

Topic: Real-time detection of irregularities on urban roads for safe travel of autonomous vehicles

Summary: Deployment of autonomous vehicles (AVs) on urban roads has become more challenging with the strengthening of the standards that the AVs should adhere to for their homologation. ISO 21448 SOTIF is an example of such kind of a standard, which aims to reduce the functional insufficiencies of algorithms that are specific to the AV. SOTIF also introduces the term Operational Design Domain (ODD), which is the *specific conditions under which a given driving automation system is designed to function*.

When an AV moves out of its ODD, it is difficult to predict its future behaviour, thus making it more important to detect this exit. Irregularities or damages on the roads could lead to hazardous behaviour of the AV. This work aims in detecting such kind of irregularities in real-time with appropriate sensors and subsequently estimating the drivable area and making a detour around them. This topic for a Research/Bachelor/Master thesis can also be offered and carried out in German language.

Tasks:

- Literature research on real-time irregularity detection on roads
- Algorithm development and implementation on Automated Driving (AD) Stack
- Evaluation and optimization of the algorithm
- Report and presentation

Recommended requirements:

- Basic proficiency in a programming language (C++, Python, MATLAB)
- Good understanding of classical mathematical and ML algorithms
- Basic knowledge on processing of camera images, 3D LiDAR point clouds and RADAR sensor data
- Knowledge on simulation softwares like CARLA

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