

# A Head-mounted Augmented Reality Device Based on Android Phone Google cardboard application part

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## 1 Introduction

With the invention of Google cardboard(Fig.1), which could be used to display 3D scenario in a straight-forward way, the 3D implementation becomes more and more practical and widespread. Google Cardboard is a virtual reality (VR) platform developed by Google for use with a head mount for a smart phone.[1] Named for its fold-out cardboard viewer, the platform is intended as a low-cost system to encourage interest and development in VR applications.[2] From this amazing invention, our group put forward the idea of making a head-mounted augmented reality (AR) device based on Android phone and let the user experience VR with the help of our own developed software.



Fig.1: The Google Cardboard used in our project. It is a very simple tool to help users get a 3D visual effect.

Basically, This project is divided into two sub-groups. Our sub-group is in charge of developing a Google Cardboard application. We aim to display the augmented reality in an Android phone placed in the Google cardboard. Therefore, we planned to develop this application in Unity 3D and Android Studio. Unity 3D is used for constructing a 3D model and a 3D scene and Android Studio is used for developing the application.

The other group is in charge of generating a augmented reality scene. Their objective is to accurately track the pose of cameras in a scene by the AKAZE

planar tracking and ORB-SLAM algorithms. After that, OpenGL is utilized to render a virtual object in the scene. Stereo cameras are used to achieve the stereoscopic AR effect. Since most applications in AR field are 2-dimensional display, to provide users a better interactive experience with virtual objects that are merged into the real environment, our AR sub-group came up with an approach that allows users to feel 3-dimensional effect by using Google cardboard head mounted display.

**Report Overview:**

- In section two, we will present our Google cardboard application implementation and methods. This section is divided into six sub-parts and introduces the outline as follows: Google cardboard application demo, The construction of 3D models, The construction of VR island scene, VR video player, Real-time display and Android app interface.
- After that, the analysis and discussion of our project is given in section three. The future work about our project is also discussed in this section.
- In section four, we would talk about the current trends in the relevant field as we studied so far.