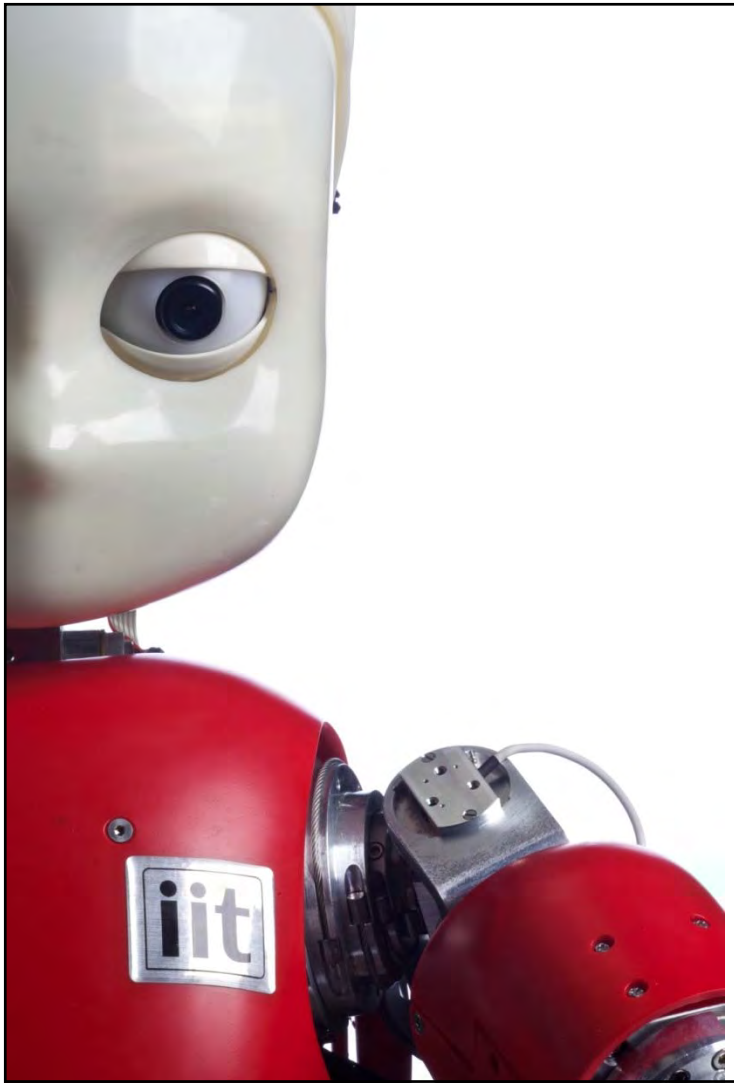

umani e umanoidi

«vivere con i robot»

ISTITUTO ITALIANO
DI TECNOLOGIA

Giorgio Metta

Istituto Italiano di Tecnologia

Via Morego, 30 - 16163, Genova, ITALIA

giorgio.metta@iit.it


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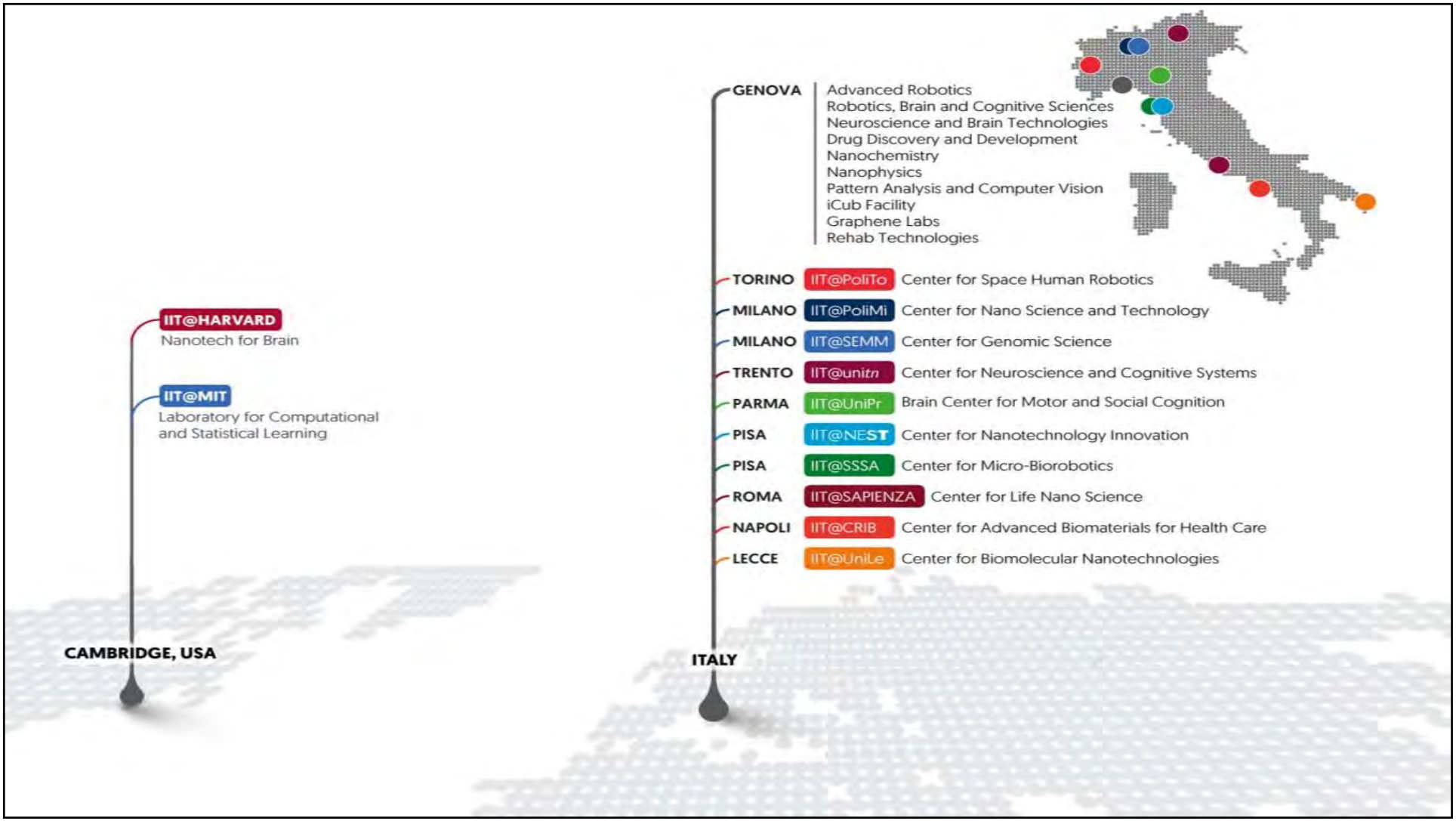
ISTITU

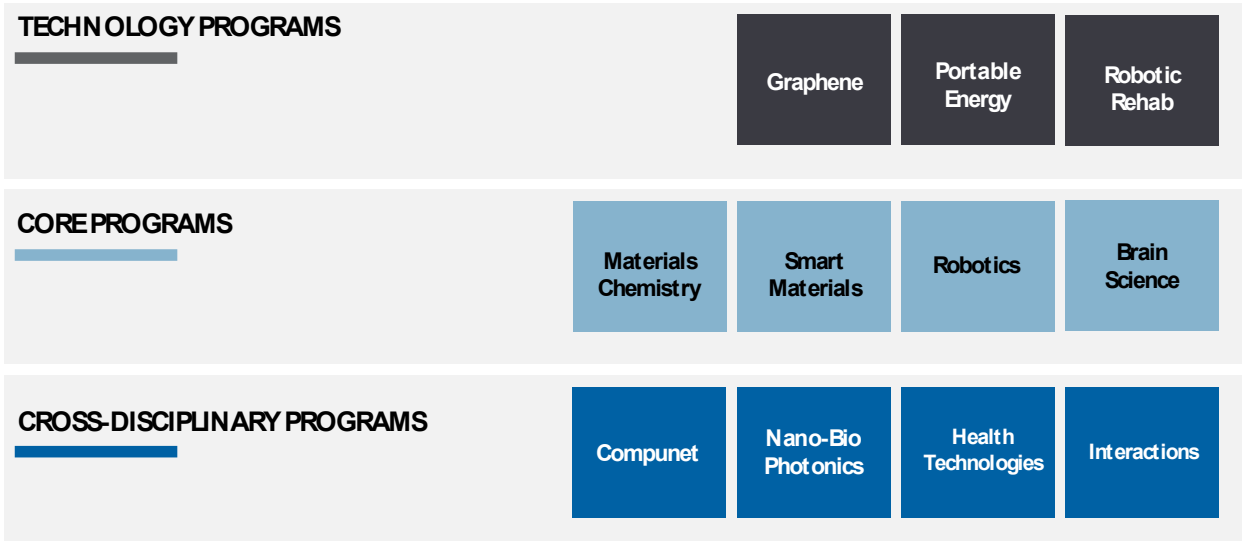

IIT@HARVARD
Nanotech for Brain
IIT@MIT
Laboratory for Computational and Statistical Learning
CAMBRIDGE, USA
GENOVA
Advanced Robotics
Robotics, Brain and Cognitive Sciences
Neuroscience and Brain Technologies
Drug Discovery and Development
Nanochemistry
Nanophysics
Pattern Analysis and Computer Vision
iCub Facility
Graphene Labs
Rehab Technologies
TORINO IIT@PoliTo Center for Space Human Robotics
MILANO IIT@PoliMi Center for Nano Science and Technology
MILANO IIT@SEMM Center for Genomic Science
TRENTO IIT@unitn Center for Neuroscience and Cognitive Systems
PARMA IIT@UniPr Brain Center for Motor and Social Cognition
PISA IIT@NEST Center for Nanotechnology Innovation
PISA IIT@SSSA Center for Micro-Biorobotics
ROMA IIT@SAPIENZA Center for Life Nano Science
NAPOLI IIT@CRIB Center for Advanced Biomaterials for Health Care
LECCE IIT@UniLe Center for Biomolecular Nanotechnologies
ITALY

il piano scientifico di IIT

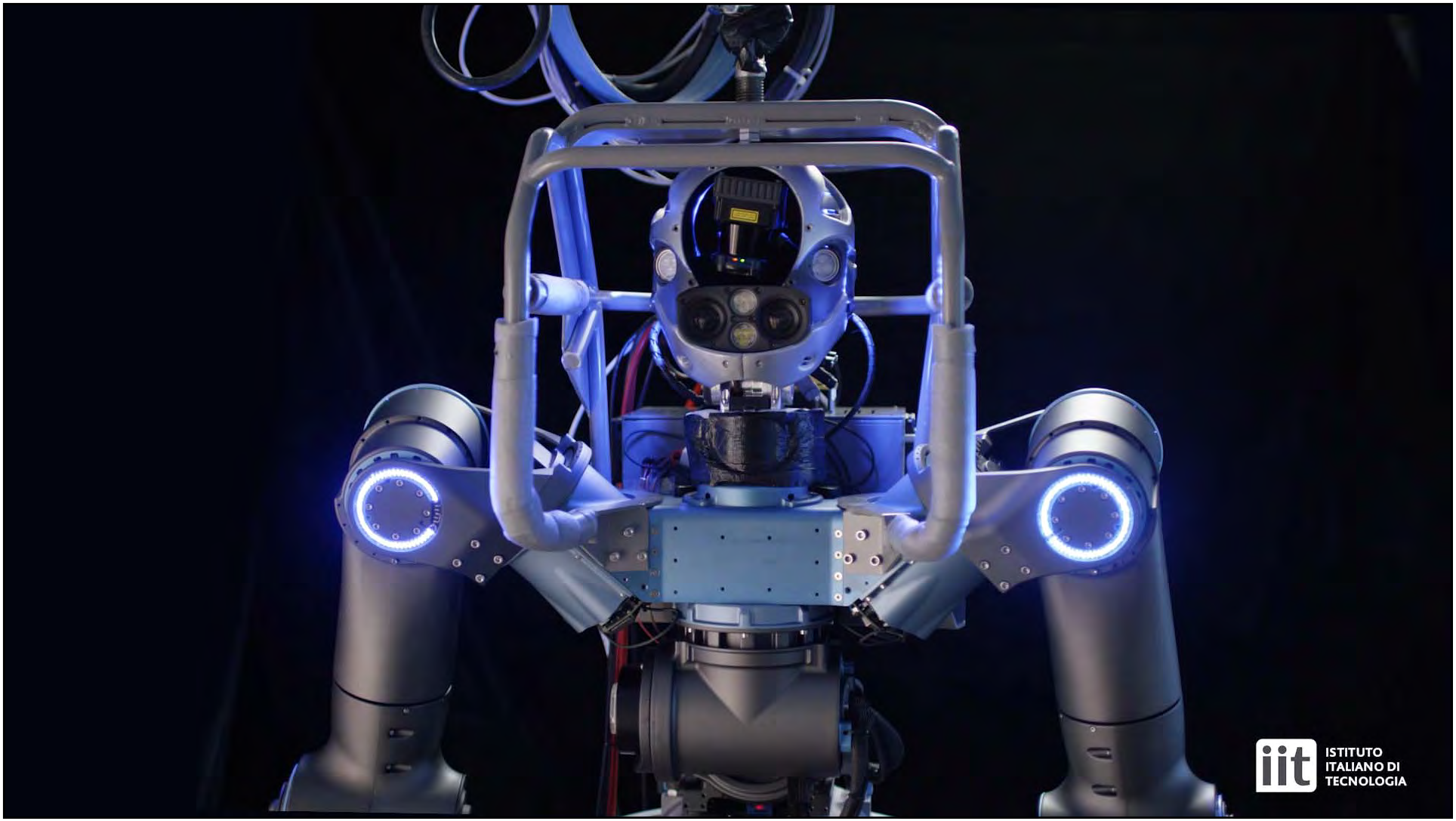
approccio bioispirato

11 programmi sinergici

robotica di base, interazione, riabilitazione




MIYAKO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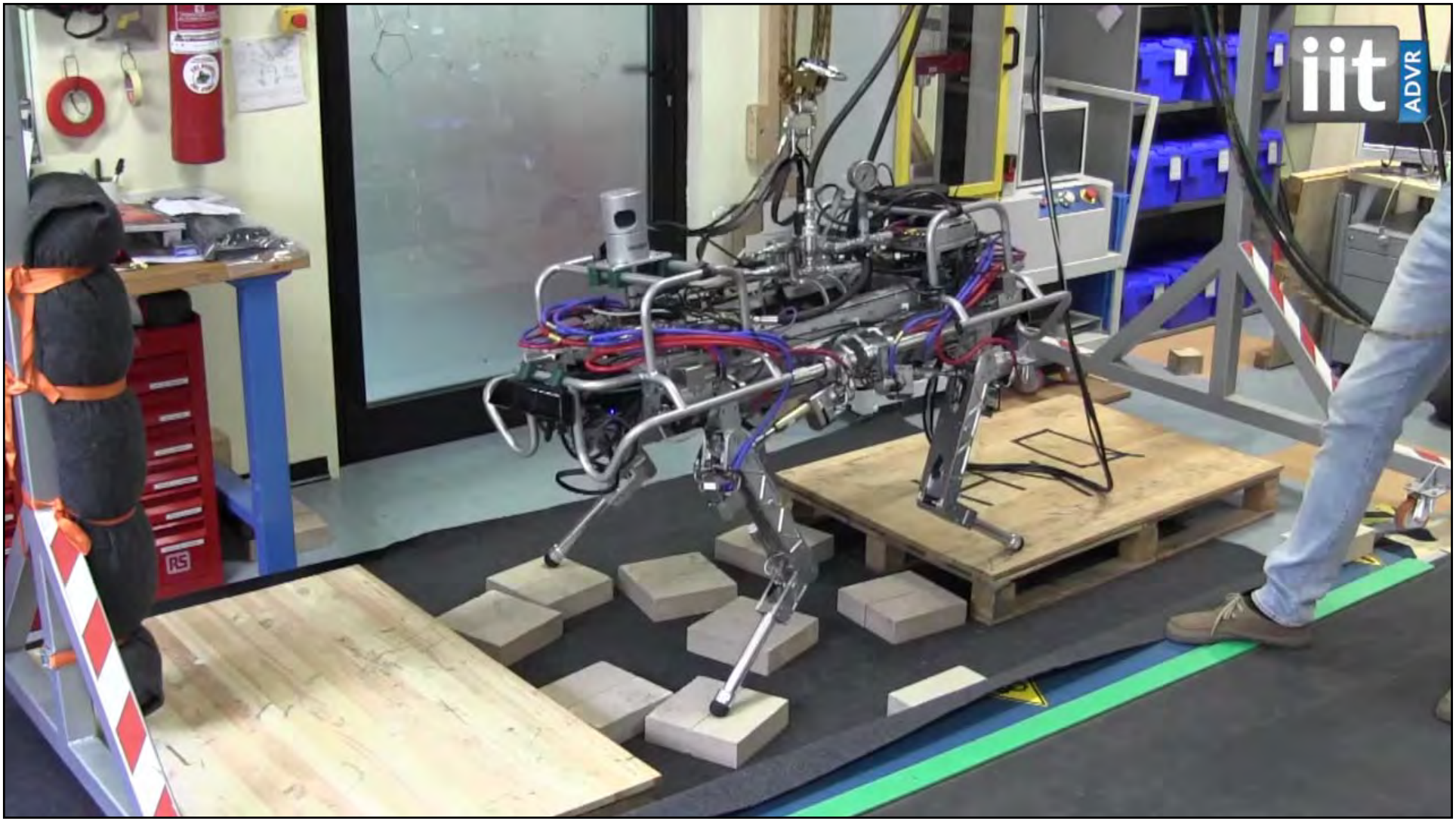
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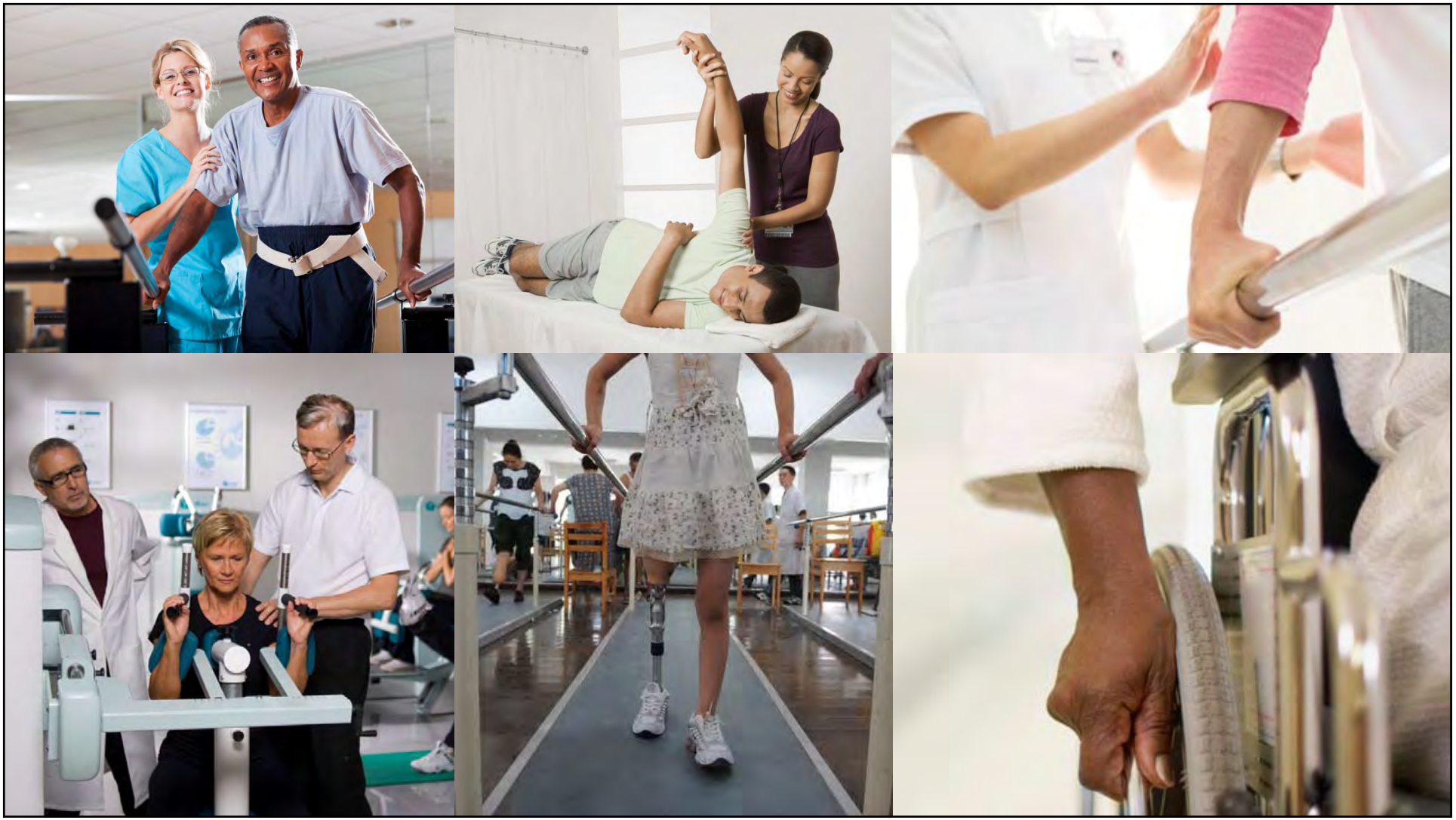
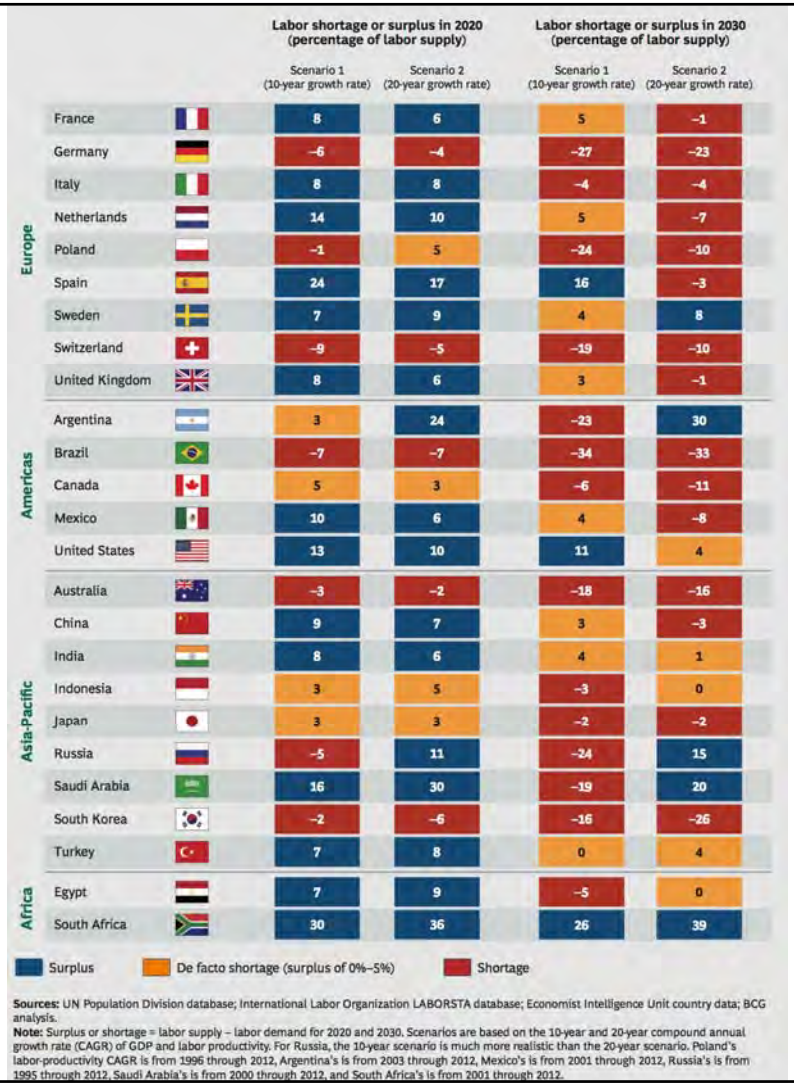
ADVR




EHAB
ECHNOLOG
iit
ADAPTIVE
ROBUST
SOFT
SIMPLE
SoftHand

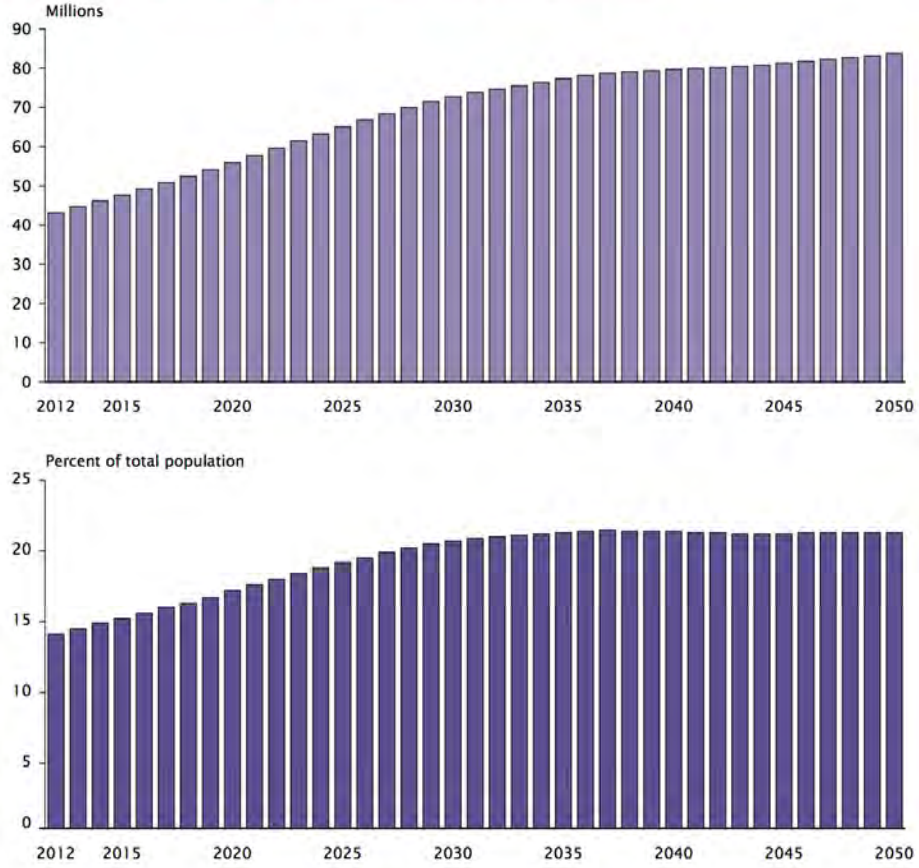

perché



Sources: UN Population Division database; International Labor Organization LABORSTA database; Economist Intelligence Unit country data; BCG analysis.
Note: Surplus or shortage = labor supply – labor demand for 2020 and 2030. Scenarios are based on the 10-year and 20-year compound annual growth rate (CAGR) of GDP and labor productivity. For Russia, the 10-year scenario is much more realistic than the 20-year scenario. Poland's labor-productivity CAGR is from 1996 through 2012, Argentina's is from 2003 through 2012, Mexico's is from 2001 through 2012, Russia's is from 1995 through 2012, Saudi Arabia's is from 2000 through 2012, and South Africa's is from 2001 through 2012.

declining workforce

Figure 1.
Population Aged 65 and Over for the United States: 2012 to 2050



Source: U.S. Census Bureau, 2012 Population Estimates and 2012 National Projections.

ageing in US

ICT_R

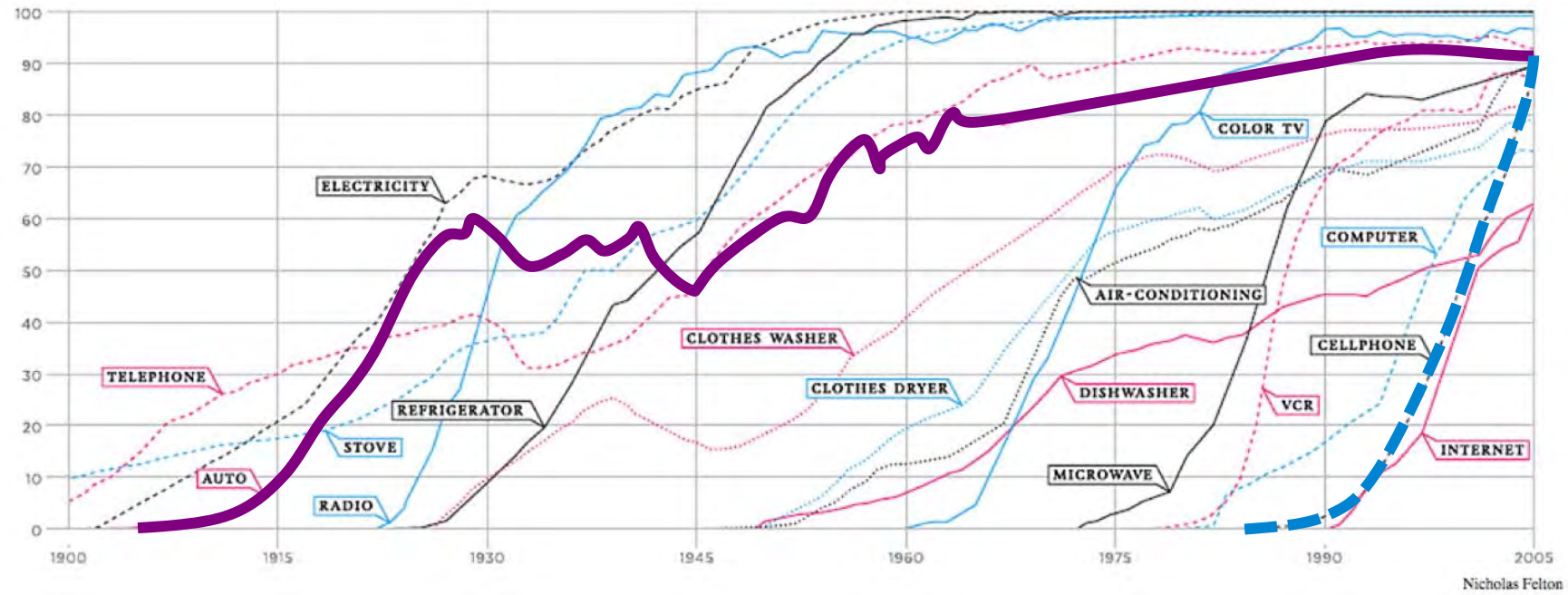
Vint Cerf, Vice Presidente e responsabile delle politiche Internet di Google, parlando su "Future of AI Robotics and Jobs", un documento redatto dalla PEW Research nel 2014, risponde alla domanda: "Quanto l'IA e la robotica diventeranno parte della nostra vita quotidiana?", in questo modo: *"Auto senza guidatore sembrano possibili nel 2025. L'elaborazione del linguaggio naturale ci porterà ad avere computer con i quali interagire in maniera naturale. I motori di ricerca probabilmente diventeranno dei sistemi con i quali conversare. La cosiddetta «Internet delle cose» sarà realtà e l'interazione continua con i nostri dispositivi digitali ubiqua. Un insieme di servizi forniti attraverso questi dispositivi sara' anche molto comune."*

anche:

- Elon Musk (Tesla) – open AI foundation
- Google – Deep Mind + robotica (si veda Boston Dynamics)
- Toyota – AI, robotica, auto
- Facebook – apprendimento automatico, IA
- Softbank – robotica

nessuna di queste è una ditta di robotica nel senso classico

Future of AI Robotics and Jobs: Aaron Smith, Janna Anderson (2014) Pew Research Center


100
90
80
70
60
50
40
30
20
10
0
1900
1915
1930
1945
1960
1975
1990
2005
ELECTRICITY
TELEPHONE
AUTO
STOVE
REFRIGERATOR
RADIO
CLOTHES WASHER
CLOTHES DRYER
COLOR TV
AIR-CONDITIONING
DISHWASHER
MICROWAVE
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A Robot in Every Home [Preview]
The leader of the PC revolution predicts that the next hot field will be robotics
By Bill Gates
See Inside
The Science of Star Wars
Droids, lightsabers and the Force return to theaters August 15th in Star Wars: The Clone Wars. Get the lowdown on the science behind it all. »
August 15, 2008
Imagine being present at the birth of a new industry. It is an industry based on groundbreaking new technologies, wherein a handful of well-established corporations sell highly specialized devices for business use and a fast-growing number of start-up
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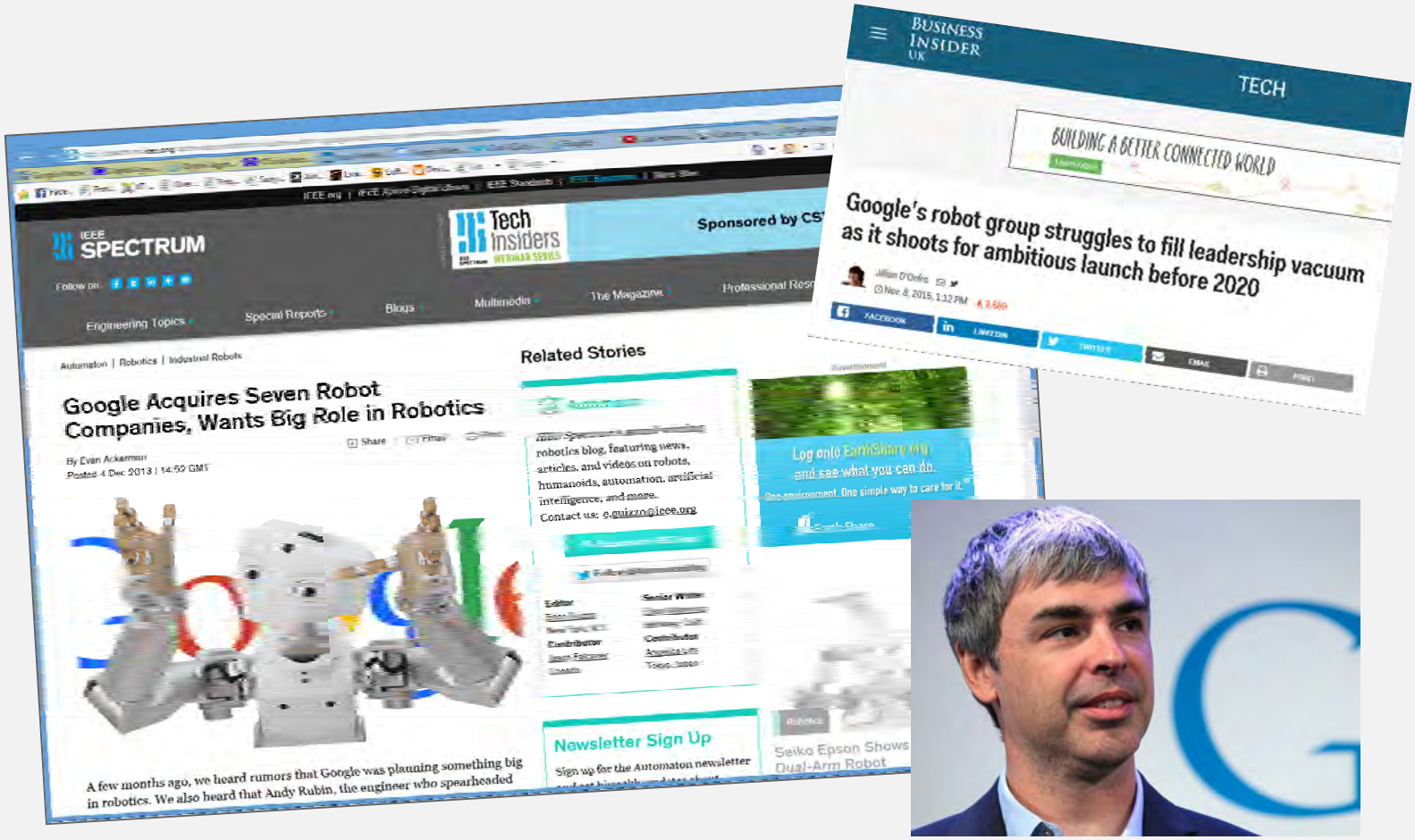
SCIENTIFIC AMERICAN
DAWN OF THE AGE OF ROBOTS
Bill Gates writes that every home will soon have smart mobile devices
SCIENTIFIC AMERICAN
PLANET.


IEEE SPECTRUM
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Engineering Topics
Special Reports
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Multimedia
The Magazine
Automaton | Robotics | Industrial Robots
Google Acquires Seven Robot Companies, Wants Big Role in Robotics
By Evan Ackerman
Posted 4 Dec 2013 | 14:59 GMT
A few months ago, we heard rumors that Google was planning something big in robotics. We also heard that Andy Rubin, the engineer who spearheaded
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BUSINESS INSIDER UK
TECH
BUILDING A BETTER CONNECTED WORLD
Google's robot group struggles to fill leadership vacuum as it shoots for ambitious launch before 2020
Nov. 8, 2015, 1:12 PM
FACEBOOK
LINKEDIN
TWITTER
EMAIL
PRINT


Quando arrivi a una biforcazione, prendila!
[Yogi Berra]

iCub and friends

iCub2.5

iCub3.0

iCub2020

"Plastic robot"

?

iCub tech

mani

il progetto inizia dalle mani

sensori

umanoidi

elettronica

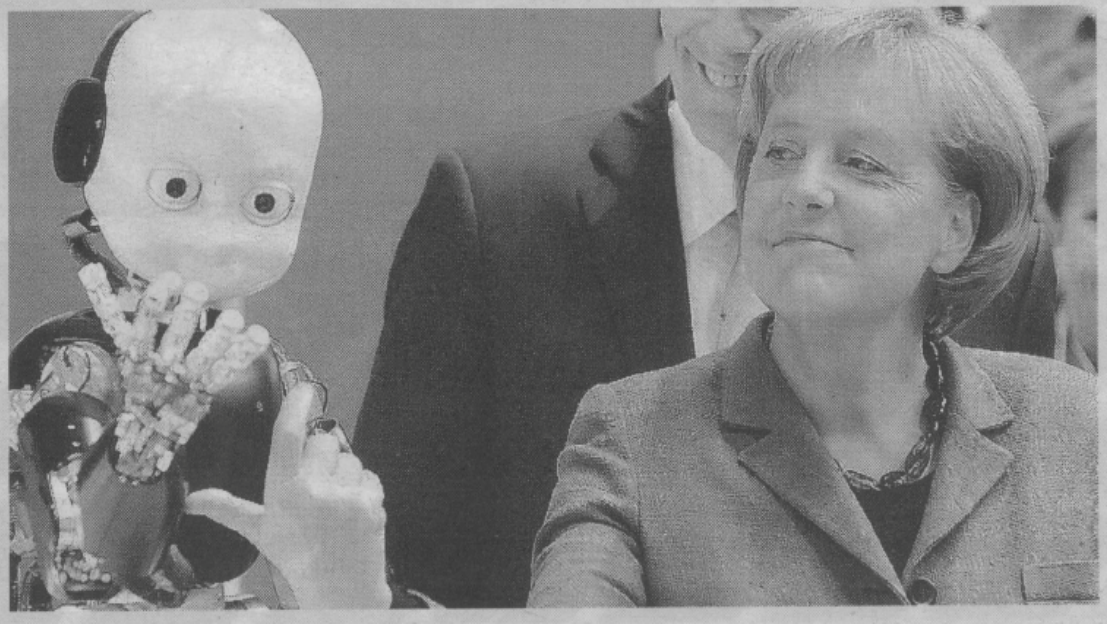
custom

piattaforma aperta

GPL

UPMC PARIS UNIVERSITAS · Universitat Pompeu Fabra · EPFL École Polytechnique Fédérale de Lausanne · Inserm Institute thématiques · iit · University of Hertfordshire · Imperial College London · Universität Bielefeld · METU · University of Plymouth

Sul «Financial Times»



Elogio alla Germania (con robot italiano)

In un ampio servizio a tutta pagina, intitolato «The miraculous machine», il «Financial Times» di ieri analizzava il successo dell'economia tedesca. Sotto il titolo campeggiava una grande foto di Angela Merkel nell'atto di dare la mano a un robot antropomorfo, simbolo, per il quotidiano finanziario britannico, della potente tecnologia germanica. Tuttavia quel robot è italianissimo ed è stato realizzato dal team di Roberto Cingolani all'Istituto Italiano di Tecnologia di Genova.

Edoardo Segantini

dal Corriere della Sera, 21 Aprile 2012

perché **UMANOIDI?**

per ragioni **scientifiche**

«gli elefanti non giocano a scacchi»

interazione naturale **uomo–robot**

meccatronica **avanzata**

FUN!

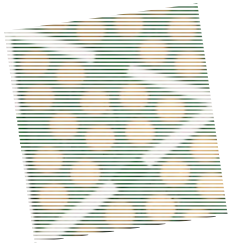
e ora un po' di tecnologia

la pelle

condensatore

tessuto conduttivo

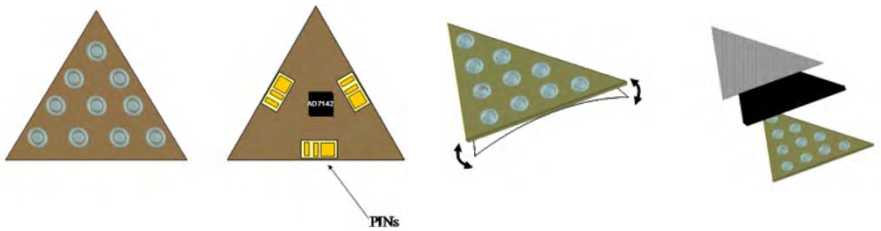
materiale soffice



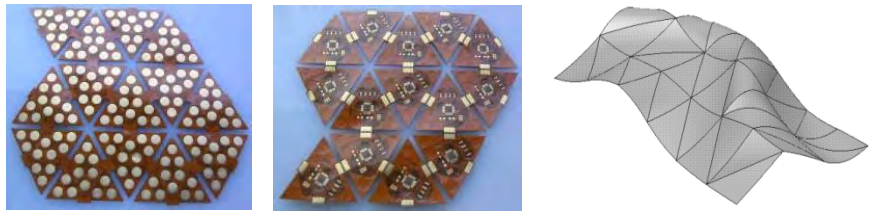
elettrodi

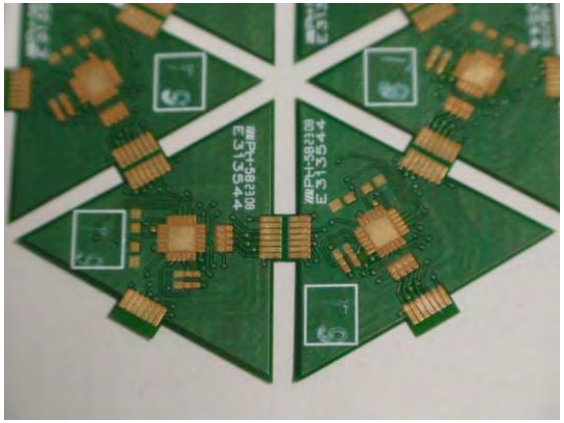
la pelle

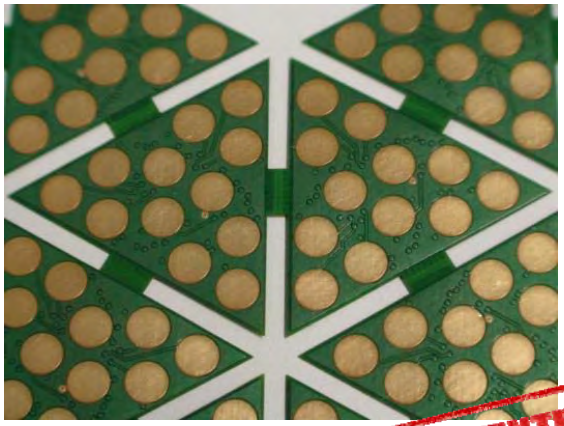
tanti punti sensibili



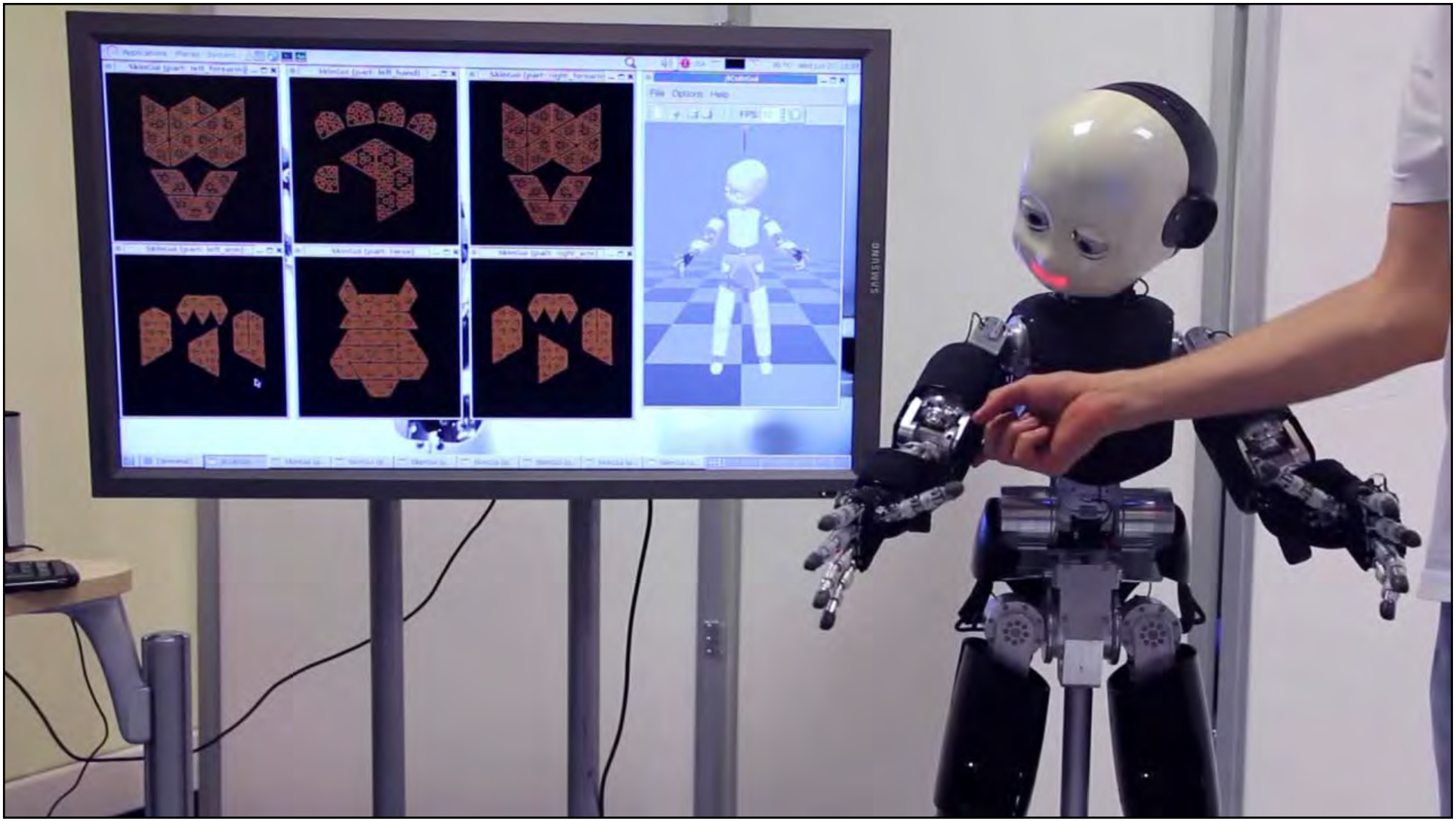
struttura della pelle

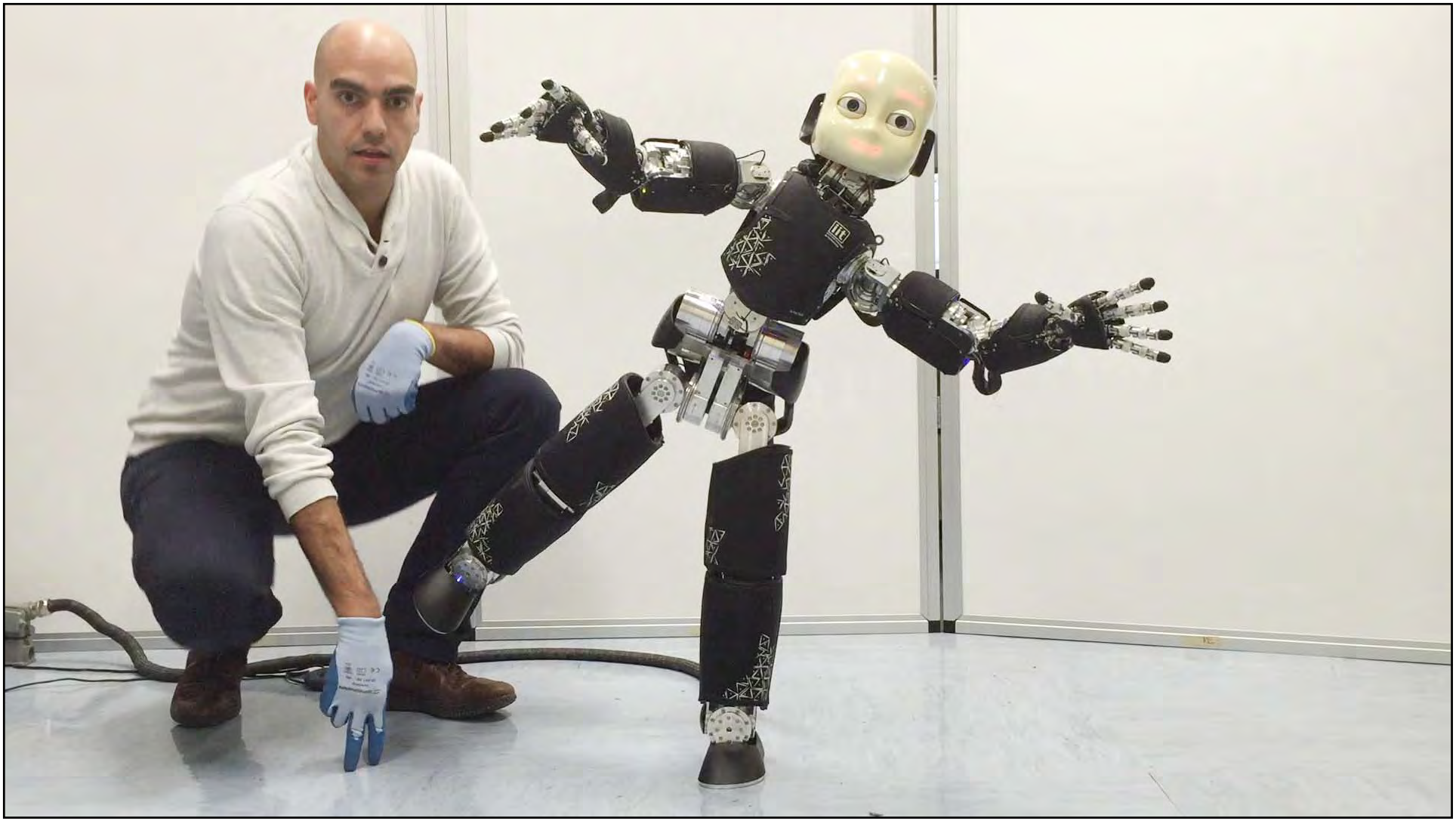


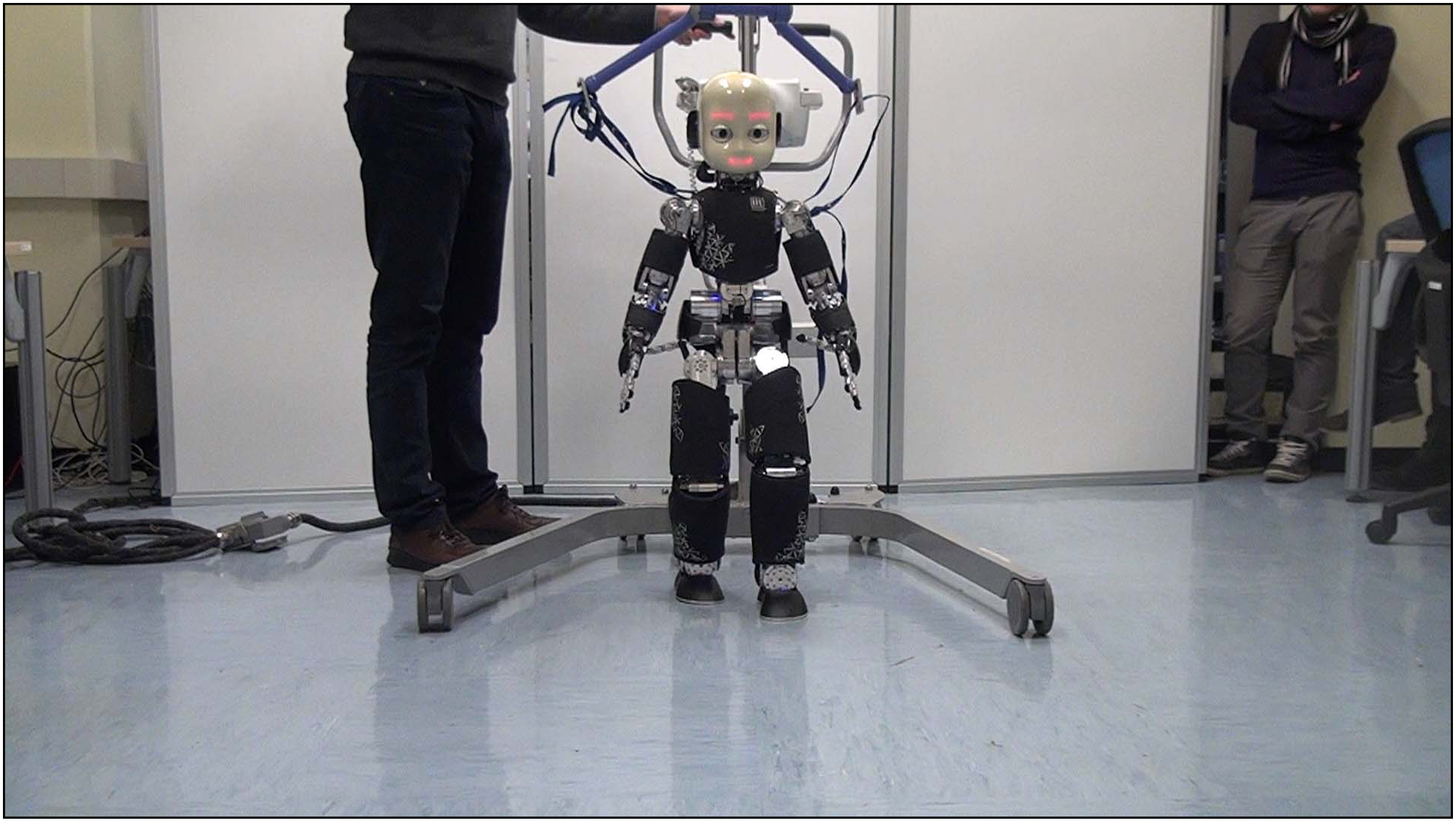




PATENTED


SAMSUNG



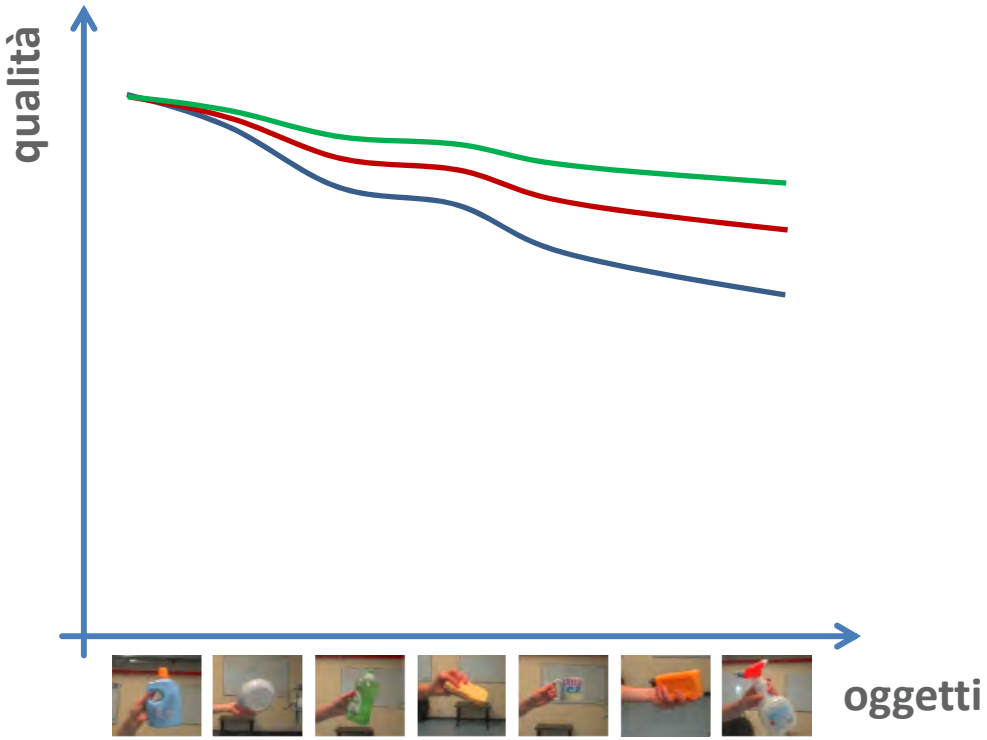


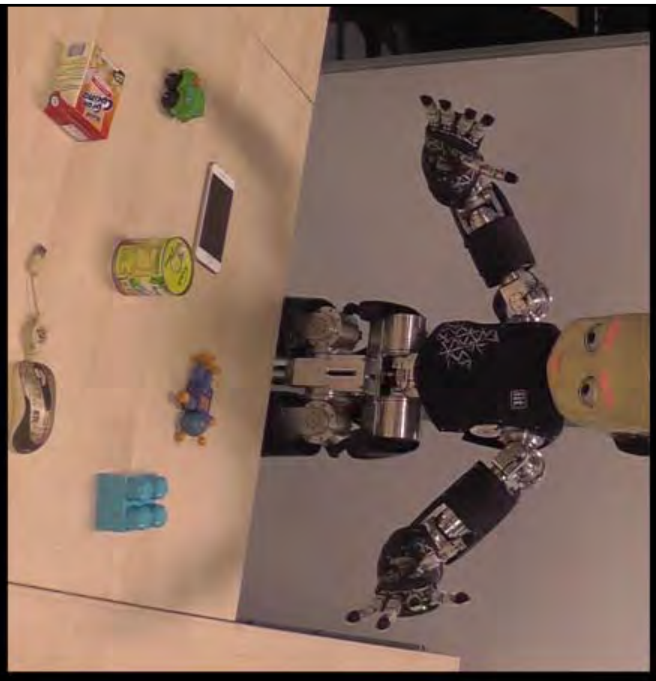

Kodak


look:cup
look:octopus
look:squeez

il mondo di iCub

di oggetti



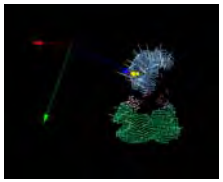


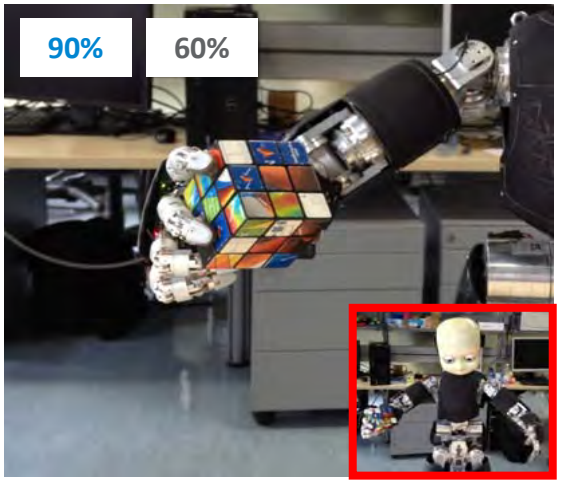
Mouse
Stapler
Robot
Can
Mints
Cup
Phone
Lego
Juice
Octopus
Squeezer
Wallet
Ball
Cube
Soap
Car
Brush
Comb

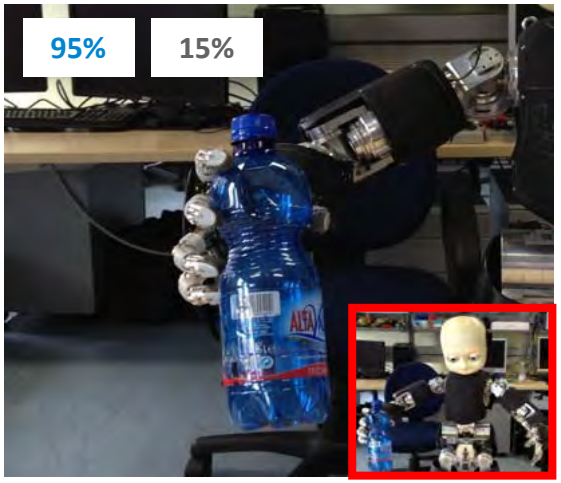
presa controllata

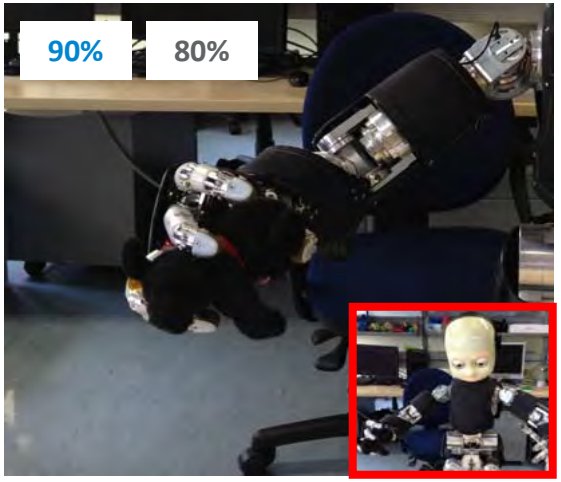
vs.

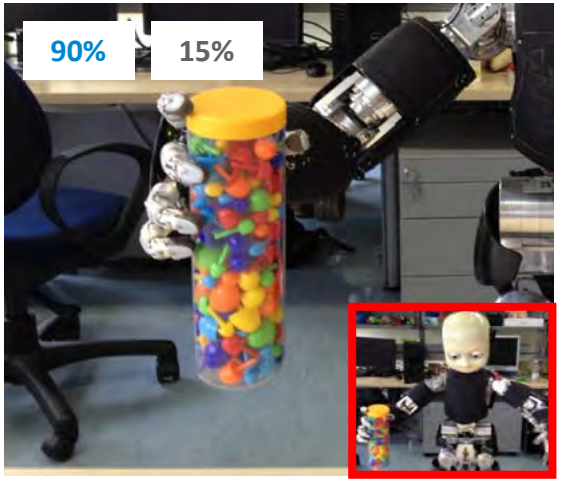
presa stereotipata (fissa)



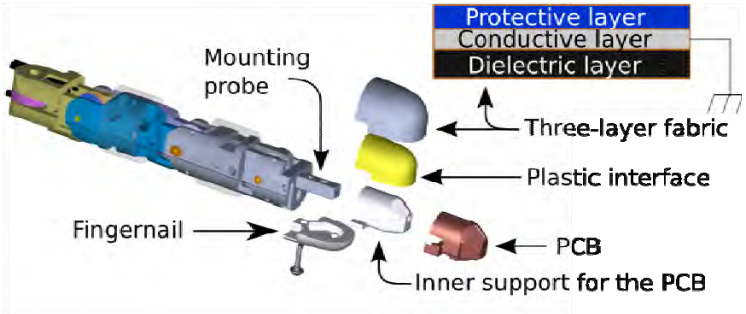


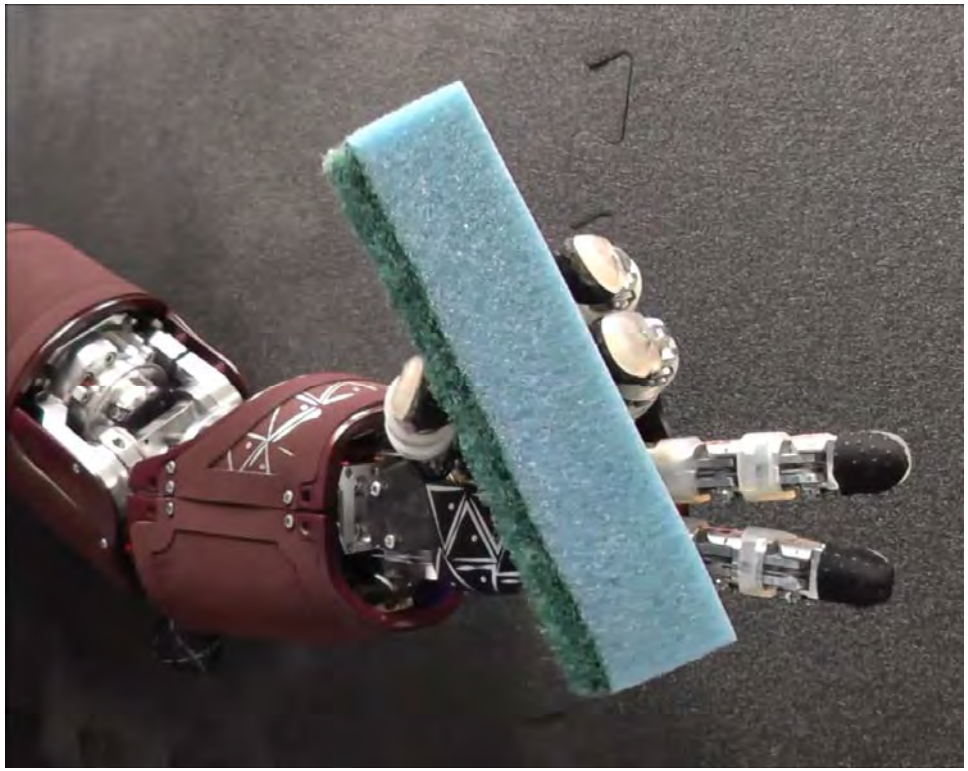


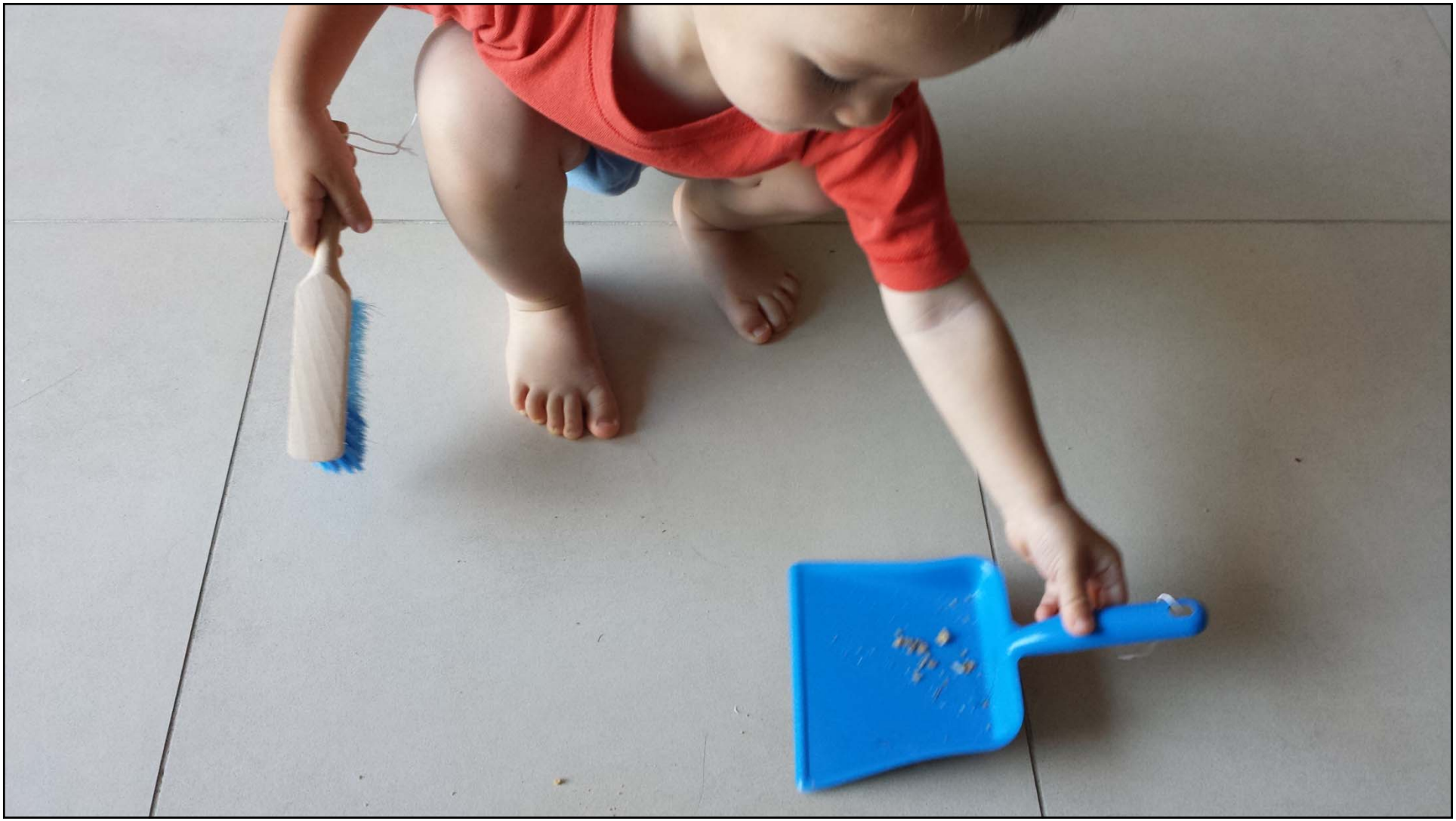


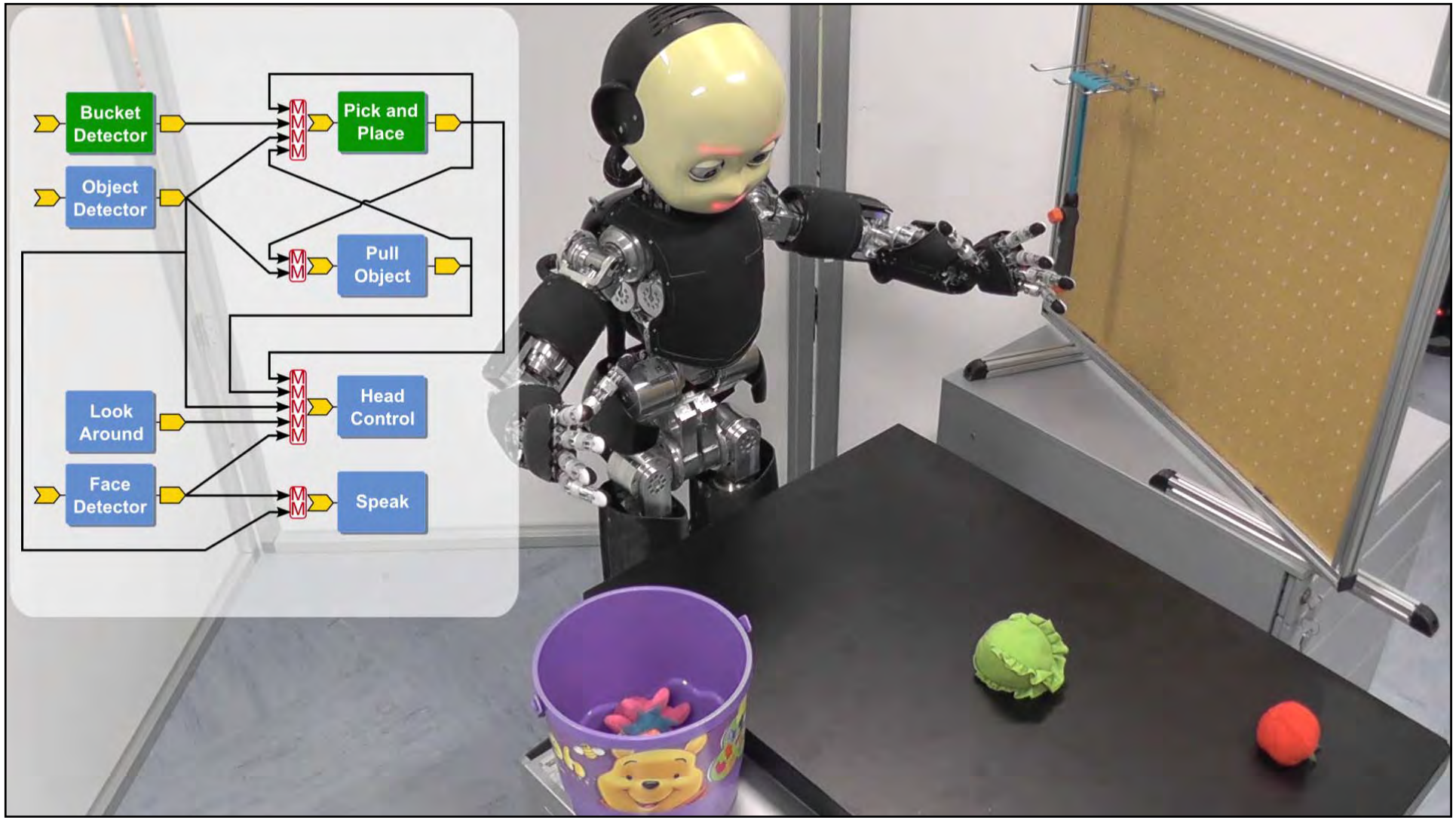


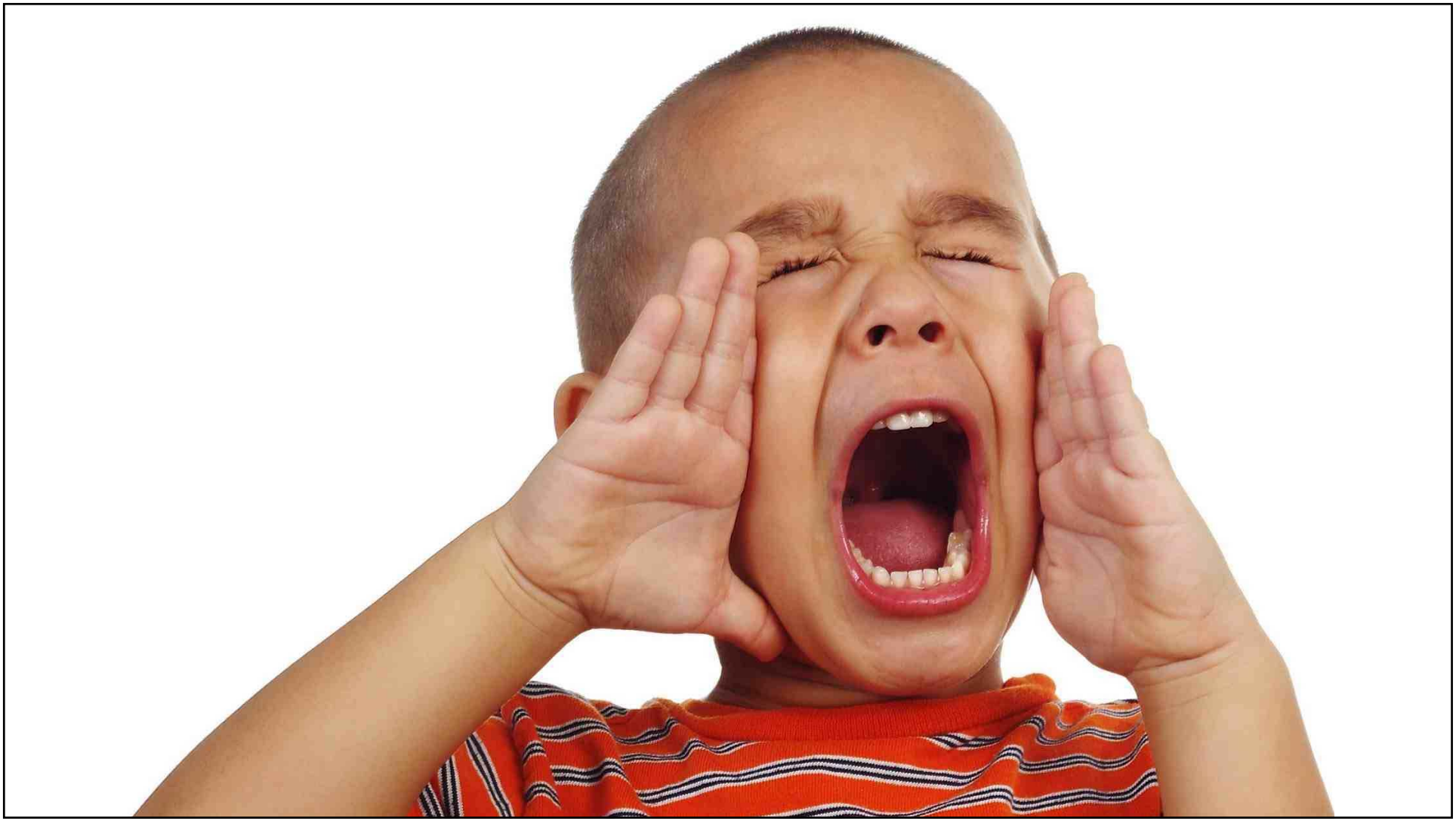
ancora MANIPOLAZIONE








Bucket Detector
Object Detector
Face Detector
Look Around
Pick and Place
Pull Object
Head Control
Speak
M



parlato
nel cervello

Report

The Motor Somatotopy of Speech Perception

Alessandro D'Ausilio,[1] Friedemann Pulvermüller,[2] Paola Salmas,[1] Ilaria Bufalari,[1] Chiara Begliomini,[1] and Luciano Fadiga[1,3,*]
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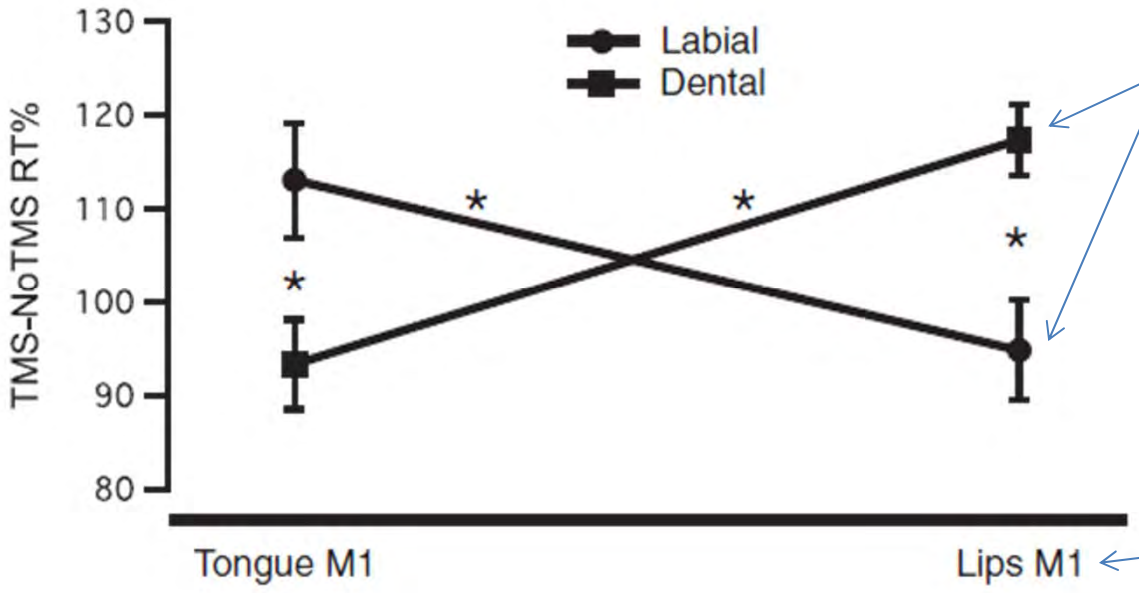
Section of Human Physiology
University of Ferrara
Ferrara 44100
Italy
[2]Cognition and Brain Sciences Unit
Medical Research Council
Cambridge CB2 7EF
UK
[3]IIT, The Italian Institute of Technology
Genova 16163
Italy

(MTSP) [3], an early precursor of a new paradigm, most radically postulated that the articulatory gestures, rather than sounds, are critical for both production and perception of speech [see 4]. On neurobiological grounds, fronto-temporal circuits are thought to play a functional role in production as well as comprehension of speech. The coactivation of motor circuits and the concurrent perception of self-produced speech sounds during articulations might lead to correlated neuronal activity in motor and auditory systems, triggering long-term plastic processes based on Hebbian learning principles [15–17]. The postulate of a critical role of actions in the formation of speech circuits is paralleled in more general action-perception theories emphasizing a critical role of action representations in action-related perceptual processes [18]. However, a majority of researchers are still skeptical toward

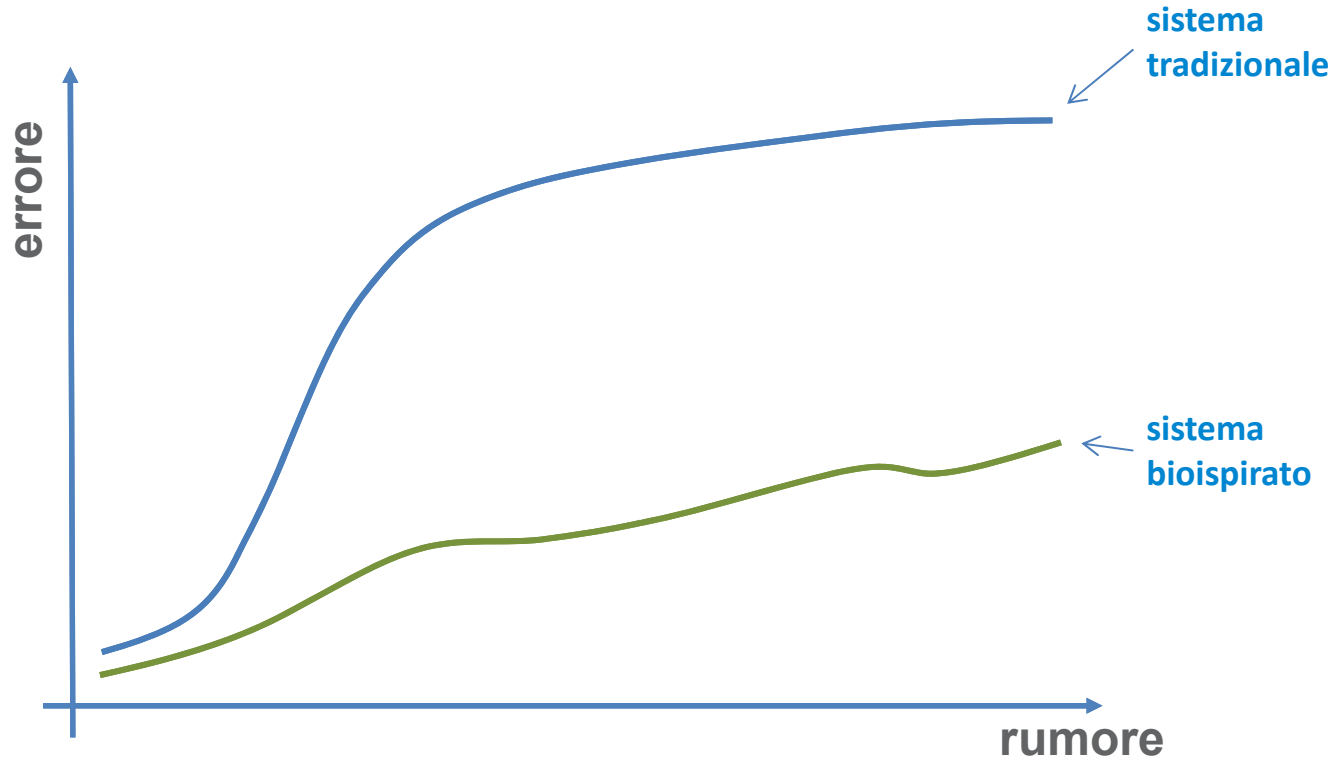


stimolo acustico

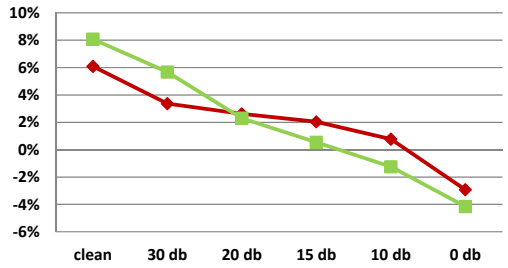
posizione TMS

parlato

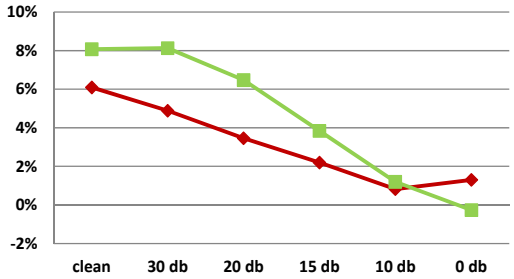
nel robot



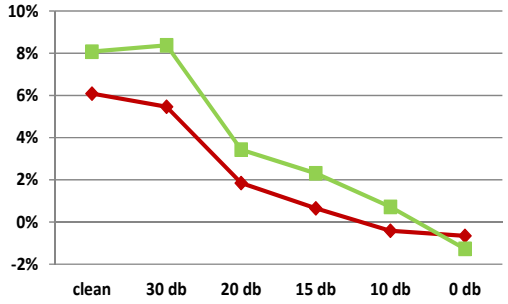
riduzione dell’errore sul fonema **(PERR)**
rispetto al caso puramente **acustico**



Gaussiano

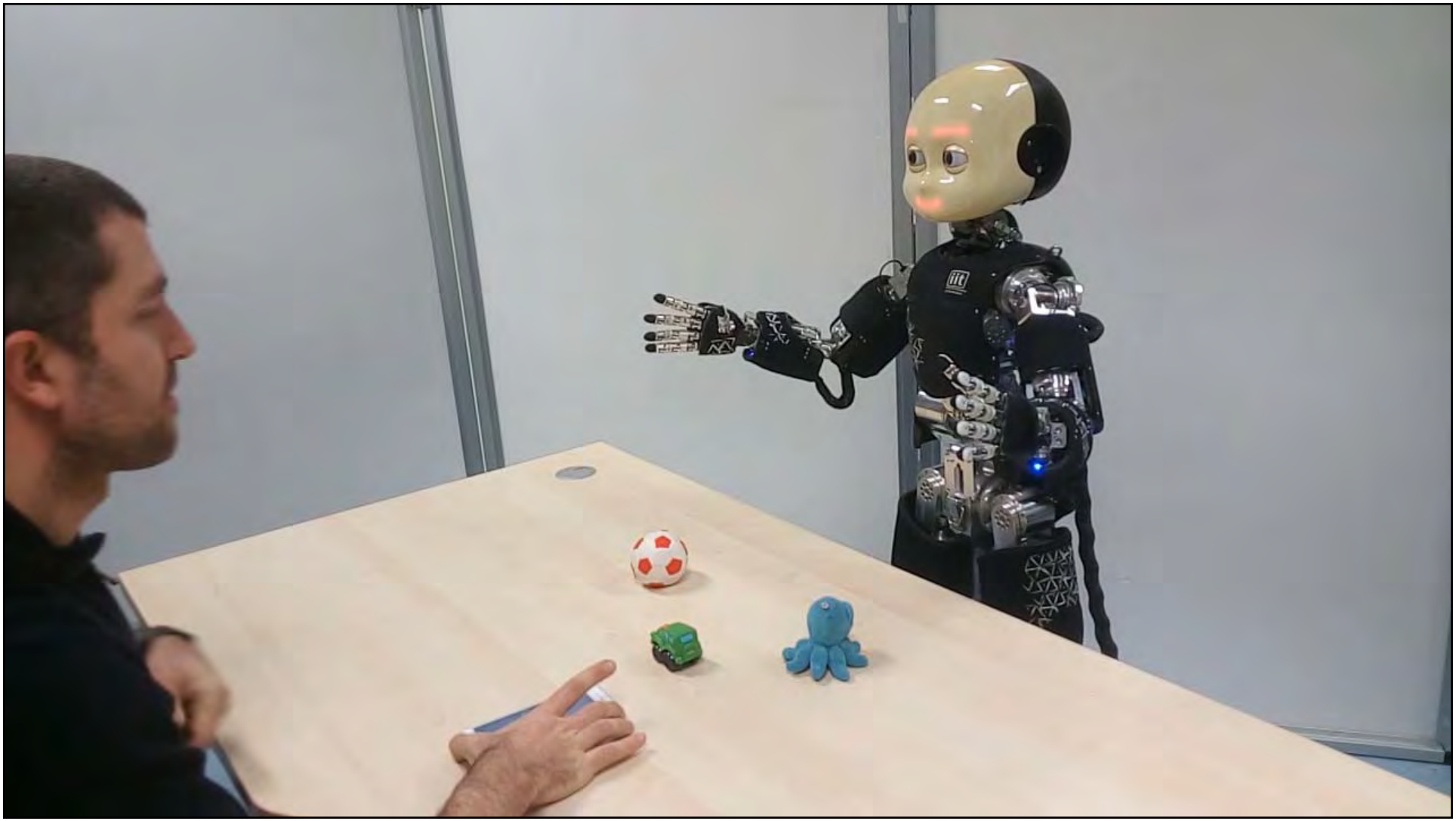


metropolitana

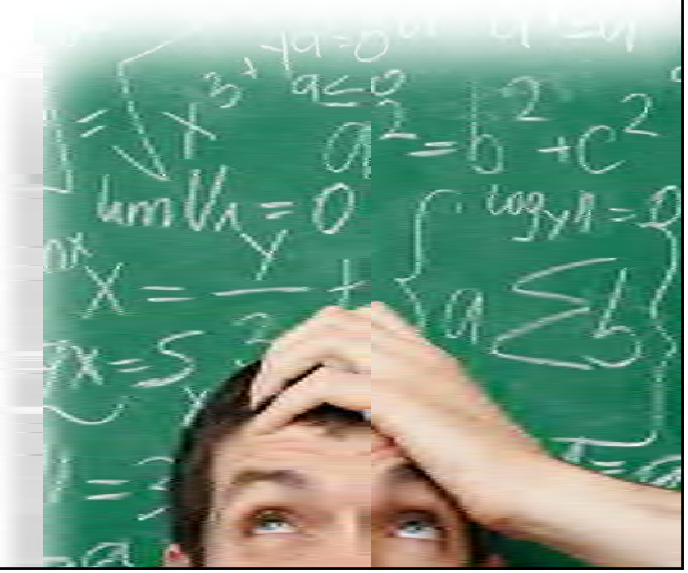


mensa

nota: dipende dal parlante



…questa ricerca rimane però **DIFFICILE**…



difficile definire le
specifiche
funzionali

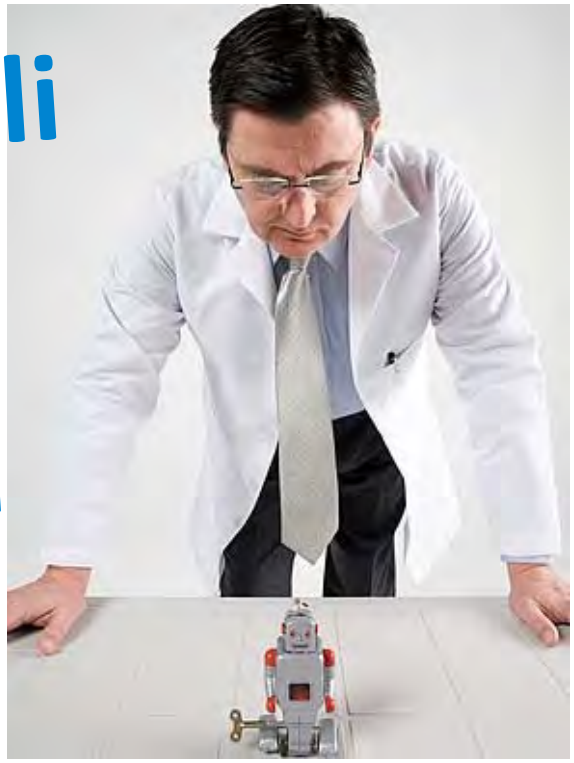
abilità

aspettative

realtà

futuro
(principalmente)

- ✓ materiali
- ✓ IA
- ✓ energia
- ✓ cloud



«Quanti anni ha?» mi chiese.

«Trentadue.»

«Allora lei non può ricordare com'era il mondo senza i robot. C'è stato un tempo in cui l'umanità era sola di fronte all'universo: sola e senza amici. Adesso ha queste creature che l'aiutano: creature più forti, più fedeli, più utili degli esseri umani... creature assoluta-mente devote. L'umanità non è più sola. Ha mai pensato a tutto questo?»