

Data on the road

by François Fischer, *AUTOPILOT Coordinator and Senior Manager at ERTICO-ITS Europe,*
and Francesca Corazza, *Project Assistant, FIA Region I*



The goal of the three-year long EU Horizon 2020-funded AUTOMated driving Progressed by Internet Of Things (AUTOPILOT) project is to enable safer, highly automated driving thanks to smart and connected objects within the so-called Internet of Things (IoT). Through works carried out at several testing grounds in Europe and South Korea, AUTOPILOT aims to bring together knowledge and technology of the automotive and IT value chains to develop IoT-architectures and platforms that will take automated driving to a new dimension.

Connectivity and the ability to collect data from thousands of objects surrounding vehicles are key enablers for highly automated driving. The IoT provides the mechanisms and tools to create virtual objects in the Cloud from real connected objects thereby allowing these objects to become more automated in the not-so-distant future. During the last

particular attention to safety critical aspects. It also makes data from autonomous cars available to the IoT – information that is crucial for the overall rolling out of IoT.

From Vigo to Daejeon

The AUTOPILOT project, which started in January 2017, comprises 44 beneficiaries representing all relevant areas of the IoT ecosystem. The pilot project involves the use of large numbers of vehicles in normal daily traffic. In order to test and advance the use of AUTOPILOT-automated IoT cars in real-life conditions, trials are being conducted at six large-scale pilot sites in France, Italy, the Netherlands, Finland, Spain, and South Korea.

The French permanent pilot site, used by VEDECOM since November 2015 for its own automated vehicle demonstration and research activities, is located in downtown Versailles close to the castle at the Communauté d'agglomération de Versailles Grand Parc. The location is fitting as the

goal here is to provide a mobility service dedicated to tourist applications. Based on a small fleet of automated vehicles provided by VEDECOM and dedicated to a car-sharing application, this use case will experiment with a high level of connectivity (fleet management operations) and automated driving tours of the Versailles Castle surroundings.

The Italian pilot site, used by the Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT), is a testing infrastructure encompassing the Florence-Livorno highway together with road access to the settlement around the Livorno seaport. This pilot site is extended by the pre-testing sites in Trento for highway driving.

The Dutch Brainport permanent pilot site is used by the Netherlands Organisation for Applied Scientific Research (Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek – TNO). It consists of three different pilot areas, including the Eindhoven University campus, the automotive campus parking,

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decade, a large number of IoT technologies were developed by the research community, including IoT software engineering tools and techniques, schemes for safeguarding security/privacy, as well as infrastructures. Building upon these recently finished or ongoing research and innovation activities, AUTOPILOT focuses on utilising the IoT potential for automated driving with

and a 6 km stretch of the A270 motorway, respectively used for the driverless car rebalancing service, automated valet parking and highway pilot, and for platooning.

The permanent pilot site in Finland is located in Tampere, which is the country's second largest urban region, after

Finally, the Korean pilot site focuses on the deployment of an IoT-based Intersection Safety Information (ISI) concept. The objective of this ISI is to provide road situation information at the intersection for increasing autonomous vehicle driving safety when crossing intersections in an urban

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Photos: Eritico

Helsinki-Espoo, with a population of around 230,000. The city has taken a strategic step to be one of the major urban test hubs for automated and connected cars. The tests will be conducted by the Technical Research Centre of Finland (Teknologian tutkimuskeskus – VTT) in two different locations, namely at a parking area and at an intersection. VTT's pilot site allows deploying and testing turning left and straight driving in the traffic light-equipped urban intersection under different outdoor conditions: Slippery intersection in winter time, low visibility for environment perception sensors due to fog, as well as other challenges resulting from dense traffic.

Used by the Automotive Technology Centre of Galicia (Centro Tecnológico de Automoción de Galicia – CTAG), the permanent Spanish test site is located in Vigo, covering the Gran Vía, the city's main street. As a result of the participation in European Compass4D & CO-GISTICS and through local initiatives, the city integrates the urban part of the SISCOSGA corridor (a field operational test on cooperative systems between different types of vehicles). In addition, underground parking has been adapted for the automated valet parking use case.

environment. Crossing an intersection is challenging for automated vehicles because of the large number of obstacles, such as pedestrians, other vehicles crossing the road, and traffic signal phases. Processing the sensed information from road radar and traffic signal will feed the Local Dynamic Map (LDM). The IoT will in turn be used for collecting and utilising these data, thereby contributing to enhancing perception in the automated vehicle with the goal of realising fully automated driving at the equipped intersections. The Korean pilot uses a test site at the Electronics and Telecommunication Research Institute (ETRI), and carries out tests in a real environment at the City of Daejeon.

Past-present-future

AUTOPILOT intends to deploy several different automated driving use cases, including highway pilot, urban driving, automated valet parking, platooning, along with a number of other automated driving services, like real-time car sharing, driverless car rebalancing,

autonomous driving route optimisation, digital dynamic maps for automated driving vehicles, city chauffeur service, and electronic driving licence. The project's test results will allow multi-criteria evaluations (technical, safety, user, business, legal, socio-economic) of IoT's impact on pushing autonomous driving to the next level.

Autonomous vehicles could solve a number of urbanisation challenges cities face today by providing and developing alternative mobility from the ground up. For instance, automated vehicles, like robotaxis, could operate 24/7 compared to private vehicles used today on average for just about 5% of the time throughout the day. While parked rather than being driven for most of the time they occupy a significant amount of a city's space (read more in BTJ 5/15's article *Reinventing urban mobility. Self-driving car fleets*). Fully automated vehicles would not only increase road safety but also reduce congestion, while at the same time freeing up parking space for other urban uses. ■



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