

INTISARI

ANALISIS PERBANDINGAN KINERJA SENSOR SUHU DHT22 DAN Si7021 DALAM RANCANG BANGUN SISTEM MONITORING BERBASIS IOT

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Suhu dan kelembapan berperan penting dalam proses kehidupan. Untuk mengetahui seberapa besar suhu dan kelembapan digunakan alat pendeteksi bernama sensor, sensor suhu dan kelembapan sendiri memiliki banyak tipe di pasaran. Dengan demikian, untuk menentukan kinerja terbaik dari tipe sensor yang berbeda agar dapat disesuaikan kebutuhan perlu dilakukan adanya pengujian. Tipe sensor yang dibandingkan yaitu DHT22 dan Si7021 dalam hal respon waktu, akurasi, presisi, stabilitas, konsumsi daya dan energi. DHT22 merupakan sensor menggunakan elemen thermistor dan kapasitor serta sering *direview* sedangkan Si7021 merupakan sensor berteknologi CMOSens yang dilengkapi kalibrasi internal. Untuk membandingkan kinerja dari kedua tipe sensor dibuatlah rancang bangun sistem monitoring menggunakan sensor DHT22 dan Si7021, mikrokontroler board development ESP32, output LCD dan Blynk mode website maupun aplikasi smartphone berbasis *IoT*. Pengujian respon waktu dilakukan pada interval 37 – 32°C, pengujian akurasi dan presisi indoor dilakukan sebanyak 5 kali, pengujian stabilitas outdoor sebanyak 8 kali dan 10 kali, pengujian konsumsi daya dan energi sebanyak 10 kali. Dari hasil pengujian tersebut didapat respon waktu Si7021 lebih cepat yaitu 31,178 detik sedangkan DHT22 1 menit 54,917 detik. Pengujian akurasi suhu dan kelembapan indoor Si7021 yaitu 96,417% dan 94,797% lebih baik dibanding DHT22 yaitu 92,907% dan 84,687%. Presisi indoor didapatkan hasil tertinggi yang berbeda tergantung kondisi suhu. Uji stabilitas outdoor didapatkan akurasi suhu dan kelembapan DHT22 yaitu 96,045% dan 81,419% lebih tinggi dibanding Si7021 yaitu 94,523% dan 79,145% serta presisi outdoor DHT22 yang lebih tinggi. Konsumsi daya indoor dan outdoor sistem sensor Si7021 lebih sedikit dibanding DHT22 yaitu 0,541 W dan 0,545 W sedangkan DHT22 0,616 W dan 0,607 W.

Kata kunci : Perbandingan Kinerja Sensor, Rancang Bangun, DHT22, Si7021, IoT.

ABSTRACT

PERFORMANCE COMPARISON ANALYSIS OF DHT22 AND Si7021 TEMPERATURE SENSORS IN THE DESIGNING AND IMPLEMENTING A MONITORING SYSTEM-BASED IOT

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Temperature and humidity play a crucial role in life processes. To determine the levels of temperature and humidity, a detection device called a sensor is used. Temperature and humidity sensors come in various types on the market. Therefore, to determine the best performance of different sensor types and match them to specific needs, testing is necessary. The sensor types compared in this study are DHT22 and Si7021 in terms of response time, accuracy, precision, stability, power consumption, and energy efficiency. The DHT22 sensor uses a thermistor and capacitor element and is frequently reviewed, whereas the Si7021 sensor features CMOSens technology with built-in calibration. To compare the performance of these two sensor types, a monitoring system was designed using DHT22 and Si7021 sensors, an ESP32 development board microcontroller, an LCD output, and the Blynk platform for both website and smartphone applications based on IoT technology. Response time testing was conducted in the temperature range of 37–32°C, accuracy and precision testing indoors was repeated five times, stability testing outdoors was performed eight and ten times, and power and energy consumption testing was carried out ten times. The test results showed that the Si7021 had a faster response time of 31.178 seconds, while the DHT22 took 1 minute and 54.917 seconds. The accuracy of indoor temperature and humidity measurements for the Si7021 was 96.417% and 94.797%, respectively, higher than the DHT22, which recorded 92.907% and 84.687%. The highest precision results indoors varied depending on temperature conditions. Outdoor stability testing showed that the DHT22 had higher temperature and humidity accuracy at 96.045% and 81.419%, respectively, compared to the Si7021, which recorded 94.523% and 79.145%. The DHT22 also exhibited higher outdoor precision. Regarding power consumption, the Si7021 sensor system consumed less power than the DHT22, with indoor and outdoor consumption recorded at 0.541 W and 0.545 W, respectively, compared to the DHT22 at 0.616 W and 0.607 W.

Keywords : Performance Comparison of Sensors, Designing and Implementing, DHT22, Si7021, IoT.