Demo: FocusVR: Effective & Usable VR Display Power Management

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1. INTRODUCTION

We will demo *FocusVR*, a system for effectively and efficiently reducing the power consumption on Virtual Reality (VR) headset with OLED displays. *FocusVR* smartly dims the screen to reduce display power through the use vignette on VR displays. Our approach has shown to save up to 80% of display power with no impact to usability and task completion time on the Samsung Galaxy Gear VR, Oculus Rift and HTC Vive (paper under review). In this demo, we will demonstrate the technique on a Samsung Galaxy Gear VR with a Samsung Galaxy Note 4. During the demo, users will be able to observe the power saving technique within a virtual world in two modes: fly-through and interactive.

2. SYSTEM OVERVIEW

All current generation of consumer VR devices uses OLED display which consists of individual pixels (without a active backlight). The reasons to this choice: 1) Low power requirements with low persistence (no backlight) 2) Low latency with high refresh rate (above 60Hz) for highly interactive environment. Hence, to effectively save power, we can either map colours to a more power saving palette [1], or dim screen content that isn't needed or less salient [3].

FocusVR uses the dimming approach that deploys a vignette mask to each eye of the VR display that dims the peripheral vision of the user to save power. This is based on findings that user tends to focus their attention to the center of the screen [2], especially in VR headsets where head tracking ensures most of the user's focus is centred. The effect is shown on Figure 1.

Figure 1: Vignette Shading on Left and Right VR Images

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3. DEMONSTRATION DETAILS

In our demo, participants will don the Samsung Galaxy Gear VR and experience two modes within a immersive virtual environment with different dimming profiles deployed during the demo.

In the first mode (fly-through), participant will experience a non-interactive fly-through in the virtual environment. This demo allow participants to observe and experience the usability tradeoffs between different dimming profiles (uniform/ vignette/ dominant-eye). In addition, participants can get acclimatised to the virtual environment and headset before using the interactive demo.

In the second mode (interactive), participants will play a game in the virtual environment by finding a hidden red ball. During the game, different dimming profiles (uniform/ vignette/ dominant-eye) can be applied and/or be adaptively change during the game. The participants will be able to observe and experience if the dimming affect their usability during the game.

To see *FocusVR* in action, we have provided videos at http://is.gd/focusvr.

3.1 Demo Setup & Requirements

This demo uses one laptop, Samsung Galaxy Note 4, Samsung Galaxy Gear VR and a bluetooth mini gamepad. In addition, this demo will require access to Internet, power point and a chair that is able to swivel 360 degree (for participants to safely use the VR device sitting down).

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5. REFERENCES

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