

# **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 #5**

**Oct 12th - Oct 25th**

### **Team Members:**

Conner Makoben - Electrical Engineer

Mohamed Adam - Electrical Engineer

Daniel Mendez - Lead Engineer

Samah Shabbo - Electrical Engineer

Ben Holt - Electrical Engineer

### **Summary**

During the last two weeks, we have been working on the hybrid model that consists of various components such as solar pv, wind turbine, converters, battery charging and dc loads. In doing so, we have encountered some areas of concern in some of the components on our system. More specifically, we are not sure where some of the voltage dissipates even though the overall power of the system is functional and modeled correctly. The wind component of our hybrid system started to have issues with producing a good input torque. This drastically affected our power output from the wind into our hybrid system. This was the main item that the team worked on to try and get the hybrid model functioning properly. As we are nearing the end of the semester, we are making it a priority to have a fully functioning hybrid model with documentation of the system.

### **Contributions**

<b>Name</b>	<b>Hours Worked Week 5-6</b>	<b>Total Hours</b>	<b>Contribution</b>
Ben Holt	12	42	- Facilitated our weekly meetings with our client and developed the status report.

			<ul style="list-style-type: none"> <li>- Troubleshoot and solved a pop-up issue with wind turbine simulation not outputting the correct torques.</li> <li>- Rebuilt the wind simulation to fix the torque issue.</li> <li>- Worked on implementing the rebuilt wind model into the hybrid model.</li> </ul>
Daniel Mendez	<b>8</b>	<b>40</b>	<ul style="list-style-type: none"> <li>- Worked on hybrid model</li> <li>- Evaluated ways to optimize current system</li> <li>- Discussed with team members on issues of concern with wind turbine model</li> </ul>
Conner Makoben	<b>8</b>	<b>32</b>	<ul style="list-style-type: none"> <li>- Reviewed and tested overall hybrid model</li> <li>- Reviewed new wind turbine model</li> <li>- Worked on trying to implement a buck converter into the new wind turbine model</li> <li>- Performed troubleshooting on the buck converter to try and figure out where problems are arising</li> </ul>
Mohamed Adam	<b>8</b>	<b>32</b>	<ul style="list-style-type: none"> <li>- Worked on reviewing the hybrid system model, and checked wind turbine simulations outputs.</li> <li>- Attended team members meeting for wind turbine discussion, and the plans for the remaining time of the project.</li> <li>- Worked on designing blocks for the wind turbine and PMSG generator for the wind turbine modeling</li> </ul>
Samah Shabbo	<b>8</b>	<b>40</b>	<ul style="list-style-type: none"> <li>- Worked on designing the buck convertor</li> <li>- Worked on implementing lab</li> </ul>

			experiments for wind turbine modules. - Attended three meetings with the group and the client.
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### **Pending Issues**

The two pending issues we had were the wind simulation not producing a decent torque for power generation and an unknown voltage drop from the output of the wind component when hooked up to the hybrid system. The torque issue from the wind simulation was resolved by rebuilding the wind turbine model with a few changes to components. The Simulink block that was being used to find torque produced from a wind speed input was found to be the cause of the problem. The current pending issue is the voltage drop from the wind component. When the wind component is tested separately it produces around 75V. When the wind component is added to the hybrid system it produces 24V with the same input. We suspect that the 24V regulating battery system we implemented may be the root cause of this issue. We plan on troubleshooting by going through each component to see how they interact with each other.

### **Plans**

Our plans for the next couple of weeks will be to mainly finish the hybrid system model with no outlying issues. We hope to complete this goal by next week. Since our wind model is working individually we plan on starting to develop multiple lab experiments around the wind model. Once we finish the hybrid model we will then plan on creating more lab experiments for the whole system in order to tie together the individual components into one. Lastly, with the semester coming to a close we plan on starting our poster for the industry panel next week.