Humanoid Robotics @ KIT

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http://www.humanoid.kit.edu  http://h2t.anthropomatik.kit.edu
H²T Research Topics

Mechano-Informatics

Perception
Vision and Haptics

Grasping
and Manipulation

Mathematical Modelling

Learning from Observation and Experience

Human Body and Motion Analysis

Balancing and Walking

Robot Design
Research Topics @ H²T

- **Grasping and manipulation**
  - Integration of vision and haptics to deal with unknown objects
  - Active perception for object segmentation
  - Vision-based localisation
  - Mobile manipulation

- **Learning for human observation**
  - Marker-based (and markerless) observation of human actions
  - Learning motion primitives from human demonstration
  - Motion primitives for grasping, walking and whole-body locomotion and manipulation tasks
Praxis der Forschung in WS 16/17 am H²T
Two Topics

1. Deep Learning for Object Manipulation

2. Reactive Grasping of Unknown Objects
1. Deep Learning for Object Manipulation

MemoryX

Deep Learning Framework for Object Detection

RGB-D Camera

Deep Action Planner

Convolution

Fully connected

L0 (Input) 512x512

L1 256x256

L2 128x128

L3 64x64

L4 32x32

F5

F6 (Output)
1. Deep Learning for Object Manipulation

Goal
- Applying RNN-based deep learning techniques to allow ARMAR to explore the possible actions that objects suggest
- Collecting and annotating data for training the proposed deep architecture

Requirements
- Knowledge in computer Vision, robotics, and machine learning
- Solid programming skills in C/C++ (or Python)
2. Reactive Grasping of Unknown Objects

- **Task**
  - Design a closed-loop reactive grasping controller
  - Data fusion of vision and haptics
  - Online grasp execution

- **Methods**
  - Comparison of different data-driven methods (SVM, Gaussian Processes, ...)
  - Data collection with ARMAR-III

- **Requirements**
  - Solid programming skills in C++
  - Solid background in math
H²T „special“ requirements for PdF

- Candidates must spend at least one day per week in the H²T labs
Contact

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