Optimization model for passengers and freight mobility

December 2022

Internship description

6 months internship, starting date: Flexible, mid-April or May 2022
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.

In the advent of new transport scenarios in cities, the coexistence of passenger mobility and urban freight as two different ecosystems poses challenges to policy-makers, who are called upon to help tackle negative transport externalities. Besides, 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 passenger mobility and urban freight systems.

The "Service technique des Transports Automobiles Municipales de la Ville de Paris" manages nearly 2,650 vehicles of different types (cars, trucks, etc.), mainly assigned to logistics, but also passengers. 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 passengers and freight 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 freight systems 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 review of passengers and freight system.
- 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