

EE267: Virtual Reality

Project Proposal

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Background

Vehicle simulation games are a genre of video games which simulates the realistic vehicle operation. During the game, players will get the chance to experience drive or fly a vehicle as a driver or pilot, including automobile, watercraft, aircraft, and other kinds of vehicles.[1] The emergence of light-weighted head-mount display ushers us into the age of virtual reality games. Starting from 1990s, VR games attracts increasingly attention from both academia and industry, as well as customers. Vehicle game is a natural genre to be built with VR, providing players with unique experience and adrenaline.

Problem Statement

In the project, we plan to build an interactive spacecraft flight simulation game using Unity3D. In this game, players can experience flying spaceship in the space, with the goal of crossing barriers and collecting fuel to be able to continue the journey. Since most of the “energy packages” are floating near the obstacles, the players need to control and optimize the flight path to collect the packages without colliding with obstacles.

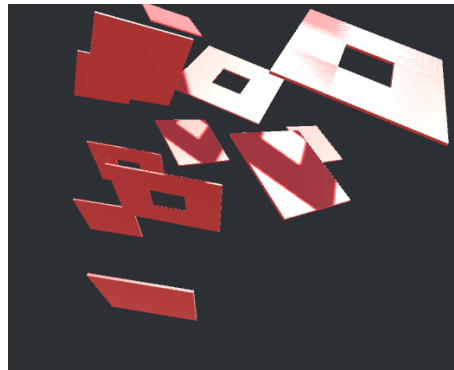


Figure 1: Obstacle Samples

The obstacles take the shape of boards, floating in space at random angles and positions. Some boards has holes in the center, through which the spaceship needs to fly to catch energy packages. The board may also be hole-less, in which case the spaceship needs to head toward the board to catch the energy package and then swiftly turn away. Due to the randomness of board position and angle, more than one turns may be needed during the journey to survive. The player needs to avoid the obstacles, but they cannot take an overly conservative approach

by flying far away from them, since the spaceship's energy supply is limited and requires refueling. The flying path can be controlled through head movement with the help of IMU position and rotation tracking.

What is new

The game is a combination of traditional vehicle simulation and virtual reality. The scene is a nearly free space, without the constraints of walls and tubes. However, this set up does not mean the player is able to run far away - this game provides incentives, i.e. energy packages, to get closer to the deadly obstacles. Therefore, there is a trade-off.

Surviving the game requires players to swiftly navigate through the maze of obstacles, not by traditionally controlling the direction with keyboard control, but through head motion. Moreover, in the game, fingers are liberated from the keyboards or cellphone screens, and people can feel the scene as if they are actually in the cockpit, which serves as a fresh excitement.

The players can also experience the sense of realism through spatial audio effect. The decoration background objects in the scene will be built incorporated with audio sound to simulate the effect of "flying pass".

Timeline

May 26-May 29: Set up the scene and add audio effect with Unity. Objects in the scene includes background, spacecraft, obstacles, energy packages and decoration objects.

May 30-June 2: Simulate the game on computer, players can interact with the scene by controlling direction with keyboard.

June 3-6: Integrate with Head-Mounted Display, replace the keyboard control with IMU tracking.

June 5-8: Final testing

Reference

- (1) Rollings, A., & Adams, E. (2006). Game Design and Development: Fundamentals of Game Design.
- (2) Imagine Media. "The Next Generation Lexicon A to Z: Simulation (Sim)".
- (3) Wawro, Alex. "Hero Shooters: Charting the (re)birth of a genre". Gamasutra. Retrieved May 6, 2016.
- (4) Stanford CS248 course website. <http://web.stanford.edu/class/cs248/>