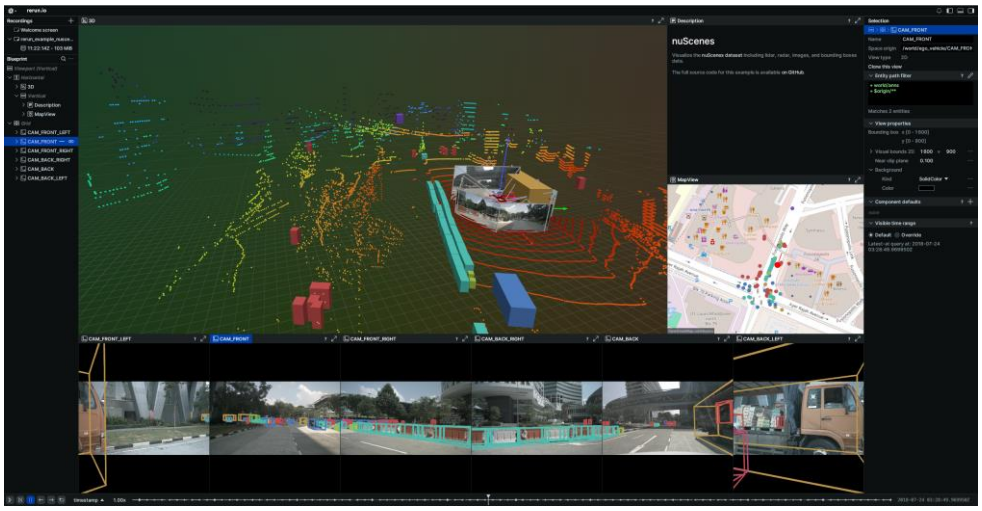
Lehrstuhl für Fahrzeugtechnik
Fakultät für Maschinenwesen
Technische Universität München

Term Paper / IDP

IDP Project – Evaluation Framework for Uncertainty-Aware 3D Object Detection in Autonomous Driving



Current state-of-the-art perception systems in autonomous vehicles rely on conventional machine learning techniques to predict the most probable bounding box for detected objects. However, these systems typically ignore the **variation in prediction quality**, which can fluctuate significantly depending on the scene and change from one timestep to the next.

To address this, we are developing **uncertainty-aware 3D object detectors** that not only estimate bounding boxes but also quantify **spatial uncertainty**—and integrate these with object tracking algorithms.

To support efficient development and benchmarking of this new approach, we are looking for a motivated student to help design and implement an **evaluation framework** for uncertainty-aware 3D object detection and tracking.

🛠️ Project Goals:

- Develop **visualization tools** for input data, outputs, and associated uncertainties
- Perform **statistical analysis** of localization errors in 3D object detection
- Evaluate the **calibration of uncertainty estimates**
- Design the framework to be **modular and easy to use**—supporting plug-and-play integration with various detectors and datasets

This project offers a unique opportunity to contribute to a **novel and impactful area of research**, as no such evaluation framework currently exists in the field.

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✅ Requirements:

- Strong interest in autonomous driving and machine perception
- Enthusiastic and self-driven working attitude
- Programming experience in **Python** is a plus

📫 How to Apply:

Please send your **CV** a **transcript of records** and a **short motivation** (max 5 lines) to:
✉️ cornelius.schroeder@tum.de

Deadline: April 25, 2025

Contact:

Cornelius Schröder, M.Sc. | cornelius.schroeder@tum.de