

EE / CprE / SE 492 – sdmay20-10

Power Scraping Module

Week 3 Report

2/14/2020 -2/27/2020

Client: Honeywell FM&T

Faculty Advisor: Gary Tuttle

Team Members/Role:

Jordan Fox — Chief Engineer

Xiangyu Cao — Design Engineer

Andesen Ande — Design Engineer

Ahmed Salem — Test Engineer

Ben Yoko — Test Engineer

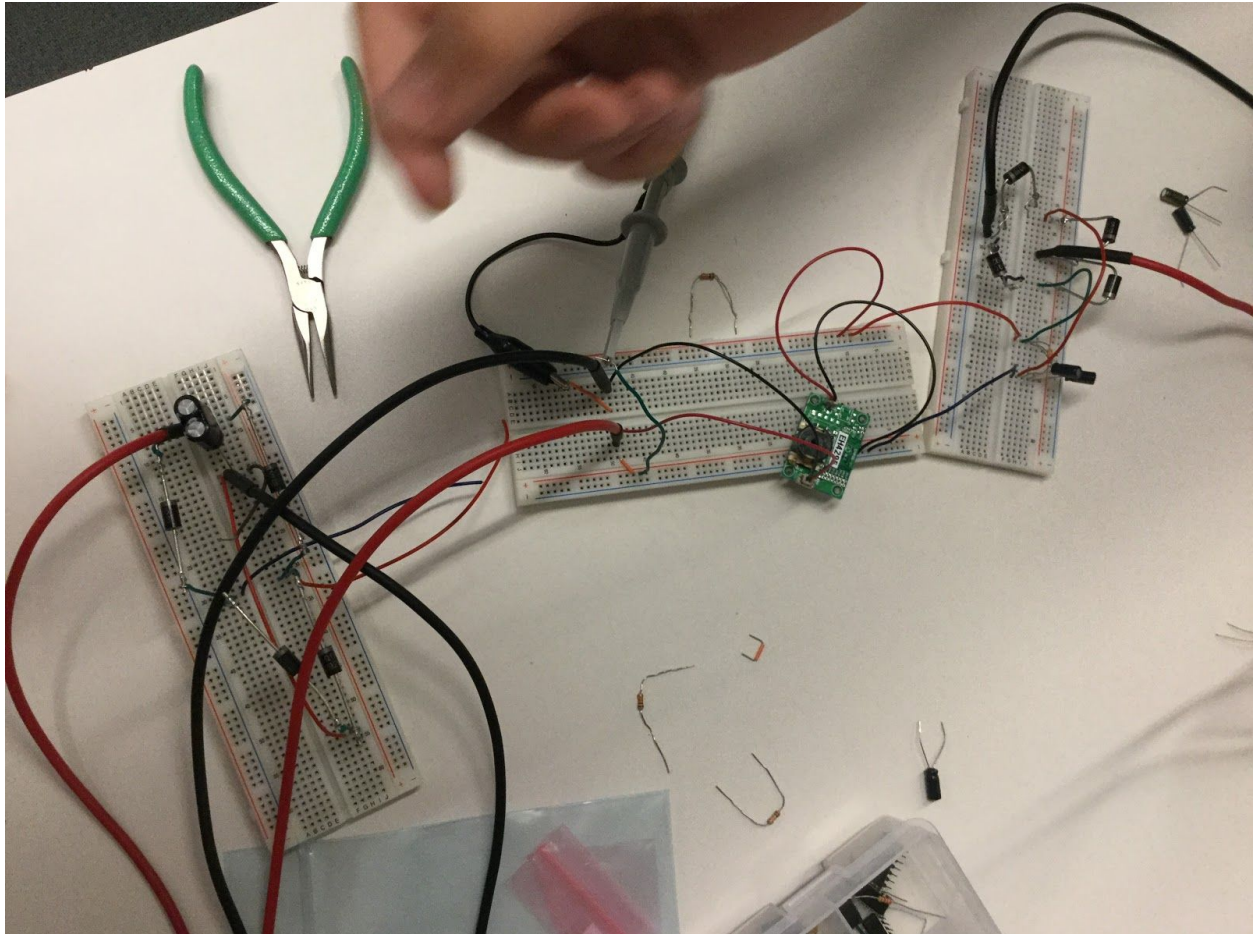
Shahzaib Shahid — *Team Leader*

Weekly Summary

The objective of these past weeks was to test the booster individually and assemble the final circuit. This week we confirmed that the booster works as advertised and we have assembled the final circuit. There is still some work to be done with fully understanding the output waveform which is not quite what we expected. With testing we want to find the maximum charge the system will charge to and the rate at which it charges. Once we have finished testing we will consider ways we can improve the design. We are on track to create a PCB and meet some of our stretch goals.

Past Week Accomplishments

Booster and System Testing



The figure above shows the initial testing setup of the entire energy harvesting circuit including the EH4205 module and two rectifiers. We tested the booster individually to find out the lowest voltage at which the booster will work. The voltage required to start the booster is around 0.3 V and the operational voltage is as low as 0.1 V. We found that this was fairly accurate when we used a 0.3 V DC signal into the booster. The maximum output voltage we were able to obtain was around 6 V which is significantly more than we are required to output. Since the booster is using a transformer the output current was reduced as expected so the charging rate of the supercapacitor is extremely slow. From our initial rough calculations we estimate the time to charge the supercapacitor to 3.3 V is greater than 10 hours. In the context of our application, which is energy harvesting, this is normal. We still have to perform further testing to generate a report on the performances of the entire circuit.

Individual Contributions

<u>Name</u>	<u>Estimated Hours this week</u>	<u>Estimated Hours Cumulative</u>
Jordan Fox	5	12.5
Xiangyu Cao	6	14.5
Andesen Ande	5	12.5
Ahmed Salem	5	12.5
Ben Yoko	6	14.5
Shahzaib Shahid	6	14.5

These times reported are estimates based on approximately 3 hours of group work done each week in addition to work done alone. The time spent is over the course of two weeks in which meetings with our advisor and client are not factored in. Our project plan showing our work schedule can be made available upon request.

Plans for the upcoming week

1. Integration testing -all team members
 - a. Determine the charge rate.
 - b. Determine the total time it takes to charge the capacitor to 3.3 V.
 - c. Voltage on the smoothing capacitor at the output terminal of the booster.
 - d. Test the difference in charge rate between full and half-wave rectifier.
2. Meeting with client - all team members
 - a. Discuss performance of system and get feedback on performance
3. Finish making changes to peer evaluation powerpoint and record video- all team members
4. Continue updating design document - Andesen and Ahmed

Summary of weekly advisor meeting

We have just begun integration testing and are looking to fully understand the output we are receiving. That includes a complete understanding of the duty cycle of the booster and the entire system performance. We have determined so far that the booster will make it into our final

design. We have set aside time in the upcoming week to test the system with our advisor to confirm everything is working. We are currently in good shape and will consider ways to improve design, and create a PCB.