

Institute for Artificial Intelligence

WS 2017/2018

see also:

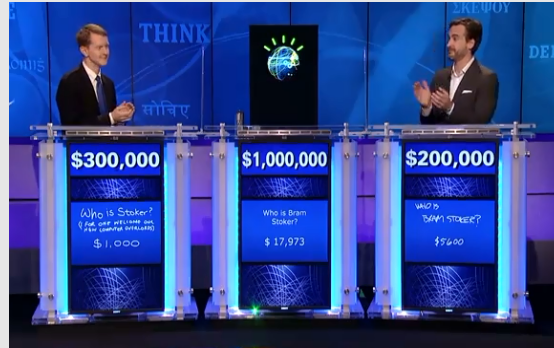
<http://ai.uni-bremen.de/teaching>

Autonomous Driving



[Google]

Watson



[IBM]

Siri/Echo



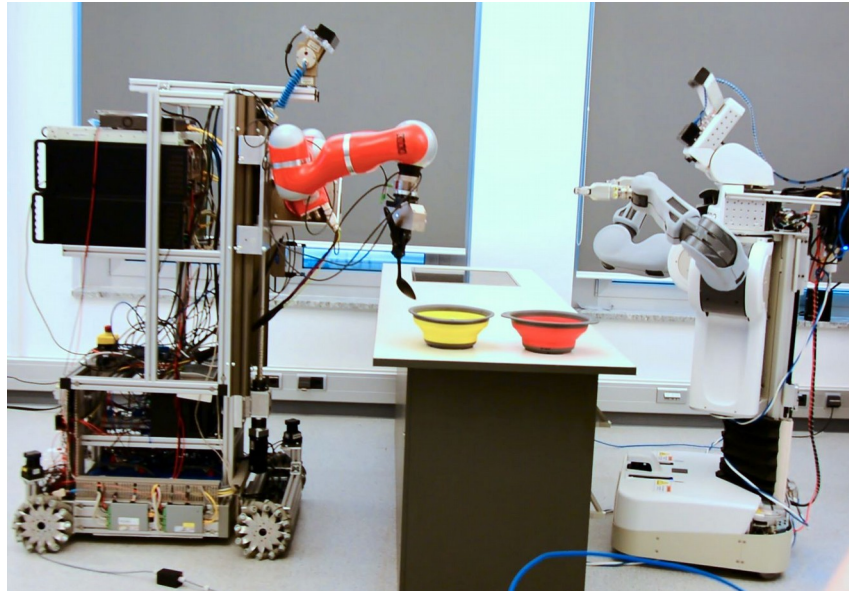
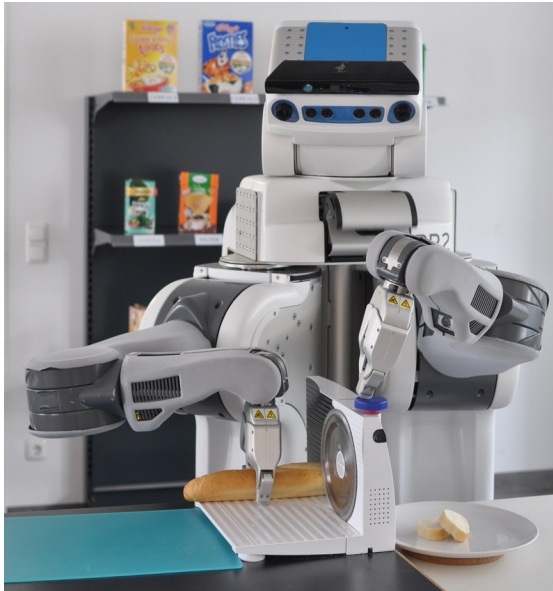
[Apple/Amazon]

Next years:

- Building 3D models with smartphones (objects, environments)
- Knowing everything about what you see (Google goggles, Google glasses)
- Computer systems reading medical research papers to generate diagnoses (Watson, big data)

Artificial Intelligence, but

- System view (understanding by building)
- Physically embedded (sensors and actuators)
- Robotic agents



Examples: personal household robots, natural-language understanding, supply chains, factory co-workers, ambient intelligent environments, (underwater-) robot scientists, human/robot rescue teams

“Technologies that will transform life, business, and the global economy”

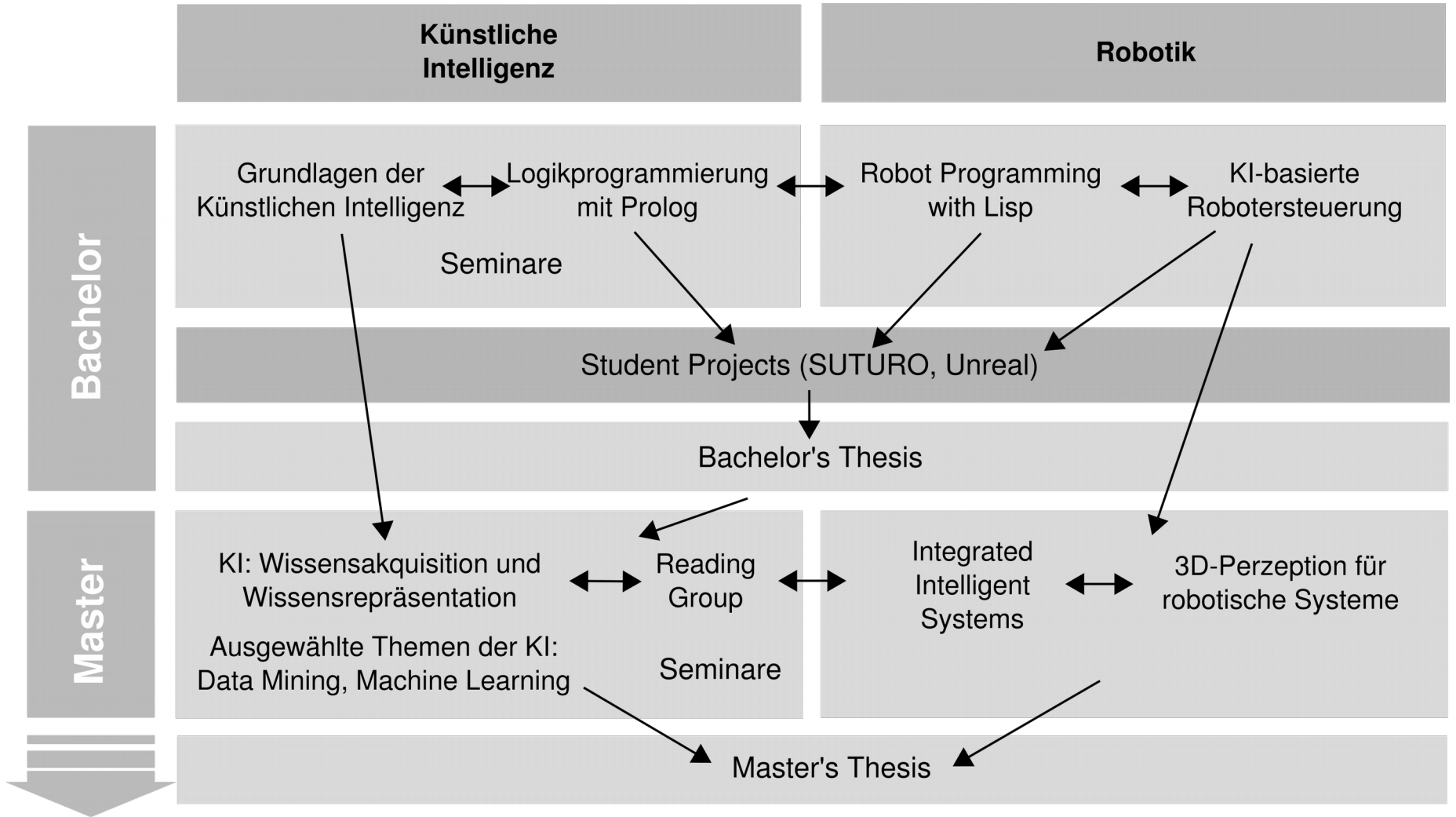
Report from McKinsey Global Institute, May 2013

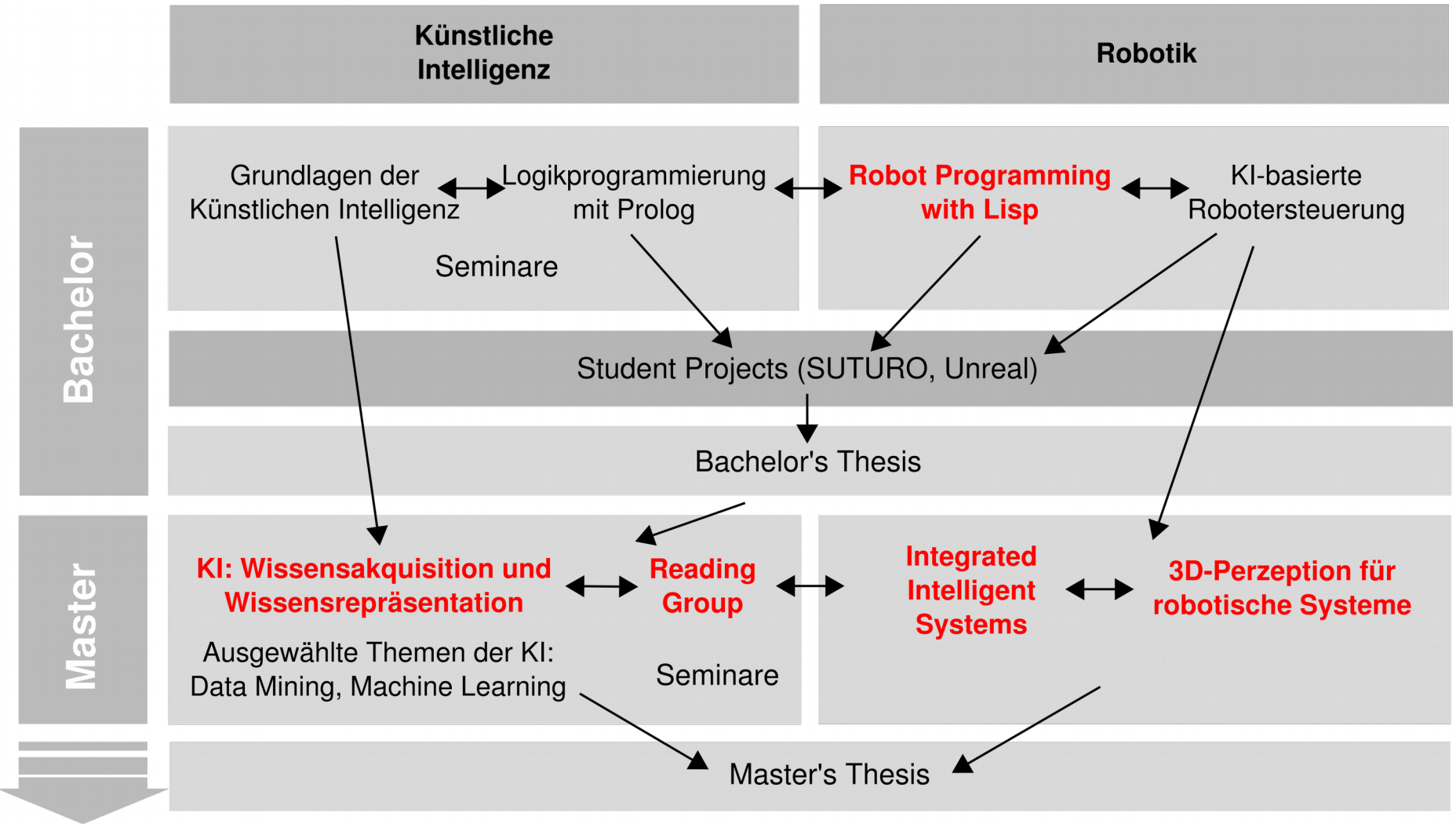
Disruptive Technologies 1-6

1. Mobile Internet
2. Automation of knowledge work
3. The “internet of things”
4. Cloud technology
5. Advanced robotics
6. (Near-) autonomous vehicles

Disruptive Technologies 7-12

7. Next generation genomics
8. Energy storage
9. 3D printing
10. Advances materials
11. Advances oil/gas exploration
12. Renewable energy



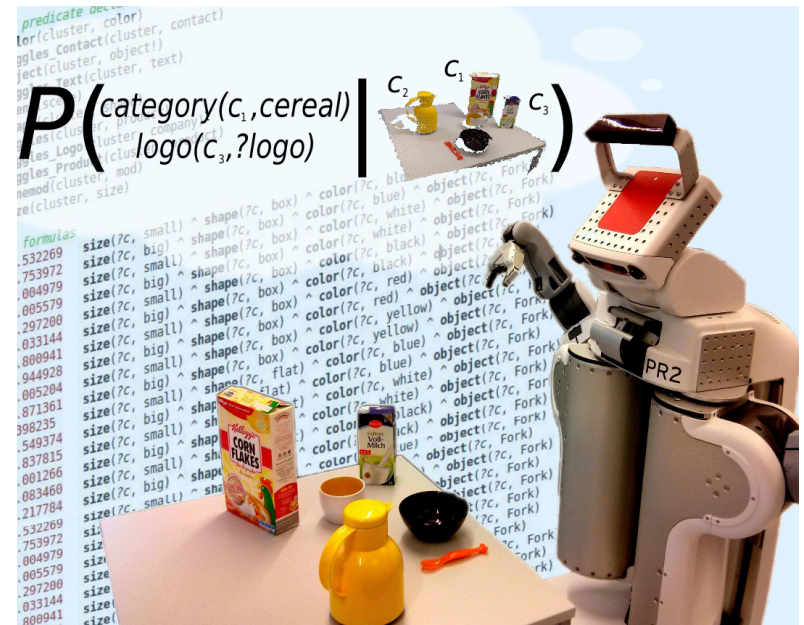


Inhalte:

- *Probabilistische Wissensverarbeitung*
 - Wahrscheinlichkeitstheorie
 - Bayes'sches maschinelles Lernen
 - Markov-Netze
- *Probabilistische Klassifikation und Regression*
 - Naive Bayes
 - Logistic Regression
 - Bayesian Linear Regression
- *Probabilistisches Schließen über die Zeit*
 - Hidden Markov Models (HMM)
 - Conditional Random Fields (CRF)
- *Statistical Relational Learning*
 - Markov Logic Networks (MLN)
- *Ensemble-basierte Lernalgorithmen*
 - Adaptive Boosting (AdaBoost)
 - Random Forests

Organisation:

- *Modul:* 03-MB-710.02
4 SWS (2V+2Ü)
6 Credits
- *Voraussetzung:* Grundlagen der KI
- *Vorlesung:* Di, 16:00-18:00 Uhr (TAB 0.31)
- *Übung:* Mo, 12:00-14:00 Uhr (TAB 0.31)
- *Prüfung:* mündlich
- *Vortragende:* Dr. Daniel Nyga
- *Übung:* Mareike Picklum
- *Beginn:* Di, 20.10.2017



Integrated Intelligent Systems

Contents:

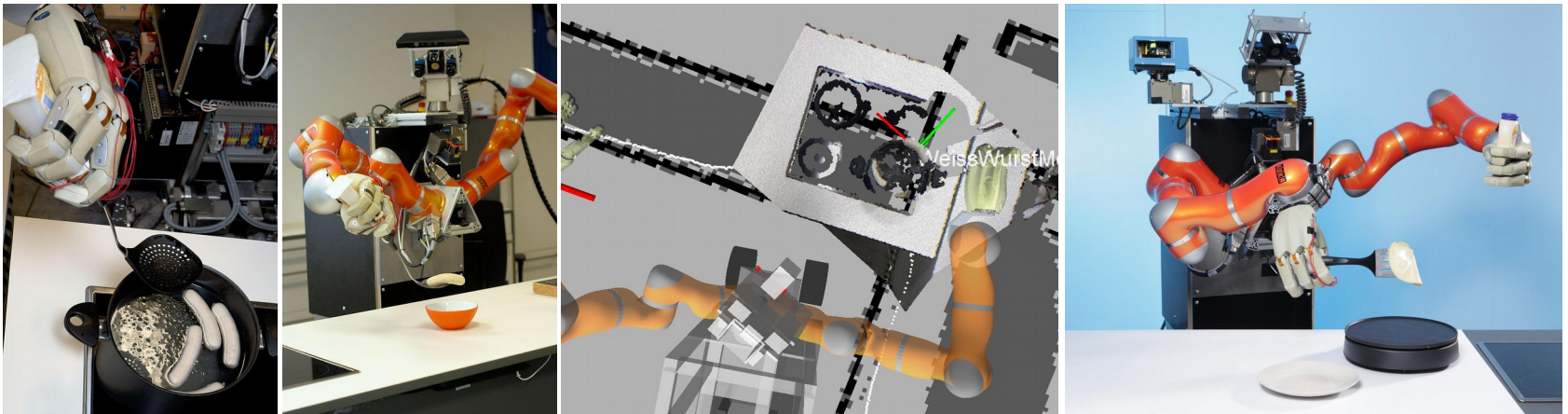
- Intelligent computer systems → Service Robots
- Sensors / Sensor models (Cameras / Lasers / ...)
- Basics of Actuators (motors, wheels, robot arms, ...)
- Introduction to perception for robotics
- Control systems for technical cognitive systems
- Basics of probabilistic state estimation
- Plan-based control
- Reasoning techniques

In short: Many things related to getting robots to do useful things.

Organisation:

- ▶ Class: **2 SWS Mondays 14:00-16:00**
- ▶ Exercise: **2 SWS Wednesdays 16:00-18:00**
- ▶ Total SWS: 4 ECTS: 6 Place: **TAB 0.31**
- ▶ Module: 03-ME-710.04
- ▶ Teaching language: English
- ▶ Teachers: Alexis Maldonado / Prof. Michael Beetz
- ▶ Exercise tutors: Daniel Beßler / Asil Bozcuoglu
- ▶ Examination: Oral test
- ▶ First class on **23.10**. First exercise on **25.10**. (!)
- ▶ Website:

<https://ai.uni-bremen.de/teaching/le-iis-ws17>



Inhalte:

- Introduction to 3D
- Features and Descriptors
- From features to semantics
- Scene registration – RGBD SLAM
- Handling uncertainty in 3D
- Perception Systems
- Convolutional Neural Networks

... and more



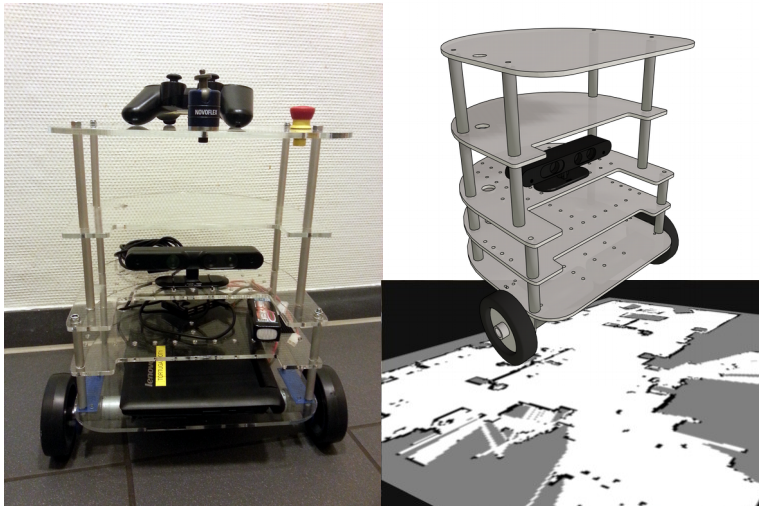
Organisation:

- *Modul:* 03-ME-710.07 / **Kurs** / 6 Credits
- *Kurs und Übung:* 19.10.17-01.02.18 10:00 - 14:00 Uhr (TAB 0.31)
- *Voraussetzung:* **Echtzeitbildverarbeitung**
- *Vortragende:* Dr.-Ing Michael Suppa
- *Übungsleitung:*
 - Ferenc Balint-Benczedi
 - Jan-Hendrik Worch
- *Sprache:* Deutsch / Englisch
- <https://ai.uni-bremen.de/teaching/le-sem-perc-ws17>



Inhalte:

- Einführung in **funktionale Programmierung** durch die Common Lisp Sprache
- Einführung in den Forschungsstand der Robotik durch einen **autonomen mobilen Roboter**



Formales:

- ▶ *Termine:*
 - Vorlesung: **Do, 14:15 – 15:45 Uhr**
 - Übung: **Do, 16:00 – 17:30 Uhr**
- ▶ *Raum:* **TAB 0.31**
- ▶ *Beginn:* **19.10.2017**

- ▶ *Modul:* 03-BE-710.98d
- ▶ *ECTS:* 6 (4 SWS)
- ▶ *Sprache:* Englisch, Deutsch
- ▶ *Prüfung:* Hausaufgaben + Gruppenprojekt
- ▶ *Modul:* 03-BE-710.98d
- ▶ *Vortragende:*
 - Vorlesung: Gayane Kazhoyan
 - Übung: Arthur Niedzwiecki

Inhalte:

- The reading group in AI will discuss current research papers on topics related to the collaborative research center 1320 '**Everyday Activity Science and Engineering**' (EASE), including but not limited to:
 - Knowledge representation and reasoning
 - Robotics
 - Computer vision
 - Natural language processing
- The course is intended for doctoral students from EASE and master students with a focus on AI and robotics
- <https://ease-crc.org>
- hlanger@cs.uni-bremen.de

Formales:

- ▶ 2 SWS **Mi 12-14 Uhr**
- ▶ Ort: **ECO5 (TAB) 1.58**
- ▶ VAK: 03-ME-710.99g
- ▶ ECTS: 4
- ▶ empf. Voraussetzung: KI 1
- ▶ Lektüreseminar mit Referaten
- ▶ Sprache: Englisch
- ▶ Start: **18.10.2017**

- Vorlesungen:
 - KI: Wissensakquisition und Wissensrepräsentation
 - IIS: Integrierte Intelligente Systeme
 - Semantische 3D-Perzeption für Robotische Systeme
 - Roboterprogrammierung mit Lisp
- Seminare
 - Reading Group

Web: <http://ai.uni-bremen.de/teaching>