Robust SENSE

Deliverable D2.1

Initial system specification

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1 Summary

Autonomous driving is one of the technological mega-trends in automotive industry today. The evolution from active safety and ADAS applications are going to a direction where the vehicle computer units take over control of the car from a human driver in increasingly new situations. In the past 20 years, the vehicle's autonomous features have been limited to situations where inevitable accidents can be avoided. Today, automation is taking role also in normal driving (e.g. highway, intersection, etc.). The main challenge, which still remains, is the reliability and robustness of the sensor systems in all possible outdoor conditions, which at the same time is a challenge for a human driver also. The RobustSENSE project has been established for generating a platform for tackling the aforementioned problem of sensor systems in all weather and driving conditions to generate a reliable situation map for vehicle control units.

This report is the first technical RobustSENSE deliverable and aims to create the common architecture description for the implementation of the modules. Even in the case that the project's final demonstration vehicles will not implement all of the described features, this architecture is designed to have generic nature and is therefore, extendable when new sensors, modules or interfaces, which cannot be foreseen today, are available.

The architecture has been divided to three different layers regarding their own roles:

1. **Sensor layer**: Sensor level components (hardware and software) and their output signals. However, exact format how sensor signal has been provided is not defined for keeping door open to the new sensor units
2. **Data fusion**: Having both low level sensor fusion for raw sensor data and high-level fusion modules for fusing object level data
3. **Understanding and planning layer**: This takes care of scene understanding and decision making concerning desired vehicle control and intervention functions and planning of the right trajectory.

All layers include performance assessment sub-modules for checking if performance over the time remains and corresponds with the initial parameters. In addition, the specific system performance assessment sub-module exists for having overall assessment of the vehicle capability to survey in the actual driving conditions. This is the most important contribution of RobustSENSE for increasing situation awareness performance of the future autonomous cars.