

EE 267 Project Proposal

Fruit Ninja VR: An Interactive Game in Unity

Sagar Honnunar, Varsha Sankar
{sagarh, svarsha}@stanford.edu

We plan to build a VR version of the popular game Fruit Ninja. This is a single player game where fruits appear on the screen and the player scores points by slicing the fruits with a blade. Occasionally bombs also appear on the screen and the game ends should the player strike them. Developing a VR version of this game will involve the scene content development including the animations as well as position tracking of the hand to enable interaction in the virtual world.

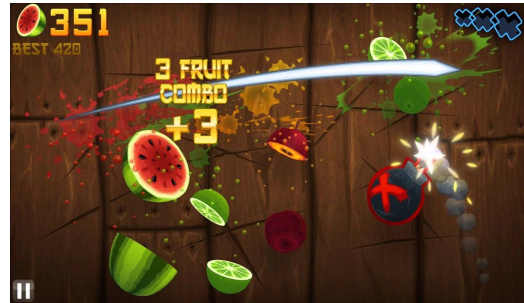


Fig 1: Screenshot of the classic version of Fruit Ninja

Motivation:

Virtual reality devices have been gaining a lot of traction lately and a number of games are being adapted to VR for a more lifelike experience. Fruit Ninja is a widely played and popular video game originally developed for mobile devices. Our objective in this project is to enrich the user experience by implementing a version in VR which could be more interactive and immersive. In the original video game, the player swipes a finger across the screen to slice a fruit, but in the VR version, the hand movement could be tracked to determine the movement of the katana and then slice the fruit. Such three-dimensional interactions would make the player's experience more realistic and engaging. Through this project, we also hope to understand better the various elements involved in developing an interactive game including content creation, animations and interactions in the scene, and interfacing input devices for the player's action recognition.

Related work:

With the proliferation of commercial VR headsets, many VR-specific and VR versions of popular video games are being released. [1] gives a brief history of early game development in VR. An essential component of our project is position tracking of the hand. Several inside-out and outside-in tracking systems have been developed for VR devices. We are planning to use the Lighthouse base station [2] and Intel RealSense [3] and compare their performance. RealSense consists of a depth-sensing and RGB camera and is useful for implementing gesture-based human-computer interaction techniques. It has an SDK [4] for building software applications with hand gesture recognition, which we plan to use for the project.

Methodology:

The scene would be developed in Unity 3D software. The important components of the scene would be the fruits, bombs, and the katana blade. The background would be chosen to be something that would gel well with these elements, such as a garden. These are available as assets in Unity. The fruits would be animated to appear from below and follow a trajectory in the scene. When the katana strikes across a fruit, it would be animated to split apart at the intersection. The katana would be controlled by the player's hand motion. We will implement a scoring system and display the player's scores in some part of the scene. We would also like to add some special effects such as motion blur for the katana using the modules available in Unity.

To track the position of the hand, we plan to use the VRduino board and the HTC Lighthouse and obtain the 3D pose using the LM algorithm we implemented as part of one of the assignments. In addition, we would also like to implement hand tracking using the RealSense SDK with the RGB-D information from Intel RealSense and compare their performance for tracking fast hand motions which are part of this game. With RealSense, we are planning to use the mass center and orientation of the hand from the hand tracking module available in the SDK [5] to control the pose of the katana blade. We would also like to incorporate head orientation tracking to allow the user to look around the scene so that the experience is more immersive. For this, we would require another VRduino board as we would be using one for the hand position tracking as well.

Timeline:

- Week 1 (5/26 - 6/1)
 - Get familiar with Unity 3D.
 - Create a basic scene by including the main components of the game
 - Incorporate animation of the fruits
- Week 2 (6/2 - 6/8)
 - Implement and interface hand position tracking using;
 - HTC Lighthouse and VRduino
 - Intel RealSense
 - Implement advanced game features such as displaying scores, bonus points, special effects, etc.

References:

- [1] https://en.wikipedia.org/wiki/Virtual_reality#Video_games
- [2] <https://vrwiki.wikispaces.com/Lighthouse+base+station>
- [3] <https://software.intel.com/en-us/realsense/home>
- [4] <https://software.intel.com/en-us/intel-realsense-sdk>
- [5] https://software.intel.com/sites/default/files/Hand_Tracking.pdf