Safety-critical positioning for autonomous driving: with ESCAPE the first fully integrated device is on its way.

Autonomous driving is the hot topic of todays' mobility and transportation world. Safety is the most fundamental requirement and, at the same time, the greatest concern about autonomous driving applications. The major perceived concern about autonomous driving is safety, at all levels of the technology and of the human interaction. In this context, the localization technology is a key element, as it enables the navigation of autonomous vehicles when operating without human supervision. To achieve this goal, the localization technology has to be designed from the beginning for safety.

The ESCAPE project (European Safety Critical Applications Positioning Engine), funded by the European GNSS Agency's Fundamental Elements Programme, has indeed pursued a **safety-oriented design paradigm** for its innovative **automotive-grade localization engine for autonomous vehicles**, the ESCAPE GNSS Engine, or EGE.

The ESCAPE GNSS Engine board in its final packaging (courtesy of FICOSA)

The design of each component on the EGE, its development, integration and manufacturing has followed stringent safety-oriented criteria, which encompass automotive-grade Safety Integrity Level (ASIL) procedures and GNSS-oriented Required Navigation Performance (RNP).

The solution leverages on the Global Navigation Satellite Systems, including the Galileo constellation, thanks to the new **STM** TESEO APP chipset, which supports ASIL-B platforms. This is complemented with intelligent automotive cameras and low-cost inertial sensors, vehicle odometry, lane-level navigation maps, governed by **GMV**'s integration algorithms. The GMV's real-time Precise Point Positioning service, as well as the use of highly precise maps, are the keys for **enhanced accuracy**, enabled via a high-speed connectivity of the vehicle. The unique feature of such a multi-layer design is the estimation in real-time of the **integrity level** associated with the location estimates, which is also the fundamental element for **safety-oriented navigation**.

The ESCAPE GNSS Engine is assembled and manufactured by **FICOSA** and will be validated through an extensive test campaign on-board of a **Renault**'s electric car.

The first accuracy results obtained from the **GNSS-only positioning algorithms** in a medium-multipath propagation scenario have offered a promising 0.3 m RMS horizontal accuracy in static and 0.5 m in dynamic conditions.

The EGE-equipped car at the Innovation Center of the University of Technology of Compiègne, during a session of validation tests.

Other **test sessions** are expected for March, July and September 2019 and are intended to validate, respectively:

- The integrated positioning algorithms (March 2019)
- The provision of integrity information through the computation of Protection Levels (July 2019)
- The robustness of the integrated approach in urban and suburban scenarios (September 2019)

The project is also planning a **final demo** at the Université de Technologie de Compiègne (UTC), in France, in which a test car will show its enhanced/autonomous driving capabilities enabled by the EGE board. Autonomous maneuvers will be demonstrated along a controlled circuit in the UTC campus, while enhanced ADAS functionalities will be demonstrated along public urban streets in Compiègne. The final demo will be organized in late November/December 2019.

The ESCAPE project's most recent achievements will be also presented at the 2019 edition of the Munich Satellite Navigation Summit at the Session 8, dedicated to "THE ROLE OF GNSS WITHIN THE CONTEXT OF AUTOMATIC DRIVING".

_____

For more information: www.gnss-escape.eu

Contacts:

Jessica García Soriano

ESCAPE Project Leader

FICOSA - Advanced Communications Dpt

Tel: +34 937008500 - Ext: 888197

jessica.garcia@ficosa.com

www.ficosa.com