

Shooting Game Using Virtual Reality and Eye Tracking Techniques

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Example VR Shooting Game

<https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DswqiRVfATUI&psig=AOvVaw0ky1SJxdjr1wmp9xaccLeD&ust=1581999612563000&source=images&cd=vfe&ved=0CAIQjRxqFwoTCODTqvnd1-cCFQAAAAAdAAAAABAJ>

1 Elevator Pitch

I will create a game in which monsters will randomly spawn, and players can shoot monsters by looking at the monsters through a VR headset and using hand control to slash them. The underlying structure of the game will be built using Unity. Then I will combine it with an HTC Vive Virtual Reality headset to implement shooting with eye tracking and hand gestures. As a stretch goal, I hope to achieve automatic recording of data – like how long do monsters generally live and how often does the user use hand instead of eye to kill the monster – to see players' reaction time and preferences.

2 Extended Overview

In most shooting games, players use hands to either press the keyboard, click the mouse, or operate on a hand controller to shoot enemies. The process of perceiving enemies by eyes, sending signals to the brain, and giving instructions to hands takes time. With virtual reality and eye tracking, players only need to perceive, eliminating the next two steps. But as a potential drawback, simplifying the reaction process might undermine the real feeling of shooting. With this project, I hope to find out how eye-shooting is different from hand-shooting and which way do people prefer by inviting people to complete a survey after playing the game.

2.1 Technical Challenges

This project involves addressing the following key technical challenges.

- I will create the structure of the game using Unity. Features include models of monsters, random spawning of monsters, shooting effects, and scoring.
- I will add eye-shooting and hand-shooting to the game by connecting the Unity game with HTC Vive's eye tracker and hand controllers, respectively.
- (Stretch goal) I will collect data as describe in Section 1 by creating counters and timers in Unity and report the data when game ends.

2.2 Key Risks and Mitigations

I identify the following key risks and potential implementation alternatives.

- Learn how to create a game using Unity.
- Learn how to get data from HTC Vive's eye tracker and use it in a Unity game.

3 Hardware and Software

This project requires the following hardware.

- **[Requested]** HTC Vive VR Headset: With an eye tracker and hand controllers
- **[Personal]** Desktop PC: This will be provided by the student team.

This project requires the following software.

- [Personal] Unity: This will be provided by the student team.

4 Team Responsibility

This is an individual project and I will be responsible for all tasks.

5 Development Plan

- **March 4:** Complete game scene creation, monster modeling and spawning.
- **March 8:** Complete shooting effects, monster dying, scoring, and game ending.
- **March 11:** Complete getting eye position data from HTC Vive headset to Unity
- **March 15:** Complete implementation of corresponding actions with eye position data in Unity.
- **March 16:** (Optional) Complete data report at the end of each game using timers and counters in Unity.
- **March 17:** Complete surveying ~5 people to get users' report of the game.
- **March 18:** Complete and submit the final report.
- **March 19:** Prepare final project demo, including (optional) poster.
- **March 20:** Participate in the final project demo session.