

EE/CprE/SE 491 WEEKLY REPORT 9

10/16/2024 – 10/23/2024

Group number: 42

Project title: GridGPT 2.0

Client &/Advisor: Gelli Ravikumar

Team Members/Role:

Luke Eitzmann -OpenDSS-Lead

Ian Louis - Power Co-lead

Scott Rininger - Power Co-lead

Aditi Nachnani - Full Stack AI Co-Lead

Ian Bussan - Full Stack AI Co-Lead

- **Weekly Summary**

This week, we met with our advisor Dr. Gelli to present our research from the previous week. The grid team worked on coding an optimization script for VPPs in Python. The Grid team has continued using OpenDSS and has been reviewing the workshop for EPRI. The Grid team also researched problems with distribution system operators. The AI team worked on creating fine tune models from OpenAI. We created fine-tuned models with example data. We then tested fine tune models for separate applications: for Neo4j queries and including DSS information.

- **Past week's accomplishments**

- **Luke Eitzmann:** I continued my practice for OpenDSS. I started going through the workshop provided to me by Dr. Gelli. Using this workshop I was able to create parts of a distribution system.
- **Ian Louis:** I continued to work on the Python VPP optimization script. I added new features to allow the script to create a different optimal VPP for every hour of the day.
- **Ian Bussan:** I have created a more complex Neo4j to test and fine-tune the model to query data. I have created a new fine-tuned model specifically for query data from the neo4j grid model. Used 20 examples to make the fine tune model.

- **Aditi Nachnani:** I looked into context state management and different methods to achieve it. I implemented these methods and used them on the model I created last week. I also implemented a fine-tuning model using a simple training dataset about transformers and tested it to compare how well it performs compared to the original model.

- **Scott Rininger:** I researched problems with DSOs. I learned that DSOs are the evolution of distribution management systems (DMS). DSOs are more focused on DERs than DMSs. Some of the problems that DSO face are data analysis, efficiency, and having enough money for maintaining and upgrading the grid.

- **Pending issues**

- No issues

- **Individual contributions**

<u>NAME</u>	<u>Individual Contributions</u> <i>(Quick list of contributions. This should be short.)</i>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Luke Eitzmann	Learned and practiced using OpenDSS. Worked through a workshop provided by Dr. Gelli	6	36
Ian Louis	I updated the Python script for optimizing the creation of Virtual Power Plants from DERs to create a different VPP for each hour of the day	6	36
Scott Rininger	Making a presentation for the client and team to learn about the problems that DSOs face.	6	36
Aditi Nachnani	Implemented context-state management methods and fine-tuned the model	6	36
Ian Bussan	Created new Neo4j Grid model, Fine tune model for Neo4j	6	36

- **Plans for the upcoming week**

- **Scott Rininger:** My plan for the upcoming week is to coordinate with the AI team to help fine-tune a model focused on DSOs.

- **Ian Louis:** I will continue to work on VPP optimization. I am going to look into different industry products to find possible features. I am also going to look into different methods of grouping DERs into VPPs.

- **Luke Eitzmann:** Next week, I plan to continue what I've been doing and try to learn more about OpenDSS. I will continue to watch YouTube training videos, and Professor Gelli has provided me with a workshop to learn about OpenDSS. I also plan to assemble my own script.
- **Ian Bussan:** I will be learning about DSO and working with Scott to fine-tune a model related to DSO. Create some application code for DSO and have it get data about the grid model.
- **Aditi Nachnani:** The plan for next week is to look into how to achieve threading and making it async.

- **Summary of weekly advisor meeting**

This week we discussed our individual progress with Dr. Gelli. The Grid team presented the research we did this week about our special topics. Scott researched more about distribution system operators and how they operate, Luke researched and practiced the use of OpenDSS software, and Ian continued working on a Python script to find the optimal grouping of DERs to form VPPs. The AI team presented their implementation of fine-tuning models and context state management. Ian created a more complex Neo4j to test and fine-tune the model to query data. Aditi implemented different context-state management methods to ensure that only relevant information is being passed in. Aditi also implemented a fine-tuned model.