ABSTRAK

Peternakan ayam sering menghadapi tantangan dalam menjaga kualitas udara kandang, seperti akumulasi gas amonia (NH_3), suhu, dan kelembapan yang tidak stabil, yang dapat memengaruhi kesehatan dan produktivitas ayam. Penelitian ini bertujuan merancang dan mengimplementasikan sistem monitoring kualitas udara berbasis IoT yang dapat memantau parameter-parameter tersebut secara real-time serta memberikan notifikasi otomatis ketika kondisi melebihi ambang batas. Sistem ini menggunakan sensor DHT22 untuk suhu dan kelembapan, sensor MQ-137 untuk deteksi amonia, serta mikrokontroler ESP32 yang terhubung ke Firebase Realtime Database untuk penyimpanan dan manajemen data. Aplikasi mobile berbasis Flutter dikembangkan sebagai antarmuka pengguna untuk memantau data dan menerima notifikasi. Hasil pengujian menunjukkan sistem berhasil membaca dan mengirim data setiap 2 detik ke Firebase, dengan notifikasi yang diterima dalam 1–3 detik. Pengujian langsung di Benny Farm selama 24 jam mencatat suhu antara 22,7–31,6°C dan kelembapan 60,1–91,6%. Meskipun terjadi kendala teknis pada sensor MQ-137 di paruh akhir pengujian, sistem secara keseluruhan dinilai andal dan mudah digunakan berdasarkan usability testing dengan skor rata-rata 4,1 dari 5. Sistem ini diharapkan dapat membantu peternak dalam memantau kondisi kandang secara efisien dan responsif.

Kata kunci: *Internet of Things*, Firebase, Flutter, monitoring kualitas udara, notifikasi *real-time.*

ABSTRACT

Poultry farms often face challenges in maintaining air quality in coops, such as the accumulation of ammonia gas (NH_3), unstable temperature, and humidity, which can affect the health and productivity of chickens. This study aims to design and implement an IoT-based air quality monitoring system that can monitor these parameters in real-time and provide automatic notifications when conditions exceed thresholds. The system uses a DHT22 sensor for temperature and humidity, an MQ-137 sensor for ammonia detection, and an ESP32 microcontroller connected to Firebase Realtime Database for data storage and management. A Flutter-based mobile application was developed as a user interface for monitoring data and receiving notifications. Test results showed that the system successfully read and sent data every 2 seconds to Firebase, with notifications received within 1–3 seconds. Direct testing at Benny Farm for 24 hours recorded temperatures between 22.7–31.6°C and humidity between 60.1–91.6%. Although technical issues occurred with the MQ-137 sensor in the latter half of the test, the system overall was considered reliable and user-friendly based on usability testing with an average score of 4.1 out of 5. This system is expected to help farmers monitor coop conditions efficiently and responsively.

Keywords: Internet of Things, Firebase, Flutter, monitoring kualitas udara, *notifikasi real-time.*