



21.10.2018

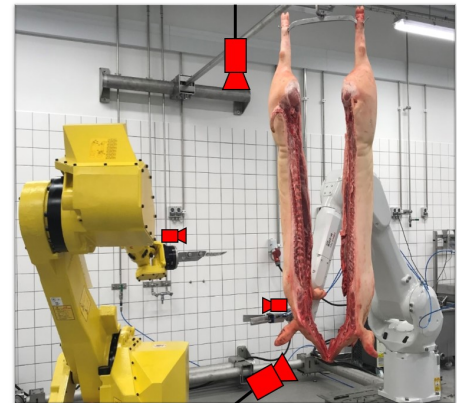
PROJECT PROPOSAL

Global calibration for multi-robot and multi-sensor system

Problem description:

Multi-sensor and multi-robot system has been widely investigated in the mission that cannot be achieved by using single robot and single vision system. By using multi-camera vision system a larger field of view is often available for acquiring global and local information of large-scale objects and scenes. Data integration from multiple cameras and multiple robots is very important part of the system.

This project will focus on the development of semi-autonomous multi-use calibration method that can be applied in a multi-sensor and multi-robot system. To ensure that the data is delivered with expected precision, a calibration has to be carried out frequently during development and regularly afterwards. Therefore, a fast and user-friendly calibration method is highly demanded. The *robot cell* shown in the picture will be served as the hardware platform. It consists of two industrial robots and several cameras. Both eye-in-hand and eye-to-hand architecture will be considered in this project. After global calibration the coordinates transformation among the robotic and visual components has to be determined. The performance of the calibration method will be evaluated in a simple pick and place task in the robot cell.



Tasks:

- Development of semi-autonomous calibration for eye-to-hand setup. (Currently there is already a manual calibration method used in the robot cell.)
- Development of calibration for eye-in-hand setup.
- Development of calibration for two robots.
- Design of user interface.
- Design of test setup.
- Performance evaluation.

Bibliography:

- [1] Julius Kuemmerle, Tilman Kuehner, Martin Lauer. Automatic Calibration of Multiple Cameras and Depth Sensors with a Spherical Target. In *Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Madrid, Spain, October 2018.
- [2] Dornaika, Fadi, and Radu Horaud. Simultaneous robot-world and hand-eye calibration. In *IEEE transactions on Robotics and Automation*, 14.4 (1998): 617-622.

Contact: Haiyan Wu (hwu@teknologisk.dk, +45 72202091)