ECE 445 First Meeting Agenda

* Set up regular meeting time
  + Mon 6-8pm
* Draw very high abstraction design of what our system will look like - ensure we agree on the general look of the design
  + Done
* Break up into clearly defined modules and prioritize (determine order of operations)
* Determine most important parts we will need particularly for power components,
  + Figure out which of these parts are candidates for the machine shop
  + Order: Microcontroller, Transistors, Gate Drivers, Rectifier
  + Determine parts we also need to order: Grounding rod, coil wire, protection
  + Look into HV Xfrmr/Variac
  + List everything we want, then separate into order vs find
* Set up meeting with machine shop - in particular, can they build the coil and/or transistor heat sinks

Jason’s Requirements:

1. First draft of Block Diagram

2. Your three High-Level Requirements

* A tesla coil that produces small visible and audible 3-5cm sparks to our ground rod.
* The coil can play several different notes and tones.
* The coil can take input from the guitar and will play the corresponding notes.

3. One subsystem requirement

4. It is highly recommended to finish a rough draft of your entire proposal before the TA meeting to make it most effective.

5. A permanently bound notebook with numbered pages. This notebook must be used only for senior design and will be turned in at the end of the semester for a grade. Suitable notebooks can be purchased at the ECE shop. If your team has opted for the git repo digital lab notebook, have the structure of the repository set up and ready to look through at the meeting.

6. Proof of completion of the lab safety training (in-person students only), uploaded to Compass.

Notes from our meeting with Jason

* Need quantitative chart of reqs to measure success like in NESLA example appendix
* Locker A6, combo: 48-04-20
* Look at OneTesla schematics
  + Look at dual resonant SSTC, but probably too hard, Jason recommends to avoid it
  + Bus capacitors and inductor - check resonance
* Dual resonant - put cap in series with prim coil
* Look into overlap loss = power dissipated as switch turns on
* Use a resonant converter to remove this
* Has to be dead on resonant freq
* Zero-current switching
* Can drive switching freqs to very high freq
* Consider a PLL for microcontroller to adjust freq, ie if an object is brought near the top load, it creates parasitic capacitance, changes resonant freq
* Igbits - gate may be more robust for high voltage and current
* Most static discharge can destroy transistors, worried that GaN may be susceptible to damage
* Consider buying mosfets with heat sinks in it
* Op amp can’t narrow pulse width, microcontroller can
* GaN says max gate-source 6V looking at one datasheet
* Look at Illini Voyager SP23
* No bullet points, unless explicitly asks for a list
* STM MAY be overkill, ESP sounds okay but do more research
* HW - build an LTSpice simulation, or at least a final circuit
* Try and have a preliminary schematic by next meeting
* **Meetings Tuesday 12pm at ECEB 2072**
* If turns ratio is high enough, can possibly skip HV and just use AC mains, may not need a transformer

Block diagram needs to be redone

Go roughly left to right

Color code, arrows with arrowheads

Merge gate drivers and switches

Protection doesn't need its own block

No circuit comps