GNG 1103 [G]

Engineering Design

Deliverable B: Need Identification and Problem Statement

Team 14

Salma Ahmed - 300168559

Scabency Adolphe - 300332534

Abdel Ahmed - 300290665

Gursevak Nijjar - 300231693

October 2, 2022

University of Ottawa

Introduction

For this project, our goal is to use programming software to create/develop an application to track a paddle ball in a 3-dimensional environment, with an accompanying virtual 3D model environment to simulate the real life equivalent of the game. To achieve this goal, the various needs of our client, as well as similar products on the market that fulfil our project's goal, need to be documented and analysed, which is the purpose of this deliverable.

In short, our client wants a 3D tracking software that will be able to simulate a squash game or a training session to give some feedback or a sport analysis to improve athletes' performance. These demands are quite popular in the sports world. There is a product called SwingVision AI which kind of falls along the lines of what our client is looking for. Swingvision AI is a mobile app for tennis players. By using a smartphone's camera, Swingvision AI will track real-time shots and give videos analysis and feedbacks on swing speed, serve placement etc. There are also products such as Veo and Pixellot which mostly record soccer and basketball games by tracking the ball. Coaches can then analyse the recordings and offer feedbacks or the Pixellot AI will use AI to give feedbacks on plays.

Interpreting the Data

Questions	User Statement	Interpreted Need
Typical Uses	I need to be able to always locate the ball. For that, I will need the "x,y,z" position and the trajectories of the ball.	The users should be able to capture the ball trajectories easily with this program.
	I need to be able to track the ball trajectories with at least one camera, however I want to be able to add more cameras in the future.	The client should be able to customize our program and add numerous camera in the future in order the capture the ball effecteviely.
	I will need to have a 3rd person, point of view of the court in the 3D environment. The camera will also need to be outside the court.	The users should be able to see the court from a 3rd person, point of view, when using the 3D program.
	I need the data storage of the program in a simple form, they need to have the time stamps and the x,y,z position.	The client should be able to gather data such as the ball 3D position and the time stamps from the program.

Likes- Current tools	I will like for the resolution quality to be at least 1080p for the rendered environment. I will need to have a good document explaining details about the project and its evolution, to easily continue the project in the future.	The resolution quality should be at least 1080p, but it can have a better resolution. Each step of the project should be well documented in order to facilitate the communication and also for the client comprehension.
Dislikes - Current tools	I do not want to have a program that is designed to have only one camera to capture the ball trajectory. I do not want you to use colour tracking in the program, because it might interfere with other aspects.	The 3D program should not be designed to have one camera to track the ball. It should be created with the thought that it could customized in the future. The program should not have colour tracking in order to not interfere with other aspects.
Suggested Improvements	I would be great for the 3D environment in the program to have nice visual.	The 3D environment should be captivating and pleasing to the eye.

Priority (1- highest; 5- Lowest)	Needs	Reason
1	Camera	The camera is important because it's the main purpose for this project so we can track the ball
2	Laptop	The laptop is being used for coding and making the camera to track the ball during its movement.
3	Racket	This is important because it's part of the game, and it's used to play the game with it.
4	Tennis Ball	This is similar to the above because the game can't be played without the tennis ball.
5	Space	Space is important, so it can be played. This game is mostly played in indoor spaces, so this game needs space for it to happen.

Problem Statement

" There is a need for 3D environment program to measure the exact position and trajectory of a Padel ball in a real-time game. The program should be able to translate the data into a 3D visual court in order to accurately give professional players and coachss a post match analysis as well as a feedback."

Conclusion

In conclusion, in order to ensure a smooth and successful implementation of our project, high priority needs, such as the camera and the accompanying code for motion tracking, as well as the physical hardware for rendering, will need to be carefully considered throughout the project's completion. In addition to those high priority needs, as well as any other necessities we have, there are real world solutions available on the market that we can adapt to our requirements, such as swing vision AI, which can greatly help in our projects completion. With all of these factors in mind and thought out for, the future implementation of this project should go smoothly, and be completed on time.