HAVEit

Highly automated vehicles for intelligent transport

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The future of driving.

Deliverable D51.1 Automated Assistance in Roadworks and Congestion: Sensors installed in vehicle (1st SW version)

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Authors

Matthias Strauss, Continental Teves

Christian Thur, Continental Teves

Waldemar Schrinner, Continental Teves

Project Managers

Prof. Alfred Hoess

Holger Zeng

Project Co-ordinator

Dr. Reiner Hoeger

Continental Automotive GmbH, STA EG

Siemensstrasse 12

93055 Regensburg

Germany

Phone +49 941 790 3673

Fax +49 941 790 13 3673

e-mail reiner.hoeger@continental-corporation.com

Executive summary

From the HAVEit use cases for automated assistance in roadworks and congestion (ARC) the sensor configuration has been derived. Precise information is needed for the area in front of the vehicle, not only for known objects, but also for generic ones.

During HAVEit it is planed to detect generic obstacles beside the track, which limit the possible drive tube. Also information about other road users in front, besides and behind the own vehicle are needed. Therefore, several sensors have been installed, which will be described later on. As shown in Figure 1, the sensor detection ranges covers almost the whole vehicle surrounding.

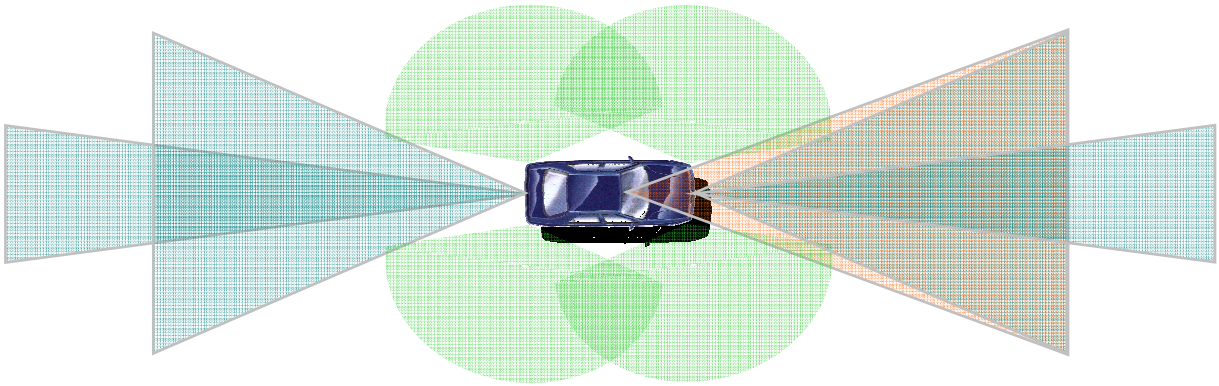

Figure 1: Sensor configuration

Most computing power is needed to detect generic obstacles. More than 60MB/s of camera picture and radar reflection raw data have to be computed. As this is not possible to handle with an actual embedded controller, this task was split between four car PCs.

There is one PC to read all data and one to show the computing results. At least two PCs are needed to compute the 3D reconstruction from the optical flow and the raw data fusion with the radar reflection information. This is the computing power, we expect the next generation of series development camera systems to have.

In HAVEit, this complex design of raw data fusion should be handled as one sensor, which detects the track boundaries. This also applies to the rear radar network. The side radar sensors at the rear of the vehicle are fused internally with the radar sensor to the back of the vehicle.

As the front and side sensors do not overlap enough (see Figure 1), no additional fusion will be implemented. All decisions about the vehicle behaviour will be made by the co-pilot by using the information from the environment sensors, the driver monitoring, the driver state assessment (DSA) and the mode selection and arbitration unit (MSU), as depicted in Figure 13 “WP5100 Functional Block diagram” in the architecture deliverable D12.1.

Not only sensors have been installed till due date for this deliverable, but also the HMI element and the actuators. A complete work over of the vehicle has taken place in one step. In the past, the experiences with building a vehicle in one step where much better than doing it in several steps. The main reason for this experience lies in the high complexity. Small changes in the hardware configuration between one and the next step could lead to irresolvable problems during application implementation.

The detailed description of all ARC components (excluding sensors which are described in this report) will be given in deliverable 51.2 “All components installed and working”. Thus, only the ARC sensor component installation will be described in this document.

First measurements with the sensors have been made and proved they are working. In the next step the code for the interface VPU (versatile processing unit) has to be implemented. The sensors will only work well, if they receive all required CAN messages correctly.

This has already taken place for the interim test vehicle we used at project start. So the sensor team could work with this vehicle until everything was working fine in the new HAVEit demonstrator, a VW Passat CC. Also first measurements where made in the earlier test vehicle, which could be used for software development during the installation phase for the VW Passat.

References

[1] D11.2 Specification, HAVEit deliverable, 2009

[2] D12.1 Architecture, HAVEit deliverable, 2009