Lehrstuhl für Fahrzeugtechnik
Fakultät für Maschinenwesen
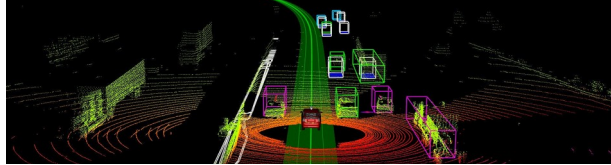Technische Universität München

TITI

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# Lidar is all you need – 3D Object detection for autonomous Driving



Lidar has emerged as the solution for the issues that camera cannot solve in the topic of autonomous driving. Depth estimation and lack of spatial information are problems of the past, thanks to lidar sensors. Therefore, if Waymo can successfully use LiDAR to detect 3D objects in real-time, so does EDGAR. The goal of this project is to implement a single and multi-LiDAR object detection module to drive around Munich.

As part of your student thesis, you will expand the existing EDGAR software stack by incorporating a cutting-edge 3D LiDAR detection module. To accomplish this, your work will involve researching suitable architectural choices based on criteria such as execution time, computational demands, and performance. Subsequently, you will implement and train these architectures using established datasets, followed by a comprehensive evaluation of your results. This evaluation will encompass quantitative assessments using validation data, as well as qualitative evaluations through real-world vehicle testing.

Work packages:

- Literature review of 3D object detection
- Autonomous driving dataset review, collection or generation
- Object detector training and evaluation and module implementation in Pytorch
- Implementation of the module as a ROS2 node inside the Autoware stack
- Test of the module on the EDGAR vehicle

Requirements:

- Programming experience in Python or C++
- Experience with Pytorch/Tensorflow
- Knowledge of computer vision,
- Desired: Experience with ROS or ROS2

The thesis should document the individual work steps in a clear form. The candidate commits him/herself to carry out the study independently and to indicate the scientific aids used by him/her.
The submitted paper remains the property of the chair as an examination document.

Prof. Dr.-Ing. M. Lienkamp                    Betreuer: Esteban Rivera, M. Sc.

Ausgabe:_____                    Abgabe: _____