



# Algorithm design for driver attention monitoring

**The Swedish National Road and Transport Research Institute (VTI) has an opening for a master thesis student at the Human, vehicle, Transport system interaction unit (MFT). The objective of the master thesis is to develop a proof of concept for a novel driver inattention detection algorithm.**

## VTI and MFT

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, Borlänge and Lund.

MFT conducts research on individual's or group's possibilities and limitations in their interaction with traffic and other road users. In particular, this includes temporary road user states such as sleepiness and inattention. With knowledge of how different states affect the goal of safe, sustainable travel, we can optimize the transport environment on the basis of the individual's possibilities and limitations.

## Background

Much research has been put into the topic of how to measure driver distraction and yet there is no practically useful solution that actually works.

MFT has previously developed a distraction detection algorithm called AttenD, which is based on eye tracking and established rules for how a driver should look while driving. The aim of the thesis work is to add situation awareness and context adaptation to AttenD. For example, if the following distance to the vehicle ahead is short, the rules that governs what a driver needs to look at changes compared to when driving as a free vehicle.

During the autumn we have acquired a data set tailored to measure a driver's attention to the roadway and to estimate how much spare capacity a driver has that can be used for other tasks while driving. The data set includes eye tracking, visual occlusion, CAN data (including radar, GPS, speed), verbal reports, movies etc.

## Work outline

Given the diverse nature of the acquired dataset, it is important that you are versatile and willing to learn new concepts, tools and techniques. The main aim of the work is to set up the adaptive rules that controls what, when and how often a driver has to attend to different targets in the traffic environment. The work could include the following tasks, depending on your interests:

- Literature reading on the topic
- Modelling (mainly physical modelling, but also system identification).
- Natural language processing
- Eye tracking analysis
- Writing and presenting conclusions.

Note that the work is mostly at a theoretical level. Pseudo code is a probable end result, rather than a data driven operational model. The thesis work is planned to start in January 2015 and is located to Linköping.

## Qualification

- Engineering background within the areas of control and signal processing, modelling, data analysis or a similar area.
- Personal key qualities should include ambitious, diligent and open minded. An ability for out of the box thinking is meritorious.
- Experience of programming in Matlab/Python/R or similar scripting language.
- Ability to work independently and to take initiatives.
- Language proficiency: English and Swedish (the report will be written in English).

## Application instruction

Deadline: Dec 31, 2014

Send your application with CV to: [christer.ahlstrom@vti.se](mailto:christer.ahlstrom@vti.se)