Cognitive Robot for Automation of Logistic Processes

ROBLOG

Gripping

Highlighted Results:
- Development and testing of gripping devices
- Development of an under-actuated robotic hand with active surfaces

Design and Specification

Highlighted Results:
- Hardware set-up for demonstration scenarios
- Defined test scenarios and test cases with specific definition of evaluation criteria

Sensing & Perception

Highlighted Results:
- Detected objects via bounded-surface representation (BSR)
- Classification of object type, including sack-shaped goods
- Packages: Data filtering and noise removal, extrinsic calibration software, textured object RGB-D recognition

Dynamic Semantic Models & 3D Maps

Highlighted Results:
- Object Database creation with point-cloud and color based model creation by sensor-data collection and pose-registration for objects of interest and visual- feature extraction
- Handling object-pose queries in various coordinate frames
- Providing obstacle information for basic trajectory planning for unloading of the top sack

Integration & Demonstrator

Highlighted Results:
- Developed modules for communication between controllers of the middleware
- Integration of ''Flystick'' to remotely control functionality of the robot

Cognitive Control

Highlighted Results:
- Working numeric solution for inverse kinematics
- Collision-free trajectory planning
- Recognized objects are visualized via point-cloud model with target sacks highlighted
- Developed GUI for controlling demonstrators

Motivation

- Increasing transport of goods in containers
- Strict-time requirements
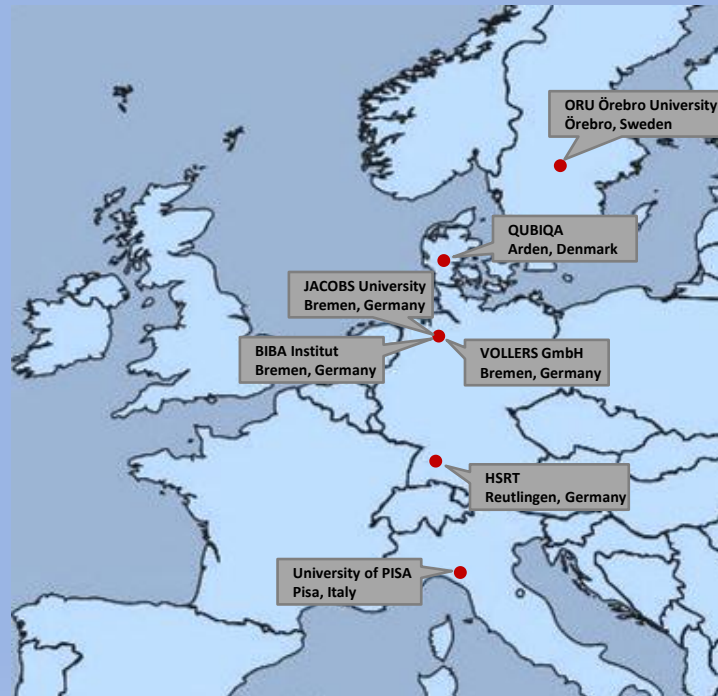- Frequent manual unloading can lead to health risks and injuries

Challenges

- Dynamic scenarios
- High variability of goods
- Requirements of robustness and efficiency

Objective

- Development of a cognitive robot for unloading of containers in logistics
- Surpass existing systems for automated unloading with regard to flexibility, adaptability and robustness
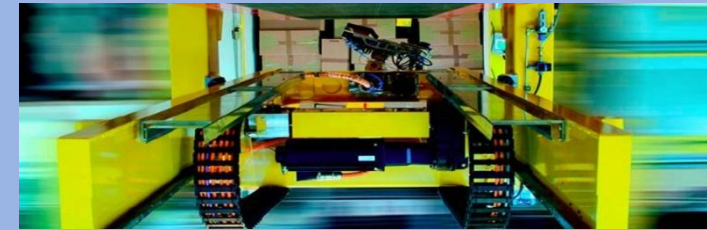
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COGNITIVE ROBOT FOR AUTOMATION OF LOGISTIC PROCESSES