

High Current Pulse Generator for the Application of Transcranial Magnetic Stimulation

Clients/ Advisors: Priyam Rastogi, Neelam Gaunkar, Jayaprakash Selvaraj, Dr. Mani Mina

Project Objective: Over the course of 2 semesters, design, fabricate, and test a high-current pulse generation device for use in TMS research.

- Objective of Circuit

- Peak Current of 2 KA +10%

- EMF feedback must be considered

- Peak Current Sustained for 400 μ s

- Rise/fall time of 100 μ s

- Up to 36 Hz pulse frequency (Commercial Benchmark)

- Circuit Input is 120 V wall outlet.

- Range of Load - 5 micro-Henry (min) to Max(Undefined)

- 10 pulses a minute max

- Circuit shall be monophasic;

- If successfully completed then a biphasic version shall be built.

- The device shall output multiple waveforms (Square, Sawtooth, etc.)

Team Members:

Brian Kirkpatrick: Head of Circuit Design

Jon Rothfus: Head of Micro-Controllers, Team Communications Leader, Webmaster

Tania Alvarado Carias: Head of Electrical Safety

Abdul Bahashawn: Head of Rectification Circuits

Yan Wang: Head of Component Selection

Curtis Richards: Team Leader

Sub Teams:

Chassis Design: Tania, Curtis, Yan

-Meets Thursdays 2:00-2:30 p.m. Howe

Rectification Circuit: Abdul, Yan, Brian

-Meets Fridays 2:00-3:00 p.m. Marston

Power Circuit: Tania, Curtis, Abdul

-Meets Fridays 11:15-12:00 p.m. TLA

Micro Controller: Jon, Brian

-Meets Wednesdays 1:15-1:45 in TLA

Weekly Summary:

- Power Circuit:

We finished the capacitor charging/discharging testing. We were able to begin the IGBT testing with the circuit. So far, our results have shown success. This is noted in the weekly reflections.

- Chassis Design:

Construction is at a stopping point for the semester, and the rest of the time will be devoted to testing.

- Micro-Controller (M.C.):

N/A this week.

- Rectification Circuit:

Accomplishments of the Past Week:

Each member is to write up a reflection on their work throughout the week. The reflections can be found at <https://iastate.app.box.com/folder/46145323949>

Pending Issues:

- I. Due Dates
 - a. Weekly Report to be filled out by Saturday at midnight

- II. Team Reports
 - a. Update your sub team sections accordingly

New Business:

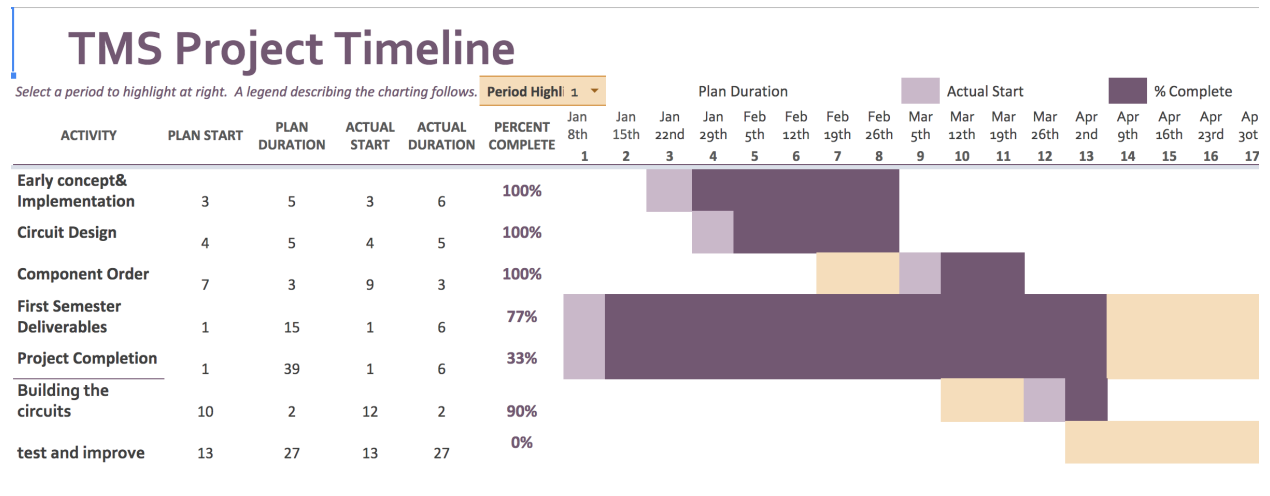
1. Final Report Out
 - a. Presentation Monday at 11:00 a.m.
 - b. Slides are in the google Docs.

Individual Contributions:

Group Member	Accomplishments	Time Worked This Week	Total Time Worked
Abdul	worked on presentation prep and design document	8	40

Yan	Worked on presentation prep, operational testing, memorized my portion of presentation and updated Gantt chart.	8	58
Jon	Soldered breadboard wire lead onto relay to make testing easier. Prepared for final presentation: slides, documentation, website updates, etc.	3	40
Brian	Functional testing of the rectifier, the capacitor and the emergency discharge circuit.	4	57
Tania	Worked on presentation prep and getting ready to deliver it.	7	52
Chuck	I finished construction for the chassis. The IGBT was tested with our circuit. It was proved to produce a successful pulsar to our coil, even if it is at low power. The current will be increased at the start of next semester.	14	103

Current Progress:



Individual tasks to be completed before next meeting:

Everyone:

- Weekly reflection
- Rectification Team
- Power Team
 - IGBT Gate Voltage
 - IGBT Testing in Circuit
 - Abdul

Financial Analysis

- Chassis Team
 - IR Camera
- M.C.
 - N/A this week.

Summary of Weekly Advisor Meeting:

We met with our Advisors this week to discuss the project for the coming semester. We plan to move forward with testing, and halfway through we will develop a second machine for biphasic operation. Also discussed was our final presentation and report out.