

New system checks autonomous vehicles to ensure driving safety in road traffic

The invention describes a new, computer-assisted method with which vehicles with a high degree of autonomy are subjected to selected road traffic scenarios and their reliability for road traffic can be evaluated based on the reactions.

- Test system for checking the driving safety of autonomous vehicles through specific links between AI, database, and principles/regulations (StVO)
- Saves time and money since the tests can be limited to a few scenarios
- Can be used for all autonomous forms of transportation
- Can be used on autonomy levels 4 and 5

Fields of application

For autonomous vehicles and all other autonomous machines.

Background

At the moment, the development of autonomous vehicles is a focus in the automobile industry. Parallel to this, it is necessary to devise innovative systems in order to make this form of transportation safe for road traffic. In addition, these vehicles with a high degree of autonomy must learn to cope with a wide variety of scenarios in their environment, also "worse-case scenarios." In addition, this knowledge must be checked and verified before approval.

Contact

Dipl.-Ing. Julia Mündel
TLB GmbH
Ettlinger Straße 25
76137 Karlsruhe | Germany
Phone +49 721-79004-0
muendel@tlb.de | www.tlb.de

Development Status

TRL 3

Patent Situation

EP 3832549 A1 pending
EP 3832548 A1 pending
US 2021/0174263 A1 pending
US 2021/0182707 A1 pending

Reference ID

19/006TLB

Service

Technologie-Lizenz-Büro GmbH
has been entrusted with exploiting
this technology and assisting
companies in obtaining licenses.

Problem

Currently, test runs of several million kilometers are executed on a test bench to check the roadworthiness of the autonomous vehicles. This is very time-consuming and expensive. That's why an intelligent testing system is desirable.

Solution

For the inventive test method of the Institute for Automation and Software Technology at the University of Stuttgart, road traffic scenarios are “played out” by the autonomous vehicle and the autonomous vehicle's reaction within the scenario is evaluated. Using artificial intelligence (AI), representative scenarios for these tests are selected from a database, which includes both scenarios recorded by other autonomous vehicles and simulated scenarios (worst-case scenarios) with several million kilometers driven. The targeted selection of scenarios using AI drastically reduces the number of scenarios in which the autonomous vehicle must be tested and time-consuming tests on the test bench are avoided. At the same time, the scenarios are linked to principles taken from the StVO [Germany's road traffic regulations] and similar sources. This allows the reaction of the autonomous vehicle in a scenario to calculate a probability σ , which indicates whether the autonomous vehicle adheres to or violates a principle. It is precisely this link that helps ensure that the autonomous systems can verify compliance with the principles by means of a minimum number of scenarios to be tested.

Primarily, this method was designed to check autonomous vehicles on the test bench with regard to their rule-compliant behavior. The method can also be transferred to other autonomous machines.