



FAKULTÄT FÜR
INFORMATIK

Kickoff Software-/Team-Project RobOTTO

Prof. Mostaghi, Christoph Steup
Chair of Intelligent Systems

Organization

- Time and location:
 - Start: 13.04.2016
 - End: 15.07.2016
 - Place: G29-035
- Contact:
 - Christoph Steup: steup@ovgu.de
- Meetings:
 - Individual meetings organized by periodically by Team Leader

Teams

- 4 Teams of max. 4 Students
- Bachelor / Master mixed
- One leader (chosen by team) :
 - Organize project (sub-tasks, milestones, documentation)
 - Communication to staff
- Presentation by all members
- Prerequisites:
 - Courses: PKES, TI2, Control Theory
 - Programming: C++/C, Python, Latex ...
 - Enthusiasm and Teamwork

Registration

- In case more than 16 Students want to take part:
 - Write an E-Mail to steup@ovgu containing:
 - Your Name
 - Your Field of Studies (IF-B, CV-M, DKE ...)
 - Your experience with robotics in years
 - Either Robotic Simulation (VREP, Gazebo, MRDS ...)
 - Or real Robotic Systems
 - Your Expertise with the following programming languages in years:
 - C/C++
 - Lua
 - Ocaml
 - Java
 - If you visited the following courses (marks are optional)
 - Technical Computer Science
 - Principles of Embedded Systems
 - Swarm Intelligence
 - Control Theory
 - Your favorite Topics in descending order

Evaluation

- You deliver:
 - Working Prototype
 - Code
 - Documentation
 - Project Management
 - A talk including video or demonstration
- We deliver:
 - Guidance
 - Introductory meetings to show you your way around the used systems
 - Either a grade or a ungraded “Schein” for Bachelors

Topics

- Evaluation of the Alternative Navigation Algorithm Nav2D
- Simulator for the @Work League
- Visual State Machine Programming for the @Work Tasks
- Optimization of @Work Tasks

Evaluation of the Alternative Navigation Algorithm Nav2D

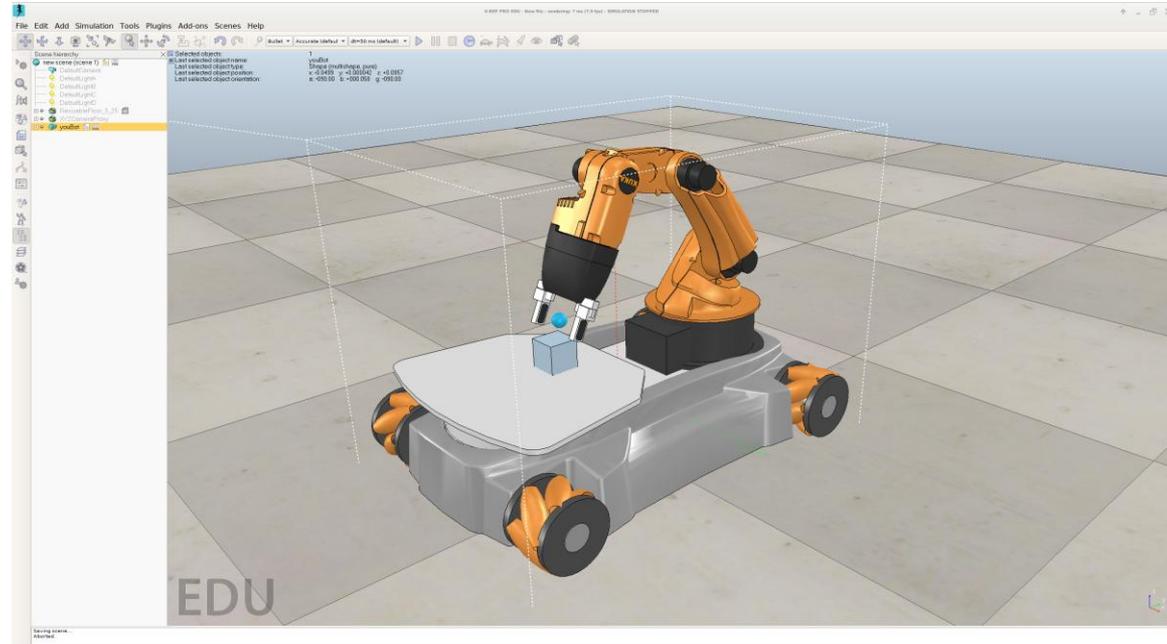
- Currently ROS Nav-Stack
- Nav2D alternative to whole Nav Stack of ROS
- Evaluation in @Work Scenario
- Comparison against currently used modified Nav-Stack
- Goal: Prototype with parameter evaluation of planning algorithms



From Robocup @Work Rulebook 2016

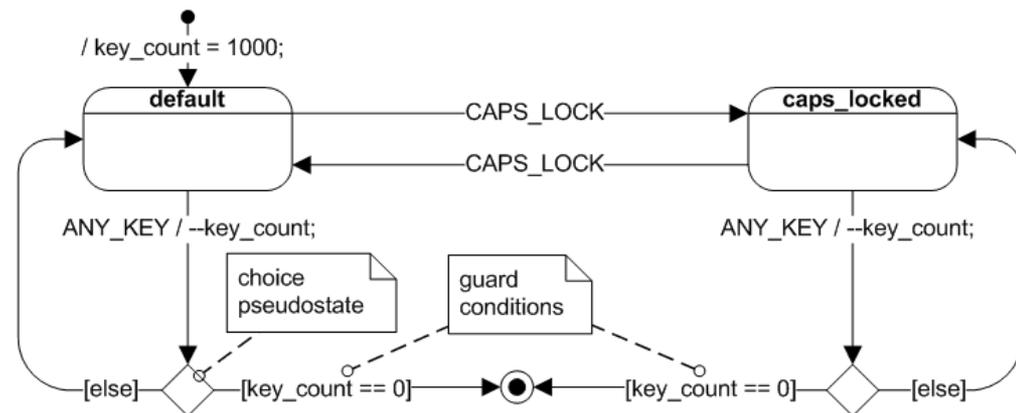
Simulator for the @Work League

- Development currently on real robot
- Simulation allows fast integration of software modules
- Simulation allows parameter estimation
- Youbot + Arm model already existent
- Modifications existent as CAD-Data
- Goal:
 - Emulation of RobOTTO Youbot in simulation framework
 - Integration of ROS communication in simulation
 - Evaluation of existing software in simulation



Visual State Machine Programming for the @Work Tasks

- State-Machine controls behavior of robot
- Input: Tasks of @Work league
- Output: Commands (Actions) to components of robot
- Goal:
 - Instead of C++-Programming Visual Construction of State-Machine
 - Interpretation or compilation of SM-Graph
 - Baseline behavior of current robot
 - Evaluation of performance
 - Evaluate modification effort



https://en.wikipedia.org/wiki/File:UML_state_machine_Fig2.png

Optimization of @Work Tasks

- Task are described using ROS messages
- Communicated wirelessly to youbot
- Basic Tasks:
 - GoTo Waypoint
 - Pick Object
 - Place Object
- Goal:
 - Optimize Task-Order to maximize points
 - Native integration
- Constraints:
 - Time (5 min)
 - Only 3 Objects at the same time on the youbot