Project Spearhead
Post Mortem - Motion Tests

Note: The testing done by the Spearhead team is by no means scientific. We aren't researchers, we're game designers attempting to learn as much about a new device as possible in a 6 week crunch period. As a result much of our data is incomplete and many of our conclusions rely on anecdotal evidence. Please feel free to disagree with our conclusions or better yet, continue our testing and refine our methods and results.

Overview

The Oculus Rift presents a lot of opportunities for the Location Based Entertainment Industry, if it can be used in conjunction with outside motion. All of these tests are focused on the usability of the Oculus while the user is in motion. The first test involves the user attempting to navigate a digital space and a physical space simultaneously. We see this as something that would be useful to the LBE and AR industries. The second and third test both deal with a user attempting to utilize the gesture controls from an earlier test while under motion from an outside force, in our case, a car. The purpose of these tests is twofold. The first is to see whether or not it's possible to ever play Oculus games in a car; can it be done with the current technology and are users able to play a VR game in a moving vehicle. The second purpose is to investigate the level of discomfort that comes with being in a world that is moving in a way that contrasts how the user is moving in the real world.

Test #1
Walking in real life while viewing a virtual world

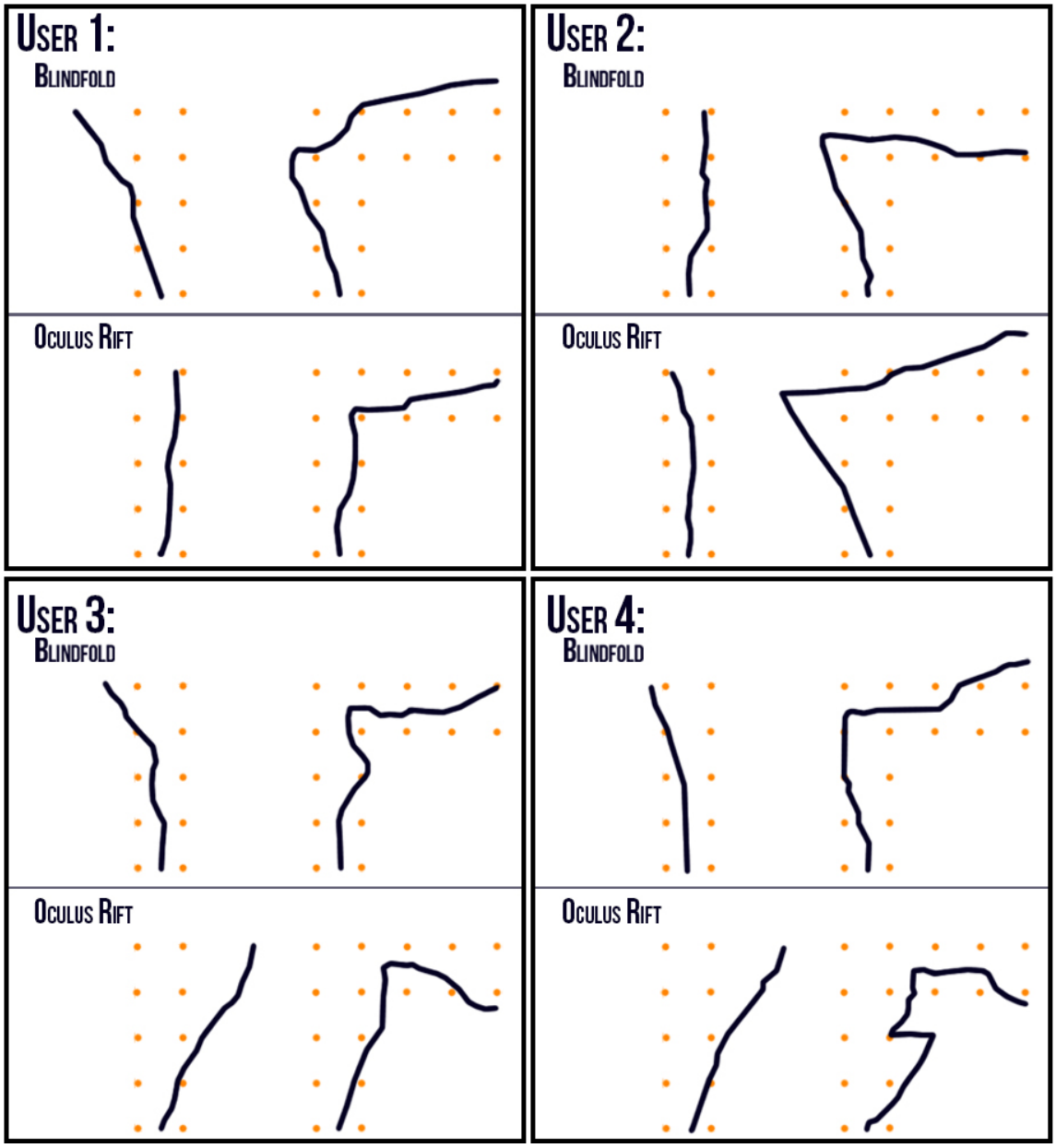
Hypothesis:

It is possible to follow a set path in real life while only being able to see a similar path in a virtual environment.

Description:

The test subject will first be blindfolded and asked to walk in a straight path of cones. The cones should be placed to create a straight hallway about 5 meters wide. The path they take through the cones will be recorded, stop them when they reach the final cones. Next, they will put on the Oculus Rift that is loaded with a level with a straight path of virtual cones similar to the real path they are walking. They will try to walk the real path and the virtual path simultaneously (the virtual path will be navigated with a control stick) and the number of deviations will be recorded. This will be done with 2 different paths, a straight line and a right 90 degree path. The right angle should also be a 'hallway' about 5 meters wide, and 40m on each side. The number of times they veered of each path during the different tests will be compared.

Results:


User 1:
Blindfold
Oculus Rift
User 2:
Blindfold
Oculus Rift
User 3:
Blindfold
Oculus Rift
User 4:
Blindfold
Oculus Rift

Test #2
Forward Motion

Hypothesis:

The Oculus Rift will still be playable in a vehicle as long as it moving in a straight line.

Description:

The test subject will wear the Oculus Rift while in a car or other vehicle. The vehicle will be driven in straight line with at least one stop sign in between the start and finish. During the trips the user will play the 'Rocket Game' from our 'Y-Axis inversion test'. This version of the game will be modified so that it is able to network with a separate laptop and Oculus Rift. The second Oculus will be set in a stationary, level, position facing forward; this will offset the motion of the vehicle and allow the user to utilize head gestures unabated. The distance of the trip should not be much longer than a minute. The user will record if they are able to finish the level and how they felt during play.

Results:

Each of the three users we tested were able to complete the course for the Rocket Game. The offset method we used worked fine and glitches were kept to a minimum and did not interfere with the gameplay.

Test #3
Chaotic Motion

Hypothesis:

The Oculus Rift will still be playable in a vehicle moving eradicating and making sharp urgent turns.

Description:

The test subject will wear the Oculus Rift while in a car or other vehicle. The vehicle will be driven in chaotic path. For our test, we used a slalom pattern with varying straight lengths and sudden turns. However, any course that quickly alternates straights and turns and direction will work. It should simulate chaotic city driving. During the trips the user will play the 'Rocket Game' from our 'Y-Axis inversion test'. This version of the game will be modified so that it is able to network with a separate laptop and Oculus Rift. The second Oculus will be set in a stationary, level, position facing forward; this will offset the motion of the vehicle and allow the user to utilize head gestures unabated. The distance of the trip should not be much longer than a minute. The user will record if they are able to finish the level and how they felt during play.

Results:

The three users we tested were able to complete the course for the Rocket Game on at least one of their attempts. Two users encountered glitches to the point where the game was rendered unplayable.

Motion Tests Conclusions:

Outside motion affects an Oculus user in strange ways that range from helpful to interesting to nauseating. From a general standpoint we found that, like most things with the Oculus Rift, moving while wearing it starts out being mildly to extremely uncomfortable, but after a few uses and a small adjustment period, the user grows accustomed to the sensation.

Our first test involved learning whether or not wearing the Oculus and having a virtual world to guide themselves through would assist the user in walking a straight line over them being blindfolded. To clarify, the user was hooked up to any device that measured motion tracking and had to move themselves in the virtual world using a controller. What we found was that the users were much better at completing the two courses while wearing a blindfold than the Oculus Rift. The Oculus created a false sense of confidence and the users ended up losing track of their position and ending up farther of course than they ever got while wearing the blindfold. The confidence also showed up in the speed at which they completed the course. The users would tread carefully, in contrast, while wearing the Oculus they would walk with a normal stride, at a normal pace. The final piece of information uncovered by this test was that if the user kept their in-game avatar still and focused on a point in the distance in the Oculus world they were able to walk in a straight line almost as quickly and accurately as if they were wearing nothing.

The second two tests were linked in that they dealt with playing an Oculus game, and using Oculus gestures while in a moving vehicle. The first test focused on vehicles moving in a straight line, as one might do on a highway or in an airplane. This test showed that users are able to play games accurately while moving in a straight line. Slowing at a stop sign did cause some discomfort during the first trial, but for subsequent attempts the stops were not a problem.

For the third test, the car was driven in an erratic fashion, turns and speed changes occurred abruptly and without warning or planning; each turn was also at least 90 degrees. This inflicted several angles of force and momentum on the user that were in no way constant with the virtual world they were viewing. In a similar fashion as the stop signs, the users were initially left feeling nauseous and uncomfortable. However, at no point did this feeling affect their ability to finish the course. What did occur was that the method in which we were offsetting the car's movement started to break down. This was the reason why users were not able to complete the course every time.

The method in which we are offsetting the car's movement has serious issues. The biggest of which is that if the car turns around even a single degree past 90 degrees from it's original position the Oculus interprets this as though the entire apparatus has inverted. For the user this means that the controls suddenly invert in a similar fashion as our 'Y-axis Inversion Test'. Another major issue is that the two Oculus's are networked via Ad-hoc Wifi and that has a substantial amount of lag and during rapid changes in direction this causes havoc with the game being played.