



## An autonomous vehicle experience: from research to education

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The LAMIH (Laboratoire d'Automatique, de Mécanique et d'Informatique Industrielles et Humaines) UMR CNRS 8201 has a strong experience in automotive control. It owns several prototypes: a hybrid vehicle, a vehicle dedicated to vehicle dynamics studies. The ENSIAME (École nationale supérieure d'ingénieurs en informatique, automatique, mécanique, énergétique et électronique) is a public engineering school accredited by the Commission des Titres d'Ingénieur since 1979. It proposes several syllabuses (such as Mechanics-Energetics, Metchatronics, etc.) related with automotive engineering.

Therefore, it has been decided to build a synergetic project between the ENSIAME and the LAMIH UMR CNRS 8201 to (i) promote joined research activities between the laboratory and the ENSIAME (ii) to provide unique experience to the ENSIAME's students.

**Educational activities:** Beside the technologies specifically related to the autonomous vehicle (lidars, vision and precise positioning systems, etc.), this prototype allows student to practice their skills on a real, full scale, system and face the associated technical and scientific challenges. As results, every year, the ENSIAME's students are developing a new technological brick (waypoint navigation, intelligent adaptive cruise control, etc.) and so enhance the vehicle abilities.

**Research activities:** The LAMIH UMR CNRS 8201 conducts research on the issue of control and monitoring of the autonomous vehicle, and is particularly interested in systems that can adapt their behavior and can be characterized in accordance with level of automation and interaction with human driver in the context of automated driving. Several studies have already emerged in this context: the ANR CoCoVeA (Driver-Automated Vehicle Cooperation) project (2013-2017), coordinated by the LAMIH, which focuses on the problem to integrate the lateral and longitudinal control functions of the automated vehicle considering the driver-in-the-loop (levels 1 and 2), and the ANR AutoConduct (2016-2020) project aiming the adaptation of the automation strategy of the autonomous vehicles (levels 3 and 4) to needs and states of the drivers in real conditions.

In addition to scientific developments of automation (perception of the environment, the path planning, the vehicle control), these projects focus on the interaction between driver and automated vehicle with continuous sharing of driving and the development of human-machine cooperation (HMC) with a dynamic authority management. With regard to the integration in vehicles and validation, the autonomous vehicle of the ENSIAME, is made available to these projects to validate control algorithms developed and already validated on the LAMIH-SHERPA dynamic simulator.

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Pictures of the vehicle:

