GNG 1103 – Engineering Design

Deliverable H – Prototype III & Customer Feedback

Team B1-05

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Abstract

A detailed report that establishes an effective test plan and presents the project's third prototype.

Unfortunately, client feedback was not given from the previous prototype.

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1 Introduction

On November 20, 2020 we were successfully able to produce and test our second prototype for this project. Since then, we as a team have met extensively to discuss and elaborate upon our project. In this report, we have extended our goals, interpreted previous client feedback, and re-implemented our concept. As such, we and have built an impressionable third prototype to test our project's most critical functionalities and target specifications.

2 Prototype III

Based on beneficial (previous) feedback of our clients and the pre-determined target specifications and criteria, we have produced our third prototype below. In this model, we believe we have validated our assumptions and have efficiently presented an encapsulation of the needed design criteria.

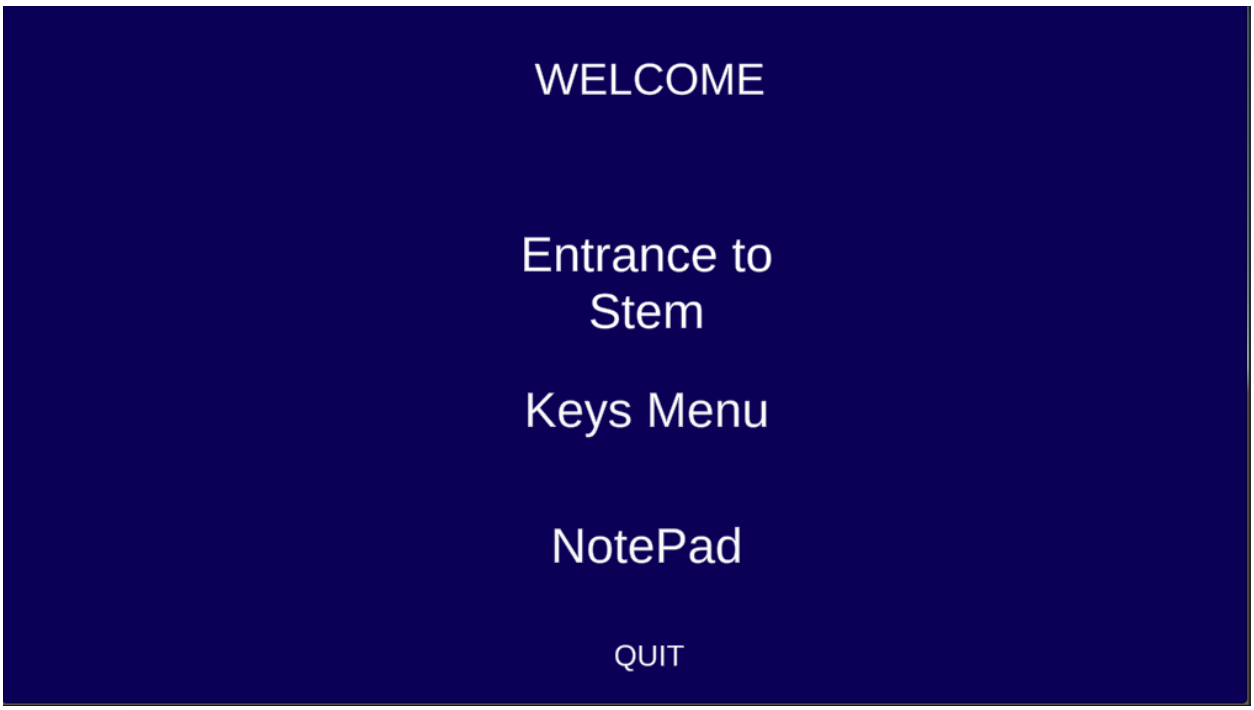

Figure 1: Main Menu

In the above figure, we have implemented the main menu. Here, the user may select the Entrance to STEM, Notepad, Keys Menu and/or Quit the application. It is simple, organized, and extremely user-friendly. Each element is further explained in the figures below.

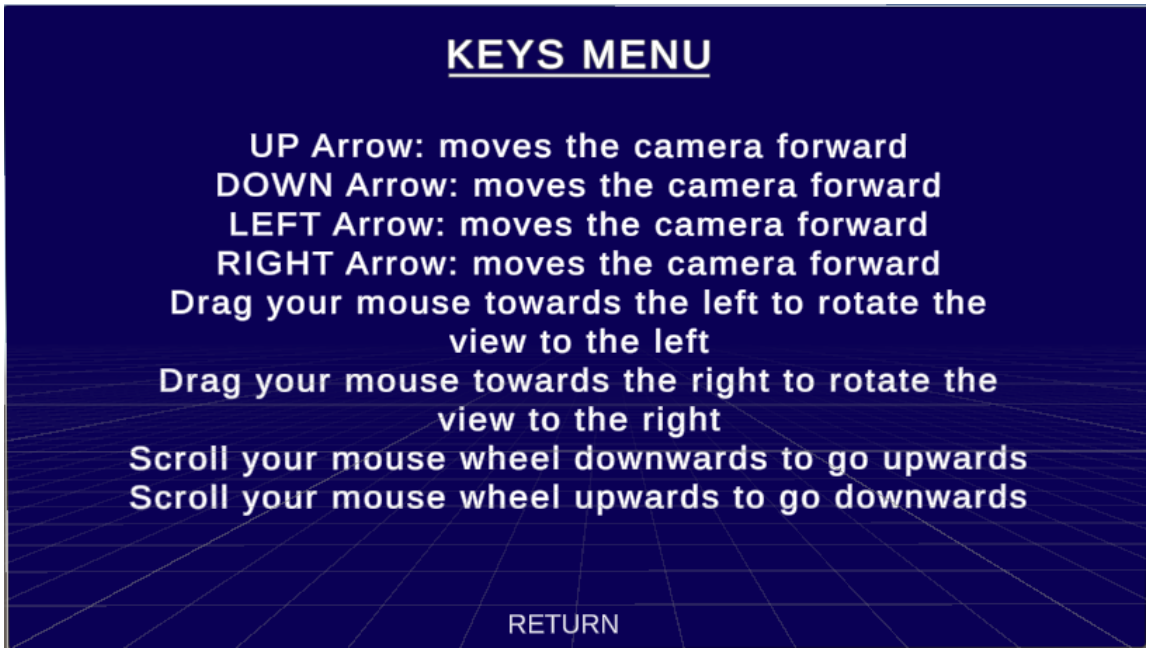

Figure 2: Keys Menu

Figure 2 displays a screenshot of our keyboard and mouse menu, where the user is taught how to preferably view the building through various instructions.

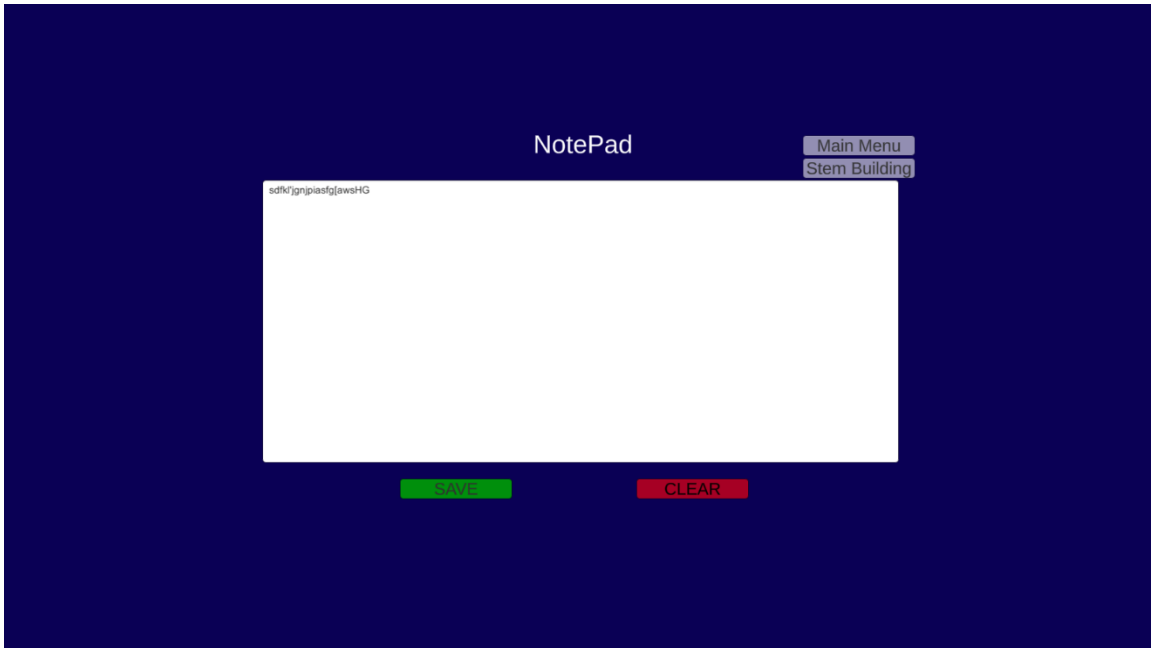

Figure 3: Notepad

Figure 3 displays the Notepad feature of our product, which enables the user to type, save and clear information. This is especially useful, since the user can save reminders and hazards within the BIM interface, that can be accessed once more for future reference. This was one of our hardest hurdles to overcome and was the largest aspect of improvement for this prototype. We believe we have effectively demonstrated this improvement and thus, are confident in our ability to continuously expand expectations for this project.

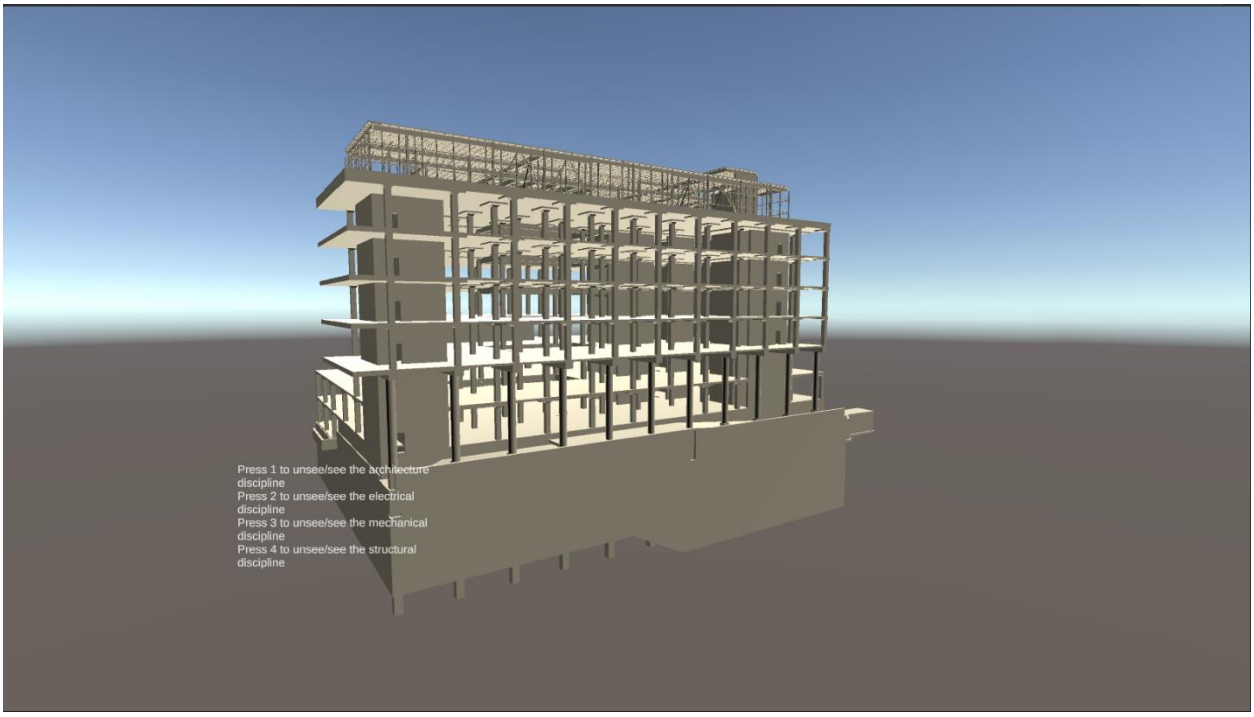

Figure 4: Structural Discipline

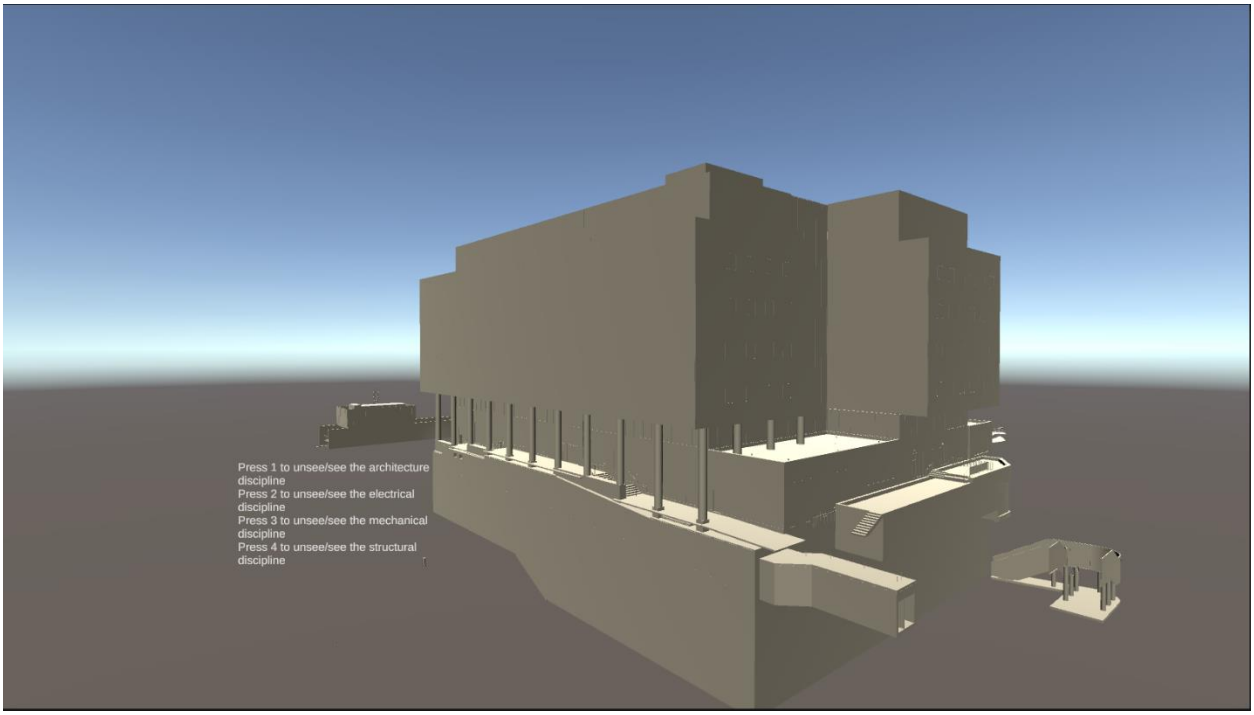

Figure 5: Architectural Discipline

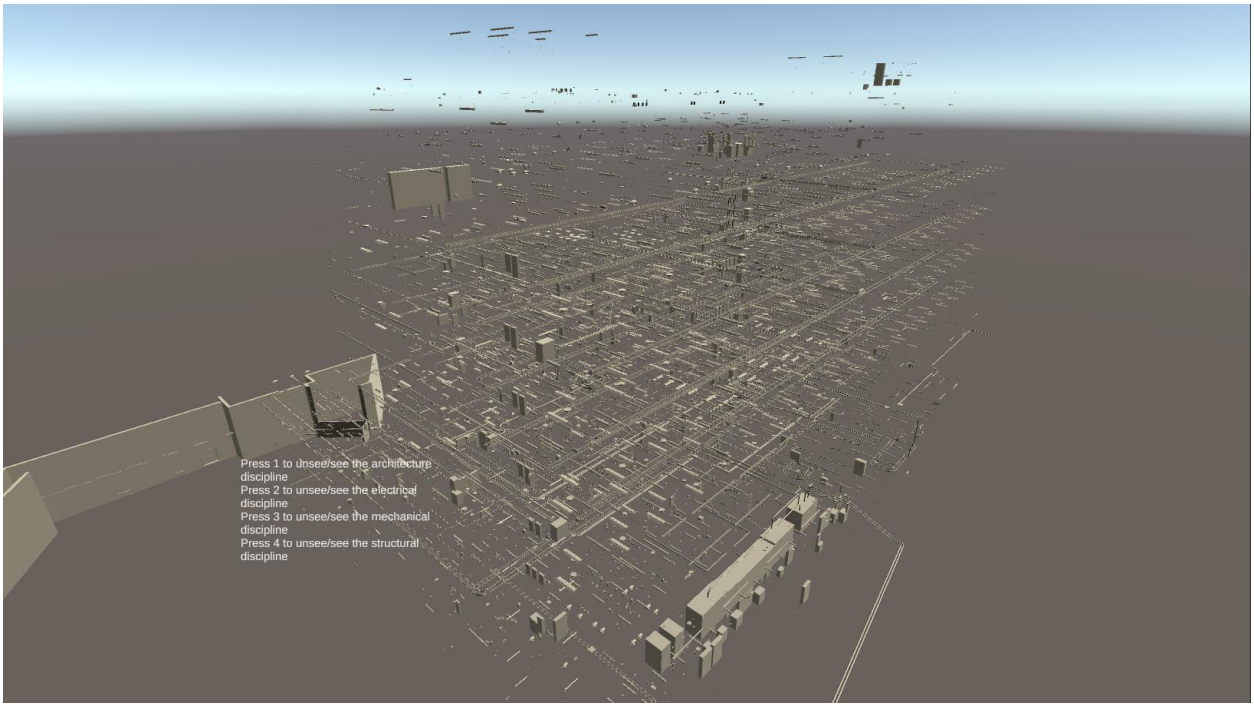

Figure 6: Electrical Discipline

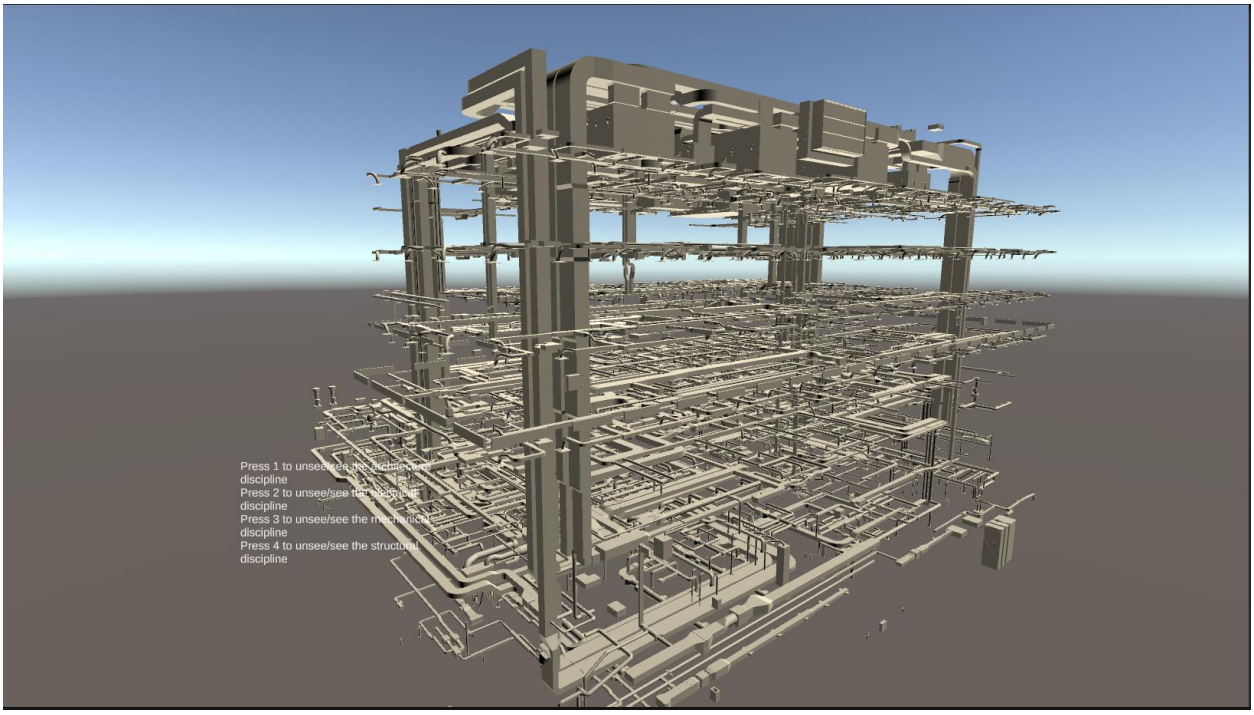

Figure 7: Mechanical Discipline

Figures 4-7 display the four types of disciplines that may be accessed just like in the last prototype. However, in this prototype, the interior of our BIM model is much clearer. We were unhappy with the lack of clarity and messy displays so worked to improve this prototype by removing the inner shadows of the STEM building. Doing do, ensured that our app will present a significantly more visible building.

3 Prototype Testing

3.1 Client Feedback

Prototype III is our latest prototype for this project; this is where we have implemented all the received feedback, as well as our own concerns. We do not have another client meet for this prototype, but we will continue to refine and improve our product through testing. Our group must produce test cases to remove all existing bugs and ensure a smooth-running AR software.

3.2 Feasibility Verification

The project that we are currently doing is one that is easy enough to realize. The only difficult part of this project was the programming and actual construction of our project. There is little programming experience within our team, however, we have slowly been able to overcome this obstacle. Through many tutorials, trials, and troubleshooting, we believe we are on track and have presented a viable solution for our client. In addition, Unity is a very popular program so almost everything that we want to do has already been done by other designers, and therefore, we have reflected upon and developed codes that have already been produced. As such, we firmly believe that whilst we may be a slower group to learn, we will present a strong and well-thought-out product. Comparing our skills from the second prototype development to this prototype, we strongly believe we have greatly improved and look forward to presenting our work. We believe we have truly overcome all obstacles that arose during the development of these prototypes, and have produced a product that is in fact, a practicality.

3.3 System Analysis

Since the prototype is an online application, there is a limited number of materials and components to be analyzed.

1) List of components and materials:

- User's android/iOS device

We also considered a study in reducing any risks/uncertainties that may arise in the system:

Risk	**Severity**	**Contingency plans**
Lack of experience in programming	3	Research, watch tutorials & reach out to TA's
Unity, as well as other necessary coding programs may crash	5	Debug and research troubleshooting options
VR headset may be affected by shipping delays or empty stock	3	Order the headset early in advance
Elements may only be producible through Asset store	2	Use the Unity Asset Store as an alternative
Severity: *scale is 1-5, where 1 is not severe and 5 is very severe*		

Functional Requirements:

Design Specifications	**Relation**	**Value**	**Units**	**Verification Method**
Ability to view 3D Building Information Models (BIM) in Visual Augmented Reality	=	Yes	N/A	Analysis/ Test
Compatible with common Mobile Devices	=	Yes	N/A	Test/ Use IOS and/or Android
Software application must be open source or free to use	=	0	$	Estimate/ Final Check
Navigation and interface must be user friendly	=	Yes	N/A	Test/ Evaluate User
Training and implementation documentation must be provided	=	Yes	N/A	Instructional Reports
Presented through VR or AR on a mobile device	=	Yes	N/A	Test/Evaluate platform
Easily operated by any individual regardless of technical skill level	=	Yes	N/A	Final test/ Evaluate User

Non-functional Requirements:

Design Specifications	Relation	Value	Units	Verification Method
Take obstructions into consideration	<	Yes	N/A	Test
Use Google Cardboard or similar device	>	Yes	N/A	Test
Display markups (dimensions, annotations, etc.)	=	Yes	N/A	Simulation/ Test

Constraints:

Design Specifications	Relation	Value	Units	Verification Method
Available on IOS and Android	=	Yes	N/A	Report/Test on multiple devices
Cost	=	0	$	Estimate/Receipts of purchases, in app purchases

3.4 Design Day Preparation

In the coming weeks, our group will be preparing a sales pitch, presentation, and simulation for design day. After having completed prototype III, we believe our app is well-organized, clear, and consistent with the client's needs. We will prepare a short presentation that consists of the following three concepts:

- A short slideshow that displays our progress throughout the creation of the "**JAND-AR Construction" Team B5 Project**.
- Prepare a short presentation of the app itself, intending to follow proper presentation guidelines.
- List and organize our main points while considering each group members strength and partaking in the project. This is to ensure that all key concepts are discussed within the limited amount of time and to create an engaging presentation.
- All these elements will be meshed to produce an effective pitch for our product.

4 Conclusion

Therefore, with the original feedback of our clients, along with our own brainstorming and troubleshooting of steps, we believe we have successfully completed all the necessary aspects of this report. We ensured that the given clients' comments were implemented into our first and second prototype, and thus, an adequate third prototype. In addition, we ensured that there was an emphasis on our project's most critical functionalities and target specifications through detailed testing and analysis. We have also taken the time to insightfully critique our process and believe that this has allowed us to successfully grow as a team. We look forward to the next step in presenting all of our work, and displaying our final product to clients, judges and peers.