GM Heater House

Overview
General Motors’ assembly plant located in Lordstown, OH has industrial heater house control boxes that are dated. As these controllers are outdated, they cannot communicate with the existing Energy Management System (EMS). These heater houses cannot be put on a schedule, which causes a loss in energy savings. Also, when a heater house reaches the pre-set temperature set point, the burner throttles back, but the blower motor continues to run. This leads to cooler air blowing into the plant floor, which causes discomfort for the employees.

Objectives
The team had to determine a cost efficient solution in order to resolve the problems stated above. The solution would allow for remote operation of the heater houses as well as solve the logic issue that exists with the burner and blower.

Approach
● Initially, we made contact with the sponsor in order to set up a site visit. This allowed us to meet with the sponsors as well as see the heater houses for ourselves. It also helped us to get a clearer idea of the task at hand.
● After the sponsor visit, the team had a better understanding of the task and brainstormed solutions. The solution agreed by the team was to research for a PLC that was affordable enough to solve the problem presented to us.
● A PLC that fit the task specifications was found in the Unitronics V350J. After talking with Unitronics customer service, the team had the PLC donated to them. While waiting for the PLC to arrive, several meetings took place to discuss how to solve the task at hand. We determined the logic to solve the problem of the blower and burner not working properly. The problem of remote operation would be solved with just the PLC solution as it has network capabilities.
● Once the PLC was in our possession, we split up into two teams. One team would program the PLC while the other team worked on a circuit that would work as a test bench. The test bench allowed for us to verify whether the program worked properly. The team got together after each part was completed in order to test the program and verify the results were as expected.

Outcomes
● A major outcome of the project was that the heater house controllers would now be able to communicate with the EMS. This allows for energy savings as the heater houses can be put on a schedule.
● The sponsor will save money with this solution as replacing an entire heater house will cost much more than integrating our PLC solution which will only cost $798.
● Safety concerns were also reduced as plant employees will not have to travel up to the roof in order to interact with the heater house controllers.