

# Deep Learning Anomaly Detection with Model Contradictions for Autonomous Driving

Bachelor / Master Thesis

The scope is designed for a Master Thesis.  
For a Bachelor Thesis, we can customize it.

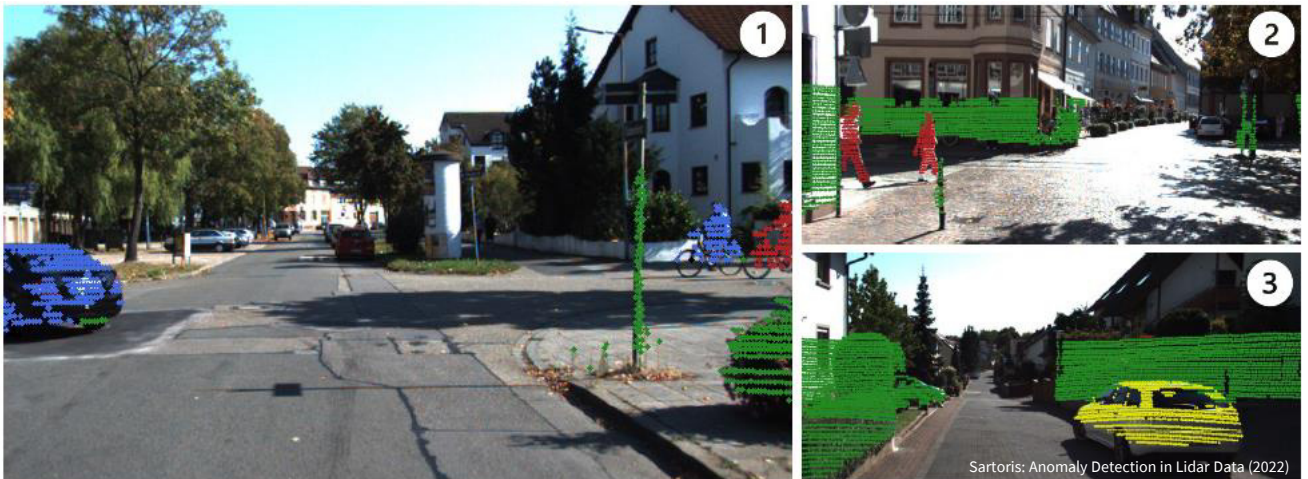
Autonomous Driving

Deep Learning

Camera Data

Lidar Data

We don't have autonomous vehicles around us yet because they're not very good at dealing with the many, crazy things we see on the roads of the world. Therefore, anomaly detection is particularly important to detect the unknown and deal with it. In this thesis you will work with deep learning based methods for the detection of anomalies in camera and lidar data based on model contradictions.



## The Topic

- You will evaluate whether model contradictions are suitable to detect true anomalies as well as model failures
- Based on previous work, you will execute and improve a set of three experiments:
  - Unknown Lidar Cluster vs CLIP Camera Classifications
  - Supervised Lidar Segmentation vs Self-Supervised Lidar Flow Estimation
  - Uncertain Semantic Segmentation vs Pseudo-Lidar and Lidar Cluster
- You will thoroughly evaluate the experiments on the multimodal CODA anomaly dataset

## Your Skills

- You study Computer Science or a related course of study
- You are deeply interested in topics such as Autonomous Driving, Robotics, Deep Learning or Computer Vision
- You are able to read and write scientific texts in English
- You are fluid in Python, first experiences with PyTorch
- You show an above-average degree of initiative and commitment as well as a thorough way of working

## What We and I Offer

- You get exciting insights into our research and gain valuable practical experience
- We use the latest hardware and software. Together with us you work in first-class laboratories (on-site or remotely)
- Regular and extensive support: Weekly 1:1 meetings, bi-weekly student group meetings, monthly 1:1 strategy meetings
- Collaboration with other students to get tips, learn together, and fix issues quickly
- High-quality theses will be published on KITopen, with the code on GitHub
- We aim to publish this work in an IEEE journal with shared first authorship

## Application

- Start: Immediately
- Shoot me an e-mail at [daniel.bogdoll@kit.edu](mailto:daniel.bogdoll@kit.edu) with your CV, grades, and a few sentences why you are interested. No cover letter necessary 😊