilakukan kalibrasi untuk mengetahui ketidakpastian bentangan pada sensor DHT22 dengan *Digital Thermohygro Barometer PCE-THB 40*.

Data hasil pengujian 4 sensor dilakukan analisis regresi jenis *power*, yang diperoleh nilai *error* keeratan hubungan ppm dengan Rs/Ro berturut-turut *slope* dan *intercept* sensor MQ-7 sebesar 0.843 dan 1.556, sensor MQ-135 sebesar 2.412 dan 3.028, dan sensor MQ-136 sebesar 0.15 dan 0.267. Serta besarnya ketidakpastian bentangan suhu DHT22 dititik 26 °C = (26.0 ± 0.6) °C, dititik 27 °C = (27.3 ± 0.6) °C, dititik 32 °C = (32.6 ± 0.6) °C dan besarnya ketidakpastian bentangan kelembaban DHT22 dititik 58 %RH = (58.4 ± 2.4) %RH dan dititik 69 %RH = (68.8 ± 2.4) %RH.

Kata Kunci : RobotDyn Mega 2560 R3 ESP8266, Sensor MQ-7, Sensor MQ-135, Sensor MQ-136, Udara Ambien.

ABSTRACT

Design Of Air Pollution Detection Systems Based On Robotdyn Arduino Mega 2560 R3 With ESP8266 Wifi

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The presence of oxygen gas in the air has its uses which is very important for humans as the main source of life, that is for breathing, but actually the air that humans breathe does is not pure oxygen but is mixed with other gases, based on Government Regulation Number 41 of 1999, the ambient air parameters that must be monitored are: Hydrocarbons, Carbon Monoxide (CO), Suspended Particles (PM10), Nitrite (NO₂), Ozone (O₃), and Sulfur Dioxide (SO₂). So that an air pollution detection system was made to determine gas levels that are safe for health with an IoT thingspeak and LCD displays which are equipped with safe, alert, and hazard indicators using a microcontroller robotDyn Arduiono Mega 2560 R3 with wifi ESP8266.

This tool is designed using the MQ-7 sensor to detect CO gas, MQ-135 to detect CO₂ gas, MQ-136 to detect SO₂ gas, and DHT22 sensor to measure temperature and humidity. Testing was carried out to determine the characteristics of sensor sensitivity to pollutant air on the MQ-7 and MQ-135 sensors by providing independent variables 1, 3, and 5 cigarettes and MQ-136 sensor with 250 gr, 500 gr, 750 gr, and 1000 gr sulfur powder solution and performed a calibration to determine the uncertainty of the stretch on the DHT22 sensor with a Digital Thermohygro Barometer PCE-THB40.

The test results of four sensors were carried out by a power type regression analysis, obtained the error value of the ppm relationship with and Rs / Ro, the slope and intercept values of the MQ-7 sensor were 0.843 and 1556, MQ-135 sensor was 2.412 and 3.028, and MQ-136 sensor was 0.15 and 0.267. And the uncertainty of the DHT22 temperature at 26 °C = (26.0 ± 0.6) °C, at 27 °C = (27.3 ± 0.6) °C, at 32 °C = (32.6 ± 0.6) °C and uncertainty the DHT22 humidity at 58 %RH = (58.4 ± 2.4) %RH and at 69 %RH = (68.8 ± 2.4) %RH.

Keywords: RobotDyn Mega 2560 R3 ESP8266, MQ-7 Sensor, MQ-135 Sensor, MQ-136 Sensor, Ambient Air.