

Week 2:

Date: 08/27/2021

Total hours: 14

Description of Design Efforts:

I spent this entire week prototyping ideas. There is a lot that we must test to see if our initial proposal is accurate. The idea of this week is to see what works and to change it as fast as possible in order to get it into the PCB design sooner than later.

- Piezo Sensors

One thing I worked on was trying to debug the piezo circuit. James built a preamp circuit for the contact sensor. We decided to purchase a pack of piezo sensors in order to pickup the vibrations of the table rather than capture and identify the sound of the ball bouncing. At first, the piezo sensors could only pick up small mV of knocks near the piezo. I noticed some weak connections and replaced the piezo sensor that James resoldered with a fresh new one. When I knocked on the piezo speaker itself, there was a noticeable 3V gain visible on the oscilloscope when 12V was fed to the preamp circuit. However, I had the piezo electrically taped to the lab table, so when I knocked around the sensor, there was no voltage change. I hope that the lab table accounts for the lack of signal produced in that situation. This upcoming week, we will be working on getting the piezo sensors to work. We will be testing on the table tennis table and with adjusted gain for the preamp circuit.

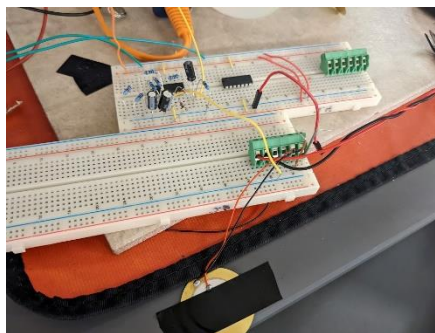


Fig. 1: Preamp circuit with a piezo sensor taped to the table.

- Microcontrollers

Another part I worked on is starting the PCBs. We had a thought of ordering at least one of the PCBs that the microcontroller will go on in week 3. The microcontroller that is communicating with both the RPi and the other microcontroller. We have to decide what ways we want to send UART to both of those devices from the main microcontroller. Since the main microcontroller will be overhead of the table, it will be able to connect to the RPi easily. However, the other microcontroller will be under the table and will need some way to communicate with the main one.

A fun way to do so, we were thinking of sending 5V and UART to the under the table microcontroller through an ethernet cable. It will also have room for a few other communication protocols in case we needed them. So the

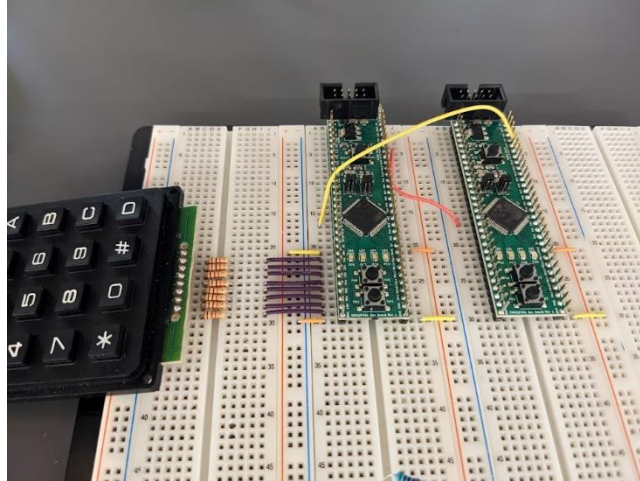


Fig 2. Two microcontrollers connected with USART and communicating with a keypad.

- Table Tennis



Fig. 3: We bought a small table for table tennis for \$60 from Facebook Marketplace.

- Raspberry Pi

James is working on an OpenGL environment on the RPi, only he knows how to do it, so I have been trying to mess around with the camera that we attained from the lab. It is an Xtion Pro Live that gets 60 fps on its color feed and 30 fps on its depth sensor. It only needs 5V for power, so it only needs USB to power it. The necessary software needed for the camera is out of date for my Windows 11 laptop, it would not register the camera as attached to my laptop. When I tried using the install disk for the computer in the lab, it also would not install. Then there was a problem of not being able to install the SDK straight from the install disk. James managed to get the feed working on the RPi when we had a desktop mode installed on it. However, we do not anymore as the RPi has constantly been not able to start. Hopefully, it remains working so we can continue to use the one we have at the lab.



Fig. 4: Xtion Pro Live hooked up to our RPi

- Plans for next week

Personally, I have been tasked with finishing the microcontroller PCBs and possibly ordering them by the end of the week. We have a good idea of what peripherals we want attached so it would not need to undergo too much of a change if something became an issue (possibly piezo sensors). I did not realize how long documentation actually took to write so I need to be more proactive with it.