Description of the project:

At IVT a large-scale agent-based traffic simulation of Switzerland and Zurich is available (Bösch et al., 2016). It is based on the traffic simulation framework MATSim (Horni et al., 2015), which is a joint development of ETH Zurich and TU Berlin. In this simulation, millions of agents move time step by time step through a capacitated network. This also means that agents may end up in traffic jams, just as in reality. Based on these experiences and individual preferences, agents may change their daily travel routes, departure times or modes of transport to avoid congestion iteratively.

Recently, autonomous vehicles (AVs) have increasingly drawn attention from the traffic research community. As of now, the MATSim simulation of Switzerland is able to simulate the behaviour of arbitrary AV fleet operators. The next step to render a realistic picture of the possible impacts of AVs, the demand for travels with the new mode in Switzerland needs to be estimated.

In Truong et al., 2017 a methodology for estimating the trip demand of AVs is presented. The student’s task will be to apply the presented approach to data from the Swiss national travel survey (Microcensus Verkehr), which is available at the institute. The expected outcome will be a detailed analysis of additional trips that are generated through the introduction of AVs by a range of socio-demographic and activity-based factors including prior results from Meyer et al. (2017). Practically, this means that a procedure needs to be developed, which is able to modify the existing daily travel plans of the simulation agents to be compliant with a future where autonomous vehicles are available for everybody.

The project work will consist of:
- a literature review of the impact of autonomous vehicles on the predicted travel demand
- familiarization with the procedure of Truong et al. (2017) and similar approaches
- development of a scaling scheme for the existing travel demand in the MATSim population of Switzerland
- application, testing and reporting of simulation results with the updated population


Additional remarks: Programming experience in Java, Python, R or similar is recommended.

Minimal amount of work: 8/9/10 KP

Recommended Lectures: Traffic Planning, Statistics, Agent-based simulation