Glass Shooter: Exploring First-Person Shooter Game Control with Google Glass

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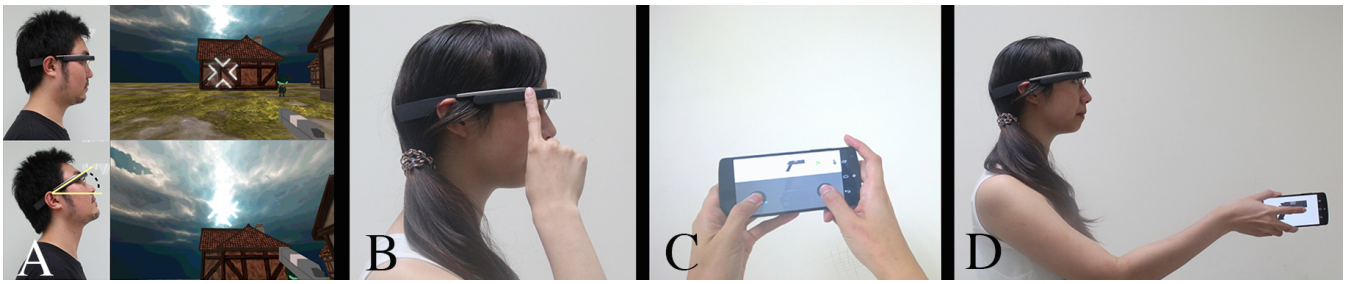

Figure 1: We implement multiple possible control methods for "Glass Shooter". (A) Our demos uses head mounted gyroscope to control the first-person viewport. (B) We designed a set of gestures on the touchpad strip: Players can move forward by touching the front half of the touchpad, and move backward by touching the rear half. Weapons can be fired by using taps. (C) Smartphones as virtual controller: two virtual joysticks and buttons to move and to change the viewport and to fire weapons; (D) Considering smart phone as a small gun: the player can use her phone orientation to aim the target.

ABSTRACT

Smart Glasses offer the opportunity to use head mounted sensors, such as gyroscope and accelerometers, to enable new types of game interaction. To better understand game play experience on Smart Glasses, we recruited 24 participants to play four current games on Google Glass that uses different interaction methods, including gyroscope, voice, touchpad, and in-air gesture. Study results showed that participants were concerned with comfort and social acceptance. Also, their favorite input method was gyroscope, and their favorite game type was First-Person Shooter (FPS) game. Hence, we implemented a FPS game on Google Glass using gyroscope for changing the viewport, and divide FPS controls into four categories: (a)Viewport Control, (b)Aim Control, (c)Fire Control, (d) Move Control. We implemented multiple control method in each category to evaluate and explore glass game control design.

Categories and Subject Descriptors

K.8.0. [**Personal Computing**]: General Games

General Terms

Human Factor

Keywords

Google Glass, Wearable Devices, Game Design, Head Mounted Display, Multi-Modal, Mobile Phone, Gestures.

1. INTRODUCTION

Smart Glasses provide several new features, such as always available display, head mounted sensors, and first-person viewport. These novel elements do not exist in the traditional game platforms. How to apply these techniques to create a relevant game experience on Smart Glasses is still an unexplored area.

To better understand game design for Smart Glasses, we invited 24 users to play 4 existing games [5] on the most popular Smart Glasses, Google Glass. The four games have been selected to span different game types and control styles. Our study showed three design challenges that are not discussed in the current game design guidelines: "Limited control", "Eye strain" and "Social acceptance". Moreover, after playing these 4 selected glass games, most participants expressed that they prefer to play First-Person Shooter(FPS) game on Google Glass.

In this demo, we focus on the issue "Limited control". Compared with other gaming platforms, Smart Glasses lack traditional input method like mouse, keyboard, joystick, or touch screen. However, there are some non-traditional wearable sensors such as camera, touchpad, microphone, gyroscope, and accelerometer.

Considering traditional game design and new features on Smart Glasses, we implement a game, "Glass Shooter", a FPS game with multiple control styles on Google Glass. With "Glass Shooter", we can collect user feedback of different control schemes and un-

derstand user preference to evaluate an ideal FPS game on Google Glass.

2. CONTROL

There are four main controls in FPS games: (a)Viewport Control, (b)Aim Control, (c)Fire Control, (d)Move Control. With "Viewport Control", users can change camera's perspective and observe the surrounding environment. "Aim Control" is about how players moving the crosshair. Furthermore, users open fire with "Fire Control" and move their avatars through "Move Control" in the game.

To extend the diversity of our input controls, we design control methods not only with input manners available on Google Glass, but also with possible game control methods on Smart Phones.

According to previous work[1, 3, 2, 6], using head orientation as a viewport control is undoubtedly intuitive (see Figure 1.A).Therefore, in this work, we only explore the remaining control problems on "Aim Control", "Fire Control", and "Move Control". First, we supposed 3 different Aim Control schemes to test which would be the most favorite control for users. Three different Aim Control schemes are listing below:

1. Viewport aiming scheme: The crosshair is always at the center of the viewport. Player can aim the enemy by using their head to move their viewport. In other words, player is using head orientation to aim the target.
2. Gun aiming scheme: Considering your smart phone as a small gun. The player can use the phone orientation to aim the target. The crosshair will be controlled by the direction of the phone.(see Figure 1.D)
3. Phone joystick scheme: Using smart phone as a joystick to move the crosshair on the glass screen.(see Figure 1.C)

We also bring up 4 different Fire Controls as below:

1. Phone trigger scheme: Using touch screen on a mobile phone as the fire trigger. Players can just open fire by tapping their phone touchscreen.
2. Glass tapping scheme: Player uses fingers to tap on glass touchpad to open fire. (see Figure 1.B)
3. Voice control scheme: Player uses voice control, such as the sound of "Bang", to open fire.
4. Eye winking scheme: Player uses intentional eye winking as a fire trigger.

We propose 4 Move Control schemes:

1. Head gesture scheme: We implement the system from the work of Hinkel et al.[4] in our FPS game control system.
2. Glass touchpad: We designed a set of gestures on the touchpad strip. Players can move forward by touching the front half of the touchpad, and move backward by touching the rear half.
3. Phone controller scheme: Using virtual joystick on Smart Phone to move the character.
4. On track moving scheme: There exist possibilities that controlling player's movement is not completely suitable for glass game. Therefore, we design a pre-defined track for player in this scheme, and the avatar will move on the track automatically. So the player can focus on aiming and fighting, rather than the movement control.

3. CONCLUSION AND FUTURE WORK

We have recruited 24 players to play 4 different built-in games on google glass. Through the investigations, we observed three main categories of challenges we may meet when developing glass games, which are "Limited control", "Eye strain" and "Social acceptance" respectively. In this work, we cast our focus mainly on discussing "limited control", for different types of controlling methods we encounter in a first-person shooter game on Google Glass. Therefore, after referring to both previous game design and glass features, we've classified the control issues among FPS glass game into four main categories as follows: "Viewport Control", "Aim Control", "Fire Control," and last but not least, the "Move Control". For all these four terms of controls mentioned above, we've proposed several methods in each category.

In the following months, we are planning to conduct a series of user studies to clarify which method is the most suitable for each four class of controls. With these user studies, we can develop a more intuitive controlling method for FPS games on Google Glass. Furthermore, we will also move on to discuss the "Eye Strain" and "Social Acceptance" problems we brought up before to accomplish the complete study of FPS games on Google Glass.

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