

ABSTRAK

RANCANG BANGUN PROTOTIPE SISTEM PENGISIAN CAIRAN OTOMATIS DENGAN MONITORING IOT (*INTERNET OF THINGS*)

(2026: xiv + 57 halaman + daftar gambar + daftar tabel + daftar pustaka + lampiran)

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Pengisian cairan secara manual masih memiliki beberapa keterbatasan, seperti ketidaktepatan jumlah pengisian, ketergantungan terhadap operator, serta kurangnya pemantauan kondisi sistem secara real-time. Oleh karena itu, pada tugas akhir ini dirancang prototipe sistem pengisian cairan otomatis berbasis *Internet of Things* (IoT) yang dilengkapi fitur monitoring dan proteksi. Sistem menggunakan ESP32 sebagai pusat kendali, load cell dan modul HX711 sebagai sensor pengukuran berat cairan, sensor ultrasonik untuk memantau level cairan pada tangki sumber, serta pompa DC sebagai aktuator pengisian. Monitoring dilakukan melalui LCD 16×2 dan aplikasi Blynk. Selain itu, sistem dilengkapi flame sensor, sensor tegangan, dan *emergency* stop sebagai simulasi sistem proteksi. Hasil implementasi menunjukkan bahwa sistem mampu melakukan pengisian secara otomatis berdasarkan berat target yang telah ditentukan, menampilkan informasi monitoring secara lokal maupun jarak jauh, serta menghentikan proses pengisian ketika kondisi darurat terdeteksi. Dengan demikian, prototipe yang dirancang telah mampu mengintegrasikan fungsi pengisian otomatis, monitoring berbasis IoT, dan sistem proteksi dalam satu sistem.

Kata kunci: ESP32, Load Cell, *Internet of Things* (IoT), Pengisian Cairan Otomatis, Monitoring, Sistem Proteksi.

ABSTRACT

DESIGN AND DEVELOPMENT OF AN AUTOMATIC LIQUID FILLING SYSTEM PROTOTYPE WITH IoT (INTERNET OF THINGS) MONITORING

(2026: xiv + 57 pages + list of figures + list of tables + references + appendices)

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Manual liquid filling processes still have several limitations, such as inaccurate filling quantities, dependence on operators, and the lack of real-time system condition monitoring. Therefore, this final project designed a prototype of an Internet of Things (IoT)-based automatic liquid filling system equipped with monitoring and protection features. The system uses an ESP32 as the main controller, a load cell and HX711 module as liquid weight measurement sensors, an ultrasonic sensor to monitor the liquid level in the source tank, and a DC pump as the filling actuator. Monitoring is carried out through a 16×2 LCD and the Blynk application. In addition, the system is equipped with a flame sensor, voltage sensor, and emergency stop as a simulation of a protection system. The implementation results show that the system is capable of performing automatic filling based on a predetermined target weight, displaying monitoring information both locally and remotely, and stopping the filling process when an emergency condition is detected. Therefore, the designed prototype has successfully integrated automatic filling, IoT-based monitoring, and a protection system into a single system.

Keywords: ESP32, Load Cell, Internet of Things (IoT), Automatic Liquid Filling, Monitoring, Protection System.