EE 491 WEEKLY REPORT #8 ***Date: 3/27/2017***

Group number: DEC1706

Project title: Renewable Energies Lab

Client &/Advisor: Prof. Ajjarapu

Team Members/Role:
Leader: Travis Merrifield
Webmaster: Elika Korhonen
Communications: Noah Chartouni
Idea Holder: Josh Pachl & Steve Ukpan

- **Weekly Summary**

This week was spent reviewing a few concepts that we need to get covered. These concepts include the limits that are involved the the boost or buck converter used in the MPPT module. One of the major concepts that needed to be understood was the role of the battery. The battery is one of the most important parts of the standalone pv system as a properly sized battery is the primary factor in being able to provide a constant voltage to our load. We also had to analyze the efficiency of the pv system and determine how this contributed to various losses. These items were researched as well as some attempts were made to model them in simulink. The battery portion was heavily researched and we ran various simulations in an attempt to understand it.

- **Past week accomplishments**

We found more calculations and discovered more limitations with our L and C values, based on the loads we are expected to see. We looked at efficiency of the system with and without the MPPT and made conclusions. We researched battery charge controllers and implemented a shunt controller into the model.

- **Individual contributions**

NAME	Hours this week	HOURS cumulative
Elika	7	58
Josh	5	50
Noah	6	41
Travis	8	51
Steve	4	47

  - **Elika:** Researched batteries inside a PV system by reading papers on the topic. I found many sources that discussed how to implement a battery control circuit and handle load management. I studied different battery types, how they fit into a system, and the charging parameters of each type. I spent a small amount of time studying Travis and Josh's Simulink model of our system.
  - **Josh:** Did research on the specific battery that is used in the current model. Read through the data sheet while trying to understand the different parameters of the battery and trying to identify the noteworthy parameters on the data sheet. These things include cyclic and standby. As well as how the voltage and charge of the battery are related. These need to be figured out because in order for the charge controller to work it has to made decisions based on the charge of the battery. It is imperative that we do not overcharge or discharge the battery when it is connected to the solar cell so a controller is implemented.
  - **Noah:** Researched batteries, particularly emerging technologies and how they might help our system evolve in the future. This included researching future capacity expectations, chemical differences and how close the batteries are to fruitation. Also looked at integration of batteries into our system and how they will impact the amount of power we can retrieve from it.
  - **Travis:** Read all of the material found by Elika regarding batteries in a PV system. Implemented the shunt charge controller into the model. Created plots that compared the efficiency of the system with and without the MPPT. Made conclusions based on this data. Spent time reviewing the material Josh made regarding the limitations of the L and C values.
  - **Steve:** Read documentation on batteries for a pv system. Reviewed the limit calculations by Josh to get an understanding of the graphs he plotted and the efficiency plots. Did reading on solutions to implementing different solar panels together.
- **Comments and extended discussion**

We are starting to move out the software and model portion of the project. In the coming weeks we will start to look at hardware designs. This will give us a head start on next semester.

Plan for coming week (please describe as what, who, when)

- **Elika:** Think of a direction for our project to head (choose an area to focus on), study a better battery circuit for our system, and work on lab experiments. The lab experiments will provide me with a great direction on where our project should go by learning what the other students will learn.
- **Josh:** The plan for the coming week is to hopefully accurately model a changing load and changing irradiance with battery in simulink. This will be the final step to have a in depth understanding of a standalone Solar PV system. If we can accurately observe lets say a accurately modeled 24 hour load with the battery and everything involved. I will work on modeling the changing load as well as irradiance for an average day and hopefully implement this into simulink.
- **Noah:** Brainstorm with the rest of the team to design a new workstation for the EE452 lab and how we can clean up the current setup. Look at other battery integration techniques so we are better utilizing our peak solar times.
- **Travis:** Start a list that everyone can access on the drive. Brainstorm ideas for workstation designs. This of new, creative, relevant ways to make the station so students will be engaged and the information will stick. Find and implement a new and charge controller; one that uses the solar power when the battery is fully charged.
- **Steve:** Work with the current simulink model with the ideal battery then modify what needs fix so we get more practical value during the charging/discharging phase. Develop ideas that are practical and cost effective for the EE 452 lab workstation.

- **Summary of weekly advisor meeting (if applicable/optional)**

Advisor meeting we presented on our findings regarding batteries and their applications in our system. We showed how the battery integration would affect the system and showed a basic setup. We discussed with our advisor other possibilities regarding how we integrate the batteries and possible advantages to different setups. Furthermore, we discussed updated goals for the team and how we can improve on the current setup in the 452 Lab.