ELROB 2020

17 - 21 August 2020

Trier, Germany

Team Information

Picture of vehicle:	
Name of vehicle:	MuCAR-3 (right) and MuCAR-4 (left)
Picture of team leader:	
Name of team leader:	Thorsten Lüttel
Team Name:	MuCAR
Team E-mail:	tas@unibw.de
Logo:	
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Team Description:

Our Team MuCAR consists of about 15 team members under the leadership of Dipl.-Ing. Thorsten Luettel. All team members work as research assistants at “Autonomous Systems Technology” institute, which is headed by Prof. Dr.-Ing. Hans-Joachim Wuensche.

Our team developes and operates the two robot vehicles “MuCAR-3” and “MuCAR-4”, the third rsp. fourth generation of our Munich Cognitive, Autonomous Robot Cars. The first two vehicle generations drove on German Autobahns under the leadership of Prof. E.-D. Dickmanns as far back as 1987. Both vehicles already have retired to museums.

MuCAR-3 is based on a stock VW Touareg with a V6 TDI engine, modified to allow computer control of steering, brake, throttle and automatic gearbox. Full body skid plates allow testing in rough terrain.

MuCAR-4 is based on a stock VW Tiguan with a TSI engine, modified to allow computer control of steering, brake, throttle and automatic gearbox.

Currently, we are building up a new research vehicle, MuCAR-5. Possibly it will be available for ELROB 2020.

Apart from inertial sensors, we continue to focus on vision as a main sensor for perception, as this sensor provides most of the information humans need for driving. In addition, we use a high definition 360 degree LiDAR sensor mounted on the roof of the vehicle. It is advantageous in special applications such as off-road driving, until our vision systems can fully cope with those scenarios as well.

The main vision sensors are forward looking color cameras. Three of them are placed on a two-axis platform inside the vehicle. This arrangement resembles the human vision system, with a tele-camera as “fovea” and 2 slightly outward pointed wide angle cameras for peripheral vision, which can also be used for stereo vision. These three cameras are mounted on a yaw axis platform to allow for active control of the horizontal viewing direction, while the view of the tele-camera with its narrow field of view is inertially stabilized. One vehicle is additionally equipped with some stereo cameras of the roof, providing 3D information in forward and backward direction. Some more cameras working in different spectral regions (SWIR, NIR) complete the camera setup.

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Our robust and fast 4D-approach to perception has been augmented by an innovative fusion of vision and LiDAR data and excels in offroad environments featuring poor GPS conditions. Different planning algorithms have shown their capabilities during the last trials.

Team MuCAR participated at the ELROB 2007, 2008, 2009, 2010, 2012, 2016, 2018, Eurathlon 2013 and – together with TU Karlsruhe and TU Munich through Team AnnieWAY – at the DARPA Urban Challenge 2007, where this team was one of only 11 teams which made it into the finals on 3 Nov. 2007.

Sponsors: none

Selection of scenario:

- X Convoying (transport with two vehicles)
- ___ Mule (shuttle between two locations)
- ___ Intelligent Reconnaissance and Surveillance (non-urban, build photorealistic 3D world model, find objects of potential interest)
- ___ Freestyle (e.g. Search & Rescue, MedEvac/CasEvac, Mobile Manipulation, etc.)
- ___ Reconnaissance and disposal of bombs and explosive devices (EOD/IED) – **for professionals only!**

Proof of citizenship:: A copy of team leader passport will do (will not be published)!

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