

## PHOTOGRAMMETRIC NEWS: Doctoral Dissertation

Mrs. **Lingli Zhu** made her doctoral dissertation on the 18<sup>th</sup> of June 2015 at the Aalto University School of Engineering, Finland. Professor Dr. **Stephan Nebiker**, University of Applied Sciences and Arts Northwestern, Switzerland and Professor Dr.-Ing. **Norbert Haala**, University of Stuttgart, Germany appeared as opponents. The title of the thesis was “A Pipeline for 3D Scene Reconstruction from Point Clouds”. (Photo: Matti Kurkela)



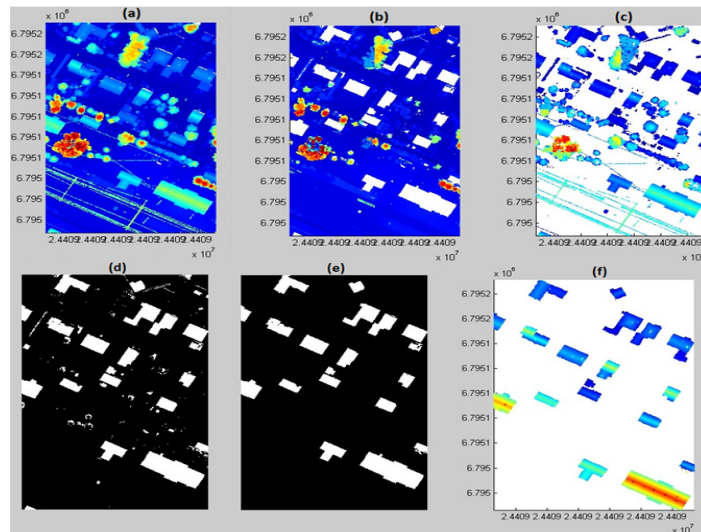
### Abstract of the thesis

3D technologies are becoming increasingly popular as their applications in industrial, consumer, entertainment, healthcare, education, and governmental. This thesis addresses techniques for automated point cloud classification and the reconstruction of 3D scenes (including terrain models, 3D buildings and 3D road networks). The experimental data include Mobile laser scanning (MLS), unmanned aerial vehicle (UAV) images, airborne laser scanning (ALS), and open geospatial data sources from the National Land Survey of Finland e.g. a topographic database. Georeferenced binary image processing techniques and data preprocessing methods have been developed for various data classification and 3D model reconstruction, which realized a fully automated pipeline for 3D terrain, 3D building and 3D road model reconstruction. The results have been evaluated and analyzed by compared to reference data. The quality was indicated by Correctness rate, Commission error rate, Omission error rate and Root mean square error (RMSE). In addition, the advantages and disadvantages of different types of data have been explored and were also introduced in this thesis.

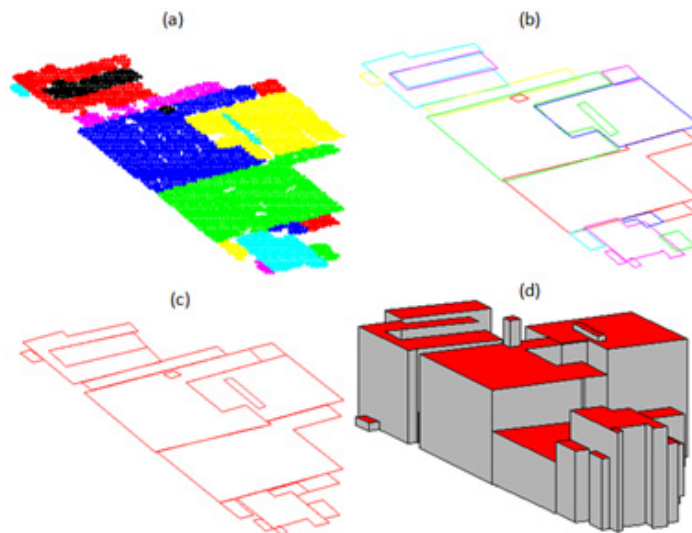
This study demonstrates the operability of 3D model construction for levels of detail (LoDs) of 1-3 via the proposed methodologies and datasets. The study is beneficial to future applications, such as 3D-model-based navigation applications, the updating of 2D topographic databases into 3D maps and rapid, large-area 3D scene reconstruction.

**Keywords:** airborne laser scanning, mobile laser scanning, topographic database, building detection, building reconstruction, road detection, road reconstruction

## Highlighted figures from the thesis



*Georeferenced binary image processing method for building extraction from point cloud.*



*Automated method for 3D building reconstruction from point cloud.*



*3D building models--- 3D Tapiola.*