

Network Impacts of Emerging Mobility Trends

Organizers:

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Sponsored by TRB ADB30-5 subcommittee on Emerging Technologies in Network Modeling.

Aim of the Workshop (up to 400 words):

This workshop aims to give insight into various network modeling methods and their applications to emerging mobility trends. Digitalization and technical inventions transformed and will continue to transform the mobility sector. On the technical side, connected autonomous vehicles are expected to drive on the street network and even fly through the air in the near future. The population's attitude towards mobility also changes as the widespread availability of mobile internet enhances the popularity of mobility services. Whereas the possession of a private vehicle or bicycle was required to use these modes of transport in the past, the sharing industry will likely enable a large share of the population access to these new modes of transportation.

Transportation network models need to incorporate the changes on the demand and supply side. On the supply side, connected autonomous vehicles have the potential to increase network flow by reduced headways, better intersection control or even new flow concepts. Furthermore, an optimized design and operation of shared vehicle fleets enables mobility service providers to offer transportation on parts of the network for an affordable price. With the additional mobility services and real-time information about their service level and the traffic system at hand, travelers can make complex decisions from a larger set of viable options. As the user convenience between private vehicle and mobility services become more similar and the private vehicle might be unpractical for one leg of a journey, travelers also have to plan whole trip chains.

In order to understand and optimize the network impacts of emerging mobility modes, the interaction of demand and supply needs to be modeled. Increased vehicle throughput can decrease travel times and induce more car traffic, better mobility as a service offers can decrease private vehicle ownership, but also decrease the ridership and profitability of conventional public transport. Models are necessary to estimate effects of emerging trends and various ways to regulate the transportation network.

Topics of interest: The workshop will address following aspects of network modeling new mobility options within the transportation network:

- Data acquisition and requirements to model demand and supply
- Advanced modeling of demand:
 - trip chains
 - intermodal transportation
- Advanced modeling of supply:
 - connected autonomous vehicles
 - shared ground/air-based vehicle fleets
- Interaction of demand and supply

Intended audience (up to 200 words):

The workshop is intended for graduate students and interested practitioners who work with transportation network models. An increasing amount of data and computational power allows building more detailed models, which can be used to understand past and predict future mobility patterns in transportation networks. The addition of emerging mobility trends into these models is necessary for traffic planners and city administrations (in order to control the transportation network) and mobility providers (in order to optimize their services).

The presentations will inform about various modeling methods and applications in the field of network modeling; they will contain some basic background knowledge about the respective topics, but also show state-of-the art research.

Expected attendance: 50+

Invited speakers/participants in discussion:

- Constantinos Antoniou, Technical University Munich, Germany
- Klaus Bogenberger, Technical University Munich, Germany
- Manos Chaniotakis, University College London, Great Britain
- Nikolas Geroliminis, École Polytechnique Fédérale de Lausanne, Switzerland
- Michael Hyland, University of California – Irvine, USA
- Martin Kagerbauer, Karlsruhe Institute of Technology, Germany
- Anastasios Kouvelas, ETH Zürich, Switzerland
- Hani Mahmassani, Northwestern University, USA
- Milad Malekzadeh, Markos Papageorgiou, Technical University Crete, Greece
- Samitha Samaranayake, Cornell University, USA
- Francesco Viti, Université du Luxembourg, Luxembourg

(Tentative) Program: Note: Schedule according to Central European Time!

Time (CET)	Speaker	Topic
8:30 – 8:40		Introduction
8:40 – 9:15	Nikolas Geroliminis	Urban traffic monitoring with drones: Lessons from a large field experiment
9:15 – 9:50	Manos Chaniotakis	Data aspects of demand for emerging systems
9:50 – 10:10	Coffee Break	
10:10 – 10:45	Francesco Viti	Incorporating activity scheduling and trip chaining in demand estimation
10:45 – 11:20	Anastasios Kouvelas	Modeling and control of connected and autonomous vehicles
11:20 – 11:55	Milad Malekzadeh	Real-time internal boundary control of lane-free automated vehicle traffic
11:55 – 13:00	Lunch Break	
13:00 – 13:35	Constantinos Antoniou	Modeling the impacts of dynamic van pooling services
13:35 – 14:10	Martin Kagerbauer	Impacts of the MOIA's ridepooling service in Hamburg
14:10 – 14:45	Coffee Break	
14:45 – 15:15	Samitha Samaranayake	The impact of access points on ridepooling
15:15 – 15:50	Michael Hyland	Operating robo-taxi services: the state-of-the-art and future directions
15:50 – 16:25	Hani Mahmassani	On-demand air mobility
16:25 – 17:00		Discussion