

Week 11:**Date:** 11/04/2022**Total hours:** 12**Description of Design Efforts:**

The PCBs came in on Wednesday 11/2. That has taken up majority of my time this week. The button matrix and our main PCB came in on the same day even though they were ordered 3 days apart.

- Before the PCBs came in

I was just background coding with Jack. I do not understand most of the computer graphics that have been implemented, because I have not yet taken the class. So, I just helped Jack debug a lot of the bugs that were stopping us from displaying the menus. By Tuesday, our program successfully displayed the images that I made last week.

- Button Matrix PCB

I started with soldering the button matrix PCB, since it is less important, and I can warm up soldering “skills”. It took about an hour since everything was through hole and easy to do in general. The only parts that go on it are button, diodes and a 1x8 connector. However, we made our connectors 2mm apart rather than 2.54mm apart. So, we ordered connectors from DigiKey on 11/3. So for now, we are carefully testing connector related problems with wires through the vias.

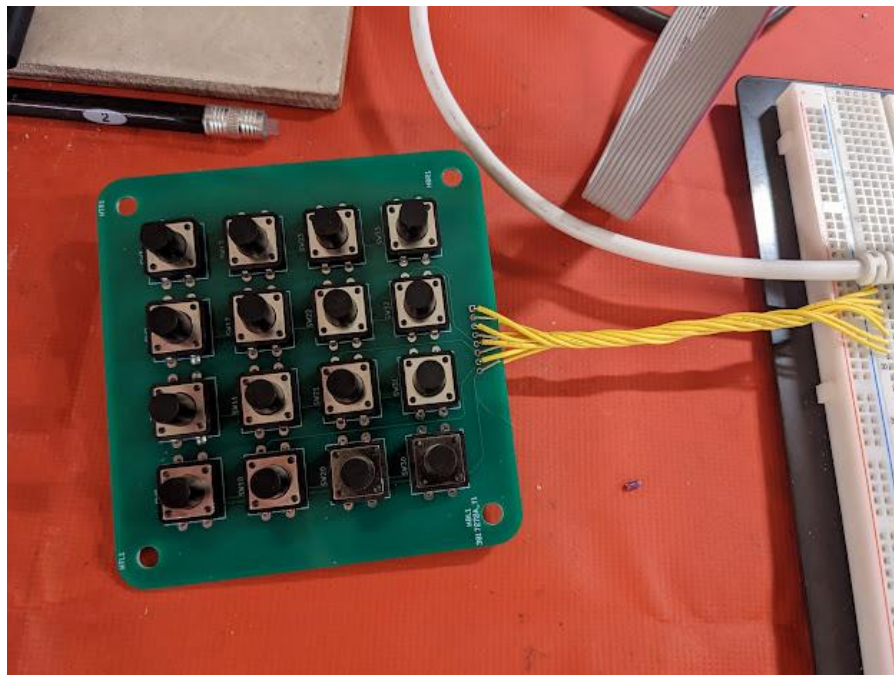


Fig. 1: Front side of button matrix PCB.

One of the other problems we ran into is that the silicone cover we designed the button matrix to fit in... does not fit. So, we will need another way to cover the PCB in our packaging. Another small issue we ran in is we flipped the rows and columns in the PCB. Fixing the software would not just require flipping some variables, but also flip all interrupts. Therefore, we will just twist the wires, just as in Figure 1. Lastly, the largest problem we encountered is after completely soldering the PCB, one of the traces doesn't work. We should have checked prior to soldering, and we also should have ordered enough button to populate a second board. However, this is what we are stuck with. Luckily for now, I just soldered on a wire to ends of what the trace should be connected to.

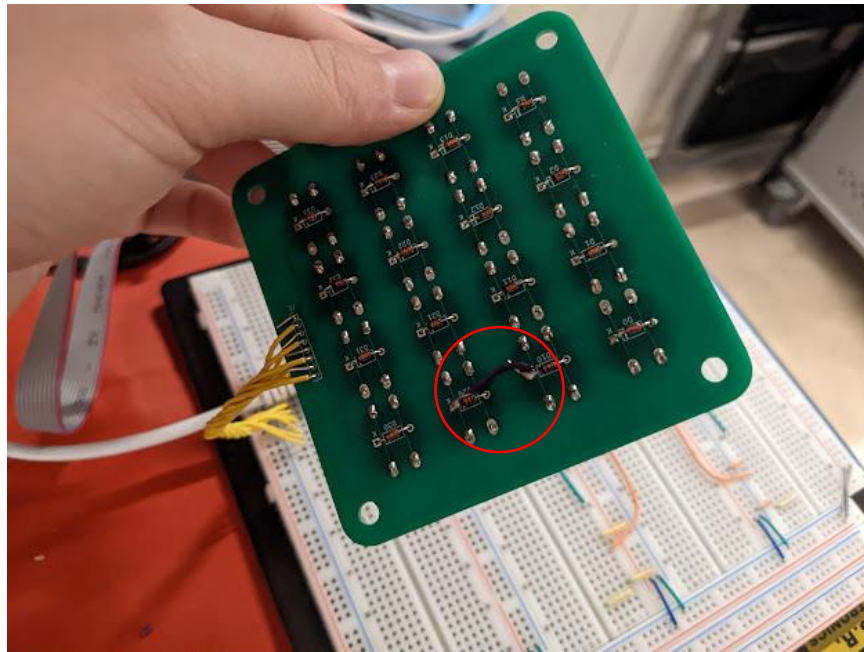


Fig. 2: Backside of PCB. Circled in red is the fix to the manufacture error.

- Main PCB

Starting on the main PCB, we continuity checked most traces before soldering. There were manufacturing defects on most of our boards, however. 50% of all our vias on all of our boards were filled (not covered). Meaning, we can get readings from the vias but not stick any wire through them. We picked a board with the least amount of filled vias and proceeded to solder the power circuit parts to it. Once that was accomplished, we measured 3.25 volts coming out of our regulator. For a more of an endurance test, we shorted 3.3V and ground on our voltage regulator with a 220 Ohm resistor and let it take in voltage for a few hours. The voltage remained at 3.25V in the end.

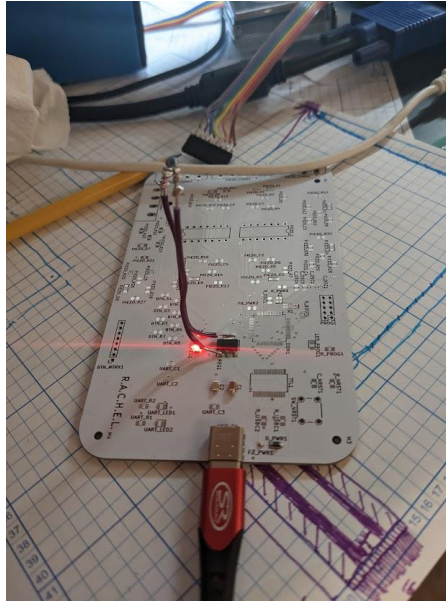


Fig. 3: Power running through PCB in endurance test.

Lastly, I have just been soldering and testing continuity for the remainder of the week. The last problem I ran into was a trace for a ferrite bead was too small. For now, we just have a solder bridge going through the pads as a temporary solution. This ferrite bead is for the 5V rail before power gets to the regulator. So hopefully, spikes are mitigated by caps and the regulator itself. There is another ferrite bead for the analog power. In figure 4, the PCB is about 60% done with soldering.

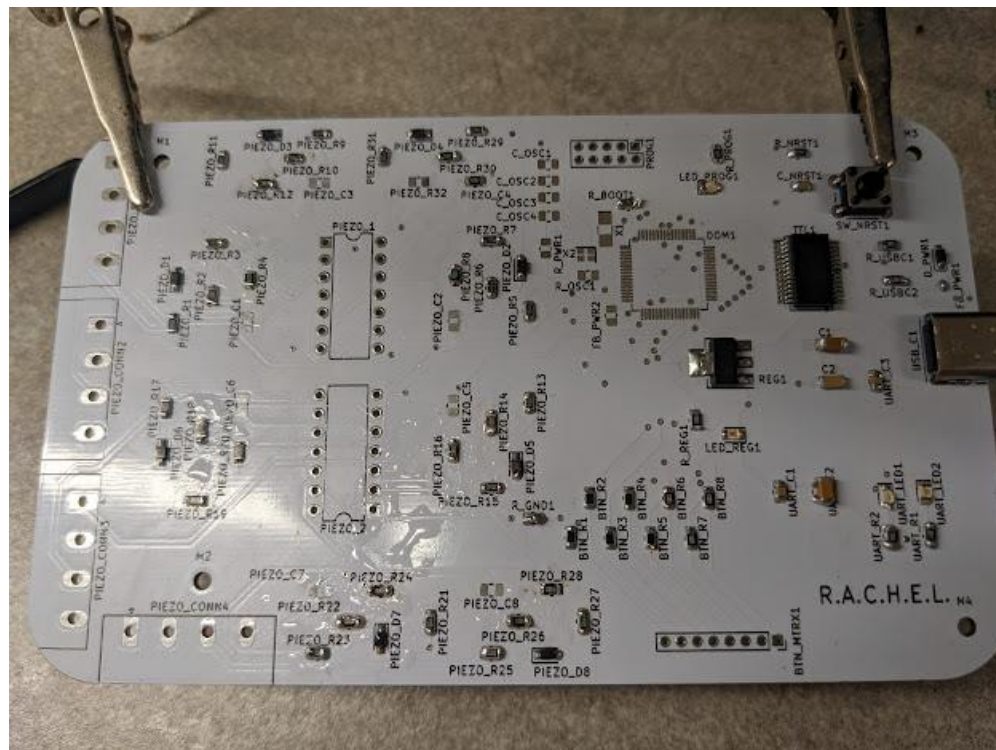


Fig. 4: PCB solder progress.

- Next Week

Solder. When Joe comes in Tuesday, solder the micro. Plan to flash micro by the end of the week and get the piezo circuit running hopefully.