

Position Offer Reference : ELSAT2020 by Cisit / OS #4 / Project #1 : ORIO / FP 50

### Context.

In the scope of the ELSAT2020 project, the URIA research team (part of the IMT Lille Douai institute) is involved in **ORIO**, which is both targeted to monitor and analyze the performances of the urban transportation networks and to provide solutions to protect pedestrians and other vulnerable users (bicycles, rollers, *etc.*) from being hurt by vehicles. This last aspect is based on the exploitation of sensors such as LIDAR and the treatment of electromagnetic signals that are “naturally” emitted by the vehicles and the transportation networks’ users (this approach is called “opportunistic radars”).

The **ORIO** project is focused on the challenges emerging from the growth of transportation networks within the cities, either in size or in complexity. It aims to fulfill two objectives: first developing a set of tools providing valuable feedbacks and possible improvements regarding the “Quality of Service” attached to a multimodal transportation system and, second, improving the safety by building a kind of “signal processing-based protection shelter” around the users.

All of these tools rely on the construction of models from “on-line” video, radar data and other electromagnetic signals (emitted by GSMs, for instance). These data will not only be exploited to characterize the users and vehicles’ natures (cars, bus, bicycles) and flows, but also to model the type of interactions these heterogeneous users will have between each other. Although the first step of the project will make use of artificial and “public” data tracks, the final set of data will be acquired by the **VLAD** platform (that stands for “**V**ehicle for **L**ocal **A**cquisition of **D**ata”), which building should be achieved within the lifetime of the **ORIO** project.

### Missions.

This position is a 12 months long job, to be started as soon as possible. The core objective consists in building users-users (vehicle / vehicle, vehicle / bikes, vehicle / pedestrians, *etc.*) interaction models from video streams acquired by the **VLAD** platform. In this work, we will put the stress on “conflicting areas”, such as crossroads or pedestrian crossings. The developments will rely on pattern recognition (for objects of interest detection, especially through the use of known Deep Neural Network frameworks such as Caffe or Torch), tracking and interactions modelling (Markov chains in particular). As a secondary objective, a contribution to the setting up and the experiments of the VLAD platform will be requested. Applicants should hold a PhD degree related to pattern recognition, machine learning or classification. A general academic profile closed to areas such as signal processing and data-driven modelling will be appreciated.

**To apply to this position, please contact:** Jacques BOONAERT ([jacques.boonaert@imt-lille-douai.fr](mailto:jacques.boonaert@imt-lille-douai.fr)) Stéphane LECOUCHE ([stephane.lecoeuhe@imt-lille-douai.fr](mailto:stephane.lecoeuhe@imt-lille-douai.fr)).

(1) The ELSAT2020 project is co-financed by the European Union with the European Regional Development Fund, the French state and the Hauts de France Region Council