



Driver Model for Mission-based Driving Cycles

The Swedish National Road and Transport Research Institute (VTI) has an opening for a master thesis student at the Vehicle and Driver unit (FOF). The objective of the master thesis is to develop a Driver model suitable for generation of mission-based driving cycles.

VTI

VTI is an independent and internationally prominent research institute in the transport sector. Its principal task is to conduct research and development relating to infrastructure, traffic and transport and its operations include all modes of transport. VTI has about 200 employees and is located in Linköping (head office), Gothenburg, Stockholm, Borlänge and Lund.

Background

One of the key issues in dimensioning and optimizing a powertrain for increased effectiveness is to know how the vehicle is used in real traffic. Driving cycles, which are represented by vehicle speed versus time, are used to represent the vehicle usage and they play an important role in assessment and optimization of powertrains. In recent years, studies have been undertaken to develop methodologies for generation of representative driving cycles that reflect real world driving conditions. In these studies, stochastic approaches are used to generate driving cycles, whereas factors that affect the real driving patterns such as street type, driver behavior, vehicle type, interfering traffic and weather conditions are not directly considered in such driving cycle generation.

A further step in construction of a representative driving cycle is to generate mission-based driving cycles. A driving mission will include for instance the street type, mission length, obstacles, and interfering traffic. Generation of a wide range of mission-based driving cycles is crucial in the design process of powertrains; it will enable dimensioning and optimization of the powertrain for various customers' needs and increase the robustness of the design with respect to real world driving conditions.

Purpose of thesis

At Vehicular System Division at LiU, in cooperation with VTI, the feasibility of generating of mission-based driving cycles

using microscopic traffic simulation has been investigated. For this purpose, an open source traffic simulation package, SUMO, has been used. The preliminary results of this investigation reveal that the basic vehicle/driver model in SUMO, usually referred to as behavioral models in microscopic traffic simulation, is not sufficient for generation of mission-based driving cycles and there is a need for further development of the behavioral model.

The objective of this thesis is to develop a behavioral model suitable for generation of mission-based driving cycles, parameterize it by running experiments, and implement it in SUMO.

Work outline

The thesis work is planned to start in January 2017 and includes the following tasks:

- Literature study to get familiar with behavioral models in microscopic simulation.
- Learning to work with SUMO
- Improving the behavioral model in SUMO
- Running experiments and gathering data with a vehicle to be used for parameterizing the model
- Identifying the Key parameters of the behavioral model that affect the load characteristics of the resulting driving cycle

Qualification

- Engineering background within the areas of vehicle dynamics, control, signal processing or a similar area
- Experience of programming and simulation, experience with Python is valuable
- Ability to work independently and to take initiatives

Application instruction

Deadline: Dec 31, 2016

Send your application with CV to: sogol.kharrazi@vti.se

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