

sdmay19-15: Capacitor Gun

Week 3 Report

February 4 - March 3

Client: Max Balzer

Faculty Advisor: Mani Mina

Team MembersGrant Larson — *Test and Design Engineer*Max Balzer — *Meeting Facilitator and Production Engineer*Bret Tomoson — *Projectile and Power System Designer*Brett Nelson — *Documentation, Engineer Designer*Mark Fowler — *Test Engineer, scribe*Zachee Saleng — *Engineer designer*

Summary of Progress this Report

We reflected on what we accomplished last semester as a group and what we need to improve on and change. We split into three groups to effectively divide up the work which Mani recommended in our bi-weekly meeting.

Past Week Accomplishments

- Split into three groups to divide work
 - Group 1: Max and Bret will work on creating a small, demo model of an electromagnetic propulsion device to help convey engineering theories and technology.
 - Group 2: Mark and Grant will work on the charging circuit either by fixing the current one or making a new one.
 - Group 3: Brett and Zachee will create a document clearly outlining the theory of operation of an electromagnetic propulsion device.
- Looked into fixing current circuit and circuit alternatives - Mark
 - Worked with circuit group to create a circuit in multisim for a voltage multiplier.
 - Worked on RC snubber circuit, began designing for our built circuit.
- Materials and small scale design research and production- Max
 - Bret and I have tested the capacitor charging off of a wall outlet. The test did not go as planned so we will have to try again.
 - Machining the metal is proving to be difficult. We were told we could get it machined on campus by one person, but when talking to another person from the same place we got nowhere. We were told to wait until Monday for more information on the machining of our aluminum.
 - I have re-split the team into 2 groups. One group composed of me, Grant, and Mark will work on a different charging circuit. The other group will work on cleaning up our theory of operation.

- We re-tested the charging circuit and it does work to charge the capacitor to around 280V. This is enough to see results when the whole project is tested, but we are still trying to find a way to get 450V off of a 12V battery
- Theory of Operations - Brett
 - Continued to work on the Theory of Operations
 - Zachee and I got feedback from our advisor and have been addressing each and every one of them
 - Had a meeting with Dr. Mina to go over what the group has been doing, and he was able to help point us out in the right direction with our ideas.
- Established plan for the semester and began small-scale design - Bret
 - I worked with Max to get the temporary charging circuit working from wall power with a variac to control voltage.
 - I also started work with the theory of operation team to help clean up some of the writing.
- Finalized a charging circuit design and ran simulations -Grant
 - Took professors help with the design and applied it
 - Created a schematic in Multisim
 - Ran simulations to find outputs, power, etc
- Theory of Operations - Zachee
 - Brett and I worked on the theory of operations, focusing on references and the safety aspect
 - We sent it to the advisor, Dr Mina to have him look at it and provide us feedback
 - Worked on the theory of operations (on going)

Pending Issues

- Analyzing the charging circuit that we have already created with the help of professors to better understand and fix what is wrong with it.

Plans for Upcoming Reporting Period

We will all continue working in our groups on our specific tasks.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Grant Larson	I finished my charging circuit design and researched a good amount of the materials	4	16

	that out be needed to complete it. I helped with the virtual design and simulation testing to figure out exactly what we should expect as outputs and found out how much power every component of the design could handle before it fails.		
Max Balzer	I split the team into 2 groups instead of 3. We are going to focus all of our strength on creating a charging circuit that outputs 450V and make sure the theory of operation is cleaned up and as well made as possible. We have a working charging circuit off of a wall outlet. This means the capacitor won't get to its max 450V but it will get to around 280V which will be enough to see the results we need when we test the project as a whole.	14	18
Bret Tomoson	Worked on charging circuit from wall power to get a variable charge from 0-280V. I also started on cleanup of the theory of operation.	12	16
Brett Nelson	Continued to do work on the Theory of Operations. We got some feedback from our advisor, Dr. Mani, and will be continuing to go through them and fulfilling them.	8	18
Mark Fowler	Researched rc snubber circuit and began designing it. Worked with Grant and max to build multisim simulation for voltage multiplier.	7	17
Zachee Saleng	-Continued working on the theory of operations, according to the feedback that was provided by the advisor. -we met with the advisor, to discuss the potential interest of the project. He gave us a lot of advisors,	8	18

	always making sure that we are moving in the right direction.		
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Plans for the Upcoming Week

- In the coming weeks we will be working on Theory of Operations: “on going” - Zachee
 - Will keep on adding valuable information and references.
 - We will with meet with Lee, to talk about the safety concern.
 - Continue to clean up the document.
- Begin designing rc snubber - Mark
 - Use resources i have found to design rc snubber circuit.
 - Work with circuit group to design and finish voltage multiplier.
- Small scale prototype design and calculations - Max
 - We need to talk with Lee to have him machine our aluminum for the small scale design.
 - Once we have our metal and UHMW machined we will start on the building of the small scale design.
 - My group of the charging circuit still needs to find a practical way to build a circuit that outputs 450V without breaking the budget for the project.
- Theory of Operations- Brett
 - Continue to address the different comments that Dr. Mani gave on the first version
 - Start finding useful references to use other than ones from Wiki
 - Start working to fulfill numbers with the equations we have
- Small-scale design and assembly - Bret
 - I will be working with the theory of operation team to clean up the safety documentation.
- Find more affordable parts for the circuit design or come up with a new design - Grant

Gitlab Activity Summary

Nothing to report.
