Lavallee Industries

Lab Section 1 – Group 4

Deliverable G – Prototype III and Customer Feedback

Engineering Design - GNG1103

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Abstract

The sole purpose of this deliverable is to analyze and reflect upon our most recent prototype (III). Additionally, this prototype is the final mock of our project which we will be presenting to our clients. Additional features were added to the UI along with functional changes to solidify the usage of our application.

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1. Introduction

This deliverable's goal is to discuss prototype III, which has been modified in response to user feedback on prototype II, which had gone through development and testing in the previous deliverable. This deliverable will be broken down into three sections: a discussion of prototype III, client feedback, and finally, the project's closing steps.

2. Prototype III

The purpose of Prototype III was to make it so that we can have a smoother tracking system, as well as calculating the position of the ball, and to work on the menu and user interface system to completion, to have a complete working application.

2.1. Camera setup

We have swapped from a 4-camera setup to a 2-camera setup. With the budget that we currently have, we require a much stronger server to use 4 different cameras at the same time to obtain different values with, however we can obtain a very good number of values using two cameras, and our laptop. However, with our current code, it would not be hard to add in the ability to use 4 cameras. Currently, instead of 4 cameras in each corner of the court, we have one at the back of the court and one on the length of the court.

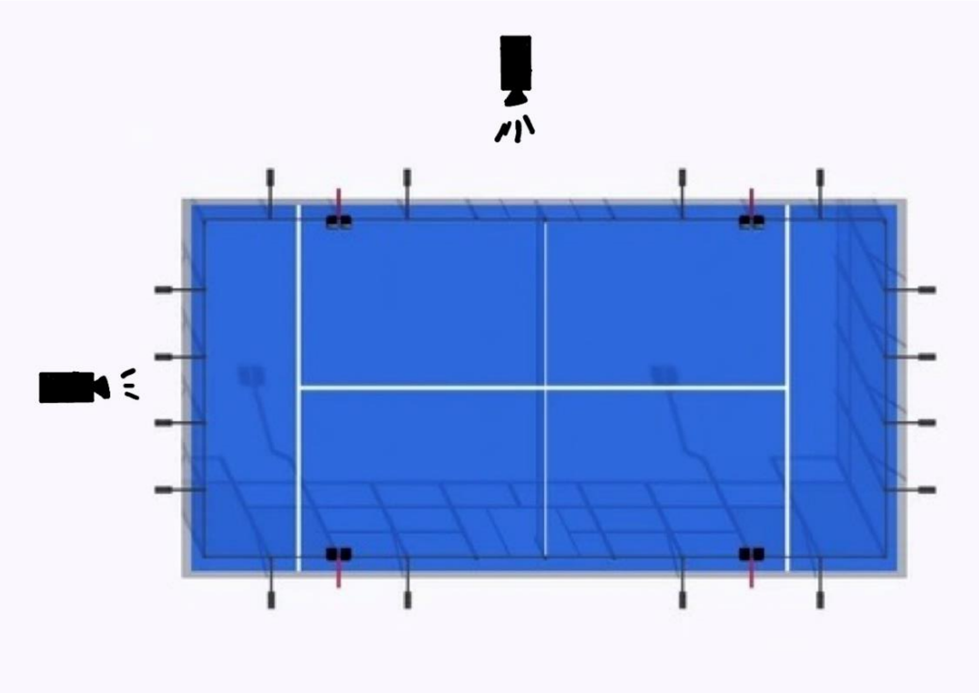

Figure 4 New Camera Set-up

2.2. The Home Screen

In the most recent prototype, the different unity scenes were connected. This just means the main menu, game section (as well as the toolbar), and the help section were connected into one project. The scripts were also made for each button, the exit now closes the application and puts “Quit!” in the debug log. The start button now switches the scene to from the menu to the game screen as well as contains the back functions from the game to main menu. The help button also leads to the help screen as well as a back button. The next step is to create the user manual and implement it into the help section. With some more time we’d like to update the sprites to look better.

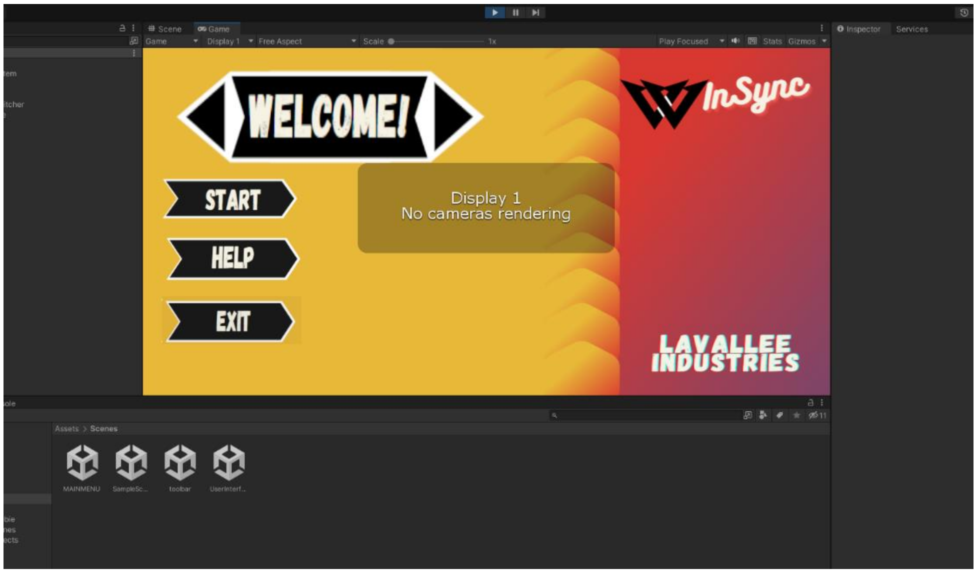

Figure 5 The Home Screen

2.3. The Main Screen

The main screen is the most important screen and vital for displaying information to the user. From Prototype 2, there have been some major changes to the main screen.

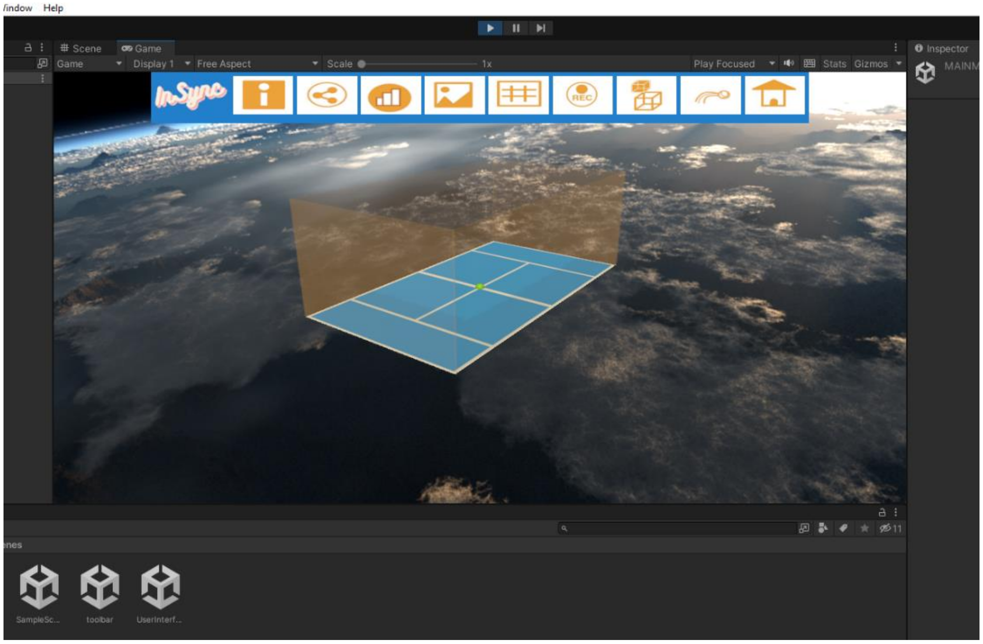

Figure 6 The Main Screen

The first major change was the addition of an awesome background! It was a free asset downloaded from unity and it adds a cool aesthetic to the program. The next change was the addition of walls to the court. The walls complete the padel ball court, the only thing left to add would be a net but since the court we are testing on is so small and we don't have a tiny net it hasn't been added, it would be an easy feature to add though. The toolbar was also repositioned to the top center of the screen because personally I think it fits much nicer there. The sprites have been added to the button holders and when you hover the mouse over the button they highlight in orange. The buttons haven't been scripted and will be done for design day.

3. Testing

In terms of testing for the final prototype, we came to a few varying conclusions. As for our camera setup, we intend to continue to use only 2 cameras solely for testing although the functionality works with 4 cameras. We've come to this conclusion because the network speeds we have tested with aren't quite high enough to maintain a steady capturing of 4 different cameras. As for the tracking, we intend to implement a code that sets the origin of the ball at the centre of the paddle ball court; doing this will improve the total tracking accuracy of the ball as it will allow us to set a "bound" for where the ball can be. By setting an origin and bounds, we will be able to limit the location of the ball to exactly how far it moves from the origin and how far it is from the bounds, thereby giving us two reference points to track. Finally, we found that using blue colour-tracking for the ball is not very effective as there are shades of blue in many colours, so we intend to revert to using a bright yellow paired with led lights at the top of the plexiglass courts to bring light to the ball and any "dark spots" in the court to allow for even better tracking.

4. Feedback

4.1. Expert Feedback

We showcased our prototype III to our Teaching assistants, and most of the feedback was about the application being used for the camera setup, the unity model, and what to add for features in our program. Firstly, our teaching assistants noted to us that light in certain areas would most definitely affect the colour tracking of our ball as colour is distorted in areas with different lighting levels which led us to the conclusion that we should run LED lights around our court to optimize the lighting in all areas. They had also noted to us that we needed somewhat of an instructional manual for our client to figure out how to use our application; we finalized with the solution that in the “help” section located in the main menu, it would open a navigation manual along with a legend for the icons to explain what their purpose is in the actual application. Lastly, although this wasn’t a major piece of feedback that would affect our final products functionality, but it was mentioned that the aesthetic of the “in-game” appearance of our application should be “appealing”, so, we decided on adding a space themed layout behind the actual court for aesthetically pleasing purposes.

4.2. Other Feedback

For the rest of the feedback, we were complimented for having the Unity program set up smoothly and that it looked professional. Furthermore, it was mentioned that the camera placements were ideal, and the tracking of the ball was highly accurate.

5. Conclusion

To conclude our updated protype involved testing and updating the code to be more accurate and consistent. The other major update was putting everything together and scripting all of it. The menu and the help were added and implemented as well as an exit application function. The future goal of Lavallee for InSync is general improvement to the accuracy and efficiency as well as the aesthetic of the entire application.