



MA: Camera-based reference system for indoor localization.

Description: Evaluating the performance of indoor localization systems requires knowledge about the „ground truth“ positions. Even though highly accurate reference systems (e.g. motion capture systems) exist, the availability of low-cost solutions with high accuracy and a simple setup for ground truth determination is limited. In this thesis, a novel camera-based indoor reference system for autonomous mobile robots (AMRs) shall be extended and optimized.

Work package:

- Literature study of camera-based indoor localization systems and study of the existing system
- Making the existing system useable as a reference system in our lab by solving open problems (e.g. localization in global reference frame, automatic position labeling and possibly mechanical stability).
- Different directions can be studied afterwards, depending on interest and prioritization.
- Possibilities: extension to global localization in different and larger rooms, algorithm improvements (tracking, outlier filtering etc.), advanced image processing techniques, graphical control interface, online processing ...
- Evaluation of system improvements with hand-collected ground truth.

Prerequisites:

- Interest in the topic and ability to work independently
- Signal processing basics, ideally w.r.t. images
- Programming experience, ideally Python & image processing with OpenCV