Autonomous robotics: Action, Perception, and Cognition

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Who am I

- theoretical physicist by training, but working in theoretical neuroscience/cognitive science and motor control for over 20 years
- second life as a roboticist/computer vision person
- way stations: Saarbrücken, Stuttgart, Boca Raton Florida, Bochum, Marseille, Bochum...
Who am I

- Chair Theory of Cognitive Systems
- Director of the Institut für Neuroinformatik
- joint appointment in the Faculty of Physics and Astronomy and in the Faculty of Electrical Engineering and Information Technology
My research

research in two related areas

- embodied cognition: motor control, movement planning and representation, decision making, action and spatial memory, visual working memory, perceptual representations, motion perception, grounding of language

- autonomous robotics: scene representation, object recognition, behavioral organization, reaching and grasping, timing, learning

based on the theoretical approach of “DST” (dynamical systems theory) and “DFT” (dynamical field theory)
Rachid Ramadan

- will run the exercises
- also available for questions etc.
- rachid.ramadan@ini.rub.de
- master thesis done on using muscle/reflex models to estimate motor commands
- doctoral student working on a neural dynamic model of bipedal locomotion with balance control… very ambitious
Who you are...

- angewandte Informatik
- cognitive science
- robotics and automation
- electrical engineering and information technology
- physics, medical physics
- philosophy
- biology
all course material will be on this webpage

- lecture slides
- exercises
- readings
Lectures will be “live” but will also be recorded. A link will be available (to participants only) for asynchronous viewing after the live session.
exercise sessions

- are also live sessions
- held by Rachid Ramadan (or a colleague)
- will not be recorded
- serve also as opportunity to ask questions
written exercises

- sheets are available on webpage, with deadline
- you can upload your solutions on the web page
- you will see your corrected exams there and the marks
peer discussion and questions

- about lecture: to me
- about exercise: to Rachid Ramadan and others
- to your peers …
Exercises

- are critical to the learning experience!

- strong correlation between active participation in exercises and success!

- the are somewhat mathematical, but not primarily aimed at math skill

- more at being precise, understanding precisely, grasping the concepts
Exercises

- there will be readings for many lectures. Read ahead of time!

- understanding technical texts from diverse fields is part of the learning

- some readings will be topics of exercises

- writing scientifically is part of the learning

- making drawings, documenting thought

- here will be an essay exercise to practice writing and organizing text
Exercises

- hand-outs and hand-ins via the web page
- hand-ins will be corrected by a team, led by Rachid and will receive a “grade”
- !! a real luxury…make use of it
Rules

- Graded hand-ins will provide bonus points that can improve your final mark by 10% or more

- => see “rules” sheet on the web page
What learning experience does this course offer?

- interdisciplinary experience: using analogies with nervous systems to design/think about autonomous robots
- learn concepts from dynamical systems theory
- experience the reading and writing of mathematical/technical material