EE/CprE/SE 491 BIWEEKLY REPORT Week 3&4

Start Date - September 20, 2024

End Date - October 2, 2024

Group Number: 02

Project Title: Ames Substation

Client &/Advisor: Burns & McDonnell / Hugo Villegas

Team Members/Role:
      Derek Elkins - Project Lead
      Patrick Musoy - Pilot Scheme Researcher
      Mackenzie Ray - Meeting Manager
      Nathan Tegeler - Pilot Scheme Researcher
      Matthew Wells - Pilot Scheme Researcher

<u>Weekly Summary:</u>
Made the decision without the client to increase the size of the solar farm from 2 to 10 MVA, more accurately reflecting utility scale power generation. Completed I/O list revisions based on feedback from the client. This included reorganizing the document to improve readability. Then, we corrected several incorrect details, including the CT and CVT sizes and quantities. The I/O assignments also needed to be restructured to implement the communication with the PLC equipment and the breaker failure relays correctly. The client requested that only one breaker reclose during a fault the other will be operated using SCADA. The transformer protection was also updated, and an additional relay was selected to ensure that each part of the substation had a backup relay protecting it.

<u>Past Weeks Accomplishments:</u>
Mackenzie Ray: Worked on the one-line. Started looking into Solid Works and getting familiar with 3D drafting.

Patrick Musoy: Revising the I/O assignment and relaying documents to meet the client's need/requirement. Worked on substation model simulation with PSCAD. Reviewed the transformer line protections document required for PSCAD.

Derek Elkins: Went through the entire relay I/O document and manually tracked inputs and outputs. Found we were missing a few inputs connected to the different breakers. Started researching information for elevation designs.

Nathan Tegeler: Revisions for the I/O assignments. This included restructuring the communications between breaker failure relays and line relays. Additionally, I restructured the transformer protection schemes to only use the current differential with the SEL-387E relay and use the 487e for monitoring internal faults and zero sequence currents measured at the tertiary winding of the transformer.

Matthew Wells: Developed a draft of the event analysis report showing how fast and stable our substation responds to faults. Began the process of developing a 3D model representation of the substation. The model will be 3D printed and color-coded.

Name	**Individual Contributions**	**Hours weeks 3&4**	**Cumulative Hours**
Derek Elkins	Completed research for Elevation Design Identified missing connections in I/O document.	7	45.5
Patrick Musoy	Revising the I/O assignment and relaying documents formatting. First simulation of substation model on PSCAD.	26	42
Mackenzie Ray	One Line/SolidWorks Research	4	35.5
Nathan Tegeler	I/O list and relay selection report. PSCAD initial substation model.	19	52.5
Matthew Wells	Drafted an event analysis report. Researched Solidworks for 3D modeling.	4	31.5

Action Item Table

Status	Action Item	Assigned to	Due Date	Priority	Notes
Complete	I/O list	Nathan	9/20		
In-progress	PSCAD model	Nathan Patrick	11/28	High	This will be broken into subtasks once more information is provided on this deliverable.

In-progress	One Line	Kenzie	10/22	Medium	
In-progress	Elevation Design	Derek	10/22	Medium	
Just started	3D model	Matt/Kenzie	11/25	Low	

Plans for Upcoming Week

Mackenzie Ray: Continue refining one-line diagram. Help out where needed. Start looking into SolidWorks and how to 3D model.

Patrick Musoy: Start working on PSCAD for project simulation and finish the I/O assignment documentation. Working on transmission protections by understanding how to use relay protection in PSCAD.

Derek Elkins: Start the CAD for the elevation design. I will also finalize a report for the elevation design standards. Additionally, I will adjust the comments that were given back to us on our general overview.

Nathan Tegeler: Meet with Christopher to learn more about how to model relays in PSCAD so that we can begin implementing complex system features such as distance relaying.

Matthew Wells: Begin sketching the transformer and breaker designs of the substation model.

Summary of Weekly Advisor Meeting

N/A