Designing and Manufacturing the Hardware:

My initial plans for the product required that the user be situated in a room with dimensions such that they could easily touch and feel their way around the walls while remaining in the centre at all times. This lead me to two possible design strategies:

1) Create an entire enclosure from scratch which would fit the required dimensions.
2) Find a room with suitable space and create wall-mounted sensory pads to be installed into the room.

There were pros and cons to both of these ideas, with the wall mounted pads being very portable and storable but requiring a likely longer setup time and being restricted to fit the size of whatever room might be found for them to be installed into. Then there was the entire enclosure which could be quite space consuming and difficult to manufacture but could be designed with complete control over the size and accessibility.

In the end up I decided to manufacture the enclosure from scratch as I felt it would give me more freedom to design an all encompassing environment which would feel the same no matter where it would be installed. In order to create a public ready installation of the enclosure, I knew that I would have to manufacture the box frame and walls from a sturdy, robust material as it would not have the support of being a part of the original walls of the room that it is to be installed into. So for my material selection I decided that I would be using wood to create some sort of a sound wardrobe or cabinet.

I began experimenting with random offcuts of wood I had sitting about the house in order to estimate a guideline size for the enclosure. With a chair in the centre of the walls I wanted to include enough space in the box for the average user to be able to touch each wall without having to lean around too much on the chair. Researching that the average adult female and male arm span lies around 150 - 180cm, I decided to make the walls 1x1m so as to leave enough space for the users to stretch out to reach different sensors located at different sections of the wall. I decided to have the enclosure stand at around 2m as this is the rough height of a standard door and therefore should allow enough room for most people to get inside the enclosure to be seated.

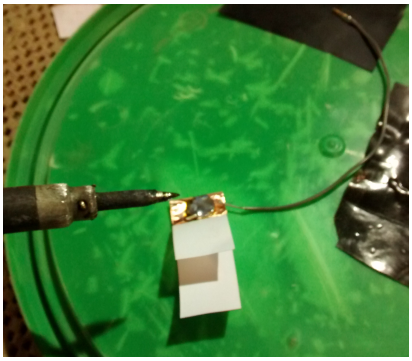
With this plan figured out, I went out and sourced four sheets of 6mm plywood to be cut to size for the four walls. In order for the enclosure to be transported and setup somewhere other than at home I knew that I would have to manufacture the product in a way that would allow it to be taken apart and be rebuildable. As a means of attaching the wall together, I created four vertical corner posts with slots at 90 degrees to each other to be attached with wood adhesive and a nail-gun to one side of each wall. This would allow the four walls to be separated and stored similarly to flatpack furniture. To keep the walls together whilst standing I attached two clips onto each wall which could successfully fasten two walls together at the edges. I then cut out a rectangle from the

front wall, attached hinges, a handle and a magnetic cupboard clip which provided the enclosure with a fully functional door.

With these four walls complete with a door, I now had the foundational structure of my enclosure and could then begin plans for the positioning of my sensors.

Sensors:

For my choice of sensors I settled on the plan of using ten push button switches and four force sensing resistors. To create the force sensing resistors I followed the instructional videos provided by StudioTTTguTTT on youtube (found here: **https://www.youtube.com/watch?v=AEvyj0lFk1s**). This required the use of a few sheets of velostat and the soldering of some wire to two separate, opposing pieces of copper tape. For the ten push buttons I simply soldered two separate pieces of wire to two of the pins of the push buttons.

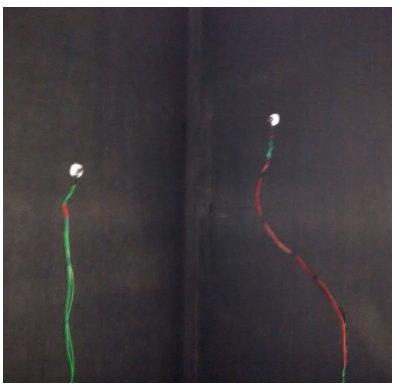


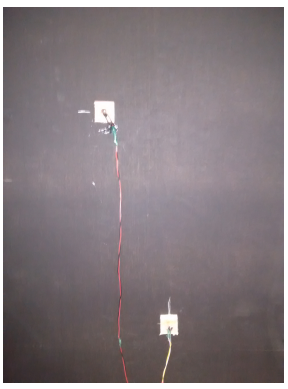
Before moving onto the next section I gave the whole enclosure a layering of black paint for some aesthetic appeal.

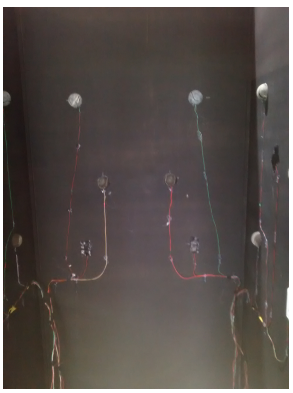
Combining Sensors and Enclosure:

The buttons and force sensing resistors were attached to the inside of the box initially using white tack. I used this purely to experiment with positioning and spacing of the sensors in the box to evaluate where the most practical locations would be.

Once I came to a decision on the sensors whereabouts, I then had to come up with a means of fixing the sensors onto the inside of the box in such a way that they would be stable and durable enough to withstand being tested by the public. Therefore as a means of creating a user friendly tactile interaction with the buttons, I decided to test Pringles lids over the top of the buttons. They worked well as a means of increasing the surface area available to the buttons but they were very flimsy and I could not think of a practical way to fortify them. My second plan was to attempt to use the casing from some burst tennis balls I had found at home. These seemed to be a reasonable size and would be easily recognisable in the dark as objects to be interacted with but they would have to be pushed with a great deal of pressure if the casing were to ever reach the buttons underneath them. Henceforth I made ten small wooden blocks that the buttons could be mounted on to, which greatly reduced the distance the ball would have to be pressed in order to

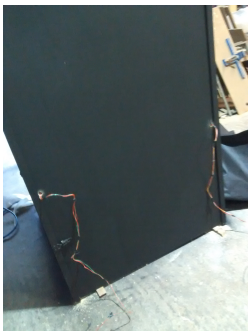






make contact with the button. When all of these were complete however I still found that some of the tennis balls were much stiffer than the others which meant some of the buttons were still quite difficult to activate. Thankfully though, with the use of a Stanley knife, a few slices into the tennis balls greatly reduced the amount of pressure needed to activate them and so the tennis balls were a success!

All of the push buttons where attached to the walls of the enclosure using a hot glue gun. Firstly I would glue the small pieces of wood, then I'd glue the buttons onto the tops of the wood and finally, I'd glue the rims of the tennis balls and pop them on over the top of the button mountings. The force sensing resistors where also attached using a hot glue gun. After all the buttons were in place, I gathered routed and glued down all the wires in an orderly fashion so that they could all be accessed through two holes that were drilled into the back of the enclosure.



Finalising the Hardware:

The enclosure was basically complete and all of the components were functioning correctly so it was finally time to add some finishing touches. To cover and hide the wires, buttons and force sensing resistors and to add to the tactile nature of the enclosure, I acquired a few sheets of white foam. To cover up the tennis balls and also as a final means of securing them in place, I used a staple gun to attach the foam in a tight circlet around the balls and then using a combination of sprayed adhesive and the staple gun, I stapled the rest of the sheet around the perimeter of the side and front walls. Over the top of the force sensing resistors, I then glued down an extra few layers of foam so that the user would know to experiment with those areas and to top everything off, I stapled down some black fabric over those three walls to fit in with the the aesthetics of the product and to add a final tactile layer. To finish, I created a roof to block out all light, with a hole for the headphone jack to be fed through, and a simplistic design to add one final bit of aesthetic appeal to the product.