

Hamburg, 14.11. 2023

Thesis/project work at the Institute of Technical Logistics

Title: Machine Learning Approach for Sidewalk Detection for Trajectory Planning

(Master's / Project Thesis)

In the integration of robots within urban landscapes, ensuring their ability to navigate sidewalks safely and effectively stands as a pivotal challenge. This research endeavors to address this critical need by employing machine learning methodologies within computer vision specifically aimed at sidewalk detection for mobile robots. The primary focus lies in the practical evaluation and selection of various computer vision and deep learning approaches to accurately delineate and identify sidewalks or the drivable areas in immediate proximity to mobile robots navigating public spaces. By integrating advanced sensor setups comprising 3D-LiDAR, stereo cameras, and high-performance computing units like Nvidia's Jetson Xavier or Orin, this study aims to empower robots with the capability to perceive and navigate sidewalks autonomously. The implications extend beyond innovation, impacting urban mobility by enhancing the safety, efficiency, and reliability of robotic navigation systems in shared pedestrian spaces.

Task description:

1. Research and familiarization with the scientific state of the art of the topic
2. Establish a sensor setup detached from the robot but comparable
 - 3D-LiDAR
 - (Stereo) Cameras
 - Mobile computing unit (e.g., Nvidia Jetson Xavier/Orin)
3. Select and practically evaluate various computer vision/deep learning approaches for
 - sidewalk detection
 - segmentation of the drivable area in the immediate vicinity of a mobile robot in public spaces

Requirements:

- Prerequisite knowledge or willingness to independently familiarize yourself:
 - Computer Vision
 - Machine Learning
 - ROS
- Linux

- Independent and meticulous way of working