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 #6
Oct 26th - Nov 8th

Team Members:
Conner Makoben - Electrical Engineer
Mohamed Adam - Electrical Engineer
Daniel Mendez - Lead Engineer
Samah Shabbo - Electrical Engineer
Ben Holt - Electrical Engineer

Summary

As the semester is coming to an end, our team has been working efficiently on completing the last remaining milestones. Some of those include completing a wind and solar pv hybrid model via MATLAB/SIMULINK that studies the behavior of clean power regeneration as well as lab experiments that enhance the learning experience. In regards to our wind turbine model, our team member Ben was able to optimize the system so that the output voltage, current, and power is stable when functioning as a stand-alone system. Due to the success of it, we were able to move forward with it and integrate into the hybrid system that includes the solar pv system and battery storage. Once this was accomplished, we needed to adhere to a few design constraints where we considered how much power each system can produce to store as well as dissipate it across DC or AC loads. In the end, our team's system was completed within specifications. One lasting milestone is to design and complete a full report on how to study hybrid models as well as a lab manual as a tool to learn the technical aspects of the system.

Contributions

Name	Hours Worked Week 5-6	Total Hours	Contribution
Ben Holt	**20**	**62**	- Facilitated our weekly meetings with our client and developed the status report. - Met with our grad student to run through our model to verify our wind turbine model is functioning properly. - Developed and tested 3 different lab experiments with the wind turbine model to be used in EE 452 lab. - Created the lab instructions and reporting template for the wind experiments.
Daniel Mendez	**21**	**63**	- Studied wind and solar pv hybrid model with battery storage and integrated it within a MATLAB/SIMULINK environment - Worked with team members to troubleshoot various components of the system to either stabilize or optimize its power conditions - Worked with grad student to learn and understand design parameters of a hybrid system - Assisted with designing and developing lab experiments for EE 452 lab that studies the hybrid model - Briefed our client on the status of the project and verified design meets expectations

Conner Makoben	**10**	**42**	- Reviewed new wind turbine models - Worked on creating a buck converter for new wind turbine simulation - Worked to troubleshoot the new buck converter - Continued working and experimenting to troubleshoot and correct the oscillating current at the input of the buck converter
Mohamed Adam	**20**	**40**	- Worked in designing buck converter for the wind turbine model - Troubleshooted the output current of the wind turbine rectifier - Worked in the rectification of the oscillating waveform of the wind turbine rectifier output current - Attended four meetings regarding the project work development with our group and our advisor
Samah Shabbo	**12**	**52**	- Work in designing buck-convertor. - Fix oscillating current with the wind turbine. - Attended five meetings with the group and client.

Pending Issues

Currently, the only pending issues we are facing are problems with a buck converter added to our wind turbine where the input current to the converter is oscillating. Currently, the wind turbine without the buck converter outputs a non-oscillating voltage and current. Once a converter is added to step down the voltage the input current oscillates. However, the buck converter is an extra component that isn't necessary for the system to work correctly. So it is not a huge deal if the issue is not resolved after this week. The only other issue we could be facing is that we only have one more week before our deadlines. However, we plan on working a lot on our final tasks and documents this week to meet that deadline.

Plans

With the last work week ahead of us we plan on finalizing our entire documentation for our project. The main plan is to design and finalize a lab experiment for our hybrid model. Once we finish the hybrid lab we plan on finalizing our lab documentation for solar, wind, and hybrid making sure their formatting is correct and free of errors. Lastly, we plan on finishing up our senior design group poster and final report for our project before our deadline this Sunday. Once we finish the poster we also plan to practice our presentation for the industry review panel next week. We hope to wrap up our project with clear documentation that can be used by the next group to continue on the project.