Company: NXP Semiconductors

Supervisor(s) at company (name + e-mail addresses):
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University

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

Project title (or topic):
Vehicle-to-Everything communication in open-source automated driving platforms based on ROS.

Short project description:
Vehicle-to-Everything (V2X) communication supports wireless sharing of information between different road objects, such as vehicles, traffic lights, Road-Side Units, etc., see https://en.wikipedia.org/wiki/Vehicle-to-everything. V2X enables many safety applications for automated driving (AD), including forward collision warning, blind spot warning, road works warning, etc.

There are several open-source platforms for automated driving based on ROS, such as Autoware (https://github.com/CPFL/Autoware) and Apollo (https://github.com/ApolloAuto/apollo). In particular, Apollo is an open-source car initiative from Baidu. Apollo includes APIs to interface with vehicle sensors and actuators, such as lidar and braking. The platform is based on GNU/Linux, Robotic Operating System (ROS) and Docker.

The goal of the graduation project is to extend a ROS-based AD platform with V2X, enabling automated driving research based on inter-car communication. In particular, we’d like to study sensor fusion systems involving V2X, cameras, radars, lidars. The study will consider safety scenarios with conflicting data from sensors, e.g. red light signaled by V2X and green light detected by the camera. Potentially, we’d also like to analyze and potentially implement V2X APIs for other robots such as drones.

For this project we’re looking for an excellent engineer:
- you are fluent in C++ and Python
- you work in GNU/Linux or another POSIX-compatible OS
- you understand concurrency basics in both hardware and software
- you value code higher than documents and people higher than processes

Technical assignment:
- Study relevant technologies, including Autoware, Apollo, ROS, Docker, V2X
- Design and code a V2X API for ROS interfacing with either Cohda Wireless or Commsignia modules
- Define and record V2X scenarios in ROS
- Build and analyze safety scenarios in the Apollo or Autoware framework’s sensor fusion algorithms

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.