

Vacancies Dutch Automated Vehicle Initiative

2 PhD positions, 1 Post Doc, 1 experienced engineer



The Dutch Automated Vehicle Initiative (DAVI) was founded in 2013 to investigate, improve and demonstrate automated driving on public roads.

DAVI demonstrated its automated vehicles driving on the Amsterdam ring way in November 2013¹ and the automation is currently enhanced to enable experiments with non-expert drivers on public roads.

TU Delft is recruiting 4 researchers for the project:

“From Individual Automated Vehicles to Cooperative Traffic Management” - Predicting the benefits of automated driving through on-road human behaviour assessment and traffic flow models, funded by STW-OTP <http://www.stw.nl/en> and supported by partners Toyota Motor Europe, TNO, NXP, Imtech Traffic & Infra, RDW, Connekt, SWOV, Technolution, Almende, V-tron, Trinité Automation, VisLab.



This project will investigate highly automated driving with 1) individual automated vehicles, 2) cooperative platoons, and 3) cooperative traffic management through infrastructure communication.

The vehicles will feature 360 degree environment sensing and V2X communication. We will assess the reliability and accuracy of the sensing technology under normal and adverse weather in complex real world traffic conditions and will develop innovative control strategies for merging, lane changing and overtaking. Innovative human-machine interfaces will be developed communicating automation modes and intentions, and enabling safe transitions between manual and automated driving.

The human interaction with automation will be investigated to quantify use and disuse of automation, human behaviour in mode transitions as well as trust, acceptance, and mode awareness. Transitions of control will be investigated in particular after highly automated driving with drivers engaging in meaningful tasks as reading or texting. The reaction of the surrounding traffic to the automated vehicles will be investigated through 360 degree environment sensing.

The experimentally collected behaviour of users of automation and surrounding traffic will serve to greatly improve the realism of scenario models and microscopic traffic flow models capturing mixed traffic. These models will be used to investigate and predict the influence of individual and cooperative automation with increasing penetration levels on road safety, traffic flow efficiency, road capacity and fuel economy.

Vacancy 1 (PhD Candidate) Human interaction with automation

- Development of human machine interfaces (HMI) to intuitively guide the operator during transitions between automated and manual driving, lane changes and merging, platooning and transient manoeuvres such as joining or leaving a platoon.
- Development of a real-time driver state monitor to alert the driver in case of drowsiness, or when insufficient attention is paid to the environment.
- The human machine interfaces and driver state monitor will be developed in cooperation with the European Funded Initial Training Network HFAuto <http://hf-auto.eu>.
- Investigate the human interaction with automation measuring behaviour including use and disuse of automation, speed, distance and lane selection.
- Behaviour observation will include advanced methods such as eye tracking and assessment of mental workload, stress and vigilance using physiological observation (e.g. heart-rate variability and pupil dilation).
- Acceptance, willingness to buy, trust and comfort will be assessed with questionnaires.

Profile Vacancy 1: Academic master in behavioural sciences or an Engineer with experience in human factors. In particular we will consider candidates with experience in volunteer experiments, human behaviour studies, human perception, human machine interaction, cognitive modelling, automotive safety, and driver support systems.

¹ The “Dutch Automated Vehicle Initiative” (DAVI <http://davi.connekt.nl/>) demonstrated automated driving on the A10 around Amsterdam on November 12, 2013 (<http://nos.nl/artikel/574107-zelfrijdende-autos-op-de-weg.html>).

Vacancy 2 (PhD Candidate) Benefits and risks of automated driving

- On road study of human interaction with automation (together with Vacancy 1).
- Using the collected real world human behaviour data to develop computer models capturing mixed traffic with automated and manually driven vehicles.
- Scenario models with a limited number of vehicles will be used to assess safety critical conditions such as merging, lane changes, platoon entry, platoon exit, and transitions between manual and automated driving.
- Microscopic traffic flow models with large numbers of interacting vehicles will be developed where automated vehicles will be described with probabilistic models of use and disuse of automation, and of speed, distance and lane selection in various traffic conditions.
- The mixed traffic models will be used to investigate and predict effects of highly automated driving on the traffic flow characteristics (capacity, fundamental diagram, flow stability, shockwave propagation, road capacity and fuel economy for varying penetration levels).
- Mixed traffic models will be extended aiming to assess safety benefits and risks of automated driving by inclusion of sensing errors, and human behaviour variations and errors.
- These models will be used to enhance control strategies in cooperation with Vacancy 3.

Profile Vacancy 2: Academic master in Civil Engineering or comparable studies. In particular we will consider candidates with experience in traffic modelling, driver modelling, traffic management, and safety assessment.

Vacancy 3 (Post Doc) Automation & safety assessment

- Development of highly automated vehicles (Toyota Prius), safely interacting with manually driven vehicles in highway conditions (together with Vacancy 4).
- Development of innovative control strategies for merging, lane changing and overtaking, adopting human like behaviour, and optimizing traffic flow.
- Study the cyber-physical interaction between: the vehicle, the computing platforms, and V2X communication channels.
- Assessment of human interaction with automation (together with Vacancy 1).
- Development of methods to systematically assess safety taking into account technical safety and human interaction with automation (together with Vacancy 2 and the Dutch vehicle approval authority RDW).

Profile Vacancy 3: Engineer with experience in control theory, software development, safety assessment (safe by design software, failure mode effect analysis), sensing (vision, radar, laser,..), electronics, preferably with industrial automotive experience.

Vacancy 4 (Engineer) Environment sensing

- Defining the systems architecture including sensors for environment sensing (camera, radar, etc), vehicle to vehicle and vehicle to infrastructure communication, vehicle actuation, driver interfaces, high level and low level control, and data storage.
- Equipping the vehicles with radar, camera and other sensors providing 360 degree environment perception, and sensing to record human behaviour (eye tracking, muscle and heart activity).
- Vehicle to vehicle and vehicle to infrastructure communication.
- Integrated data acquisition.
- Sensor fusion integration environment sensing, communication, GPS and detailed map information.
- Assessment of the reliability and accuracy of sensing technology under normal and adverse weather in complex real world traffic conditions.
- Aligning the development with (industrial) partners.

Profile Vacancy 4: Engineer with experience in sensing (vision, radar, laser,..), communication, control, software development, electronics, preferably with industrial automotive experience.

Requirements

- Vacancies 1 & 2 are offered as 4 year PhD candidate positions, requiring an academic Master. Alternatively vacancies 1 & 2 can be offered as 3 year Post Doc positions.
- Vacancy 3 is offered as 3 year Post Doc position, requiring a PhD degree or comparable experience (more senior candidates are also encouraged to apply).
- Vacancy 4 is offered as 2 year position, requiring an engineering degree (HBO or academic) and proven experience.
- Candidates for Vacancies 1 & 2 shall preferably be available no later than April 1, 2015.
- Candidates for Vacancies 3 & 4 shall preferably be available no later than January 1, 2015.
- All positions require (excellent) writing and presentation skills in English.

Conditions of employment

TU Delft offers an attractive benefits package, including a flexible work week, free high-speed Internet access from home (with contracts of two years or longer), and the option of assembling a customised compensation and benefits package (the 'IKA'). Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities and depending on knowledge and work experience.

Information and application

For more information contact Dr. R. Happee, phone: +31 015-2783213, e-mail: r.happee@tudelft.nl.

To apply, please e-mail

- a letter of application also specifying which vacancies you apply for
- a detailed CV, including courses & grades at Master & Bachelor level, experience, and publications,
- an example publication or report of which you are the first author

to Nancy Kouters N.Kouters@tudelft.nl

Positions will be filled on a case by case basis.