

Laser Safety System PLC Improvement Project

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BACKGROUND

To ensure the safety of personnel around laser systems, robust administrative controls are essential. Currently, programmable logic controllers (PLCs) are used to implement these safety measures. The controls in place include:

- Opening and closing laser shutters
- Setting the laser mode
- Locking entry doors

For the MEC-U system, a more advanced and robust laser safety system is required. Utilizing PLC-to-PLC communication will enable synchronization and distribution of control across the PLC network, ensuring comprehensive safety management.

PLC-TO-PLC COMMUNICATION SYSTEM

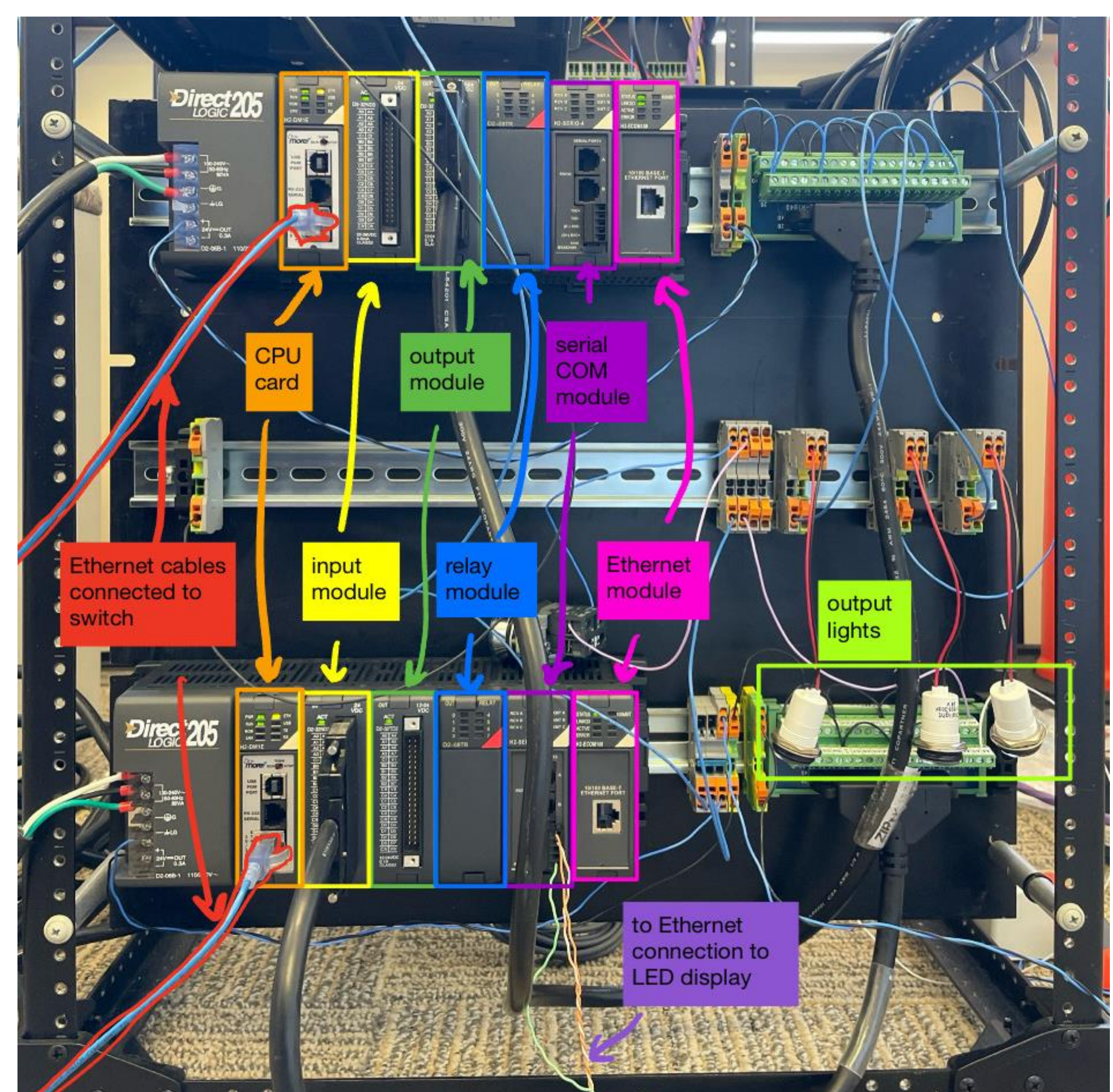


2-PLC system connected to HMI touchscreen and LED display via Ethernet

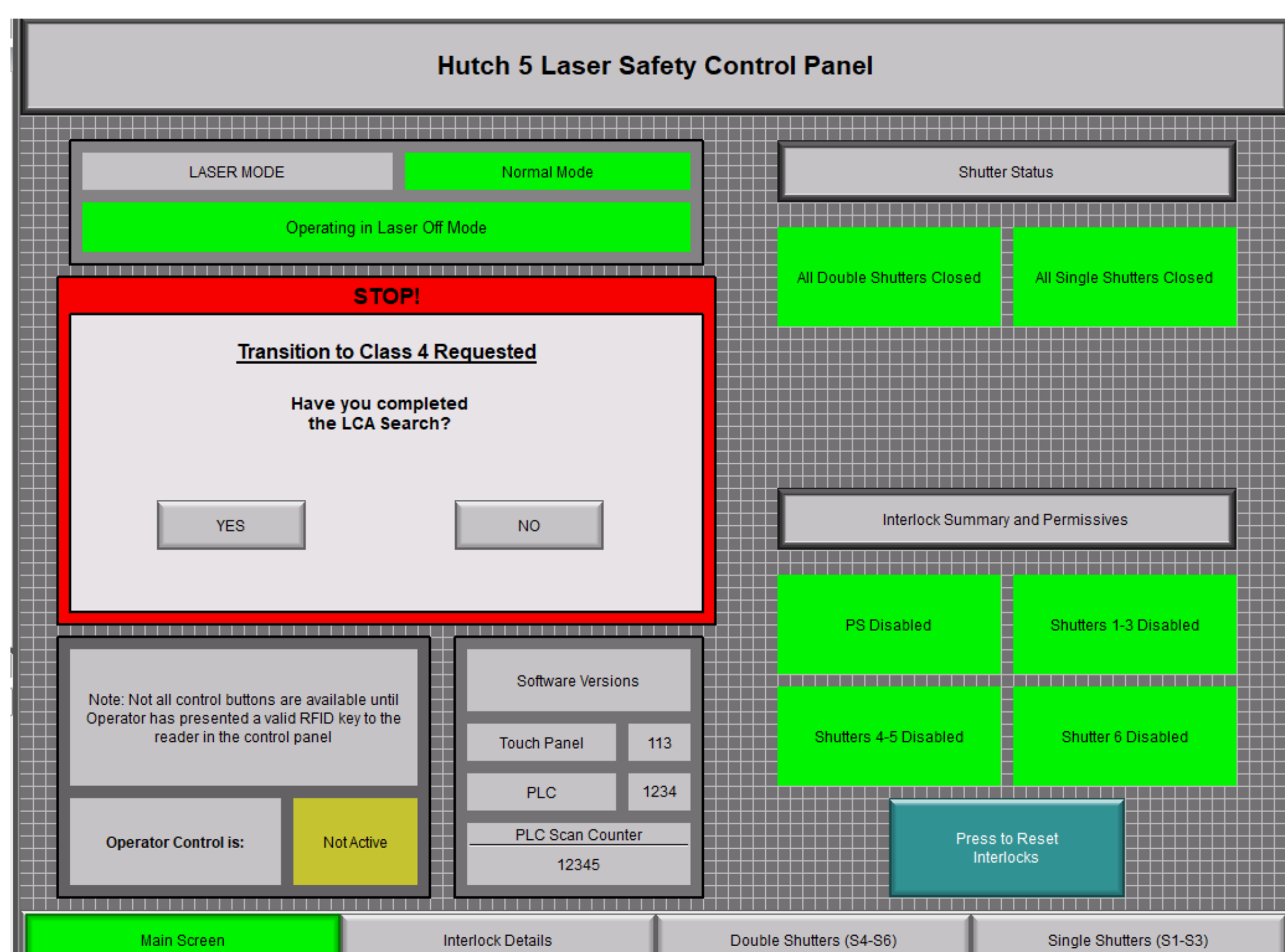
PROJECT OBJECTIVE

In preparation for the MEC-U system, we are experimenting with PLC-to-PLC communication. The objective is to get two PLCs to share data via an Ethernet switch, thereby reconstructing a single-PLC system using a 2-PLC setup.

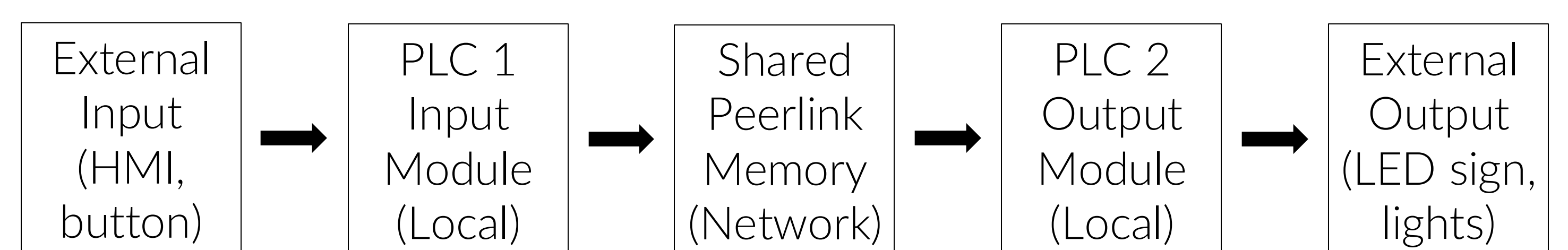
- One PLC will handle inputs.
- The second PLC will control outputs.
- Operator input will be received from an HMI touch panel.
- Display messages will be written to a programmable LED sign.



PLC rack setup for two PLCs to communicate with each other via Ethernet



Example Laser Safety Control Panel for Hutch 5



Communication Process

FUTURE STEPS

- Introduce more inputs/outputs to mimic real laser safety system
- Audio outputs – buzzers, speakers, recorded audio files
- Experiment with different modules and their capabilities
- Multiple PLCs reporting to one supervisory PLC
- Keep learning