THE CAVIAR FRAMEWORK: SIMULATION OF 5G/B5G SYSTEMS IN VIRTUAL WORLDS

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1. INTRODUCTION

5G and beyond 5G (B5G) wireless networks will have considerable impacts in different areas, including the usage of unmanned aerial vehicles (UAVs). In this context, it is important to investigate how UAVs can interact with 5G/B5G networks [1]. To develop significant investigations involving UAVs and 5G/B55G networks it is important to have substantial amounts of data, however, it is exceedingly difficult to collect real measurements using UAVs connected to 5G systems [2]. A simulation framework called "Communication networks, Artificial intelligence and computer VIsion with 3D computer-generAted imageRy (CAVIAR)" was developed to simulate with realism the interaction between UAVs and 5G/B5G networks [3].

2. COMMUNICATION NETWORKS, ARTIFICIAL INTELLIGENCE, AND COMPUTER VISION WITH 3D COMPUTER-GENERATED IMAGERY.

The CAVIAR framework orchestrates different simulators to have a realistic simulation scenario, from the UAV controller to the communications channels. A 3D virtual scenario using the Unreal Engine [4] is the base of the simulation, where it is possible to simulate pedestrians, cars, and UAVs. The AirSim simulator is used to control the UAVs inside the simulations, and combing the 3D environment with AirSim it is also possible to simulate different applications running inside the UAVs, such as computer vision applications.

On the communication side, to provide information about the 5G network functions, simulators can be attached to AirSim/Unreal Engine simulation base, such as the Network Simulator 3 (NS3), used alongside the 5G-Lena module [5]. It is also possible to simulate the physical layer using ray-tracing simulators, such as the Wireless InSite [6].

3. CONCLUSION

This video will present the results of a CAVIAR simulation showing that it is possible to generate realistic communication data involving different simulators. The video will demonstrate a full CAVIAR simulation inside Unreal Engine as well as the visualization of 5G/B5G information (rays, beams visualization, etc.) inside the 3D scene, as shown in Figure 1. It will also be discussed how these data can be used to optimize communication systems for their use with UAVs.

Fugure 1. CAVIAR simulation scene

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