Company: TNO

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Supervisor(s) at university (name + e-mail addresses; TU/e will look for suitable supervisors if left blank):

Project title (or topic): Platoon management enhancement via IoT-based vehicle trajectory exchange

Short project description:
Vehicle platooning consists of vehicles driving in a convoy at relatively close distance. This brings benefits in terms of traffic throughput and homogeneity, enhancement of traffic safety, and reduction of fuel consumption and emissions due to lowering the air drag.

Currently, vehicle platooning is enabled by inter-vehicle communication where status information is directly exchanged between platoon members. In the EU Autopilot project, platoon management (i.e. maneuvering and formation) is enhanced with IoT (Internet of Things) connectivity which enables extended interaction between platoon vehicles, infrastructure, traffic management and services, thereby bringing more efficiency in terms of platoon maneuvering.

The goal of this graduation project is to study the feasibility of enhancing platoon management by IoT gathering and processing trajectory information of other vehicles on the road that might affect the platoon management. This brings the following research questions:

- **Scalability**: How to share and process trajectories from multiple vehicles in a scalable manner?
- **Periodicity and latency**: At what frequency should vehicles share their trajectory? What latency is achieved?
- **Data representation**: How to define these trajectories efficiently? How accuracy should they be?

Technical assignment:

- Getting acquainted with basic concept of the oneM2M standard to be used as IoT platform.
- Finding a method to extract trajectories of vehicles on the motorway (e.g. from navigation app).
- Development of a proof-of-concept IoT cloud app to process shared trajectories (e.g. Python).
- Development of a proof-of-concept IoT mobile app to visualize the shared trajectories and platoon instructions such as speed advice, gap making maneuver, etc. (e.g. Android).
- Performance evaluation of the overall solution regarding scalability and latency.
- Extending hardware-in-the-loop simulation to evaluate effects on platoon maneuvering

Business assignment*:

*This part is only relevant for graduation projects carried out by students of the EIT ICT Labs (www.ictlabs.eu) variant of the Embedded Systems program. In addition to the MSc thesis about the technical aspects of their graduation project, these students need to write a short additional report discussing the business-related aspects of their graduation project. Please fill in this part if you wish your project proposal to be considered for this option.*