

Week 7:**Date:** 09/30/2021**Total hours:** 13**Description of Design Efforts:**

Not much noteworthy events happened this week. Jack and I started a button matrix PCB and I added to the schematic some oscillators. Also, the PCB and all of its Gerber files have been looked at and are ready to ship. I might ask during main lab next week if I am allowed to actually ship the PCB.

- Button PCB

With the button Matrix PCB, we need to find 12mm by 12mm buttons to fit the silicone button mold we found in the closet. The entire PCB was made to fit the mold. Each button is spaced about 4.5mm apart. For future user interactivity ease, we will have to put stickers on the buttons to indicate what they do or at least number them for a legend that will be located next to the matrix. The buttons will be connected to the main PCB via connectors and fly wire. On the button PCB there are also diodes to help with ghosting and masking. For finding the buttons that we will need to fit the mold, the ECE shop will most likely have them, if not we will order them from DigiKey. Note, this is all optional as we can just hook up the button matrix board that came with our ECE kits like we have been doing during testing.

- KiCAD Schematic

After Thursday's lecture, we realized that the dev board we are prototyping with uses an external clock oscillator. So today, I tested if we needed to include one on our board. By disabling the external clock oscillator and by enabling the STM's internal clock. We were not sending UART signals to the laptop as fast as we wanted to. Therefore, we needed to add an oscillator to the schematic. The lab already has the oscillators we need for our board, so we simply just had to add the oscillators to the schematic and PCB.

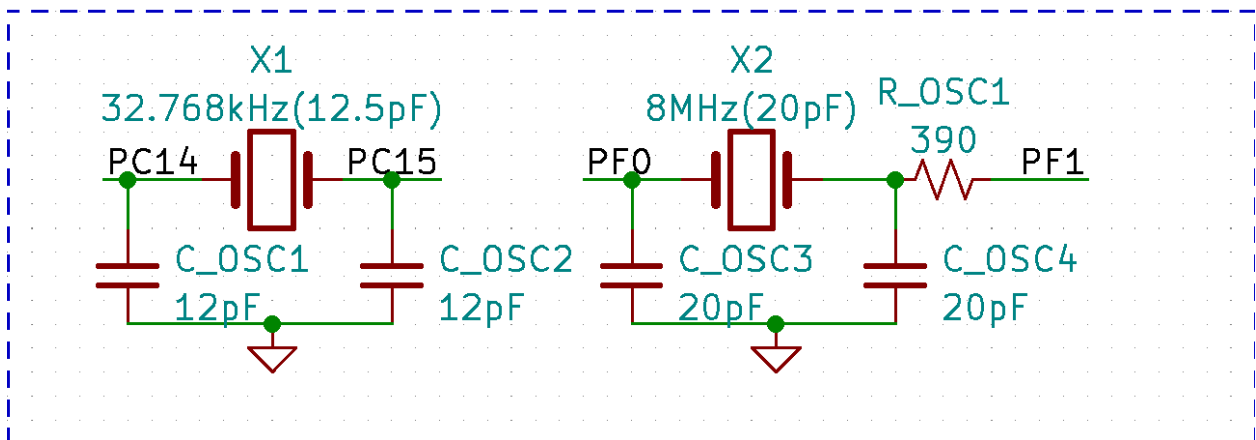


Fig. 1: Both crystal oscillators that are being added to the PCB

- KiCAD PCB

The KiCAD PCB barely has any DRC errors. The only ones that appear are from via clearance from the USB-C connector and the piezo connectors hanging off the board. All other errors are taken out. I had Joe take a look at the PCB and said it was fine other than needing to create more vias. He said it would be a lot easier to test the microcontroller if we made vias for a lot of the unconnected pins. Joe also pointed out that on our Gerber files, there was no vias appearing on our front and back layer solder masks. The PCB has been since altered and updated on the website to reflect those changes.

Next up, the clock oscillator had to be put somewhere really close to the microcontroller. I also put it away from the analog and power circuitry to not interfere with the clock signal. With all these additions, the PCB is on the shopping cart for OSH park and JLC PCB vendors. All that needs to be done is to order them.

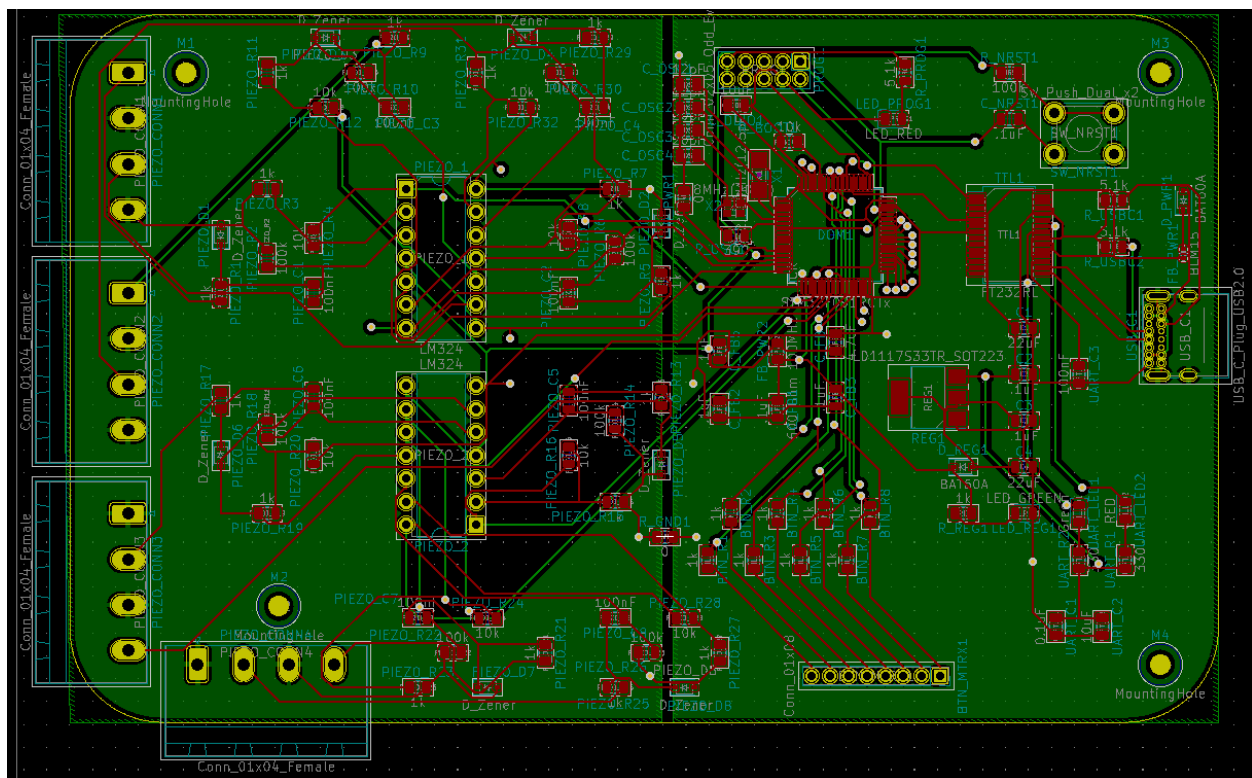


Fig. 2: The finished PCB

- Next Week

The goal for main lab on Wednesday is to order the PCB after one final check by Walters, Rohan, and Joe. But before Wednesday, as a group, we'll have to start and finish our midterm review presentation. That may be the plan for the whole week I'm guessing. I am still waiting on the serial to uart converter to come in so hopefully it does, so we don't have to pry the chip off the breakout board. If I have time, I'll help on ball detection with the camera.