



Master Thesis: Motion cueing for a bicycle simulator

VTI is looking for one (or possibly two) master thesis student for the vehicle and driver (FOF) and simulation units (SIM). The FOF and SIM units conducts research in driving simulation, vehicle dynamics, tire characteristics and have several unique equipment including three driving simulators and a test rig to measure the tire-road friction. The objective of the master thesis project is to investigate and develop control algorithms for motion feedback of the newly developed bicycle simulator. The project will be performed in cooperation with Chalmers University.

VTI, FOF and SIM

VTI, the Swedish National Road and Transport Research Institute, 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 a total of some 200 employees. The institute is a government agency under the Swedish Government.

FOF and SIM activities currently focus on the evaluation and simulation of driver assistance systems and safety-related vehicle dynamics issues.

Background

There is an interest and need from society to study bicyclists and their behavior in a controlled manner. VTI has developed a bicycle simulator in Gothenburg, which utilizes the visual system and the motion platform of the car/truck simulator, a close to 180-degree projector screen and an 8 DOF motion platform.

Bicycle simulators may simulate the motion feedback through a motion platform; the visual feedback through a projector screen and the sound

through a speaker system. The rider interacts with the simulation through a bicycle mockup with a handle bar brakes and pedals.

The motion platform at VTI is capable of actuating linear motions through the linear XY sled system and smaller rotations and linear motions through the hexapod. These are used to simulate the accelerations that a driver of the simulator expects while driving. The algorithm that is responsible for this is called motion cueing.

Motion cueing for car and truck simulators is a relatively well-established field of research and there is an understanding on how to use the motion platform in a best way. This is not the case for two wheeled vehicles and in particularly not for bicycles.

The aim of this project is to study and understand what the bicyclist expects in terms of motion cues and what of these can be actuated in the motion system of VTI.

Qualification

You are a self-sufficient person that can make your own decisions and work independent. Successful candidate(s) should have a good knowledge in physical modeling and simulation and in vehicle dynamics as well as basic programming skills (Matlab and Simulink). It is a necessity to have a working knowledge in control theory and a basic understanding of real time computing.

Application instruction & information

Send your application (incl.CV & transcript) to: fredrik.bruzelius@vti.se
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