TUM

Forschungspraxis, Interdisciplinary Project

Simulation of In-Vehicular-Network

Context:

Future cars have a wide variety of sensors such as cameras, LiDARs and RADARs that generate a large amount of data. This data has to be sent via an intra-vehicular network (IVN) to further processing nodes and, ultimately, actuators have to react to the sensor input. Inbetween the processing steps the intra-vehicular network has to ensure that all of the data and control signals reach their destination in time. Hence, next to a large amount of data, there are also strict timing constraints that the intra-vehicular network has to cope with. Therefore, the so called time-sensitive networking (TSN) has been introduced. The functional safety of such networks plays an important role against the background of higly automated driving. Emerging errors have to be detected early and potential countermeasures have to be taken to keep the vehicle in a safe state. Therefore, highly sophisticated monitoring and diagnosis algorithms are a key requirement for future cars. (See Project EMDRIVE)

Our approach for such diagnosis builds on non-intrusively monitoring the intra-vehicular network by snooping on data traffic at an interconnect in the car. An analysis of the traffic shall give information about anomalies that occur inside the network as symptoms of an error inside the electrical architecture.

THIS WORK:

Substance of this work is to first work into an existing simulation environment for an IVN with TSN in OMNET++. Based on the already existing work, several extensions have to be implemented (C++ based) in the simulation environment to mimic certain fault classes like delayed messages, broken links, etc. These fault classes can then later on be injected into the IVN simulation. (FP or IDP)

It is desired to combine Forschungspraxis and Master thesis in the context of this project. In this way, the time during Forschungspraxis can be used to familiarize with the OMNET++ simulation environment.

Prerequisites

OSI-Layer
Basic knowledge in C++
Basic knowledge in simulations

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