RoboCup @Home — RoboCup GERMAN OPEN 2019

TU/e Technische Universiteit **Eindhoven** University of Technology

SIOUX TECHNOLOGIES · kpn · Eindhoven Medical Robotics · reboocon bionics · BECKHOFF · TMC PEOPLE DRIVE TECHNOLOGY · PRODRIVE TECHNOLOGIES · SANDERS MACHINEBOUW BV · maxon motor driven by precision · VANDERLANDE

Tech United Eindhoven
RoboCup German Open 2019

HERO, AMIGO (& SERGIO)


Figure 1: HERO

Figure 2: AMIGO

- HERO
  - Toyota HSR
- AMIGO (retiring)
  - Omni-wheels, 1 DoF torso
  - 2x 7-DoF manipulator
  - Designs available at Robotic Open Platform

Natural language interpretation

- Conversational interface
- Natural Language Interpretation using Feature Context Free Grammar (FCFG)
- Phoneme level speech recognition with dynamic dictionary and FCFG grammars
- Chat interface using Telegram or Slack
- WIP: STT based on Kaldi, trained on Mozilla Common Voice

Image recognition
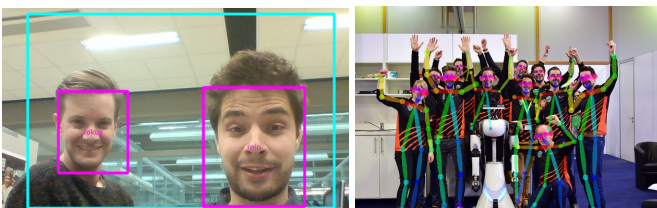
- Object recognition using Deep Learning
- Face recognition: Openface based on Torch
- Pose recognition: OpenPose
- ROS-packages: ros-kinetic-image-recognition
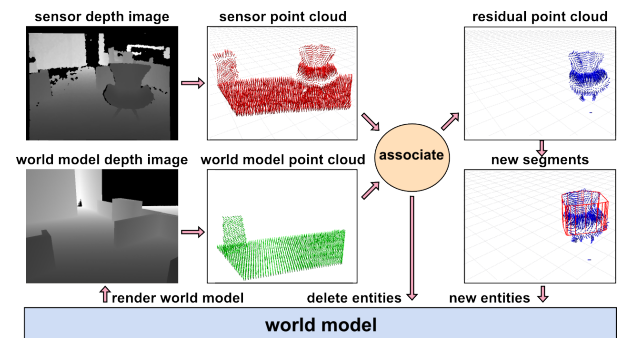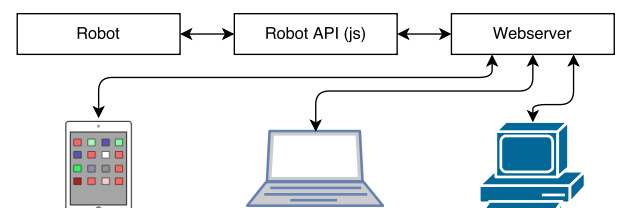
World modeling

Figure 3: Overview of ED: Environment Descriptor

- A central object-oriented, volumetric world model, used for:
  - Navigation, localization
  - Object tracking
- Objects have 3D shape, pose, type
- Updating by comparing rendered world model with depth image
- Furniture fitting
  - Increases performance of navigation, localisation and object segmentation

Generic application architecture

- 1 application for 3 robots
- N arms, X DOF
- SMach-based
- Easier programming with World Model

WebGUI

- Web-based GUI, Cross-platform
- Sensor and World Model view