Fortnite Corporation

Lab Section 1 - Group 4

Deliverable B – Needs Identification

Engineering Design – GNG1103

Listed Needs:

1. Capture Ball trajectories in real time → Importance (out of 5): 5
2. Game analysis → Importance (out of 5): 4
3. Athlete performance → Importance (out of 5): 3
4. Animations and 3D Digital Replica → Importance (out of 5): 5
5. Modular Setup → Importance (out of 5): 4
6. Motion Capture System → Importance (out of 5): 5
7. Stats (Speed, force, etc.) → Importance (out of 5): 4

The most important needs within this design process would be to Capture the Ball trajectories in Realtime, such as having a display of the coordinates of the ball relative to a 3-dimensional plane, which is the main objective of this design to begin with.

Motion capture system is also a high priority in this design process, as we need to figure out a way to make sure the software has a distinct way of telling motion of the ball aside from other motions that may occur on the court. This would have been much easier if the color of the ball never changed, however, we know that the color of the ball is in fact inconsistent. While this may cause some issues, OpenCV is very good at tracking objects based on additional information given to it based off the object, such as size of the ball, and many other settings. By the end of this, the motion capture system should be able to accurately capture the movement of the ball whilst ignoring the movement of the players, and other objects that are not of use on the court.

Animations and 3D Digital representation of the ball's movement in the 3D plane is very important, as that would be the visual representation aspect of this software design. We would like to create a very simple, but clean 3D grid showing the ball's trajectory including the coordinates of the ball in action. Without good visual representation of the ball's trajectory the client will most likely not be satisfied.

Modular setup is relatively important, but not as complicated as the 3 previous needs for this software. The modular setup can't be too complicated to the point that the client struggles to set it up. However, we need to ensure the entire court can be always viewed, using 3 at the very least cameras.

Game analysis and stats are not as important as the points previously stated; however, they are a major factor that the client is looking for. If we can set up a successful grid showing the balls trajectory, the velocity should be able to be calculated, as well as other factors required.

Athletic performances wouldn't be much of our worries, as those will be what the client can achieve themselves using the stats, and game analysis data from the software.

Problem Statement:

Padel Ball coaching staff needs a visually and technically effective software, and a modular camera setup to track Padel Ball statistics using motion tracking software.

Benchmarks

Functions	**Dartfish**	**Quintic Sports**	**Altair MotionView**	**Kinovea**
Velocities & acceleration measurements	No	Yes	Yes	Yes
Time & position markers	No	Yes	Yes	Yes
Tagging moments	Yes	Yes	No	Yes
Multi-platform	Yes	Yes	No	No
Data sheet	Yes	Yes	Yes	Yes
Memo	Yes	Yes	No	No
Video editing	No	Yes	No	No
Overlay comparison	No	Yes	No	Yes

Bibliography

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