CHAUFFEUR II

Promote Chauffeur II

**Funding:** European (5th RTD Framework Programme)
**Duration:** Jan 2000 - May 2003
**Status:** Complete with results

**Background & policy context:**

In the FP4 TAP project CHAUFFEUR I extensive discussions with freight forwarders and professional drivers took place to investigate their opinions about the three CHAUFFEUR I applications:

1. Tow-Bar, which consists in an electronic coupling of two trucks of which only the first vehicle needs an active driver;
2. Platooning, which consists in an electronic coupling of more than two trucks again with an active driver only in the first vehicle (feasibility study);
3. Automated Platooning, which consists in a fully automated truck platoon (feasibility study).

In these discussions, that are documented in CHAUFFEUR I Deliverable D07.4.1 and the CHAUFFEUR I final report, it became clear, that both groups of users clearly saw the need for action in the field of truck traffic and in general like the CHAUFFEUR approach. For instance German freight forwarders were willing to buy a Tow-Bar system if it were on the market. Professional drivers too did like the Tow-Bar approach, especially due to the fact that it can reduce their workload. They explicitly stated that in the Rotterdam area in the Netherlands, where dedicated truck lanes already exist, the capacity could be increased considerably by the Platooning approach.

Freight forwarders and professional drivers also gave valuable hints for the further development of CHAUFFEUR systems. Freight forwarders for instance suggested that to make it interesting also for companies with a smaller vehicle fleet the Tow-Bar approach should be extended so that this system is more universally usable. They proposed to implement a driver assistance function, that maintains the general system functions but allows to follow any other truck, not only CHAUFFEUR equipped vehicles.

The group of professional drivers especially mentioned the importance of the HMI (Human Machine Interface) aspects. Particularly take-over strategies and the necessity to keep the driver alert while using driver assistance functions or driving in Tow-Bar mode.

These recommendations and general European developments (such as the former ART project in The Netherlands, which dealt with truck Platooning on dedicated lanes) are the starting point of the project CHAUFFEUR II.

**Objectives:**

CHAUFFEUR II was tailored around the following two objectives:

1. Realisation of three truck Platoon and demonstration of typical platooning manoeuvres in test track environment (Platooning).
2. Extension of the Tow-Bar system developed in CHAUFFEUR I by intoperable system functions that allow following of any other truck and reduce drivers' workload (CHAUFFEUR Assistant). The CHAUFFEUR Assistant functions can be described as a combination of truck-adaptive-cruise-control (enhanced ACC) and lane keeping. Furthermore, advanced vehicle control features such as brake performance estimation to optimise braking capabilities were added.

**Methodology:**

In general, tests and demonstrations of the two CHAUFFEUR II applications were done on test tracks and in real life environments. The technical developments were complemented by horizontal support
functions ranging from HMI work, operational scenarios, cost benefit analyses, system evaluations and simulations until legal implications.

In particular the realisation of the truck platooning function (first objective) implied a number of activities to:

- transfer platooning strategies developed in CHAUFFEUR I to demonstration vehicles and develop concepts for Platoon driving;
- develop sensors for lane keeping function for the trucks;
- develop/integrate communication concept for platoon vehicle communication;
- develop safety concept for platoon operation;
- demonstrate truck platooning on test track.

The activities carried out to pursue the second objective of the project (the extension of the existing Tow-Bar function) consisted in:

- developing/integrating stand alone systems for the trucks, that allow following any other truck at a safe following distance and incorporate suitable obstacle detection and collision avoidance functions;
- developing additional systems to optimise CHAUFFEUR I Tow-Bar operation (tyre-road friction monitoring);
- developing/integrating suitable safety concept;
- demonstrating/evaluating system functions in test track environment and real life situations.

The following horizontal support functions complemented these main tasks (they can be seen as an intensification and further development of the respective activities in CHAUFFEUR 2):

- further development of existing CHAUFFEUR 2 HMIs;
- conducttion of system evaluation on theoretical and operational level;
- development of scenarios and conduction of traffic simulations;
- development and evaluation of concepts for CHAUFFEUR 2 freight logistics;
- conduction of cost/benefit analysis for the newly developed functions;
- evaluation of user/customer acceptance;
- investigation on legal and liability implications (in co-operation with other Advanced Vehicle Control projects).

The combination of the main tasks with the horizontal support activities ensured that CHAUFFEUR 2 systems w

**Related Projects:**

CHAUFFEUR I

**Parent Programmes:**
FP5-IST KA1 - Systems and services for the citizens

**Institute type:** Public institution

**Institute name:** European Comission, DG Information Society

**Funding type:** Public (EU)

**Partners:**

France:
Regienov; Renault VI - Direction Technique

Germany:
Daimler Chrysler AG Forschung und Technologie 3; PTV Planung Transport Verkehr AG; Robert Bosch GmbH; TUEV Kraftfahrt GmbH - Institute of Traffic Safety User Centre; ZF Lenksysteme GmbH - Ball and Nut Steering Gear Development Department; Wabco Standard GmbH - Fahrzeugbremsen, Clifford Chance Puender

Italy:
Iveco S.p.A. - Vehicle Engineering Center; Centro Studi Sui Sistemi di Trasporto S.p.A.; Centro Ricerche Fiat Società Consortile per Azioni - Advanced Product Technologies

United Kingdom:
**Key Results:**

In general, the CHAUFFEUR II project has proven the technical and operational feasibility of CHAUFFEUR Assistant and Platooning. Five prototype vehicles have been constructed, that do successfully perform the applications, which were defined in the beginning of the project.

**Technical Implications**

On the basis of the prototype vehicles product development can start, provided that the sales departments of the participating companies decide, that CHAUFFEUR products fit into their medium and long-term product portfolios.

Especially for the CHAUFFEUR Assistant function the chance of a nearer term realization is quite high, since this function is a logical step forward from the ACC system and is expected to find broad acceptance among freight forwarders and professional truck drivers. Also the Platooning function has some potential for realization but on a far longer time perspective. For an economically viable Platoon operation dedicated truck lanes are necessary, of which only very few are existing at the time of writing. But in several European countries there are plans to introduce such dedicated lanes in the foreseeable future. Also Platoon operation in confined environments is feasible. There are for instance studies ongoing in Austria for a double use of railway tunnels through the Alps by conventional trains and “trains” consisting of electronically coupled trucks.

But the various systems and components developed in the project are not only suitable for use in the applications they have been designed for. The stereo video systems for instance can be used for all types of vehicle applications, where lanes and other vehicles have to be detected and with the 5.8 GHz communication system the foundation has been laid for all kinds of inter-vehicle and vehicle-infrastructure communication in the future.

Also the non-technical work is not limited to CHAUFFEUR applications only. The evaluatio framework, which has been set up for the economical assessment of the CHAUFFEUR II functions can be applied to other driver assistance functions with only minor modifications. The same is the case for the safety process, which, for the first time has been carried out to such extend. Hence, CHAUFFEUR II means not only brought a significant technological and scientific knowledge gain to the members of the consortium. It has also created a sound basis for further developments in the field of driver assistance systems and for future products in a field, that is expected to grow rapidly in the years to come.

**STRIA Roadmaps:** Cooperative, connected and automated transport

**Transport mode:** Road transport

**Transport sectors:** Freight transport

**Transport policies:** Digitalisation

**Geo-spatial type:** Other