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World first: automated driving in real urban traffic

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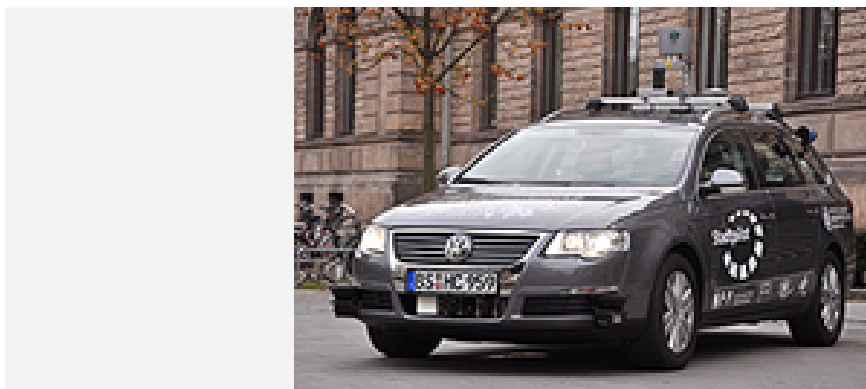
DLR involved in Braunschweig research project



Leonie does not need a driver

Setting off, accelerating and braking – all done without a human driver. This is made possible by the 'City Pilot' (Stadtpilot) project in which the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) is involved. The project is being carried out under the auspices of the Automotive Research Centre Niedersachsen (Niedersächsisches Forschungszentrum Fahrzeugtechnik; NFF) of the Technical University of Braunschweig. On 8 October 2010, the vehicle performed its first automated drive along a preselected route through Braunschweig's urban traffic as part of a presentation of interim results.

At speeds of up to 60 kilometres per hour, the research vehicle 'Leonie' is capable of staying in one lane of the dual carriageway of the Braunschweig ring road; it can take account of junctions, avoid obstacles and adapt its distance and speed to match the prevailing traffic conditions. Although the car can drive unaided, for safety reasons, there is always a driver on board, there to intervene if it should become necessary.



Research vehicle 'Leonie'

'City Pilot' project

'City Pilot' is the world's first research project to implement automatic driving under real urban traffic conditions. It implements the experience gathered from 'Urban Challenge 2007' in the real traffic of Braunschweig. In this competition, an interdisciplinary team from the Technical University of Braunschweig used their test vehicle 'Caroline' to demonstrate that automated driving is feasible in an urban environment.

Safety always takes centre stage

DLR has been involved in the development of the vehicle since May 2010. Work at DLR focuses on the simulation of driving functions. For a vehicle of this kind to be considered safe, it has to have all of its functionality checked during an elaborate series of test procedures. Recent tests conducted on test tracks are supplemented by simulation trials for numerous complex scenarios, performed by DLR. As the project progresses, the DLR Institute of Transportation Systems (Institut für Verkehrssystemtechnik) will be creating simulations of the Braunschweig ring road area, and will then integrate these into one of DLR's driving simulators. "The algorithms which enable Leonie to drive autonomously in urban traffic will be checked on our simulator before they are put into operation in the real world, to verify their functionality and safety," says Prof. Karsten Lemmer, Director of the DLR Institute of Transportation Systems, as he outlines what is due to happen next. "This is especially important for the complex situations faced in an urban traffic environment."



The dynamic driving simulator at the DLR Institute of Transportation Systems

AIM facilitates further research

Something Leonie has not yet been able to do is to correctly recognise traffic lights. This is still an area where the 'safety driver' has to intervene – by pressing a button. If the traffic light is red, the driver must press a red button – or a green one if the light is green. The driver is not required to take any further action; the car operates its brakes as necessary and sets off again automatically.

As part of a major project called Application Platform for Intelligent Mobility (Anwendungsplattform Intelligente Mobilität; AIM), DLR is also equipping sections of the Braunschweig ring road with measuring systems and communication units. This means that, in future, traffic lights will be able to communicate with the test vehicle and notify it when they are about to change. With this knowledge, the vehicle can then be driven more fuel-efficiently. "Once we are sufficiently advanced with AIM, our test vehicle will no longer need that human touch – it will manage without someone pressing the traffic light buttons," explains Prof. Lemmer. "AIM will make further research into automated driving much easier."

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