

Week 13:

Date: 11/18/2022

Hours: 14

Description of design efforts:

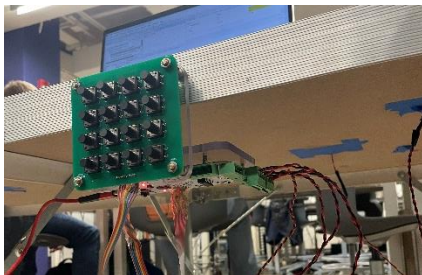
PCB Testing:

This week the team spent a lot of time ensuring the PCB functionality is complete. We resolved all our issues for setting up our final PSSC test. Currently, we have our PCB running at 8 MHz to resolve our UART clock problem. Everything else works exactly as expected from the development board.

We struggled to get our device to work properly without the programmer attached; UART seemed to work fine with it plugged in (even if it wasn't flashed) but did not work when unconnected. After hours of schematic checking and oscilloscope reads, we realized that the programming device must also be unplugged from the PCB, not just the wire connected to the laptop. It appears that some connection within the programmer is problematic when not connected to the laptop, and caused UART to not work (though, we found that most of our other microcontroller functions did). We do not understand this issue but can fix it by unplugging the programmer.

As all our major components were found to work properly, we opted to fully mount our PCB to the ping-pong table. This required some drilling and extra soldering but was overall very simple to interface with our machined design. Unfortunately, our plans for some of our connections changed after we had already ordered the PCB, so we are locked in with some older, larger connectors for the microphones. Similarly, the button matrix PCB has slightly different input sizes than we had anticipated, and we had to directly solder wires to where we intended to place a header. The working system is shown in Figure 1, below. Currently, the wiring for the piezoelectric sensors is rather messy – this is because it still holds experimental trilateration microphones and wiring.

Figure 1. Table configuration.



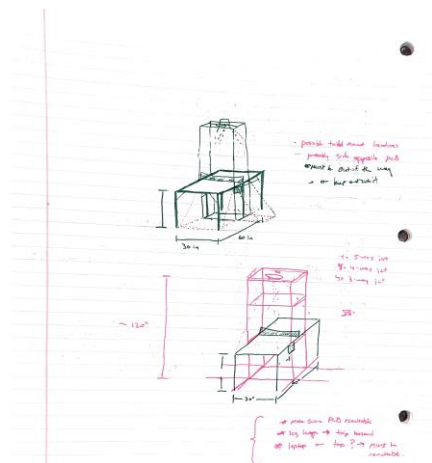
The problem, though, with using 8 MHz is that it is likely that our microphone trilateration system will not work; we will need quicker processing for this algorithm. This, in combination with the inconsistent analog inputs analyzed last week, led to us deciding to pull the plug on this feature. While it would be cool, and is feasible, we do not have enough time to implement it. Instead, my focus will be on mechanical structure for holding up our projector and camera system.

Mechanical Structure:

I began planning out how we may manufacture a secure structure to hold our camera and projector overtop the table. The building manager did not have any pre-built materials available for us to use, such as ladders or scaffolding. Instead, we will be working with the machine shop to create a rig with aluminum T-slots through 8020.net. This, fortunately, should allow for a sturdy and low-profile support system, that neither the ladder nor scaffolding provided both of.

Though, we do have problems with the height of the design we need. Currently, we have the projector 90" above the table, which is 27" tall. We would like to mount the projector about 6 inches higher than it is, to provide full table coverage. Thus, we need a support slightly taller than 120", or 10'. This is doable with the T-slots. Of course, we need some sort of bracing system to allow a 10-foot-tall rectangular prism to have some balance. The challenge in this design is that we must avoid blocking the projector's display on the table with any scaffolding. The design shown in Figure 2 is the current plan to implement; we will speak to Chuck in the machine shop next week to ensure he agrees it is acceptable. Our issue is that we must have large "feet" that extend beyond the table as our balance system, creating a tripping hazard, especially during gameplay. To counteract this, we intend to ensure the feet do not extend beyond the table on the playing sides, but they may need to extend past the table on the longer sides.

Figure 2. Structure diagram.



Next Week:

Next week, I intend to work on cleaning up and configuring our final hardware setup, then continuing work wherever needed to assist in game production. If considerable time is left, I may return to attempting trilateration.