Karlsruher Institut für Technologie

IFL Institut für Fördertechnik und Logistiksysteme

Bachelorthesis/ Masterthesis

Development of a Simulation Model for Semi-Solid-State LiDARs in Outdoor Environments

Field: Multimodal perception setups can significantly outperform conventional vision-based approaches, especially in challenging and dynamic outdoor environments. Semi-solid-state LiDAR systems—combining mechanical scanning for wide coverage with solid-state elements for high-speed detail capture—are becoming increasingly important in autonomous vehicles, robotics, and environmental monitoring. However, real-world testing is costly, time-intensive, and constrained by environmental factors. A realistic simulation model for semi-solid-state LiDAR under varying outdoor conditions (lighting, weather, atmospheric effects) can accelerate development and reduce costs.

Problem Statement: You will review existing methods for modeling semi-solid-state hybrid LiDAR sensors and implement them within a simulation environment. Based on these baselines, you will enhance the model's performance and validate it using statistical methods and real-world datasets

Required Skills: Interest in perception, programming skills in python or C++. Experience with simulation environments (e.g. Nvidia Isaac, CARLA) is a plus.

Benefits: You will be working closely with a young, dynamic, and enthusiastic team of researchers and students on industry-relevant topics. Your contributions are directly applied to various projects and research topics. Furthermore, we offer extracurricular workshops on scientific writing, software engineering and more. Supervision includes weekly meetings with your supervisor and team.

Research Group:
Mobile Agents and Robotic Systems

Thesis Type:
Experimental Study, Simulation

Majors:
Mechanical Engineering, Mechatronics

Start Date:
immediately

Language:
German/ English

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