Lavallee Industries

Lab Section 1 – Group 4

Deliverable F – Prototype I and Customer Feedback

Engineering Design - GNG1103

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November 6th, 2022

Abstract

The project's price and timetable were estimated in the last deliverable, allowing everything to be planned for the remaining work. The purpose of this deliverable is to discuss client input and outline the software features of the initial prototype. The client approved the prototype, and the development can proceed.

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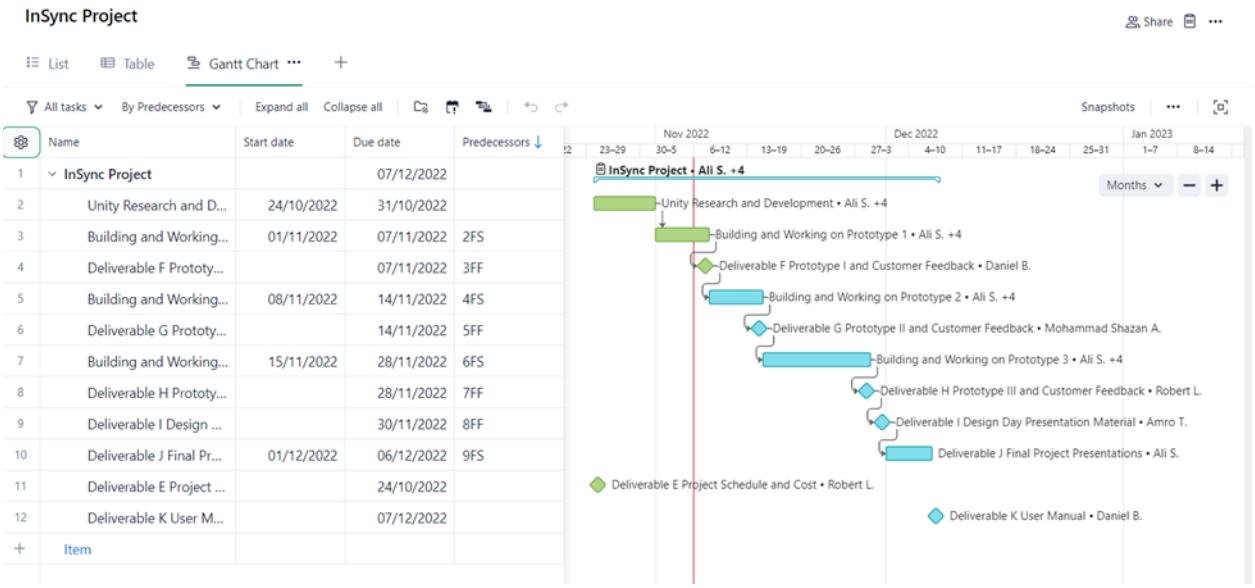
Wrike

Snapshot Link:

https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=0CD0yIh24dmqIWpc1HNLKB6k2IcB83JI%7CIE2DSNZVHA2DELSTGIYA

Screen shot:



1. Introduction

In the previous deliverable, we had formed a timetable for our process as well as an estimation for the cost of our prototype. For this deliverable, the focus was in developing our prototype for 3D tracking of a tennis ball based on our previous conceptualizations. This deliverable is split into 3 topics: prototype, testing, client feedback, as well as updates in our Wrike.

2. Prototype I

The main focus for Prototype number 1 was for us to get the most complex parts of the application functioning. The basics include the cameras tracking the ball and the main screen with its functions. Our prototype was designed to be a focused prototype, not all features are included in this version, but the main features the client is most interested in are open to feedback.

2.1 Camera Tracking System

The camera tracking system was most definitely the most tedious aspect of our prototype. To begin with, we had to find a method that allowed us to utilize our cell phones as cameras for 3D tracking. We utilized an application called Iriun webcam that allowed devices connected to the same network to transfer their camera to one another. From this point we applied a code from an online source [1] to apply a circular colour tracking system to track the tennis ball. The next step after our prototype will be able to send the coordinates collected from the python tracking system to unity.

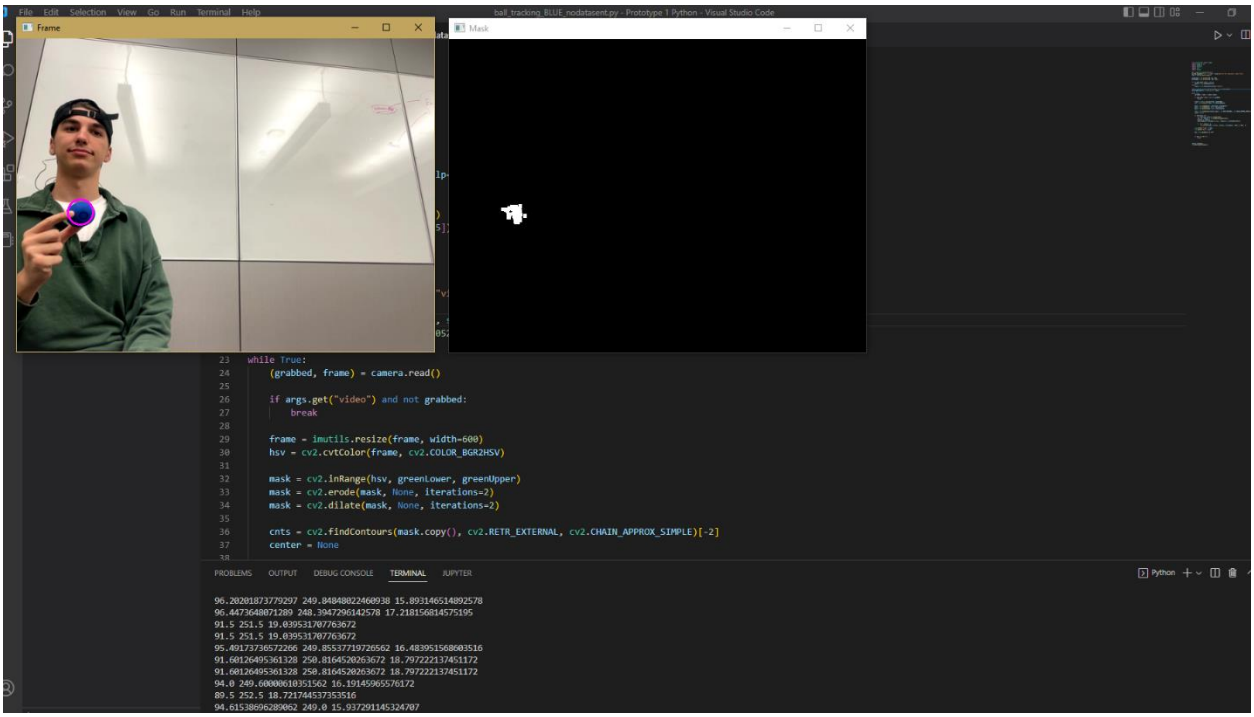


Figure 1 Ball Tracking

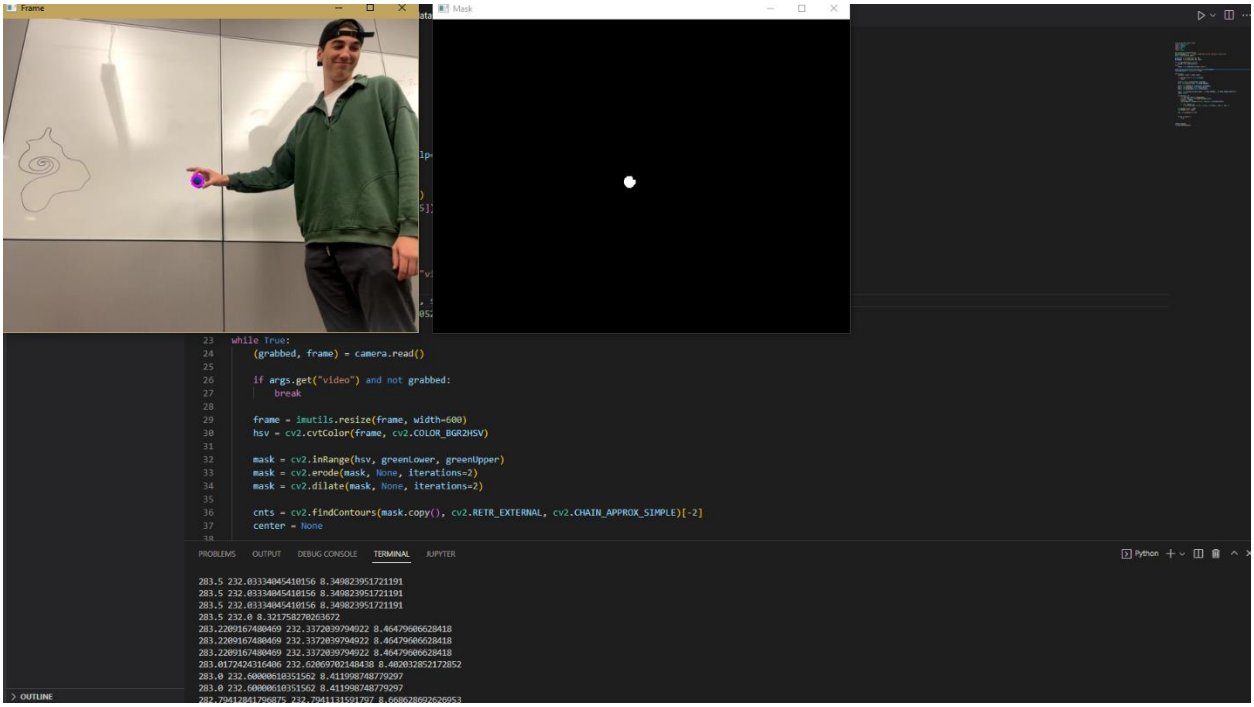


Figure 2 Ball Tracking 1 Camera

In these two pictures, the python tracking system is live and tracking the x, y, and z coordinates of the ball in real time.

2.2 The Main Screen

The main screen is the most important screen and vital for displaying information to the user. The main screen is implemented with the most functions and the primary function of the application will be experienced from the main screen. Figure 2. below shows how the main screen looks currently. We have not implemented the buttons yet because we have been focusing on having good code to track the ball accurately and be able to send information into unity. Currently the main screen displays a padel ball court and the ball. The user can also rotate spherically around the court using their mouse and the camera locks wherever they decide. For now, the main screen is plain but has a nice clean aesthetic.

The buttons and the icons have not been created nor have they been scripted yet, but they will be displayed along the top of the screen for the next prototype.

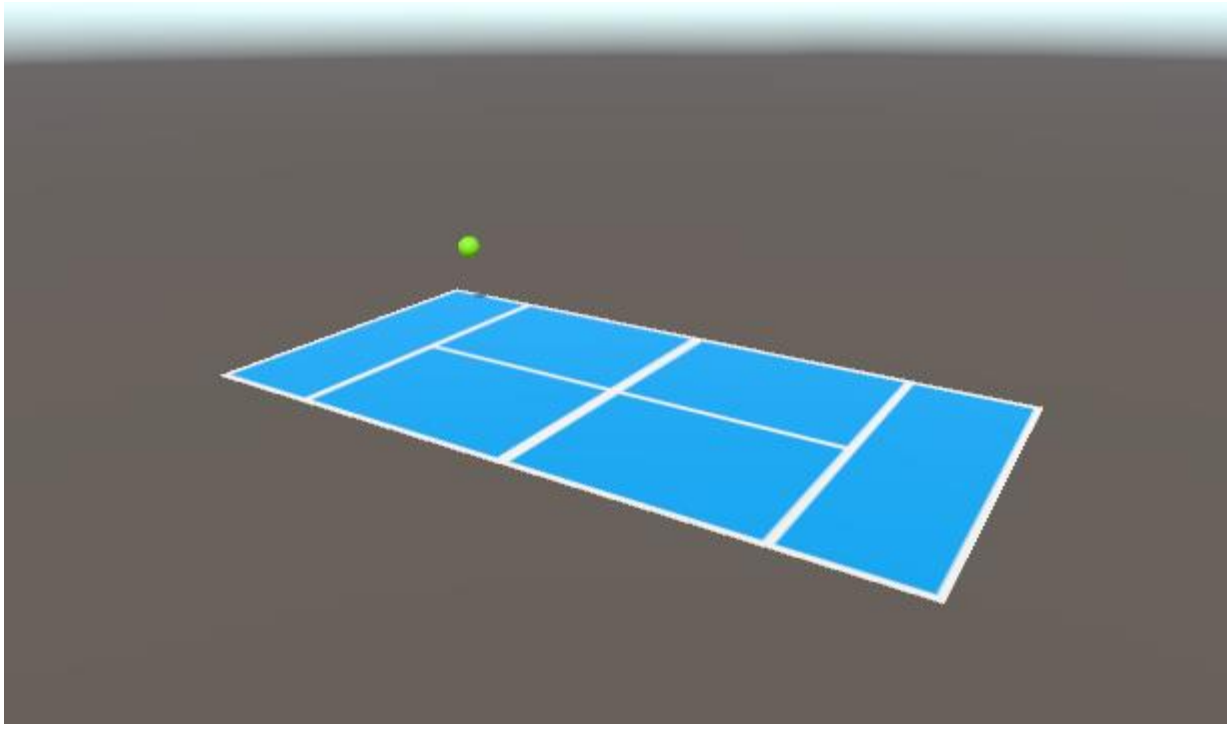


Figure 3 3 Main screen view

3. Testing

Testing is one of the most important parts of the prototyping phase of any product. For our tracking software we aimed to get at least 2 cameras capable of tracking the same object and recording the position of the ball. The next step of our prototype was to put out data into unity and move the virtual across the court (figure 3).

The biggest issues that came up while working on the prototype was getting the camera to track the right object. We solved this by using different frames and adjusting the radius sizes to capture the right object.

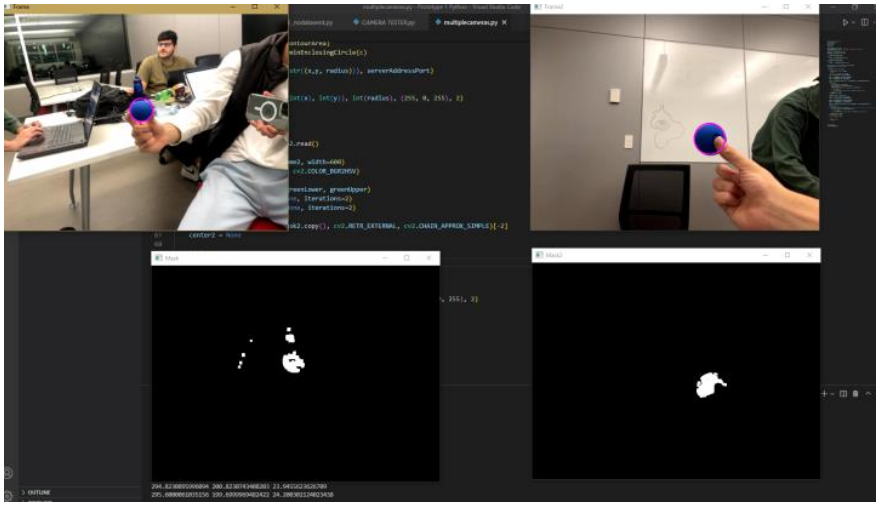


Figure 4 Testing with 2 cameras (screen shot)

Figure 5 Testing full view (1)

Figure 6 Testing full view (2)

Feedback

The client's feedback on the camera position method was that we are on track and having 4 cameras in each corner of the court would be the most beneficial in our case for this project.

As for the menu and User Interface (UI), we were told that the hardest and most challenging part of this project, is the process of tracking the ball, and sending such information such as velocity, acceleration of the ball, forces applied on the ball including the directions and the position of the ball, all in real time. This requires us to make sure we fully always track the ball, with complete precision. Thus, from this point on our goal is to focus more on the tracking of the ball rather than the User Interface, which we can work more on after we finish the hard part of this project.

Conclusion

The first prototype was a success overall, as it met the client's expectations, and everything seems to be on track. Moving forward, the second prototype will have a user interface, a main screen, buttons, and four cameras that can track the ball well, with the addition of having it sync the data and have Unity follow the ball better. The second prototype will be more presentable and smoother.