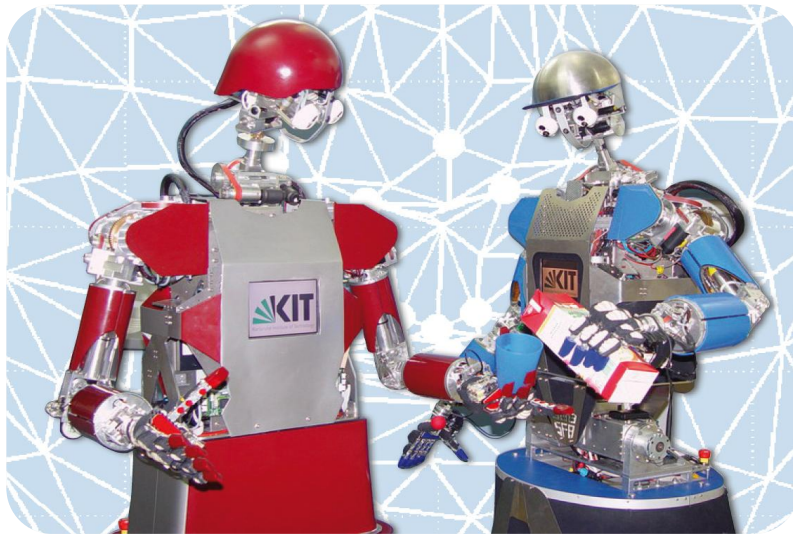
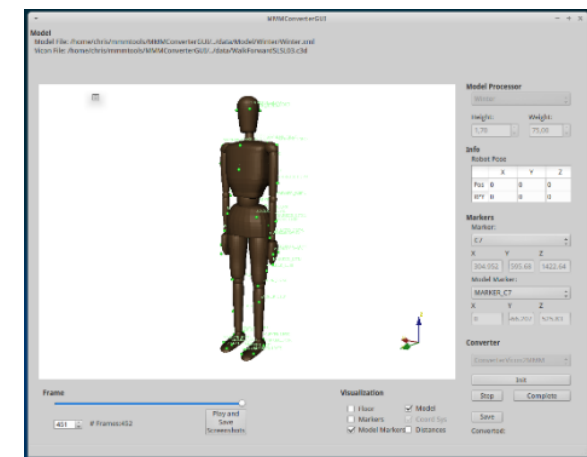
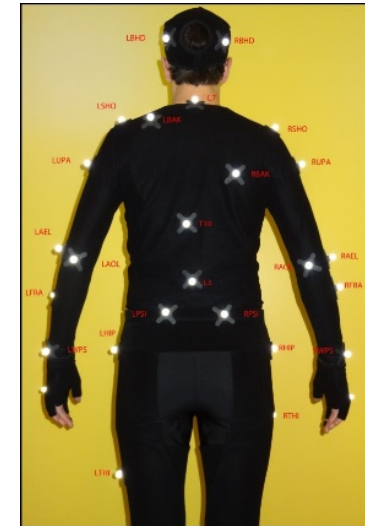


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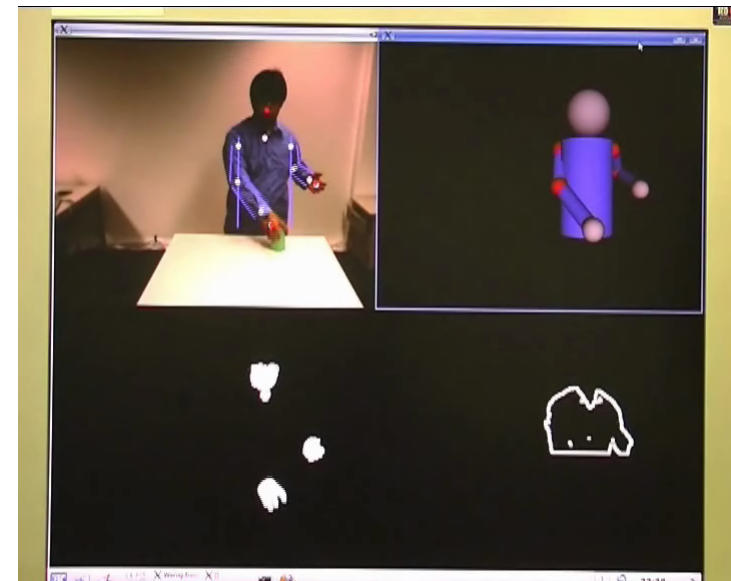
# Segmentation of Human Motion

- Separation of a recorded human motion into several distinct parts
- Essential process in the further processing of motion capture data for various applications
- Parts of the seminar topic:
  1. Literature research: Which segmentation techniques do exist and how do they work?
  2. Implementation of a selected (simple) segmentation method
  3. Evaluation of the implementation using own Vicon motion capture recordings



# Learning and Reproduction of Actions from Human Observation

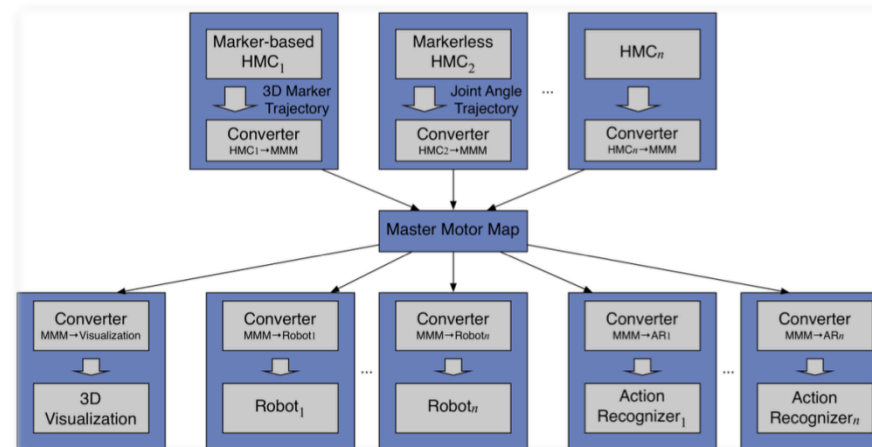
- Capturing of human actions with Motion Capture System
- Learning of parameterizable action representations from captured demonstrations
  - Dynamic Movement Primitives
- Reproduction of learned actions with different conditions
- Execution of action on Armar robot in simulation
- Open questions:
  - Specifying the representation for different actions
  - Task vs. joint angles. Which space is more suitable for which action



Learning and reproduction of a shell game scenario

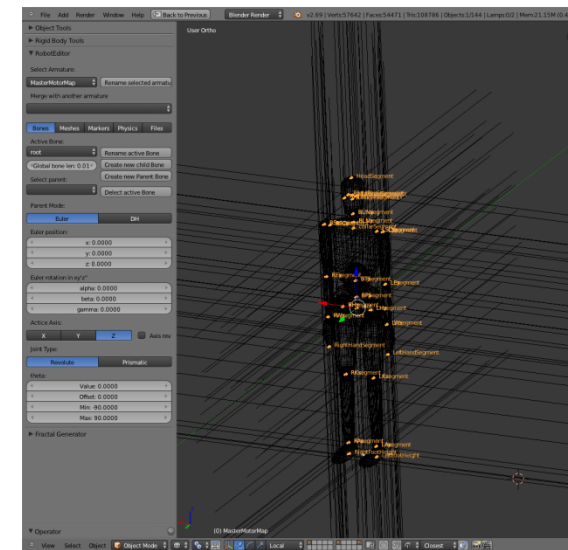
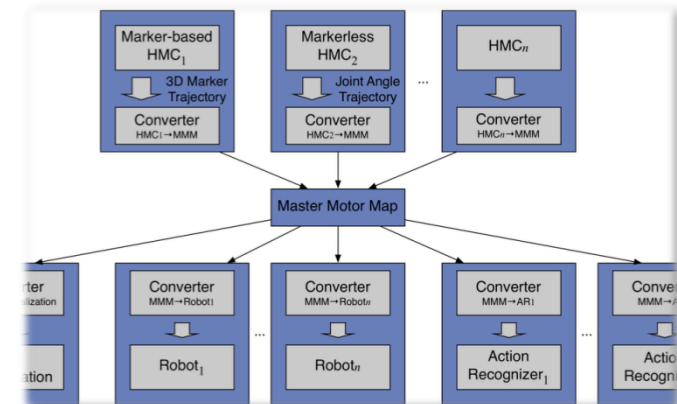
# Conversion of Human Motion Data

- Conversion of **Human Motion**
  - *Marker-less* and *marker-based* motion capture
  - Mapping to reference model (Master Motor map)
  - Conversion for the execution on (humanoid) robots
- How does this conversion work? What problems are to be expected?
- Tasks
  - Literature research
  - Which techniques are known for mapping human motion to robots?
  - Presentation of a Survey on these methods in form of a scientific paper



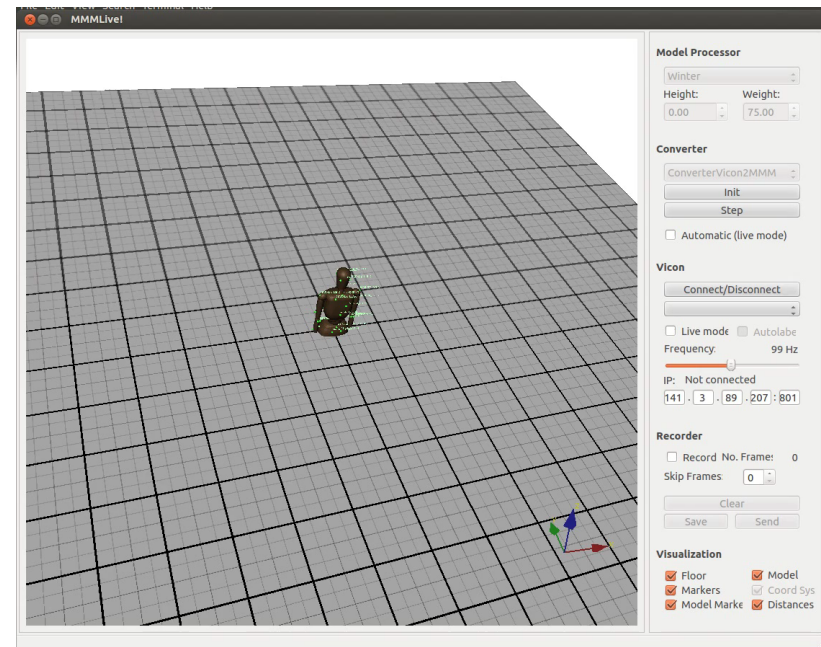
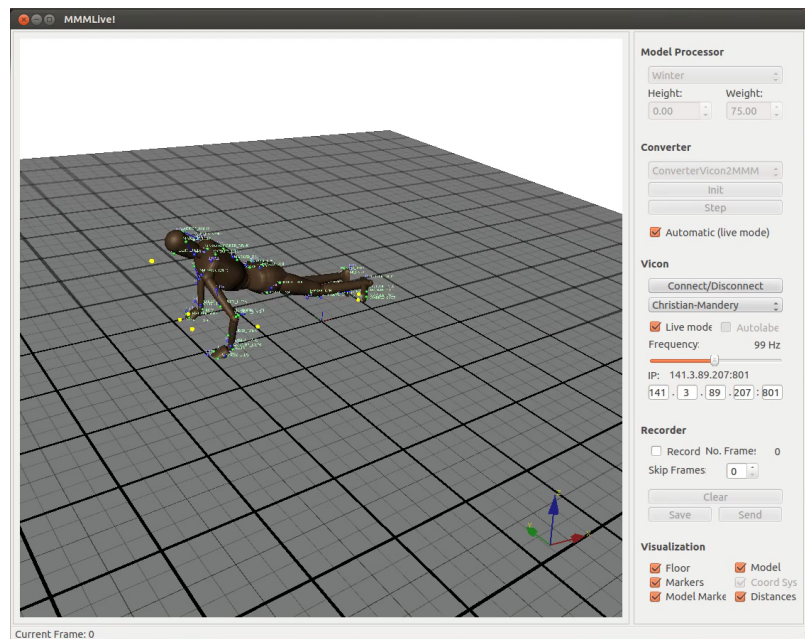
# Live Motion Capture and Mapping

- Mapping of **Human Motion Capture** data to reference model (Master Motor map)
  - Enables the transfer to humanoid robots
  - Requires *time-consuming post processing*
- Is **Live (Online) mapping** possible?
- Tasks
  - Preparation of reference models in CAD (*Blender RobotEditor*)
  - Offline post processing of motion capture data
  - Mapping to reference models (Master Motor Map framework)
  - Investigate Live/Online mapping to reference models (Master Motor Map framework)
  - Documentation of results





# Live Motion Capture and Mapping



# Trajectory Generation for Exoskeletons

- Conversion of human motions into trajectories
- How to trigger motions with force sensor?
  
- Tasks
  - Literature Research: Kinematics of the human leg, exoskeletons
  - Record squatting motion with vicon system
  - Convert data from MMM to MATLAB
  - Generate trajectories for knee (ankle)
  - Perform squats with the exoskeleton
  - Use gesture to initiate motion
  - Documentation of results

