PLC Lab Creation

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Abstract

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Introduction (1-3 paragraph summary of the entire project)

Any reliable control scheme for industrial automation will use a system comprised of PLC’s. A PLC or Programmable Logic Controller is like a ruggedized built-out microcontroller designed to meet industrial criteria and specifications. UE has been looking to implement a physical lab and coursework to help students going into these fields to be more competitive. My team has been tasked with familiarizing ourselves with the basic PLC ecosystem and to design and fabricate the lab stations and lab work for it.

Problem Statement (Lay foundation of project and reasons it is being undertaken)

To offer coursework to better prepare UE students for positions in industrial control systems and automation. Done through the creation of dedicated lab work and the associated materials to construct and operate the labs.

The stakeholder group is the university for investing time and money into the project through senior electrical and computer engineers and trusting in their ability to produce quality results. The seniors are also stake holders here in that their grade and graduation is dependent on the quality of the finished work.

Background

Without this project graduates looking to interview and go into these fields are personally responsible for familiarizing themselves with PLCs and their associated controls. This is a distinct disadvantage because those materials are prohibitively expensive for an individual undergraduate to purchase explicitly for the purpose of training.

Requirements (something determined to be an integral part of the project to be included)

8 individual lab stations

5 distinct lab assignments for each station

Must have a complete description PDF for each one

Should include overview, goal, questions

All equipment to assemble each one

Necessary diagrams

2-3 unique cooperative large lab assignments

Should all be assembled in old laser laboratory

Specifications (Any other goal for the project)(Specifics like languages and models)

Follow established layout from Dr. Shang of 2’ x 2’ board

Should use donated Schieder Electric PLCs

3 sets of DIN rails for mounting components

2 horizontal Panduit rails for routing cables

1 vertical Panduit rail for routing cables

Highly configurable

Labs

LED and Button Lab

Get input from buttons

Provide output to LEDs

Inter-PLC-communication

Traffic simulation

Get input and cycle through state machine

Design Approach (what decisions and tradeoffs were made where)

The sourcing of all parts for the labs has been at our team’s discretion.