



An operation as simple as crossing a toll barrier or a road works zone, represents a major challenge for the autonomous car to provide a continuous travel in “Mind off” mode. A challenge that Groupe Renault and Sanef are well on their way to achieve in order to build a comfortable and easy driving experience.

## **SANEF AND SYMBIOZ DEMO CAR**

Groupe Renault and Sanef launched a specific pilot project in June 2016 to study the approach and crossing of toll barriers and work zones by autonomous Renault vehicles. It is currently taking place in Normandy on a section of the A13 motorway and is using the connected infrastructure (V2X) developed by Sanef. In this case, five roadside units antennas (UBR) have been installed on the test route. For the toll barrier crossing:

1. The vehicle receives information about 1 km before the barrier of the toll lanes that are available and compatible with autonomous vehicle driving. Before approaching the zone, the vehicle will anticipate its position in the lane and adapt its speed by gradually slowing down according to the speed signs. Approaching such an area is a critical step in the absence of ground marking. To ensure its guidance, the autonomous Renault vehicles use virtual lines derived from a high definition map of the site. Access to the dedicated lane is performed at a speed of less than 30 km/h, while the sensors maintain the car in the center of the lane.
2. The toll transaction is done by using an electronic tag that exchanges acknowledgement data with the car's on board computer.
3. During the acceleration phase, the virtual lines system is used. Of course, the car is also able to detect the surrounding vehicles and adapt its behavior and its trajectory accordingly. Once the marking on the ground is restored, the autonomous Renault vehicles can continue their route normally.

For the work zones crossing, the process is quite similar:

1. The vehicle receives geo-localized information about the road works zone a few kilometers before its location. Before approaching the zone, the vehicle will change lane and reduce its speed according to the information received from the road side units and confirmed by the vehicle sensors.
2. At the end of the road works zone, the vehicle will check that it can return to the initial traffic lane and will resume to the authorized speed limit, to continue its route normally.

## **ABOUT US**

Sanef is a motorway concessionaire, the only «pure player» in France and main subsidiary of Abertis, a Spanish-based company, world leader in motorway concessions. Sanef group is recognized by

its customers for its capacity to innovate based on a strong culture which encourage the spirit of initiative and the open innovation. The Group has developed solutions for mobility such as electronic tolling or fast charging solutions for electric vehicles. Sanef operates 2 063 km of motorways, mainly in Normandy and in the Northern and Eastern part of France. 2,700 people are working for the Sanef group which had a €1,658m turnover in 2016.