

## **GNG 2101 Deliverable D**

### **Detailed Design, Prototype 1, and BOM**

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# **Table of Contents**

<b>Table of Contents</b>	<b>1</b>
<b>List of Tables &amp; Figures</b>	<b>2</b>
<b>1.0 Introduction</b>	<b>1</b>
<b>2.0 Client Meet #2 Summary</b>	<b>2</b>
<b>3.0 Updated Design Concept</b>	<b>3</b>
3.1 New Scope for the Project	4
3.2 Most Critical Assumption	4
<b>4.0 Prototype</b>	<b>5</b>
4.1 Prototype Testing	7
4.2 Future Presentation to the Client	8
<b>5.0 General BOM</b>	<b>9</b>
Table 2: Bill of Materials	9
<b>6.0 Conclusion</b>	<b>10</b>
<b>7.0 Appendix</b>	<b>11</b>
7.1 Meeting #2: Notes	11

## **List of Tables & Figures**

<b>Figure 1: First sketch of wireframes</b>	<b>5</b>
<b>Figure 2: Wireframe prototype for basic application</b>	<b>6</b>
<b>Figure 3: Flowchart explaining general steps for the app procedure</b>	<b>7</b>
<b>Table 1: Updated target specifications</b>	<b>8</b>
<b>Table 2: Bill of Materials</b>	<b>9</b>

## **1.0 Introduction**

This Stage will begin by identifying the information retrieved from the second client meeting.

Then, We will demonstrate the ways in which that information changed our intended design from the previous deliverable to better reflect the needs presented in both meetings.

Furthermore, we will identify the key product assumptions we will be making for the purpose of this prototype. Once we create a suitable prototype, we will analyze it and determine a Bill of Materials, to keep track of its cost, and compare it to the target specifications and needs established. This will also determine the result that we will present to our client. Overall, this stage will take the first real steps towards developing our solution.

## **2.0 Client Meet #2 Summary**

In our meeting with the client, We presented her with our concept from the last deliverable. She helped us realize that it had a few primary flaws. Firstly, it would need to be implemented by the city which would take longer on its own than our project time allows. Secondly, she said she'd prefer that it work on buttons typically found in office buildings such as elevator buttons and exterior doors whereas our design was more concerned with crosswalk buttons. Finally, she said, for reasons mentioned in the first flaw, that she'd prefer something portable and purchasable. This has forced us to change quite a bit to better suit her needs.

### **3.0 Updated Design Concept**

During the client meeting, our client addressed a problem with our design, that it would develop a dependency on the city to adopt it, which either would not happen, or would take years to implement. Further, after a discussion with the professor, our product design was deemed unfeasible, as the goal for the project is to have a working product by the set deadline. Thus, we had to ideate a new design concept.

We re-visited the original problem statement from Deliverable B. Keeping feasibility in mind, we adjusted the scope of the project to focus on locating elevator buttons instead of pushing it. Additionally, a point the client brought up during our second client meeting was user autonomy, where the product's functionality is solely dependent on the user.

Based on these new parameters, we decided to switch back to developing a product that will guide the user to a button instead of a product that will push the button for them. The product will be an app that can take live footage and detect a button. The product will then notify the user of the button and the user can then decide to start the guidance procedure.

The app will guide the user to the button by tracking the button's position in terms of the camera feed. There will be an "approval region" set so that when the button falls into that region, the user's phone will vibrate to let the user know they are walking or looking in the right direction. Should the button fall outside of the approved region, the app will verbally notify the user and begin verbally guiding the user so that the button falls into the tolerance region again. The app will notify the user if they are close enough to the button to push it, then the user can then press the button and stop the guidance procedure.

### **3.1 New Scope for the Project**

After getting feedback during the second client meet we were able to narrow down the scope of our project to focus on solely detecting elevator buttons. With this in mind we continued to narrow our scope so that our product will only help locate the general vicinity of buttons, but won't be pushing the button for users so that we have a feasible goal for the end of the semester.

### **3.2 Most Critical Assumption**

The most critical assumption about our product is that our button locator software will be able to recognize buttons to an accurate degree and that this will be an easy to use product. Our team is still in the initial stages of reading existing documentation on elevator button recognition software, learning the theory behind it and how we can implement it in our own app. The software itself will take one of the longest duration in our prototype to finish and won't be done in time to test for prototype 1 so for now we have to assume that in the future we will finish writing the software and that it will work to an accurate degree.

## 4.0 Prototype

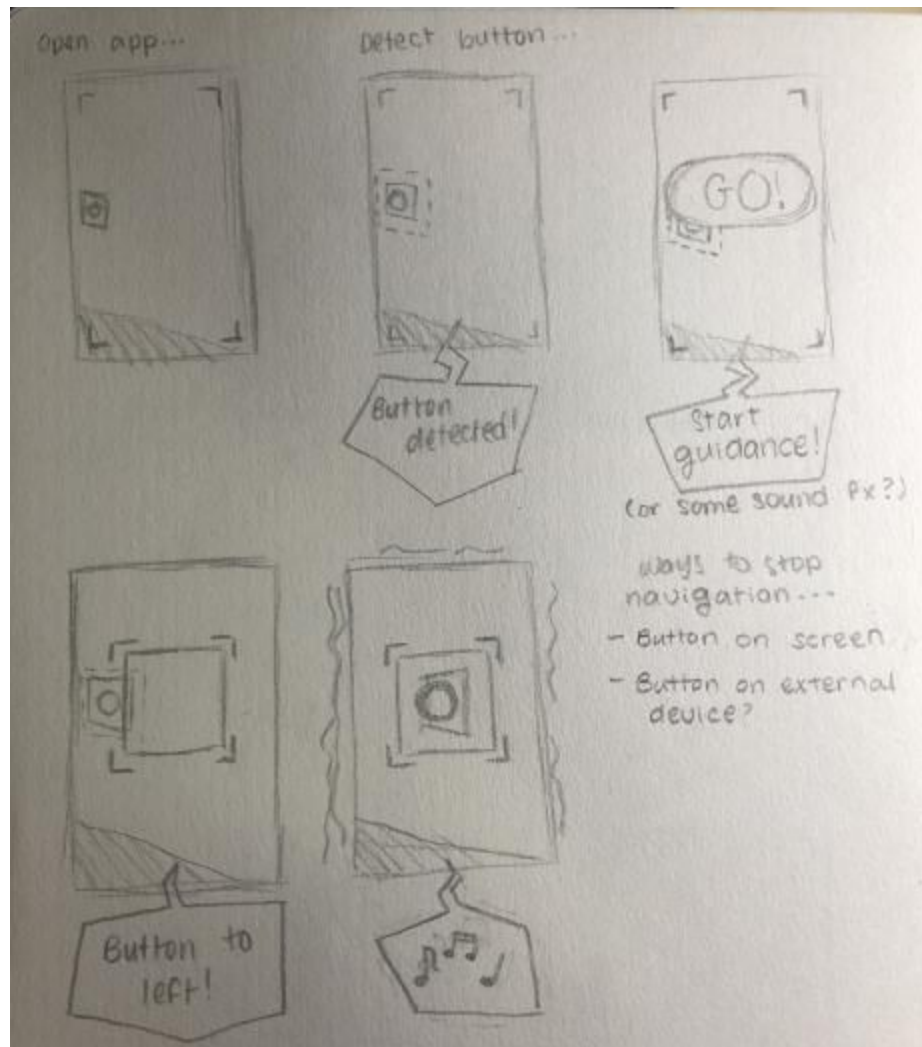
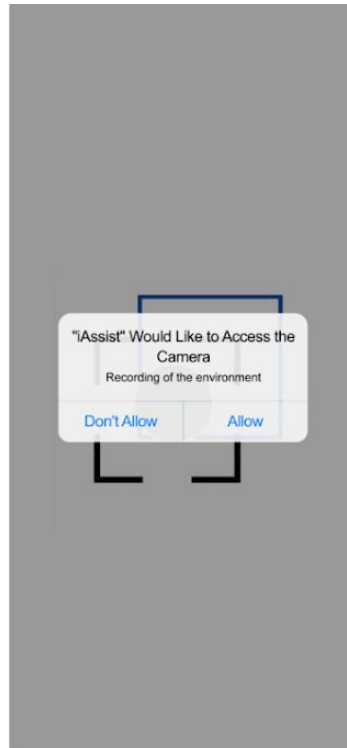
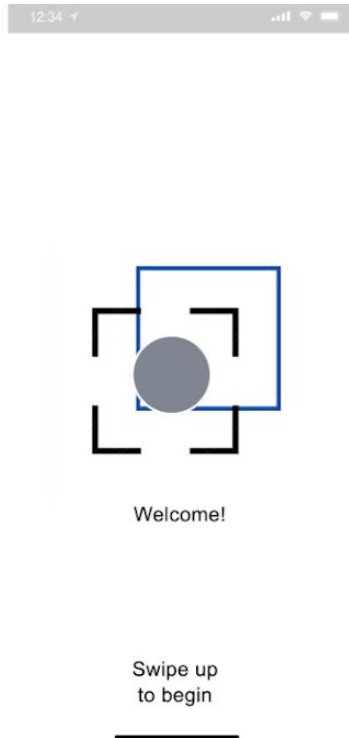
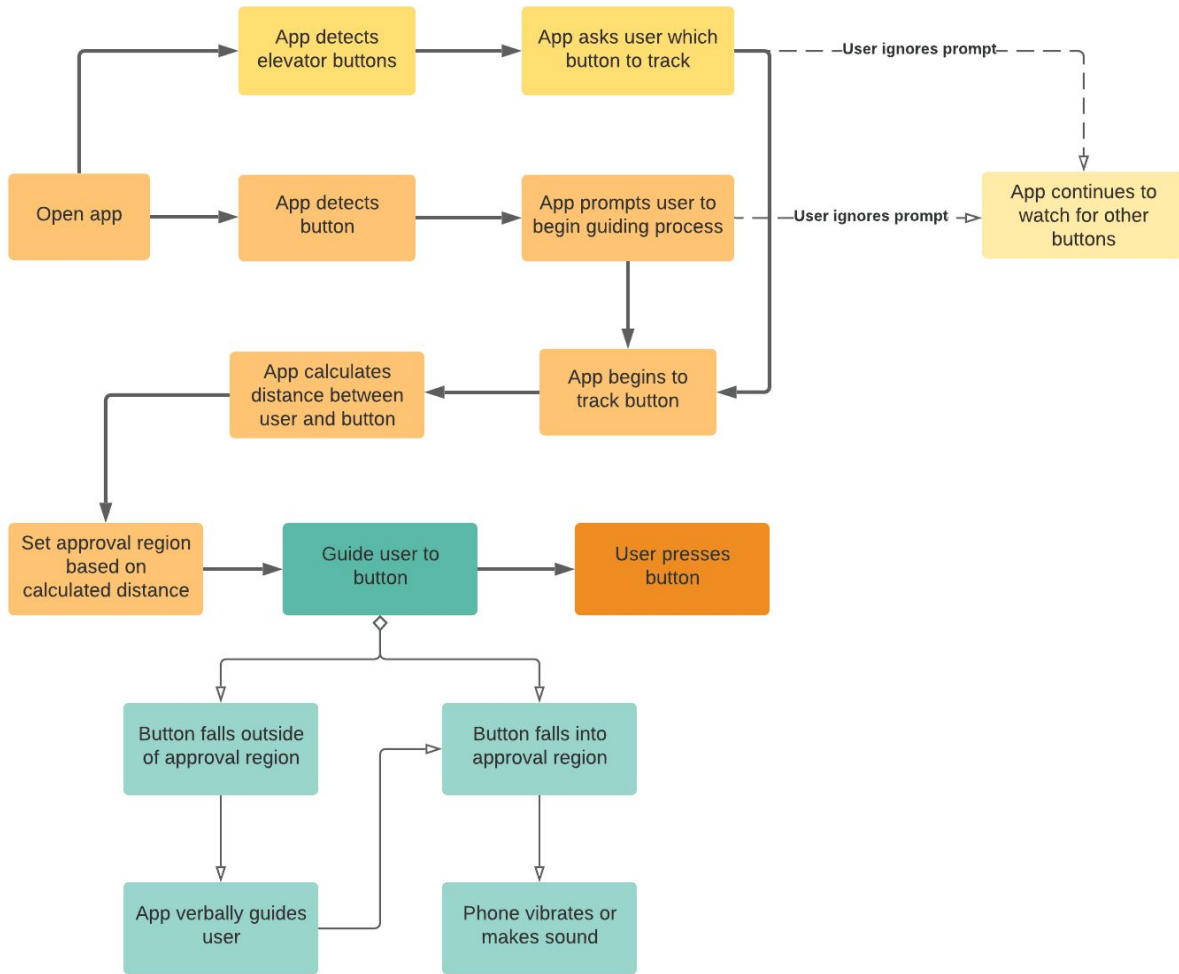


Figure 1: First sketch of wireframes





**Figure 2.** Wireframe prototype for basic application.



**Figure 3.** Flowchart explaining general steps for the app procedure

#### 4.1 Prototype Testing

Our prototype is a Focused, low Fidelity, Analytical prototype that we used to test the formatting and usability of our app which is the central component to our design. Its purpose is to see the sequence of actions required and a good and easy to understand method of displaying them. It is trying to verify the assumption that an app can be used effectively for what we intend.

**Table 1: Updated target specifications**

Target Specification	Unit	Expected(Marginal)	Actual
Cost	\$	$\leq 100$	0 because it was just programming here
Presses buttons remotely	Y/N	Y	Not in this stage of testing
Usability	1-Very user friendly 2-Moderately user friendly 3-Not user friendly	1	2
Phone integration	Number of Platforms	1	1
Notifies user to problem	The number different notification systems	Audible or vibrational	Not in this stage of testing
Route planning feature	Y/N	N	Not in this stage of testing

#### **4.2 Future Presentation to the Client**

In our next client meeting, we intend to present the client with our updated design concept with its new benefits and constraints. We will also describe to her our prototype here designed to help her comprehend the idea better and the intended direction.

## 5.0 General BOM

**Table 2: Bill of Materials**

Item Number	Part Name	Description	Quantity	Unit Cost (CAD\$)	Extended Cost (CAD\$)
1	Publishing Fee	Uploading App to the app store	x1	131.22	131.22
2	Renting Mac OS	This is a potential cost if we have to cater towards Apple users	x2	20	40
Total					171.22

## **6.0 Conclusion**

This deliverable helped us work from our concept in the last stage and the client feedback to a current, firm design concept and a prototype that helped us establish the direction for the solution. Furthermore, we established, in a relative sense and are open to change as new problems arise, a total cost for the materials we intend to use. All this data will be helpful in the future as the first part helped us devise the intended solution, which we can look back on and change for future prototypes, and a prototype to establish the field and scope of the solution.

## **Appendix**

### **A.1 - Meeting #2: Notes**

#### **Gianluca:**

- Sensors were used for people with disabilities that restricted their range of motion.
- Audio options with accessibility
- Personal devices at most frequently visited places (Offices, home, etc.)
  - Tile like devices to track accessible buttons

*\* More interested into development of indoor door accessibility (used example of elevators at Parliament LRT station).*

#### **To consider:**

- Malls/doors inside buildings
- Elevator buttons
- Tight/crowded places
- LRT station with elevators

#### **Thuy-Vi**

- Mentioned using motion detectors
- Beats headphones(?) have option to cycle through different songs
  - Can implement that except for crosswalk buttons to select which button to push
- Can have different notifications for different buttons
- “Luggage locator”
- Movable locator
  - Problem: theft

#### **Tony**

- Mentioned using Blindsquare, an app used by people with little to no vision
  - Uses pause & play buttons to list options/choose option

#### **Hiruni**

- There are sensors for people in wheelchairs that detects specific motion movements or the specific area they would approach from
- The pro to having the device incorporated into the phone is that you only have to carry one device versus the con of having to use battery life
- Look into blindsquare usability (Nolan likes how it works)
- Likes the idea of having a personal device that you can keep on you or move around throughout the day

- Want to focus on elevator buttons

**Gabriel Was Speaker**