Project Deliverable G: Prototype 2
GNG 2101 – Intro. to Product Dev. and Mgmt. for Engineers

Faculty of Engineering – University of Ottawa

Section: Z **Date:** June 23rd, 2019
Team #: Z2

Introduction

After our third client meeting, our team will now define the design solution we intend to present on Design Day and develop new prototypes as we refine our solution into becoming our final product. In this document, our team is going to summarize client feedback, document our latest prototypes and layout plans for Design Day.

Client Meeting 3 Feedback

- Rooms should be elevated instead of lowered.
- Addition of contrasting colours will make the map more effective.
- The pathway to room 118B should stand out more.
- Audio buttons should be integrated *into* the map.
- Our choice of material (acrylic) is great and should be kept.
- Walls and other outlines should be in black and contrasted against the background colour we will choose.

Second Prototype Development

For our second prototype, we will need to mount the tactile map. We are yet to decide on the method we will use to do this. However, some potential solutions would be to use a wood casing, to 3D print a base or use a wall mount. As for audio, our second prototype will have cut-outs in the map itself where audio buttons will be inserted. Our circuit, microcontrollers and all other audio components (excluding the speaker of course) will be enclosed and hidden within the element we will use to mount the map. In our second prototype, we want to avoid having our audio component apart from the map, we want both components to be unified. We will also decide on which type of buttons to use once we get feedback from our user who was not able to attend the meeting. We will either use regular pushable buttons or sensor based buttons that do not need to be pressed. We will also paint our map to obtain those much requested contrasted colours. In sum, our second prototype will focus on the integration of our audio and visual components and should set us on the path to producing our final product.

Latest Prototype

Our latest prototype was built by laser cutting into an acrylic board. The prototype was a preliminary visual representation of how the surface of the map will look and feel. It was incomplete as it lacked a legend, a mount, an integrated audio component, and colour contrast. However, a prototype of the audio component was designed and showcased at the client meeting. It was composed of a breadboard, a Raspberry Pi, wires, a single button, a speaker and a wall plug. Our audio setup is currently capable of playing a sound file when the single button is pushed.

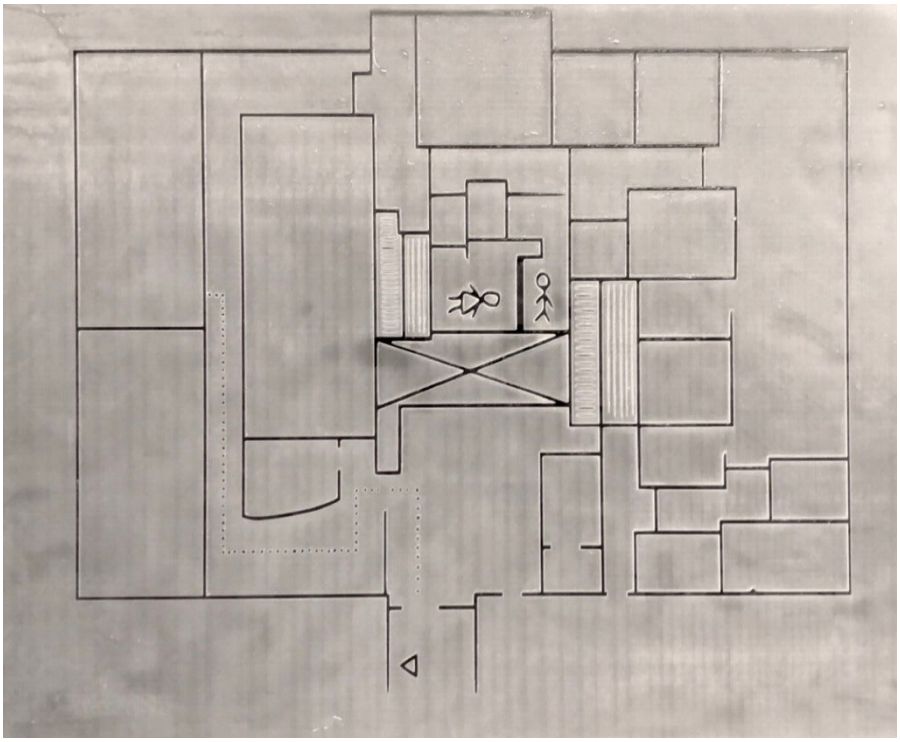

Fig 1. Aerial view of our second prototype made by laser cutting an acrylic board.

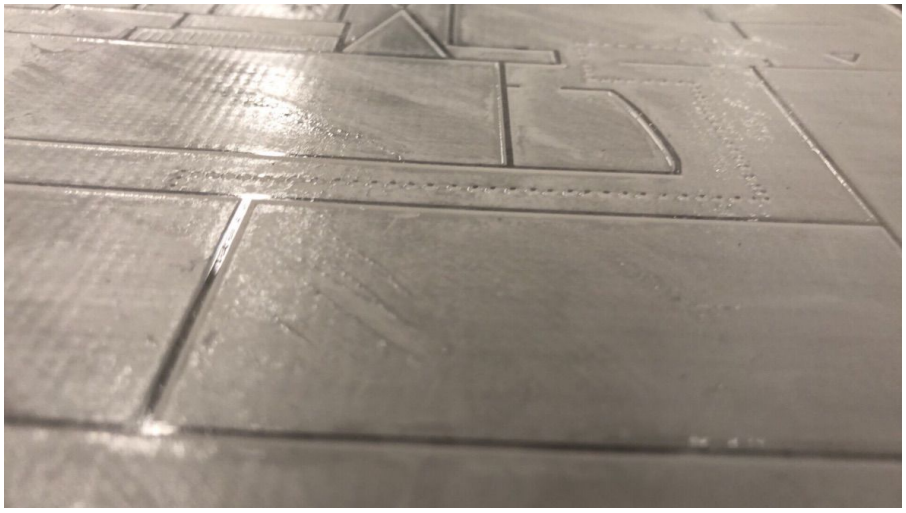

Fig 2.Closeup of the elevations and texture of the map.

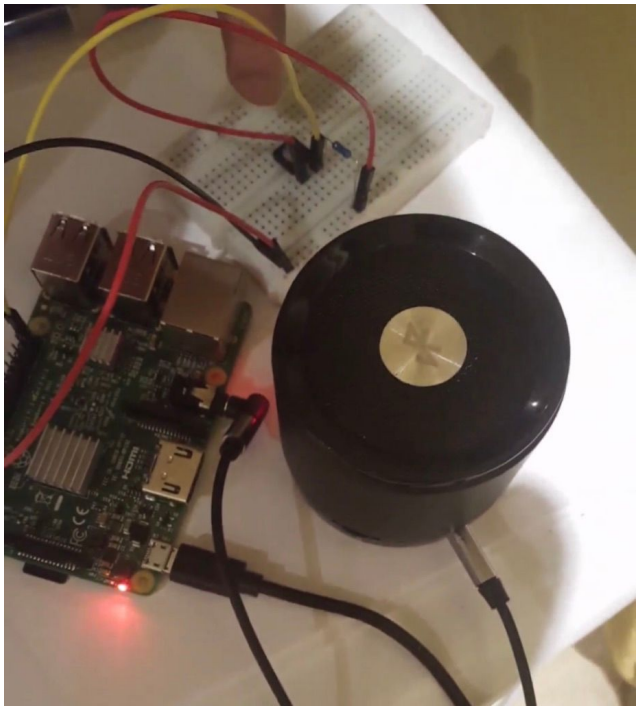

Fig 3. Audio component prototype.

We developed a focused physical prototype for our audio component. It was designed using a Raspberry Pi which is an independent computer (microcontroller) that fits on small circuits. Since it's a computer, we can program it to carry out certain commands. In our case, we programmed the Raspberry Pi using Python and were able to create a basic soundboard. When an electrical input triggered by the push of a button is detected by the computer's processing unit, a specific recorded sound file will be played out of the 3.5 mm analog audio jack output.

Prototype Testing

	Design Specifications	**Relation (=, < or >)**	**Prototype One Value**	**Target Value**	**Units**
No.	**Functional Requirements**				
1.	Weight	=<	0.6	5	kg
2.	Dimension	=<	24.1 x 27	50 x 60	cm

3.	Thickness	=<	≈5	3	mm
5.	Writing size	=<	N/A	15	mm
6.	(margin of error)	=<	0	2	mm

*5. We have decided not to include any form of writing on our map. Only a small percentage of visually impaired people (4%) can read braille and textured writing can lead to confusion.
*6. Now that we have decided on building a stationary map, we have allowed our map to be thicker.

Design Day Presentation and Solution Verification

On Design Day, we will present a general overview of our project plan and our progression over the duration of this course. We will concisely explain how we went about creating our final product, starting with our first and ending with our final prototype. Our explanation will touch on topics such as our problem statement, client/user needs, design criteria, target specifications and product prototyping and testing. Generally speaking, this will be a brief summary of the creative thinking design method used for our project. We will also present a Gantt chart demonstrating how we scheduled our tasks every step of the way as well as our bill of materials. Finally, we will showcase all of our physical prototypes and explain the functionality and purpose of each one.

To verify that our solution works really well, we will have to see it being used by our targeted users. To do so, we will have to visit the 785 Carling Avenue building and witness our map being used by employees and visitors with visual impairment s. How well they are able to navigate the first floor without getting lost or having to ask for additional directions will help us determine if our map does its job very well.

Conclusion

During the third client meeting, were not able to meet with Jeff, a visually impaired person we have been consulting with. However, Graham, our client, gave us some very insightful feedback on our prototype. Our team now has a better understanding of what improvements will make our tactile map a winning solution.