

Hamburg, 14.11. 2023

**Thesis/project work at the Institute of Technical Logistics****Title: Comparison of Various Existing Solutions for the Extrinsic Calibration of a Robotic Sensor System (Master's/Project Thesis)**

The precise alignment and calibration of sensors within robotic systems play an indispensable role in ensuring the accuracy and reliability of data for various applications, spanning from industrial automation to advancements in autonomous technologies. This study delves into the comparative analysis of established methods for the extrinsic calibration of a diverse sensor suite—comprising 3D-LiDAR, monocular and stereo cameras, and IMU—within a robotic framework. By leveraging Motion Capturing Systems, this research aims to not only establish optimal sensor alignments but also contributes to the broader scientific community by enhancing the reliability and effectiveness of robotic sensor integration. The findings hold promise in advancing fields reliant on sensor technology, impacting industries, and the development of sophisticated, dependable autonomous systems.

**Task description:**

1. Research and familiarization with the scientific state of the art of the topic
2. Establish a sensor setup determinable via Motion Capturing System consisting of:
  - 3D-Lidar
  - Monocular Camera
  - Stereo Camera
  - IMU
3. Calibrate the Sensors using multiple state-of-the-art algorithms
4. Experiment with multiple sensor and package configurations
5. Evaluation of calibration results (alignment of sensors among themselves) using the known alignment from the Motion Capturing System

**Requirements:**

- Prerequisite knowledge or willingness to independently familiarize yourself:
  - ROS
  - Linux
- Independent and meticulous way of working