



# HAVEit

Highly automated vehicles for intelligent transport

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ICT for intelligent vehicles and mobility services

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## The future of driving.

# Deliverable D41.2 Components (including steer-by-wire) available, installed and working

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## D41.2 - Executive Summary

This report describes the architecture and the components of the HAVEit WP4100 test vehicles called “FASCar” and “Extended Joint System Demonstrator” (see Figure 1). In the matrix organisation of HAVEit, WP4100 is a vertical work package with contact points to many other work packages. The two main tasks among these are the integration and finally the demonstration of the steer-by-wire system developed within WP2300 and of the Joint-System designed in SP3000.

In the context of WP4100, this deliverable focuses on the Joint System Demonstrator vehicle and the integration of the steer-by-wire system components while D41.1 contains a more detailed description of the FASCar and the SP3000 related integration tasks.

In order to meet in-vehicle testing and development demands of both SP3000 and WP2300, two test vehicles are assigned to WP4100:

- The *Extended Joint System Demonstrator* vehicle, covered in this report in detail, is at the moment the main development tool for the steer-by-wire system of WP2300.
- The *FASCar*, a generic research vehicle already fully equipped with actuators before the start of the HAVEit project, is now serving the Joint System development for testing and integration purposes. The FASCar is scheduled to leave the HAVEit project, when the steer-by-wire system is operable, the Joint System will then be migrated to the Extended Joint System Demonstrator.



**Figure 1:** Extended Joint System Demonstrator (left) and FASCar (right)

This deliverable reports the overall system architecture, a description of each single sensor and actuator and their integration and the functionality of the modules is proven by concrete test drives and measurement results.

The main sensors are a front-looking laserscanner system (IBEO Lux<sup>®</sup>) covering a sector of 200° at a range of 150m and a camera connected to an image processing unit for lane marking detection. As the tracking algorithm of the laserscanners and the data fusion in the Joint System are currently still under development, these sensors can be by-passed by combining high-precision GPS data with a pre-stored artificial environment. This shortcut is currently used for fine-tuning parts of the Joint System such as controllers which are dependent on sensor information in a quality that is not yet available.

The main key actuators (beside the vehicles actuators like engine, brakes etc...) are

- The servo steering actuator at the front axle that controls the angle of the wheels

- The safety clutch inserted in the steering column that cuts the feedback actuator (interface to the drivers hands) from the original steering column
- The driver feedback actuator, located between the safety clutch and the steering wheel

The basic functionality of these actuators has been proved by performing simple test cases. The finalized sensor setup in the FASCar assures a comfortable Joint System development environment and the finalized actuator setup in the Extended Joint System Demonstrator enables the SP2000 modules to be commissioned in a rapid prototyping way. The combination of both will be the final vehicle setup in which the full span of scenarios will be performed.