PROJECT TITLE	Developing a Map Routing and Tiling Service for Autonomous Driving Systems	
PROJECT TYPE	Student project (25% Research + 75% Developpement)	
PROJECT DURATION	6 months	
SUPERVISORS	Dr. Gamal ELGHAZALY	Prof. Dr. Raphael FRANK

360Lab

The 360Lab at the Interdisciplinary Research Centre for Security, Reliability and Trust (SnT) of the University of Luxembourg, is the first thematic research laboratory focusing on smart mobility. The purpose of the 360Lab is to serve as an umbrella for research projects sharing common equipment and complementary expertise to conduct strategic and collaborative research in the broader area of mobility innovation. The topics of interest include but are not limited to: Connected and Automated Driving, Machine Learning, Data Science, Sensing Technologies, Mobility Modeling and Simulation, and Transportation Planning.

For more information visit: https://360lab.uni.lu

Project Description:

The 360Lab is currently involved in developing a modular autonomous driving system based on HD maps for their robotized vehicle Junior. The intern will actively participate in developing a map service subsystem together with other developers in the team. High definition (HD) maps provide automated vehicles with centimetric-precision lane-level and semantic information about the physical driving environment. Lane geometry, road intersections, points of interests (POI), traffic signs and road markers are typically the elements found in these maps. They are a key component used by autonomous vehicles for driving scene understanding and route calculation. Given an HD map database, the aim of this project is to implement a map service that provides the AD system the functionalities of route calculation and map tiling. For this service to be used by a fleet of autonomous vehicles, it may be possible to deploy this service in server-side via a RESTful API.

Job Requirements

- Bachelor or Master student in robotics, computer science, mathematics or closely related field
- Familiar with tools GeoJSON, GIS, SQLite, XML, Serialization, REST APIs, web sockets, ROS
- Good knowledge of route planning algorithms, graph optimization (e.g. A* and $Dijkstra\ algorithms$)
- Good knowledge of Linux based operating systems
- Good development skills (Python, C/C++, Javascript)
- Fluent in English (oral and written)

Starting Date: March 2022

Application

Interested candidates can send their CV together with a motivation letter to:

- Dr. Gamal Elghazaly, Research Associate, Member of 360Lab, gamal.elghazaly@uni.lu
- Prof. Dr. Raphaël Frank, Senior Research Scientist, Head of 360Lab, raphael.frank@uni.lu

PROJECT TITLE	HD Map Change Detection Using Deep Learning	
PROJECT TYPE	Master Thesis Project (70% Research + 30% Engineering)	
PROJECT DURATION	6 months	
SUPERVISORS	Dr. Gamal ELGHAZALY	Prof. Dr. Raphael FRANK

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For more information visit: https://360lab.uni.lu

Project Description

The master student will participate in the AUTOMAP (Always Up-TO-date high definition MAP) project funded by the FNR (Luxembourg National Research Fund). The aim of this project is twofold: Design and deploy a novel procedure to detect and update changes in HD maps. Produce and validate a ground truth HD map of the metropolitan area of Luxembourg City with our partner Civil Maps. The student will work together with other project team members to develop new algorithms to detect changes in HD maps using deep learning. In this master thesis, novel Deep learning architectures will be developed, trained, validated and tested on a dataset including camera images, lidar point clouds, vehicle pose as well as the HD maps to be check for changes.

Job Requirements

- Bachelor or Master student in robotics, computer science or closely related field
- Experience with at least one of deep learning frameworks (Tensorflow, PyTorch, Keras, Caffe)
- Good knowledge of Linux based operating systems
- Good development skills (Python, C/C++, Javascript)
- Good knowledge of ROS, OpenCV, PCL
- Fluent in English (oral and written)

Starting Date: March 2022

Application

Interested candidates can send their CV together with a motivation letter to:

- **Dr. Gamal Elghazaly**, Research Associate, Member of 360Lab, gamal.elghazaly@uni.lu
- **Prof. Dr. Raphaël Frank**, Senior Research Scientist, Head of 360Lab, raphael.frank@uni.lu