

Master Thesis
IDSC-GZ

Smart Vehicles or Smart Cities? An Inside-Out Approach to AMoD

Motivation

The design of Autonomous Vehicles (AVs) and the design of AVs-enabled mobility systems are closely coupled ([1],[2]). Which type of AV allows the best performance for an AV-based mobility system? Research on the field mostly focuses on optimizing the performance of AVs, assuming they will operate in today's cities. What if the city can become smarter, allowing one to use less sophisticated AVs? What are the trade-offs?

Task

This thesis aims to frame and solve a first instance of the co-design problem of AMoD systems and smart cities.

During the thesis, you will understand the existing co-design framework and extend it to model trade-offs characterizing investments in the city infrastructure and in the development of AVs. Starting from a formulation of the problem, you will develop a co-design framework, which will produce actionable information for stakeholders such as municipalities and AV companies.

**Working Packages**

- Read about literature on co-design, AMoD, and Autonomy
- Formulate the problem and solve it by developing a co-design framework
- Analyze the trade-offs characterizing your framework via compelling case-studies

Skills Required

Affinity for programming (Python), mathematics, optimization, robotics and control

References

- [1] G. Zardini, N. Lanzetti, M. Salazar, A. Censi, E. Frazzoli, and M. Pavone, “[On the Co-Design of AV-Enabled Mobility Systems](#)”, 2020.
- [2] A. Censi, “*A Mathematical Theory of Co-Design*”, 2015.

Contact: Use the link <http://bit.ly/frazzoli-apply> to apply.

IDSC: Gioele Zardini (gzardini@ethz.ch), Emilio Frazzoli (efrazzoli@ethz.ch)

To Apply:

