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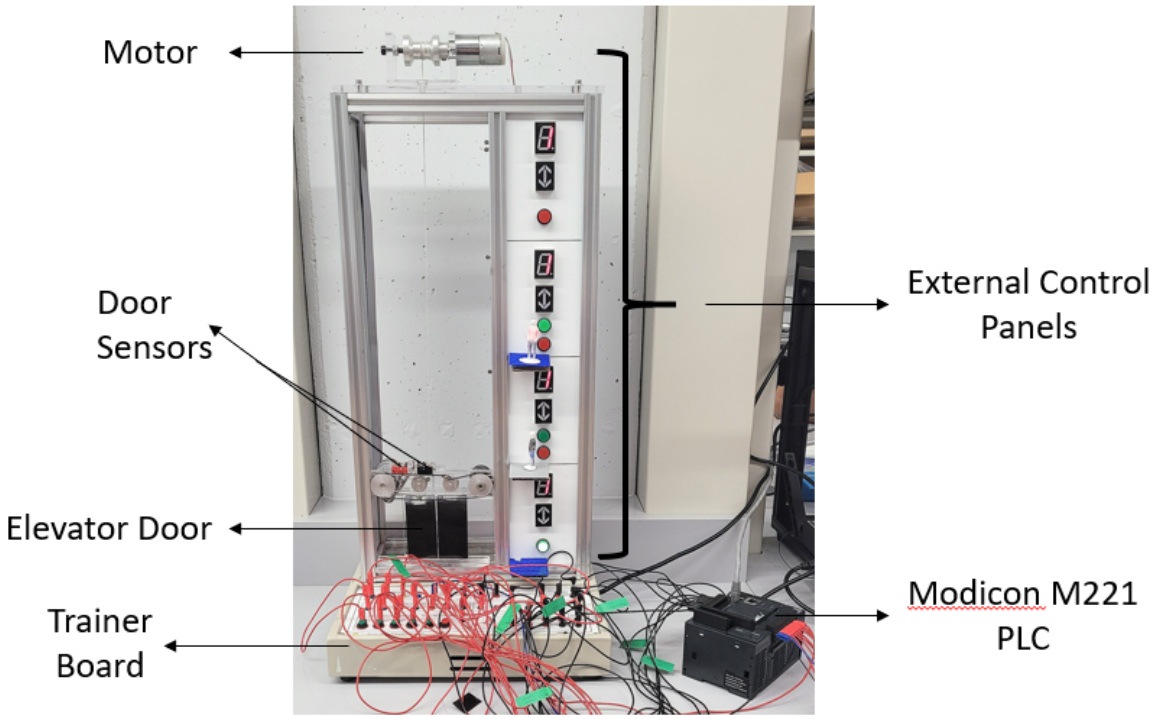
DFRWS 2023 Challenge
The Troubled Elevator: Elevator Manual

Elevator Model connected to a Schneider Electric Modicon M221 PLC

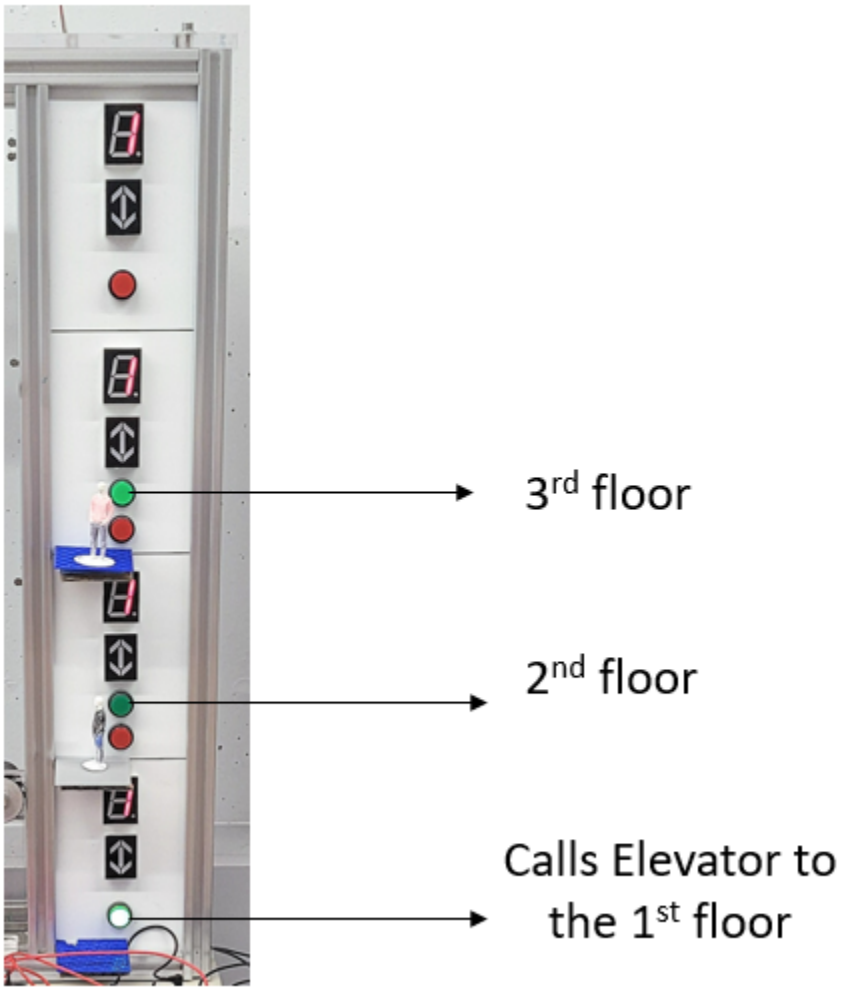
Elevator Anatomy

- The figure below demonstrates what an elevator model looks like.
- The motor is used to move the elevator up and down.
- The door sensors detect when the elevator arrives at the requested floor, the door opens for a few seconds, then closes.
- The Trainer Board physically connects the PLC to the elevator and is used to manually operate the elevator.
- The elevator is controlled by a Schneider Electric Modicon M221 Programmable Logic Controller.



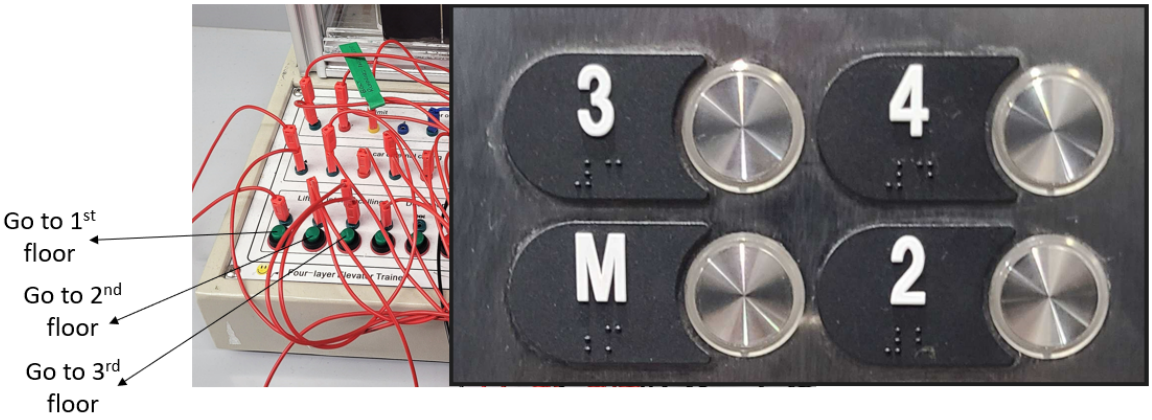
Floors & External Control Panels (Up & Down Buttons)

- An external control panel on each floor is used to call the elevator to the floor that it is requested from. An LED also shows which floor the elevator is currently on.



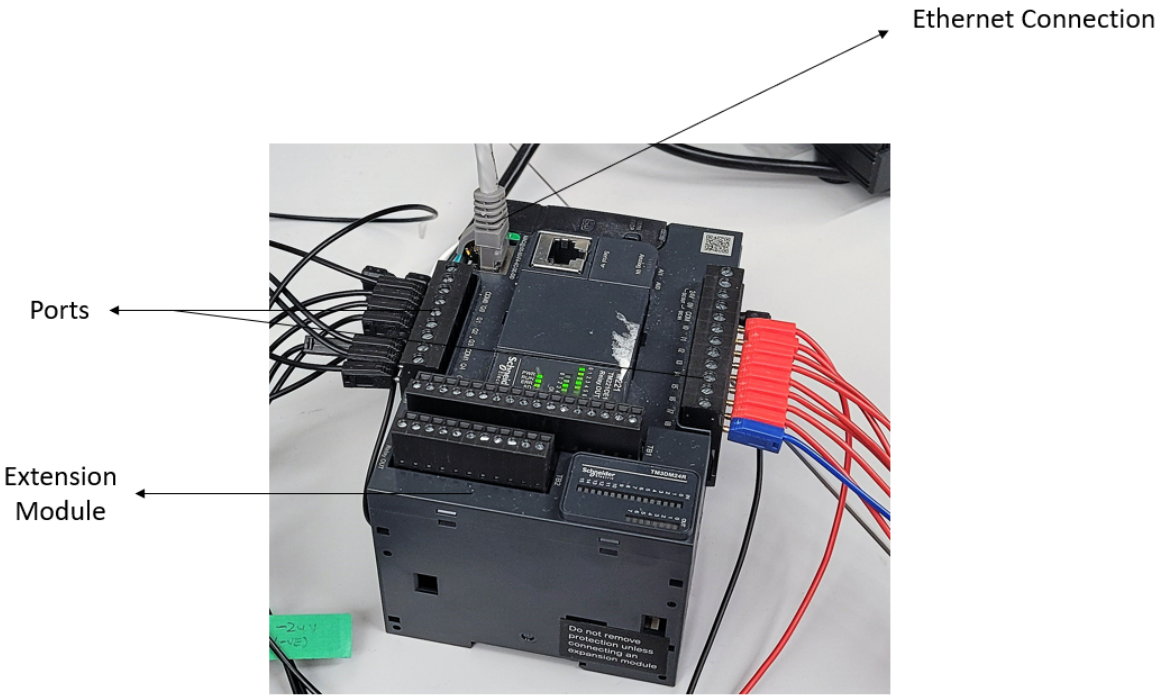
Elevator and Internal Control Panels (Floor# Buttons)

- The internal control panel on the Trainer Board resembles the internal control panel inside the elevator, where a button is pressed to move the elevator to the corresponding floor.



Schneider Electric Modicon M221 PLC

- The PLC contains ethernet sockets to connect it to the LAN.
- It contains I/O ports to connect it to the trainer board.
- It can be extended by connecting extension modules with more I/O ports to it.

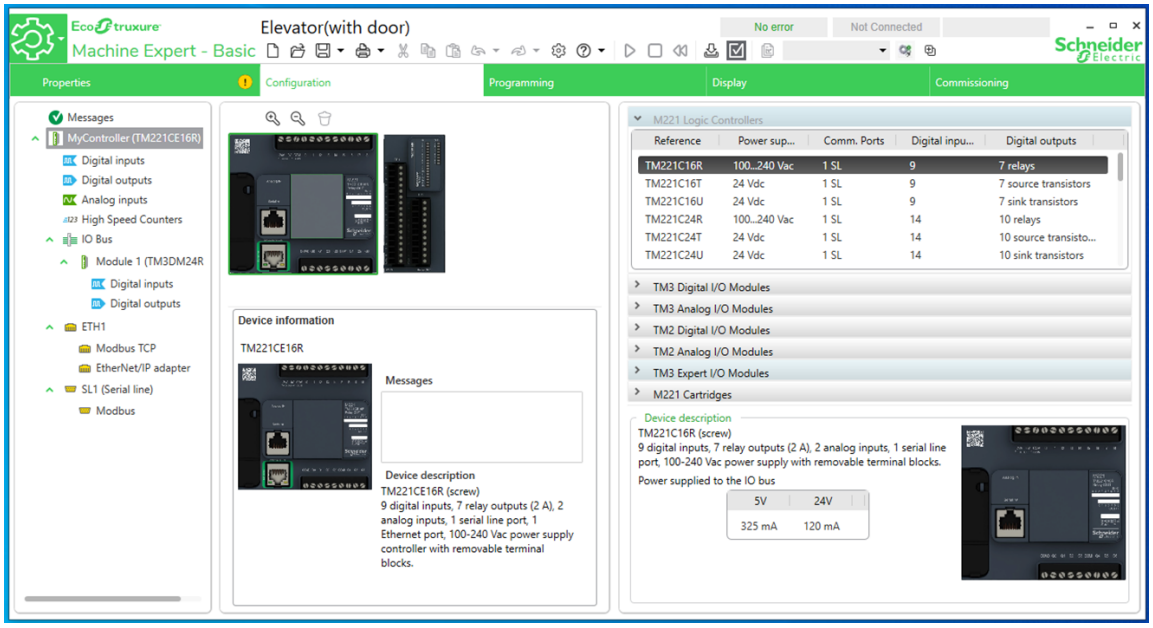


Engineering Software

EcoStruxure Machine Expert - Basic

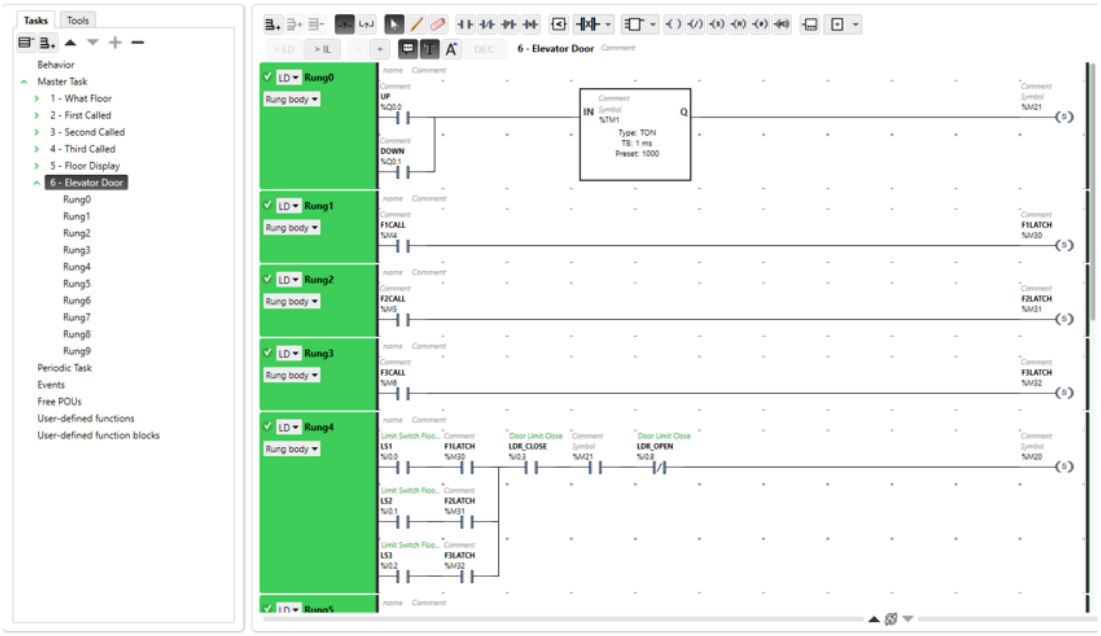
Configuration Module

- The configuration module maps the engineering software to the physical process through the PLC.
- It shows the PLC Model, number of relays, digital inputs, digital outputs, and I/O assignments.
- It is also used to configure an extension module if more ports are needed for additional I/O operations.



Programming Module

- After configuring the Engineering software and the PLC, the programming module uses Ladder Logic to program the PLC using the configured Inputs and Outputs, where a master task calls different subtasks.



Commissioning Module

- This module is used to connect/disconnect the engineering software (from the engineer's PC to the PLC using the IP address of the PLC by logging in or out.
- This module is also used to download the control logic from the engineer's PC to the PLC or upload the control logic from the PLC to the engineer's PC when needed.
- An engineer uses this module to start and stop the PLC as well.