Modelling the impact of new mobility modes to transportation networks

- **Supervisors** Jakob Puchinger (jakob.puchinger@irt-systemx.fr) and Michele Tirico (michele.tirico@centralesupelec.fr)
- **Deadline to apply** 01.03.2022.
- **Starting date** 01.04.2022, 4/5 months.
- **Location** CentraleSupélec, Université Paris-Saclay, 3 rue Joliot-Curie, 91192 Gif-sur-Yvette Cedex.
- **Laboratory** Future Cities Lab (CentraleSupélec, Centrale de Pékin, IRT SystemX) and LGI lab (CentraleSupélec).

Context

Cities are approaching to a transportation revolution, with the rise for autonomous and electric vehicles demand, an incremented requirement for smart, eco-friendly and micro-mobility modes, a reduced need for many to travel to a physical place of work and private car ownership giving way to shared ownership. Transportation networks will adapt to those technological and social transformations: infrastructures must be rethought, adapting the existing transportation network. To avoid repeating planning mistakes from the past, to understand how human lifestyles shape city living and ensure an adequate support to urban decision-makers, we must investigate the co-evolution of transportation networks with the emergence of new mobility modes.

The Future Cities Lab (https://www.futurecitieslab.city/) is a joint research laboratory between the Centrale Pékin (Beijing University) and CentraleSupélec (Paris-Saclay University). Its mission is to contribute into the understanding, managing and modelling the urban transformations, with a focus on mobility, supply chain and energy.

The research topic of the internship is based on urban models, and include geographic data processing, network science, agent-based models and spatio-temporal analysis. The research activity of the intern will contribute to the mission of the Future Cities Lab.

Objectives and activities

The main objective of this internship is to focus on evolution of multi-modal transportation networks. More precisely, the activities are detailed as follow:

- build a consistent dataset of spatio-temporal and statistical data of Paris and Beijing. More precisely, we wish to propose a generic method to collect information from heterogeneous sources into a spatio-temporal and disaggregate dataset.
- simulate the transformation of the transportation network. The intern will extend the MATSim micro-simulation platform and explore the impact of autonomous vehicles and micro-mobility will have to cities of tomorrow.
- quantitatively measure the transformation over the network and measure the impact in terms of congestion, pollution production and efficiency.

Candidate profile

- Candidate should be enrolled in a M.Sc. degree program majoring in computer science, engineering, quantitative geography or related field.
- preference will be given to highly motivated and self-driven candidates with experience in spatial analysis, urban mobility simulations and geographical data processing.
- He/she must have strong programming skills in Java and Python.
- He/she must have experience in Geographical Information systems (GIS), OpenStreetMap platform and related software (ArcGis or Qgis).
- knowledge in network science, spatio-temporal analysis, agent-based models and transportation models is appreciated.

Application instruction

For more information, feel free to contact the supervisors. Candidates are invited to send their application to supervisors as a single pdf file containing a cover letter describing their background and motivation, and a detailed CV.