

Master's Thesis

Realistic Simulation of Emergency Vehicles in SUMO

Abstract

The creation of an Emergency Lane (EL) has received a lot of media attention in recent years. Many accidents have been reported in which Emergency Vehicles (EVs) only reached the scene of the accident with effort and loss of time. Even though creating the EL is mandatory for all traffic, many issues exist: Drivers do not react immediately, they do not make room for EVs, or wait in front of red light instead of carefully crossing the stop line. Hectic and wrong reactions and resulting driving decisions are dangerous for other traffic as well as the EVs.



In order to research and improve such scenarios, researchers use simulation tools for road traffic mobility such as SUMO¹. The key of such simulations are models for the mobility of EVs as well as the offer traffic in corresponding situations. These models are not yet fully up to the task and, thus, the simulation of EVs and the behavior of other traffic is not very realistic.

Content

This thesis focuses on realistic simulation of EVs as well as human drivers in corresponding situations. The goal of this thesis is to analyze existing data and models to improve the models in SUMO such that a more realistic simulation of EVs is possible.

Possible milestones are as follows:

- Literature research on legal requirements for emergency vehicle and human drivers in corresponding situations (in Germany).
- Literature research on data for driving behavior of emergency vehicles and human drivers in corresponding situations.
- Literature research on models for driving behavior of emergency vehicles and human drivers in corresponding situations.
- Analysis of existing driving models for emergency vehicles and human drivers in SUMO.
- Design of new/extended driving models for SUMO.
- Implementation of the proposed driving models/changes into SUMO (C++).
- Evaluation of the proposed driving models in simulations with SUMO.

Collaboration

This thesis is in collaboration with TU-Dresden/Paderborn University and co-advised by Tobias Hardes².

Requirements

Interests should have at least some basic knowledge of SUMO and C++ as the work will mostly be done with these tools. General skills in literature research are expected as this is one key aspect of this thesis. In case you are not familiar with these requirements, you will need to familiarize yourself during the thesis.

¹<https://sumo.dlr.de/>

²<mailto:tobias.hardes@uni-paderborn.de>