

PROTOTYPE SISTEM OTOMASI DAN MONITORING PROSES PENCUCIAN MOBIL BERBASIS PLC OUTSEAL DAN HMI MODBUS

ABSTRAK

Penelitian ini merancang dan merealisasikan prototipe sistem otomasi dan monitoring proses pencucian mobil berbasis PLC Outseal dan HMI Modbus untuk meningkatkan efisiensi tenaga dan waktu pada layanan pencucian mobil. Sistem otomasi menggunakan PLC Outseal dengan pemrograman ladder diagram melalui software Outseal Studio untuk mengendalikan pompa DC, fan DC, dan conveyor secara berurutan berdasarkan deteksi sensor proximity infrared, memungkinkan proses penyemprotan, penyikatan, pembilasan, dan pengeringan berjalan otomatis dengan waktu respons cepat 0,14–0,3 detik. Sistem monitoring menggunakan HMI Modbus terhubung melalui modul WiFi DT-06 yang memungkinkan pemantauan status proses pencucian secara real-time melalui smartphone dengan jarak komunikasi stabil hingga 16 meter, mempermudah operator dalam memantau dan mengontrol proses jarak jauh. Hasil pengujian menunjukkan sistem dapat berjalan responsif, stabil, dan akurat dengan deteksi sensor hingga 97–98%, mendukung integrasi sistem otomasi dan monitoring secara efisien pada prototipe ini. Dengan demikian, penelitian ini menghasilkan sistem pencucian mobil otomatis yang praktis dan terjangkau untuk diaplikasikan pada industri kecil-menengah, membantu mengurangi antrean, tenaga kerja manual, serta meningkatkan produktivitas layanan pencucian mobil.

Kata kunci : Otomasi, PLC Outseal, HMI Modbus, Pencucian mobil Monitoring, Prototipe

Prototype Design of an Automated Car Wash and Monitoring System Based on Outseal PLC and Modbus HMI

ABSTRACT

This research designed and implemented a prototype of an automated car wash and monitoring system based on Outseal PLC and Modbus HMI to improve time and labor efficiency in car wash services. The automation system utilizes an Outseal PLC programmed with ladder diagrams through the Outseal Studio software to control DC pumps, DC fans, and conveyors sequentially based on infrared proximity sensor detection, enabling the spraying, brushing, rinsing, and drying processes to run automatically with a rapid response time of 0.14–0.3 seconds. The monitoring system employs Modbus HMI connected via the DT-06 WiFi module, allowing real-time monitoring of the car wash process status through smartphones with stable communication up to 16 meters, facilitating operators to monitor and control the process remotely. Testing results indicate that the system operates responsively, stably, and accurately with a detection accuracy of 97–98%, effectively supporting the integration of the automation and monitoring systems in this prototype. Thus, this research produces a practical and affordable automatic car wash system applicable for small to medium-scale industries, helping reduce queues, minimize manual labor, and enhance productivity in car wash services.

Keywords: Automation, Outseal PLC, HMI Modbus, Car Wash, Monitoring, Prototype.

