OPEN UNIVERSITY
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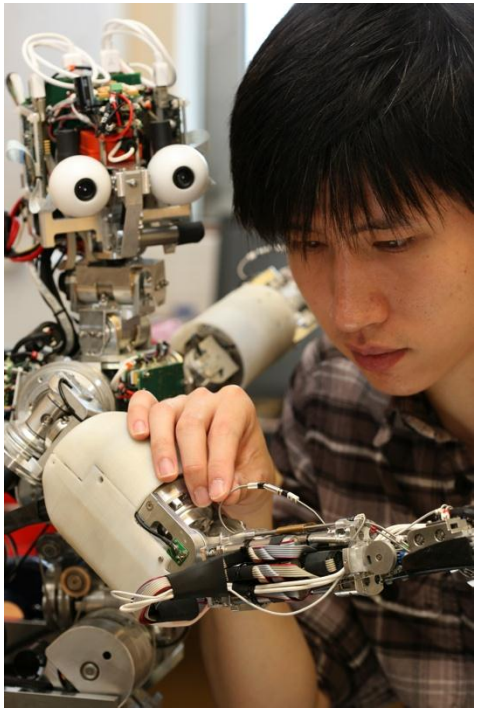
Imperial College
London
Consultants

HUMAN CENTERED ROBOTICS

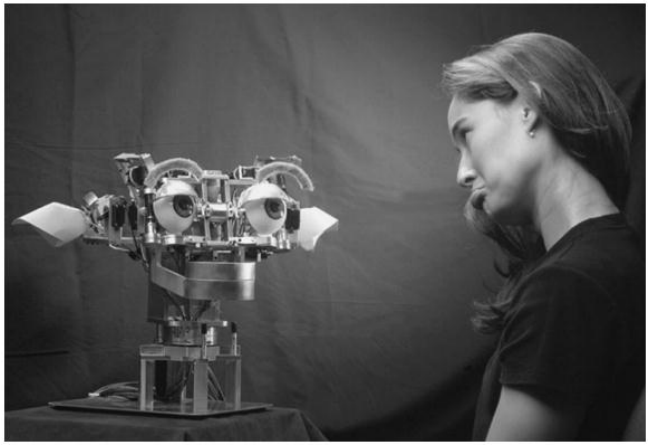
Open University Skolkovo
Imperial College London
Summer School
August 24-28, 2012, London



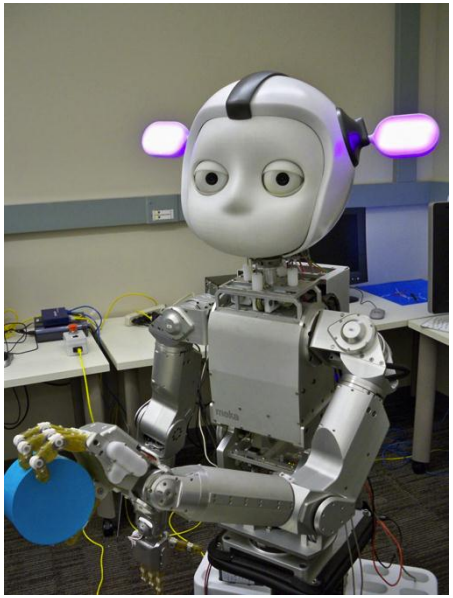
Alessandro Astolfi
Yiannis Demiris

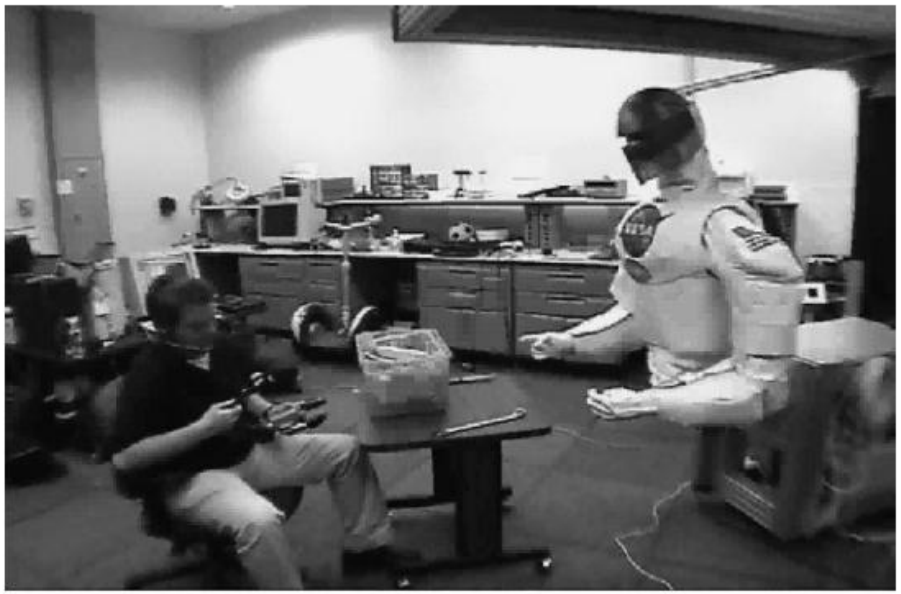
Department of Electrical and Electronic Engineering
Imperial College London

Human Centered Robotics



Robots designed to act upon, or interact with, human beings





Aims of the course

To teach

- the design steps
- the control tools
- the evaluation methodologies

enabling robotic systems to have intelligent interactions with humans in industrial, medical, entertainment, and rehabilitation settings.

Learning outcomes of the course

Learn the principles which allow robotic systems

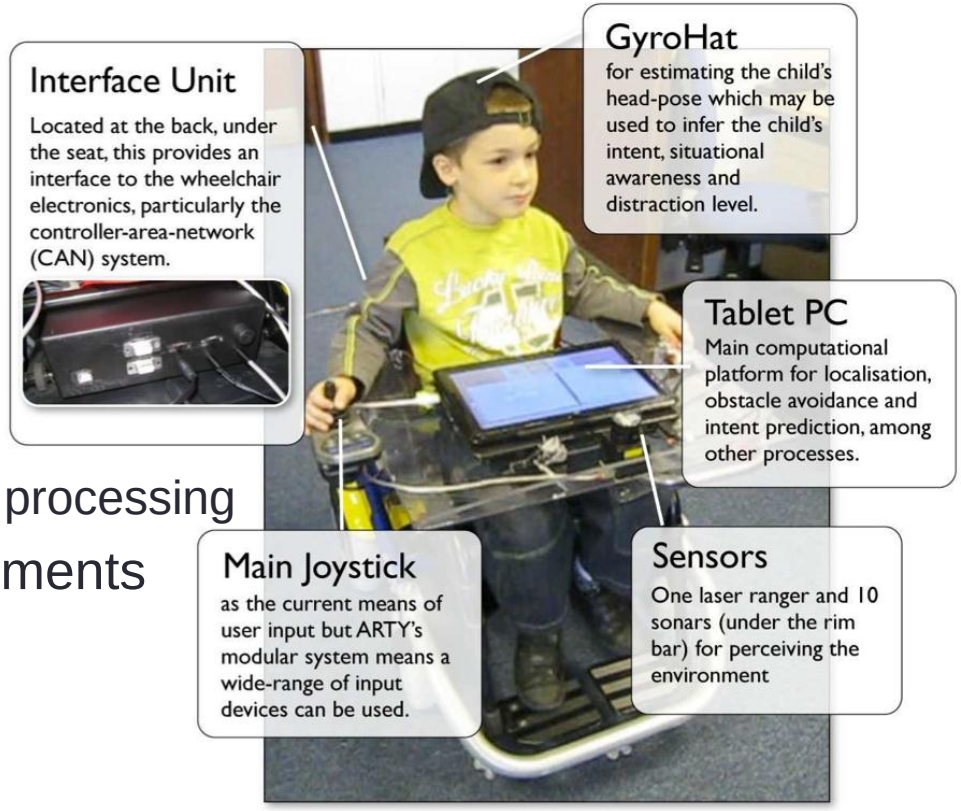
- to perceive human states using multimodal interfaces
- to model and recognise human actions
- to use adaptive shared control methods to assist humans in their task
- to use learning algorithms to improve their performance through interaction with humans

Course structure

	Day 1	Day 2	Day 3	Day 4	Day 5
Lecture 1 (~2h)	Introduction to human-centered robotics	Action perception	Action generation	Human-Robot Interaction	Collaborative Control
Lecture 2 (~2h)	Introduction to Control for Robotics	Image processing	Motion planning	Multi-agent systems	Evaluation
Laboratory projects	Introduction to laboratory hardware, software and projects	Parallel projects	Parallel projects	Parallel projects	Parallel projects

Course structure – Lectures (AM)

- Human centered robotics: novel applications and markets
  - Entertainment, Assistive and medical robotics
  - Robots for the consumer market
- Designing interactive robots
  - Understanding human actions and intentions
    - Machine vision, physiological signal processing
  - Acting in human-populated environments
    - Adaptive control, motion planning
  - Adapting to the needs of humans
    - Machine learning
  - Principles of evaluation of designed products



Transferable skills to multiple technological domains involving human interaction

Course structure – Laboratory (PM)

Strong hands-on component (4+ hrs every day)

- Designing and building an actual interactive robot in groups
- Alliances (multi-teams) encouraged to tackle more difficult issues
- Research equipment (sensors, mobile robots, software libraries) from the Personal Robotics research lab provided for bootstrapping

Course structure – Laboratory (PM)

- Design and implement an interactive robot in teams
  - Examples include an assistive robot, a robot to encourage recycling, robot guides for the blind, entertainment robots, interfaces to search & rescue robots
- Students are given hardware and software libraries to bootstrap them in their designs and implementation
  - Emphasis on open-source software to enable transferring of know-how to home universities