

Implementation of a 5G System Simulation Framework for Remote-Rendering Augmented Reality

Student Assistant (10 h/week)

Problem Statement

A promising use-case discussed for the sixth generation (6G) of mobile communications systems is augmented reality (AR). Contrary to virtual reality (VR), where the user is fully immersed in the virtual content, AR aims to overlay the real world with virtual objects. Possibilities for applications are various, ranging from enhanced navigation, ubiquitous social interaction to entertainment.

Currently, available AR glasses are still chunky and, thus, not suitable for everyday life. Hence, lightweight AR glasses are desired that do not differ much from reading glasses. To be able to build lightweight glasses in the future, video rendering could be outsourced to the cloud and the rendered result could be transmitted to the device as a video stream. Such a remote-rendering architecture moves the challenges from the device to the network. Additional to strict latency requirements, high data rates have to be achieved at the same time, which is a huge challenge for today's 5G systems. The cell load becomes especially demanding when multiple users in a radio cell are active at the same time and compete for radio resources.

To evaluate the performance and identify potential bottlenecks of streaming AR content over today's 5G systems, extensive system level simulations need to be performed. Matlab's *5G Toolbox* offers the necessary 5G simulation capabilities, which can be used to build a close to reality remote-rendering AR simulator.

Tasks

In this position you help your supervisor implement and test the simulation framework in Matlab. You will learn skills about cellular communications systems, object oriented programming and Matlab. Open topics in the simulator include:

- Testing and revising the SDAP sublayer implementation
- Testing and revising the PDCP sublayer implementation
- Testing the communications modeling
- Testing and porting the simulator to other Matlab Versions

Expected Skills

- Experience with Matlab
- Experience with version control, i.e., git
- Interest in cellular communications technologies

Contact Person

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