KIT-Department of Informatics
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Answer sheets for the exam

Robotics II: Humanoid Robotics

on September 17, 2018, 11:00 – 12:00

Family name:	Given name:	Matriculation number:

Exercise 1	out of 8 points
Exercise 2	out of 11 points
Exercise 3	out of 6 points
Exercise 4	out of 11 points
Exercise 5	out of 9 points

Total:	

	Grade:

Exercise 1 *Grasping*

1. Difference between grasp analysis and grasp synthesis:

2. Benefits of grasp taxonomies for robotic grasping:

3. Shape completion:

4. Online phase vs. offline phase:

5. Grasp synthesis for known objects (online/offline):

Process	**Online**	**Offline**
Grasp selection	X	
Grasp generation		
Scene segmentation		
Object recognition		
Grasp simulation		

Exercise 2 *Grasp Synergies*

1. Postural synergies:

2. Soft synergy model:

3. Amplitude vector $\mathbf{a}$:

4. Realization of $\mathbf{p}_{\text{new}}$:

5. Exact realization of $\mathbf{p}_{\text{new}}$:

Exercise 3 *Active Perception*

1. Active vision vs. active perception:

2. Purpose of ICP:

3. Purpose of pushing actions

4. Heuristics for initial object hypotheses:

5. ICP modification:

Exercise 4 *Haptics*

1. Purpose, attractive and repellent regions:

2. Potential field equation:

3. Motion generation:

4. Changes of the potential field:

5. Motion direction:

Exercise 5 *Imitation Learning*

1. Parameters for the definition of an HMM:

2. Training algorithm for HMMs:

3. Principle of semantic segmentation:

4. Principle of motion segmentation:

5. DMP Transformation system:

$$\tau \dot{v} = K(g - x) - Dv + (g - x_0)f(u)u$$
$$\tau \dot{x} = v$$

DMP Canonical system:

$$\tau \dot{u} = -\alpha u$$

Explanation of terms:

Term	**Explanation**
τ	*Temporal factor*
x	
D	
K	
g	
x_0	
f	

6. Changeable properties of a DMP-represented motion: