Controller-less Interaction Methods for Google Cardboard

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ABSTRACT
Google Cardboard was recently released as Google's attempt at virtual reality (VR) which has made it more accessible, with its low-cost and easy assembly. The purpose of this research is to provide an initial analysis of controller-less interaction and highlight its potential for enabling a truly portable and accessible VR experience.

Categories and Subject Descriptors
H5.1 [Information interfaces and presentation]: Multimedia Information Systems - Artificial, augmented, and virtual realities.

Keywords
Virtual Reality; Google Cardboard; Head Mounted Display; Virtual Reality Interaction Techniques

1. INTRODUCTION
Smart phone virtual reality, a form of VR that relies on a smart phone's motion sensors to perform head tracking has been gaining popularity recently after Google released their own head mounted display (HMD), called the Google Cardboard [1]. What makes the Cardboard stand out from other HMD's is its inexpensive nature, portability (no cables required) and the growing support on the Android platform due to the SDK available that allows developers to create their own apps with either Unity or native Android. However, a persistent issue is how to interact when fully-immersed in a virtual environment [2]. As the Cardboard is inexpensive and portable, an interaction method should cater for those aspects as well. Therefore, we investigate controller-less interaction methods, using only the Cardboard itself to retain its status as a portable and accessible HMD.

2. INTERACTION METHODS
We reviewed 32 Cardboard apps [3] from the Google Cardboard section of the Google Play Store to find the current popular interaction methods being utilized based upon the amount of apps implementing a certain method and rating. After testing the apps, we categorized the interactions based upon the interaction method: (1) Magnetic sliding switch (Fig 1a); (2) Instant Gaze (Fig 1b); (3) Dwelling Gaze (Fig 1c, Fig 1d); (4) Tilt; (5) External controller.

Magnet switch was clearly the most popular interaction method with 16 apps utilizing it (Figure 2). However, it scored on lower on average than the other methods. The apps that used Tilt were a part of the Google Cardboard Demo app, therefore only the score for the demo app was available. External controllers scored lowest.

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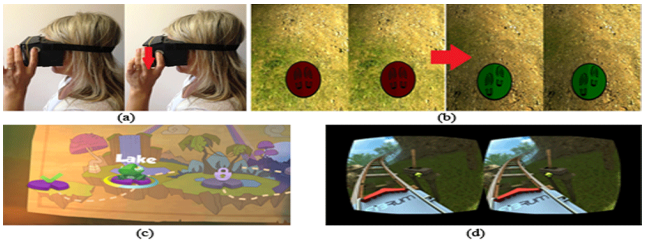

Figure 1. (a) Magnet sliding switch, (b) Gaze toggle in the Tuscany demo, (c) Gaze menu selection in Froggy VR, (d) Environment interaction using gaze in Roller Coaster VR.

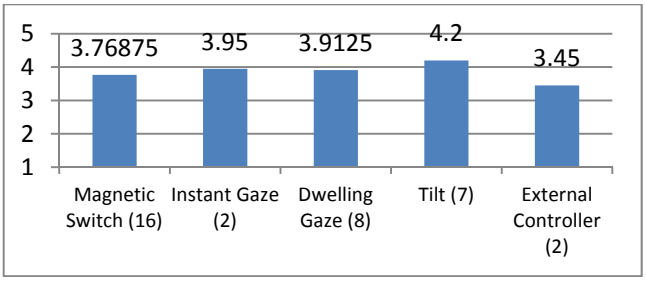

Figure 2. Average ratings by users on the Google Play store.

3. DISCUSSION AND CONCLUSION
Overall, the Cardboard apps were well received, with an average rating of 3.95 out of 5 stars on the Google Play Store at the time of writing. It demonstrates that there is much potential for this platform and that there is interest in these types of apps.

It is clear that controller-less interaction methods are more popular than external controllers from the sample of apps tested. However, further work is needed with the users themselves to find the preferred method. The inexpensive nature of the Google Cardboard also makes it an ideal immersive platform to be used for education, in a networked, collaborative environment.

4. REFERENCES
[1] Google. 2015. Google Cardboard. [online] Available at: https://www.google.com/get/cardboard/ [5 June. 2015].

[2] Oculus. 2015. Best Practices Guide 1st ed. [ebook] Available at: http://static.oculus.com/sdk-downloads/documents/Oculus_Best_Practices_Guide.pdf [5 June. 2015].

[3] Yoo, S. 2015. List of apps reviewed in the study. [online] Available at: http://www.soojeongyoo.com/googlecardboard.html [5 Jun. 2015].