SOE 22: Traffic Dynamics, Urban and Regional Systems II

Time: Friday 10:00–11:00 Location: GÖR 229

SOE 22.1 Fri 10:00 GÖR 229

Prediction of lane changes with a mathematical model using steering wheel angle — •Kim Schmidt, Matthias Beggiato, Karl Heinz Hoffmann, and Josef F. Krems — Technische Universität Chemnitz, Chemnitz, Deutschland

Advanced driver assistance systems aim at increasing driving safety. However, positive safety impact can only take effect if drivers accept and use these systems. If too many false alarms occur, the systems are switched off and the potential gain in safety gets lost. Early detection of driver's intention would allow a selective activation of these assistance systems. A present driving simulator study aims at exploring early predictors of lane changes. In total, 3,111 lane changes of fifty-one participants, which drove the same highway track in a fixed-base driving simulator, were analyzed. Results show that drivers stopped their engagement in the secondary task about 7 seconds before crossing the lane, which indicates a first planning phase of the maneuver. Subsequently, drivers start moving towards the lane marking with a mean steering wheel angle of 2.5 degrees. Steering wheel angle as a directly measurable vehicle parameter appears as promising early predictor of a lane change. A mathematical model of the steering wheel angle is presented for lane change. This model is supposed to contribute for predicting lane change maneuvers.

SOE 22.2 Fri 10:15 GÖR 229

Autonomous Vehicle Control through Dynamic Traffic Scenarios Based on Artificial Potential Fields — •Thomas Streubel[1] and Karl Heinz Hoffmann[2] — [1]Adam Opel AG, Rüsselsheim, Deutschland — [2]TU Chemnitz, Deutschland

Mobility is a basic need in modern societies. However, the increasing traffic volume is challenging and asks for efficient solutions. Drivers are not capable of synchronizing traffic streams due to inherent limits of our cognitive abilities. Autonomous driving can overcome this restraint with sensor systems providing environmental information more accurate and faster than any driver would be able to. Here, this information is utilized to create an environmental representation in the form of an artificial potential field. In the field of robotics, it is already used for autonomous motion control. However, the vehicle environment differs greatly especially on highways due to the high speed and vehicle dynamics. We introduce road and object models to generate the artificial potential field, so the objects as well as the road edge is assigned a high potential while the potential on the lanes is rather low. This can be interpreted as a risk map. So, the driving task is reduced to seek for a lower potential. Thus, the adverse gradient is retrieved from the potential field and is used directly for the vehicle control. Consequently, the modeling of objects and roads determines the driving behavior. The vehicle control is realized in a simulation. In particular, the lateral and longitudinal control was combined and tested in the scenario "approaching a slower vehicle in a highway environment".

SOE 22.3 Fri 10:30 GÖR 229

SPINWIRE(R): the smart solution for cities in motion — •I. Fina[1], X. Marti[1], J. Garces[1], and T. Jungwirth[2,3] — [1]IGSresearch, Barcelona, Spain — [2]Institute of Physics ASCR, v.v.i., Cukrovarnick 10, 162 53 Praha 6, Czech Republic — [3]School of Physics and Astronomy, University of Nottingham, Nottingham NG7 2RD, United Kingdom

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SOE 22.4 Fri 10:45 GÖR 229

Large scale embedded networks: The UK bus grid — •Masayuki Hase[1] and Christian von Ferber[2] — [1]Universidade de Sao Paulo, Sao Paulo, Brasil — [2]AMRC, Coventry University, Coventry, UK

Using large scale data on a large part of the UK public bus networks we investigate the embedding of these interconnected networks in the given underlying road network. In particular we investigate the statistics of spatial route distance as function of the number of stations traveled testing earlier observations of fractal and Levy type behaviour in smaller systems. We identify different regimes for these particular behaviours. Further, we investigate the shapes of the local embedded networks applying notions developed for polymer shape characterisation.