



Axolotl Industries

Team B03-2

Deliverable H - Prototype III and Customer Feedback

Engineering Design - GNG1103

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ABSTRACT

The purpose of this deliverable is to reflect upon prototype III which is also the final prototype to be made and to be presented to the client EllisDon. New feedback and ideas were integrated to make this final product and a test was done to further improve the application.

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1. Introduction

In the previous deliverable, prototype II underwent development, testing, and was subject to client feedback to design the final prototype. The purpose of this deliverable is to discuss prototype III, which has been redesigned according to its feedback. This deliverable will be divided into three parts; discussing prototype III, customer feedback, and finally, the final steps in the project.

2. Prototype III

The main purpose of prototype III was to develop the AR application near completion. This includes having the main components and functions of the app completed, and what remains are small changes for the final version presented on Design Day.

2.1 Home Screen and Main Screen

The application home screen is the screen that remained mainly unchanged. The home screen is the first screen of the application and offers the user the following options: to enter the AR mode, enter the settings menu, and view the app tutorial. The settings menu includes the option to change the application language, the resolution of the model, and the option to turn the background music off and on. The app tutorial will offer a tutorial video for the user, as well as labelling of icons, for easy understanding. In regards to the main screen, the overall appearance remained the same, but two new features were added: gaze interaction for adding notes and dimensioning.

2.1.1 Gaze Interaction

The gaze interaction feature utilizes Raycasting from our main camera to present information. Rays from the camera must come in contact with a target object to present the information. In our case, we used a 3D “Explanation mark” model that we obtain from the asset store, as our target. Once the rays from the z-axis of the camera come in contact with our target, a 3D Speech bubble model pops out of the target. The speech bubble rotates around the y-axis to always face the user. The user can tap on the speech bubble to add his or her notes regarding the BIM. We plan to utilize the gaze interaction in more ways, for example, if the user looks at a plumbing pipe a speech bubble would pop informing the user of data about that pipe. Figure 1 below illustrates the gaze interaction feature.



Figure 1. Gaze Interaction

2.1.2 Scaling and Dimensioning

In the main screen, in addition to the gaze interaction feature, a scaling feature and dimensioning feature were also created. The scaling feature, controlled by pinching the model with two fingers, will be used to change the size of the model. The dimensioning feature will allow the user to measure the dimensions of the model when it is at a 1:1 scale. The function uses two spheres that will appear with a click of a button, and the user can drag the spheres around to measure distances. Essentially, it works like a tape measure. Figure 2. and 3. below illustrates both features.

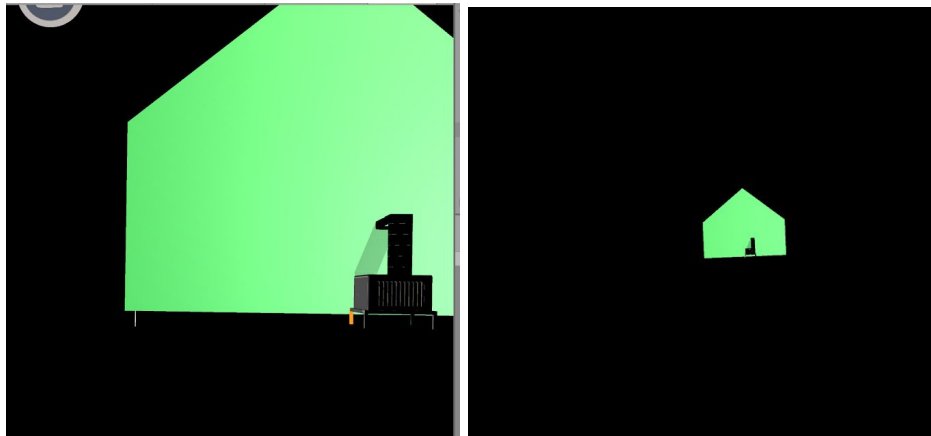


Figure 2. Scaling Feature

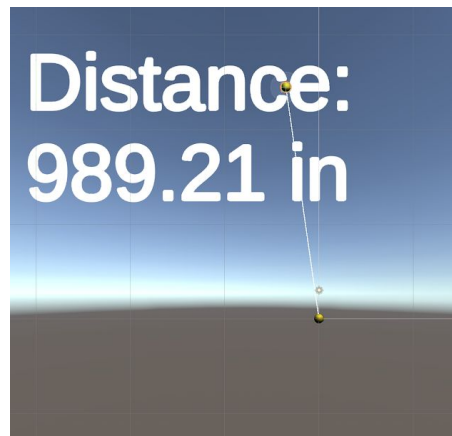


Figure 3. Dimensioning Feature

2.1.3 New B.I.M model

For this prototype, customer feedback suggested that another B.I.M be used to showcase the features of the app (the specific feedback will be further discussed in section 3.1). Instead of the original house model discussed in the previous deliverable (shown in figure 4. below), the STEM building will be used (shown in figure 5. below). This new model includes the mechanical, structural, architectural and electrical engineering views, and is only one floor, but its design is much more professional and better features this application's functions. The engineering views will be accessible through the main screen's view buttons, and users will have the ability to toggle between each view. Figure 6 below depicts the toggling between the engineering views.

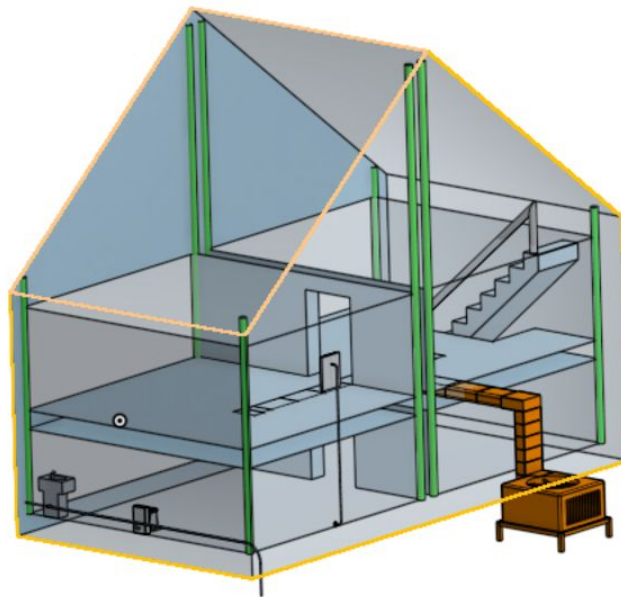


Figure 4. House B.I.M

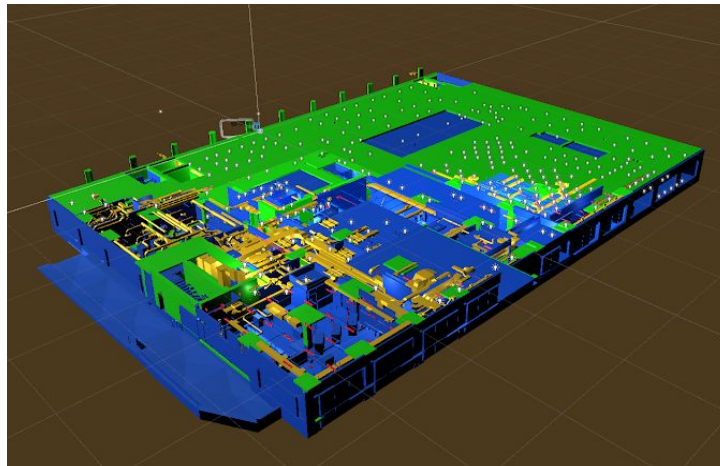


Figure 5. STEM B.I.M

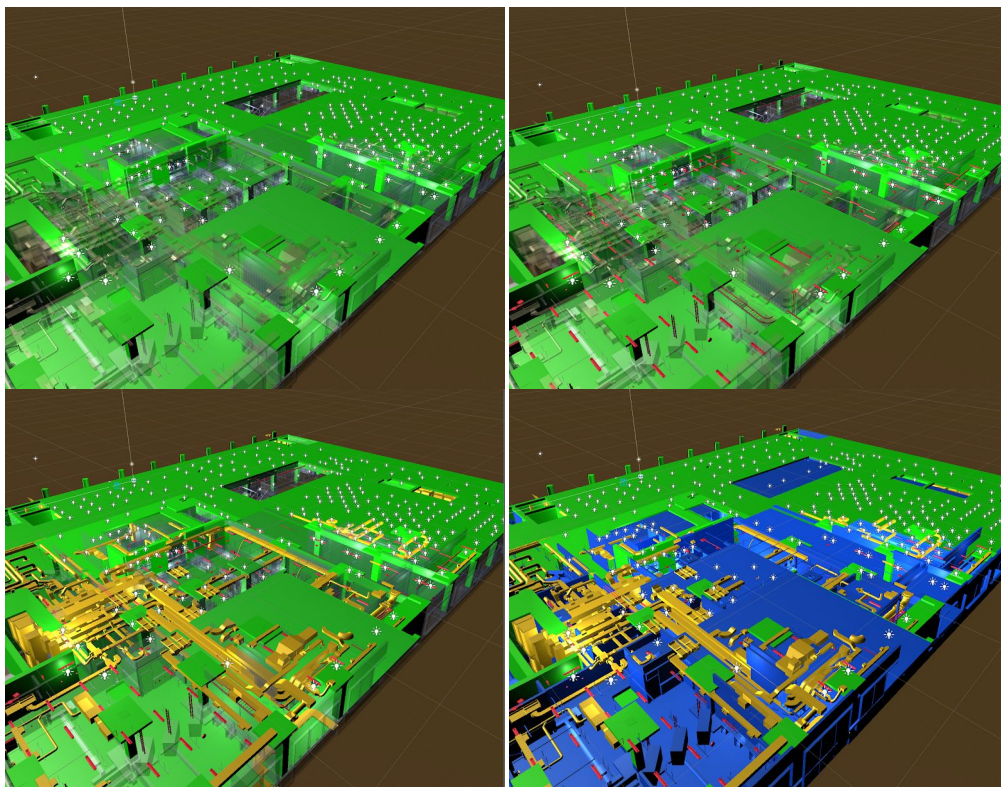


Figure 6. Engineering Views

2.2 Testing

In regards to testing prototype III, since it was intended to be the final prototype and a representation of the final version of the application, the testing methods were more rigorous and comprehensive. The application was tested on both the Unity PC platform and the mobile platform. In terms of the Unity PC platform, testing criteria included the following: whether the STEM model appears on unity, whether the engineering views function works, and whether the scaling and dimensioning features work. For the mobile platform, in addition to the unity testing criteria, it also included whether the model appeared on tap, whether the gaze interaction and communication features worked, and finally if the UI functioned as intended.

When both tests were conducted, the application passed them both. On the Unity platform, the function was smooth, and all features and UI worked as intended. On the mobile platform, all testing criteria were passed, but to a certain extent. The BIM, scaling and gaze interaction all worked as intended, but the dimensioning faced some issues, where the feature did not appear at first. All issues faced were debugged, and the current version of the application runs well and is near completion.

3. Feedback

3.1 Expert Feedback

The expert feedback received for prototype III was mainly about the model used, the note-taking ability of the Gaze interaction, and the features that are included or are to be included in future prototypes. First, it was mentioned that the model used was not compatible with the unity interface and was too simple. The expert suggested that the STEM model be used to emphasize the capabilities of the app. Second, it was said that to improve the app the gaze interaction was used more frequently in the app. This feedback was mainly to indicate that the gaze interaction feature can be used in other scenes and have added functionalities. Finally, the expert stated that the aesthetics of the app was very good and the main functionalities are spot on.

Using the feedback given, certain changes have been brought or will be made to the final product. The STEM model will be brought into Unity and used as the main model to showcase the features of the app and replace the previous model. As for the gaze interaction, in the final product, this feature will be implemented in more ways to give the user a more in-depth AR experience. Another update that will be used for the final



prototype will be making sure all the functionalities of the app work flawlessly on phones. The final update will be a warning screen to caution the user of the use of the app on a construction site, where they will be prompted to accept the “terms and conditions” before proceeding to the app itself.

3.2 Other Feedback

Other feedback included praise for the smoothness of the app and the quality of the new icons implemented. It was also mentioned that the background music was pleasant to listen to and that once all the bugs are fixed, the app will be top notch.

4. Conclusion

For the final prototype, we finished inputting most of the design elements discussed in previous deliverables and after testing the app on our phones, it seems to be working as expected. Many expert and general feedback were given to enhance the app’s performance and usability. Overall, the app is essentially complete and only has small issues that will be solved for the design day presentation.