Universität Bielefeld

teutolab robotik

teutolab-robotik - Hands-On Teaching of Human-Robot Interaction

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CORE Lab
Research Institute
for Cognition and Robotics

CITEC
Cognitive Interaction Technology
Center of Excellence
Bielefeld University

Ministerium für Innovation,
Wissenschaft und Forschung
des Landes Nordrhein-Westfalen

Motivation: bringing students of secondary school in touch with research

- Intelligent systems encounter us in our everyday life
- Increasing students' interests in a playful way
- Countering the negative prejudices like "programming is too difficult"
- Motivating young people for a study at the involved departments at Bielefeld University

Motivation: Why Human-Robot Interaction?

- **Available platforms like Nao, Aibo, or Pleo allow a new interdisciplinary perspective on robotics**
- **Emphasizing the social dimension of robotics**
- **Emphasizing learning aspects**
- **Getting an own (emotional) experience of robotics**

What is *teutolab*?

- Hands-on laboratory experience for school students and their teachers
- For more than ten years at Bielefeld University
- Overarching goal is to sensible children and youths for scientific themes

teutolab chemie

teutolab physik

teutolab biotechnologie

teutolab mathematik

teutolab robotik

Goals of *teutolab*-robotik

- Showing the fascination and variety of robotics instead of its complexity
- Creating self-identification with science and technology
- Students learn team working and increase their socio-cognitive processes
- An age-appropriately experimental enlarge to school

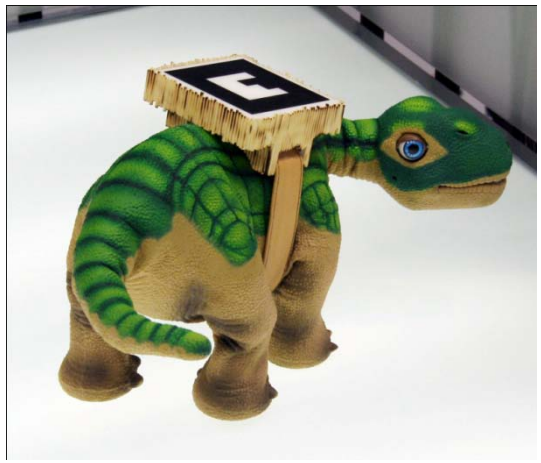
Courses' model – Part I

- School students slip into the role of young researchers for one afternoon (three hours)
- Focusing on human-robot interaction, cognition and learning robots
- Two courses for students of secondary schools:
  - Academy of Robots (Die Roboterakademie):
    - for students of grades 7 to 9 (age 12-15)
  - Lab of Learning (Das Lernlabor)
    - for students of the senior grades (age 16-19)

Courses' model – Part II

- Offer for class groups and single enrolments to open workshops and during school holidays
- Workshops occur without school teachers' participation
- Course instructors are students
- No teacher-centred teaching
- Previous knowledge isn't necessary
- Physical interaction with robots
- Programming with graphical interfaces

“Academy of Robots“ (age 12-15)



- Topics: human-robot-interaction and learning robots
- Contents:

- Decision tree – differences between human’s and robot’s recognition a person

- Robot platforms: Pleo and Aibo

- Goals:

  - getting to know the sensors

- Programming tricks and a learning process

“Lab of Learning“ (age 16-19)

- Topics: learning robots and machine vision
- Contents:

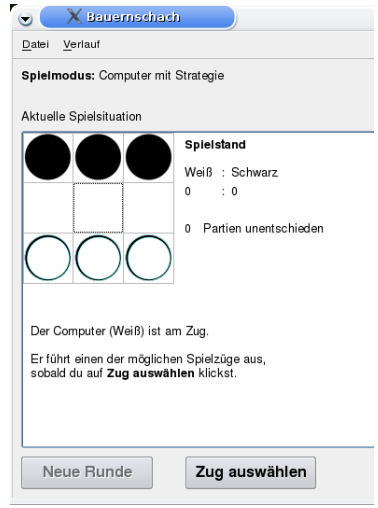
- “Bauernschach” – playing a board game against the computer

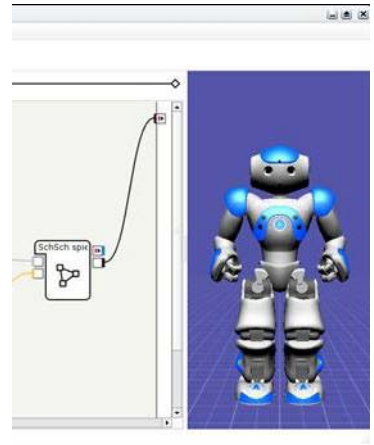
- Robot platform: humanoid robot Nao

- Goals:

- Realising which game strategy is used and assigning it to the robot

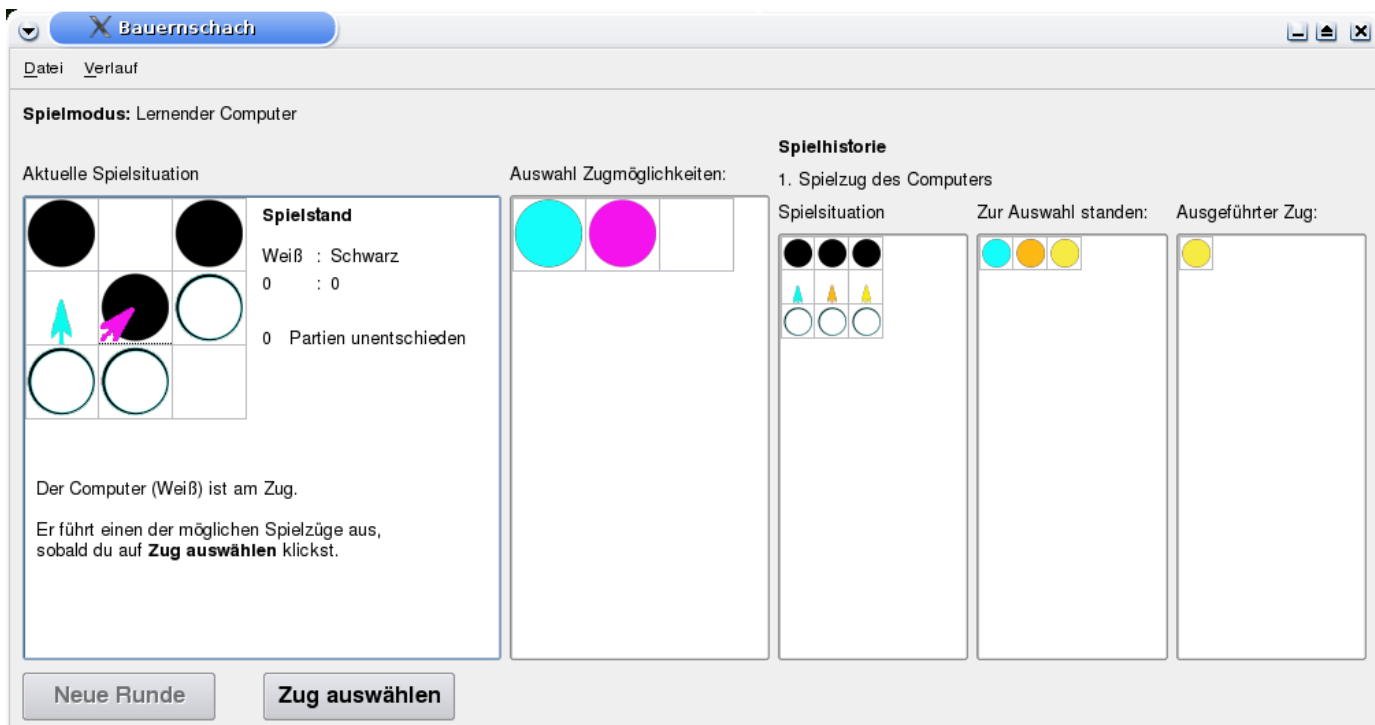
- Programming learning strategies for the game “Rock, Paper, Scissors”



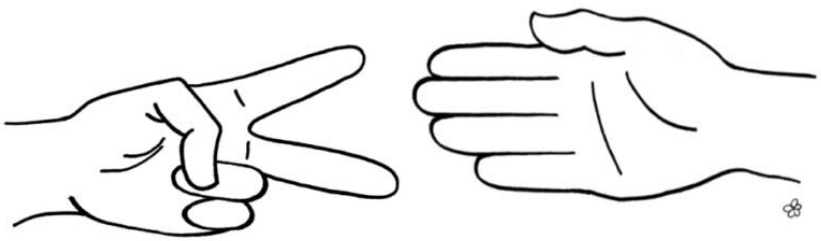


“Lab of Learning“
Introductory example “Bauernschach”

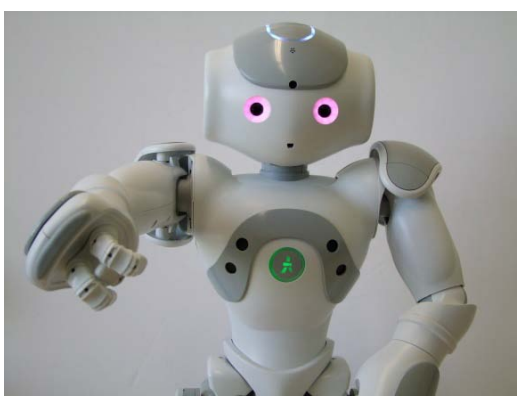
System learns strategy from success and failure examples



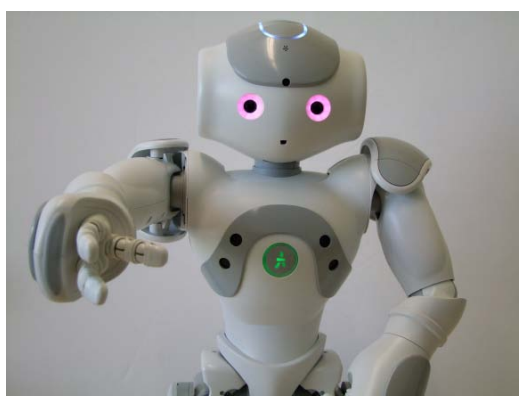
“Lab of Learning“
Transfer task: play rock-paper-scissors



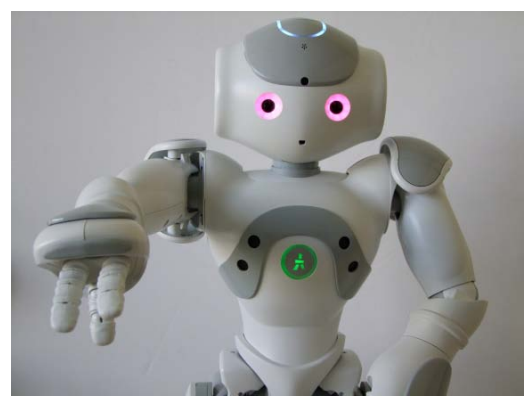
	Rock	Scissors	Paper	Fountain
Rock	O	+	-	-
Scissors	-	O	+	-
Paper	+	-	O	+
Fountain	+	+	-	O



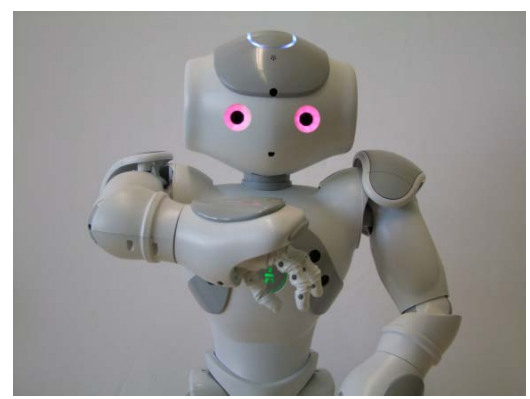
rock



scissors

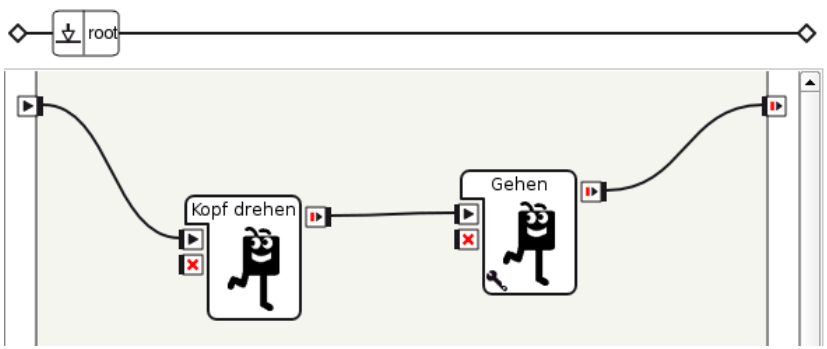


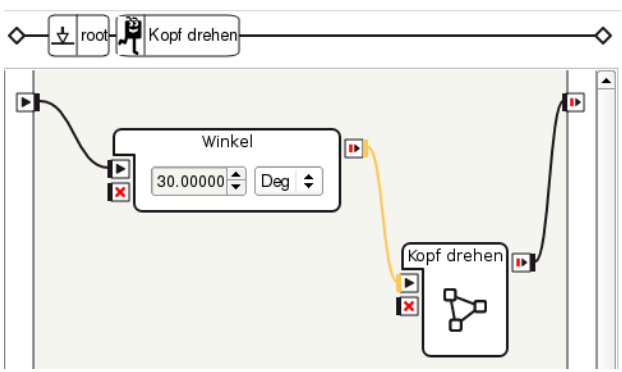
paper

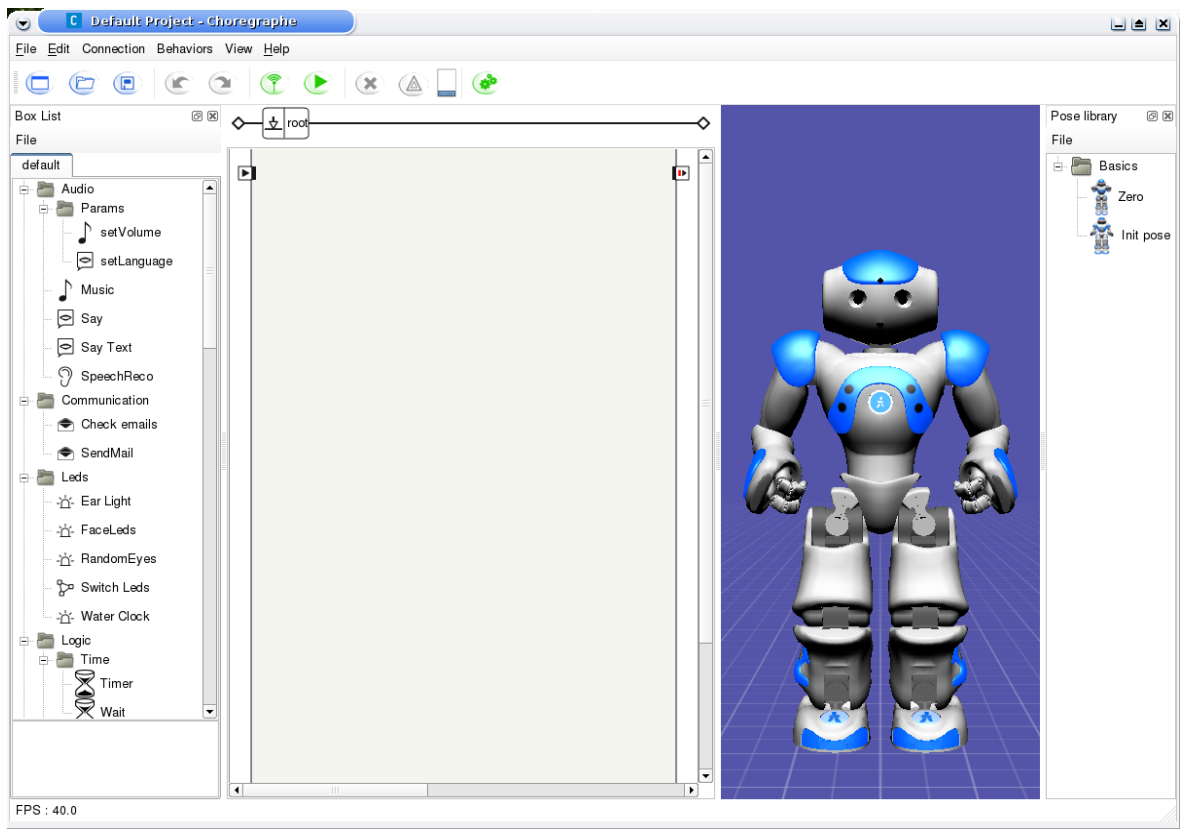


fountain

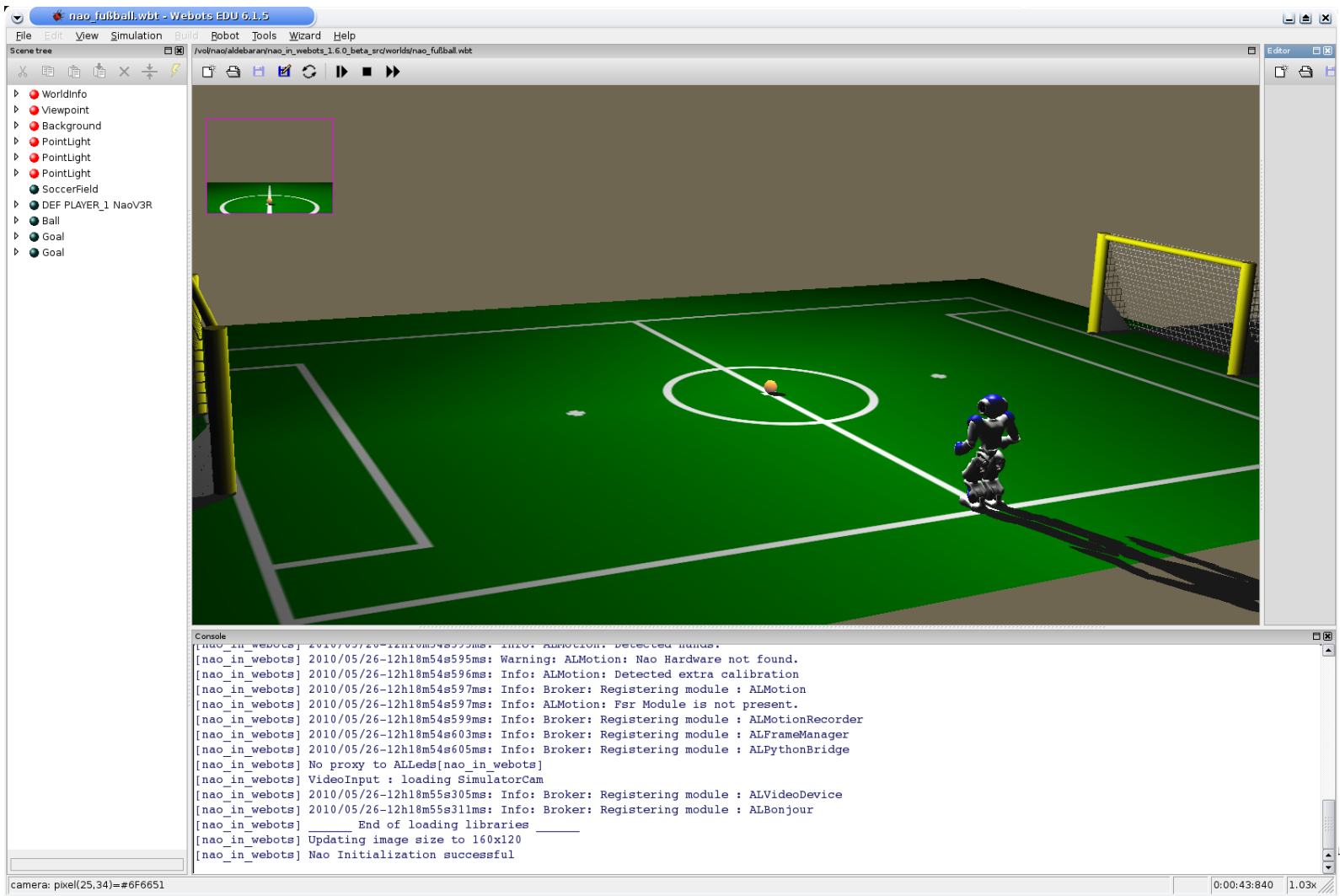
“Lab of Learning”
Using *Chorégraph* for programming







“Lab of Learning“
Simulation environment Webots



Course statistics and impact

- **Since the start:**
- **roughly 620 visitors**
- **above 65 workshops**
- **about 40% female participants**
- **The course is integrated in annual events like Girls' Day and pea*nuts-Herbsthochschule**
- **Collaboration with school teachers and projects for highly gifted attendees like Kolumbus-Kids**

Conclusion and Outlook

- Continuous evaluation of the courses with the participants' feedback (89% best or 2nd best mark)
- Enlarging the offer to workshops for younger students and adults
- Creating of materials for teachers

- Better integration of robotics in school education (Bielefeld U is official education partner of Aldebaran)
- Aspiring cooperative EU-projects in education with robots

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Dissemination in German TV (kids channel)