

Group number: DEC1706

Project title: Renewable Energies Lab

Client &/Advisor: Prof. Ajarapu

Team Members/Role:

Leader: Travis Merrifield

Webmaster: Erika Korhonen

Communications: Noah Chartouni

Idea Holder: Josh Pahl & Steve Ukpan

- **Weekly Summary**

The main focus this week was completing the Project Plan. This took up most of our hours because we wanted to have a good first draft. This will hopefully save us time in the future. We also generated new I-V characteristics of the PV cell by using various resistor values. We then tried to model an MPPT by simply using a booster and manually controlling the duty cycle. This was not giving us the expected result. It became clear, and some of us thought about it before, that no matter what we changed the voltage and current to, the power would be the same.

To overcome this obstacle, we know that we are going to have to use the battery that we are using to run the system when there is an absence of sun or wind. How we are to implement this however is still not clear. There was a lot of discussion on this topic during our weekly meeting. In conclusion we have some areas that need clarification and we will dig into those areas this week.

- **Past week accomplishments**

- We we created I-V curves with varying load and presented our knowledge on the subject. Prof. Ajarapu was pleased and agreed we understood the fundamentals of this topic.
- Generated the project plan to include; flow charts, time tables and references.

- **Pending issues**

- **Elika:** Fix current MPPT model and read literature. Our understanding was not up to our advisor's expectations.
- **Josh:** Need to hone in our understanding of the MPPT. This will be accomplished by searching for more literature as well as receiving other models from group members that had previously done this.
- **Noah:** Read literature on MPPT and get a functionality understanding of how one works. Start to look at possible solutions to increase power on the solar side.
- **Travis:** I need to get in contact with the other group and see if they have any other simulations that we can use for reference.
- **Steve:** Validate the purpose and the effects of an MPPT model and simulating and I-V/P-V with and without MPPT functionality

- **Individual contributions**

<u>NAME</u>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Elika	7	37
Josh	5	31
Noah	6	24
Travis	8	32
Steve	8	29

- **Elika:** Worked on group website and got it working. Added some features to it and studied more PV literature regarding our MatLab model.
- **Josh:** Contributed to the project plan. Also spent time trying to create a simulink model to manually observe what was happening when we adjusted the voltage on the output terminals of a solar cell. Although it did not work like expected it was good to observe this outcome for a better understanding.
- **Noah:** Looked over presentation making checks for spelling and layout etc. Tried to recalculate our values for our duty cycle to try and find out why our output values were coming out with too much ripple.
- **Travis:** Completed the introduction, deliverables and design portions of the project plan. Created the I-V curves and corresponding relationships.
- **Steve:** Developed a Gantt chart for our project timeline. Sourced an extra MPPT simulation documentation.

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

- **Elika:** I will work with the team to try to understand the MPPT model that we are struggling to get our heads wrapped around. We will all read the information on Thursday and Friday together. I will also add project info to our website as well as more content.
- **Josh:** MPPT will be of the utmost this week. It is imperative that we work out the remaining understanding that we need to have about solar PV models so that we can move on. The big thing will be getting more literature that explains this. We will also seek out help from the other group working on this project as we clearly do not have the proper understanding of what is happening with MPPT.
- **Noah:** Read MPPT literature to really hone in on what is going on within the functionality of the MPPT itself and how it is affecting the circuit. Also I will look into possible solutions regarding the boosting of power on the solar side to see if power can be increased.
- **Travis:** Read MPPT documentation again and try to find some circuit diagrams of the MPPT. I need to contact the other group and see if they have any more models that we can use for reference. There are also 3 currents that we need to measure on the PV Cell to see their relationship.
- **Steve:** Read documentation to get an understanding of how to adjust power across solar cell terminal. Then simulate a working MPPT model in conjunction with a boost converter. Verify simulations coincides with the solar panel datasheet.

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

This weeks meeting was very similar to last week where we did not have the exact information that prof. Ajarapu wanted. We briefly discussed our VI curves and spent most of the meeting discussing our circuit model. He spend some time talking about the model and defining what values are constant and what values can change. This is important because our MPPT has a limited amount of variables it can change in order to get maximum power. Next meeting we will present information on how we modeled an MPPT and how the solar cell terminal voltage adjust on the I-V/P-V curves. He would like us to use the prior team model as a reference and for us to model MPPT an energy source this will help us show we are receiving the maximum power with a fixed load.