

# **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 #4 Sept 28th - Oct 11th**

### **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 still in simulation and experiment development. Our team members worked in smaller teams to work on separate models to integrate into our hybrid system. Once we were able to design and develop models for both wind and solar PV, we are then able to integrate them into one system. The wind turbine model was troubleshot with its issues being resolved with the help of our advisor's grad student. Our hybrid model had a charge controller component added into the system which adjusts the generation system dependent on the batteries charge. The wind turbine component was added into the hybrid system and an inverter section was added to convert our DC bus connecting the two generators into AC power if required. Lastly, we started to develop lab experiments by looking into which change in variables affect parameters of wind turbines. and how their relations would be beneficial for educational purposes.

### **Contributions**

<b>Name</b>	<b>Hours Worked Week 5-6</b>	<b>Total Hours</b>	<b>Contribution</b>
Ben Holt	8	32	- Facilitated our weekly meetings with our client and developed the status report.

			<ul style="list-style-type: none"> <li>- Finalized Windturbine simulation issues and verified the model mathematically.</li> <li>- Worked with Daniel to implement the wind turbine model into our hybrid model.</li> <li>- Reviewed hybrid model on components functionality.</li> </ul>
Daniel Mendez	<b>8</b>	<b>32</b>	<ul style="list-style-type: none"> <li>- Worked with team members to troubleshoot various components of wind and solar pv models separately</li> <li>- Designed and developed hybrid model that integrates wind, solar pv, converters, inverters, battery, battery charge controller, mppt, and ac/dc loads together</li> <li>- Troubleshot hybrid system to optimize its capacities</li> </ul>
Conner Makoben	<b>8</b>	<b>24</b>	<ul style="list-style-type: none"> <li>- Researched hybrid PV/wind standalone systems and models.</li> <li>- Worked on a hybrid Simulink model with a temporary DC voltage source in place of the wind turbine.</li> <li>- Began reviewing current hybrid model to gain a better understanding of how it functions and what different components contribute to the outputs.</li> </ul>
Mohamed Adam	<b>8</b>	<b>24</b>	<ul style="list-style-type: none"> <li>- Troubleshot wind turbine simulation outputs issues</li> <li>- Did some research about the wind turbine simulation parameters and the mathematical validation of the wind turbine calculations</li> <li>- Attended group meeting regarding the hybrid system configuration and how</li> </ul>

			the wind part could be integrated into the system
Samah Shabbo	8	32	<ul style="list-style-type: none"> <li>- Attend all the group meetings and the client meetings.</li> <li>- Worked on the electrical schematic diagram of the wind turbine</li> <li>- Worked on the wind turbine lab manual.</li> </ul>

### **Pending Issues**

Currently, the only pending issue we face is the potential for the hybrid simulation model to develop simulation errors. Currently, we are finding issues on how power is being dissipated through the system. In order to remedy this, we will work through any issues in a step by step matter to find which component of the hybrid system is causing issues. Within last week and this upcoming week, we will continue to work towards finding a solution to this issue as a team.

### **Plans**

Our plans for the next period involve finalizing our hybrid simulation by making sure it makes sense mathematically at every part. Once our simulation models are all correct we then plan on using them to develop lab experiments. We already have solar experiments so we will be developing hybrid and wind labs. Once the experiments are finished we plan to develop documentation on our hardware system design. We hope to have the hybrid simulations completed by the end of this reporting period.