

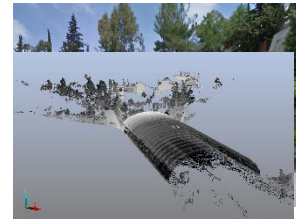
Title:

In-motion Area Modelling and 3D Reconstruction using a 3D Laser Scanner

Scope:

Recent trends in the ICT domain have provided advanced solutions for area and structure modelling and measurements (high definition lasers, optical scanning systems and other). Such devices consist of advanced scanning systems that are usually mounted at particular positions and perform high definition measurements of the structures under evaluation and use optical, laser, infra-red and other technologies. However, due to the fact that they are fixed at certain positions, they suffer being able to provide only partial views of the structure under measurement/inspection. During this thesis we will examine the 3D reconstruction and modelling of large areas such as the tunnel of the National and Kapodistrian University of Athens with a high-precision 3D Laser Scanning System. The laser scanner will be mounted on a rolling tripod while making measurements following the tunnel length. The collected data (point cloud of measurements and images) will be gathered by the laser scanner while the automated 3D reconstruction of the area (tunnel) will be developed. The thesis will be performed in the steps that follow:

- Familiarization with the laser scanning system, configuration etc (point cloud, accuracy and resolution).
- Experimentation with fixed measurements with the laser scanning and area mapping.
- Moving laser scanner measurements (tunnel length) and acquiring images.
- 3D representation of tunnel (model and texture) from the collected images.
- Helical approach procedure for data gathering with limited point-cloud to speed up the measuring process.
- Development of automated algorithms for images interpolation and texture creation on the 3D model.



The apparatus to be used includes the following:

- FARO FOCUS 3D laser scanner.
- Scanner and rolling tripod.
- FARO Application Programming interface.

Prerequisite Knowledge:

- Experience with programming languages (Python, C++).
- 3D Reconstruction and modelling out of laser scanning measured data (point cloud).

Knowledge to be acquired from the thesis:

- Familiarization with high-precision measuring equipment.
- 3D reconstruction of model with images and cloud-points.
- Investigation of highly innovative methodologies for data collection (helical approach).

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