Deliverable G

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Introduction

At this point of the process, we are currently working towards our final design and prototype. In deliverable C, we picked a design to pursue further that would fit all our clients needs. In deliverable D, we started to make our first prototype and run our first tests for proof of concept.In the past week, we had our third client meet with Jorge, he gave us feedback on the revised design that we proposed to him and he suggested we add an extra component to the final product.

Summary of Client Meet 3

This past week, we met our client, Jorge, for the third time. During the meeting we discussed what stage we currently stand at in our process for creating a product. We showed him the CAD models and explained how it all fits together, the models are shown later in this deliverable. Jorge mentioned that his current setup with the computer on the chair will not work since the computer can’t turn to be over the bed making it not possible for him to see the screen. There are a couple solutions that we discussed with him, one being connecting his computer to a tv in the hospital room and the other is making an external stand to hold the computer over the bed. After receiving the feedback from Jorge, he mentioned he is eager to try our product and arranging another meeting with him to test the product.

Latest Design For Prototype 3

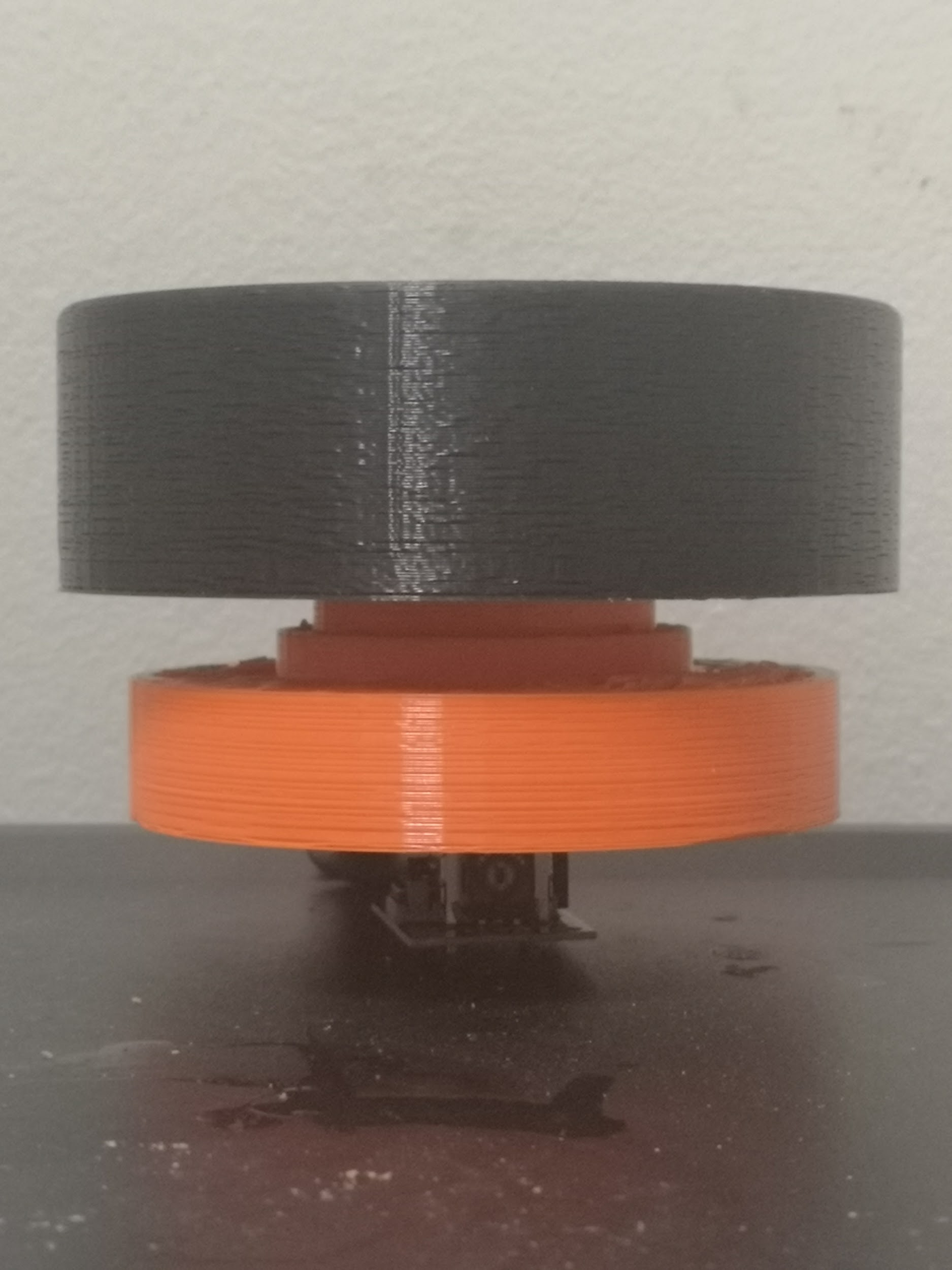


Figure 1: Current 3D Prints

The purpose of this prototype is to prove that the design would function properly and to refine dimensions based on client feedback. Figure 2 shows the last 3D model for the joystick. Figure 1 shows the joystick, bottom attachment and top piece respectively from left to right. The joystick will fit into a little notch in the bottom of the bottom attachment. This will allow the bottom attachment to slide freely on a flat surface while still moving the joystick with it. The bottom attachment will sit under the surface of the ramp while the top piece will be glued to the bottom attachment. The user will put their foot on the top piece to move the joystick.

After looking at the physical joystick, the team decided to increase the diameter based on feedback received from the client. A larger diameter will make operating the device easier for Jorge since fine muscle motions are difficult for him. While discussing other ways to improve ergonomics, it was decided to chamfer the edges of the joystick as well.



Figure 2: Previous 3D Print on left, current print on right

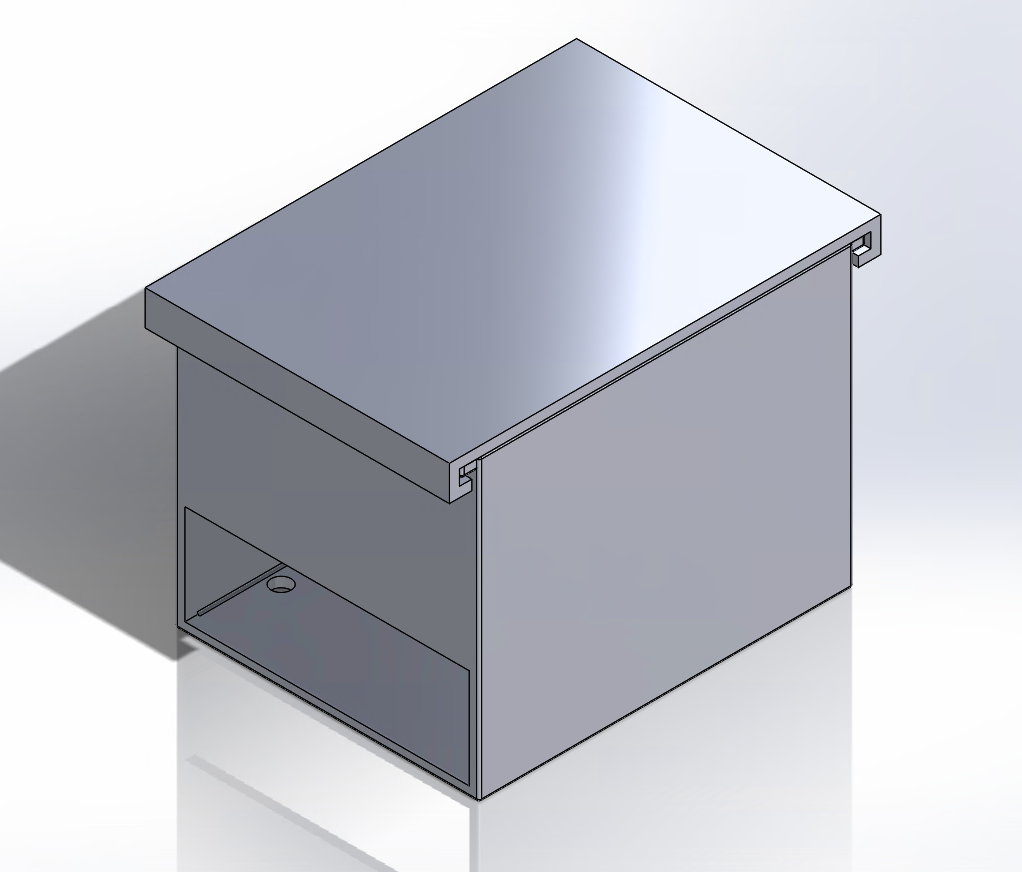


Figure 3: Arduino Container

As shown in figure 3, we have created a little box to contain the arduino, breadboard and other electronics. Its purpose is to protect all the electronics and to keep it contained. This will make the interior of the product cleaner and simpler and easy to remove if there is a problem with the electronics.

Prototype Testing

Joystick Testing and Bluetooth Functionality

The hardware currently works as a master/slave setup. One arduino is responsible for decoding user input and sending that information to the slave arduino through a bluetooth connection. The second arduino is constantly polling for new user input to be received then translates it into mouse movement on the screen.

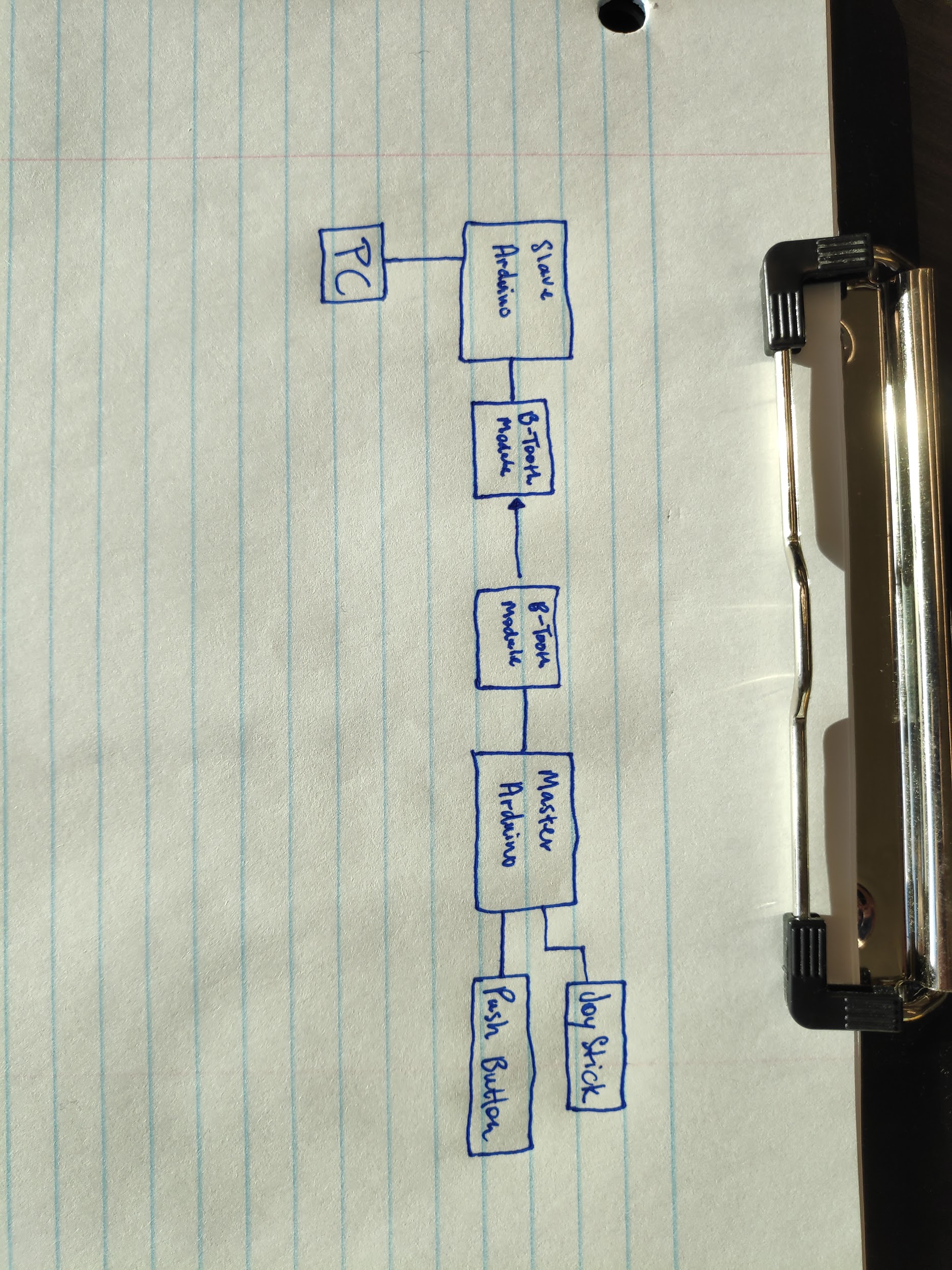


Figure 4: Circuit Flow Chart

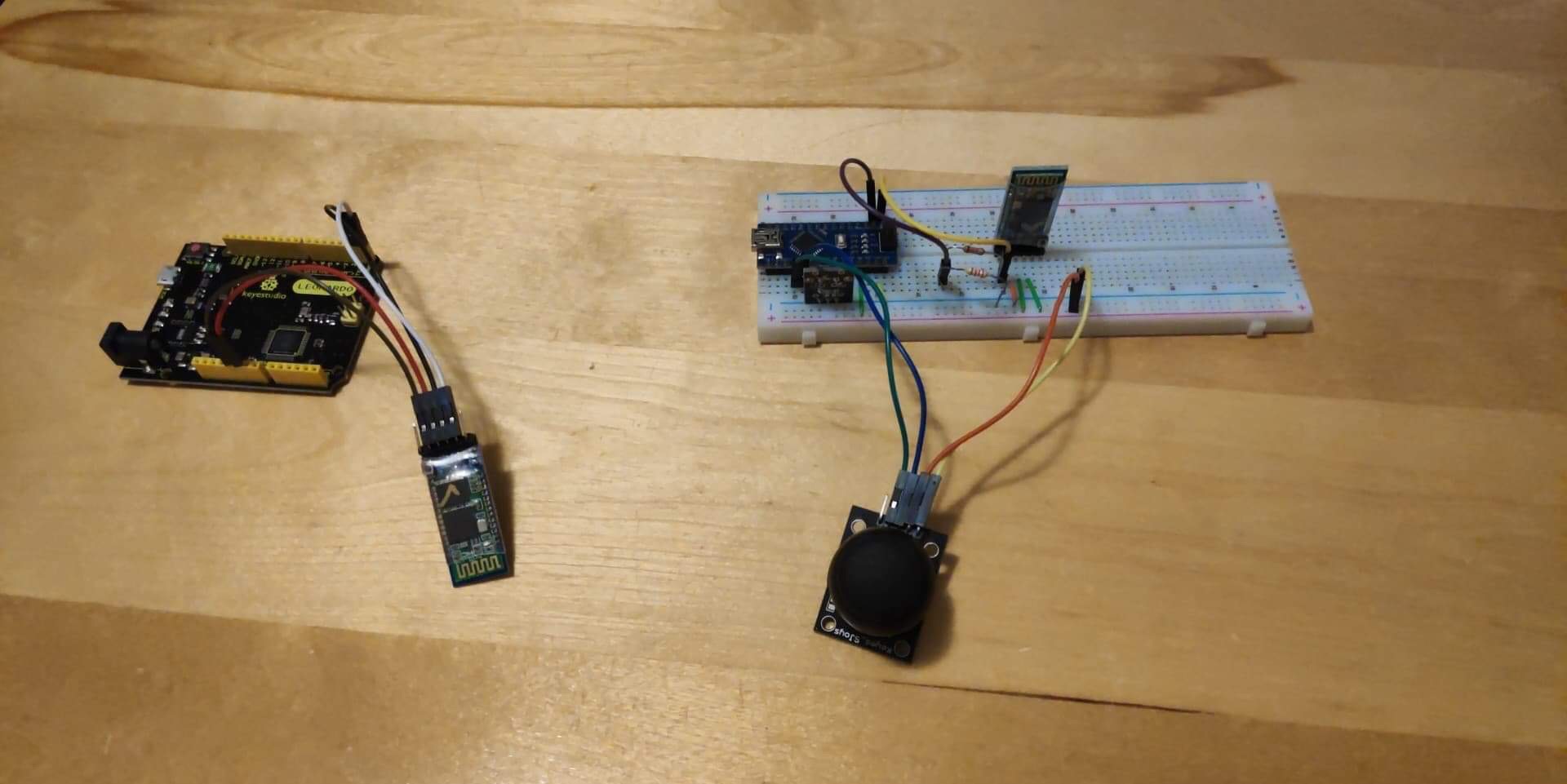
Breadboard 

Figure 5: Left; Slave arduino. Right; Master arduino checking for user input

Math for Power Bank

The battery is advertised as 20mAh, assuming the arduino draws between .5A-1A of current the battery life will last between 20 and 40 hours. This is an ideal case calculation and since it is very unlikely that the arduino will draw a consistent amount of current from the battery a practical test will verify the battery life. The arduino will be left plugged into the battery at max capacity, the arduino will simply update an LCD monitor (on a seperate power supply) with how long the arduino has been online, when the arduino loses power the last input to the LCD will display how long the battery lasted.

How Are We Going to Present on Design Day?

The design day presentation is a short demonstration and presentation of the product. To prove our concept is a valid solution for the client, we need to communicate effectively and have a good setup for our product. To demonstrate its functionality, our joystick will be mounted on an elevated surface and connected to a computer. The user will sit in a chair with one of their feet resting on the product. The movement of the joystick and button will show on the computer to prove that the user can effectively and easily interact with the computer using their foot.

Conclusion

To conclude, the third client meeting helped us to get feedback for our second prototype and ideas for testing the product. It was discussed with Jorge, who was satisfied with how the prototype looked. Another meeting is required for the client to perform tests on the product. Additionally, we will test the bluetooth functionality of the joystick. In the future, we need to make the frame box out of wood to support the load put on the joystick by the user and laser cut the holes for the cables. We also need to connect the arduino that links the joystick input into the screen and assemble the joystick with the frame box. Moreover, we need to start with the economics report which will include the list of costs, the income statement and the NPV analysis.