DEPARTMENT OF MINING ENGINEERING RESEARCH

The development of techniques to convert visual data (such as video footage obtained by a drone flying over an open pit mine) into 3D VR and AR images

This project is being carried out by the Department of Electrical, Electronic and Computer Engineering under the auspices of the AEL Chair.

The knowledge base for converting point cloud data into three-dimensional (3D) virtual reality (VR) and augmented reality (AR) images had not been available within the Department of Electrical, Electronic and Computer Engineering prior to the commencement of this project. This capability has now been established in the Department and initial success has been achieved in the use of existing and newly developed engines to achieve this objective. In the process, a master's degree candidate submitted his dissertation at the end of 2019. Two additional candidates have registered for their master's degree studies and will pursue their research on the VR visualisation project.

The initial phase of the project has been completed and various demonstrations have been held to progressively show the levels achieved. To improve the quality of VR visualisation, an approach using mixed-medium and high-resolution meshes has been developed. The approach entails the use of a medium-resolution mesh for general navigation, switching to a high-resolution mesh when approaching objects or features in the environment.

The integration of large 3D models extracted from point clouds and other data into the Unity and Unreal engines must overcome the memory and object count limitations of the engines. Although the initial partitioning (segmentation) results were disappointing, an improved segmentation algorithm has been developed that is optimised for the generation of segments used for VR visualisation. However, the algorithm is currently only serial in nature and therefore requires long run times for large point clouds. More work is required on this matter.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

www.up.ac.za/mining-engineering