

## Master's Thesis

“Precise Assessment and Implementation of Security and Privacy Mechanisms for an Autonomous Driving Function Software Architecture”

### Motivation

Autonomous driving is in the spotlight of both scientific research and industrial development. The challenging task in putting self-driving vehicles onto the street is to cross the chasm between high system availability and low to zero malfunction rates, even in dense traffic and complex situations on the road. In addition, autonomous driving cars will inevitably be strongly connected to the environment to send and receive data, e.g. via a Car-2-X interface.



Thus, besides a sound functional design and a strong focus on robustness and reliability of an autonomous driving function in normal operation, issues of security and privacy as known from classical communication networks come into play. There have already been some attention-grabbing demonstrations how easy it is to hijack a modern car over a wireless interface and to take over full control of electronic systems in the car. To avoid this, novel security mechanisms have to be considered and implemented on both vehicle system and software architecture level, like authentication, intrusion prevention or ciphering.

### Scope of the Master's Thesis

In the Master's Thesis, a software architecture for a novel autonomous driving function is to be investigated and enhanced with respect to security and privacy aspects of operation in a networked Car-2-X environment. The key **research question** is to identify an approach to analyse the security posture of data-driven architectures. The following tasks shall be performed:

- Survey of the current related work, methods and technologies in this application area
- Evaluation of the existing software architecture and identification of potential threats from external sources
- Systematic security analysis, e.g. based on the DFD, Fault Trees or Model Checking
- Development and implementation of adequate means for security and privacy protection
- Documentation

### **Candidate's Profile**

- Good analytical competencies
- Good programming skills
- Sound knowledge of software engineering and security technologies
- Strong interest in new and trendsetting technologies in the automotive industry
- Strong coordination, negotiation, organization and communication skills

### **Project Setting**

The Master's Thesis position is offered by **IEE Sensing Germany GmbH**, a subsidiary of IEE S.A., Luxembourg, in cooperation with the **Software Engineering Division** at Chalmers and University of Gothenburg, Sweden. The main part of the work will have to be performed on-site at IEE Sensing Germany GmbH in **Kösching, Germany**. The Master's student will receive a fixed-term contract from IEE Sensing Germany GmbH for the duration of the Master's Thesis project, including a fixed monthly compensation. In order to assure an adequate scientific supervision and to strengthen the participation of the Master's student in the current research at the University, two short-term intermediate stays in Gothenburg are planned and supported during the project.

### **IEE Sensing Germany**

IEE Sensing Germany GmbH is the ADAS (Advanced Driver Assistance Systems) competence centre of IEE S.A., Luxembourg, located since early 2016 in Ingolstadt and Kösching, Germany. The company's mission is to develop comprehensive function modules in the fields of autonomous driving, driver assistance and integrated safety. Development processes are agile with a strong focus on simulation, machine learning and novel methods and technologies from the fields of sensor development and verification and validation.

### **Contacts**

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