



iCub - an open source cognitive humanoid robotic platform

Genova

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Open Science Café

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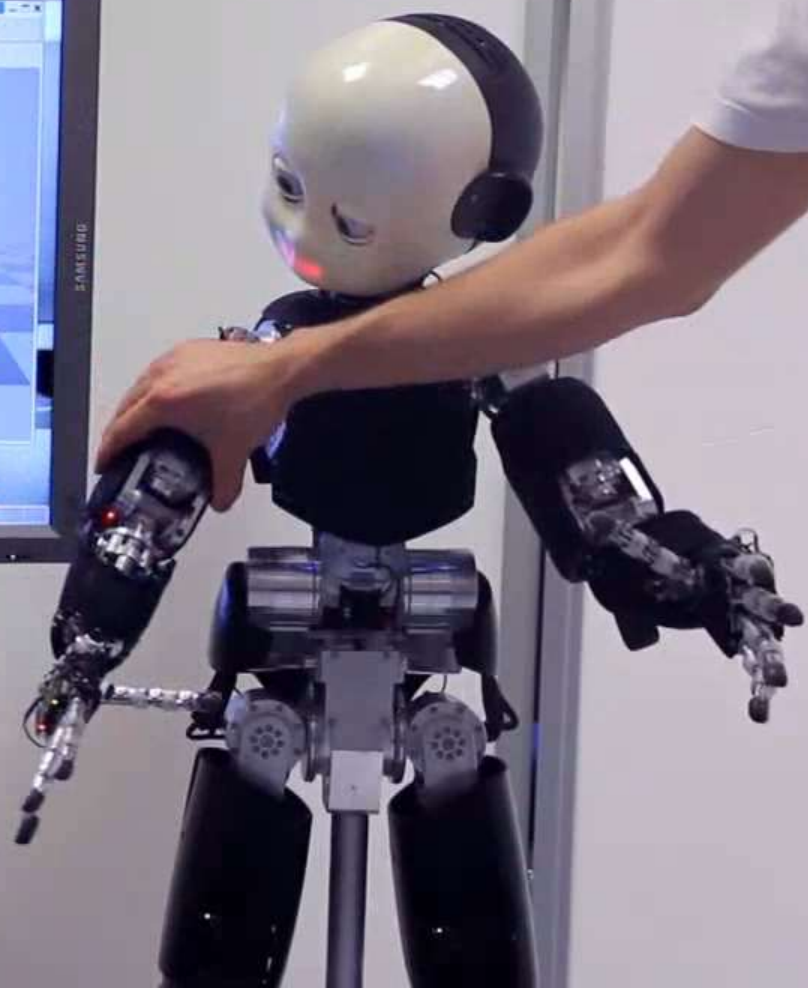
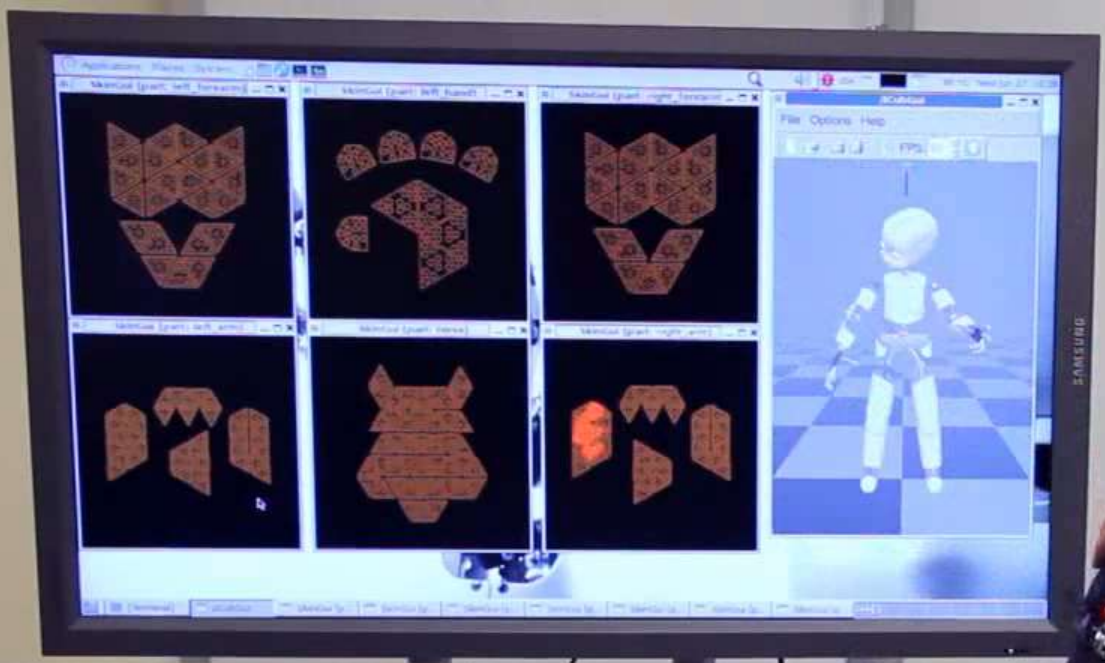
iCub Facility

Istituto Italiano di Tecnologia

iCub is an **open source** international endeavour initially funded by the EU project **RobotCub**

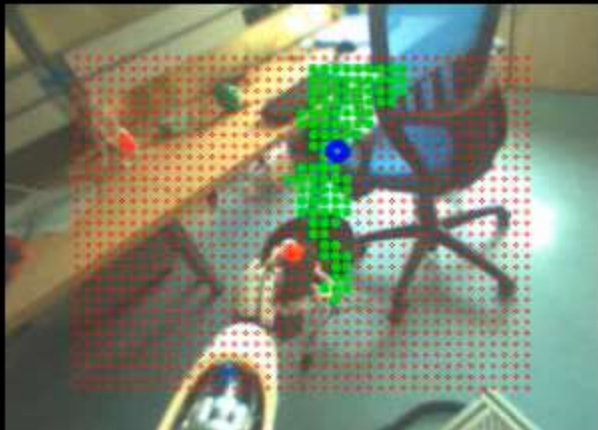
- a full **humanoid** robot
- is **104cm**, weighs **25 kg**
- has **53** degrees of freedom
- can **crawl, sit and manipulate**
- open design as **LGPL/GPL**
- community: **21 copies**



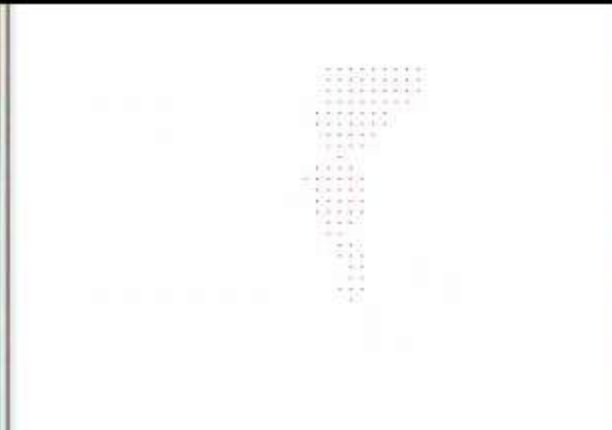


Extracting tool kinematics

Independent motion
detection

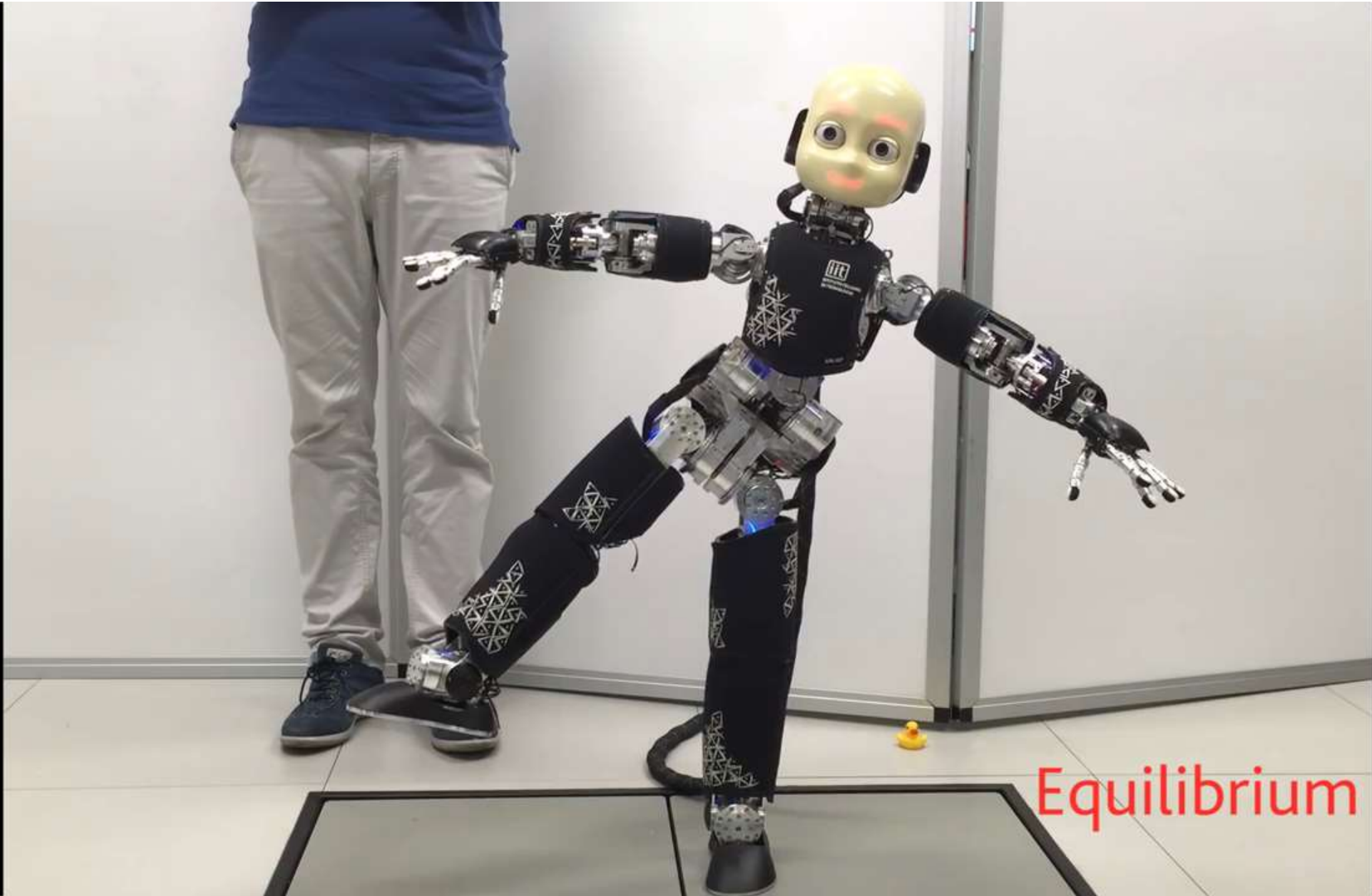


Tooltip extraction



Tool projection





Equilibrium

Thank you!

Let's start the discussion

Overview

interaction



learning actions



recognizing actions

objects



learning objects



recognizing objects

tools



learning tools



using tools

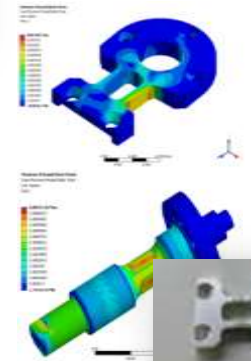
iCub: engineering



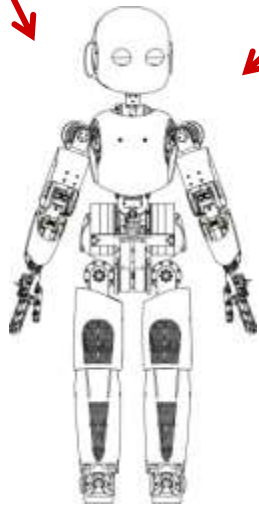
intelligence



vision



force/torque sensors



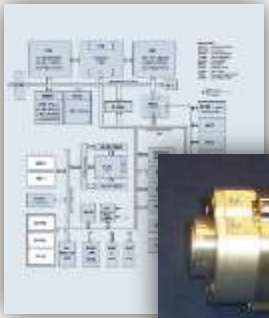
new actuation



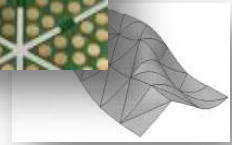
computation



new tools



skin-like sensors



Principle: a soft capacitor



capacitor



ground plane: e.g. conductive fabric
parameters: mechanical properties, impedance, etc.

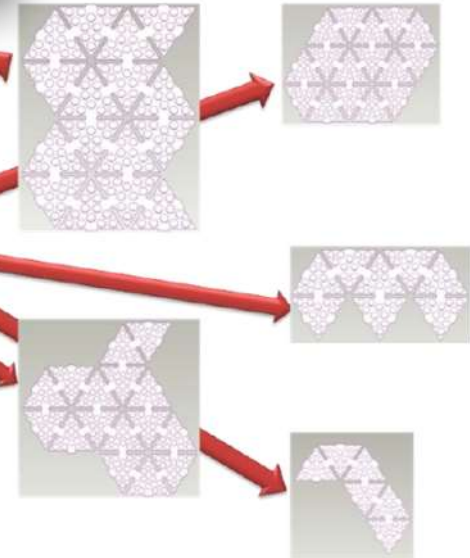
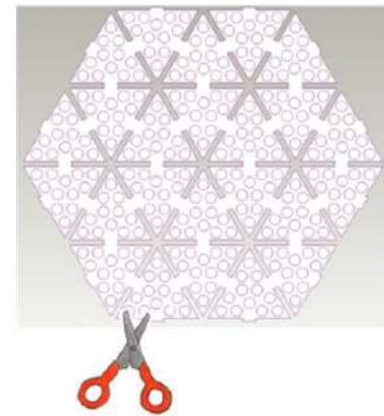
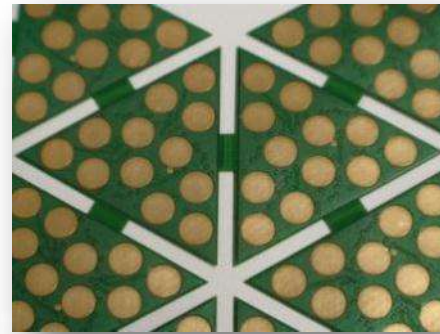
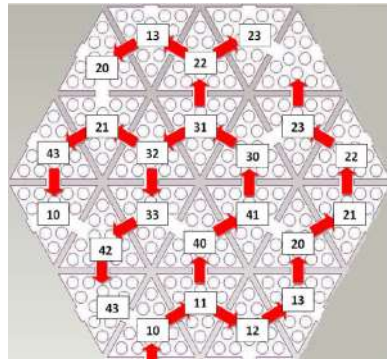
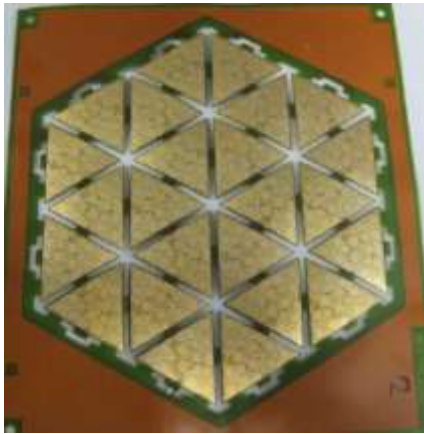


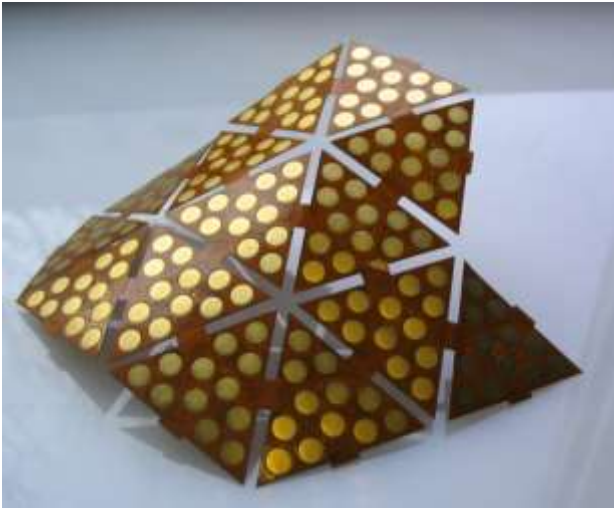
soft material: e.g. silicone
parameters: dielectric constant, mechanical stiffness, etc.



electrodes: etched on a flexible PCB
parameters: shape, folding, etc.

A mesh of sensors





iCub sensorization

Hands: 104x2

Forearms: 230x2

Upperarms: 380x2

Torso: 440

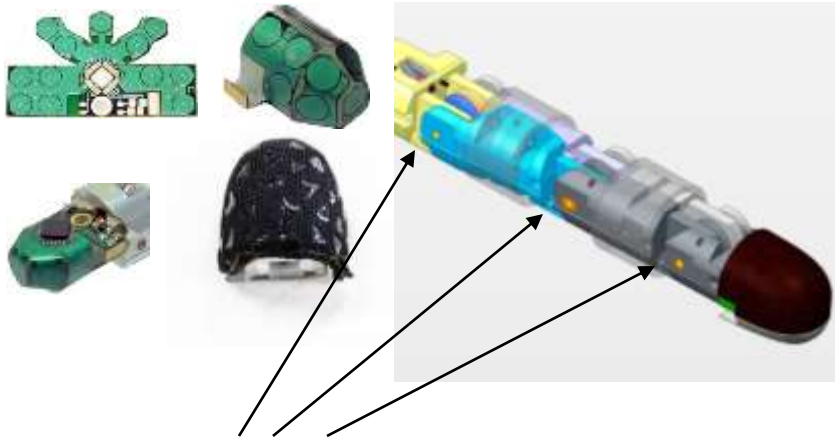
Total: 1868



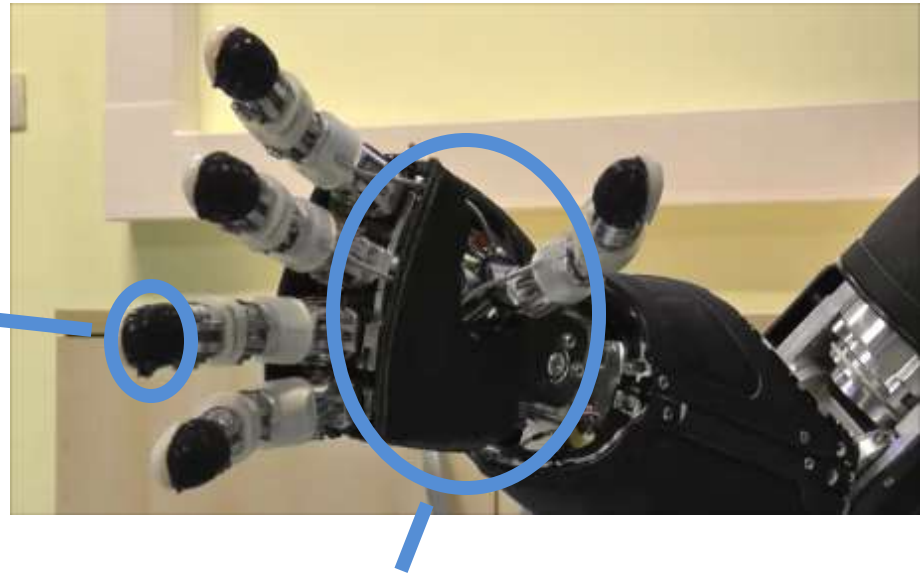
+ accelerometers in the palms and arms



Hand sensorization



Angular position sensors



- 12 sensors each fingertips
- 44 sensors + 4 for temperature comp.
- three-axis accelerometer, $\pm 2g$, $\pm 4g$, $\pm 8g$
- three-axis gyroscope (250/500/2000 dps)

