Foot Board Controller

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Problem

Problem

Be it due to medical conditions, accidents, or other causes many players cannot use one or both of their hands to play games.

Justification

There is a lack of accessibility, especially physical accessibility in the video game industry.

Identified opportunity

We can offer another option for players with hand related disabilities to play games through their feet.

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Competition Landscape

1. Literature Review
2. Patents
3. QFD Competitors

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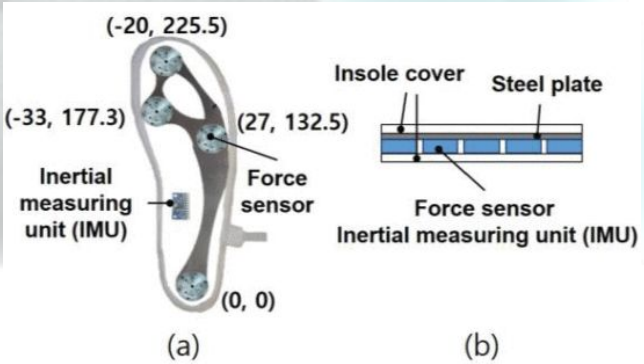
Literature Review / Patents

We looked at several papers and patents regarding foot based controllers for inspiration and to see what we were competing against in the market. We found 3 different devices, although only one (3dRudder) of them was available commercially to consumers.

Two of the devices we found was the Spring Stepper and an unnamed Korean one. Both of which had pressure sensors to detect the change in pressures. Though both largely focused on locomotion input of a game, whereas our device aims to allow button input as well.



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QFD competitor

The last device we looked at was the 3dRudder which is the only commercially available device and market competitor. It uses gyroscopes and force sensors at the top to take in user input and can allow the user to move in all 4 directions, rotate and move up and down. It also focuses on movement and is meant to be used in tandem with other controllers like a PS4 controller or a keyboard and mouse, while ours is a standalone foot only controller.

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Results

Design, Electronics, etc.	QFD and SUS	Feedback We Got

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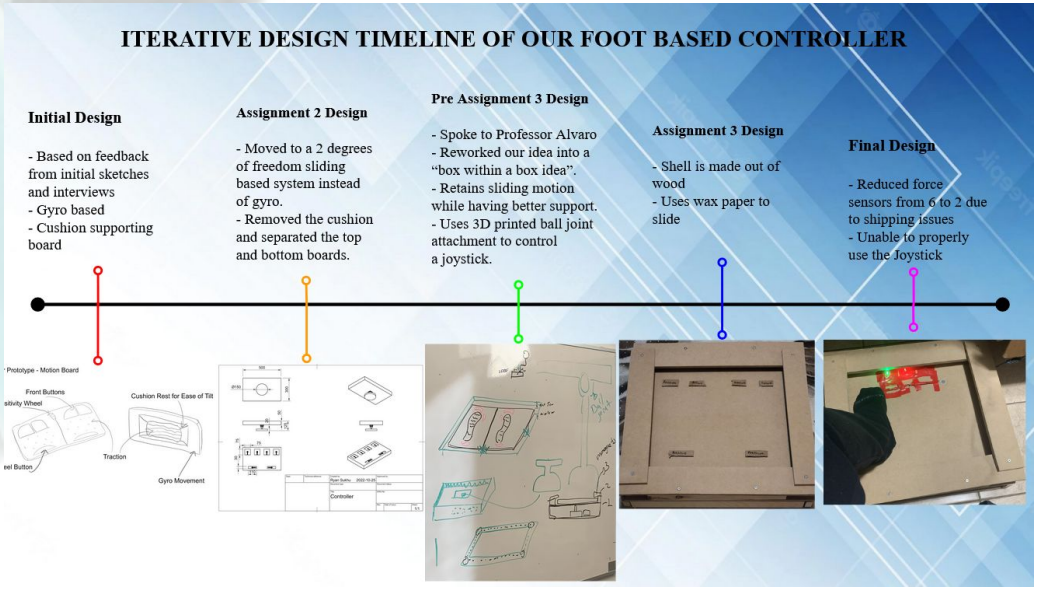
Design

Starting with our original foot motion board idea we had a significant amount of iteration and changes over the course of the semester, many of these changes were for the betterment of the design, some were simply because we could not solve certain problems.



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Design

The final design we ended up using is a board that you place both feet onto, it has a central red LED indicating it has power, and two force sensors buttons, which each trigger an input in game and cause either a blue or green LED (depending on which one you press) to light up

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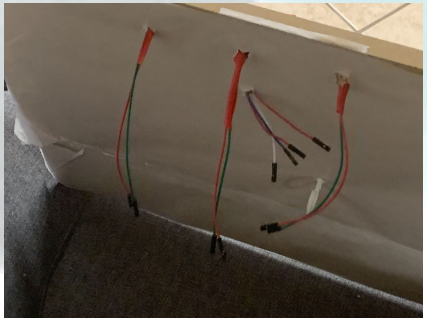
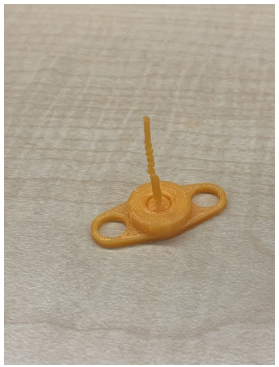
Design

While we wanted to have the board slide for joystick input, our attempt to 3D print an attachment for the joystick did not work, we instead tried attaching a hook to the bottom of the board, tying a rubber band to the joystick, and latching that onto the hook, however the rubber band has a tendency to fall off the hook and while we could get joystick input to work if we properly secured the rubber band on the hook, it also has to slide on the wires for both the force sensors and the LEDs, which has a tendency to cause the wires to disconnect, making it infeasible with the time we had to make joystick input work.

It's possible that we could solve both problems with time, but as it stands currently, this is a design feature that simply did not pan out in our final implementation.





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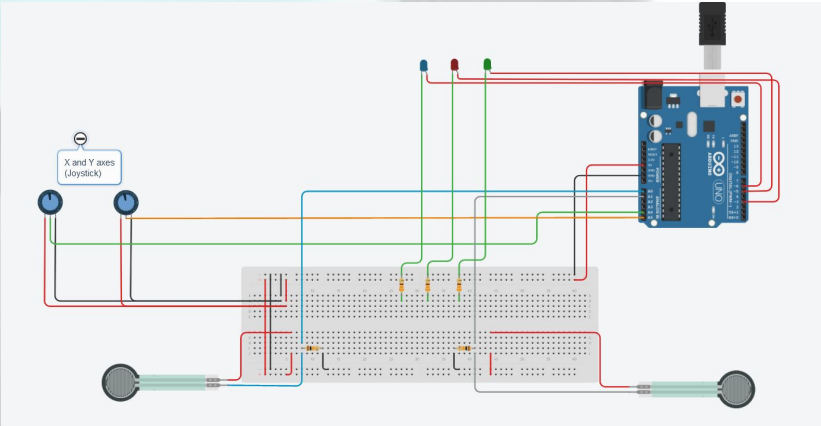
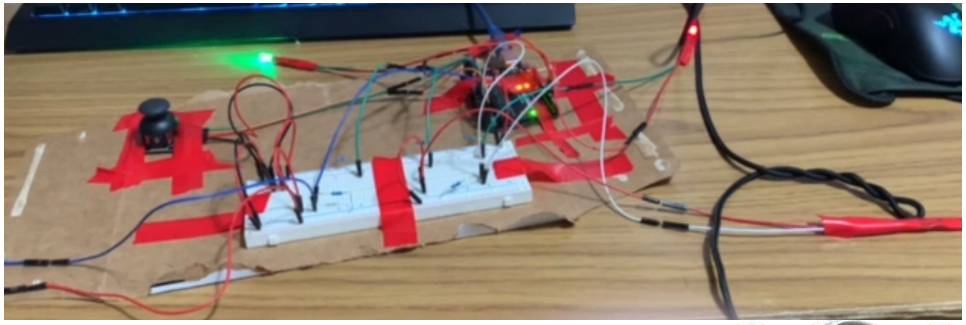
Electronics

Here you can see the tinkercad wiring diagram, excluding the aforementioned male/male to female/female connections, this is how they are wired in the prototype itself, even though we are not using it, the joystick is still hooked up and sending input.





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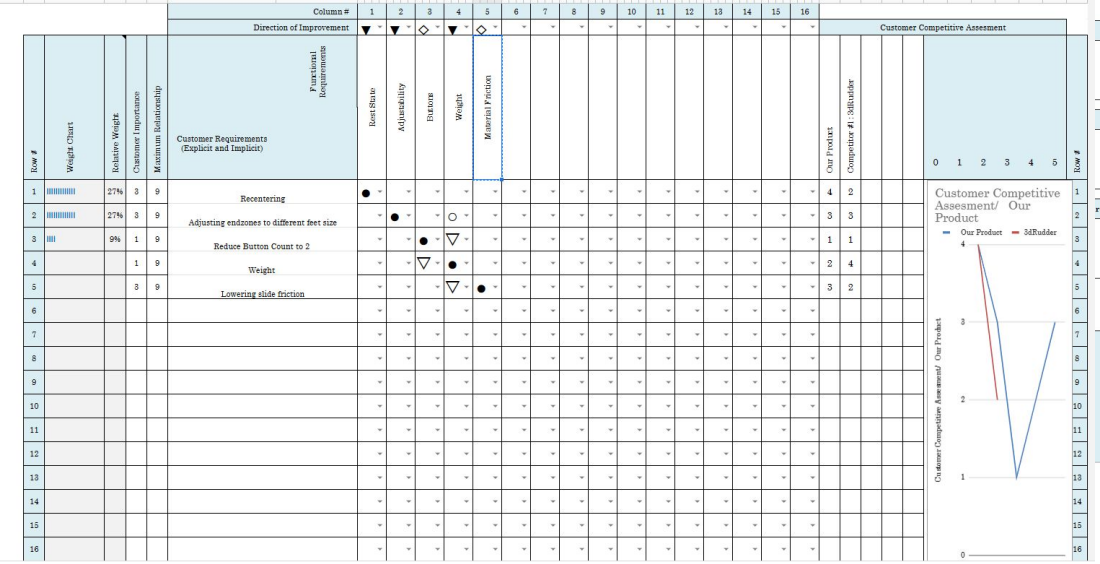
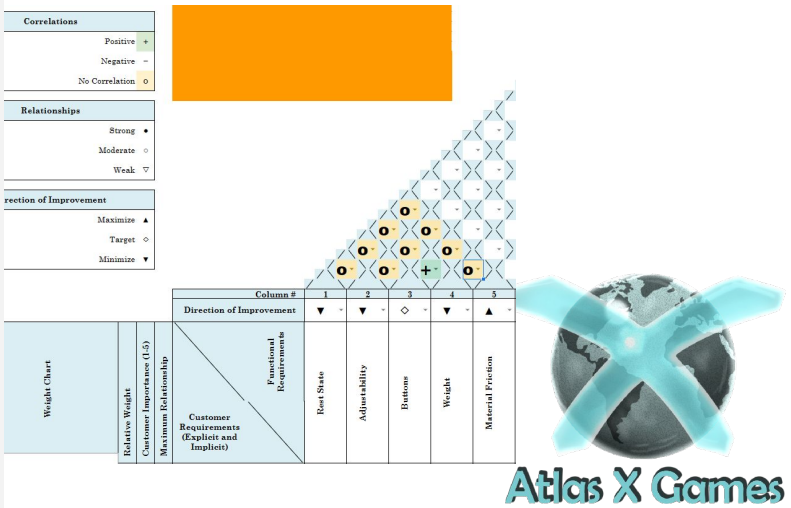
QFD and SUS

Though we had to simply show users pictures and videos of the 3D Rudder for the competition, users thought, that recentering a feature we were unable to implement due to scope, but would be something we'd consider if we moved forward with the product and lower slide friction which we achieved using wax paper, was most important to our device while appropriate device weight was more important for the 3D Rudder.





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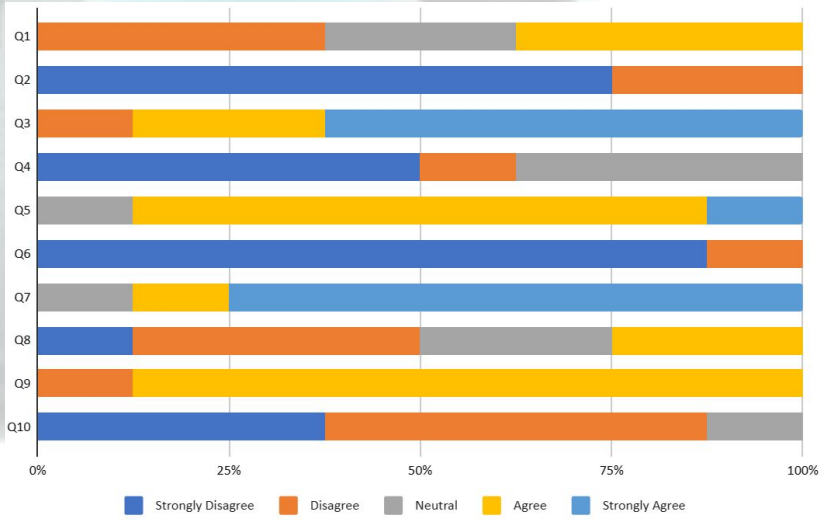
QFD and SUS

Of the 8 people who filled out our SUS survey, all but one outlier had a score of 70 or above, with the average of all of the scores being 78.4375 the SUS results indicate people overall found our controller very usable.



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Feedback we got

- Several people mentioned that they wanted some sort of recentering system for the board when they aren't actively using it.
- Some people want to be able to adjust the size of the board for more comfort due to their feet size.
- Some said the sliding was a bit too slow and that there was too much friction
- Finally a few people were concerned about the possible weight of the controller, saying we need to find the right balance of it being heavy enough to not slide the entire board accidentally, but still light enough to move around when needed.

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Takeaways

			What we would do differently
1	Tunnel visioning on initial ideas	We tried to stick with our original design despite it having issues we couldn't address	Be more open to new and different ideas, especially in the early phase of a project.
2	The importance of understanding physical sense of scale	We had a lot of problems with sizing throughout, from the 3D printed piece being too small, to the controller being too big	Get materials/placeholders earlier to help us understand the size of the project.
3	The importance of iteration and being flexible	There were many hiccups in our project that forced us to adapt and change our design	Be less afraid of changing parts of the design that are problematic or out of scope.

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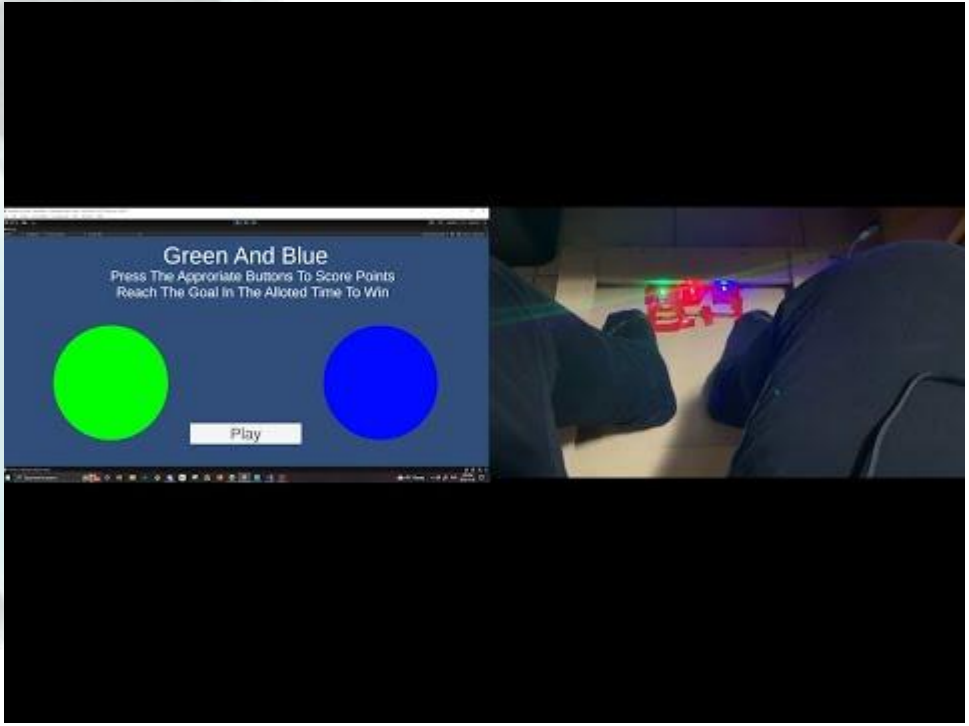
Demo



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Thank you for listening!