At RESEARCH AND DEVELOPMENT you will be a key contributor to the next generation outstanding luxury cars from Volvo. Together with other engineers around the world, you and your team will create innovative human-centric car technology that makes life less complicated and more enjoyable for people. Are you interested in design and connected car technology? Do you share our passion for people, the environment and our urge to create a superior driving experience? Research and Development is the place for you to prosper.

Robotized test systems for autonomous driving cars - Virtual Objects

Background

Safety has the highest priority at Volvo Cars with zero fatality and serious injury vision in a new Volvo car in 2020. Active Safety (AS) is a key enabler for that. At the same time, Volvo Cars will be the first to deploy autonomous driving cars with driven by customers in real traffic in 2017. The safety of these cars heavily relies on Autonomous driving (AD) systems which must be extensively tested and calibrated. Because of the increasing complexity of AS and AD functions, a vast parameter space must be investigated during function development and computer simulations are usually employed to run a large number of testing scenarios. Before a new function is released, it must also be tested in the real vehicles.

Safety-critical tests are run on the closed test track. Vehicle under tests, and targets (typically soft dummies that are safe to collide with) are driven by human operators or advanced robots. For testing to be efficient and give reliable results, all parameters must be controlled with high accuracy, while scenarios should be reproducible and fast to set up. In current setups, several objects can be involved into the test simultaneously; however, due to limitations of the test setups, the complexity of the tests and the automation degree are limited. One of limitations for efficient automated testing is that all objects need to be returned to start positions manually.

In the Vinnova-financed research projects iTransit and Chronos, Volvo Cars have developed a concept of a novel fully-automated test system involving a mix of real cars, dynamic test dummies radio-controlled in real time, and virtual objects. The concept is called Steer by Server and is implemented by Volvo Cars and project partners with the aim of providing efficient testing of future AD functions.

The server collects signals from robotized targets and controls their trajectories to ensure that scenario specification is followed and the objects are moving safely avoiding unexpected conflicts. This requires the development of closed loop communication between the server and the test targets, new algorithms to control a number of different targets in a safe manner, and the definition of new, efficient testing protocols.

Scope

The scope of this thesis work is to include virtual objects in the steer by server environment to ensure efficient and reproducible testing of AD functions. Virtual objects can be used to reproduce scenario components (e.g. roads, guard rails) and to ensure the safety of the test environment. The thesis will include both computer simulations and practical implementation at the test track.

The project will be a part of the research project that will continue the work done in iTransit project, and the students will interact with a team of research teams from Volvo Cars, SP, Asta Zero test track, and Chalmers
University. The thesis will contribute to one of the biggest challenges and opportunities currently faced by vehicle manufacturers, i.e., the development of self-driving vehicles.

Project steps

- Literature study to investigate existing methods.
- Development of a steer by server function in Simulink to include virtual objects.
- Testing of the function with SPAS simulator.
- Practical implementation and testing at Volvo test track.
- Documentation and presentation of results at Volvo Cars and host University.
- Practical demonstration at test track

Desired qualification

- Background in computer science, control theory, optimization or mechatronics.
- Sufficient experience in Matlab and Simulink programing.

Duration

Proposed thesis work period

- Estimated start date; 2018-01-18
- Estimated end date; 2018-06-20
- ECTS (Academic Credits/"Högskolepoäng") 30 ECT for each student
- Project is suitable for 2 students working together

Application

We would like you to use the electronic link further down in this ad.

Please apply with: CV, cover letter, grades, and references.

The applications will be reviewed continuously, so please apply as soon as possible.

Please contact:

- Francesco Costagliola, Francesco.costagliola@volvocars.com
- Siddhant Gupta, siddhant.gupta@volvocars.com

We want your application at the latest 2016-11-30.