

Designing of VR Gesture Interface: Master's Project Proposal

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PROPOSAL

Virtual Reality (VR) is a platform that quickly became popular in the past few years, with thousands of VR games, VR experiences, and 360° videos releasing each year. However, the modes of interaction did not keep up. The lack of an effective, standardized user interface is one of the main problems of this platform.

In this proposal I am focusing on VR games, as gamers are the target audience for current VR headsets.

The current input solutions in popular VR games are specially-designed game controllers that can be tracked in 3D spaces. While some controllers are capable of tracking motions and gestures, very few VR games utilize this function. Instead, most VR games use the buttons on the controllers, which have button mappings similar to traditional controllers. Since VR interaction is particularly powerful when it uses embodiment, holding on to traditional game controllers could potentially break the immersion. Thus, it is necessary to design a user interface for VR games that truly embraces the nature of virtual reality and create better experience for players.

My Approach

I am proposing a gesture interface for VR. Using my interface players are able to navigate through virtual spaces, interact with virtual characters and virtual objects, and perform meaningful actions.

Gesture interfaces retain the immersiveness of virtual reality, in which players are playing themselves, as if in real life. Performing actions using their body motions and hand gesture is the most natural way to interact with the world. In fact, the center element in

VR interfaces is a form of gesture--the head movement. The head-mounted display maps directly to player's point of view in VR applications, which creates embodiment in VR.

There is currently not a well defined gesture interface in VR.

Background

VR Controllers

VR controllers built for different gaming platforms are different in design, but similar in terms of button combination and mapping. In this section I will briefly discuss the Vive Controller and the Oculus Touch Controller as related interfaces



Left, Holding a Vive Controller. vrbrillen24.net/produkt-htc-vive/

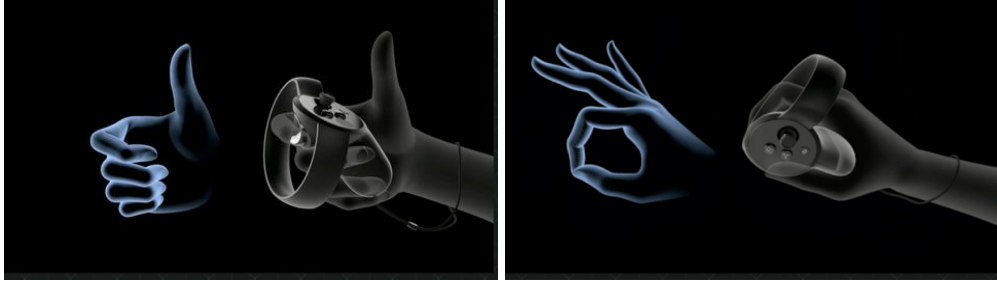
Right, Holding a Oculus Touch Controller.

www.wired.com/video/2016/12/how-oculus-designed-its-touch-vr-controllers/

Both controllers have a trigger button in the front, where user's index finger naturally sits when holding the controllers. This button is often used as the trigger of a gun in First-person Shooter Games. It is the main action button for most VR games.

Both controllers have a grip button located at the bottom, beneath user's three fingers. It will detect whether the users has closed their palm or squeeze the controller. This button is often used in games for players to grab virtual objects.

Trigger button, grip button, along with all other buttons and pads inform the position of each fingers, and further suggest the player's hand gesture, as shown in the images below.



Oculus Touch Controller Design. medium.com/facebook-design/designing-for-hands-in-vr-61e6815add99

The Oculus Touch controller provides enough information to construct a simple gesture interface.

Gesture Interface in The Unspoken

The Unspoken is a pioneer in VR gesture interface. It is a combat action game in which players cast spells to attack the opponent by performing whole body gestures. The gesture interface makes the game more compelling while retaining the immersiveness of VR.



The Unspoken by Insomniac Games, insomniac.games/game/the-unspoken/

There are four main gestures in the game: Attack, Conjure, Guard, and Volley. Each is a compound gesture that allows players to learn complex gestures without having to memorize a lot. The gestures consists of the following simple gesture:

- Grip the Oculus Controller in both hands
- Hold your hand about shoulder width
- Various arm movement

The type of spell is determined by the position and movement of the arms:

- **Attack:** hold your hands in front of your stomach and push towards the target
- **Conjure:** arms held down and palms out
- **Guard:** cross your arms across your chest

- **Volley:** stretch out your arms above your head in a Y-shape

The motion that the gesture creates matches well to the spells, which provides a example of embodied interface design.

Controlling A Third-person Character in Moss

Moss is a VR game with third-person controls released on Sony Playstation VR. In this game, players are controlling Quill, a small mouse with armor and sword, to solve puzzles and defeat enemies. Throughout the game, there are certain places and objects that Quill's small body cannot reach, so players have to use their magic blue light to remove the obstacles for her.



ThoughtDragon, MOSS PSVR PS4 GAME Walkthrough. www.youtube.com/watch?v=NixjrJyO_C8

The way that players control Quill is same as traditional third-person game--using a Playstation Controller. The controller can be also tracked in VR, which allow players to control an additional component: a blue light that interacts with the virtual environment.

This game demonstrate how to combine third-person game with a first-person VR game. It has a potential to adapt a gesture interface to make the control feels more natural to the players.

Project Outline

For the project, I am using human-pet interaction as a guideline to design the gesture interface. Since most users are already familiar with gesture interaction with their pets, dogs in particular. In addition, there are well-defined guidelines of training dogs which can serve as references to design the gestures.

I will implement a VR game in which players controls a third-person character using gestures that are used to interact with pets.

Gestures

Gestures that I will implement are point, flick, sit, roll, grip, and attack. Some of which are compound gesture inspired by the gesture design in The Unspoken. The first four

gestures are performed using the right hand, and will be controlling the movement of the third-person AI character.

Point is used for guiding the character to navigate in the space. It is inspired by cat chasing laser. There will be a laser point showing on the ground that players are pointing at, and the character will follow the laser point.

Flick is used to instruct the character to jump. It can be used as a compound gesture with point such that the player can flick their wrist upwards when pointing, guiding the character to charge and then jump.

Sit is used to instruct the character to stop moving and wait for further instructions. It is designed according to how owners command their dog to sit down.

Roll is used to instruct the character to roll over, which can be interpreted as dodging during combat. It is designed to mimic how owners command their dog to roll over.

The last two gestures are performed using the right hand, involves interacting with virtual objects and other characters.

Grip is used to instruct the character to interact with virtual objects, usually by gripping. It uses the standard grip gesture on Oculus Controller.

Attack is used to instruct the character to fight with enemies. It adopts the finger gun hand gesture.

Game Setting

My VR game will have a similar setting to Moss, but will be simplified to make sure I can deliver the project in time. It is a first-person VR game, in which the player will be controlling a third-person character. The game will consist of less than ten levels with incremental difficulties that will teach players the basic gestures and guide them to do complex interactions.

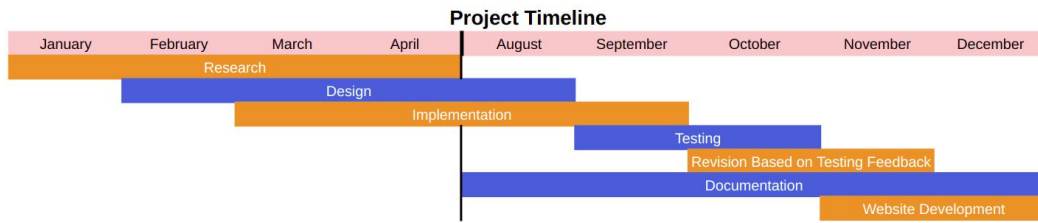
Technical Background

Given my previous experience in developing games in Unity Game Engine and gesture recognition with wearable devices, I believe that this project is within my capability. In addition, I am taking Dr. Janet Murray's project studio and developing a VR game which involves a few gesture recognition with Oculus Touch Controller. This game will be implemented using Oculus Rift and Unity Game Engine. I will use the workstation and the Oculus Rift in TSRB room 325 for development.

Deliverables and Timeline

At the end of this project, I will be responsible for delivering a functioning prototype of my VR game, a website detailing my project, a presentation explaining my project, with

videos and written documentations. In which I will detail the background research and implementation approaches used.



Project Timeline

The tentative project timeline is shown above, starting with January 2019 and continuing until the final deadline at the end of the 2019 fall term. I will begin the project by doing background research into human-pet interactions, VR interaction design and game design.

Insomniac Games (2016) The Unspoken [Oculus Rift] Oculus Studios. Burbank, California

Polyarc Inc. (2018) Moss [PlayStation VR] Sony Interactive Entertainment. San Mateo, California

ChanSu Lee, SangWon Ghyme, ChanJong Park, and KwangYun Wohn (1998) The control of avatar motion using hand gesture [ACM symposium on Virtual reality software and technology (VRST '98)] ACM. New York, New York

Jaime Ruiz, Yang Li, and Edward Lank (2011) User-defined motion gestures for mobile interaction [SIGCHI Conference on Human Factors in Computing Systems (CHI '11)] ACM. New York, New York

