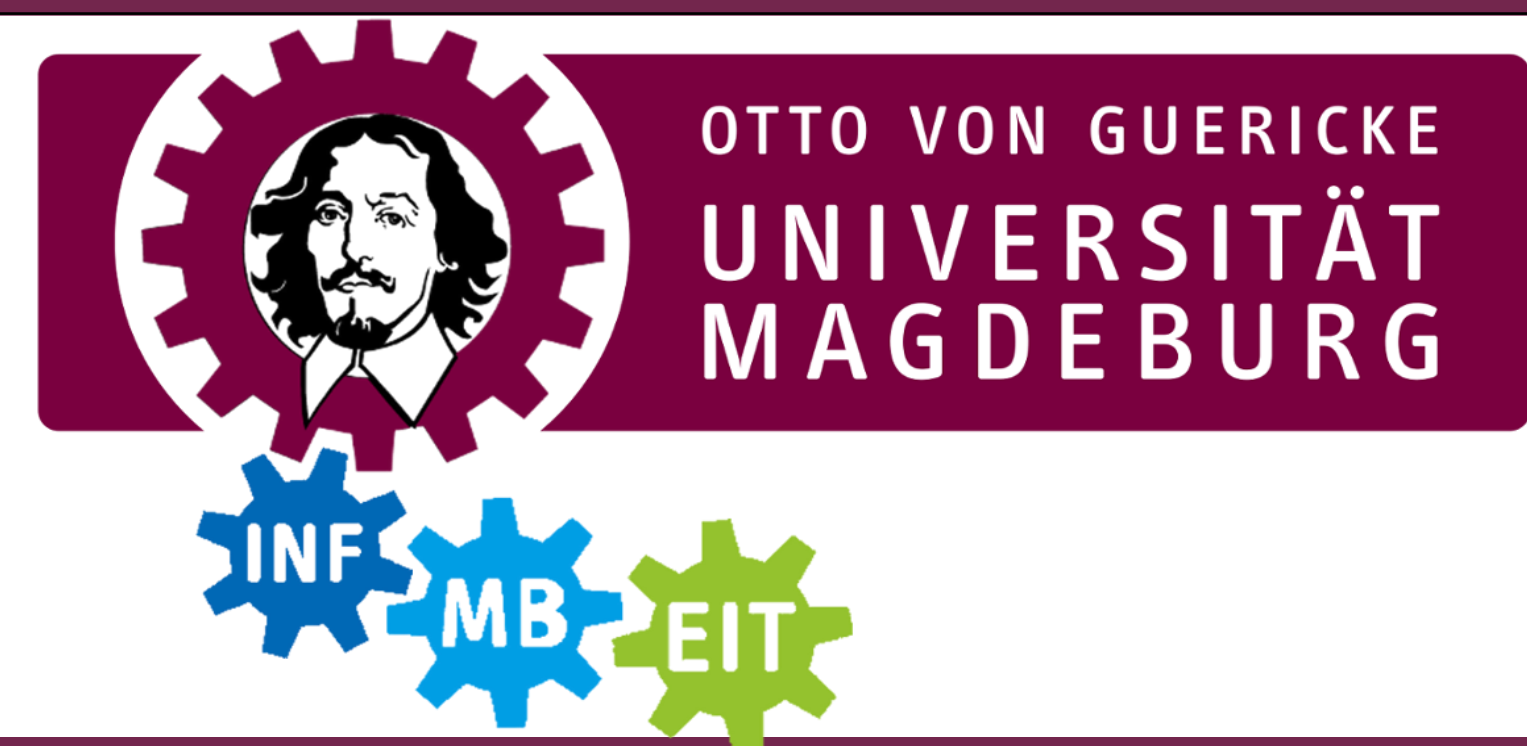


Team robOTTO

Otto-von-Guericke-University Magdeburg

otto
baut
roboter



Team History

RobOTTO was founded as a Robocup Logistics Team in 2010 by 9 students from different faculties. Reaching second Place 2010 in Singapore the team continued to attend each following RoboCup, with further successes in 2012 (4th Place) and 2013 (2nd Place). With regards to broad rule and equipment changes in the Logistics League 2015 we decided to participate in @Work, as the required KUKA YouBots were already in use by our CS-Department. We participated successfully at the RoboCup@work German Open in Magdeburg and the Championship in Hefei 2015.

Our Robot and Adaptations

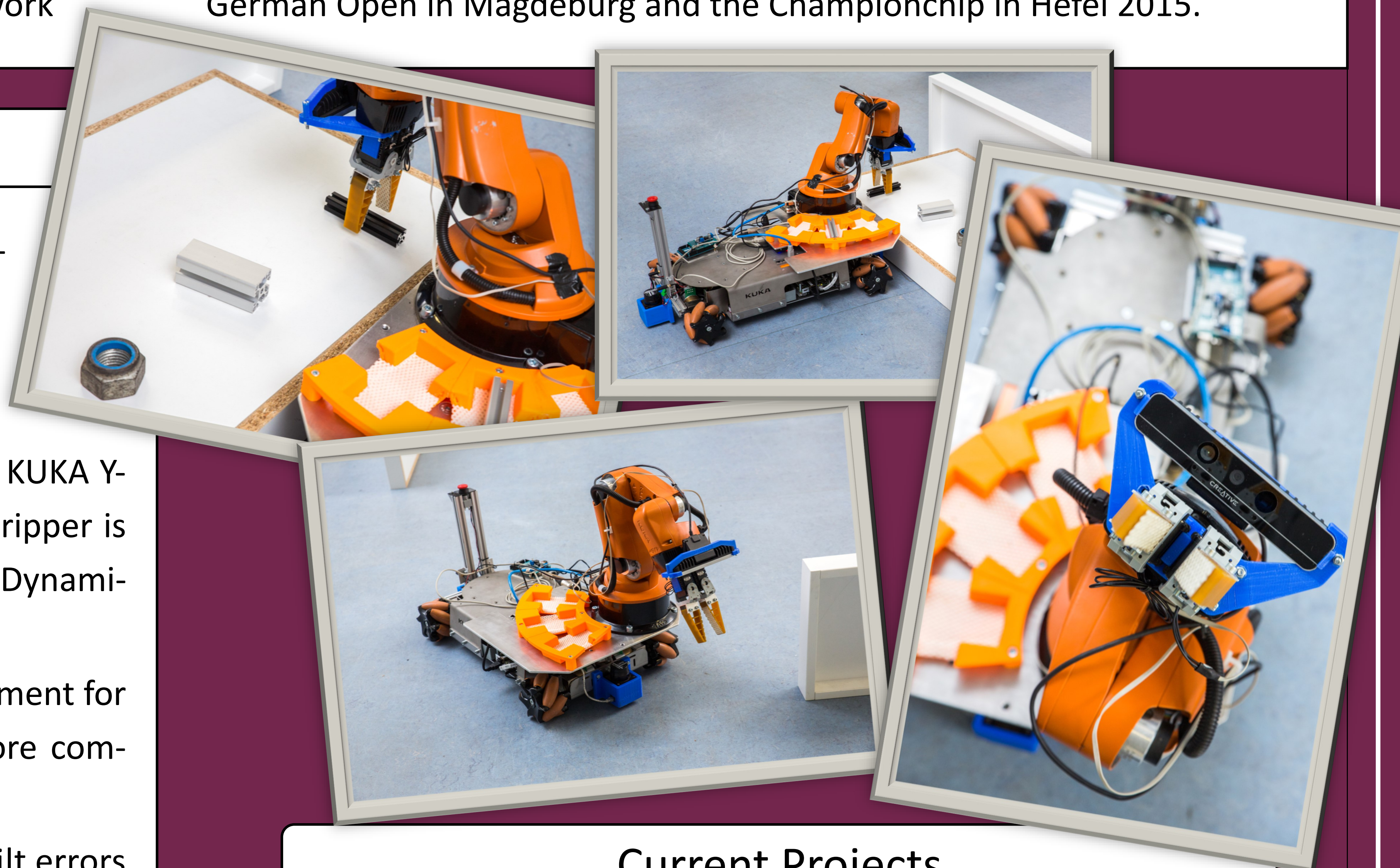
Object Recognition Sensors — We decided on using an Intel Realsense RGB-D camera which provides us with registered pointclouds at close range as well as an normal RGB-Image.

Gripper — Objects in @Work have varying shapes and sizes and early testing showed that the normal metal gripper on the KUKA YouBot is quite difficult to use with many objects. Our current gripper is based on an custom 3D-Printed holder with Servomotors from Dynamixel and Finray-fingers.

Computing — An i7 NUC was fitted into the robot as an replacement for the original Atom-based computer, to enable the usage of more complex algorithms and parallelisation of processes.

Laserscanner Mounting Brackets — We integrated to prevent tilt errors even at the edge of the URG-04LX's measurement range and shield the expensive sensors in case of accidental collisions.

Additional Sensors — A number of linear distance sensors mounted above the normal table-height should provide a rudimentary collision avoidance between the manipulator Arm and the Environment.



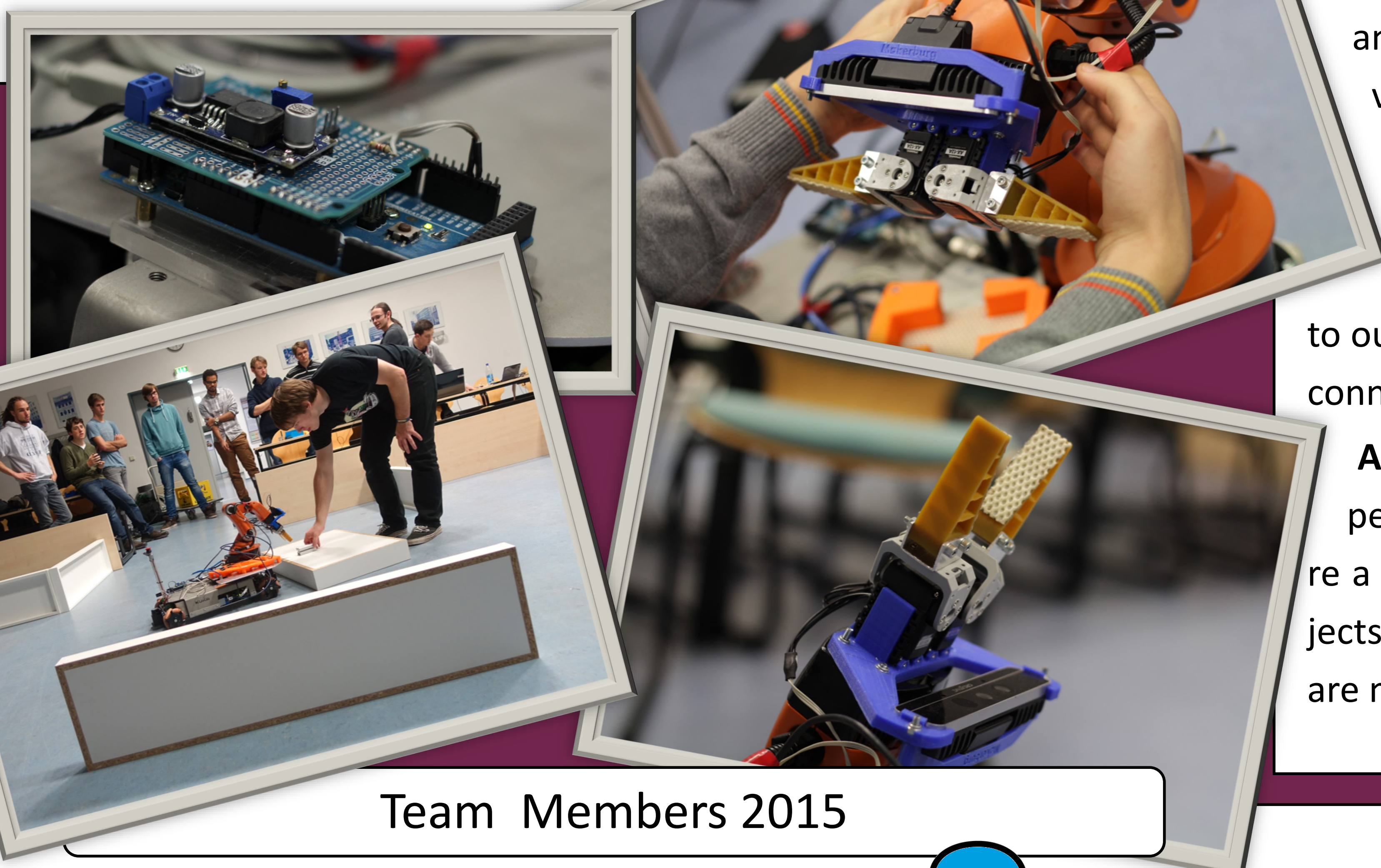
Current Projects

Path Planning for industrial robots — The goal of this project is to analyse and evaluate the most important approaches for path-planning (for example: potential field method, relative velocity diagram, dynamic window approach etc.) in order to fulfil all requirements for the RoboCup Logistic League and @Work contests.

Flexible State Machine for automatic Task Planning — For optimal task and worker structure we implement a modular Statemachine to activate and deactivate the functional submodules depending on the current situation.

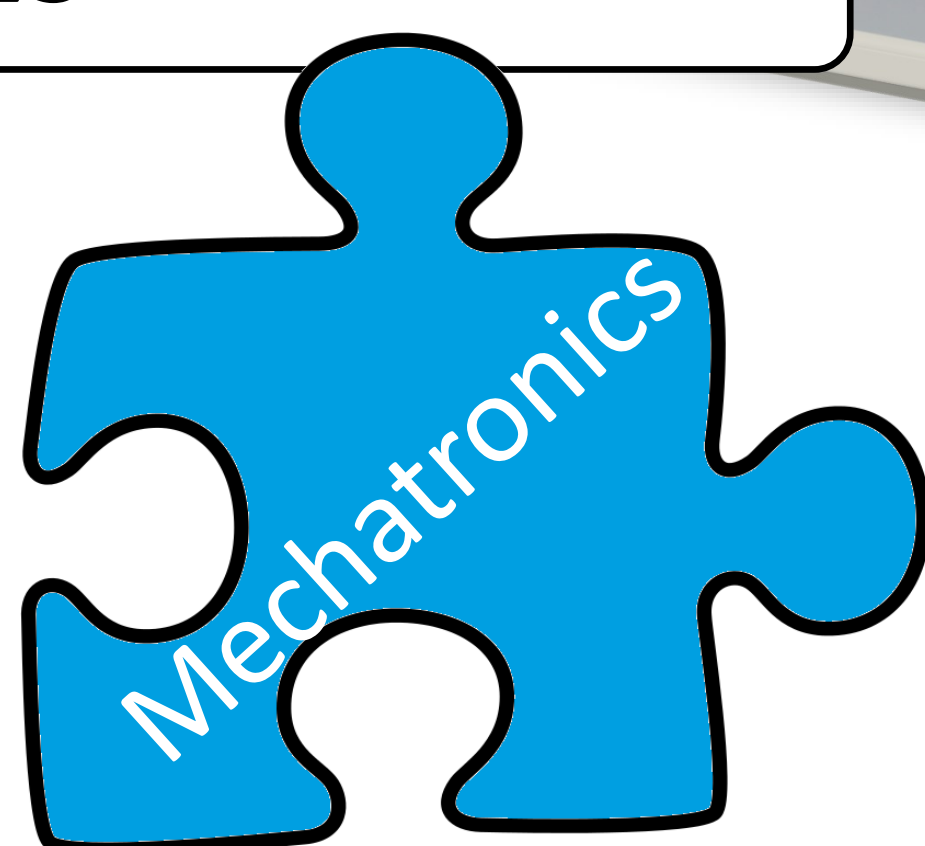
Integration of the MoveIt Trajectory and Kinematics Stack — We decided to try to integrate the OpenSource MoveIt stack into our system as an replacement and are currently working on the logic connecting the task-planning interface with our internal state machine.

Alternative Algorithms for Object Recognition — Based on the experiences we want to develop a new hybrid object recognition where a diversity of algorithms evaluating the vision data. For specific objects this concept uses 2D-RGB data, for other ones 3D Point cloud data are more promising.

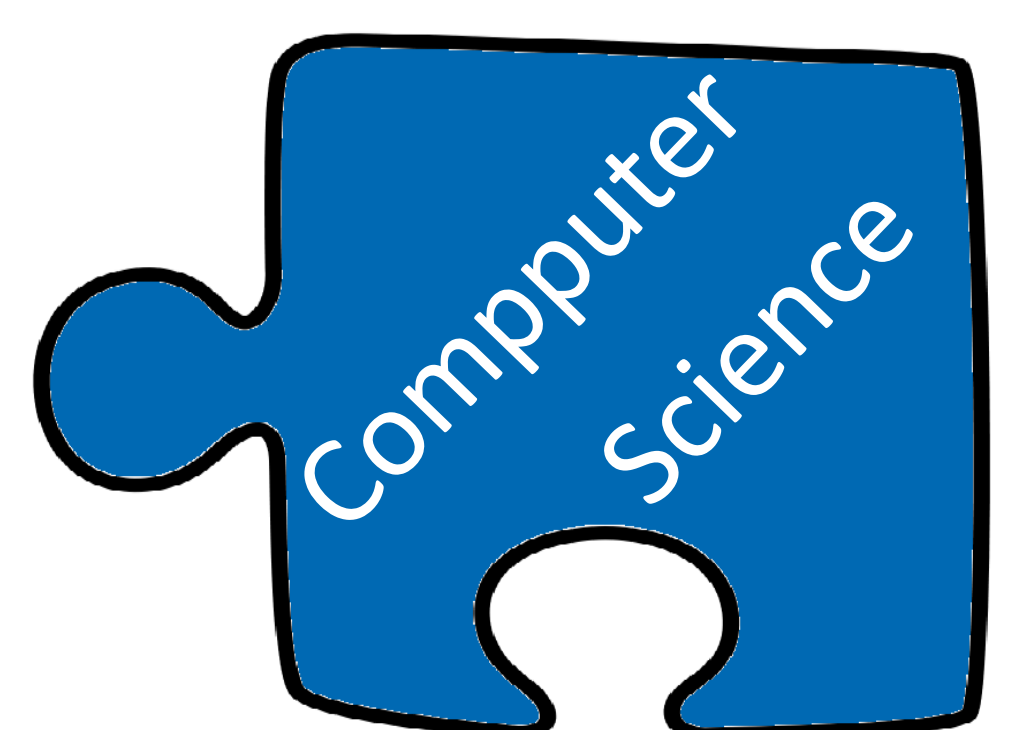


Team Members 2015

Hauke Petersen - Pathplanning and Motion
Finn Süberkrüb - Custom sensor integration
Kai Rüssel - Arm Kinematics, CAD-Design
Jan Hintz - URDF-Modeling



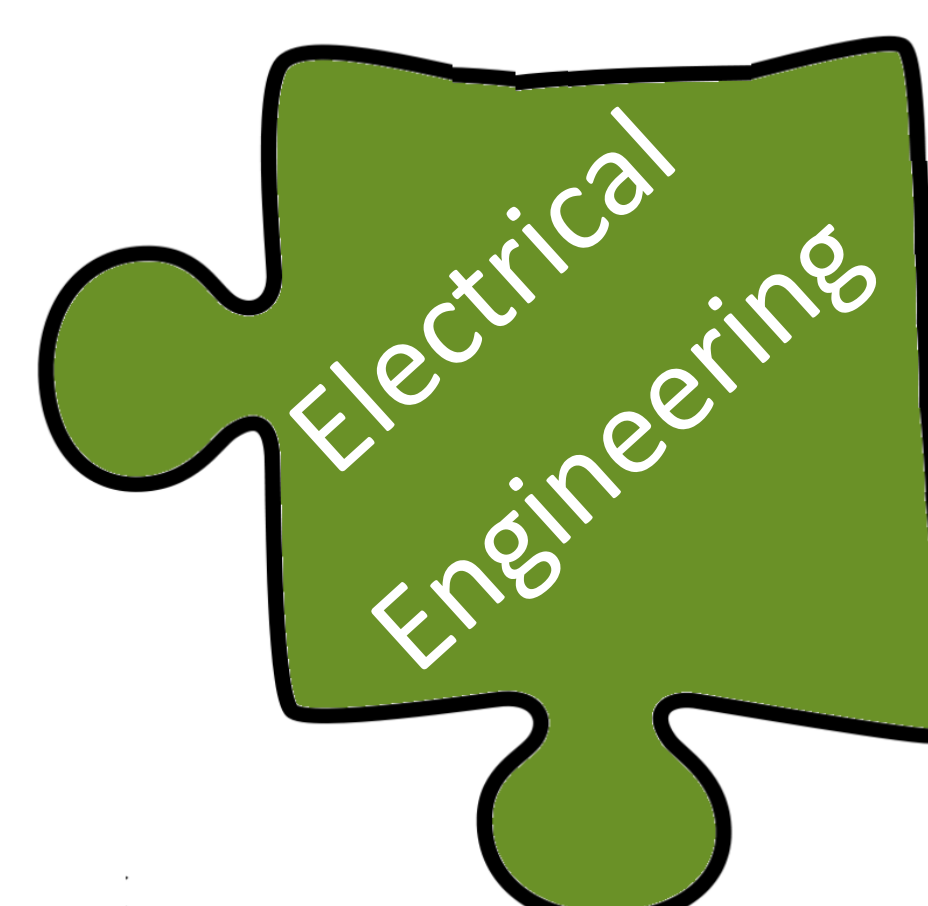
Kai Seidensticker - Refbox and Statemachine
Philipp Busse - Networking, URDF-Modeling
Juliane Höbel - Object Recognition
Lukas Hoyer - Object Recognition



Lea Pusch
Organisation,
Logistical Analysis



Magnus Jung
Object Recognition
Johannes Kopton
Object Recognition



Nils Harder
Gripper and Electronics
Rodion Marynych
Object Recognition