KIT-Department of Informatics
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Exam Answer Sheet

Robotics II: Humanoid Robotics

on September 20, 2019, 14:00 – 15:00

Family name:	Given name:	Matriculation number:

Exercise 1	out of 7 points
Exercise 2	out of 6 points
Exercise 3	out of 12 points
Exercise 4	out of 10 points
Exercise 5	out of 10 points

Total:	

	Grade:

Exercise 1 *Building Humanoids*

1. Motivation of MMM framework:

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   -

2. Diagram of the MMM framework:

3. Three models:

   (a)

   (b)

   (c)

Exercise 2 *Grasping Synergies and Eigengrasps*

1. Difference, advantage, disadvantage:

2. Grasping study and hand design

   (a) Minimum number of motors:

   (b) Method:

   (c) Mechanism that realizes mechanical underactuation:

   (d) Dimensionality reduction for fully actuated hand:

Exercise 3 *Grasping*

1. Grasp analysis and synthesis:
   (a) Four properties:
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   -
   -
   -

   (b) Grasp analysis and synthesis with sketch of the relation:

2. Six factors that influence grasp synthesis, with example:

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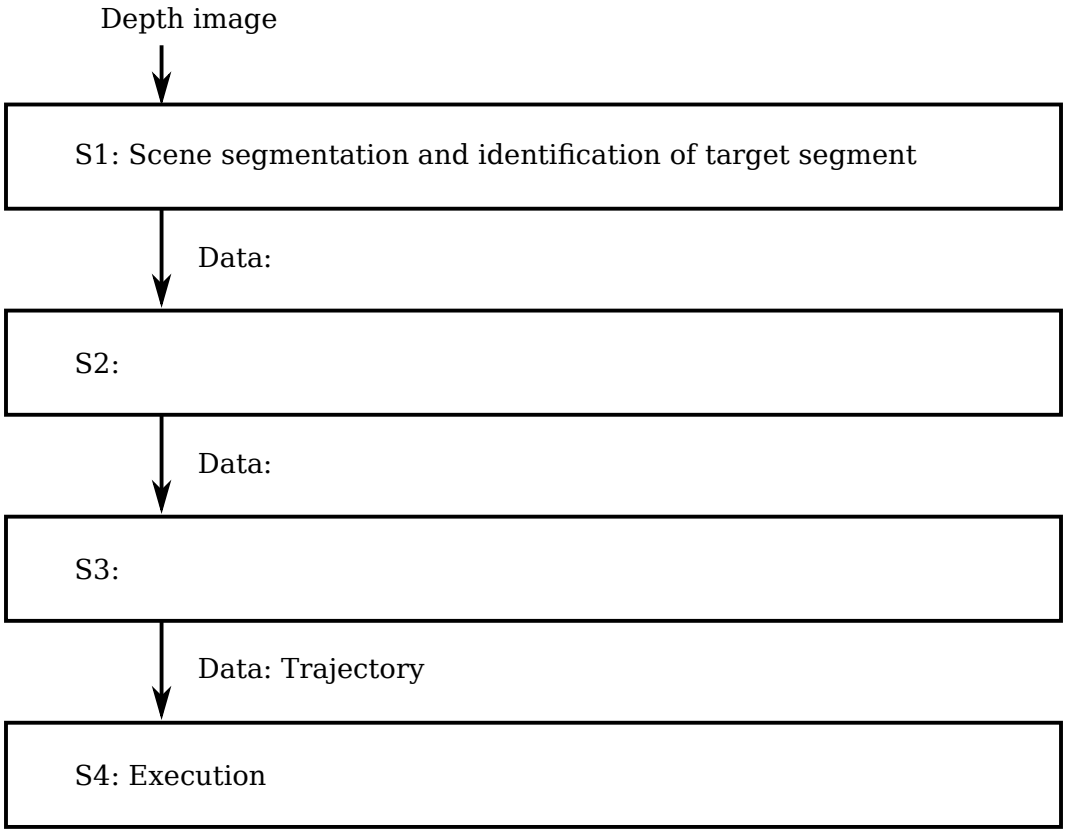
3. Grasping unknown objects

   (a) Pipeline:



(b) Two general concepts to synthesize grasp hypotheses from input images:

(c) Changes in the pipeline:

Exercise 4 *Active Perception*

1. Five questions and description:

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2. Differences:

	Classical CV	Active Vision	Active Perception
Image Processing	x	x	x
Viewpoint Selection			
Multi-modal sensory input			
Changing the agent's state			
Changing the environment			

3. General purpose of the *Iterative Closest Point (ICP)* algorithm:

4. Two problems that can occur using *ICP*:
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   -

5. Grasping unknown objects in cluttered scenes:
   (a) Three heuristics:
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   -
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   (b) Possible approach to verify hypotheses:

Exercise 5 *Imitation Learning*

1. Four key questions and explanations:

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2. Hierarchical Segmentation:

3. Mirror neurons:

4. Four challenges in Imitation Learning: