Project Proposal - Cloud Accelerated MR for Android

1. Introduction
Virtual Reality (VR) and Augmented Reality (AR) applications have been rapidly gaining ground in recent years. The current method for providing a high quality immersive VR experience requires a dedicated head mounted display (ie. Oculus Rift, HTC Vive) that is cable connected to a GPU-powered PC. Recent smartphones also have their own platforms for VR. Unfortunately, the computational capacity of smartphones to render graphics is far from the PC deployments, which severely limits the visual experience that can be provided with them.

In our research group we have developed a solution for cloud rendered VR which enables high quality visual experience also for the mobile platforms. The project we are proposing extends this solution to Mixed Reality (MR). To this end, the project develops an MR game / scene that leverages our cloud rendering solution and can be used as a demo in the future. The game / scene should be designed so that its computation load can be scaled to benefit from cloud acceleration.

2. Project goals
The goal of the project is to create a cloud accelerated mixed reality game for the Android operating system. The project can be divided into two main stages:

1. Create a local mixed reality game for Android using ARCore and Unity
2. Transform the generated game into cloud accelerated version where part of the graphics are rendered in the cloud and streamed to the client device. For this we already have the necessary technology. However, some integration work might be needed to make it suitable for the MR game.

Overall we would like to have a computationally scalable mixed reality scene / game that is integrated into our existing solution for use in demo and development purposes.

3. Technologies
The main development platform for the project is the cross-platform game engine Unity. Our solution is implemented using a Unity specific streaming plugin. For this reason the team cannot use other game engines (i.e., Unreal).

The project will also be using Google’s Daydream VR platform for the Android operating system. Unity has built-in support for the Daydream platform which makes the development fast and relatively easy.

4. Requirements for the students
The tools used can be learned fairly quickly, However,

● Previous experience using Unity for game development is a bonus
● Unity’s scripting language is C#, prior experience in C# for at least some of the team members is beneficial

5. Legal Issues
Intellectual Property Rights (IPR):
1. The client gets all IPRs to the results.

Non-disclosure agreement (NDA):

1. Signing the NDA included in the Aalto’s contract template is required.

Disclaimer: This is relevant for the parts that include streaming technology, i.e. the cloud acceleration part.

6. Client
The project is done for the Distributed and Pervasive Systems group in the Department of Computer Science (Aalto University). Specifically for the CloudVR team. The contact persons are:

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We can provide the group with at least a couple of the mobile phones needed for development as well as a GPU-powered PC/server if needed. The group is stationed in T-building in Aalto so we are surely available for as many contact sessions as needed.