Capstone Project Summary: SCADA Simulation Platform

Thomas Schmidt

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Project Overview

This capstone project focuses on the development of a low-cost SCADA simulation platform using Raspberry Pi single-board computers. The system emulates intelligent electronic devices (IEDs) found in power substations, enabling safe and affordable testing of Supervisory Control and Data Acquisition (SCADA) systems.

Key Features

- Emulates Modbus TCP and DNP3 devices for interaction with SEL RTACs.
- Supports real-time communication over Ethernet and RS-232.
- Configuration stored and loaded via SD card in JSON format.
- Simulates analog/binary inputs, outputs, and counters.
- Designed for classroom, training, or testing environments.

Technical Stack

- **Hardware:** Raspberry Pi 4, RS-232 USB adapters
- **Languages:** Python, C
- **Protocols:** Modbus TCP, DNP3 (simulation only)
- **Tools:** Git, VS Code, Wireshark, SEL Configuration Tools

My Contributions

As the project lead, I:

- Designed system architecture and selected protocols.
- Implemented communication modules and point simulators.
- Developed JSON-based configuration tool and interface.

- Coordinated hardware testing and software integration.

GitHub Repository

https://github.com/TWi5td/CAPSTONE$_SCADA_simpi$