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Themes

Aerial Robots

Research into intelligent aircraft, including autonomous Micro Air Vehicles, specializing in their guidance and control.

Assisted Living

Research into an integrated intelligent home environment for the provision of health, nutrition and mobility services to older adults.

Bioenergy & Self Sustainable Systems

Research into overcoming the energy barrier to deployment of autonomous robots in remote areas utilising microbial fuel cells.

Biomimetic and Neuro-robotics

Developing robots that can operate in challenging environments, beyond the limitations of conventional sensory devices.

Medical Robotics

Robotic technology is able to provide precise and accurate sensing and movement capabilities, thus improving patient and surgeon experience.

Non-linear Robotics

Would you feel confident of approaching and touching a heavy duty production assembly robot in operation? Possibly not…

Robot Vision

Developing Robots that are able to view, analyse what they see and make decisions in response to instructions by humans.

Safe Human Robot Interaction

Investigating the aspect of physical and behavioural safety, to enable safe Human Robot Interaction, thus ensuring a robot is capable of performing cooperative tasks with humans.

Self-Repairing Robotic Systems

Self-healing cellular architectures for biologically-inspired highly reliable electronic systems. Drawing inspiration from nature in how it deals with complex versus unreliable issues.

Smart Automation

Research into the next generation of advanced robotics engineering systems. Robots that can make human like decisions whilst carrying out manufacturing process.

Soft Robotics

Soft robotics seeks to make robots that are soft, flexible and compliant, just like biological organisms.

Swarm Robotics

A combination of environmental, social and internal cues could result at the group level in components believed to be important in the emergence of self-organised behaviour.

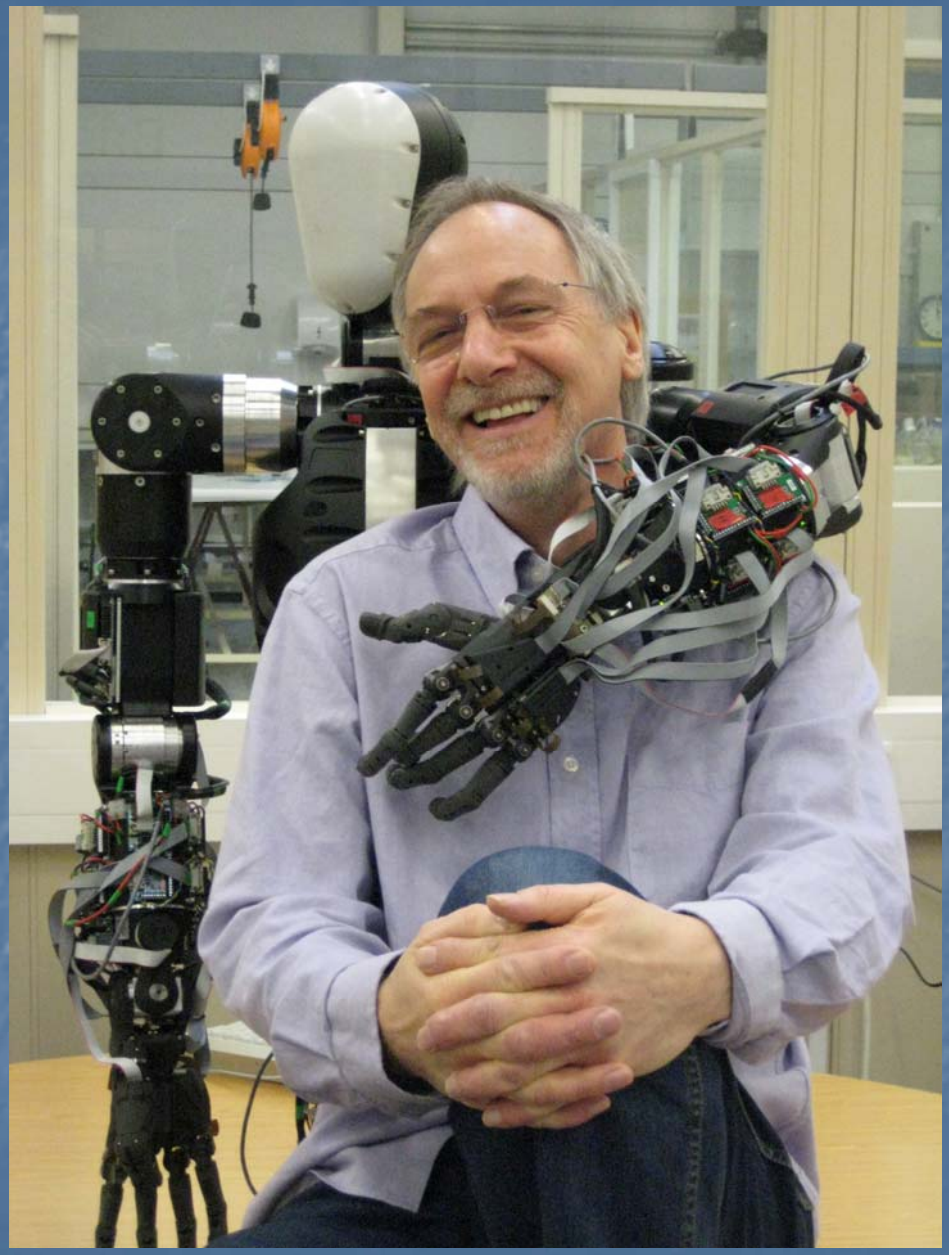
Unconventional Computation in Robots

Drawing inspiration from nature to address the issues of distributed manipulation in the micro-scale.

Verification and Validation for Safety in Robots

Investigating all aspects of safety for verification and validation purposes and to enable safe Human Robot Interaction in cooperative tasks.

The BRL laboratory space

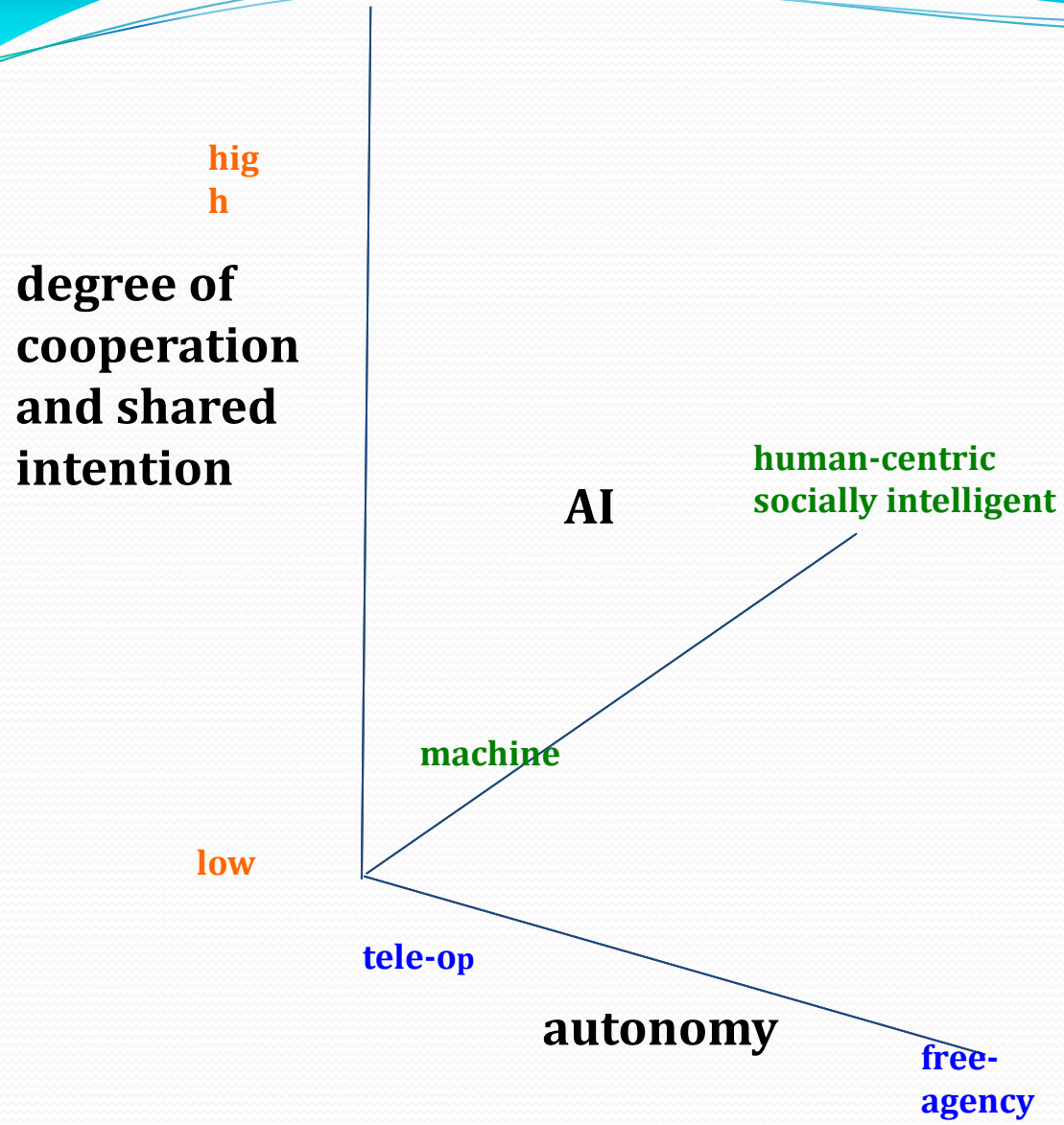


Some definitions?

- Cognition: the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.
- Autonomy: the ability of the person to make his or her own decisions.
- Robot: a machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer.

<video>

--- it’s what we do --- - cabinet

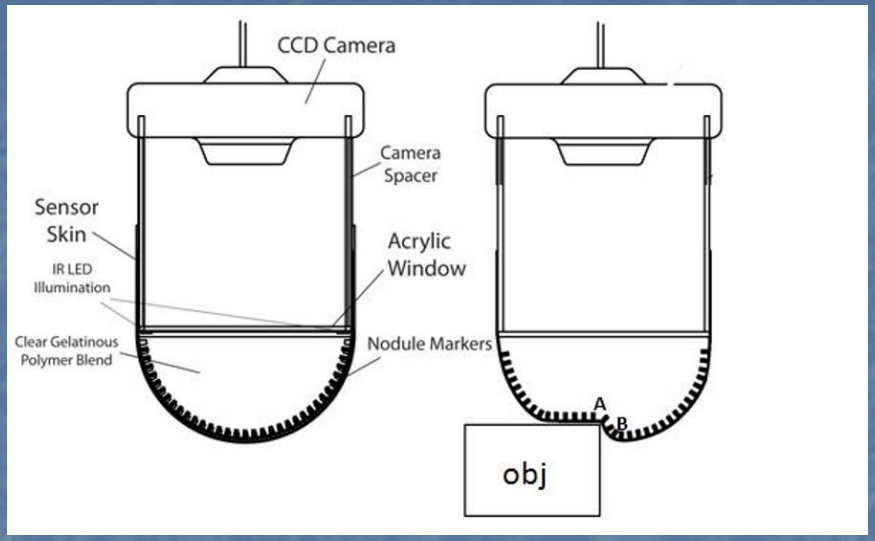


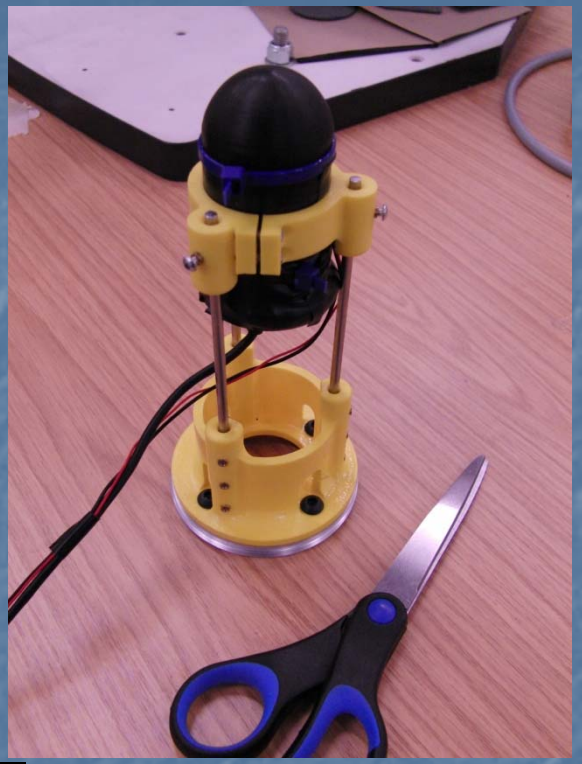
R&AS state space

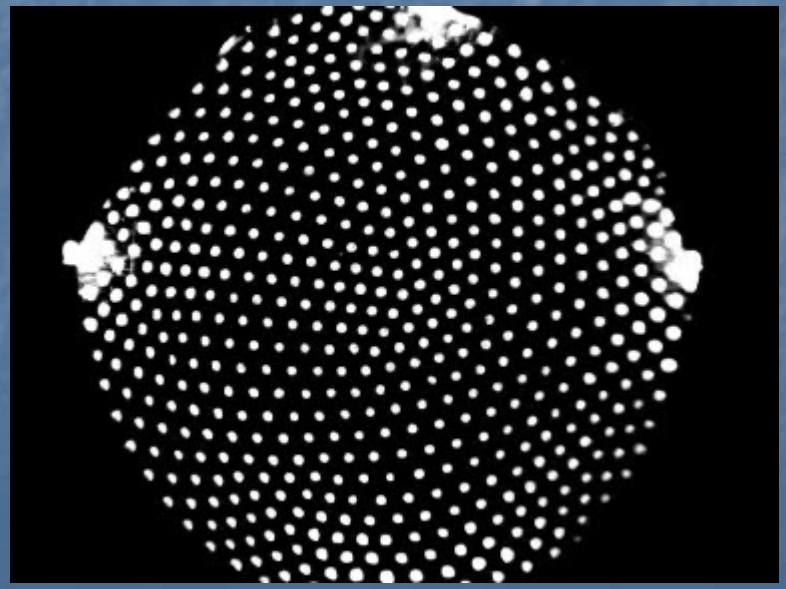
Some key challenges

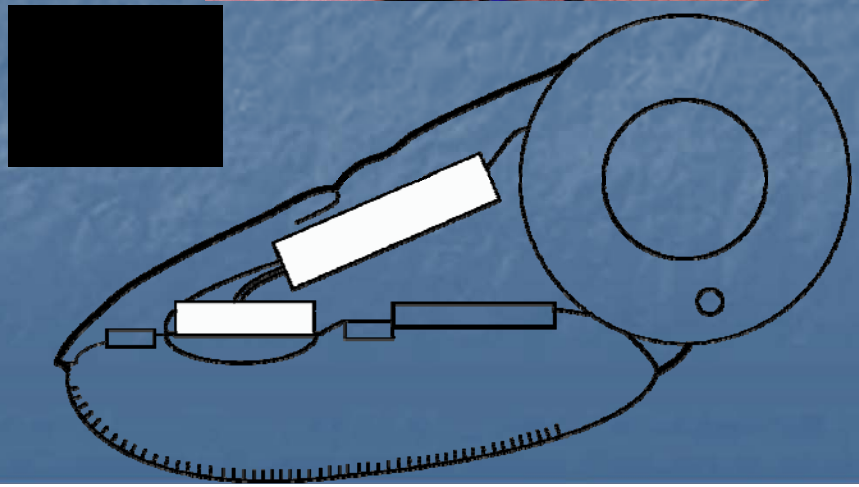
- Multi-channel HRI signalling
  - Voice, eye-gaze, body-gestures, face-gestures, body-pose – in both directions!
  - Sensors – vision, audio, **touch**, olfaction
- Safe and useful HRI - trustworthiness
  - Physical safety
  - Behavioural safety
  - Usefulness
  - Certification
- Energy Autonomy

A sense of touch: Tactile Sensing 1



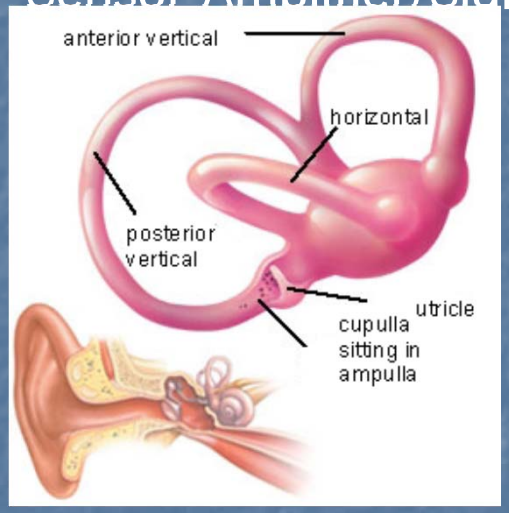


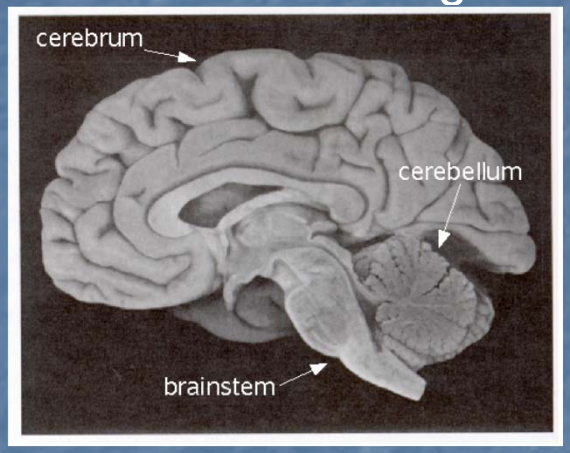


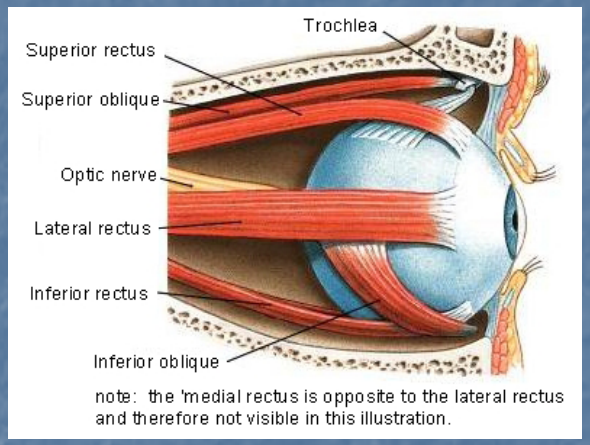


Components of the sensory-motor processing system … or lower-level cognition?

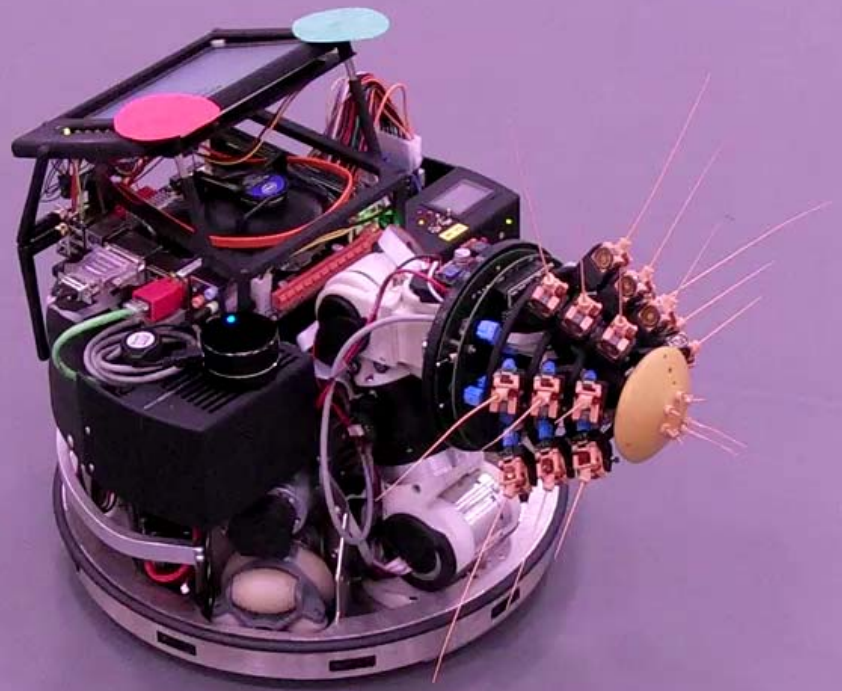
Sensor Amplifier/Signal Conditioning



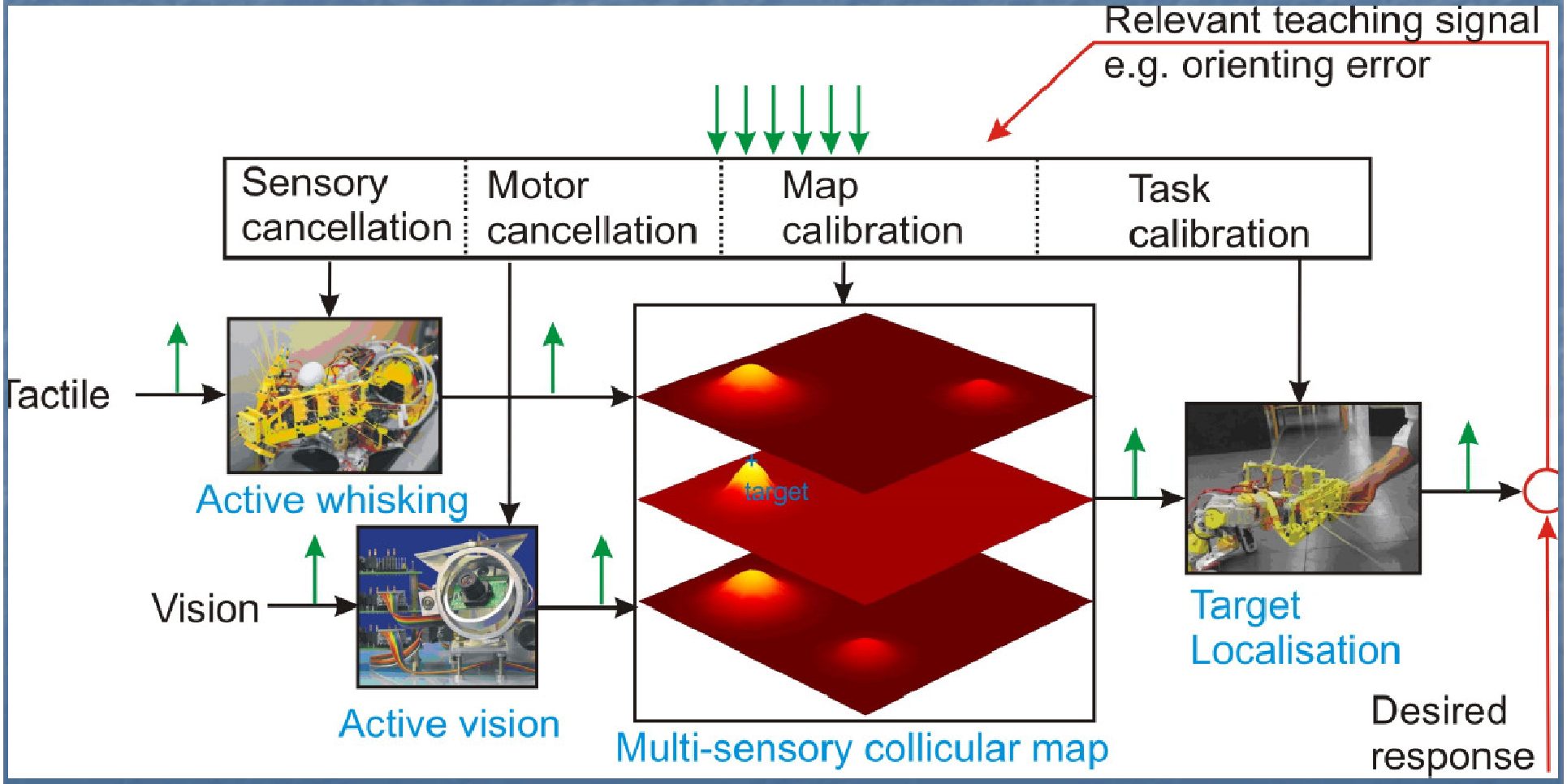




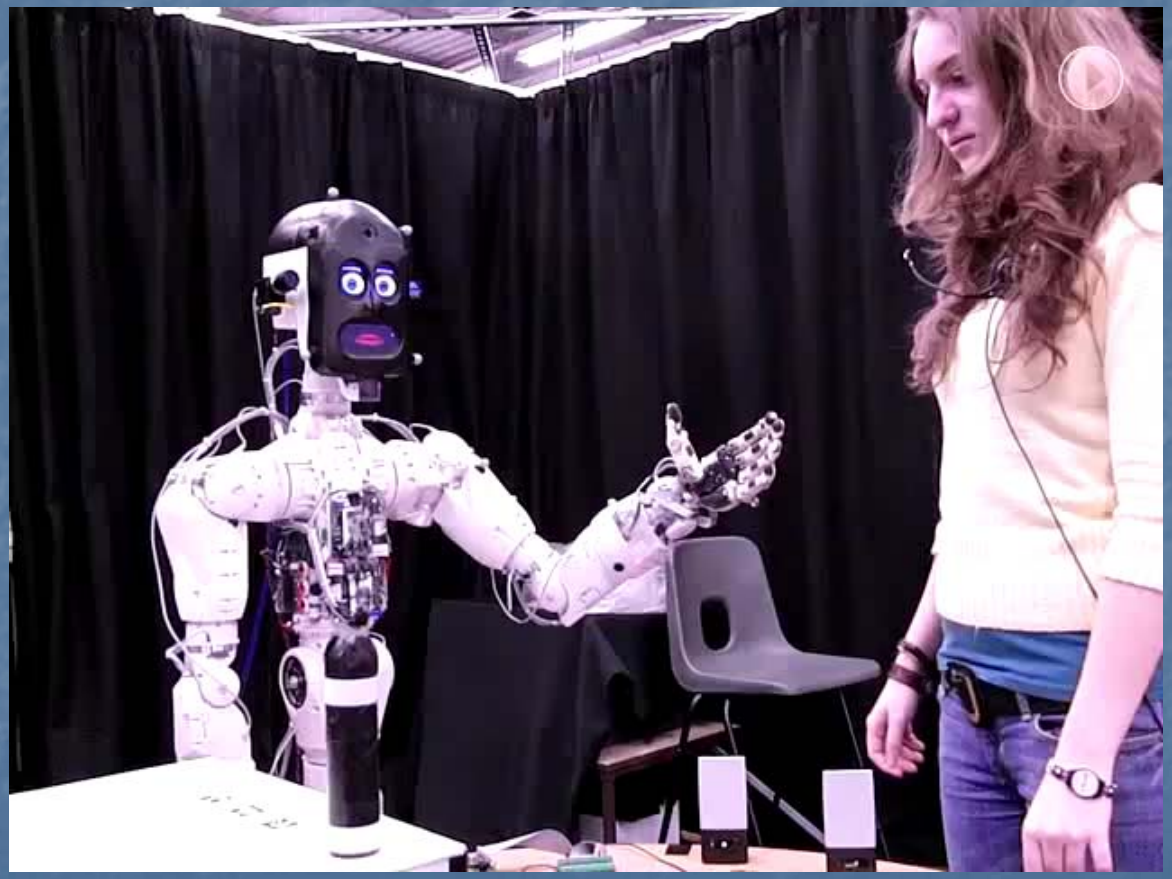
A sense of touch: Tactile Sensing 2



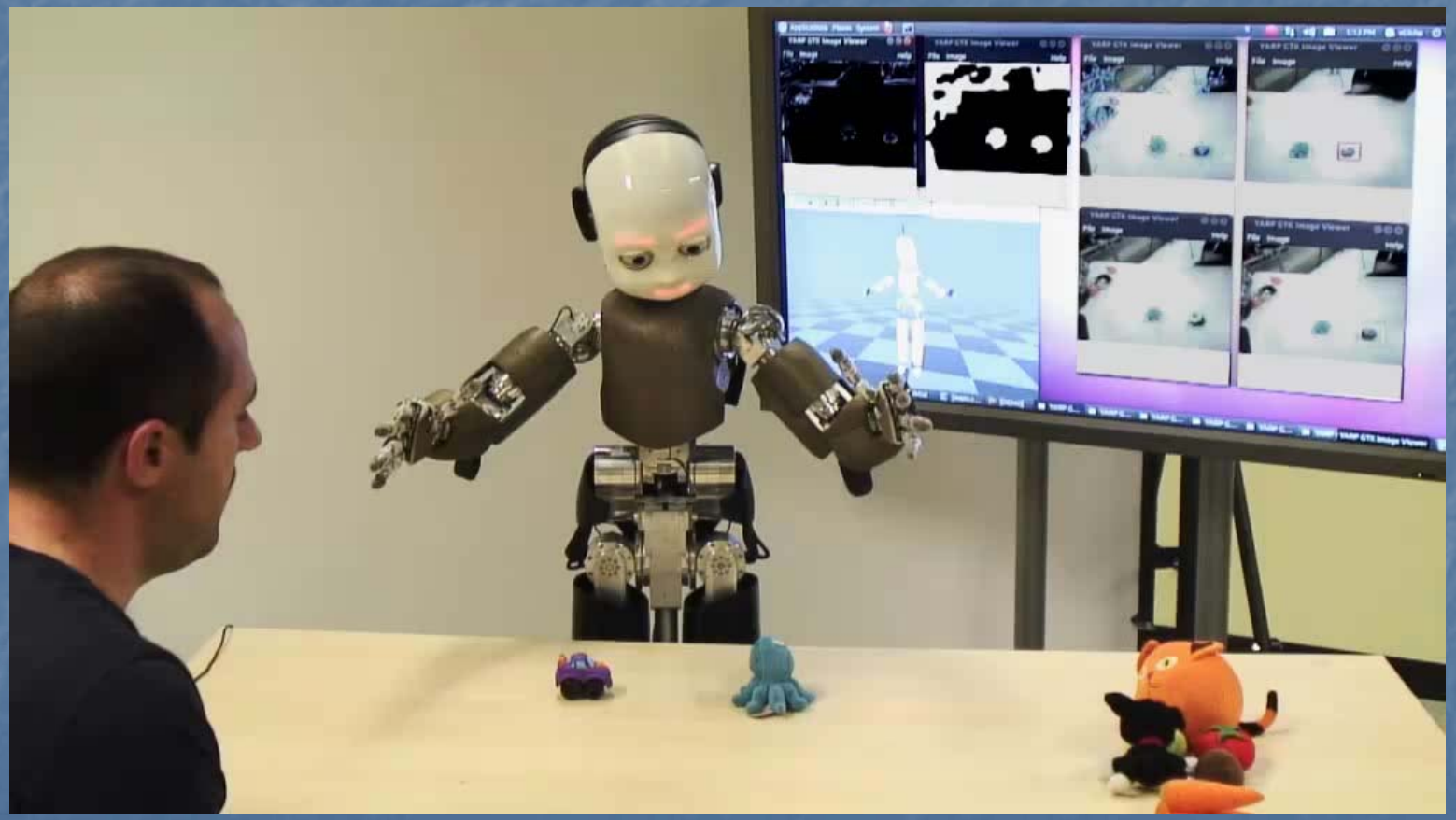
Soft robot control scheme. There are four basic tasks, each is assigned its own cerebellar control module.



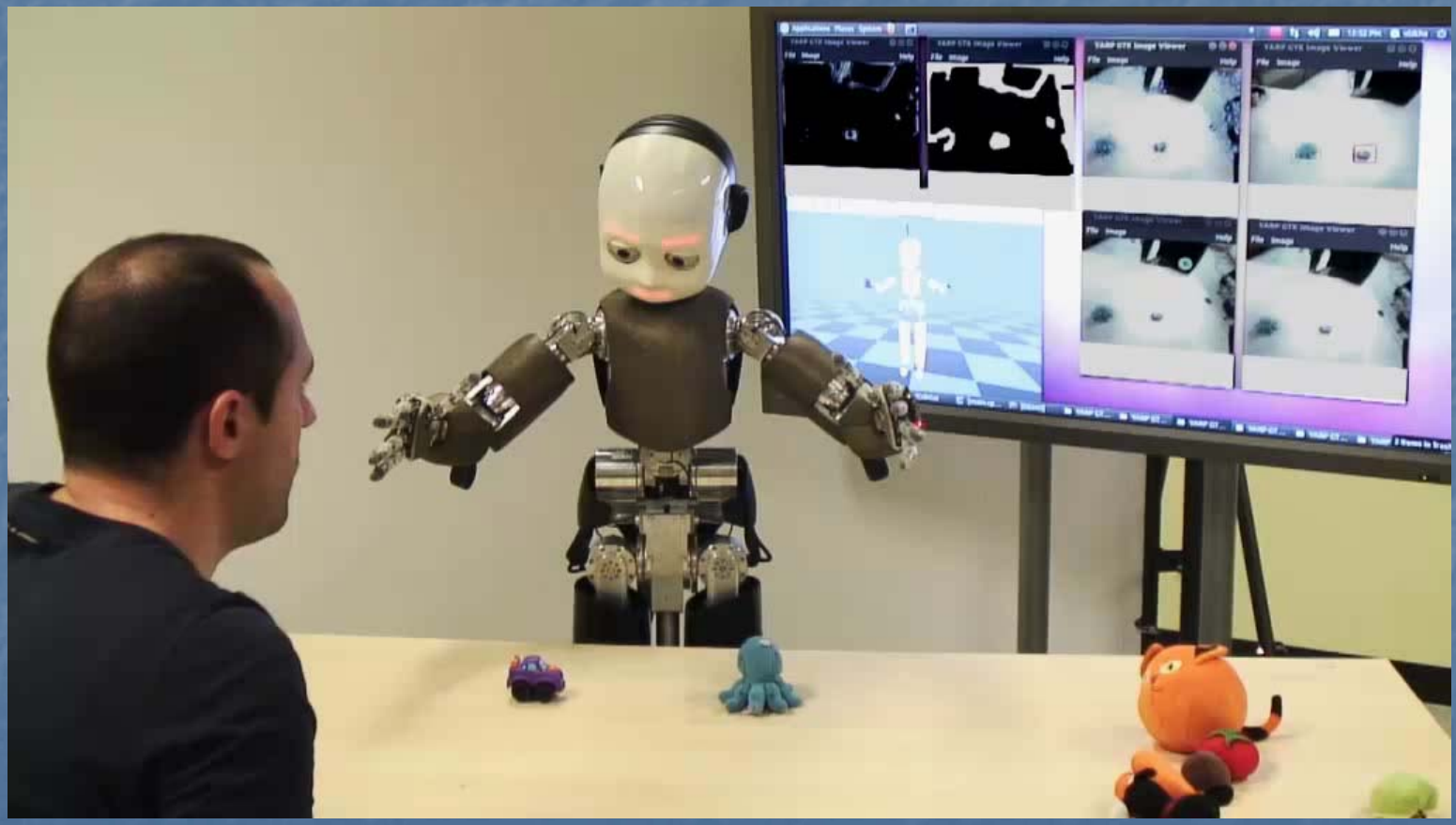
But back to higher level cognition (?) … The CHRIS Project



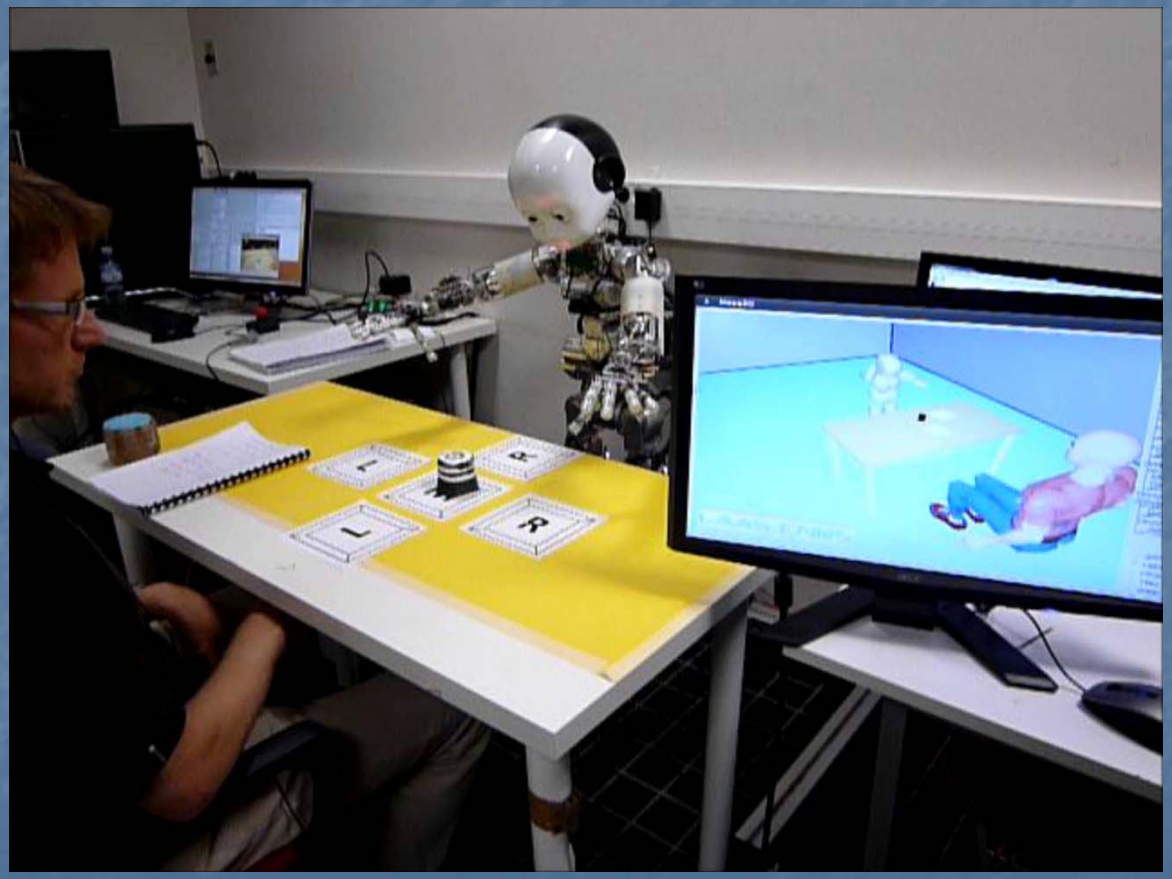
Teaching basic actions:



Teaching new objects:

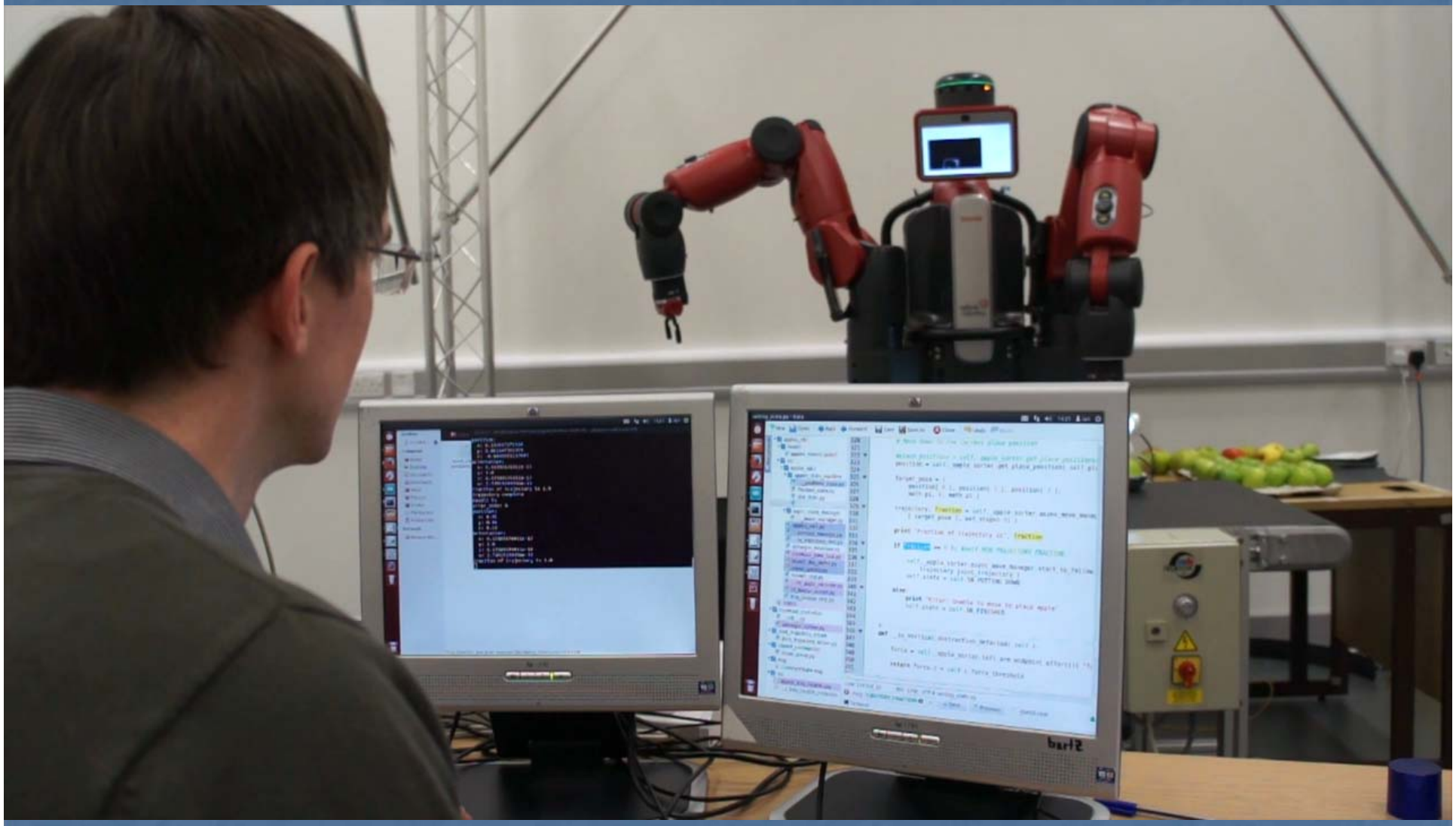


Teaching complex actions and shared plans

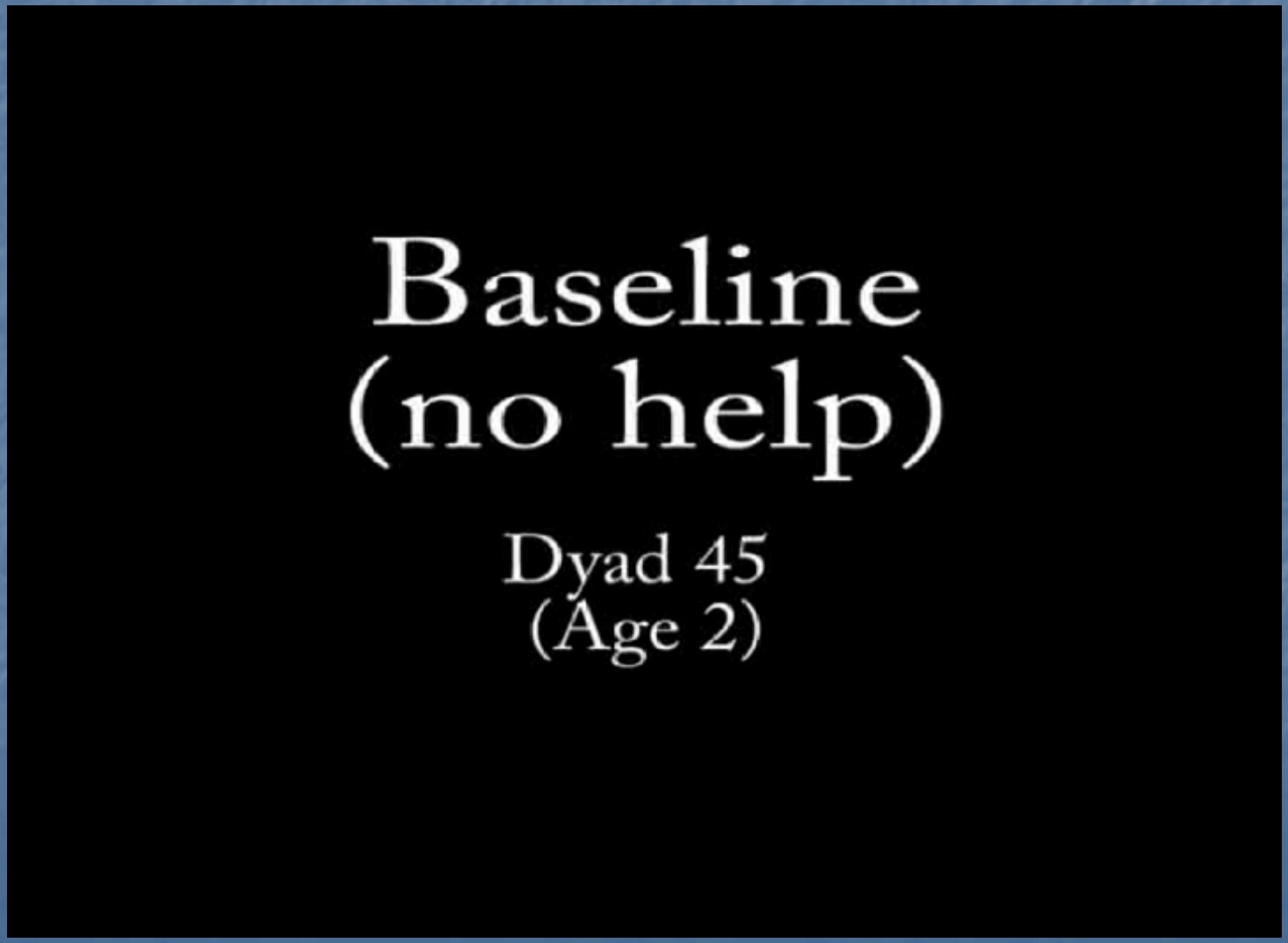


Closer to market … Baxter

ECHORD++



--but humans ....
Human-Human Interaction



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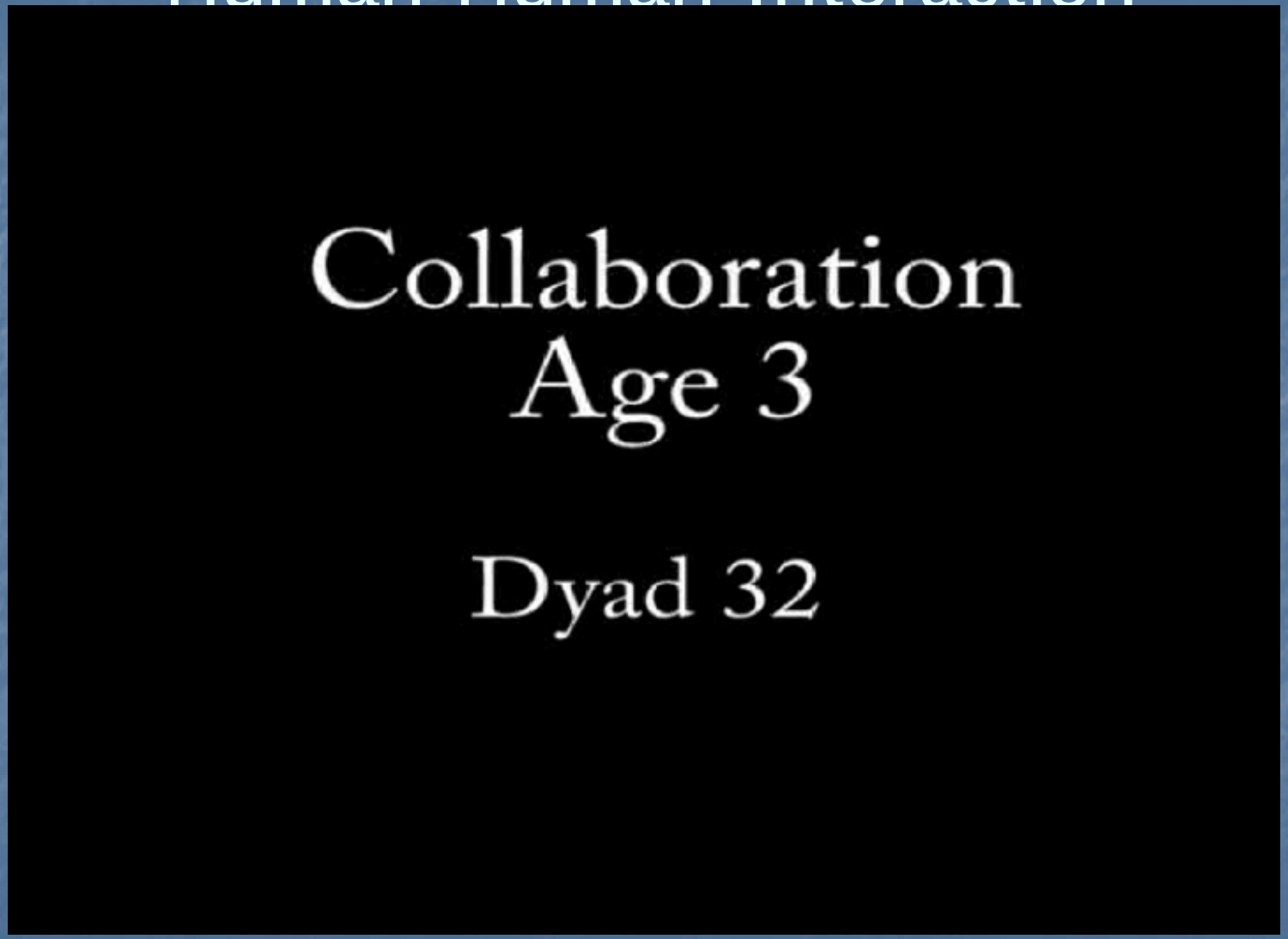
Human-Human Interaction



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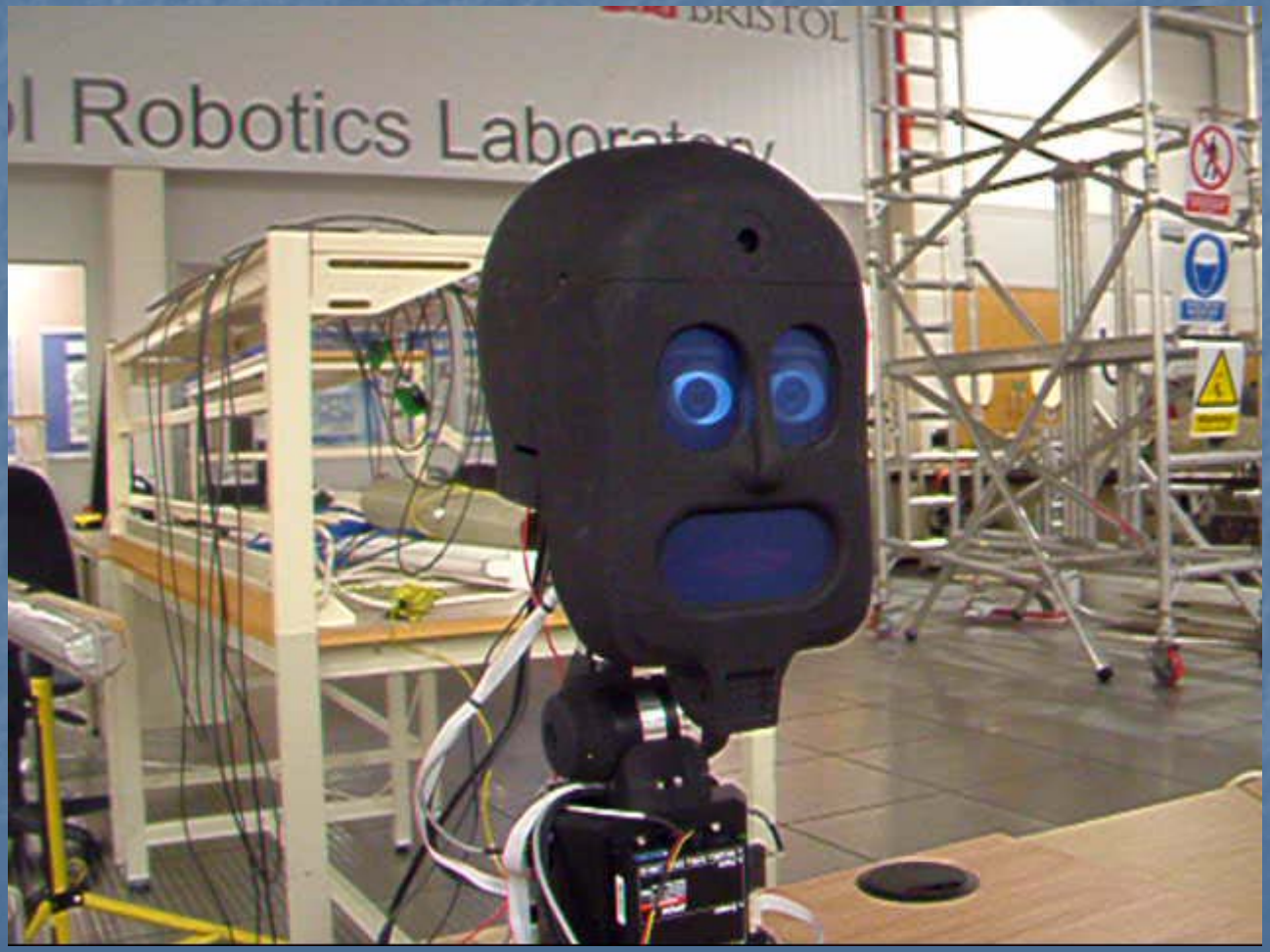
What kind of HRI should we try to achieve?



Thank you ☺

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