



Anreal: Android Virtual Reality

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Overview

The **Android Virtual Reality** system, or **Anreal** for short, is a system designed to provide an easy way to convert an Android smartphone or tablet into a head-mounted 3D display.

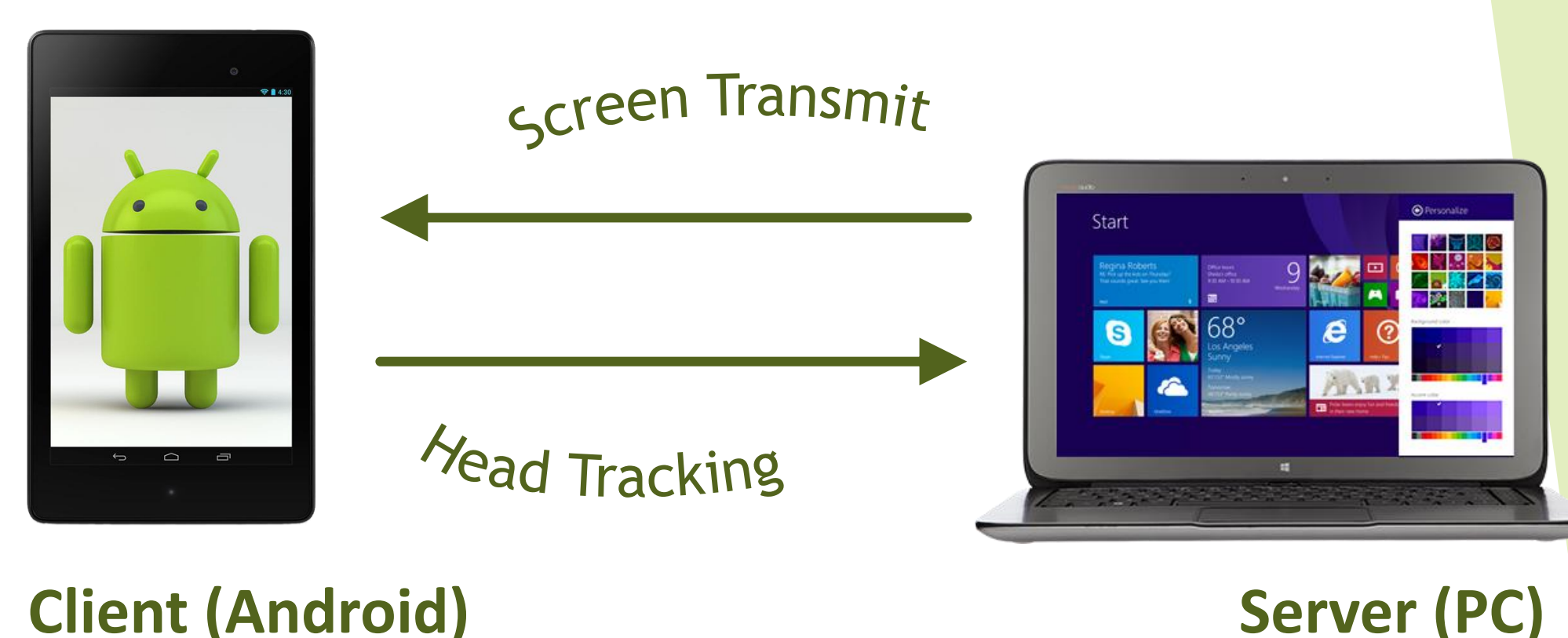
Originally inspired by the Oculus Rift, a commercial-grade virtual reality (VR) headset currently in development, Anreal aims to mimic the Oculus's functionality while remaining cost-effective with respect to the Oculus's estimated \$300 price tag.

Features

- Streaming of 3D enabled PC games, displayed directly on an Android device
- Active head tracking with three degrees of rotational freedom (yaw, pitch, roll)
- Wireless functionality for ease of movement
- Low cost: runs with an existing computer and Android device

Implementation

Anreal consists of two main parts: the screen transmit, and the head tracker. This is split into two programs: the server, which runs on a PC, and the client, which runs on an Android device.



Anreal Server

The Anreal server-side program, running on the Windows computer and coded in Java/C++, periodically transmits screen captures over a TCP connection to the Android device.

The 3D conversion is provided by Vireio Perception, a third-party software system made for the Oculus Rift, which automatically converts current PC games into VR-compatible images.



Anreal Client

The Anreal client-side program, running on the Android device and coded in Java, periodically transmits head tracking orientation data over UDP to the server application. Head tracking is based off of gyroscope and compass data, which is easily obtained due to the availability of sensors on the Android device.

The yaw (blue), pitch (red), and roll (green) angles are converted by the server into mouse/camera movements, which allows for dynamic, head-controlled vision in the game itself.



Conclusion

A prototype housing (shown below) was constructed out of elastic straps, cardboard, and duct tape. The lenses were purchased together for \$20, making the total construction cost an estimated \$30, which fits the original goal. An Android tablet running the Anreal client is placed inside the housing, and is connected via Wi-Fi to a PC running the Anreal server.

With this setup, Anreal runs at a decent transmit rate, which is expected to improve as development advances.

Overall, Anreal fulfills all of its original goals, and gives a promising outlook on providing cheap virtual reality for all.

