
Traffic simulation in a model world

Introduction:

We are currently developing a model car, which will serve as a demonstration and simulation platform for traffic control algorithms in a semi-autonomous driving setting. Basically, it is a modified 1:24 scale model car, which is upgraded by a 32bit ARM cortex M3 microcontroller, a motor driver, power management circuitry and a number of sensors: magnetometers, IR distance sensors, current/voltage sensors and odometry. The car should be able to drive autonomously inside a small model world, follow the streets, avoid crashes, etc. and should be able to be controlled remotely by a control station (e.g., a computer or another microcontroller). Beside the basic functionality, such as accelerating, flashing when turning, turn the lights on, the demonstrator should simulate more complex behavior such as mass inertia, driver reaction time and sensor failure. The communication to the control station is done in real-time via ZigBee or Wi-Fi. On the computer side (control station) an abstraction layer provides additional functionality, such as interfaces to connect to a database and simulation framework.

Content:

This work consists of three parts:

- First, there will be a paper research about traffic simulation in general and a comparison of available tools and frameworks.
- Second, you have to create a concept model for the simulation, which will be used to verify your practical work and serves as a guideline for implementation.
- The last part of this work will be implementing the model world in simulation, which includes the demonstrator, traffic lights, pedestrians, etc. The simulation should be written in a way, such that parts of the simulation can be replaced with parts of the real world and vice versa. For example, the simulated model world should be able to use data of the real driving demonstrator or both simulated and real world run in parallel and share their data.

Requirements:

- Very good programming skills in C/C++, Simulink/Matlab, Qt, OMNet++
- Self-reliance, ability to work in team

Contact:

If you are interested in working with us, please send your CV and transcript of grades to:
philip.parsch@cs.tu-chemnitz.de