

Research Assistant / Master's Thesis

Socially optimal behaviour of autonomous vehicles in the context of mixed traffic with human-driven vehicles

Full Time Position at TUMCREATE, Singapore

Availability: Now

Contact: Dr. Jordan Ivanchev (jordan.ivanchev@tum-create.edu.sg)

Background

Interest in autonomous vehicles is rapidly growing in the past few years due to the big benefits they can potentially bring to the transportation sector in terms of travel time reduction, fuel consumption, accident prevention etc. This is a strong indicator that such vehicles will soon be part of our everyday life. However, the transition from human-driven to autonomous vehicles will not be instantaneous. There will be a period of time when the transportation systems will have both human-driven and autonomous vehicles interacting and a considerably body of the research community as well as policy-makers are interested in the possible outcomes of such type of co-existence.

Objective & tasks

The goal of this thesis will be to explore the interaction between autonomous and human-driven cars on a microscopic level using an agent-based traffic simulator designed in our research team. More specifically, the thesis will deal with the design of a driving logic model of autonomous vehicles that aims at optimizing the flow of all vehicles on the road. Congestion waves, which are created as a result of an abrupt stopping or a car joining a highway, are a known phenomenon in current traffic systems. The presence of intelligent vehicles on the road can reduce such effects, by acting as a flexible medium between human-driven cars, or even completely mitigate this phenomenon.

Completing the project would require the following steps:

1. Literature review on existing automated highway systems and mixed traffic scenarios
2. Formal definition of scenario and optimization objective
3. Socially optimal AV model design
4. Carrying out of experiments and post-processing of output data
5. Dissertation/paper writing

What we expect from you

- Object-oriented programming concepts
- C++
- Knowledge of Modelling and Optimization Techniques
- Basic understanding of discrete event simulations

What we offer you

- An international and multidisciplinary working environment
- Opportunity to work on a project with real-life relevance
- Work with researches from world-renowned Universities (TU Munich and NTU Singapore)

Send your resume/CV to the contact person if interested

NOTE: Only shortlisted candidates will be contacted

ABOUT TUMCREATE

TUMCREATE is a research platform for the improvement of Singapore's public transportation, including the deployment of electric and autonomous mobility. Researchers from Technical University Munich and Nanyang Technological University join forces and are funded by Singapore's National Research Foundation as part of the Campus for Research Excellence And Technological Enterprise (CREATE).

TUMCREATE is made up of over 100 scientists, researchers and engineers led by Professors from the Technical University of Munich and Nanyang Technological University.