A cooperative model that ensures the urban transportation systems' resilience.

Internship description

4 to 6 months internship, starting date: Flexible
Tutors: Neila Bhouri, HDR, Mostafa AMELI, PhD, Hassan Mahdavi, PhD
Location: University Gustave Eiffel, COSYS department, Grettia Lab., 77420 Champs-sur-Marne, Paris area, France.

Urban transportation systems' structure and functionality can be affected by unexpected disruptions due to several reasons, e.g., natural hazards, intentional attacks, accidents, etc. Resilience is generally understood as the ability to continue to serve under disruptive states and to recover from them rapidly [1]. The objective of this research is to study cooperative resilience strategies for mobility in urban systems.

The trainee's objective is to build a cooperative strategy in which each transportation mode operates independently in normal conditions and cooperates under disruption to ensure the whole system's resilience. The challenge is to keep both services at their quality using a centralized regulation strategy.

This internship aims to provide a comprehensive overview of the previous research, emphasizing the definition and key characteristics of urban mobility mathematical models. A comprehensive benchmark is required to consider the existing methods for representing and measuring the service quality and vulnerability of mobility passengers and propose an efficient optimization framework for resilience assessment and improvement. After learning the basics, the student will provide a literature review on combined mobility providers and clarify the research gap. Then, she/he will work on a new framework based on the existing resilience assessment tools [2], optimization framework, and transportation simulation tools [3] provided by the mentors. To this purpose, the steps of this research work are:

- To perform a literature review on cooperative systems.
- To collaborate with the team members to design new methodologies to be applied in the real test case of Paris city.
- To validate the new methodology on academic test problems and perform sensitivity analysis.

Keywords: Passengers and Freight mobility, Transportation resilience, Vulnerability, Operations research

References:

Profile and Competences

Education: Master level, in the field of transportation engineering and/or industrial engineering.

Main skills: Mathematical modelling and optimization, skill in computer programming Python/Java (R will be a plus), Basic knowledge in graph theory, knowledge of risk management domain will be a plus, Excellent level of English.

Know-how: Autonomy, Sense of initiative, Excellent relationship, Rigor, Taste for experiments

Contacts
Candidates CV and cover letter should be sent to: neila.bhouri@univ-eiffel.fr, hassan.mahdavi@vedecom.fr, mostafa.ameli@univ-eiffel.fr