Karlsruher Institut für Technologie
Fakultät für Informatik
Institut für Anthropomatik und Robotik
Lehrstuhl für Intelligente Sensor-Aktor-Systeme (ISAS)
Prof. Dr.-Ing. Uwe D. Hanebeck

Intelligente ISAS Sensor-Aktor-Systeme

Praxis der Forschung:

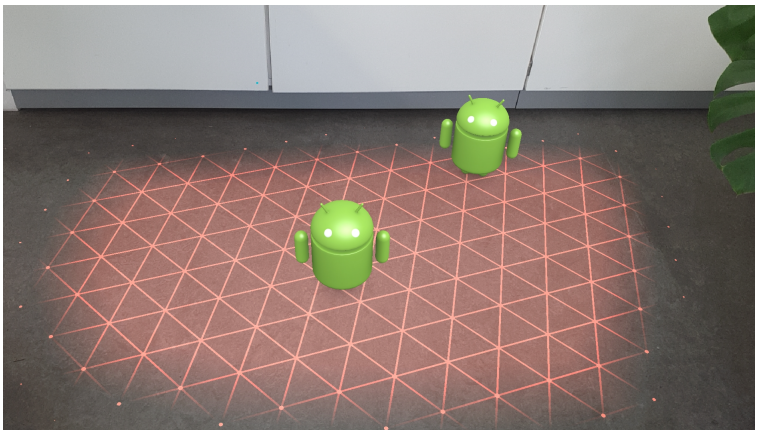
Localization of a Robotic Platform using ARCore

Contact: Dipl.-Inf. Antonio Zea
Email: antonio.zea@kit.edu

Keywords: Tracking, Localization, Indoor Navigation, Computer Vision

In the last few years, visual odometry has made large strides both in robustness and resource efficiency. The idea in this field is to allow for the real-time localization of a camera by finding certain markers or features in a video image, and then estimating their three-dimensional position in the world. Then, by following their motion in successive frames, it is possible to obtain the position and orientation of the camera accurately, without requiring additional hardware or changes in the infrastructure. The entrance of giants such as Google and Apple in the last few months has further revolutionized the field, allowing for visual odometry to be usable even in small devices such as smartphones. While their main target is the field of augmented reality, the tracking algorithms can also be used in many other applications.

In this project, we want to explore the applicability of Google's ARCore for use in robotic indoor localization and navigation. The idea is to attach a smartphone on a small moving robotic platform, called *Omnimover*, to allow it to locate itself as it carries a load to a given location. This task is not straightforward, as the robot needs to know its absolute starting position, avoid sensor drift, detect and move around obstacles, and solve many other issues. Robustness must also be taken into account, given that the robot needs to work in a large variety of scenarios and environments.



Work Packages:

- Learn about programming in Android and game engines (such as Unreal or Unity)
- Research algorithms for detection of fiducial markers using OpenCV
- Implement a procedure for the platform to find its starting pose based on found markers
- Find a mechanism to detect obstacles using the sparse point cloud provided by ARCore

Requirements:

- Solid programming skills. The languages used in the project are C#, Java, and some C++
- Knowledge of basic linear algebra (transformations, coordinate systems, etc.)
- Background in computer vision preferred
- You enjoy working independently, researching on your own, and improvising solutions