sdmay20-39: High Speed Magnetic Field Generator
Week 8 Report
January 30-February 13

Team Members
Jason Cheng — *Technology Lead*
Ben Colson — *Test Lead*
Zach Higgs — *Project Lead*
Harel Cohen — *Hardware Lead*
Craig Philipp — *Communications Lead*

Weekly Summary
This progress period was focused mainly on testing of small scale systems and solutions to existing problems that are preventing us from meeting our rise time requirements. The largest chunk of time was spent making a breadboard and perf-board model of the system to better test individual components, now we have a full scale model that we can easily go back to.

Past Week Accomplishments
This progress period was focused mainly on testing of small scale systems and solutions to existing problems that are preventing us from meeting our rise time requirements. From last period, to change around our testing protocol, we made a solderless perforated board prototype of our existing circuit, as well as a traditional breadboard with exact or close to exact duplicate parts from our original solution. This allowed us to use MOSFETs that weren't originally compatible with our test board from last semester. We can now vary our internal capacitance with greater precision. Because of this, we were now able to quickly change between MOSFETs helping us select one that had a faster rise time and close the gap between our current solution and our project goals.

We also decided to explore a new component to our circuit to boost our response, since the field generated is close to our limit, but changes based on the MOSFET used. By using a driver, we are now able to use GaN MOSFETs that our group plans on using as according to their specifications and our PSPICE model, they should give us similar rise times with what we need, as well as increase our field response to the Gauss strength we're looking for.

Pending Issues
• GaN driver needs to be implemented into circuit and proof of concept test needs to be executed
• Documentation needs to be updated and created for second semester
• Weekly meetings need to be standardized; Thursday and/or Friday isn't working
• Worknights need to be more organized and less spontaneous

Individual Contributions

Team Member	Contribution	Bi-Weekly Hours	Total Hours
Jason Cheng	This period, I have been mainly in charge of helping schedule out the meetings, and sourcing additional MOSFETs for testing in the circuit as a whole to decrease rise time without changing to GaN fets just yet, to see if we can achieve a minimum viable product without a substantial hardware revision. I have also been updating and maintaining the timeline and Gantt chart to give a better insight on current progress and what needs to be done in the period coming to finish on time, with a complete project. I'm also working on organizing the git repo, as our project files are not very organized, and our dependencies are not clearly marked so it would be very easy to accidently delete a hidden dependency or weird part.	12	124
Ben Colson	Spent time testing application circuit of boost converter on bread board with our chosen mosfet. Added additional elements to the circuit and duplicated our current solution onto a breadboard to more easily rearrange parts and see if moving trace lengths or connections will have any impact on signal and noise. Determined the board may have been too noisy and tested the circuit on a perf board Zack soldered together to try and identify sources of noise and possible solutions to noise reduction by moving parts or eliminating significant unnecessary runs of wire or equivalent traces on our circuit board(s).	10	108
Zach Higgs	Our goal this period was to test for parasitics using an LCR meter and build and start testing our MOSFET driver. This period I tested our current shunt resistor for its	12	120

	inductance and found that there is very little parricides with in are large current shunt resistor. Ben and I also started testing our MOSFET driver on a bread board, and we started testing the driver using a function generator and oscilloscope. In the last part of the period, we also tested the driver by soldering it to a perf board, to try and get more reliable results from that over our breadboard. We are still in the middle of testing the board, and are waiting for results soon.		
Harel Cohen	Harel will be taking over the testing of the MOSFET driver to see if it improves the rise time of the circuit. He will also be leading protoyping of the driver and finishing out testing in the solderless breadboard, and drawing up the parts in Altium for implementation in the final project. In this cycle, Harel sourced the GaN driver for use in the board.	10	116
Craig Philipp	Assisted in testing our current revision of our circuit as well as the LM5111 gate driver using a breadboard. We are currently planning on implementing our circuit with the driver on a perf board for more convenient soldering. I have also helped to create a plan for our weekly update meetings to keep them as efficient as possible. We will be discussing past weeks progress, what we want to get done by the next week, and we will assign tasks to each person so that if everyone is not available at the same time, we can still get work done.	12	124

Plans for Upcoming Reporting Period

• Implement GaN driver into perforated board solution before implementation into circuit
• Document MOSFET selection for possible future expansion; as of right now, we are using MOSFETs found around the lab and Coover
• Redesign PCB to incorporate driver if found successful
• Map new MOSFET footprints in Altium for possible inclusion in future boards.
• Organize meetings and figure out weekly schedule