

ENSEMBLE: Overview and Main Results

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Platooning is a cooperative driving technology for driving in a longitudinal formation. Vehicle-to-vehicle (V2V) communication is the key enabling technology. Platooning is considered to be a closed application between well-known participants that use V2V data for their operation. For the deployment of platooning, multi-brand, i.e. interoperable, solutions are paramount. To achieve this, the European ENSEMBLE (ENabling Safe Multi-Brand pLatooning for Europe) project has been conducted with large representation from the automotive sector - all 7 European truck manufacturers (DAF, Daimler Truck, IVECO, MAN, SCANIA, Volvo Group (Volvo and Renault trucks)), major suppliers (Bosch, Brembo, Continental, NXP, ZF) and their European Association CLEPA. In this project, multi-brand specifications have been harmonized to a set of common specifications and requirements for a generic Platooning Support Function (PSF) and a generic Platooning Autonomous Functions (PAF). Part of the specifications is a common interaction protocol, which also encompasses security features. This paper outlines the technical results achieved in the project for the two defined platooning levels, PSF and PAF: harmonized multi-brand use cases, specifications and a vehicle-to-vehicle (V2V) communication protocol, and presents the results from testing the first platooning level, PSF.

In ENSEMBLE two platooning levels have been defined: Platooning as a Support Function (PSF) and Platooning as an Autonomous Function (PAF). The main difference between these two functions is the role of the driver: for the PSF, all drivers in the platoon are responsible for the dynamic driving task. Considering the PAF, the driver in the first truck has a responsibility to respect the traffic rules (i.e. laws and informal rules) and to guide the platoon through traffic, but is not responsible for the (operational and functional) safety of the entire platoon. In other words, the lead truck driver is 'driving' a 'long truck' consisting of electronically coupled automated following vehicles.

Use cases of both the PSF and PAF have been defined for finding a platoon, forming the platoon, driving in platoon and dissolution of the platoon. Examples of use cases are: join the platoon from behind, handle a cut-in vehicle, maintain platoon cohesion and dissolve the platoon.

From the use cases specifications and requirements have been derived. Specifications have been formulated for all common parts of the platooning function, e.g. interaction protocol and information exchange. Requirements have been formulated for those parts of the system that contribute in realizing motion control and for a "lowest common denominator" HMI. This is done to allow brand specific solutions, e.g. control solutions, HMI look and feel, etc. Highlights of the use cases, specifications and requirements, and the communication protocol will be presented.

The PSF was also implemented by all OEMs and tested in different testing sessions, from mono-brand, though triple-brand to multi-brand testing. Results from this testing will also be presented.

Reference: <https://platooningensemble.eu/>

