

# ELROB 2022

30 May - 3 June 2022

Eggendorf, Austria

## Team Information

Picture of vehicle:



Name of vehicle:

MuCAR-3 (right) and MuCAR-4 (left)

Picture of team leader:



Name of team leader:

Thorsten Luettel

Team Name:

MuCAR

Team E-mail:

elrob@mucar3.de

Logo:



Website:

<https://www.unibw.de/tas>

Location:

Neubiberg, Germany

Institution/Company:

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### Team Description:

Our Team MuCAR consists of about 12 team members under the leadership of Dipl.-Ing. Thorsten Luettel. All team members work as research assistants at “Autonomous Systems Technology” institute of the University of the Bundeswehr Munich, which is headed by Prof. Dr.-Ing. Hans-Joachim Wuensche.

Our team develops and operates the two robot vehicles “MuCAR-3” and “MuCAR-4”, the third resp. 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 our new research vehicle MuCAR-5 based on an Audi Q8. Maybe, this will be ready for ELROB 2022.

Apart from inertial and odometry 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 and a 360 degree system of multiple radar sensors. These sensors are advantageous in special applications such as off-road driving, with fog or dust, or at night.

The main vision sensors are forward looking color cameras. Two of them are placed on a pan-tilt-platform inside the vehicle, others are roof-mounted. MuCAR-4 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.

Our robust and fast 4D-approach to perception has been augmented by an innovative fusion of vision, LiDAR and radar data and excels in offroad environments featuring poor GNSS

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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:

- Reconnoitring of structures (3D mapping & find simulated radiation & chemical sources)
- Mule (shuttle between two locations)
- Convoying (transport with two vehicles)
- Search & Rescue (SAR) / CasEvac (find and drag a dummy body)
- 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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