EE / CprE / SE 492 – sdmay20-10
Power Scraping Module

Week 1 Report

1/13/2020 -1/27/2020
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

This week we regrouped after winter break to discuss the status of our project. The objectives of this week to reassess what parts of our circuit we are confident in and create a schedule for the rest of the semester. We have determined group working hours, and will set up a biweekly meeting schedule with our client and faculty advisor. We also determined that we need at least five weeks in order to have a working PCB by May. One member investigated a different way we could go about rectification.

Past Week Accomplishments

Bridge Rectifier

Table: Vin (Peak-Peak) vs. Vout (DC)

| 100 Hz		1 kHz		5 kHz		10 kHz		100 kHz	
Vin (p-p)	Vout (DC)	Vin (p-p)	Vout (DC)	Vin (p-p)	Vout (DC)	Vin (p-p)	Vout (DC)	Vin (p-p)	Vout (DC)
5	3.42	5	5.02	5	5.97	5	6.07	5	6.05
4.5	3.05	4.5	4.46	4.5	5.29	4.5	5.37	4.5	5.35
4	2.68	4	3.91	4	4.61	4	4.68	4	4.65
3.5	2.3	3.5	3.36	3.5	3.94	3.5	3.995	3.5	3.96
3	1.92	3	2.81	3	3.27	3	3.31	3	3.28
2.5	1.54	2.5	2.26	2.5	2.6	2.5	2.64	2.5	2.61
2	1.172	2	1.72	2	1.95	2	1.97	2	1.95
1.5	0.81	1.5	1.18	1.5	1.32	1.5	1.328	1.5	1.3
1.1	0.527	1.1	0.758	1.1	0.826	1.1	0.832	1.1	0.81
1	0.457	1	0.654	1	0.708	1	0.713	1	0.692
0.9	0.388	0.9	0.552	0.9	0.593	0.9	0.597	0.9	0.577
0.8	0.326	0.8	0.452	0.8	0.482	0.8	0.484	0.8	0.467
0.7	0.26	0.7	0.358	0.7	0.377	0.7	0.378	0.7	0.362
0.6	0.206	0.6	0.269	0.6	0.281	0.6	0.28	0.6	0.267
0.5	0.16	0.5	0.193	0.5	0.199	0.5	0.19	0.5	0.188
0.4	0.12	0.4	0.137	0.4	0.14	0.4	0.13	0.4	0.133
0.3	0.094	0.3	0.1	0.3	0.102	0.3	0.1	0.3	0.098
0.2	0.073	0.2	0.074	0.2	0.077	0.2	0.074	0.2	0.074
0.1	0.056	0.1	0.056	0.1	0.058	0.1	0.058	0.1	0.058
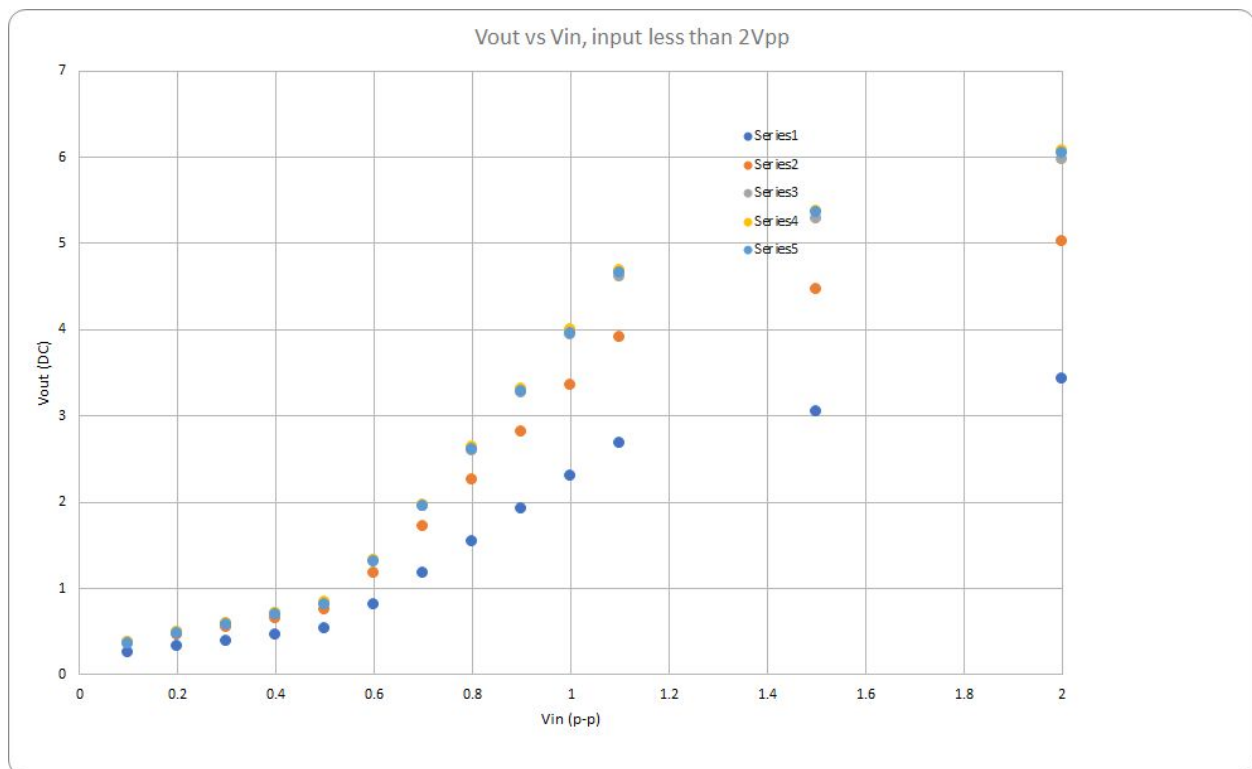
Figure: Bridge Rectifier Vin vs. Vout at varying frequencies

Previously for the rectifier we investigated schottky diodes. We observed that the schottky diodes would rectify the input AC signal with a forward voltage drop of approximately 0.4 V. We wanted to investigate better ways to rectify a signal. Over the break Ben tested a bridge rectifier chip and found that it had an approximate 0.3 forward voltage drop. The test chip most likely will not be used in our prototype. However it may be an indication of better performing diodes than we currently are using or could lead to building a bridge rectifier. Another diode we searched for was a germanium diode on digikey. We were told that there may be some diodes that are available with a voltage drop of .2 V. We have not found any diodes that provide a competitive voltage drop than the schottky diodes we already have tested. We will continue to investigate ways we can minimize the voltage drop in order to increase the range at which our circuit could operate.

Individual Contributions

Name	**Estimated Hours this week**	**Estimated Hours Cumulative**
Jordan Fox	2.5	2.5
Xiangyu Cao	2.5	2.5
Andesen Ande	2.5	2.5
Ahmed Salem	2.5	2.5
Ben Yoko	2.5	2.5
Shahzaib Shahid	2.5	2.5

Plans for the upcoming week

1. Meeting with client - all team members
   a. Discuss booster testing results and building a booster
   b. Discuss the rectifier results and decide what direction to go
2. Begin researching booster convert with inductor -Ahmed and Andesen
3. Begin researching charge pumps- Jordan
4. Begin researching synchronous rectifier switch- Ben and Shahzaib
5. Re-test the schottky diode according to faculty advisor suggestions in order to evaluate whether it is a viable option for rectifying - Cao

6. Create a schedule for the upcoming semester and send our client-Andesen and Ahmed
7. Prepare a progress report for the instructor meeting by next Monday- Andesen and Ahmed

Summary of weekly advisor meeting

We are currently figuring out our booster and rectifying stage of our circuit. One of the objectives was to make our circuit as efficient as possible so we will continue to investigate different ways to achieve this. This is done so that when we give a report to our client they know we found the most efficient way within our means. We have delegated the work that needs to be done and are on track to create a prototype on a breadboard.