

RANCANG BANGUN SISTEM PENGONTROLAN ALAT KELISTRIKAN DAN ELEKTRONIKA MENGGUNAKAN OUTSEAL PLC DAN SMARTPHONE MELALUI KOMUNIKASI MODBUS HMI

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ABSTRAK

Perkembangan teknologi otomasi industri memungkinkan sistem pengontrolan alat kelistrikan dilakukan secara nirkabel. Penelitian ini merancang sistem pengontrolan alat kelistrikan dan elektronika menggunakan Outseal PLC yang dikendalikan melalui smartphone dengan komunikasi Modbus HMI. Modul *Bluetooth HC-05* digunakan sebagai media komunikasi, dan modul relay 4 channel sebagai aktuator. Push button digunakan sebagai *input* manual. Perancangan meliputi desain perangkat keras, pemrograman ladder diagram, dan pengujian sistem. Hasil pengujian menunjukkan sistem mampu mengontrol alat kelistrikan secara efektif melalui smartphone dengan jarak komunikasi optimal $\pm 9-10$ meter. Relay merespons perintah ON/OFF dari aplikasi HMI dengan baik, meskipun terdapat delay saat jarak lebih dari 10 meter. Tegangan output relay berkisar antara 208–220 V AC saat ON, dan mendekati 0 V saat OFF. Sistem juga dapat dikontrol secara manual melalui push button. Berdasarkan pengujian, sistem ini layak diterapkan sebagai solusi kendali alat kelistrikan berskala kecil.

Kata Kunci: Outseal PLC, Modbus TCP, *Bluetooth HC-05*, Ladder Diagram, Kontrol Jarak Jauh.

DESIGN OF ELECTRICAL AND ELECTRONIC DEVICE CONTROL SYSTEM USING OUTSEAL PLC AND SMARTPHONE THROUGH COMMUNICATION MODBUS HMI

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ABSTRACT

The development of industrial automation technology allows electrical equipment control systems to be carried out wirelessly. This study designs an electrical and electronic equipment control system using Outseal PLC controlled via smartphone with Modbus HMI communication. The HC-05 Bluetooth module is used as a communication medium, and a 4-channel relay module as an actuator. Push buttons are used as manual input. The design includes hardware design, ladder diagram programming, and system testing. The test results show that the system is able to control electrical equipment effectively via smartphone with an optimal communication distance of ± 9 –10 meters. The relay responds to ON/OFF commands from the HMI application well, although there is a delay when the distance is more than 10 meters. The relay output voltage ranges from 208–220 V AC when ON, and approaches 0 V when OFF. The system can also be controlled manually via push buttons. Based on the test, this system is feasible to be implemented as a small-scale electrical equipment control solution.

Keywords: Outseal PLC, Modbus TCP, Bluetooth HC-05, Ladder Diagram, Remote Control.