EE/CprE/SE 492 Bi-WEEKLY REPORT 5

3/9/2020-3/29/2020

Group number: 57

Project title: Impact of High Photo-Voltaic Penetration on Distribution Systems

Client &/Advisor: Dr. Venkataramana Ajjarapu

Team Members/Role: Thomas Coleman – Team Leader

Andrew Chaney – Project Engineer

Daniel Riley – Assistant Project Engineer/Editor

Kenneth Prell – Assistant Project Engineer

BiWeekly Summary

During this time period, we altered all scripts to be run from personal computers due to campus laboratories being closed for the COVID-19 pandemic. This involved redirecting our GIT repository and changing all file paths for our scripts. Also, we all downloaded OpenDSS and MATLAB on our personal computers so that we may all continue working from home.

We continued working on forming our objective function which aims to minimize the operation of voltage regulation components in our system using the functionality of solar panels and their inverter controls.

Past biweek accomplishments

o   Parsed through every script to find file path locations and change them to the new repository file addresses.
o   Prepared all personal computers to run OpenDSS and MATLAB to continue progress.
o   Worked on forming the objective function for optimizing network performance by minimizing traditional voltage regulation component operation.

Pending issues

o   Dr. Ajjarapu could not contact Alliant Energy during this period. We have had the project altered to work on a similar network to Alliant's using an IEEE 123 bus system.
o   Adjusting to working from home using remote means of communication.

Individual contributions

Name	Individual Contributions	Hours this Session	Hours cumulative
Daniel	Familiarized himself with CPLEX (program used for optimization). Read lecture notes on how optimization is done.	8	52.5
Andrew	Altered scripts so that they will work from the altered GIT repository address. Ensured proper operation of scripts from personal computer.	10	60
Kenneth	Assisted with rewriting scripts so that they may be run from home.	8	54
Thomas	Read through research papers detailing how to size and sit solar farms (this will play an important role in our optimization process with regard to putting a cost on farm installation).	9	58

Plans for the upcoming biweek

- o Split up into two teams of two. One team will work on the optimization process for the 34-node network. The other team will be performing a similar process to what has been done on the 34-node for the 123-node system (123-node will give us a more realistic scenario and data results to industry).
- o Have optimization mostly finished by the end of the biweek so that we may begin analyzing results and possible look at other methods of optimization.
- o Analyze the 123-node system and compare results with 34-node results. Note the difference in system behaviors based on size and regulation component additions.

Summary of weekly advisor meeting

- o Discussed quality of operations from working at home
- o Optimization (Minimizing voltage regulation component operations)
    - o Assume a cost for MVA and KVA regarding solar farms
    - o Also, assume a fixed cost per solar farm installation
    - o Do not limit size of solar farm at first. If results are unrealistic, add restraint for size
- o Team future
    - o Split into two teams of two
    - o One team moves forward with optimizing the 34-node system
    - o Other team repeats same process of modeling for the 123-node system
    - o Optimization will not be performed on the 123-node system