GNG 1103 [G]

Engineering Design

Deliverable E: Project Plan and Cost Estimate

Team 14

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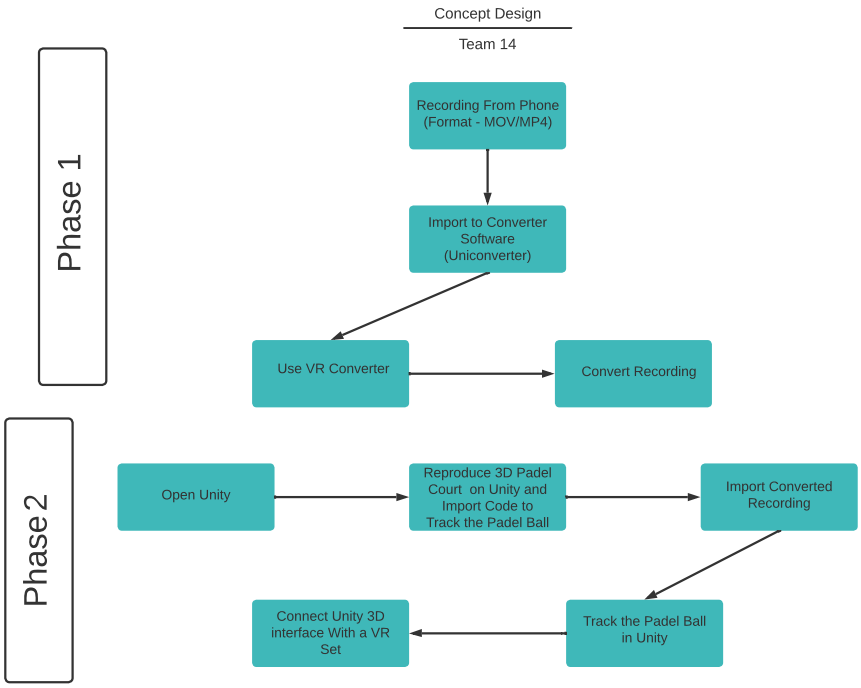
Introduction

The deliverable E will discuss about the team's chosen concept. We will establish the cost estimate as well as a precise test plan for our prototype. We will also explain our conceptual design and project risks. Lastly, we will prepare a schedule for the entire team to create and test our prototype within the deadlines.

Conceptual Design



The first phase of our project would consist of converting the videos taken with the phones (iPhone/Android) into 360° stereoscopic videos. This process is crucial because the formats of the videos recorded on the phones are MOV or MP4. Unfortunately, these formats are incompatible with Unity. Therefore, we are unable to upload the videos automatically to Unity without this process. As shown in the conceptual design above, we will a converter software called Uniconverter. The second phase consists of creating and developing the interface on Unity. We will reproduce 3D Padel Ball Court and we will implement a code in Unity to always identify and track the position of the Padel Ball. Once, we are satisfied with the interface on Unity, we will then connect it to a VR headset for the client to experience the game through it.

Cost Estimate

Bill Of Materials (BOM)

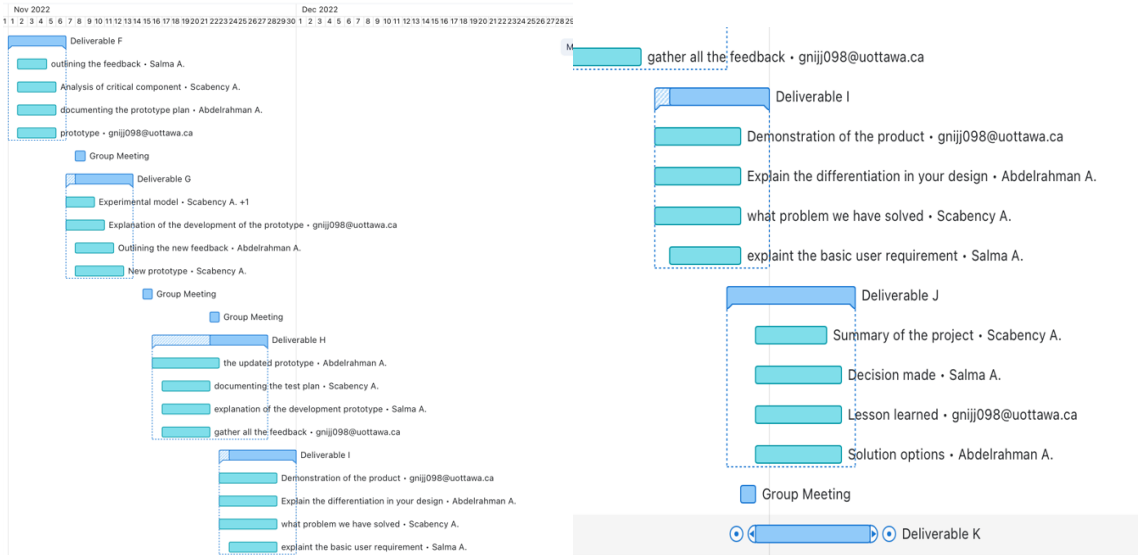
Item	Description	Type	Quantity	Unit Cost	Total Cost	Link
Phones (IPhone/ Android)	The phones will be used to record the Padel Ball game as well as the movement of the ball, to be analysed.	Equipment	3	0 $	0 $	https://support.apple.com/kb/SP804?locale=en_US
Tennis Balls	The Ball will be detected through OpenCV, and its analysis will show on Unity.	Equipment	2	0 $	0 $	N/A
VR Headset	3D environment will be projected through the VR Headset ; The client would experience the analysis of the Padel game through it	Equipment	1	0 $	0 $	https://arvr.google.com/intl/en_ca/cardboard/get-cardboard/
OpenCV	Software for the code to detect the ball and run an analysis of it	Software	1	0 $	0 $	N/A
Unity	Software for the interface and analysis of the Padel Ball game	Software	1	0 $	0 $	N/A
Product Total Cost					0 $	

The VR set needed for this project will be given to us, so there is no cost for it. All the other tools and software needed for this project will be given to us, therefore there is no cost at all. In consequence, we are within the budget of 50$ CAD per group.

List of Equipment

- VR headset
- Laptop or Desktop
- Uniconverter (by Wondershare) Software
- Unity Software
- Steam VR Software
- iPhone/Android
- Balls (Any type)

Schedule of Prototyping & Testing



Test Plan (Prototype 1)

Test ID	***Test Objective*** ***(Why)***	***Description of Prototype used and of Basic Test Method*** ***(What)***	***Description of Results to be Recorded and how these results will be used*** ***(How)***	***Estimated Test duration and planned start date*** ***(When)***
Convertion of video format	Check if we can convert MOV/MP4 video format into a 360 stereoscopic format.	We will use a software converter called (Uniconverter).	2D video turns into a 360 video We can use that format for Unity.	1-2 hours October 31
Tracking the padel ball in Unity	Check if we can track the ball from converted video in Unity.	We will use Unity different assets to try to track the ball.	We get the position of the ball at any given time.	Unknown November 1st
Using position of the ball and simulating the movement in the 3D Padel Court	Check if we can reproduce the movement of the ball in Unity.	We will use Unity different assets to try to reproduce motion of the ball.	The ball movement seems similar on the 3D court compared to the original video.	Unknown November 3rd
Comparing motion of the ball from Unity against the original video	Check if the motion of the ball matches the one on the original recording.	We will use VR headset to analyse the motion in the 3D court from Unity.	The motion of the ball through the headset and recording matches.	Unknown November 8th

Prototyping Test Plan

Our prototype will go through a variety of tests. Firstly, we will record a random ball moving with two different phones. We will first use an iPhone and then an Android. The format of the videos may differ between the phones. Once these videos are downloaded onto our computer, we will test if the Software converter (Uniconverter by Wondershare) can convert those two different formats into a VR/360 stereoscopic format. Depending on the result, we will import the converted video into Unity. Once successfully imported, we will test if Unity can track the ball from the converted video. Next, using different Unity assets, we will try to use the positions of the ball and reproduce those positions in a 3D version of the Padel court in Unity. Using a VR set, we will then analyze the final version of the movement of the ball in 3D Padel Court and compare it to the original 2D video to see if the movements are similar. If all those steps lead to positive results, it would mean that our model works properly.

Project Risks

The main risk of this project is not being able to convert a 2D video to a 360 stereoscopic format with Uniconverter. If we cannot, we will try with other software available while being mindful of the cost. We could also try to record with a special camera that can shoot 360 videos directly. However, the cost of those tools will impact the final choice. Finally, we could find a way to track the position of the ball from the 2D video and try to use those values in Unity to sort of reproduce the motion of the ball in the 3D simulation of the Padel court.

Conclusion

In summary, in this deliverable, we have defined and explained our chosen concept. We then proceeded to establish all the software and equipment as well as the cost needed to complete our project. As shown in the deliverable, our project is within the budget provided to us. The next step in our process will be to create and test our first prototype. We were able to schedule and prepare the teams test plan for the prototype in this deliverable.

References

"Wondershare Uniconverter." *Capterra*, https://www.capterra.ca/software/202213/uniconverter#pricing. (OCT 25, 2022)