

ABSTRAK

IMPLEMENTASI *FUZZY LOGIC* CONTROL PADA SISTEM REJECT BERBASIS PLC DENGAN MONITORING BERBASIS *CHATBOT* PADA MESIN PENGISI BOTOL OTOMATIS

(2026: xii + 50 Halaman + 15 Gambar + 8 Tabel + Daftar Pustaka + Lampiran)

ROMI AFRIANSYAH

062240342220

JURUSAN TEKNIK ELEKTRO

PROGRAM STUDI SARJANA TERAPAN TEKNIK ELEKTRO

POLITEKNIK NEGERI SRIWIJAYA

Perkembangan teknologi otomasi industri menuntut sistem pengisian botol yang tidak hanya mampu melakukan proses pengisian secara otomatis, tetapi juga dapat melakukan penyortiran hasil pengisian dengan cepat dan akurat. Penelitian ini bertujuan mengimplementasikan metode *Fuzzy Logic* Mamdani pada sistem reject berbasis Programmable Logic Controller (PLC) dengan monitoring berbasis *Chatbot* Telegram pada mesin pengisi botol otomatis. Sistem menggunakan sensor *Flowmeter* untuk mengukur volume cairan dan sensor *Loadcell* untuk mengukur berat hasil pengisian sebagai masukan metode fuzzy. Data sensor diproses oleh ESP32 menggunakan metode *Fuzzy Logic* Mamdani untuk menentukan status botol OK atau Reject. Hasil keputusan kemudian dikirimkan ke PLC melalui relay untuk mengendalikan linear actuator sebagai mekanisme penyortiran botol. Selain itu, data hasil pengisian, status botol, serta jumlah botol OK dan Reject dikirimkan secara *Real-Time* ke *Chatbot* Telegram sebagai media monitoring. Berdasarkan hasil implementasi dan pengujian, sistem mampu melakukan penyortiran botol sesuai aturan *Fuzzy Logic* Mamdani yang telah dirancang serta menampilkan informasi monitoring secara *Real-Time*. Dengan demikian, sistem yang dikembangkan dapat meningkatkan efektivitas proses penyortiran botol dan mempermudah pemantauan kondisi sistem pengisian secara otomatis.

Kata kunci: *Fuzzy Logic* Mamdani, PLC, ESP32, *Flowmeter*, *Loadcell*, Sistem Reject, Telegram Bot.

ABSTRACT

IMPLEMENTATION OF FUZZY LOGIC CONTROL IN A PLC-BASED REJECT SYSTEM WITH CHATBOT-BASED MONITORING FOR AN AUTOMATIC BOTTLE FILLING MACHINE

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ROMI AFRIANSYAH

062240342220

DEPARTMENT OF ELECTRICAL ENGINEERING

BACHELOR OF APPLIED ELECTRICAL ENGINEERING STUDY

PROGRAM

SRIWIJAYA STATE POLYTECHNIC

The advancement of industrial automation technology requires bottle filling systems that are not only capable of performing automatic filling processes but also able to sort filling results quickly and accurately. This study aims to implement the Mamdani Fuzzy Logic method in a Programmable Logic Controller (PLC)-based reject system with Telegram Chatbot monitoring on an automatic bottle filling machine. The system utilizes a Flowmeter sensor to measure the liquid volume and a load cell sensor to measure the filling weight as Inputs to the Fuzzy Logic method. The sensor data are processed by an ESP32 using the Mamdani Fuzzy Logic method to determine whether a bottle is classified as OK or Reject. The decision result is then transmitted to the PLC through a relay to control a linear actuator as the bottle sorting mechanism. In addition, the filling data, bottle status, and the number of OK and Reject bottles are sent to a Telegram Chatbot in real time for monitoring purposes. The implementation and testing results show that the system is capable of sorting bottles according to the designed Mamdani Fuzzy Logic rules while providing Real-Time monitoring information. Therefore, the proposed system improves the effectiveness of the bottle sorting process and facilitates automatic monitoring of the bottle filling system.

Keywords: Mamdani Fuzzy Logic, PLC, ESP32, Flowmeter, Load Cell, Reject System, Telegram Bot.