Future Mobility Christmas Double Feature

When: **Tuesday 17.12.19**

Where: **ML H37.1**

Time: **15:00-16:00** **16:00-17:00**

Speakers:

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Do Self-driving Cars Swallow Public Transport? A Game-theoretical Perspective on Transportation Systems

Abstract. The advent of autonomous mobility-on-demand (AMoD) systems constitutes a paradigm shift for future transportation systems. While many experts envision huge benefits from AMoD systems, others warn against negative externalities, e.g., cannibalization of public transport. To this end, we develop a game-theoretical framework that captures the dynamics between mobility service providers and non-cooperative customers. We study the corresponding game equilibrium and assess the impact of an AMoD system competing with public transport in a transportation system where customers select their trips in a multimodal fashion. We present results for a real-world case study for the city of Berlin.

Bio. Nicolas Lanzetti is a Ph.D. student in Prof. Florian Dörfler group, Automatic Control Lab. He has been a Visiting Student Researcher at the Autonomous Systems Lab in the Department of Aeronautics and Astronautics at Stanford University. He received the B.Sc. degree and M.Sc. in mechanical engineering from ETH Zürich, in 2017 and 2019 respectively. His current research interests include optimal control theory, game theory, and model predictive control. Mr. Lanzetti received the Outstanding Bachelor Award and the Excellence Scholarship and Opportunity Award from ETH Zürich.

Real-time state estimation and flow control for multi-region urban networks

Abstract. Given an urban network that is partitioned in a number of homogeneous regions (zones), the aggregated traffic dynamics describe the vehicle accumulations in each region, as well as the transfer flows among neighbouring regions. The first part of this work tackles the real-time estimation problem when limited data is available. An estimation engine is developed according to the Extended Kalman Filter (EKF) theory, that estimates the state vector of the multi-region dynamical system based on traffic sensors measurements. The second part develops a controller for the perimeter flow control along the regions' boundaries. A linear parameter varying (LPV) system is proposed that approximates the original nonlinear system and simplifies the control design. Both approaches (estimation and control) are tested in micro- and macro-simulation.

Bio. Anastasios Kouvelas is the Director of the group Traffic Engineering (SVT) at the Institute for Transport Planning and Systems (IVT) of the department of Civil, Environmental and Geomatic Engineering, ETH Zurich, since August 2018. He holds a PhD (2011) from Technical University of Crete, Greece, specializing in the analysis and optimization of large-scale transport systems. Prior to joining ETH Zurich he had been a Postdoctoral Fellow at UC Berkeley, California (2012-2014) and a Research Scientist at EPFL (2014-2018). He serves as an Associate Editor in the journal IET Intelligent Transport Systems.