

High-quality extended reality in easy-to-use and inexpensive devices

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Thomas van Gemert, Matti Siekkinen, Olavi Mertanen and Teemu Kämäräinen work in the CloudXR project. They have collaborated with e.g. Elisa that recently announced a demo app developed during the collaboration. Credit: Olavi Mertanen, Teemu Kämäräinen

Augmented reality (AR), virtual reality (VR), and mixed reality (MR) technology open new possibilities across many fields. However, high-quality extended reality (XR) applications are computationally heavy in terms of computer graphics, which means that they do not run smoothly on inexpensive and easy-to-use XR devices such as VR/AR headsets and smartphones, because their GPU computing capacity is limited.

Matti Siekkinen, Teemu Kämäräinen, Olavi Mertanen, and Thomas van Gemert, researchers at Aalto University Department of Computer Science, have developed technology that solves this problem. The solution makes use of distributed computing and offloads the heaviest part of graphics rendering to remote servers.

According to the project's Principal Investigator Matti Siekkinen, this type of new technology can benefit experts in education, interactive media or healthcare, among other fields. "However, the biggest benefits will be achieved in cases in which

ease of use and high visual quality of the XR experience are both very important," Siekkinen explains.

When a part of the computing takes place on remote servers, the XR experience will be of higher quality. However, the use of distributed computing does not come without challenges of its own. Latency, in particular, is such a challenge, and in their solution, the Aalto researchers trust in latency compensation. "In addition to distributed computing, we have developed an adaptive solution for latency compensation, which provides a good user experience even when using a 4G network," continues Siekkinen.

In the 5G networks that are becoming increasingly common, network latency is low, bandwidth is high, and edge computing enables computing at close proximity to the user. All this makes it easier to use the new solution in increasingly complex situations that include a lot of interaction. Furthermore, the need for [latency](#) compensation is reduced when using a 5G network.

Siekkinen says that during their research project, they have tested the new solution with several collaborators. One of those collaborators is Elisa, a Finnish company offering telecommunications services, [which on Thursday March 5 announced a demo application developed during the collaboration](#).

One aim of the Aalto computer scientists is to try to find the customers who will gain most benefit from the solution. "Our goal is to start a company that brings the [solution](#) to the market." says Olavi Mertanen.

Provided by Aalto University

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