



## 4th Term - MSc Proposal

MSc title: Robot localization within a 3D geographic information system	Host University: LAAS/CNRS, Toulouse, France
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### Brief description of the project:

The knowledge of a mobile robot position is an essential information required for autonomous navigation. This information can be recovered using various means (odometry, visual odometry, inertial localisation), but all these means provide a position estimate whose precision degrades over time or distance. Other means based on exteroceptive sensors exists (SLAM approaches), but they remain difficult to set up and a re fragile.

An other solution is to rely on available data on the environment, 3D Geographic information system (GIS) in the case of this work. If the robot can match perceived data with such initial data, then it can estimate its absolute position, regardless of the motions it is achieving. The proposed work consists in matching 3D data perceived by the robot, either with stereovision or a Lidar, with a 3D GIS composed of planar facets, and to derive a 3D position estimate on the basis of the found matches. In order to be robust with respect to sensor and model noise, a stochastic approach will be favoured – very likely particle filtering. The work must lead to the production of a operational software component, that will be integrated on board one of our robots, and demonstrated in an actual pedestrian urban environment.

### Software/Hardware needs:

The candidate must have very good skills in applied mathematics and in C/C++ programming on Unix systems.

### Special remarks:

Submit a single page proposal.

Host University: Bourgogne/Heriot-Watt/Girona

Software/Hardware needs: Detail the programming platform (matlab, C++, etc) and the lab facilities required for the project (cameras, acquisition cards, lasers, etc).