



Photo Jay Heike, Unsplash

## Driving Simulation on Roads with Uneven Friction

The Swedish National Road and Transport Research Institute (VTI) has an opening for a master thesis student in Linköping at the Vehicle Systems and Driving Simulation unit (FSK). The objective of the thesis project is to model roads with uneven friction in a driving simulator.

### 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 and Lund.

### Background

Simulation in winter or harsh weather condition is essential in many studies where the ability of a human driver or an automated vehicle to handle safety critical conditions is investigated. Improving the realism of winter road simulation is also part of VTI's plan as a leading actor in driving simulation in Sweden.

There are two large motion-based simulators and several mini driving simulators at VTI. The software for these driving simulators is developed inhouse, including the environment model, vehicle model and the interaction between the two. Open source standards such as OpenDrive (a framework for describing road network) and OpenCRG (a standard format for describing road surfaces) are used in the software developments.

### Purpose of thesis

The purpose of this project is to use OpenCRG and OpenDrive to model roads with uneven friction in a driving simulation scenario. Also, the interaction between the vehicle/tire model and the road should be improved, so that changes in the friction level of the road can be handled.

The project will include road modeling, as well as vehicle/tire dynamics modeling for simulating the vehicle interaction with the road and the feedback to the driver.

### Work outline

The thesis work is planned to start in January 2023 and includes the following tasks:

- Literature and state of the art study
- Developing road models using OpenRoad and OpenCRG
- Improving an existing Simulink vehicle model for interaction with an uneven road
- Performing tests in mini driving simulators

### Qualification

- Educational background in the areas of vehicle engineering, computer engineering or a similar area
- Experience of programming and simulation
- Ability to work independently and to take initiatives

### Application instruction

Send your application with cover letter, CV and transcripts to [mattias.hjort@vti.se](mailto:mattias.hjort@vti.se)

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