Research Engineer position: 3D urban reconstruction from GIS data (collaboration between Inria and Oslandia)

Job environment. The job environment is the one of the CP4SC project, a collaborative effort that focuses on developing a cloud platform for smart cities. We will collaborate with Oslandia on C++ software components for urban reconstruction from 3D point clouds and GIS (Geographical Information Systems) data, based on the CGAL library and SFCGAL (a wrapper around CGAL that implement 2D and 3D operations on OGC (open geospatial consortium) standards models).

Assignments. We will explore the automated generation of 3D urban models, either from measurement data such as 3D point clouds or from GIS data. This requires a pipeline of algorithms ranging from analysis to processing of large-scale data, through semantic classification and reconstruction of 3D meshes from data that are possibly heterogeneous, incomplete and defect-laden. Measurement data such as 3D point clouds may be acquired on a building, a city block or an entire city. The reconstruction algorithms must generate adjustable levels of detail with fine-grain and adjustable balance between complexity, resolution and approximation. The CGAL library already offers components for the aforementioned pipeline, and the SFCGAL library provides a wrapper around some of the CGAL components. The objective is to complement the pipeline for urban reconstruction and to extend the SFCGAL library.

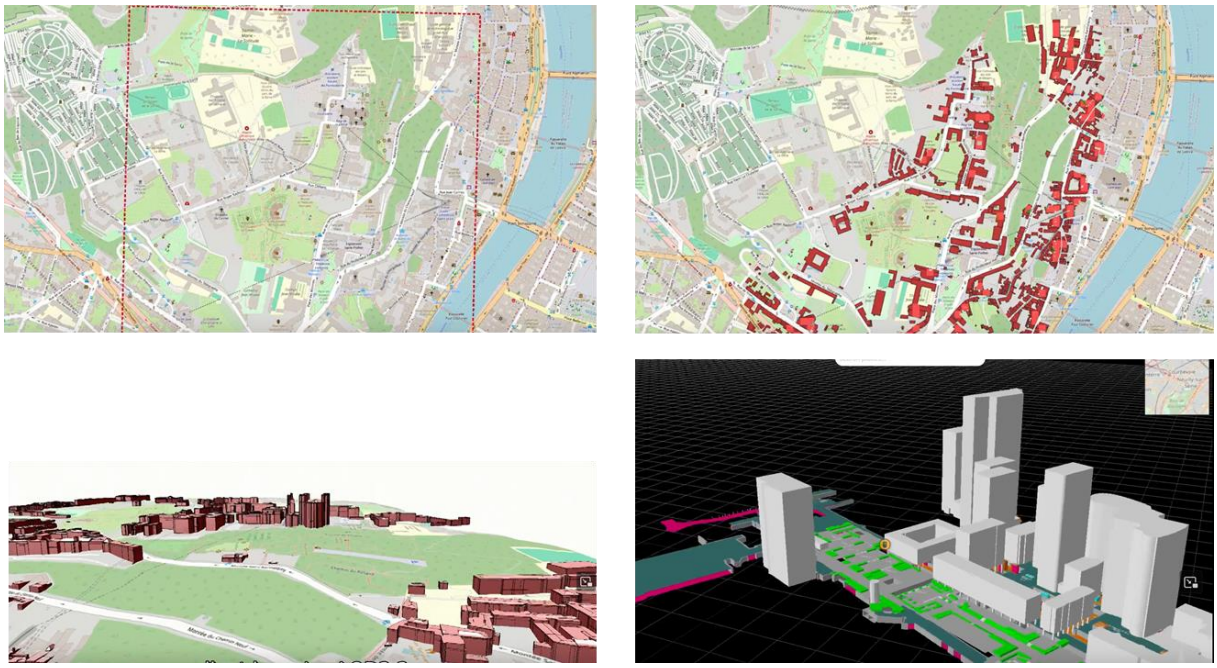

Figure 1. 3D urban reconstruction from GIS data, using Oslandia software tools.

Main activities

- Devise and implement geometric algorithms
- Devise interfaces to GIS formats (Geographical Information Systems)
- Evaluate and benchmark the algorithms
- Exchanges with partners of the project

Skills

Technical skills and level required:

- Geometric data structures and algorithms
- Geometry processing: 3D point sets and meshes
- Advanced C++ programming: generic programming, STL
- Experience with GIS data is a plus
- Experience with the CGAL library is a plus (see www.cgal.org)

Languages: French and English

Relational skills: Ability for team work and collaborative activities

Contact

Pierre Alliez
Email: pierre.alliez@inria.fr