**GALLANT**

Galileo for Safety of Life Applications of Driver Assistance in Road Transport

**Funding:** European (5th RTD Framework Programme)

**Duration:** Dec 2001 - Dec 2003

**Status:** Complete with results

**Background & policy context:**

GALLANT is a pilot project under the Growth thematic programme of the 5th Research Framework Programme of the European Union. Together with the Galilei study, it forms part of on-going research work for the Galileo programme. It is managed by the EU Directorate General for Energy and Transport. GALLANT is the follow-on to the ‘GALILEO Application for Road Safety and Mobility’ GALA Pilot Project, which focused on specifying the technical needs of an Advanced Driver Assistant System (ADAS) for the road environment. It is a significant improvement over the prototype system developed in recent years within different national and international initiatives, using GPS integrated with ADAS.

**Objectives:**

GALLANT is a Pilot Project devoted to the application of the future Galileo for road transport safety and mobility. The project has addressed studies for the integration of Galileo with Advanced Driver Assistant Systems (ADAS) aiming the demonstration of the benefits coming from the integration of the satellite localisation system performances (e.g. increased availability, higher continuity level, possibility to have integrity information etc.).

Car manufactures, automotive and technology suppliers are cooperating since years for the development of ADAS systems at European level. Nevertheless, until the lunch of the GALLANT project, the experience has been led to the awareness of a more precise localisation service. With the next generation localisation system, the additional possibility to have a certified and reliable vehicle position (i.e. the system warns the user when the localisation service fails) will allow the ADAS application to reach the requested reliability as well as to resolve those cases which are not detectable by the on-board sensors.

Most of the ADAS applications considered in the GALLANT project involve the safety of the vehicle occupants and are considered belonging to the cluster of the safety of life applications which require high degree of accuracy, integrity and reliability/availability. Certification and guarantee of the service are mandatory to set a suitable level of liability from the service provider and for all the legal and institutional implications of this type of services. Safety of life applications will also take benefits from a precise localisation of the vehicle on the road network and into the road boundaries. Furthermore the association with high quality digital maps, in terms of accurate road geometry, allows a precise and reliable scenario reconstruction that is the prerequisite for all automatic actions. Mainly, the performances have been considered for the project are related to the accuracy, the integrity, the certification, the update rate, the continuity and the availability.

Anyway only for part of them it has been possible to test their potentiality in terms of benefits they could provide to the in-vehicle application. Those performances are related to the ones available and obtainable by the EGNOS system. For instance since November 2003 the EGNOS test bed has switched to the west European IOR satellite notifying, as it is reported within the test res

**Methodology:**

GALLANT focuses on ADAS. Car manufacturers, automotive suppliers and technology suppliers have been cooperating for some years in developing ADAS at the European level. Their growing
experience has led to the awareness that sensors alone cannot fully satisfy all the specifications. GALLANT will investigate the contribution of Galileo to the following functions:

- Adaptive Cruise Control. The vehicle will automatically adapt its speed by using its Galileo location information and stored road characteristics;
- Overtaking Warning. Galileo positioning in the correct lane will help to detect other vehicles and avoid the false alarms that affect current systems;
- Vision Enhancement. A Galileo receiver supported by detailed map information will help to adapt vehicle headlights to road geometry, and will guarantee to warn users when the function is unavailable;
- Lane Warning and Keeping. Galileo could provide high accuracy and continuity in combination with a digital map;
- Collision Warning and Avoidance. Galileo positioning information and accurate mapping will allow ADAS to recognise the road geometry and avoid false alarms;
- Automatic Guidance. The vehicle is partially/fully controlled via a set of long- and short-range sensors around its, including certified Galileo positioning and precise digital road maps.

GALLANT will develop a demonstration version of Adaptive Cruise Control assisted by Galileo.

Related Projects:

- GENESIS
- GEMINUS
- GALA

Parent Programmes:
FP5-GROWTH KA2 - Sustainable Mobility and Intermodality

Institute type: Public institution
Institute name: European Commission, Directorate-General for Energy and Transport (DG TREN)
Funding type: Public (EU)

Partners:

The GALLANT partners include a major European map provider (Navigation Technologies, NL); a car manufacturer (Centro Ricerche FIAT, I); a navigation receiver manufacturer (THALES Navigation, F); a European Research and Development Centre (TNO, NL) and a satellite simulator provider (GMV Sistemas, E). Close cooperation between these partners and R&D centres is the key to success for GALLANT.

Organisation: Centro Ricerche Fiat (CRF)
Contact country: Italy

Key Results:

Modular architecture

for simulation of positioning performances in ADAS applications. The architecture of GALLANT simulator allows to have a high modularity where the different features and capabilities of the simulator are manageable independently. This has allowed the simulation of a PCC but is able to envisage the simulation of other ADAS functions (with the proper modules development)

Customizable scenarios

for simulation purposes. Any generic scenario can be defined for simulation purposes. The inclusion of curves, obstacles and urban canyons is possible. The result is available as a software module and the source code is considered as confidential.

Models of inertial sensors (odometer and gyroscope) performances

. The simulator defines the models of the performances of an odometer and a gyroscope (that can be used together with satellite navigation for scenarios with reduced satellite visibility). The model has been defined in terms of sensors error. The result is available as a software module and the source code is considered a confidential.

Integration of positioning performances of satellite navigation + inertial sensors
The implementation of a very simple Kalman filter allows the calculation of global positioning performances of a system that integrates the defined satellite navigation together with the defined inertial sensors. The result is available as a software module and the source code is considered as confidential.

Simulation of PCC ADAS application

The integration of the PCC dll (delivered by CRF) with the rest of the simulation tool modules allows the simulation of PCC in different types of scenarios and considering different parameters.

User-friendly Graphical User Interface

The simulation tool allows a very easy management thanks to its GUI, where the functionalities available in any windows-based tool are present. Incorporation of a toolbar to select the different simulation options to manage the functionalities of the simulator. Visualization of results according to a colour scale. Incorporation of a PCC monitoring window to allow the monitoring of the main variables associated to PCC simulatio

Technical Implications

Project objectives have been reached. In particular:

- a real pilot on Galileo has been realized for road transport sector starting form the general specification performed during the GALA (Galileo Overall Architecture Definition) studies;
- EGNOS system has been integrated with the in-vehicle road transport application at simulation and prototype level; the integration represents a further step with respect the studies done by CRF and ESA shown during the ITS World Congress 2000;
- Galileo like system (EGNOS) and GPS have been compared and evaluated in terms of benefits obtained by an on-board ADAS application (PCC – Predictive Cruise Control);
- large scale results dissemination has been performed by each partners of the in order to complete the project the following activities have been performed in the first three months of the 2004:
- complete and deliver the pending deliverable taking into account of the customer recommendation done during the FR meeting;
- prepare the project final report and the cost statement related to the second year project;
- continue in dissemination activities (e.g. dispatching GALLANT brochure and video);

As conclusion of this report it has to be underlined that the experience matured by the partners and the research line opened during the project stimulate a reflection on the need to continue the investigation of the topics addressed. For this reason the project coordinator is active in evaluating with the GJU the possible follow-on of the GALLANT project maintaining the focus on the Galileo for the road transport sector extending the application not only to the ADAS but also to the telematic services

Policy implications

The project has opened different research lines which will need further investigation and, for same aspect, standardisation. The partners are well linked within the consortium therefore further projects could be launched within Galileo and ITS programs on the next future for the:

- technological studies on the Galileo system;
- services and applications development for the road sector;
- experimentation on real pilot;
- the definition of standards and norms.

No doubts that the activities performed within the project oriented at the integration of technologies with particular focus on the future Galileo will also have an impact on the entire localisation system industries in terms of opportunity for the development of components as well as innovative application and service based on Galileo. Furthermore political entities will benefit of the results coming from pilot projects such as GALLANT in terms of decision strategies facilitating the process of the introduction of road transport application requiring specific services related to the liability and certification for their launch.

European dimension of the problem

(The extent to which the project has contributed to solve problems at European level)

The dimension of the problem related to the road safety and security is well known to the European Commission and GALLANT addresses obviously a part of this problem.

In September 2001 the European Commission has presented the “White Paper European Transport
Policy for 2010”, which states that the main objective within 2010 is to reduce 50% road fatalities. In the next years, all Europe should foster an integrated safety policy with particular attention to the introduction of innovative driving supporting systems to promote preventive safety. The GALLANT system impact can be evaluated considering that the dimension of road accidents in Europe alone is of around 50,000 deaths and 1.5 millions injured people every year; one person out of every 200 European citizens is injured in a traffic accident each year. Around one European citizen every 80 dies 40 years in advance, with respect to the expected lifetime, due to a road accident. The benefit thr

**STRIA Roadmaps:**
Cooperative, connected and automated transport, Network and traffic management systems
Water transport (sea & inland)

**Transport mode:** inland

**Transport sectors:** Passenger transport, Freight transport

**Transport policies:** Digitalisation

**Geo-spatial type:** Other