Project Summary

Power supply

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We set out to build a power supply that was programmable, safe, and could output 2-14V. We had to first figure out what our power source would be, wall power, or 120V AC. We used a rectifier and transformer to change the AC voltage to Dc voltage. We used an Arduino uno microcontroller to implement the dual channels and handle the programable aspect. The microcontroller used two 5V pins with a PWM signal to modulated, or set, the voltage from 0-5V. This basically allowed us to control what voltage we wanted the microcontroller to output from 0-5V. We used a GUI and python programming language to make an interface that was easy to use and self-explaining. The program converted the user input into SCPI commands, which is what the microcontroller can receive and interpret. We used an amplifier PCB circuit to extend the range from 0-5V to 1-14V. We implemented two PCB's, one for each channel. To handle the safety feature, we implemented a heat sensor, which was mounted on the transform and rectifier block, because that is what dissipates the most power. The heat sensor was connected to the microcontroller, when the heat sensor reaches its threshold temp, it sends a signal to the microcontroller, which sends a signal to an Led which is visible to the user. The LED lighting up indicates a temperature warning to the user. The project was enclosed in a plastic box to implement a black box style, with standard plug ins and no loose wires.

To begin this project as a group we didn't really know how to implement and tackle the design problems. We knew what we need to use, such as the transformer, amplifier, and microcontroller but we did not know how to use it. We faced a lot of logical challenges, mostly questions about the flow and implementation, answering these questions took a lot of time and energy. Some major milestones of revision was in implementing our first amplifier, we used a BJT because we had worked on it the term before in lab and had some prior knowledge. After designing and simulating it, we prototyped and tested it live, and it didn't work as we expected. We tried everything from using different resistors, to changing the transistor, we re soldered and even tried a breadboard. With the deadline quickly approaching we used an opamp and were able to simulate, build, and test. It worked great. We had to go back and change our block diagram to match the new change. We also struggled with ordering the PCB, we actually ordered 3 PCB's incase we messed one up, which ended up happening during a demo. None of us had every ordered a PCB before and other than a workshop given by Brandy we had no knowledge. Daniel was our groups expert in PCB, although he was learning it at the same time we were. Although not being too sure and feeling shaky about how it would turn out, Daniel handled the PCB ordering and implementation flawlessly with no bumps or bugs.

Overall this project was a success and the group worked together seamlessly. The group all communicated effectively and was efficient in tackling problems. As a whole our group learned how important teamwork is, because although we had less technical skills and less knowledge then other groups, we still completed our project on time, because we were a good team. We used each other's strengths to complement our weakness. Not only were we able to work together, but we were able to enjoy ourselves why we worked.

Task	Start date	End date
Planning	Apr-6	Apr 9
Design	Apr 10	Apr 24
Building	Apr 13	Apr 24
Debug	Apr 24	May 18
Presenting	May 31	Jun 3

Task	Start on day	Duration
Planning	0	3
Design	4	14
Building	7	11
Debug	18	24
Presenting	41	3