

Postdoctoral Research Fellow

Design of state-of-the-art autonomous vehicle and driver behavior models

Availability: Starting as soon as possible for the duration of 1 year

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Background

Inevitably the introduction of autonomous vehicles (AVs) will have far-reaching effects on traffic conditions. Indeed, the potential for improving transit services via AVs is considerable, but we simply cannot transition from manned vehicles to AVs in a short period. The introduction of AVs will be gradual thus requiring a careful analysis of the effect of mixed traffic to prevent accidents, slowed traffic and backlashes on autonomous technology. Experimenting in real traffic conditions is obviously an expensive and potentially unsafe proposition. To mitigate this problem, a great deal of preliminary analyses are carried out virtually, i.e., using simulation techniques to evaluate various what-if scenarios.

The current state of the art in traffic and mobility models, however, does not allow a satisfactory and realistic evaluation of traffic behaviour when both autonomous and man-driven vehicles are present.

The aim of this joint project between TUMCREATE and University of California, Berkley, is to provide a framework for studying mixed (AVs/conventional vehicles (CV)) traffic and evaluating implications of a wide range of AV-related policies.

To achieve this aim, two main tasks have to be performed:

- 1) Modelling human drivers adequately by extending current state-of-the-art models to account for stochasticity introduced by human behavior.
- 2) Developing autonomous vehicle behavior models, which are generic enough to allow easy extension to more specific AV strategies and yet complex enough to capture the wide spectrum of AV functionality.

Objective & tasks

- Extend current human driver models by introducing stochastic elements in the current models
- Design hierarchical autonomous vehicle models allowing for platooning and high level route and trajectory planning
- Design of framework to calibrate and validate the models in the presence of appropriate data

What we expect from you

- PhD in Math/ Electrical Engineering / Computer Science
- Strong statistical modelling background
- Experience in discrete event simulation
- Knowledge of C++

What we offer you

- Multicultural and dynamic working atmosphere
- Opportunity to work on a project with real-life relevance
- Work with researchers from world-renowned universities (TUM and Berkley)
- A competitive salary

ABOUT TUM CREATE

TUM CREATE innovates. We are developing cutting-edge electric vehicle technologies and pioneering the *Ultimate Public Transport System* concepts for the growing transport and sustainability challenges in fast-growing tropical megacities. Germany's *Technical University of Munich (TUM)* and Singapore's *Nanyang Technological University (NTU)* — two world-leading engineering universities — have come together to collaborate on this ambitious joint research programme. It is funded by Singapore's National Research Foundation.