ABSTRAK

Penelitian ini bertujuan merancang dan membangun perangkat IoT *embedded* berbasis modul WT32-ETH01 yang mampu menjembatani komunikasi data multi-protokol antara alat laboratorium dan Laboratory Information System (LIS). Perangkat ini dirancang untuk mendukung protokol TCP Server, TCP Client, dan Serial RS-232, serta mengonversi data hasil pemeriksaan ke format JSON. Berbeda dengan pendekatan statis, perangkat ini mengimplementasikan fitur konfigurasi nirkabel melalui Bluetooth Low Energy (BLE) agar dapat digunakan secara fleksibel pada berbagai alat laboratorium tanpa perlu pengunggahan ulang kode (*re-flash*ing). Komponen utama yang digunakan meliputi WT32-ETH01 sebagai unit pemroses dan ethernet *gateway*, MAX3232 untuk konversi sinyal serial RS-232, serta sistem catu daya stabil menggunakan adaptor 5V 2A melalui soket DC-005. Metode penelitian yang digunakan adalah prototyping. Hasil pengujian menunjukkan perangkat mampu melakukan integrasi data satu-ke-satu secara akurat, stabil, dan mudah dikonfigurasi ulang di lapangan melalui koneksi Bluetooth.

Kata Kunci: IoT *gateway*, ASTM, HL7, LIS, ESP32

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ABSTRACT

This research aims to design and build an *embedded* IoT device based on the WT32-ETH01 module that is capable of bridging multi-protocol data communication between laboratory equipment and the Laboratory Information System (LIS). This device is designed to support TCP Server, TCP Client, and Serial RS-232 protocols, as well as converting examination result data to JSON format. In contrast to the static approach, this device implements a wireless configuration feature via Bluetooth Low Energy (BLE) so that it can be used flexibly on various laboratory equipment without the need for re-uploading the code (*re-flash*ing). The main components used include the WT32-ETH01 as a processing unit and Ethernet *gateway*, the MAX3232 for RS-232 serial signal conversion, and a stable power supply system using a 5V 2A adapter via the DC-005 socket. The research method used is prototyping. Test results show that the device is capable of performing one-to-one data integration accurately, stably, and easily reconfigured in the field via a Bluetooth connection.

Keyword: IoT *gateway*, ASTM, HL7, LIS, ESP32

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