Executive Summary

The design problem to be solved was to create a DC power supply that could be programmable by a PC. The original requirements included that the power supply needed to have two output channels, supply up to 1A of current through each of its channels, not allow any object greater than 1mm in diameter to enter the enclosure and only use standard US plugins for connecting to external devices, display the voltage and current to the user within 5% or .1V of the actual output voltage, and be programmable over a serial interface using SCPI commands. The additional requirements added to the project were that the power input would be rated at a minimum of 5V, 1.1A DC up to a maximum of 12V, 2A DC, and provide status feedback in the form of an LED that will be green when the current is in acceptable range and red when the overcurrent circuit breaker has been tripped. When the LED is red, the LCD display will provide an overcurrent error message.

The project was approached by creating a system level block diagram of different components of the project and assigning blocks to each person. Blake worked on the 3D printed enclosure and the custom PCB for the voltage regulation with a switching voltage regulator. Brock worked on the power distribution with buck-boost converters and the circuit breakers that would shut off the power when it reached the maximum current of 1A. Julissa worked on the user interface to enter the voltages and current limits to display on the LCD and turn on the LED with an Arduino.

Some of the key lessons learned included how to research and learn about new tools and software since most of the project components we were dealing with were new to us, including the 3D printing and PCB design. We also learned the importance of time management so that we could meet deadlines in time while also ensuring that we had a sufficient work-life balance.