

ABSTRAK

RANCANG BANGUN PROTOTIPE SISTEM PENGISIAN CAIRAN OTOMATIS DENGAN MONITORING IOT (*INTERNET OF THINGS*) (2026)

(2025: xv + 73 Halaman + Daftar Gambar + Daftar Tabel + Lampiran)

BIMA ANDALA SAPUTRA

062330310444

JURUSAN TEKNIK ELEKTRO

PROGRAM STUDI TEKNIK LISTRIK

POLITEKNIK NEGERI SRIWIJAYA

Perkembangan teknologi otomasi mendorong penerapan sistem pengisian cairan yang lebih akurat, efisien, dan mudah dipantau. Proses pengisian manual masih memiliki kelemahan berupa ketidaktepatan volume, ketergantungan pada operator, serta risiko kesalahan selama pengoperasian. Penelitian ini bertujuan merancang dan membangun prototipe sistem pengisian cairan otomatis berbasis *Internet of Things* (IoT) menggunakan ESP32 sebagai pusat kendali. Sistem memanfaatkan sensor *load cell* dan modul HX711 untuk mengukur massa cairan, sensor ultrasonik untuk memantau level cairan pada tangki sumber, serta aplikasi Blynk untuk monitoring secara *real-time*. Sistem juga dilengkapi fitur proteksi berupa *interlock limit switch*, *flame sensor*, sensor tegangan, dan *emergency switch*. Hasil pengujian menunjukkan bahwa sensor *load cell* memiliki rata-rata error sebesar 1,68% dan sensor ultrasonik sebesar 4,75%. Sistem mampu melakukan pengisian otomatis, menampilkan data secara *real-time*, serta menjalankan fungsi proteksi sesuai perancangan. Dengan demikian, prototipe berhasil mengintegrasikan fungsi pengisian otomatis, monitoring, dan proteksi dalam satu sistem.

Kata Kunci: ESP32, *Internet of Things* (IoT), *Load Cell*, Monitoring *Real- Time*, Sistem Pengisian Cairan Otomatis.

ABSTRACT**DESIGN AND DEVELOPMENT OF AN AUTOMATIC LIQUID FILLING
SYSTEM PROTOTYPE WITH IoT (INTERNET OF THINGS)
MONITORING****(2026)***(2025: xv + 73 Page + List of Figure + List of Table + List of Apendix)***BIMA ANDALA SAPUTRA****062330310444****DEPARTMENT OF ELECTRICAL ENGINEERING****ELECTRICAL ENGINEERING STUDY PROGRAM****SRIWIJAYA STATE POLYTECHNIC**

The advancement of automation technology has encouraged the implementation of liquid filling systems that are more accurate, efficient, and easier to monitor. Manual filling processes often result in inaccurate filling volumes, operator dependency, and operational errors. This study aims to design and develop an Internet of Things (IoT)-based automatic liquid filling prototype using ESP32 as the main controller. The system utilizes a load cell sensor and HX711 module to measure liquid mass, an ultrasonic sensor to monitor the liquid level in the source tank, and the Blynk application for real-time monitoring. In addition, the prototype is equipped with protection features, including an interlock limit switch, flame sensor, voltage sensor, and emergency switch. The test results showed that the load cell achieved an average error of 1.68%, while the ultrasonic sensor achieved an average error of 4.75%. The system successfully performed automatic filling, displayed monitoring data in real time, and executed protection functions according to the design. Therefore, the proposed prototype successfully integrates automatic filling, monitoring, and protection features into a single system.

Keywords: *ESP32, Internet of Things (IoT), Load Cell, Real-Time Monitoring, Automatic Liquid Filling System.*