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Driver and cabin monitoring- Pilot Project Driver Readiness L3+

Accelerate Startup Partnership

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Aim and objectives

The Pilot Project aimed at implementing and evaluating a concept for detection of driver readiness to resume control of an Autonomy Level 3+ system deployed in a Scania production truck. To determine driver readiness and a suitable HMI action to re-engage the driver (e.g., audio, visual warning, brake pulse), the project utilized Smart Eye Driver State Estimator that relies on the information from Smart Eye Driver Monitoring System (DMS) as well as other information such as vehicle speed.

Approach and results

The project defined functional requirements, use cases, test cases, system architecture and HW, SW and vehicle interfaces as well as optimal placement of DMS cameras in the Scania Pilot truck. However, due to its premature termination, the project did not succeed in implementing a full driver readiness detection concept in the Scania Pilot truck and evaluating it on a test track. While the project generated useful insights for both Scania and Smart Eye on the implementation of driver monitoring technology and driver state estimation, its overall objective was not fully met.

The project consisted of three work packages (WP1-WP3).

WP1 consisted of defining functional requirements, use cases (Pilot and production), test cases, the system architecture and hardware, software, and vehicle interfaces. It was executed largely in line with the original plan (see Table 1).

Table 1 Planned and completed activities in WP1.

Summary of Work Packages and Timing	Planned activities	Status
1.1	Define functional requirements, use cases, and test cases for evaluating Pilot Responsible: Scania, Smart Eye support	Largely completed
1.2	Define Pilot system architecture and specify hardware and software interfaces Responsible: Scania and Smart Eye	Largely completed

WP2 consisted of determining optimal placement of cameras in the Scania Pilot truck cab and implementing the full driver readiness system concept (HW and SW including the HMI feedback loop) in a the Scania Pilot truck (equipped with Autonomy Level 3+ system). WP2.1 was done according to the plan, while WP2.2 and WP2.3 started, but were not finalized. WP2.4 and 2-5 were not carried out at all due to the premature termination of the project.

Table 2 Planned and completed activities in WP2.

Summary of Work Packages and Timing	Planned activities	Status
2.1	Analyse Scania cabin to determine optimal camera placement, for DMS camera (narrow FOV) and if needed, a CMS camera (wide FOV) Responsible : Smart Eye, Scania support	Laregly completed
2.2	Implement Smart Eye Driver State Estimator Responsible: Smart Eye	Started
2.3	Implement Scania Driver Re-Engage HMI Arbitration module Responsible Scania, Smart Eye support	Started
2.4	HMI implementation and integration into the L3 Pilot vehicle Responsible: Scania	Not started
2.5	Integration of software modules and hardware needed for the L3 Driver Take over system in the Scania L3 Pilot vehicle Responsible: Scania HMI and system, Smart Eye Camera and Driver State estimator	Not started

WP3 consisted of testing the system on Scania's test track to evaluate the Pilot principle. This activity was not done due to the premature termination of the project (see Table 3).

Table 3 Planned and completed activities in WP3.

Summary of Work Packages and Timing	Work Package overview	Status
3.1	Test Pilot system in the Scania L3 vehicle on the test track Responsible: Scania w. Smart Eye support	Not started
3.2	Analyse results from the test track sessions and make recommendations Responsible: Scania w. Smart Eye support	Not started