

Interactive planning of GNSS monitoring applications with Virtual Reality

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SUMMARY

Global Navigation Satellite Systems (GNSS) are used in challenging environments with increasing accuracy demands. Therefore, many systematic effects become significant and require a detailed planning of monitoring campaigns with high integrity. In conventional GNSS planning software, the local circumstances at the antenna locations are hardly covered. Due to uniform cut-off angles in the elevation of the satellite orbits the quality investigations are often not representative at inhomogeneous areas (e.g. in the vicinity of mountains or buildings).

In order to fulfil the requirements of modern deformation analysis, the prediction of the satellite visibility and the estimation of the point dilution of precision (DOP) is improved by the usage of high-resolution 3D data in this publication. Nowadays, with ray-tracing approaches from the entertainment sector, 3D computations can be easily carried out like in reality based on accurate reality-capturing-data or digital terrain models.

For this purpose, an experimental software was developed in the coding environment Unity with the usage of Virtual Reality (VR) technology as a human computer interface. The VR gear overcomes the limitations of conventional 3D viewers in complex 3D scenarios and provides the user an immersive and interactive first-person view.

The developed software has been tested in a real-life use case for the simulation of GNSS measurements at an Austrian water dam. Furthermore, the predicted results of the simulations have been validated by actual measurements taken at the planned epoch at the site.