**Theme**: **Autonomous Vehicles**

**Number of students:** minimum 2 students

**Project duration**: 3 to 12 months

**Project frame**: Bachelor, Master, research project with 4 to 6 months

**Work load: 15 to 30 ECTS**

**Background:**

* Autonomously operating means of transport are developed with the intention of increasing safety, throughput, and comfort [1]. A platoon is a group of vehicles that moves behind one another in a line. In autonomous platooning a leader is appointed, driving in front and deciding on the speed, acceleration and deceleration.
* An important property of autonomous platoons is given by string stability, which ensures a reduction of spacing-errors along the platoon. In addition, the risk of intra-platoon collisions can be assessed and should be minimized. To ensure string stability and guarantee a low risk of collisions, a tight coupling between communication networks and networked control systems (NCS) used in platooning [2] is an important factor.

**The challenge:**

* The robust and reliable control of platooning depends on the used hardware and the wireless communication technologies to communicate data within an autonomous vehicle and also among the autonomous vehicles. The main objective of this project is to form students’ groups to evaluate the performance of platooning. The tasks include:
	+ Evaluation of platooning requirements on small scale testbeds
	+ Evaluation of platooning requirements on large scale scenarios using simulators
	+ Evaluation of platooning requirements on large scale scenarios using mathematical models

**The company:**

* Projects might be carried out in collaboration with companies and/or as a research project including researchers from AAU and TUHH. The relevant company would depend on the setting,
* A company[[1]](#footnote-1) is able to provide lots of valuable data to create simulations and mathematical modelling.

**Supervisor:**

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* Daniel Plöger, Hamburg University of Technology, daniel.ploeger@tuhh.de

**Candidate background:**

* The project can be tailored to students of any background, as long as they are interested in performance evaluations using testbeds, simulators (like OMNeT++ /NS-3, and MATLAB). Basic knowledge of TCP/IP and good programming skills are a clear advantage.

**References and complementary description:**

* [1] M. Larburu, J. Sanchez, and D. J. Rodriguez, “Safe road trains for environment: Human factors aspects in dual mode transport systems,” ITS World Congress, Busan, Korea, pp. 1–12, 2010.
* [2] Plöger, D., Krüger, L., & Timm-Giel, A. (2018). Analysis of Communication Demands of Networked Control Systems for Autonomous Platooning. In 19th IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks.
1. We are in the process of contacting some companies to join as an advisory board member to contribute for the project [↑](#footnote-ref-1)