

# **Design and Implementation of a small scale stand-alone Hybrid Solar PV and Wind Energy Generation system for EE 452 lab**

## **EE 492, Bi-Weekly Status Report #3**

**Sept 14th - Sept 27th**

### **Team Members:**

Conner Makoben - Electrical Engineer

Mohamed Adam - Electrical Engineer

Daniel Mendez - Lead Engineer

Samah Shabbo - Electrical Engineer

Ben Holt - Electrical Engineer

### **Summary**

This period's project status is fully in simulation and experiment development. During the last couple of weeks, our team discussed various ways we could progress our project through the installation of equipment in both the EE 452 lab and Coover courtyard. However, after careful consideration and recommendations from both lab supervisors and client, it is not possible to work in the lab due to COVID restrictions. The safest option was to utilize the TLA during set appointment time but is not a feasible option because our equipment requires solar panels, batteries, wind turbine, and controllers and need to be stationary. Since hardware is now off the table, we are focusing our goals toward modeling solar PV, wind, and a hybrid model as well as designing and developing a lab manual for students to use as an educational tool. The wind simulation side ran into simulation issues that are still being worked on. The experimentation side started development and is still in progress. Lastly, we also started to develop hybrid simulations for wind and solar to be combined. Because our system can function as 3 stand-alone systems, we can divide our team efforts into each system. In doing so, our solar PV model has been optimized by adding a mppt and charge controller for our battery system. In doing so, this makes our hybrid system a little easier to integrate the wind turbine because a DC bus will hold both systems together while maintaining battery level limits.

## Contributions

Name	Hours Worked Week 5-6	Total Hours	Contribution
Ben Holt	8	24	<ul style="list-style-type: none"> <li>- Created the Bi-weekly status report and helped organize our PRIM meeting presentation.</li> <li>- Facilitated our weekly meetings with our client.</li> <li>- Worked on troubleshooting wind turbine simulations.</li> </ul>
Daniel Mendez	8	24	<ul style="list-style-type: none"> <li>- Facilitated discussions with Client and building manager to understand the feasibility of working with hardware in a separate lab</li> <li>- Reviewed and optimized solar PV model by adding MPPT and Charge controller</li> <li>- Worked with team members in designing a hybrid model</li> <li>- Initial developments for lab manuals</li> </ul>
Conner Makoben	8	16	<ul style="list-style-type: none"> <li>- Worked on the wind/solar hybrid Simulink model</li> <li>- Researched hybrid standalone systems to learn more about how to use Simulink to model the hybrid system</li> <li>- Worked on potential lab experiments for the wind and solar hybrid simulation</li> </ul>
Mohamed Adam	8	16	<ul style="list-style-type: none"> <li>- Troubleshooted wind turbine simulation outputs issues</li> <li>- Did some research about the wind turbine simulation generator</li> </ul>

			alternatives that may help in building a generator block for the system rather than using the standard ones in the Simulink library
Samah Shabbo	8	24	<ul style="list-style-type: none"> <li>- Collaborated with the team to decide the next steps of the project and the team final vision.</li> <li>- Finalized the total estimate of the project.</li> <li>- Work with the team to develop wind turbine lab experiments and lab manuals.</li> </ul>

### **Pending Issues**

Now that the hardware issue has been resolved the only pending issues we now have are getting our wind turbine simulations to work properly. Currently, our current waveform results don't make any sense, however, our voltage waveform makes sense. We are still trying to troubleshoot the issue. Another possible pending issue is joining solar and wind simulations into a hybrid system. How the system is wired up might cause issues with the simulation model.

### **Plans**

Our future plans involve troubleshooting and trying to get the wind turbine simulations working as expected. Since this is a major step we plan on having all group members work on individual simulations and have members check each other's simulations to develop a working design. We plan on continuing to develop lab experiments for wind and hybrid simulations for future use. We hope to have the wind simulations finished in the next week to start working on hardware documentation for future use.