TECHNISCHE UNIVERSITÄT CHEMNITZ

Department of Computer Science
Software Technology for
Embedded Systems

Programming a demonstrator for semi-autonomous driving

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 odometers. 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 existing autonomous driving technologies and traffic simulation in general.
- Second, you have to analyze the software requirements of the demonstrator and the control station and create a concept model, 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 software for the demonstrator and the control station, such that the more complex behavior, which is described above, can be realized. On the computer side, a graphical user interface (GUI) has to be programmed, which allows controlling and configuring the demonstrator, as well as displaying the model world and the current status, e.g. position, speed, errors, etc., of each demonstrator.

Requirements:

- Basic knowledge in hardware design
- Very good programming skills in C/C++, Simulink/Matlab, Qt
- 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*