

ABSTRAK

IMPLEMENTASI *FUZZY LOGIC* MAMDANI DAN *INTERNET OF THINGS* UNTUK UJI KELAYAKAN DAGING AYAM, SAPI, DAN IKAN PADA RUMAH MAKAN ADITYA

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Penelitian ini bertujuan mengimplementasikan metode *Fuzzy Logic* Mamdani dan *Internet of Things* (IoT) pada *prototype* alat uji kelayakan daging ayam, daging sapi, dan ikan. Sistem dibangun menggunakan mikrokontroler ESP32 dengan sensor MQ-135 sebagai pendeteksi gas amonia (NH_3) dan sensor MQ-136 sebagai pendeteksi gas hidrogen sulfida (H_2S). Data hasil pembacaan sensor diproses melalui tahapan fuzzifikasi, inferensi menggunakan operator MIN, agregasi menggunakan operator MAX, dan defuzzifikasi metode centroid untuk menghasilkan status kelayakan bahan pangan. Hasil implementasi menunjukkan bahwa *prototype* mampu membaca perubahan konsentrasi gas NH_3 dan H_2S pada setiap sampel, kemudian mengolahnya menjadi informasi kelayakan yang ditampilkan secara *real-time* melalui *platform* Blynk. Validasi dilakukan dengan membandingkan keluaran sistem terhadap hasil perhitungan manual menggunakan metode *Fuzzy Logic* Mamdani. Hasil pengujian menghasilkan rata-rata *Mean Absolute Percentage Error* (MAPE) sebesar 0,0081% dengan rata-rata akurasi 99,9919%. Selain itu, pengujian *Quality of Service* (QoS) menunjukkan bahwa sistem mampu mengirimkan notifikasi melalui *platform* Blynk dengan rentang delay 6,16–13,17 detik dan rata-rata delay 9,81 detik, sehingga proses *monitoring* dapat dilakukan secara *real-time*. Dengan demikian, *prototype* yang dikembangkan dapat digunakan sebagai pendukung proses pemeriksaan kelayakan bahan pangan hewani pada Rumah Makan Aditya sebelum bahan pangan diolah.

Kata kunci: *Prototype* Uji Kelayakan, *Fuzzy Logic* Mamdani, *Internet of Things*, MQ-135, MQ-136.

ABSTRACT

IMPLEMENTATION OF FUZZY LOGIC MAMDANI AND INTERNET OF THINGS FOR FEASIBILITY TESTING OF CHICKEN, BEEF, AND FISH MEAT RUMAH MAKAN ADITYA

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This study aims to implement the Mamdani Fuzzy Logic method and the Internet of Things (IoT) on a prototype of a feasibility tester for chicken, beef, and fish meat. The system was built using an ESP32 microcontroller with an MQ-135 sensor as an ammonia (NH₃) gas detector and an MQ-136 sensor as a hydrogen sulfide (H₂S) gas detector. The sensor reading data was processed through fuzzification, inference using the MIN operator, aggregation using the MAX operator, and defuzzification using the centroid method to produce the feasibility status of food ingredients. The implementation results showed that the prototype was able to read changes in NH₃ and H₂S gas concentrations in each sample, then process them into feasibility information displayed in real-time via the Blynk platform. Validation was carried out by comparing the system output with the results of manual calculations using the Mamdani Fuzzy Logic method. The test results produced an average Mean Absolute Percentage Error (MAPE) of 0.0081% with an average accuracy of 99.9919%. Furthermore, Quality of Service (QoS) testing demonstrated that the system was capable of sending notifications via the Blynk platform with a delay range of 6.16–13.17 seconds and an average delay of 9.81 seconds, enabling real-time monitoring. Therefore, the developed prototype can be used to support the animal food safety inspection process at Aditya Restaurant before the food is processed.

Keywords: *Feasibility Test Prototype, Fuzzy Logic Mamdani, Internet of Things, MQ-135, MQ-136.*