2 year Research Engineer or Post-doc position at IFSTTAR, COSYS, LICIT – 2017/001

L. Leclercq, 12/05/2017

Title: Multimodal dynamic simulation of large-scale transportation systems

This position is part of an ERC Consolidator Grant hold by Prof. L. Leclercq (project MAGnUM - http://magnum.ifsttar.fr ). This will provide a stimulating working environment with lots of international collaborations. The MAGnUM team is currently composed by 3 permanent researchers, 5 PhD students, 1 post-doc and 2 research engineers all working on close and connected topics.

Resume:

This position aims to reinforce the current research effort within the MAGnUM project about large-scale multimodal traffic simulation. A trip-based dynamic approach has been elaborated by a PhD student based on the concept of Network Macroscopic Fundamental Diagrams (MFD). This concept is appealing because it permits to decompose a large city network into bins where traffic dynamics is reproduced based on simple behavioral curves (MFD). Based on this approach, a first simulator has been developed in Matlab and coupled with traffic assignment methods to account for user route choices. This first version is currently under investigation but lacks for some critical components to address the simulation of a full transportation system.

The objective of this position is to pursue the effort in developing this simulator considering different extensions. In the current stage, the simulator only considers car-traffic. The first extension will be to introduce multimodal options that can interfere or not with the car-traffic (metro is not interfering while buses may influence or be influenced by traffic conditions). For interactions, the concept of multimodal fundamental diagram that has been recently introduces in the literature will be investigated but other approaches may also be proposed. A simplified separate simulator will be developed to account for the metro transportation network. Second, the dynamic assignment component has to be updated to account for the new multimodal options. The recent works made by the MAGnUM team about fast dynamic methods for calculating network equilibriums may here be of use. This requires to interface the simulators with advanced C++ codes and to make the full platform functional on simple test cases. Third, we envision to demonstrate the capabilities of the full platform for a large case real city, i.e. the Lyon metropole. This requires to work on the calibration process for the (multimodal) MFD and the other components based on the traffic and demand data we have already collected. Designing specific scripts to aggregate the data from GIS environment and other databases will be necessary to complete this task. A complete validation of the platform will then be achieved by comparing the simulation results with both real traffic data and dynamic microscopic simulations that are realized by other team members on the same area.

Skills:

We are looking for highly talented and motivated PhD graduates in Applied Mathematics, Modeling and computational sciences. Advanced skills in computer programming (Matlab or C++) is required. Good English skills (speaking and writing) is required, as are strong analytical
skills and project management skills. As the projects are part of a large research program, we seek for opportunities for the project members to cooperate on various topics. Affinity for working in a group is therefore preferred. Some basic knowledge about transportation systems and traffic models is appreciated.

Other information:

The MAGnUM Project: magnum.ifsttar.fr @ERC_MAGnUM
Supervision: Prof. Ludovic Leclercq
Location: Lyon, France
Starting date: 01/09/2017
Gross salary: from 2467 € to 2699$ / month depending on the qualification
Duration: 24 months

Applications:

Applicants should send their CV, a motivation letter and a copy of their PhD manuscript by e-mail to ludovic.leclercq@ifsttar.fr. Recommendation letters may be requested during the selection process. They will get an answer only if their application is considered for a first interview.