A Design for a Smartphone-Based Head Mounted Display

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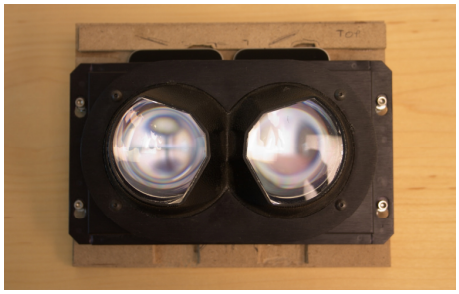
Introduction

- Smartphones and tablets are growing in display resolution and graphics processing power.
- Our experimental, wide field of view, stereoscopic head mounted display leverages these trends.

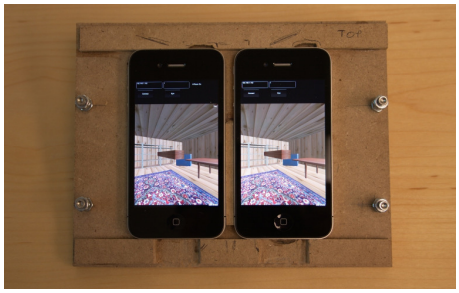
Apparatus

iPhone Display Specifications:

- 3.5 inch diagonal displays
- 960x640 pixels (326 ppi)
- 3:2 aspect ratio



Head mounted display with
a LEEP-type lens assembly in place.



HMD with lenses removed, revealing
smartphones which render imagery.

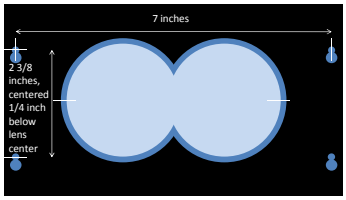
Alternative Optics:

If LEEP-type optics can not be acquired, we suggest :

- A pair of 2 inch diameter plastic aspheric 5x magnifiers with a 2 inch focal length, mounted 2.5 inches apart.

Discussion

- This HMD is unique since it combines the display with onboard graphics rendering.
- With appropriate tracking, it is completely wireless.
- The LEEP-type optics: 112 degree FOV. The alternative optics: 55 degree FOV.
- There is some tracking lag, due to the current method of distributing tracking data. This will be replaced by a VRPN client running on the smartphones.
- The lack of refresh synchronization between displays can be addressed by hardware modifications.
- Smartphone cameras can provide tracking.
- Plastic lenses can further reduce weight and cost.



Suggested dimensions for a
common lens assembly mount
(based on the LEEP lens mount).

Discussion

- We hope this design will enable “pick up and use” immersive experiences, such as engineering reviews and classroom discussions.
- We will continue to develop improvements to our initial design.
- We plan to share our progress and additional mechanical and software details online.
- We encourage others to build and improve upon these initial designs.

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