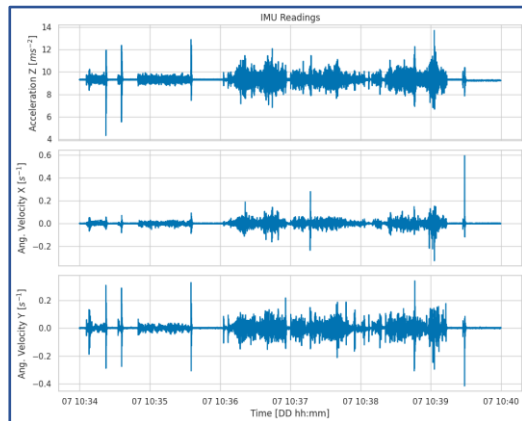**Bachelor/ Master Thesis**

Going Blindfolded: Can We Use Raw IMU Data for Place Recognition in Urban Scenarios?

Introduction: The IFL participates in several research projects exploring autonomous robotics for urban logistics, particularly focusing on novel driving contexts such as sidewalks and city centers. These environments present unique challenges, as robots must navigate tight spaces and often venture into occluded areas, which reduces the effectiveness of GPS/GNSS sensors. While visual place recognition is one method to bolster the localization pipeline, it is critical to incorporate other resources available to augment the robot's perception, such as Inertial Measurement Units (IMUs). When positioned optimally, IMUs can detect bumps and other ground imperfections. These features, robust and unaffected by seasonal changes, could provide valuable information for a robot's state estimation, as well as additional information about the environment.

Problem Statement: In your thesis, you will be exploring, developing, and assessing methods to use raw IMU data for place recognition. You will start with a literature review on the state of the art. Subsequently, you will develop non-traditional concepts for place recognition and state estimation using IMU data. Your ideas will be directly assessed on one of our mobile robots. Depending on the initial research findings, variations of the sensor setup and the application of machine learning techniques may be considered.

Required Skills: Interest in autonomous robotics; Programming experience in python and ROS is beneficial.

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 in 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:
Robotics and Interactive Systems

Thesis Type:
Data Analysis, Experimental Study, Machine Learning

Majors:
Mechatronics, Computer Sciences, or similar

Start Date:
Immediately

Language:
German/ English

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