Projektförslag för kandidatarbete inom Elektroteknik (E2) EENX15:

Dynamic speed limit control

Bakgrund

Traffic congestions in urban and rural areas result in a significant loss of time, increase the environmental load and traffic incidents. Intelligent Transportation Systems (ITS), recognizing the importance of traffic management, aims at compensating the effect of congestions without changing the road infrastructure itself. Accordingly, ITS applications are nowadays intensively researched areas. This project addresses the problem of how to design dynamic speed limit signs (variable message signs) in freeway traffic context. With real traffic data and in a real traffic context.

source: openstreetmap.org

Problembeskrivning

The project proposes to analyse the traffic flow behaviour based as a function of speed limit signs. This technique nowadays is often implemented in freeway management systems and hence this project focuses on the analysis and design of Dynamic Speed Limit (DSL). The analysis is based on the derivation of mathematical models for traffic systems with the help of first principal models borrowed. Macroscopic modelling concepts are considered in the project, where average-valued quantities, such as mean traffic speed and density describe the traffic behaviour. With the help of real traffic data, a model parameter estimation is carried out. Finally, based on the model, the project aims at developing a new and model based DSL.

The project is divided into the following major and consecutive steps.

1. Understand the concept of macroscopic freeway models. Select one model framework and define the effect of dynamic speed limit signs within this setup.
2. Pay visit at the traffic control centre in Gothenburg and understand current dynamic speed limit policies. Collect and analyze motorway data around Gothenburg.
3. Create a digital twin of highway segments in Matlab/SUMO/VISSIM or alike. Identify key traffic flow parameters from real traffic data (database from Trafikverket).
4. Propose a novel model based (DSL) approach. Comparison with some baselines in the digital twin.
5. Evaluation of results and conclusion.

Målgrupp: TKAUT, TKMAS, TKELT, TKDAT, TKTFY,
Gruppstorlek: 3-6
Antal grupper: 1
Förkunskapskrav: Reglerteknik
Kontaktperson: Balazs Kulcsar, *1785, kulcsar@chalmers.se*
Projekt Rapport: Swedish or English (free to choose)