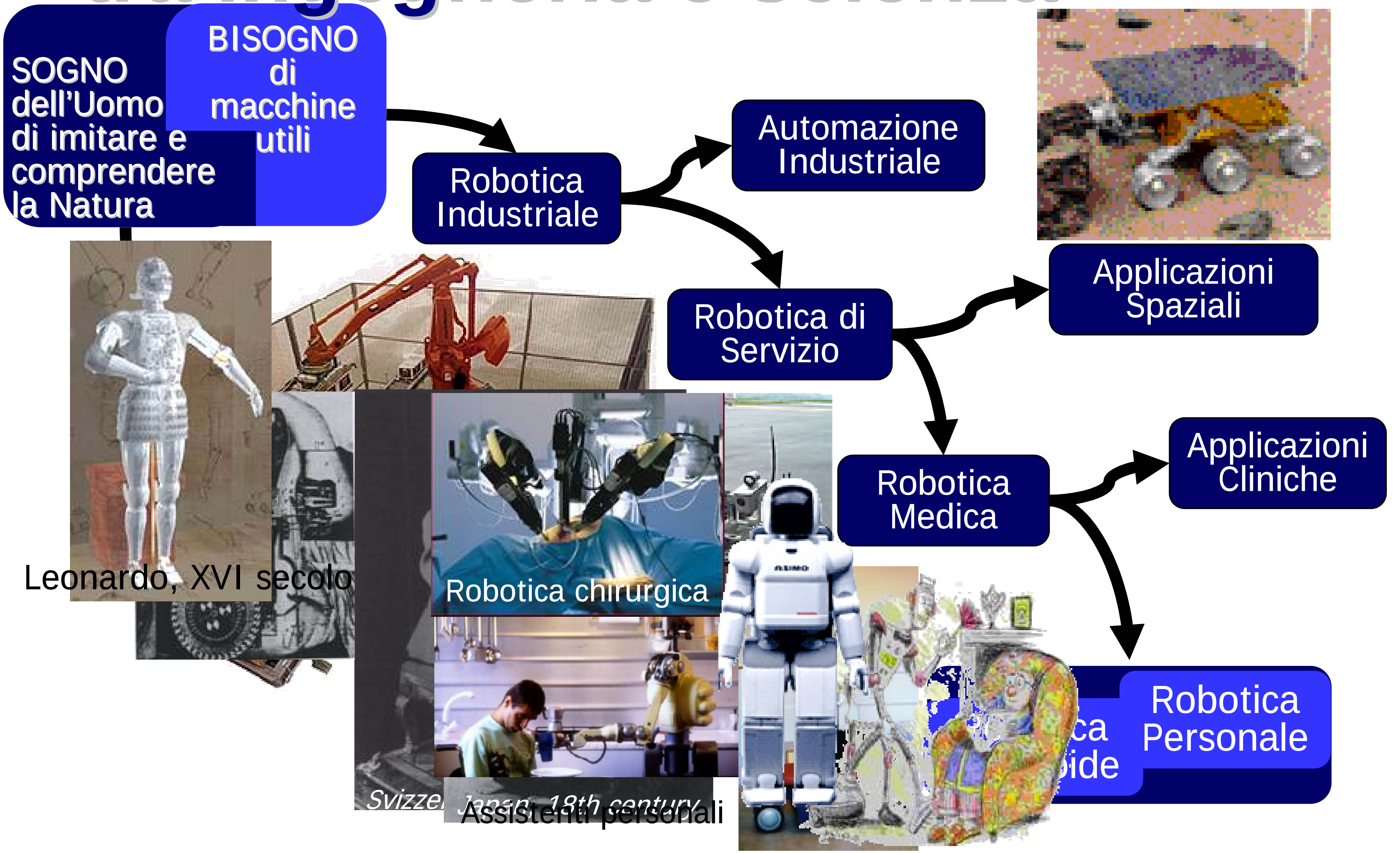
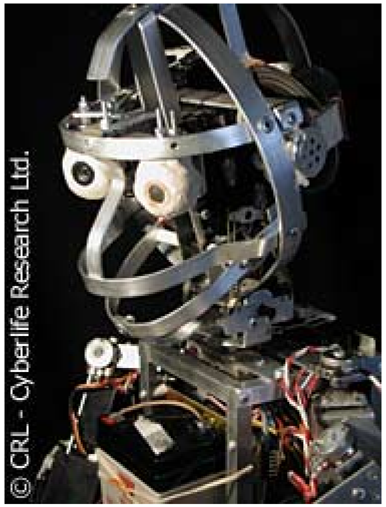
L'evoluzione della robotica tra ingegneria e scienza



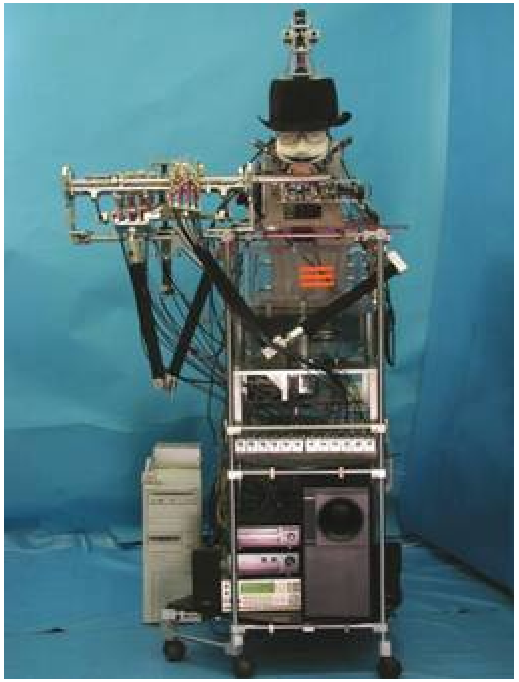
Esempi di robot umanoidi attuali



Robot umanoidi

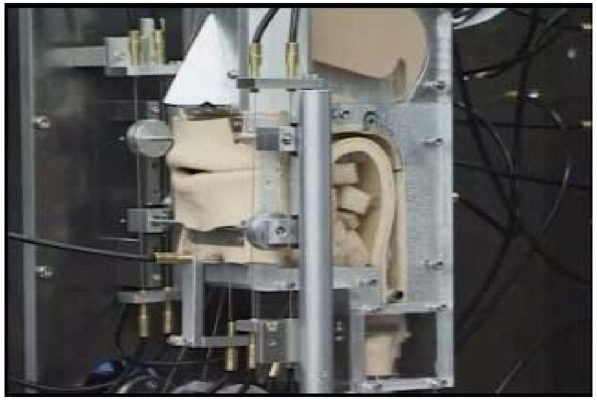
I robot umanoidi della Università Waseda di Tokyo

Robot flautista



Takanishi, A., Sonehara, M., Kondo, H., "Development of an anthropomorphic flutist robot WF-3RII", in *IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 96*, 1996, 37-43

Robot parlante



Nishikawa, K.; Imai, A.; Ogawara, T.; Takanobu, H.; Mochida, T., Takanishi, A.; "Speech planning of an anthropomorphic talking robot for consonant sounds production", in *IEEE International Conference on Robotics and Automation ICRA 2002*, 2002, 1830 -1835

Robot emotivo

Miwa H., Okuchi T., Takanobu H., Takanishi A.; "Development of a New Human-like Head Robot WE-4", in *IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2002*, pp.2443-2448, 2002

I robot della SONY

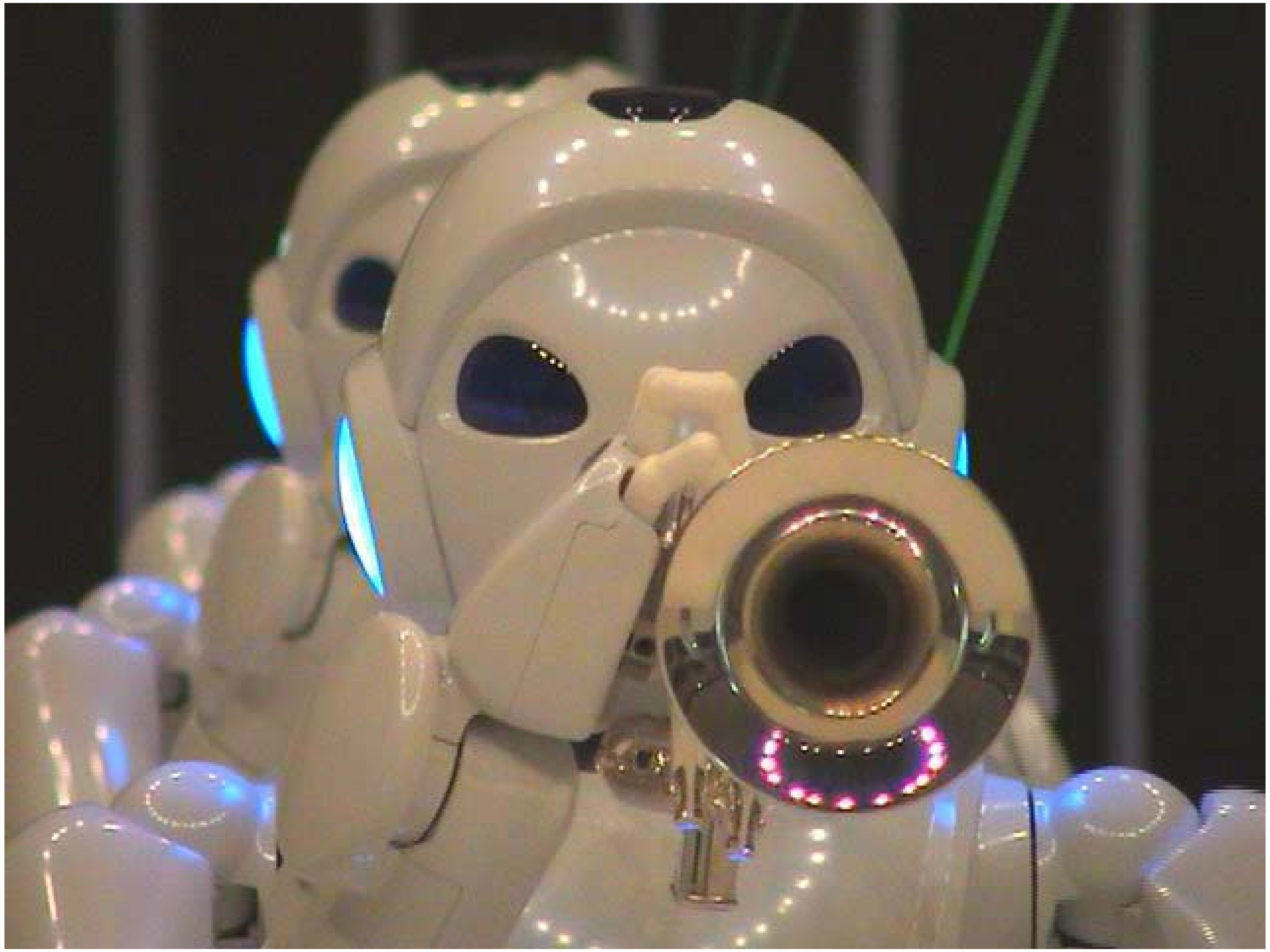
1999	2000	2001			2002

AIBO ERS 110	SDR 3 SONY Dream Robot	AIBO ERS 210	AIBO ERS 220	AIBO ERS 312	SDR-X4

Sales of Aibo (mar. 2000- feb. 2001)*:
7.214.000.000 Yen (**60 M€)**

(Source: Sony News and Information, Summary of Consolidated Results http://www.sony.net/SonyInfo/News/)

Toyota Partner Robot



This robot has developed to recreate the human-like natural yet charming expressions with high functionalities retained.
Emphasizes on its own realistic presence with smooth gestures.
It has news hooks and high eye-catching effects. It can be utilized to play active part for many occasions as a chairperson with fluent narrations and booth bunny.

kokoro
a company of Sanrio Group
KOKORO COMPANY LTD

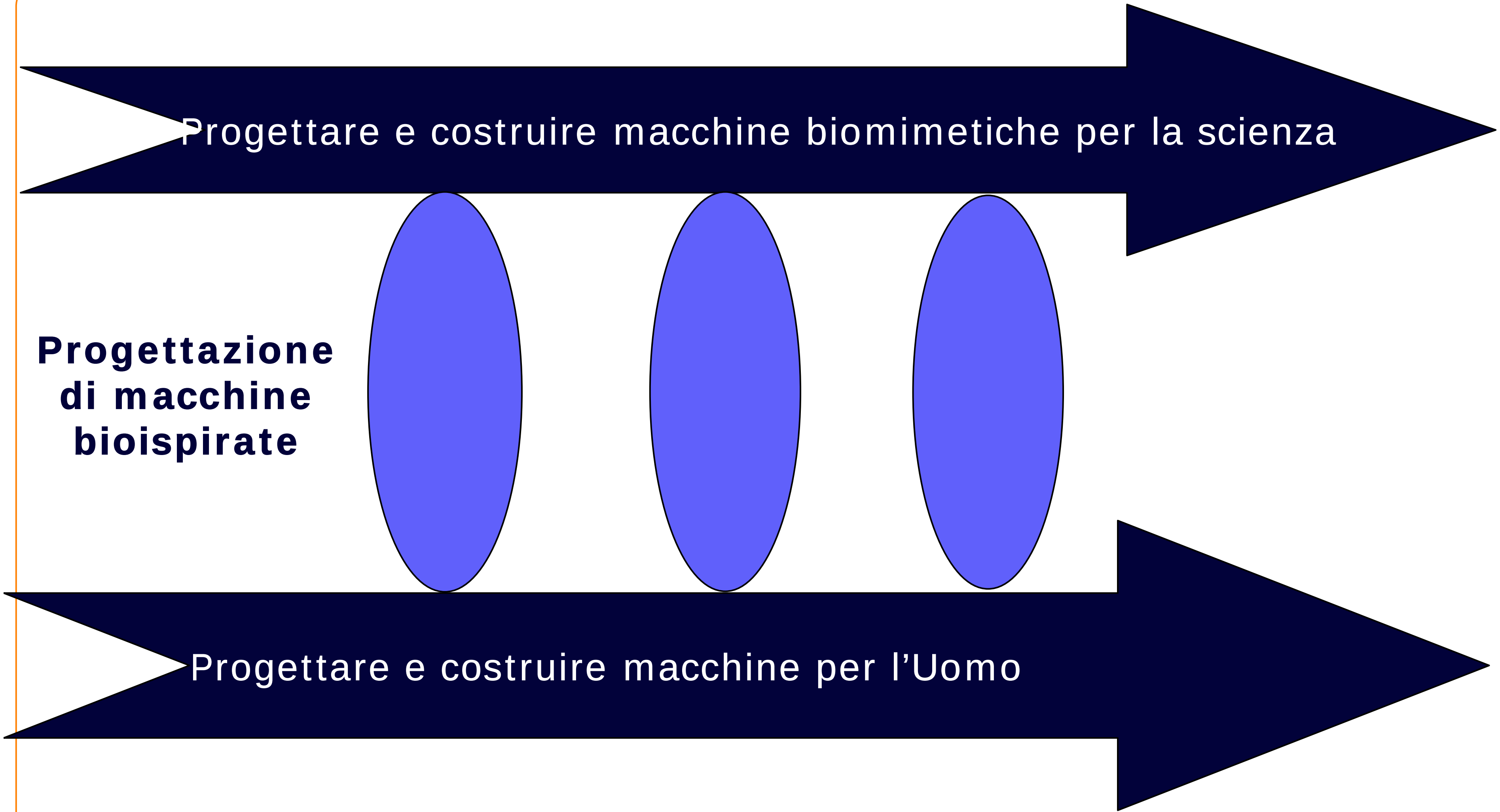
ARTS Lab

La nuova sfida: una squadra di calcio di robot umanoidi

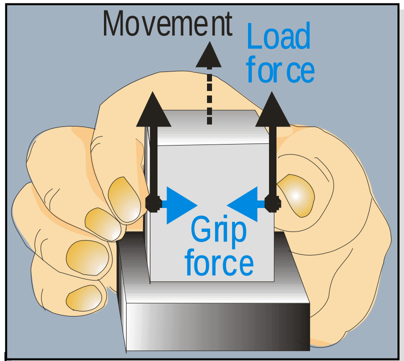
Usare i robot per ***inventare***...

Usare i robot per ***scoprire***...

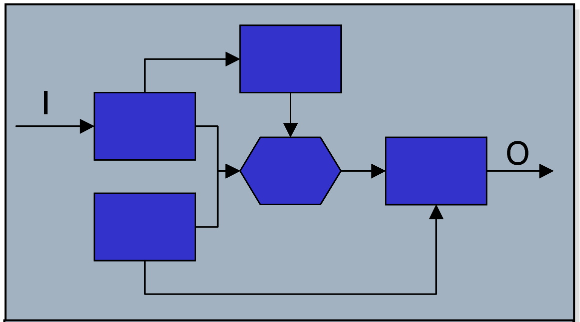
Scienza e Ingegneria Biorobotica



Scienza Biorobotica

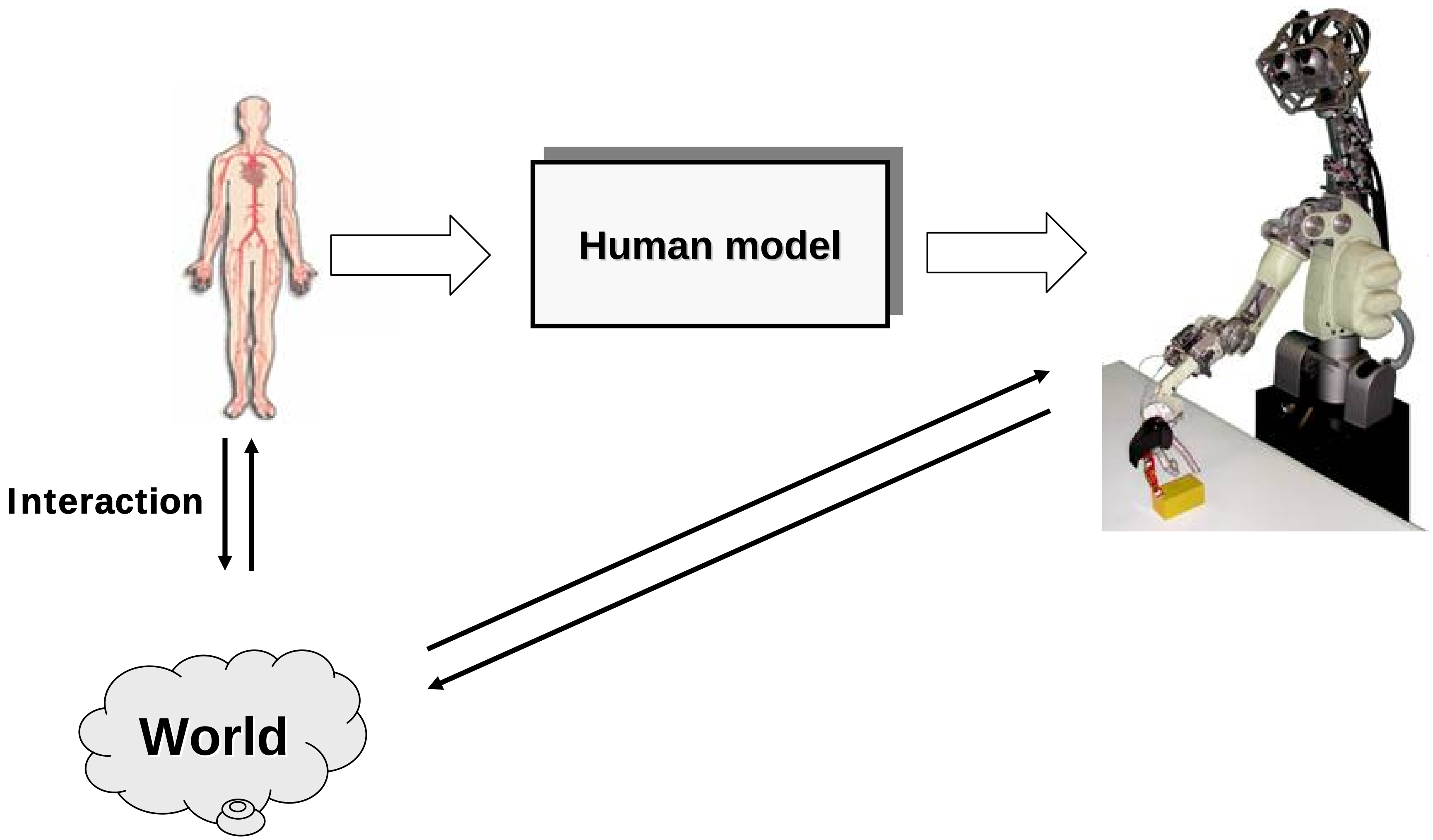


Fenomeno da studiare



Ipotesi e modello teorico

Biorobotica vs simulazione e modelli animali



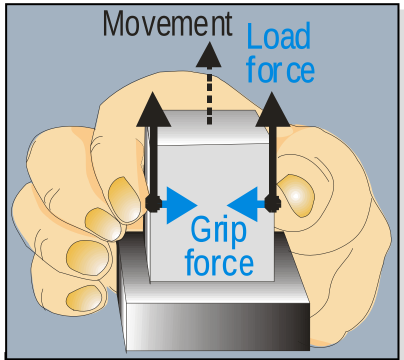
Biorobotic research at the AI Lab, MIT, USA

"Humanoid intelligence requires humanoid interactions with the world"

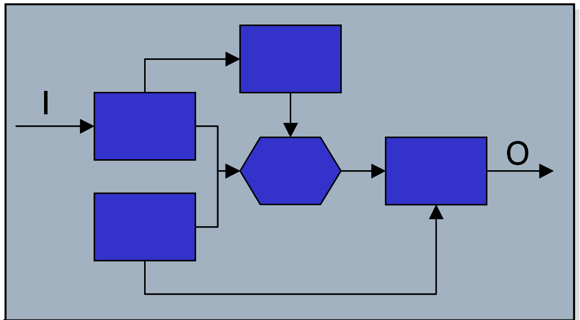
to build a robot with human-like intelligence and human-like body

"It turns out to be easier to build real robots than to simulate complex interactions with the world, including perception and motor control. Leaving those things out would deprive us of key insights into the nature of human intelligence".

Scienza Biorobotica

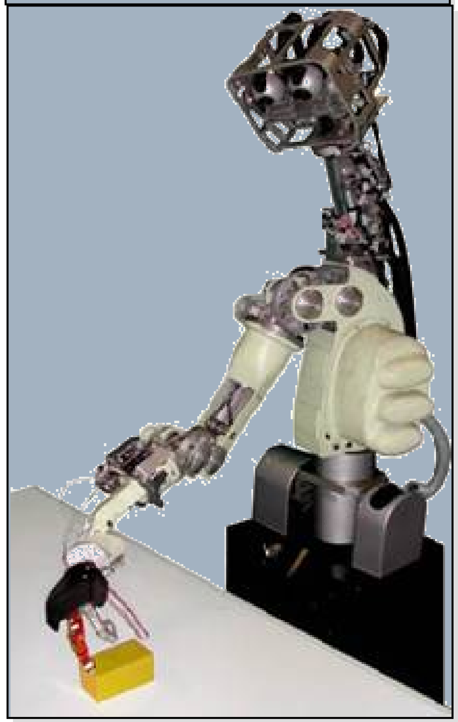


Fenomeno da studiare



Ipotesi e modello teorico

Implementazione in un robot



ESPERIMENTO
Confronto fra la prestazione del robot e quella del sistema biologico

Validazione del modello

Biorobotics epistemology

Proto-Cybernetics (J. Loeb 1905, 1912; H. S. Jennings 1906)

Mechanicism Vs. Functionalism for studying the behavior of living organisms

If a machine is implemented on the basis of a theory of behavior, and ***it behaves according to what this theory allows to predict***, this test reinforces the proposed theory

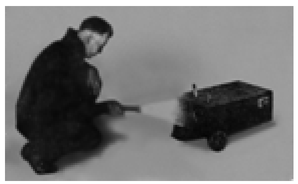
Cybernetics (Rosenblueth, Wiener, Bigelow 1943)

Unified approach to the study of living organisms and machines

Purposive adaptive behaviors (in animals and humans) are produced by *feedback machines (teleology)*

Machines as 'material models' useful for testing scientific hypotheses

Machines are used for SCIENCE

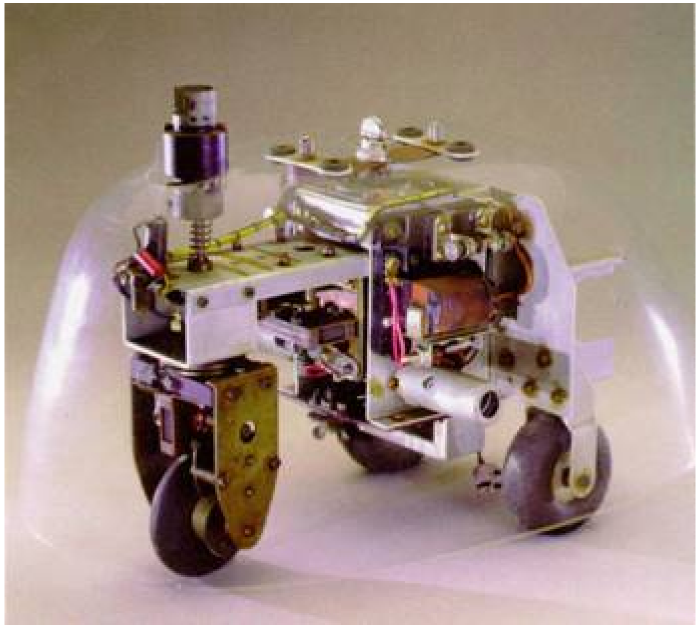


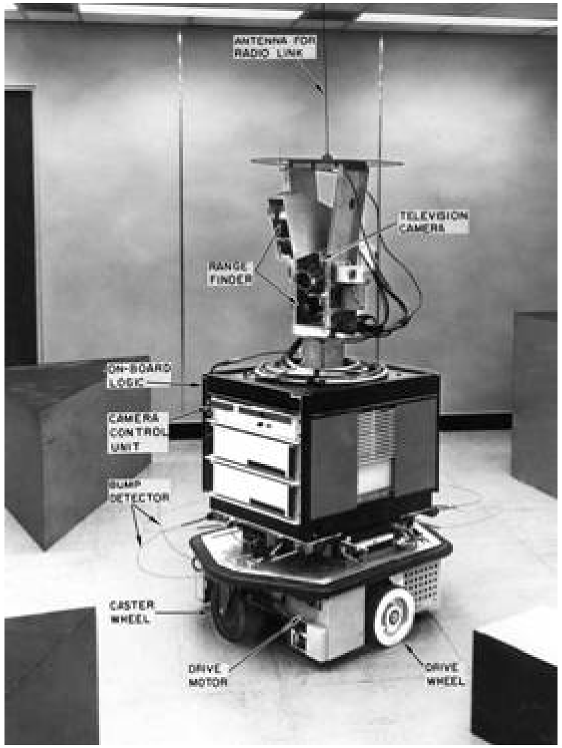
The technological bottleneck

Cybernetic Robotics

Turtle robots (The living brain, Grey Walter, 1950-1953): simple robotic models of ‘emerging’ behaviors

- Machina speculatrix, Machina docilis, etc.





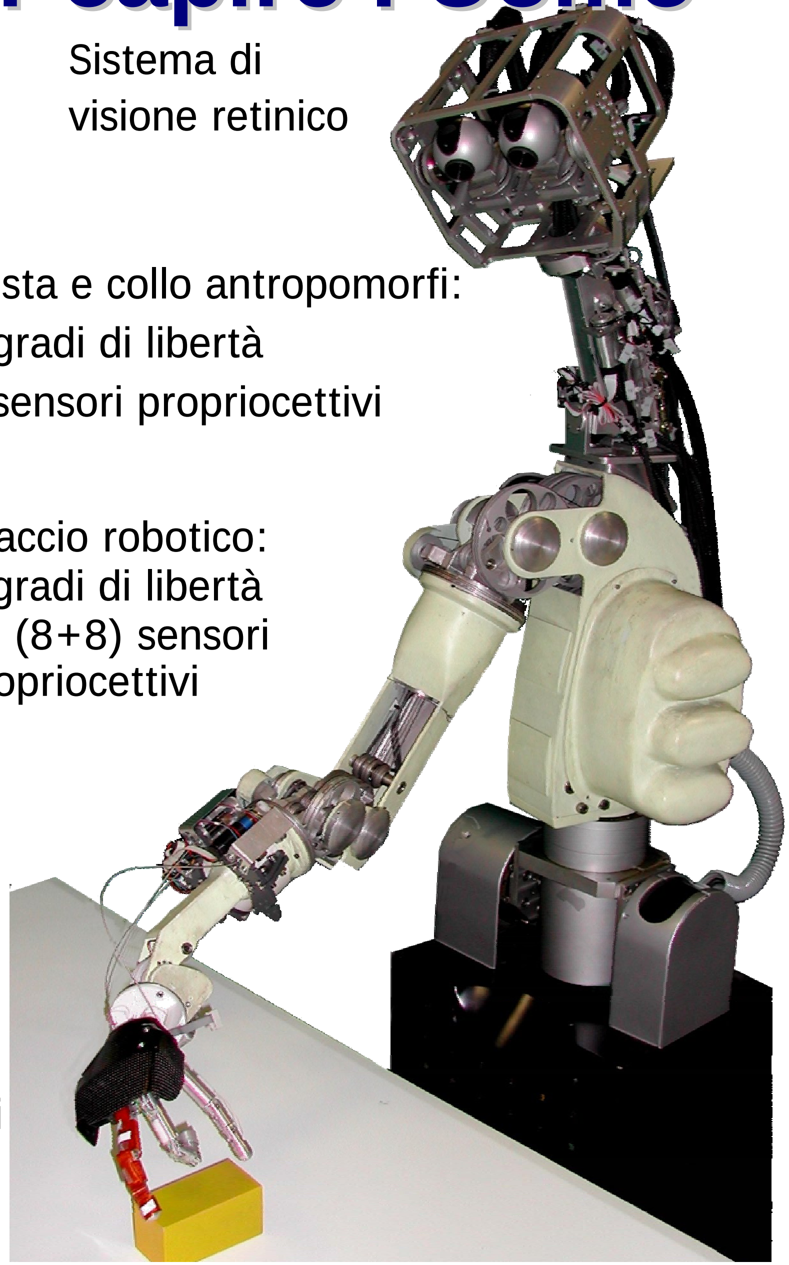
Early robots (’80 / ’90)

Costruire l'umanoide per capire l'Uomo

Sistema di
visione retinico

Testa e collo antropomorfi:
7 gradi di libertà
7 sensori propriocettivi

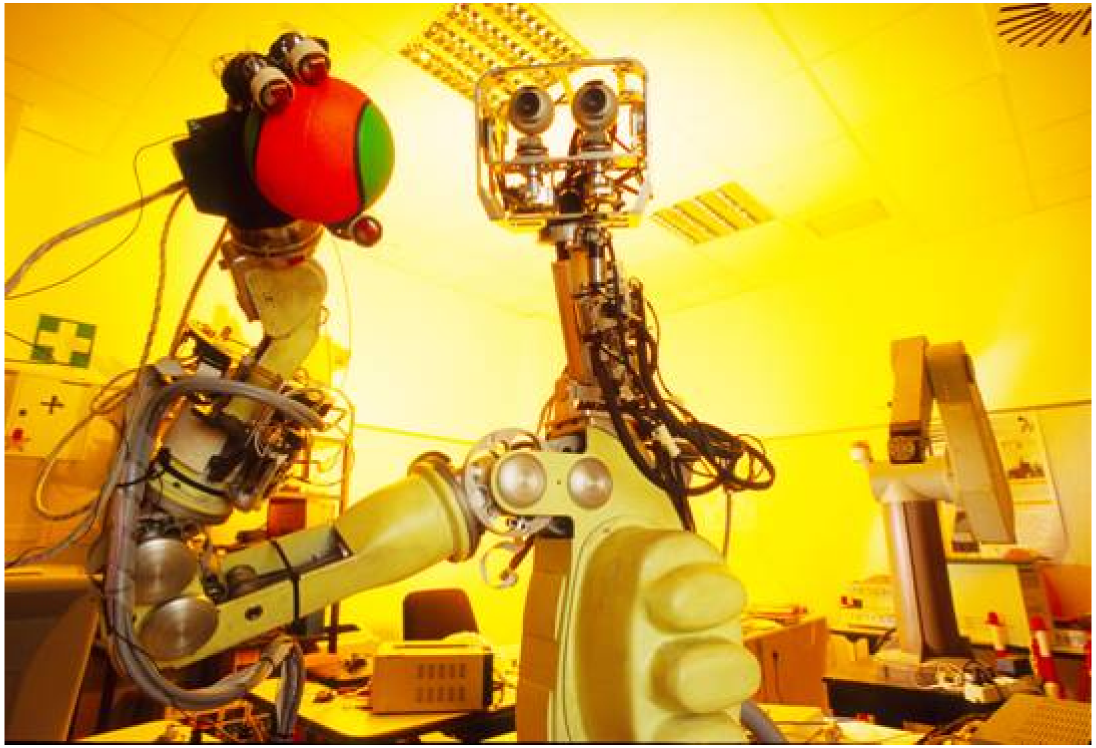
Braccio robotico:
8 gradi di libertà
16 (8+8) sensori
propriocettivi



Gradi di libertà	25
Sensori propriocettivi	36
Sensori tattili	12
Sensori visivi	2

Mano biomeccatronica:
10 gradi di libertà
13 sensori propriocettivi
12 sensori tattili

Una piattaforma robotica per validare un modello dell'apprendimento della coordinazione senso-motoria per la presa nei neonati



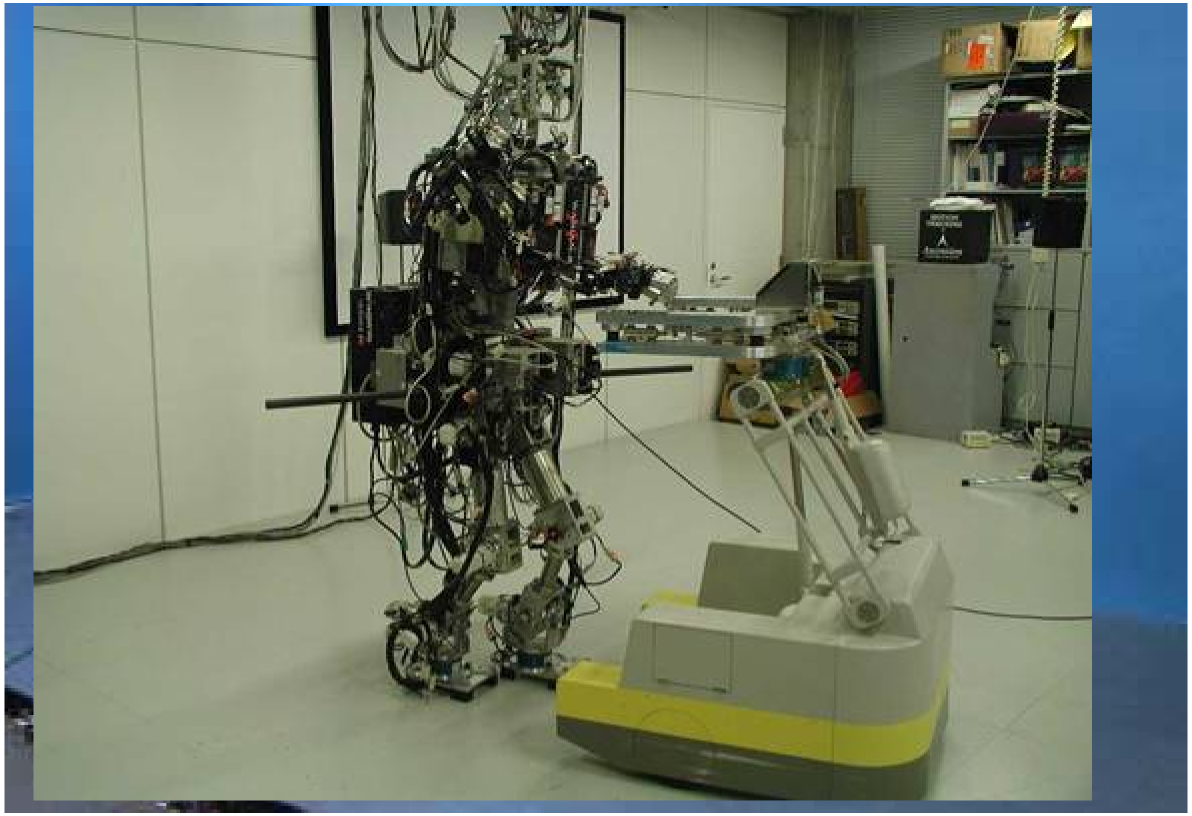
Obiettivi:

- Migliorare le conoscenze sulla connettività cerebrale (architettura) e sull'attività cerebrale (funzionalità), riguardo la coordinazione senso-motoria nella presa nei bambini
- Integrare una piattaforma robotica per la presa e la manipolazione per validare modelli neurofisiologici delle 5 fasi di apprendimento della coordinazione visuo-tatto-motoria nei neonati

P. Dario, M.C. Carrozza, E. Guglielmelli, C. Laschi, A. Menciassi, S. Micera, F. Vecchi, "Robotics as a "Future and Emerging Technology: biomimetics, cybernetics and neuro-robotics in European projects", *IEEE Robotics and Automation Magazine*, Vol.12, No.2, June 2005, pp.29-43.

Un robot umanoide come modello del cammino umano

Walking robot Wabian-2R

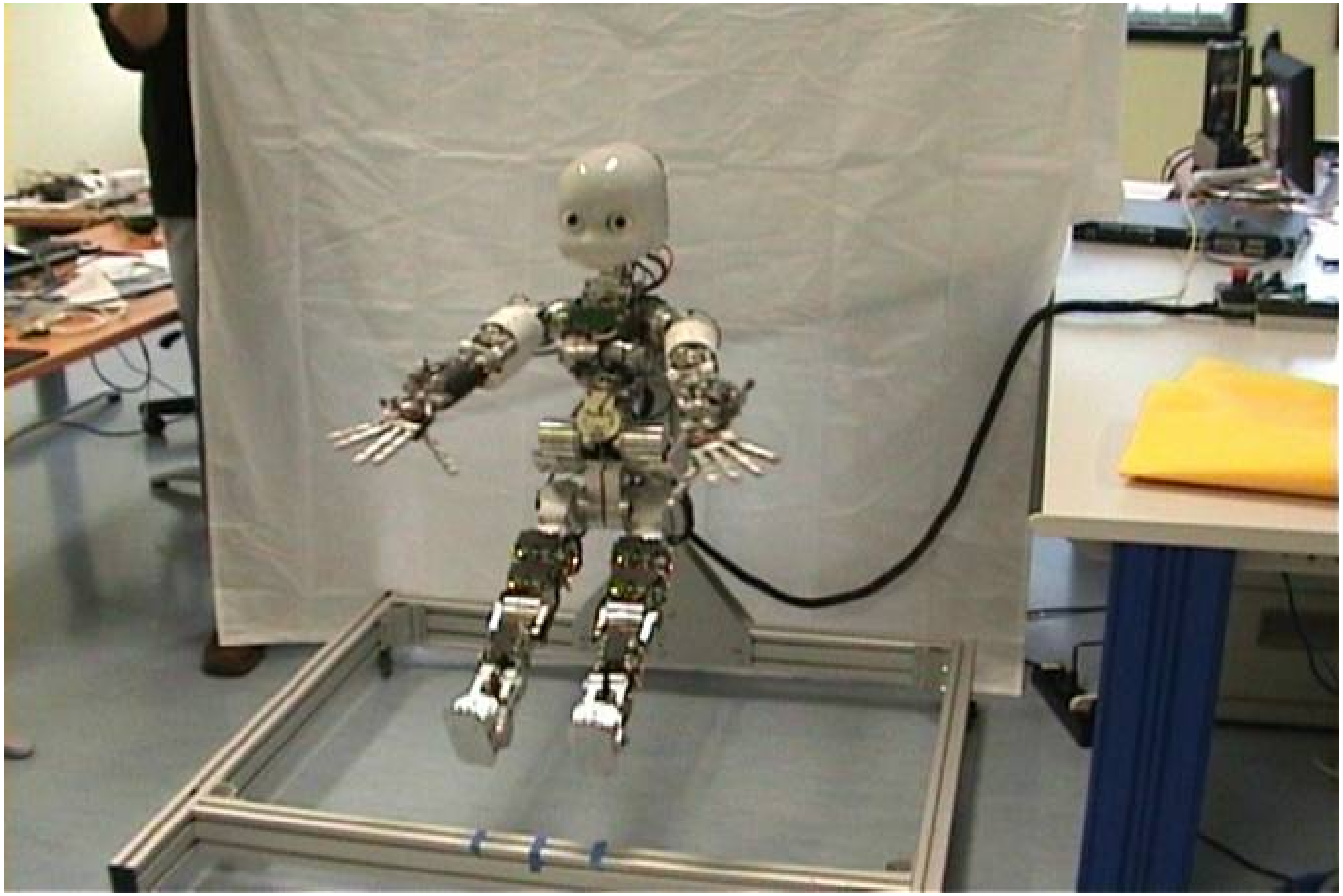


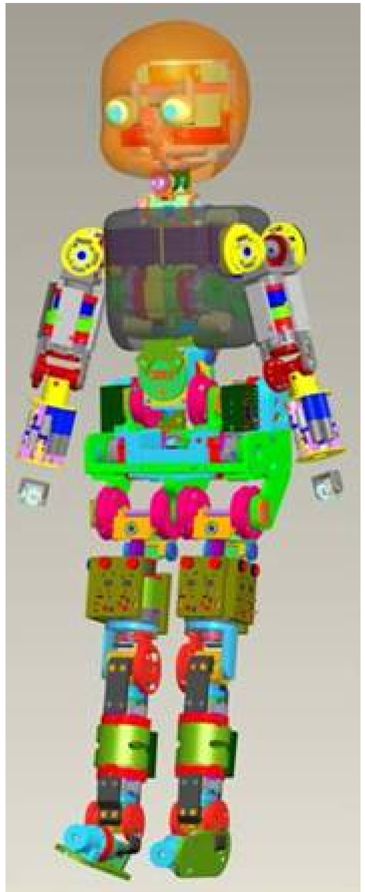
WABIAN come simulatore dell'Uomo e strumento per la progettazione e la valutazione quantitativa di sipositivi di supporto alla deambulazione

RobotCub Project

RobotCub

Objective: to understand how the brain of living systems transforms sensory input into motor and cognitive functions by implementing physical models of sensory-motor behaviours





G. Metta, G. Sandini, "Embodiment and complex systems. A commentary on Barbara Webb: Can robots make good models of biological behavior?", *Behavioral and Brain Sciences* 24(6) pp. 1068-1069, 2001.

From Swimming to Walking with a Salamander Robot Driven by a Spinal Cord Model

Auke Jan Ijspeert,[1*] Alessandro Crespi,[1] Dimitri Ryczko,[2,3] Jean-Marie Cabelguen[2,3]

The **transition from aquatic to terrestrial locomotion** was a key development in vertebrate evolution.

An amphibious salamander robot demonstrates how **a primitive neural circuit for swimming can be extended by phylogenetically more recent limb oscillatory centers** to explain the ability of salamanders to switch between swimming and walking.

The model suggests **neural mechanisms for modulation of velocity, direction, and type of gait that are relevant for ALL tetrapods.**

9 MARCH 2007 VOL 31 SCIENCE www.sciencemag.org

CPG Model and the Robot

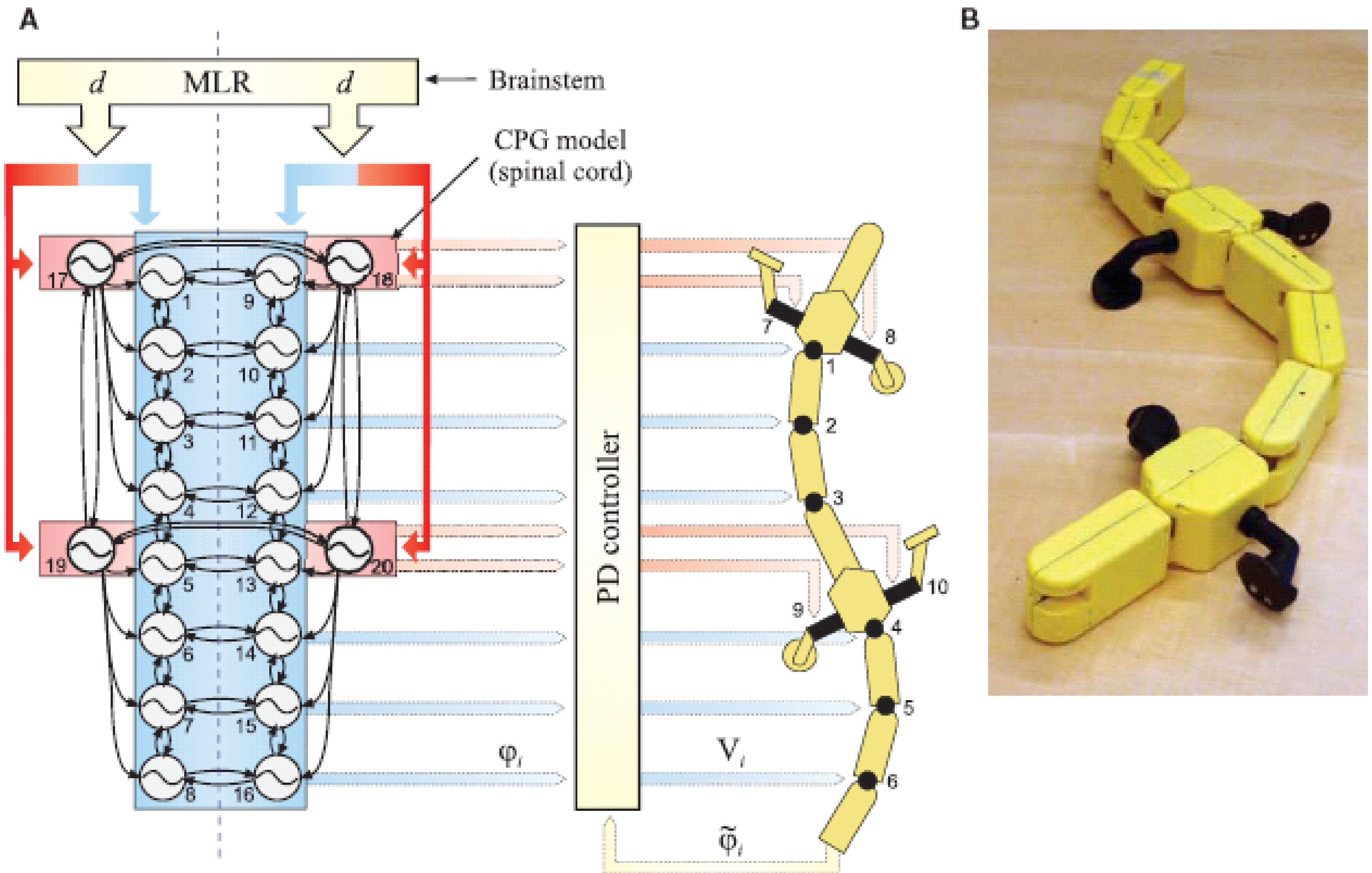
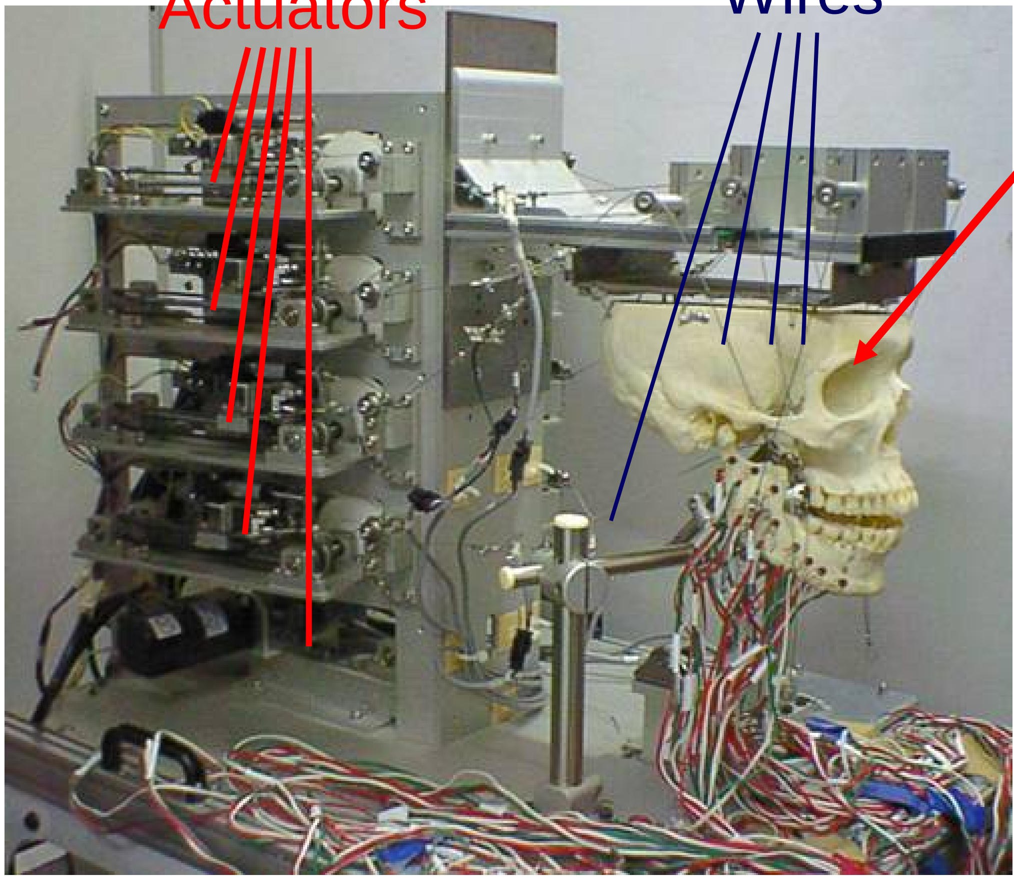


Fig. 1. Configuration of the CPG model (**A**) and salamander robot (**B**). The robot is driven by 10 dc motors, which actuate six hinge joints for the spine (black disks in the schematic view of the robot) and four rotational joints for the limbs (black cylinders). The CPG is composed of a body CPG—a double chain of 16 oscillators with nearest-neighbor coupling for driving the spine motors—and a limb CPG—4 oscillators for driving the limb motors. The outputs of the oscillators are used to determine the setpoints φ_i (desired angles) provided to proportional-derivative (PD) feedback controllers that control the motor torques (through their voltage V_i) given the actual angles $\tilde{\varphi}_i$. The CPG model receives left and right drives *d* representing descending signals from the MLR region in the brain stem. The velocity, direction, and type of gait exhibited by the robot can be adjusted by modifying these two signals.

Dental Robotics: Clarify Human Mastication with Mastication Scientists

WASEDA UNIV. HRI



Height	: 510 [mm]
Width	: 450 [mm]
Depth	: 600 [mm]

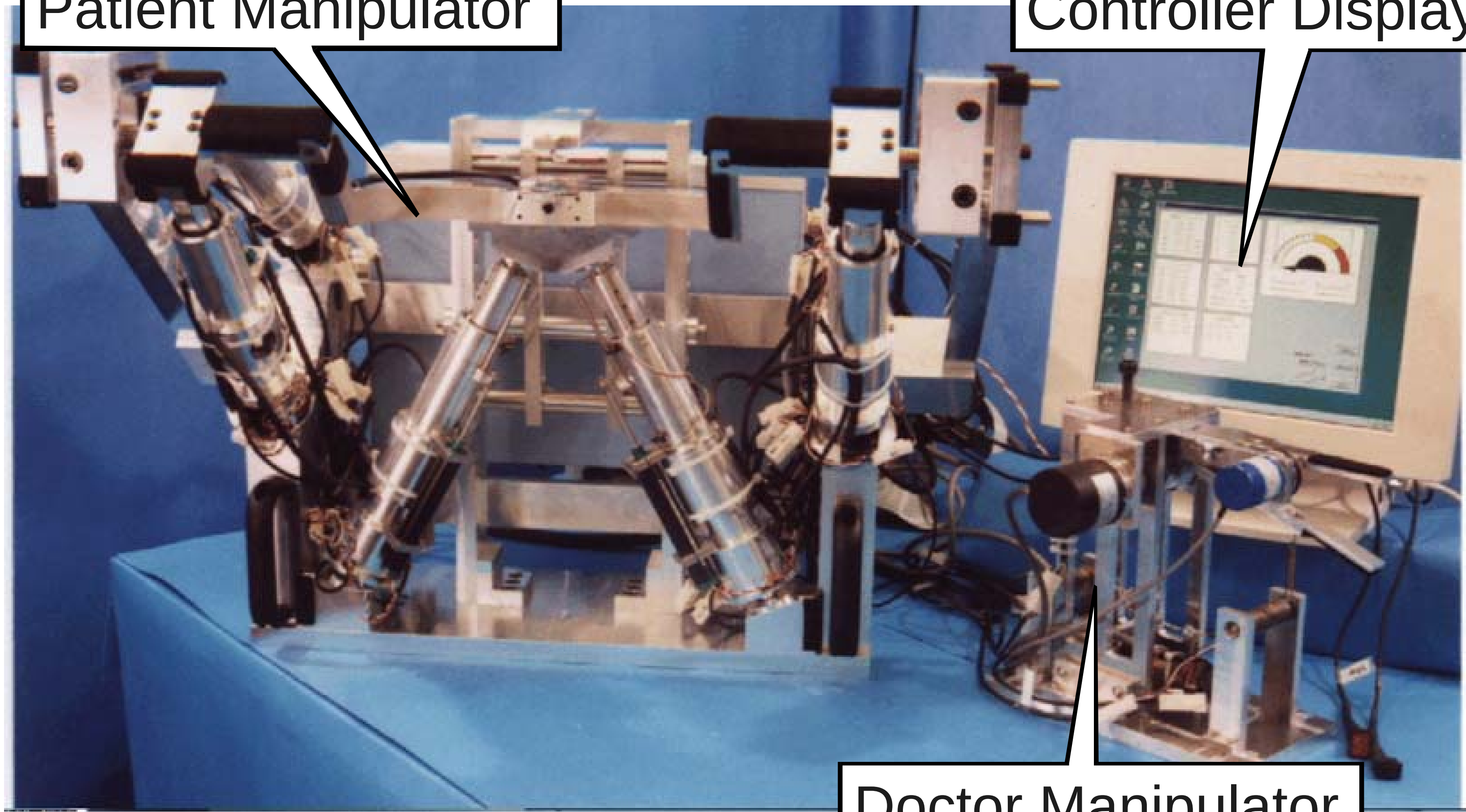
9 DOF

- -9 AC Servo Motors
- -Wire Drive
- -Nonlinear Viscoelasticity

With OKINO Industries

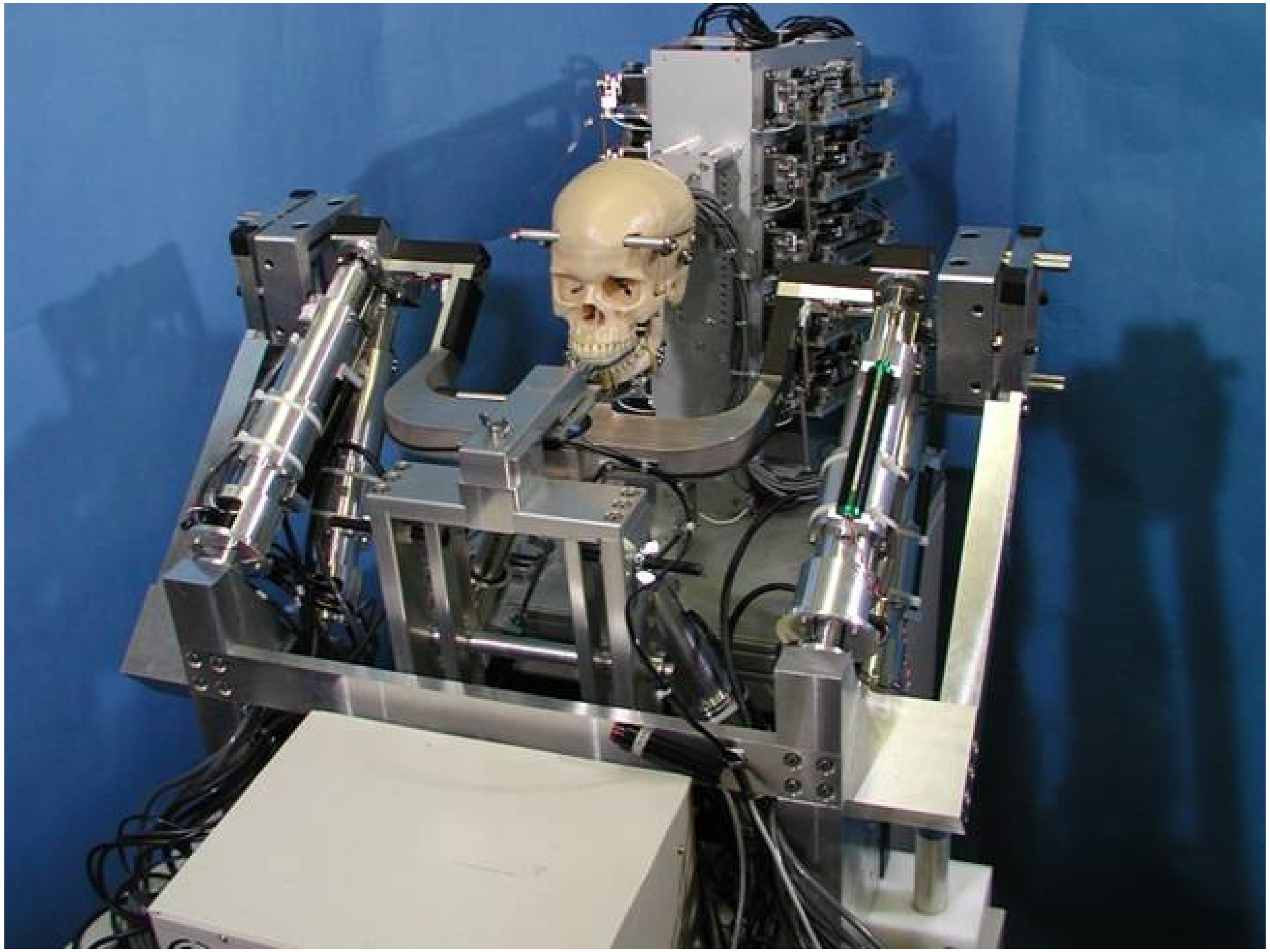
WASEDA UNIV.
HRI

Jaw Training Robot for TMD Patients Designed using Human Mastication Model

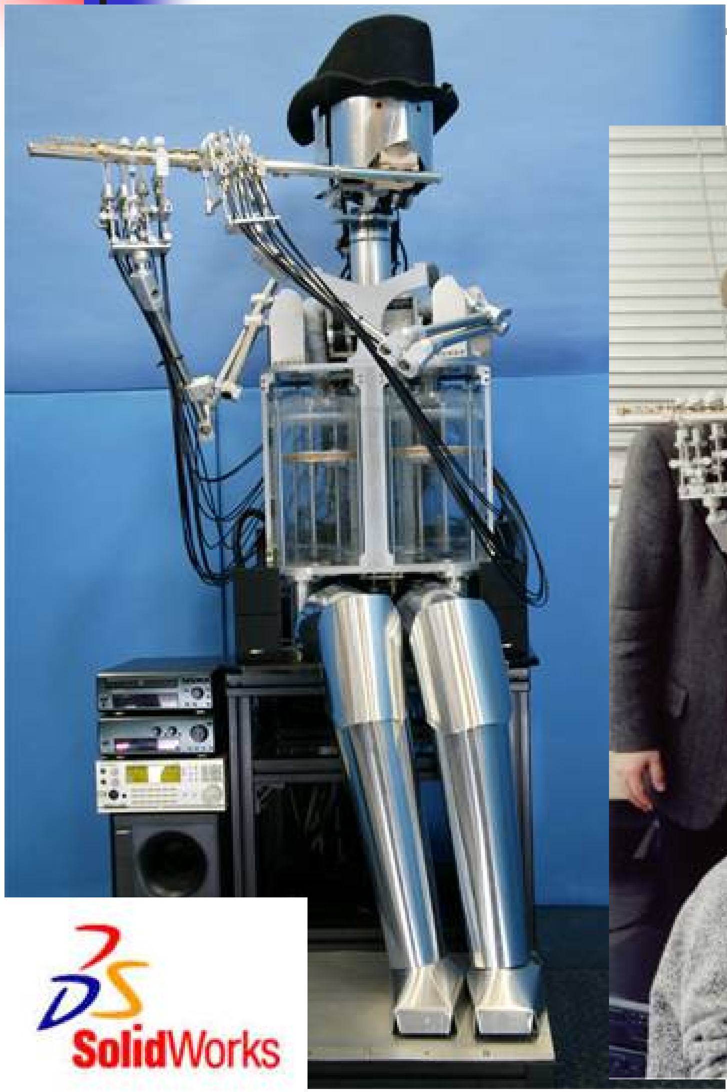


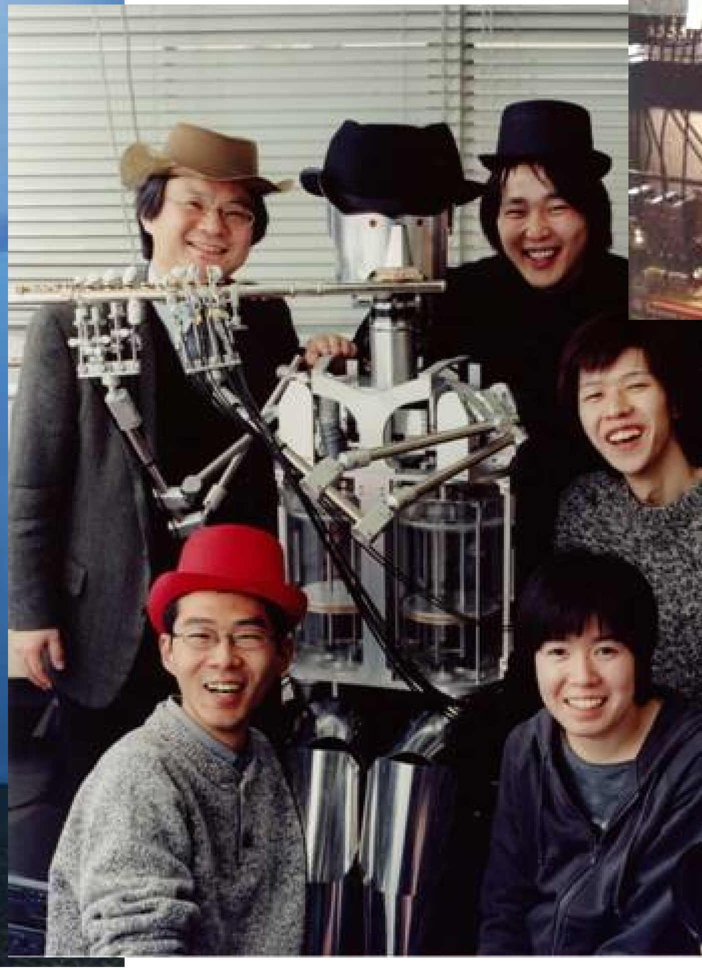
Jaw Training Robot and Patient Simulator Robot for Exploring New Robotic Treatment Methodology

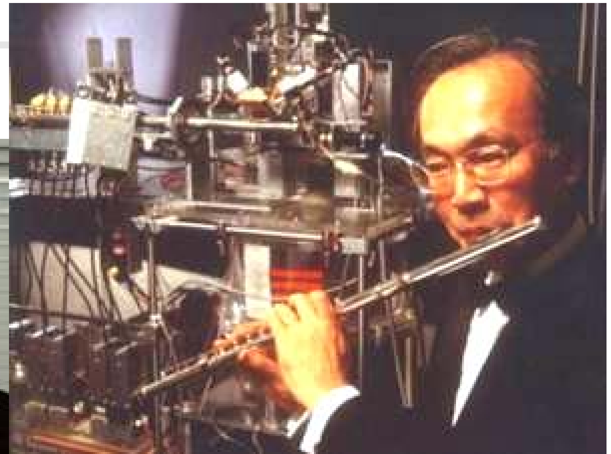
WASEDA UNIV.
HRI



Flutist Robot for Simulating Human Flute Playing:WF-4



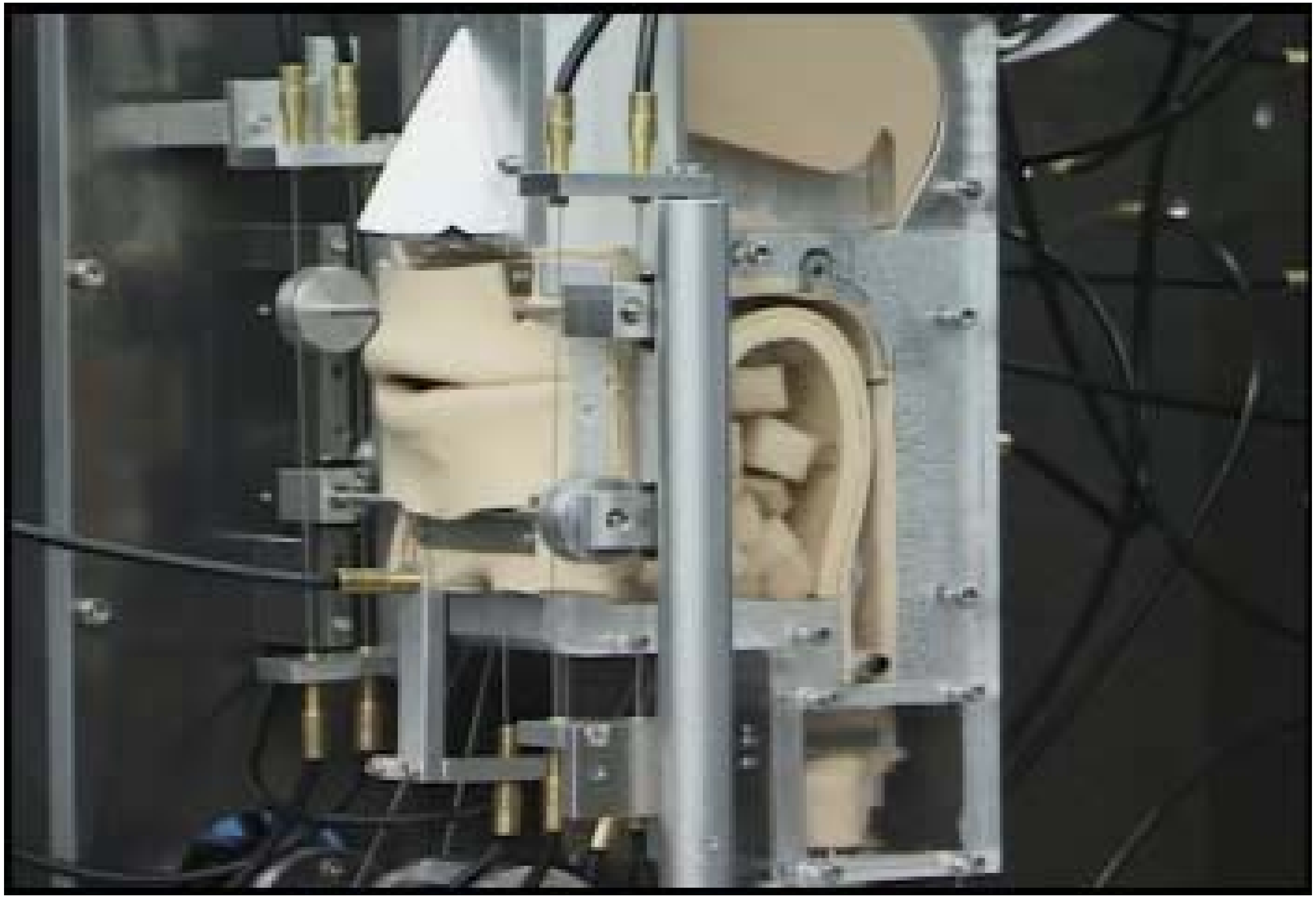




Professional Flutist: Mr. Kunimitsu Wakamatsu

GIFU-WASEDA WABOT-HOUSE Project

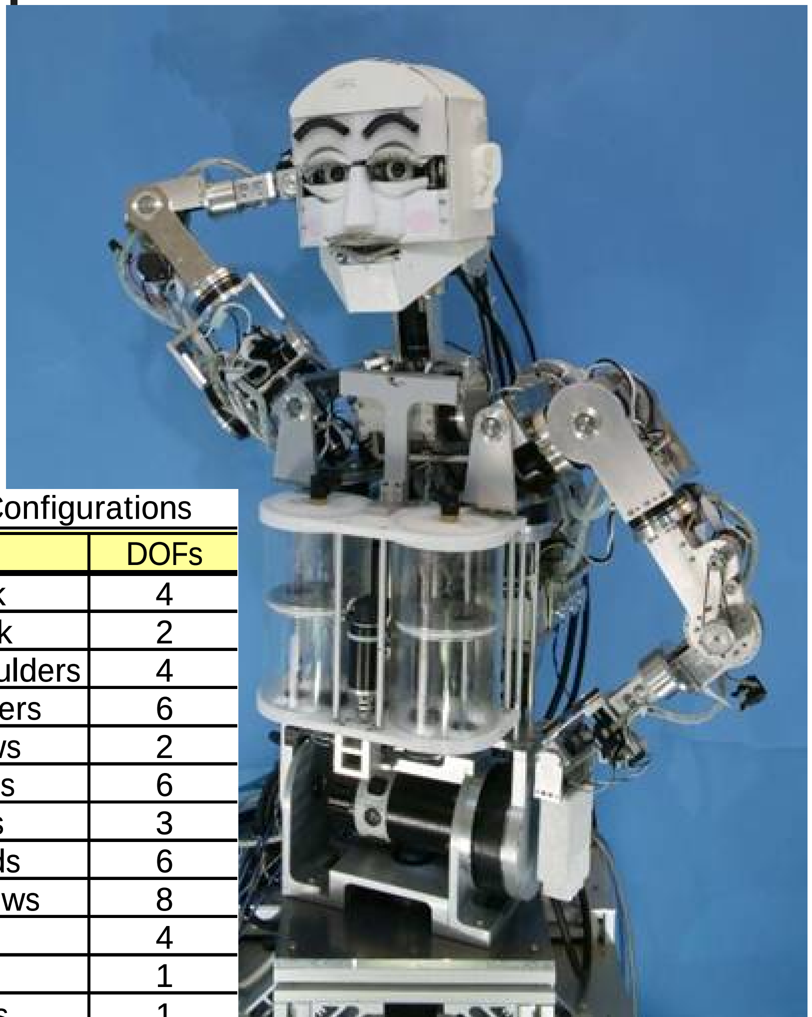
Modeling of Human Speech Production Using Talking Robots: WT-3/4



Waseda Daigaku (Waseda University)

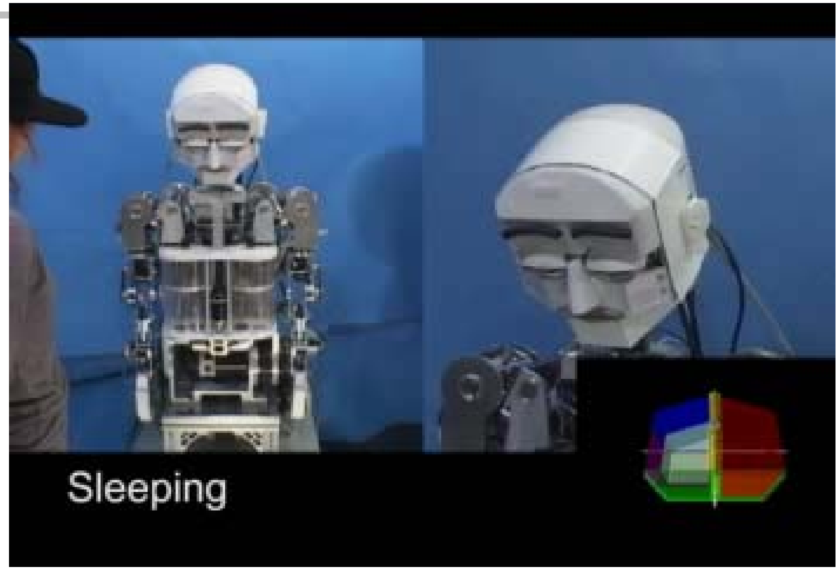
Emotion Expression Humanoid **EYE-Chan**: WE-4R for Modeling Human Mind

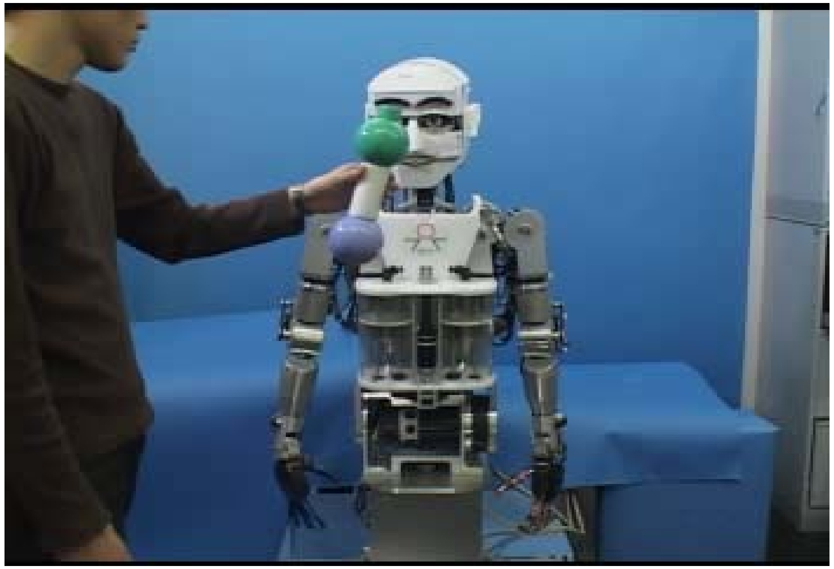
WASEDA UNIV. HRI



DOFs Configurations

Part	DOFs
Neck	4
Trunk	2
Base Shoulders	4
Shoulders	6
Elbows	2
Wrists	6
Eyes	3
Eyelids	6
Eyebrows	8
Lids	4
Jaw	1
Lungs	1
Total	47





SANT'ANNA WASEDA
PARTNERSHIP

ROBOCASA
HUMANOID & PERSONAL ROBOTICS
ロボ・カーサ
ヒューマノイド&パーソナル ロボティクス

Con il contributo del Ministero degli Affari Esteri, Direzione Generale per la Promozione e la Cooperazione Culturale

With the support of the Italian Ministry of Foreign Affairs, General Directorate for Culturale Promotion and Cooperation

本連携は、イタリア外務省文化交流振興局の支援による研究、振興、産業応用事業です

Un laboratorio congiunto per la ricerca in Robotica Umanoide & Personale
A joint laboratory for research on Humanoid & Personal Robotics
ヒューマノイド国際共同研究室

Robot come strumenti per studiare l'interazione uomo-robot

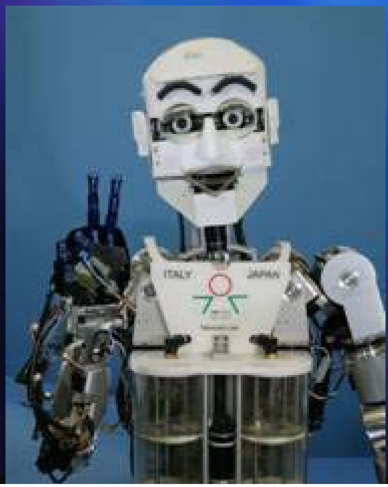
Felice

Sorpreso

Disgustato

Robot come strumenti per le neuroscienze

RoboCasa Tokyo

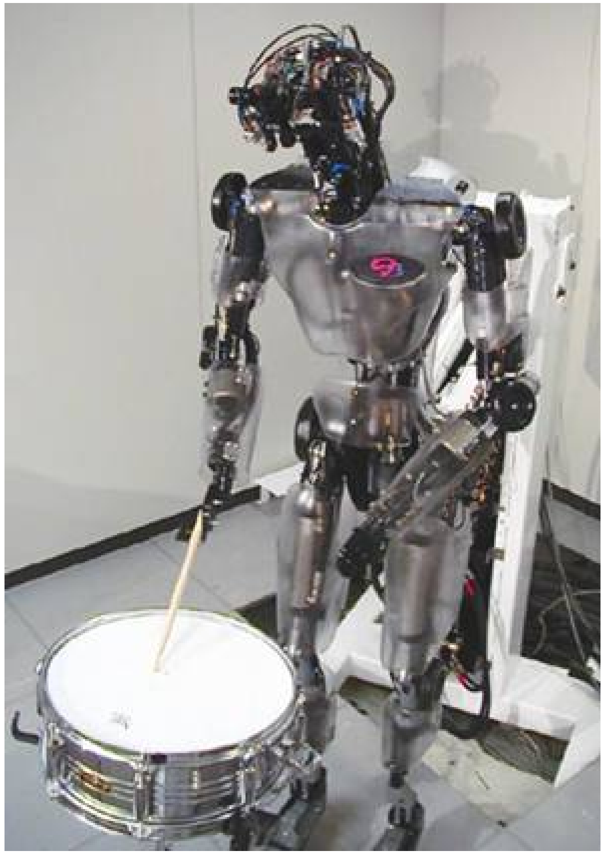


Robot-An, Laboratorio congiunto italo-giapponese

Inaugurazione ufficiale di RoboHan, Laboratorio congiunto italo-giapponese, Pisa, Febbraio 2006

Un robot gemello del **Wabian2** viene sviluppato a Robot-An

Neuro-Robotic research at the Human Information Science Lab, ATR, Japan



Computational Neuroscience Project
Prof. Mitsuo Kawato

to understand brain mechanisms, including vision and motor systems, which support the adaptive behaviour of humans by adopting a "Computational approach", i.e. developing an artificial brain in order to understand the brain

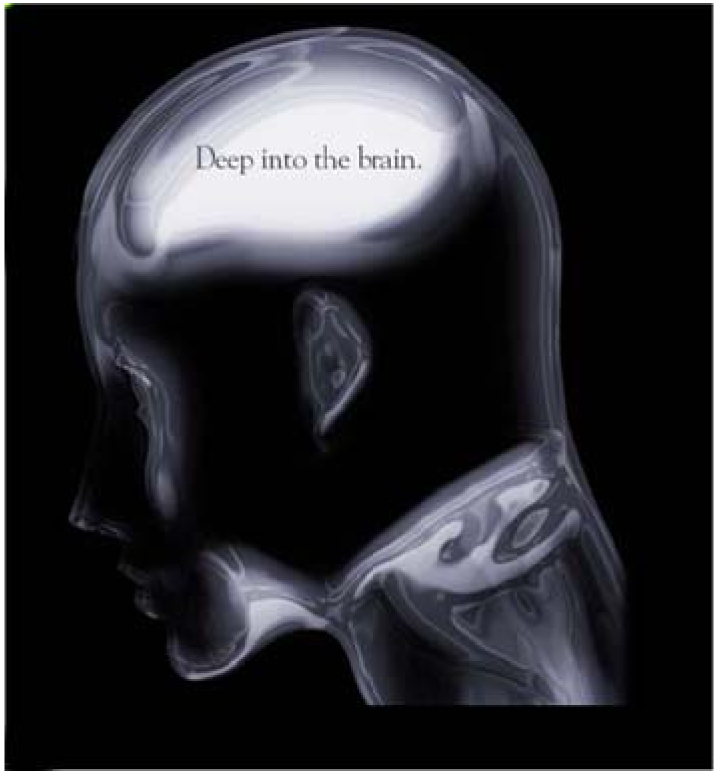
Neuro-Robotic research at the AI Lab, Department of Information Technology, University of Zürich, Switzerland

to understand natural forms of intelligence (humans, animals) by designing and build intelligent systems (computer programs, robots, other artefacts)

“Understanding by building“ approach

- modelling aspects of a biological system,
- abstracting and exploring general principles of intelligence,
- using these principles in the design of artefacts.

Neuro-Robotic research at the RIKEN Brain Science Institute, Japan



Research Groups and Laboratories

Understanding the Brain

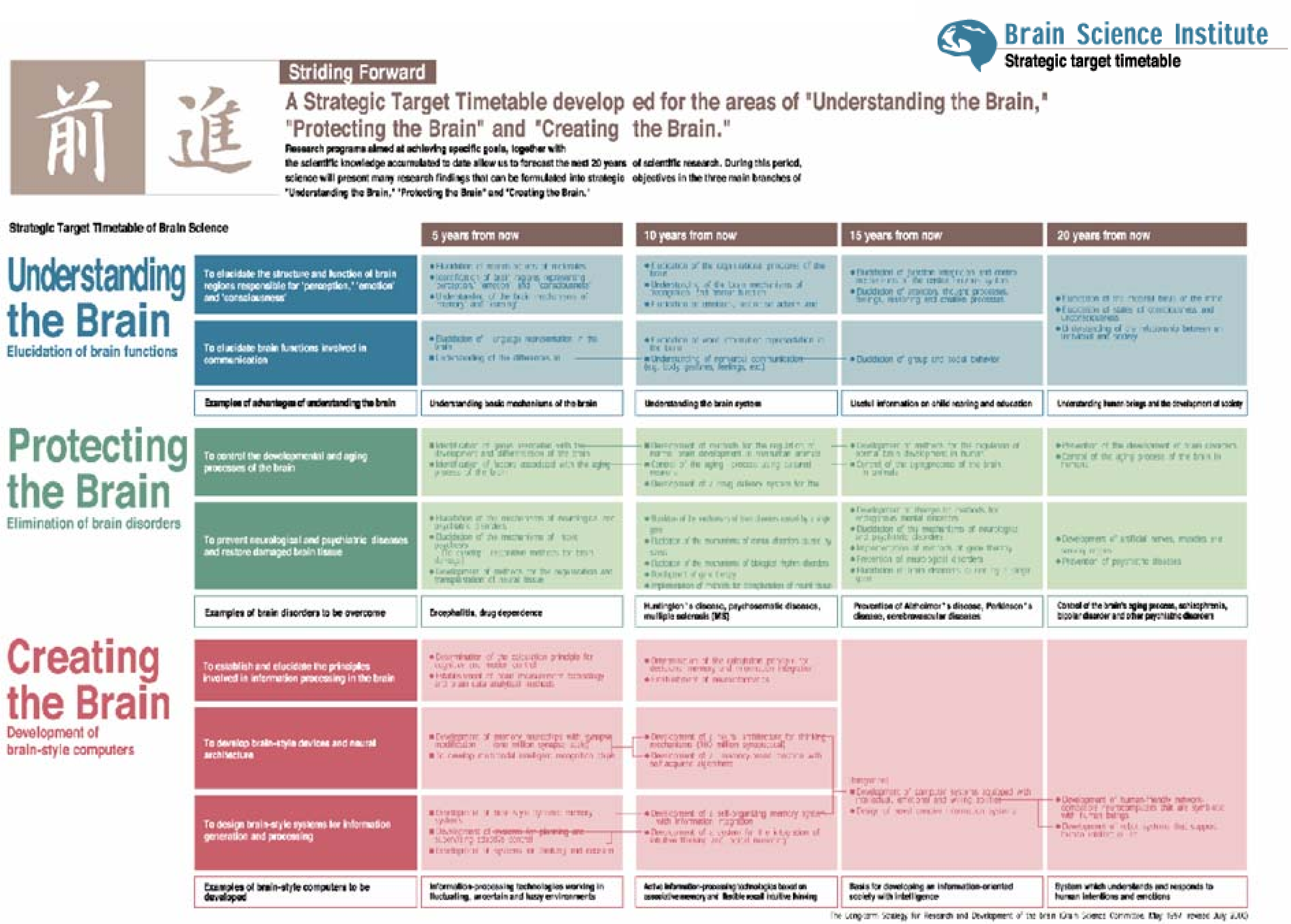
- Neuronal Function Research Group
- Neuronal Circuit Mechanisms Research Group
- Cognitive Brain Science Group
- RIKEN-MIT Neuroscience Research Center

Protecting the Brain

- Developmental Brain Science Group
- Molecular Neuropathology Group
- Aging and Phychiatric Research Group
- Recovery Mechanisms Research Group

Creating the Brain

- Brainway Group
- Brain-Style Inteligence Research Group
- Brain-Style Information Systems Research Group



http://www.brain.riken.go.jp/res-outline/image/timetable.gif

Understanding the Brain

Elucidation of brain functions

	5 years from now
To elucidate the structure and function of brain regions responsible for 'perception,' 'emotion' and 'consciousness'	• Elucidation of neurofunctions of molecules • Identification of brain regions representing 'perception,' 'emotion', and 'consciousness' • Understanding of the brain mechanisms of 'memory' and 'learning'
To elucidate brain functions involved in communication	• Elucidation of language representation in the brain ■ Understanding of the differences in
Examples of advantages of understanding the brain	**Understanding basic mechanisms of the brain**

10 years from now	15 years from now	20 years from now
• Elucidation of the organizational principles of the brain • Understanding of the brain mechanisms of 'recognition' and 'motor function' • Elucidation of emotions, instinctive actions and	• Elucidation of function integration and control mechanisms of the central nervous system • Elucidation of attention, thought processes, feelings, reasoning and creative processes	• Elucidation of the material basis of the mind • Elucidation of states of consciousness and unconsciousness • Understanding of the relationship between an individual and society
• Elucidation of word information representation in the brain ■ Understanding of nonverbal communication (e.g. body gestures, feelings, etc.)	• Elucidation of group and social behavior	
Understanding the brain system	**Useful information on child rearing and education**	**Understanding human beings and the development of society**

Protecting the Brain

Elimination of brain disorders

	5 years from now
To control the developmental and aging processes of the brain	■ Identification of genes associated with the development and differentiation of the brain ■ Identification of factors associated with the aging process of the brain
To prevent neurological and psychiatric diseases and restore damaged brain tissue	● Elucidation of the mechanisms of neurological and psychiatric disorders ● Elucidation of the mechanisms of toxic psychosis [To develop restorative methods for brain damage] ● Development of methods for the regeneration and transplantation of neural tissue
Examples of brain disorders to be overcome	**Encephalitis, drug dependence**

10 years from now	15 years from now	20 years from now
■ Development of methods for the regulation of normal brain development in nonhuman animals ■ Control of the aging process using cultured neurons ● Development of a drug delivery system for the	● Development of methods for the regulation of normal brain development in human ■ Control of the agingprocess of the brain in animals	● Prevention of the development of brain disorders ● Control of the aging process of the brain in humans
● Elucidation of the mechanisms of brain disorders caused by a single gene ● Elucidation of the mechanisms of mental disorders caused by stress ● Elucidation of the mechanisms of biological rhythm disorders ● Development of gene therapy ● Implementation of methods for transplantation of neural tissue	● Development of therapeutic methods for endogenous mental disorders ● Elucidation of the mechanisms of neurological and psychiatric disorders ● Implementation of methods of gene therapy ● Prevention of neurological disorders ● Elucidation of brain disorders caused by a single gene	● Development of artificial nerves, muscles and sensory organs ● Prevention of psychiatric diseases
Huntington's disease, psychosomatic diseases, multiple sclerosis (MS)	**Prevention of Alzheimer's disease, Parkinson's disease, cerebrovascular diseases**	**Control of the brain's aging process, schizophrenia, bipolar disorder and other psychiatric disorders**

Creating the Brain

Development of brain-style computers

5 years from now

To establish and elucidate the principles involved in information processing in the brain

- Determination of the calculation principle for cognitive and motion control
- Establishment of brain measurement technology and brain data analytical methods

To develop brain-style devices and neural architecture

- Development of memory neurochips with synapse modification (one million synapse scale)
- To develop multimodal intelligent recognition chips

To design brain-style systems for information generation and processing

- Development of brain-style dynamic memory systems
- Development of systems for planning and supervising adaptive control
- Development of systems for thinking and decision

Examples of brain-style computers to be developed: Information-processing technologies working in fluctuating, uncertain and fuzzy environments

10 years from now

- Determination of the calculation principle for decisions, memory and information integration
- Establishment of neuroinformatics

- Development of a neural architecture for thinking mechanisms (100 million synapsescal)
- Development of a memory-based machine with self-acquired algorithms

- Development of a self-organizing memory system with information integration
- Development of a system for the integration of intuitive thinking and logical reasoning

Active information-processing technologies based on associative memory and flexible recall intuitive thinking

15 years from now

[Integration]

- Development of computer systems equipped with intellectual, emotional and willing abilities
- Design of novel creative information systems

Basis for developing an information-oriented society with intelligence

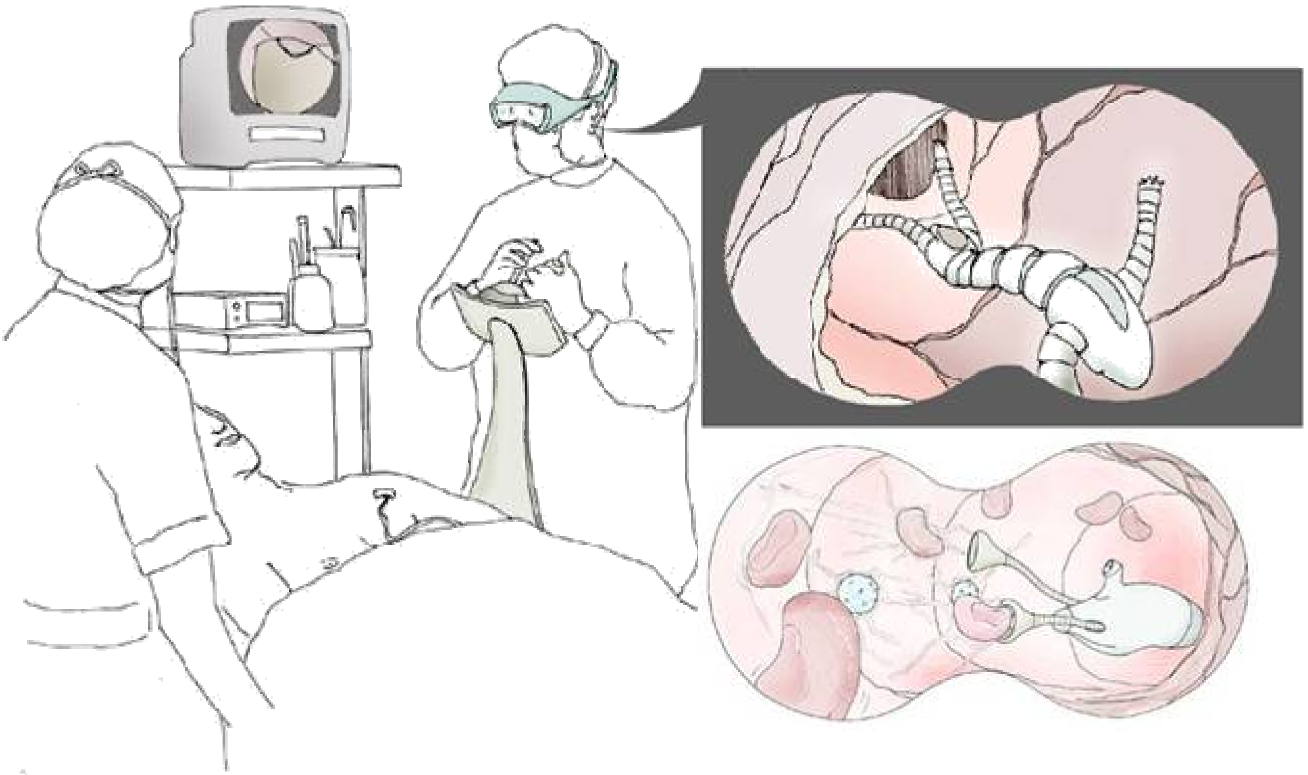
20 years from now

- Development of human-friendly network-compatible neurocomputers that are symbiotic with human beings
- Development of robot systems that support human intellectual life

System which understands and responds to human intentions and emotions

The Long-term Strategy for Research and Development of the brain (Brain Science Committee, May 1997, revised July 2000)

Bionica
scenario ‘Beyond teleoperation’



Explorations inside the human body, with full sensory feed-back

Information Society Technologies

Future and Emerging Technologies

The NEUROBOTICS IP Project (Duration: 5 years)

The fusion of NEUROscience and RoBOTICS for augmenting human capabilities

Participants

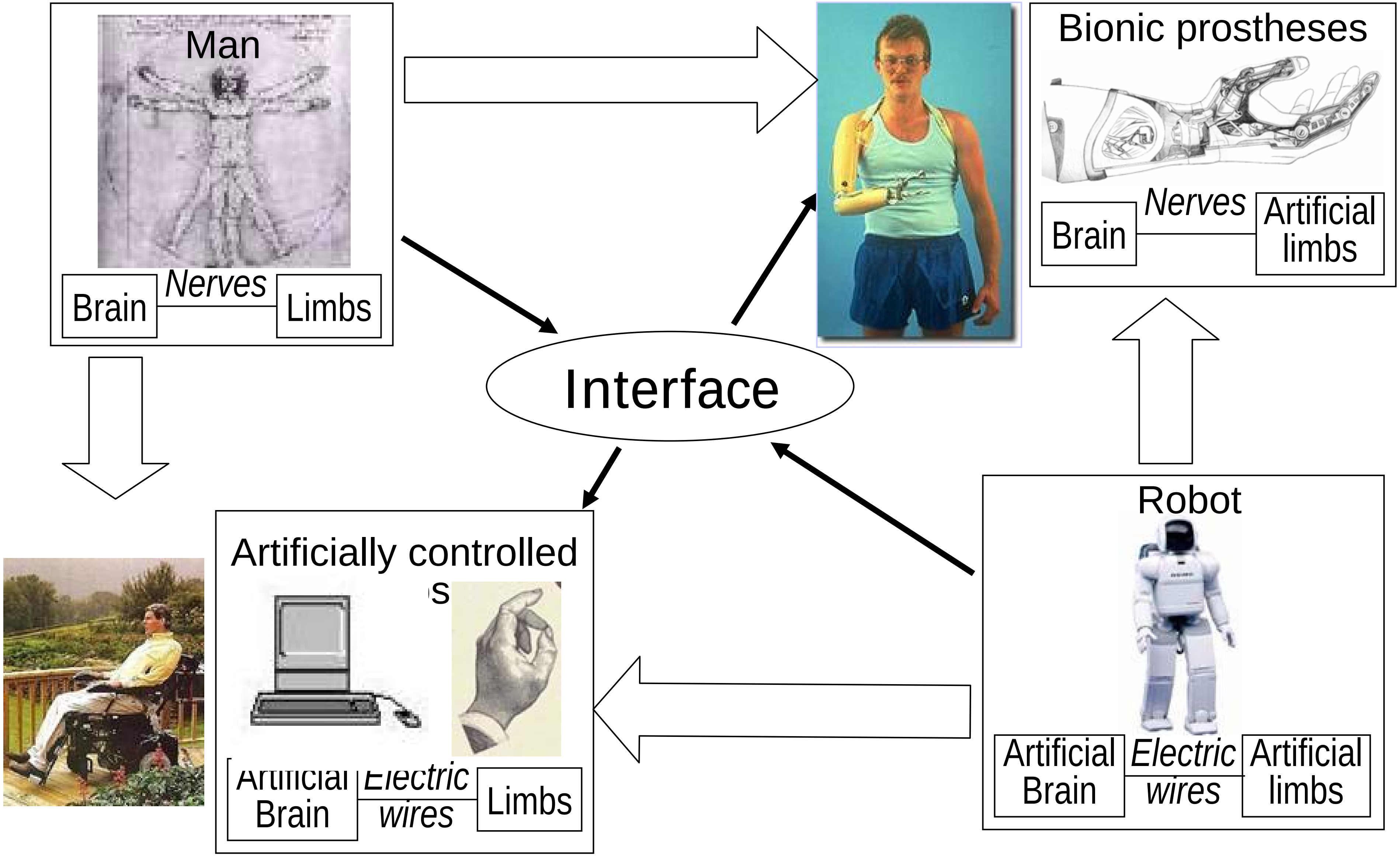
1. SSSA: Scuola Superiore Sant'Anna, Pisa, Italy (prof. Paolo Dario) – Project Coordinator

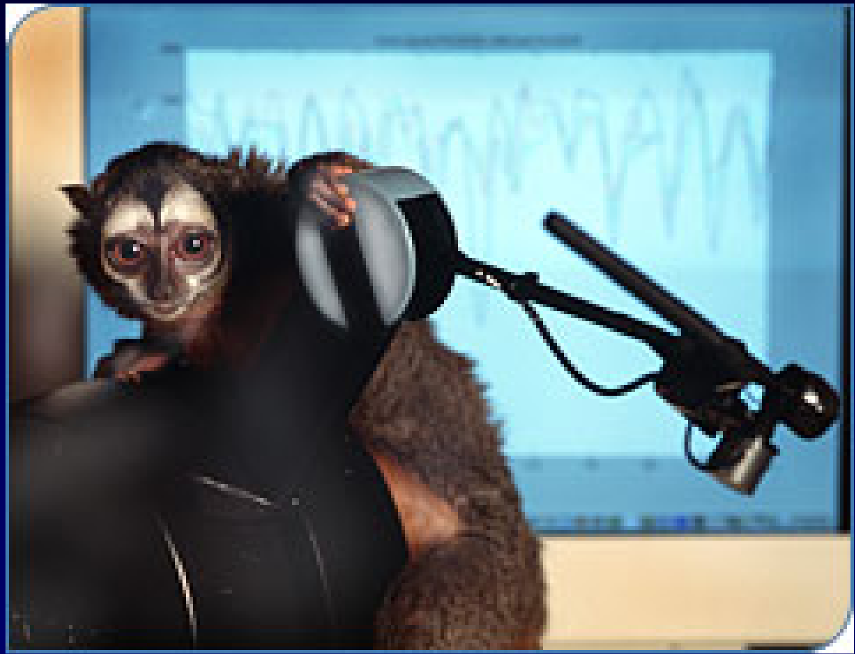
2. CDF: Collège de France, CNRS, Paris, France (prof. Alain Berthoz)
3. DLR: Deutsches Zentrum fur Luft und Raumfahrt, Oberpfaffenhofen, Germany (prof. Gerd Hirzinger)
4. IBMT: Fraunhofer Institute for Biomedical Engineering, St. Ingbert, Germany (Dr. Thomas Stieglitz)
5. KI: Karolinska Institutet, Stockholm, Sweden (prof. Sten Grillner)
6. KUL: KU Leuven, Belgium (prof. Guy Orban)
7. KTH: Kungl Tekniska Högskolan, Stockholm, Sweden (prof. Henrik Christensen)
8. NTUA: National Technical University of Athens, Greece (prof. Kostas Kyriakopoulos)
9. UMEA: Umea Universitet, Sweden (prof. Roland Johansson)
10. UAB: Universitat Autònoma de Barcelona, Spain (prof. Xavier Navarro)
11. UGDIST: University of Genova, Italy (prof. Giulio Sandini)
12. UNIPR: University of Parma, Italy (prof. Giacomo Rizzolatti)
13. UPMC: Université P. et M. Curie / INSERM U483, Paris, France (prof. Yves Burnod)

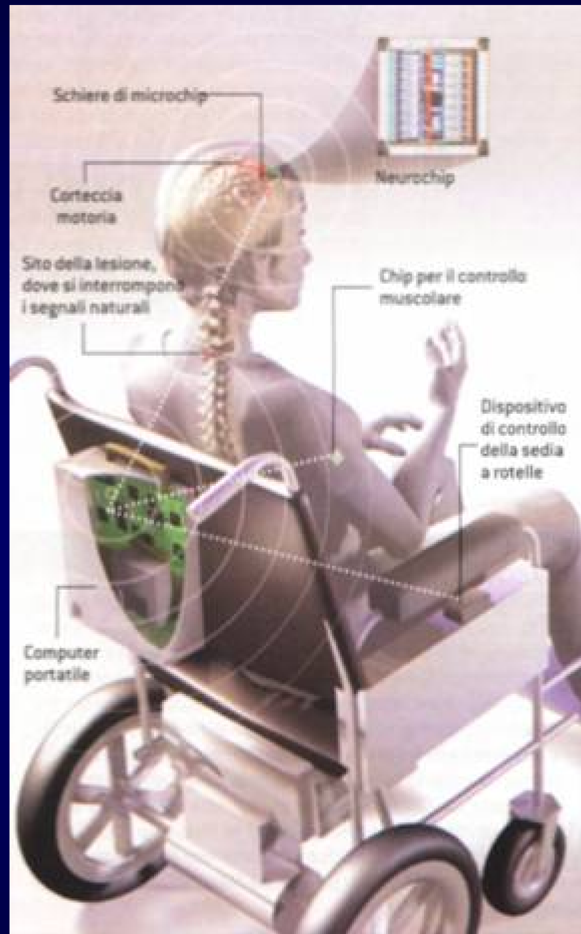
International Partners:

Brown University, Providence, RI, USA (Prof. John Donoghue)
Waseda University, Tokyo, Japan (Prof. Atsuo Takanishi)

"Connecting" the Man and the Robot



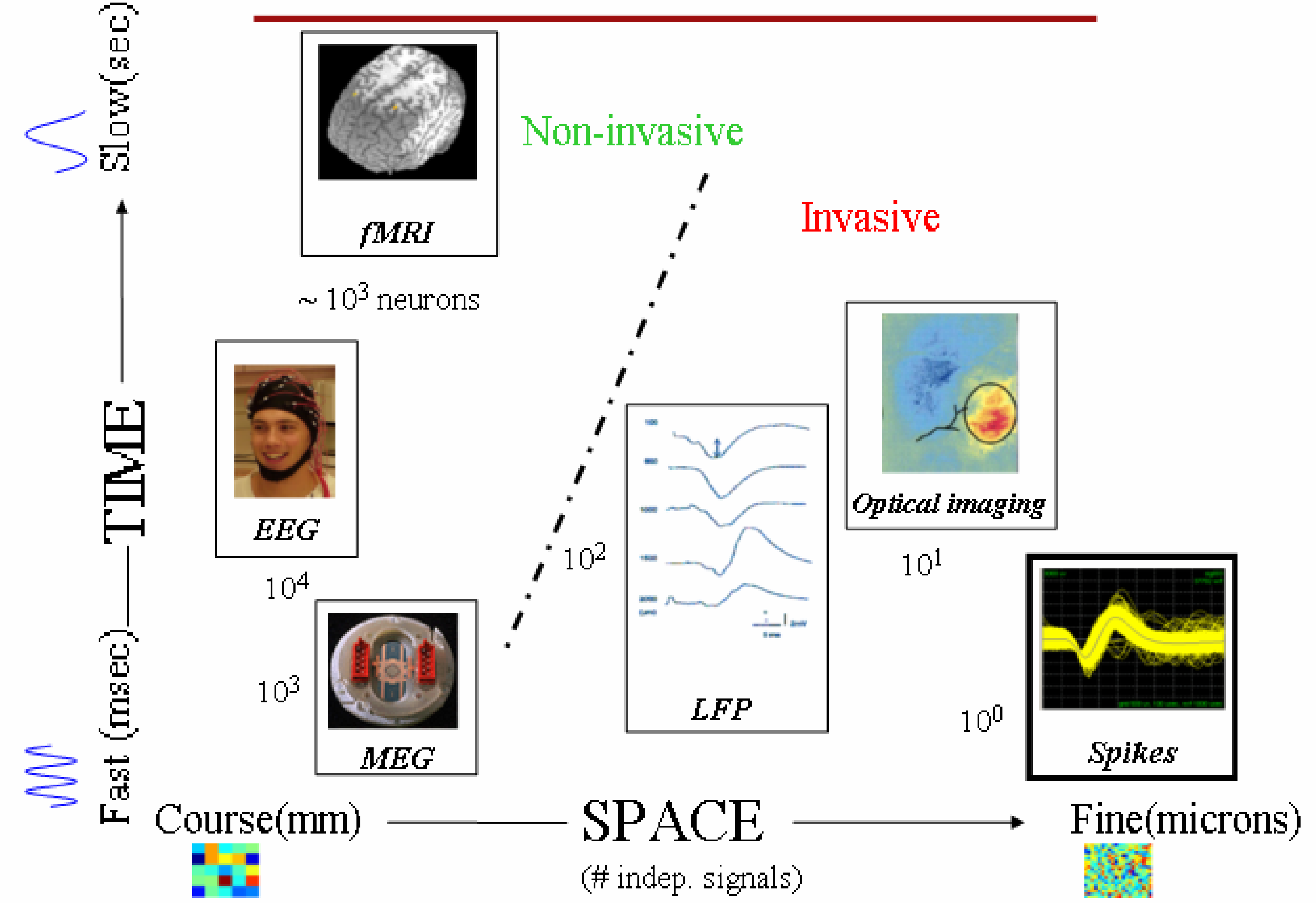




"Brain to Computer Interface is one of the 10 Emerging Technologies that will change the world"

***Technology Review*, January/February, 2001**

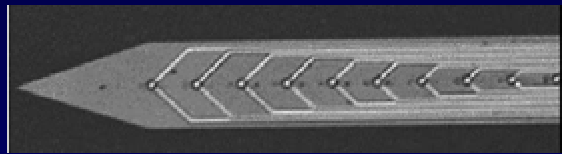
Sensing the Brain



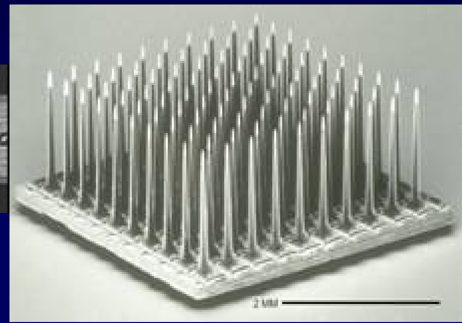
Sensing technologies that can be used to observe neural activity, divided by non-invasive vs. invasive, spatial and temporal resolution.

Brain Computer Interfaces

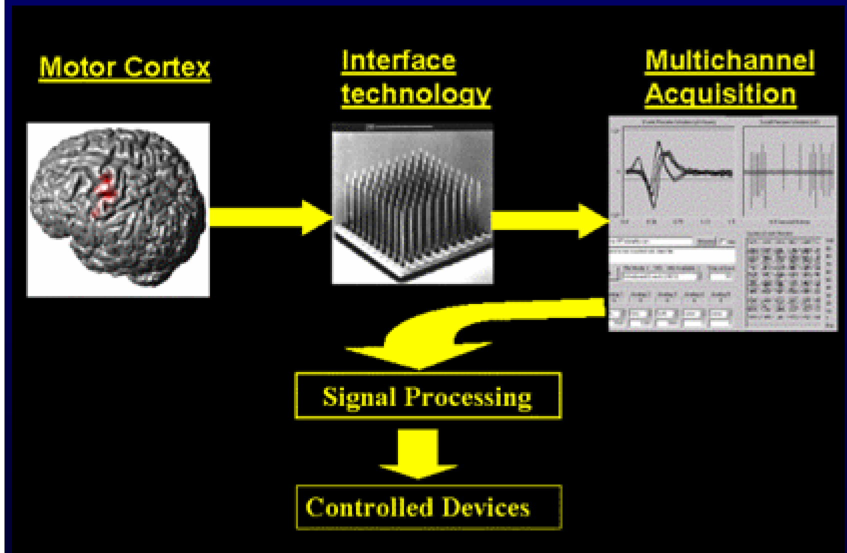
Develop new neural implant technologies to establish *reliable* ,*high-capacity* ,and *long-term* information channels between the brain and external world.

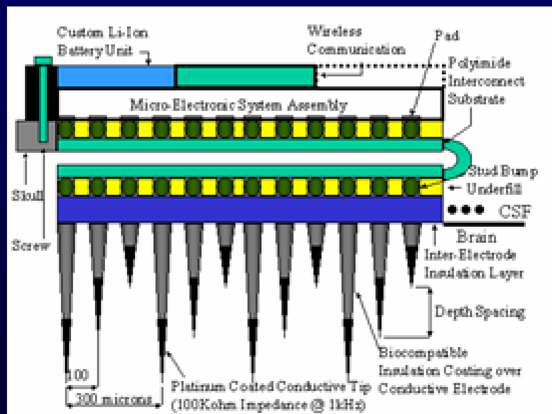


IBMT, Germany, Sensors and Actuators, 2002



Utah Electrode Array, Bionic Technologies





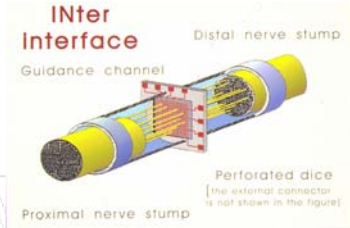
Bai and Wise, IEEE Trans Biomed Eng 2001

MIT Bioinstrum. Lab

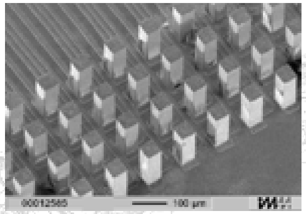
Interfaces with the PNS

Selectivity

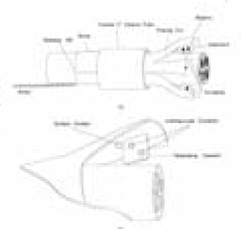
Sieve



Multi-needle



Intraneural

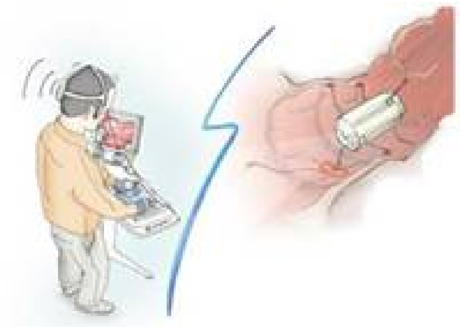


Cuff

In order to control many DoFs and to deliver a sensory feedback a good selectivity is crucial

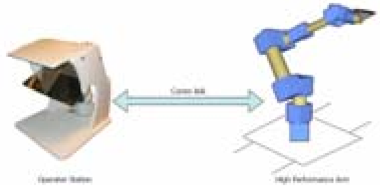
Invasivity

From concepts to real NEUROBOTICS platforms



Telepresence

Teleoperated catching



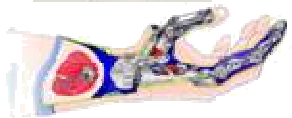
Goalkeeper

NEUROExos

EMG-controlled prosthesis

Third arm

Cybernetic prosthesis



Quali implicazioni?

'It will be impossible to build humanoid robots that have human level interactions without them having souls...'
'BUT, we (engineers) will not have to try to give them souls. They will just have them'.

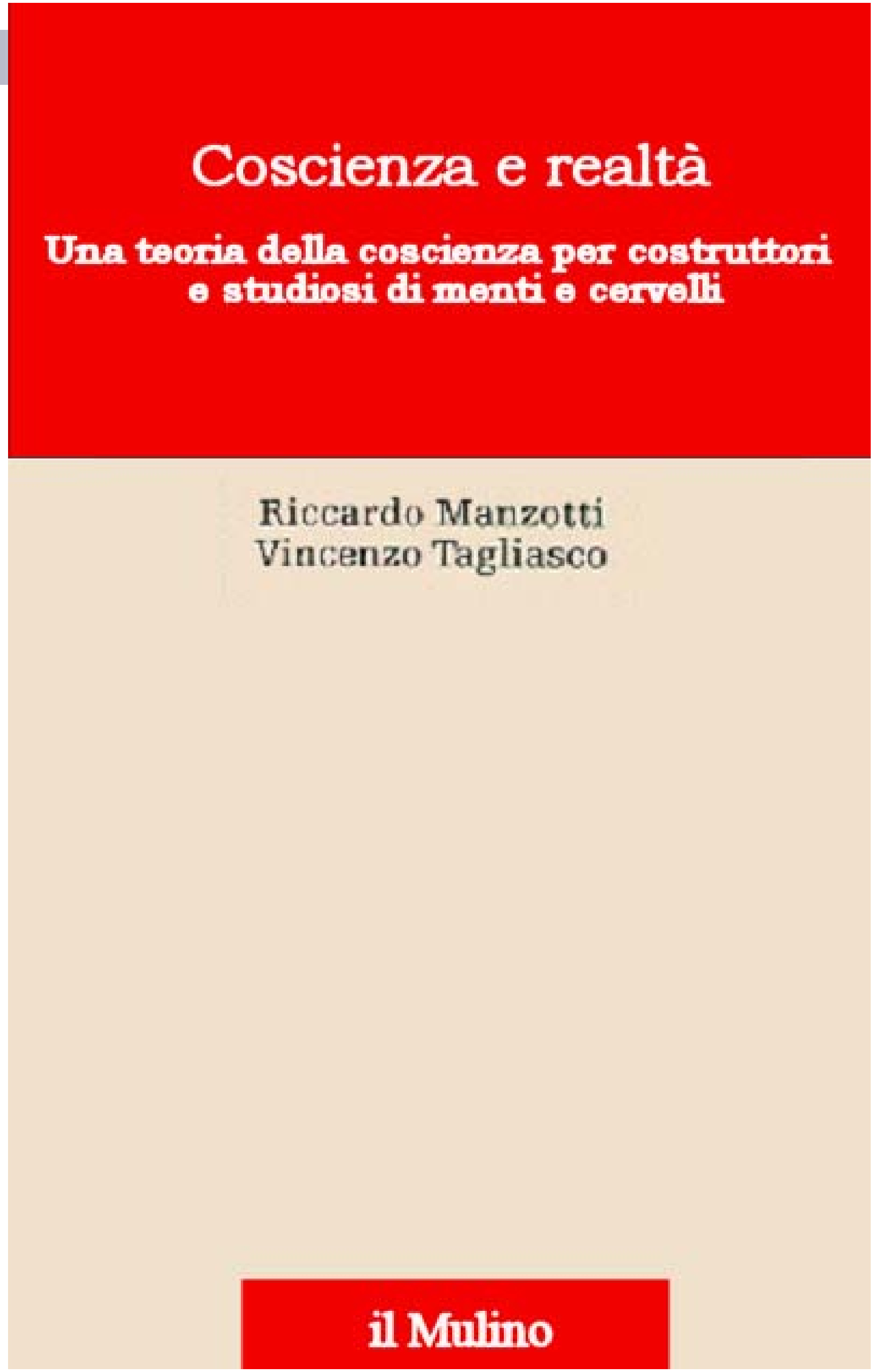
Can Humanoids Be Spiritual?
(R. Brooks, 1998)

Sarà impossibile costruire robot umanoidi con lo stesso livello di interazione degli esseri umani, senza che essi abbiano un'anima. MA noi (ingegneri) non dovremo cercare di dargliene una. Semplicemente l'avranno"

Verso un nuovo paradigma

“e’ necessaria una nuova teoria della coscienza che possa essere implementata su un robot umanoide dotato di capacità sensoriali e motorie”

Vincenzo Tagliasco, 2001



Italy-Japan 2001 Workshop

HUMANOIDS

A Techno-Ontological Approach

November 21st, 2001, Waseda University, Tokyo

Supported by the Italian Embassy in Tokyo, by the Italian Ministry of Education, University and Research and by the Italian Ministry of Foreign Affairs

HOMMES ET ROBOTS

MAISON DE LA CULTURE DU JAPON A PARIS

"Robots : entre technologie et culture"

Are robots accepted in the same way in Japan and in Europe?

Paolo Dario

Professor, Scuola Superiore Sant'Anna, Pisa, Italy
President, IEEE Robotics and Automation Society

SCUOLA SUPERIORE SANT'ANNA PISA

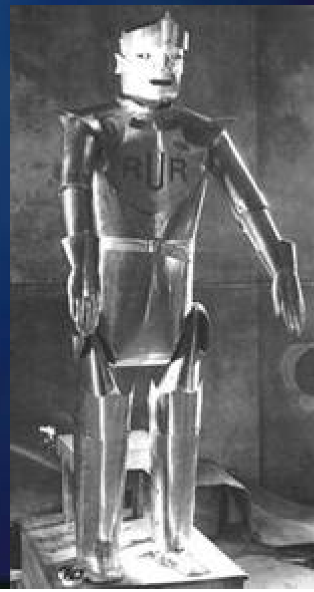
December 13, 2003, Maison de la Culture du Japon a Paris

Popular myths in Europe:
- “goodness” is associated to being human
- robots are a threat for Humankind

Pinocchio becomes a human boy when he becomes “good”

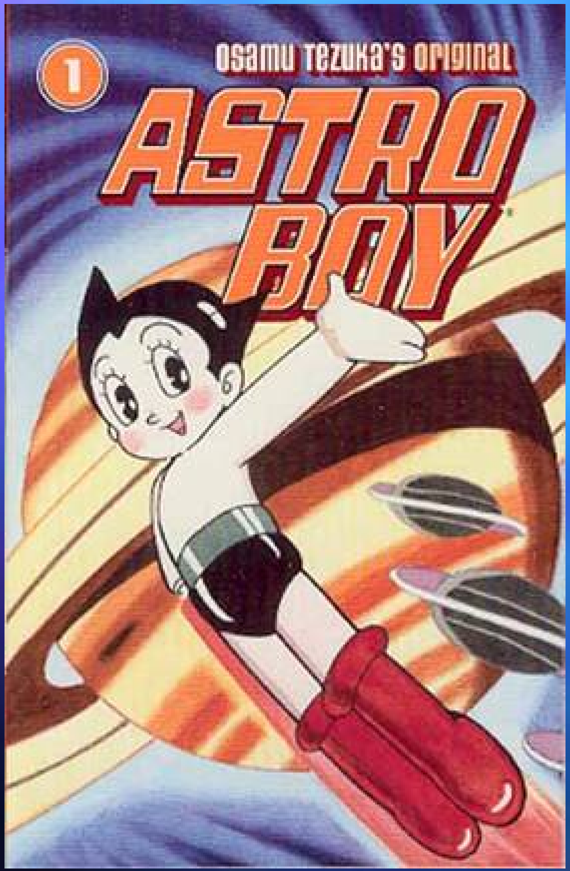
Frankestein: a monster with human body but no soul

A robot from the 1921 play “**R.U.R.**”: Robots are used as workers but they rebel to humans



Superheroes: Humans with superpowers

Popular myths in Japan: “good” robots in the help of humankind



Astro Boy / Atom Man: a “good” robot boy

A space robot protecting the Humankind against aliens

Doraemon: a boy’s cat robot, friend and helper

L’ingegnere e il ricercatore del futuro assumono un nuovo ruolo e nuove responsabilità etiche

José Maria Galvan “Sulla Tecnoetica”, IEEE Robotics and Automation Magazine, Dicembre 2003

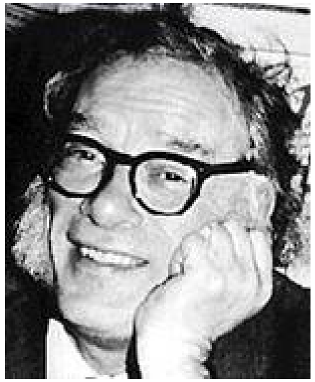
Obiettivo della Tecnoetica

Superare il paradosso fra la dipendenza tecnologica dell'uomo di oggi e la percezione diffusa che la tecnologia sia "antiumana"

La questione che si pone è quella di un nuovo rapporto fra uomo e macchina

(Josè Maria Galvan, Sant'Anna News, gennaio 2002)

Temi di riflessione etica (1/2)


- Autonomia dei robot: quale grado di autonomia dovrebbe essere fornito ai robot, dato che azioni incontrollate dei robot possono essere dannose agli esseri umani?
  - robotica per l'assistenza personale
  - robotica per applicazioni militari
- Le leggi di Asimov costituiscono una linea guida utile per vincolare l'autonomia dei robot?
- È realistica la possibilità di esseri artificiali auto-replicantesi?
- Stato ontologico dei "cyborg" e delle entità artificiali:
  - Chi è la macchina e chi è l'uomo?
  - Possiamo permettere che esseri umani vengano riprogrammati?
  - Possono esistere dissidenti in un mondo di replicanti?


Temi di riflessione etica (2/2)

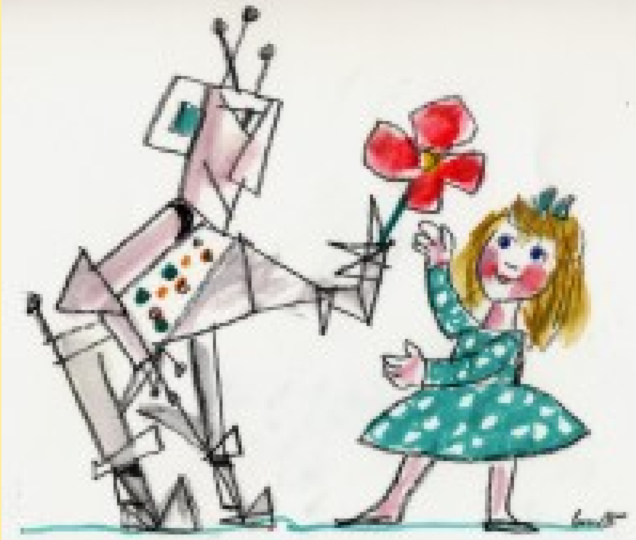
- Robotica per l'assistenza e per la riabilitazione
  - Possono i robot sostituire gli esseri umani in compiti in cui sono importanti i fattori emozionali ed empatici?
- Accrescimento delle facoltà sensomotorie
  - La possibilità di "potenziare" gli esseri umani può essere causa di discriminazioni e nuove forme di schiavitù?
  - Che impatto può avere sulla società l'allungamento della vita lavorativa?
- Chi si potrà permettere, in senso economico, di recuperare capacità sensomotorie mediante artefatti neuro-robotici?

First International Symposium on

ROBOETHICS

The ethics, social, humanitarian and ecological aspects of Robotics

30th - 31th January, 2004
Villa Nobel, Sanremo, Italy



The ROBOETHICS Symposium aims to open a debate, among scientists and scholars of Sciences and Humanities, with the participation of people of goodwill, about the ethical basis which should inspire the design and development of robots.

The Symposium is an opportunity to encounter scientists and scholars committed to discuss new and sensitive problems that humankind is glimpsing at the horizon.

Philosophers, jurists, sociologists, anthropologist and moralists, together with robotic scientists, are called to contribute to lay the fundations of the Ethics in the design, development and employment of the Intelligent Machines, the Roboethics.

For this reasons the Distinguished Speakers will report their experience in a general way, with a special focus on the social and ethical problems they are identifying in their fields.

Program Commitee:

Paolo DARIO
José M. GALVÁN
Fiorella OPERTO
Jovan PATRNOGIC
Gianmarco VERUGGIO

Organiser:

Scuola di Robotica

Co-Organisers:

ARTS-Lab, Scuola Superiore Sant'Anna, Pisa, Italy
International Institute of Humanitarian Law
School of Theology, Pontifical University of the Holy Cross, Rome, Italy

Bio-Robotics: New Ethical Challenges for the Robotics Researcher

Bruxelles, March 16, 2004

Paolo Dario

Scuola Superiore Sant'Anna, Pisa, Italy

EURON ROBOETHICS ATELIER Genova 27 February-3 March, 2006

EURON Atelier on Roboethics 2006

EURON ATELIER ON ROBOETHICS

27 FEBRUARY: PALAZZO DORIA SPINOLA
28 - 3 MARCH: SALA LIGNEA, BIBLIOTECA BERIO
GENOVA

SCHOOL OF ROBOTICS

EURON
EUROPEAN ROBOTICS RESEARCH NETWORK

The Research Atelier on Roboethics is an EURON Project aimed to develop the concept of an Ethics applied to Robotics. The Atelier will last one working week, in February 2006. It will be attended by about 30 participants (Senior Scientists and PhD Students) coming from different fields of research, both from Sciences and Humanities. The result will be a ***Roboethics Roadmap Book***.

In January 2004, Scuola di Robotica organized the First International Symposium on Roboethics. The success and the important follow-ups of that event encouraged the partners of this proposal to design a more continuous and systematic approach: the Roboethics Atelier inside **EURON**.

The Roboethics Atelier will apply, in the Robotics field, the EC directives on the subject of Ethics. Actually, the Action Plan "*Science and Society*" specifies some of the principles which should govern researches in science and technology. In this context, the Atelier will analyze the effects of Robotics, from those principles, in the applications fields where the potential problems are more important and evident.

ETHICBOTS Project

- Home
- Goals and motivations
- Consortium
- Documents
- Events
- Media information
- Contacts
- Links

News

University of Hertfordshire, Hatfield, United Kingdom, 6-8 September 2006
15th IEEE International Symposium on Robot and Human Interactive Communication

IEEE RO-MAN 06 provides a forum for an interdisciplinary exchange for researchers dedicated to advancing knowledge in the field of human-robot interaction and communication.

Go to the website

Napoli, Italy, April 20-22
Workshop

ETHICBOTS project home page

ETHICBOTS project
Emerging Technoethics of Human Interaction with Communication, Bionic, and robOTic systems
Coordination Action
FP6 - Science and Society
Start date: November 1st, 2005
Duration: 2 years

News

- Workshop on ***Ethics of Human Interaction with Robotic, Bionic, and AI Systems - Concepts and Policies***, Naples, 17-18 October, 2006
- Some kick-off meeting presentations have been uploaded on the kick-off agenda page

Project overview

ETHICBOTS will promote and coordinate a multidisciplinary group of researchers into artificial intelligence, robotics, anthropology, moral philosophy, philosophy of science, psychology, and cognitive science, with the common purpose of identifying and analyzing techno-ethical issues concerning the integration of human beings and artificial (software/hardware) entities.

Three kinds of integration will be analized:
(a) Human-softbot integration, as achieved by AI research on information and communication technologies;
(b) Human-robot, non-invasive integration, as achieved by robotic research on autonomous systems inhabiting human environments;
(c) Physical, invasive integration, as achieved by bionic research.

ETHICBOTS Workshop Napoli, 17-18 ottobre, 2006

ethicbots

EMERGING TECHNOETHICS OF HUMAN INTERACTION WITH COMMUNICATION, BIONIC, AND ROBOTIC SYSTEMS

SCIENCE AND SOCIETY

- Home
- Goals and motivations
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- Documents
- Events
- Media information
- Contacts
- Links

Ethics of Human Interaction with Robotic, Bionic, and AI Systems

October 17 th 2006

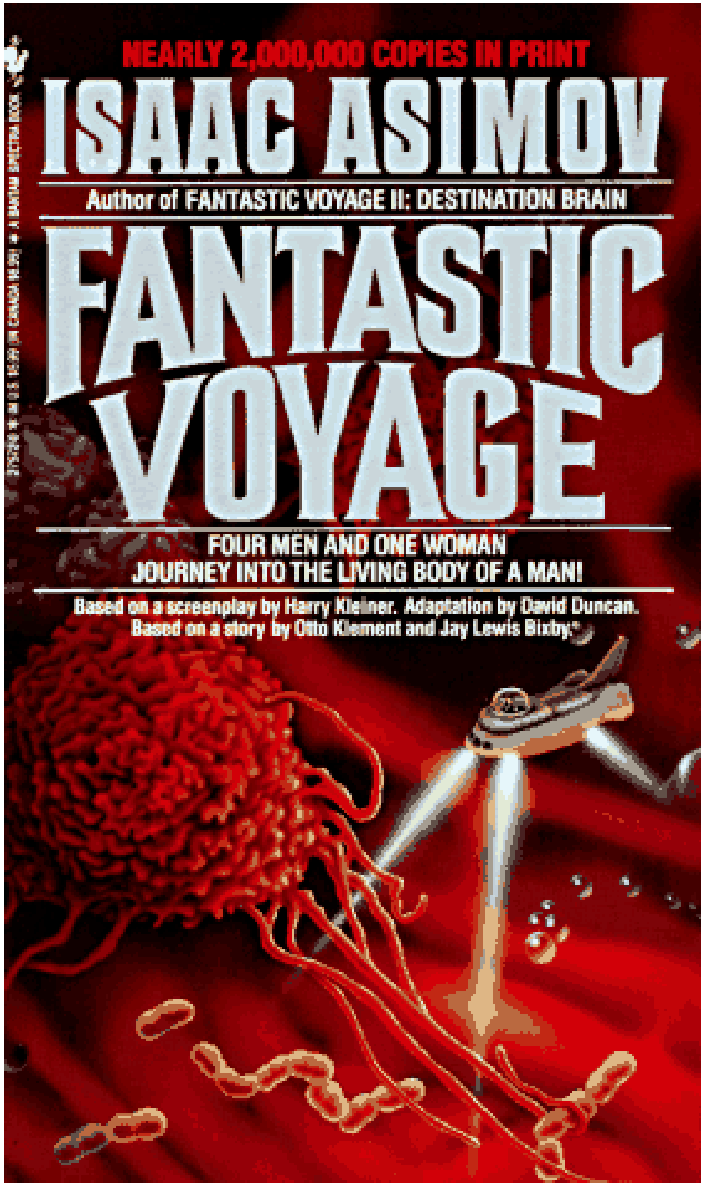
9:00	9:30	**Welcome and presentation**
9:30	10:15	*S. Rodotà* Adventures of the human body
10:15	11:00	*A. Mowshowitz* Technology as excuse for questionable ethics
11:00	11:30	Coffee Break
11:30	12:15	*R. Rosenberg* The Social Impact of Intelligent Artifacts
12:15	13:00	*D. Miller* Piecemeal Decision Making
13:00	14:30	Lunch
14:30	15:15	*A. Mackworth* Can We Know The Robot Will Do The Right Thing?
15:15	16:00	*R. Cordeschi* Freedom of action in a robotic universe. A tutorial
16:00	16:20	Coffee Break
16:20	17:05	*J. Weber* Robots - From Slaves Towards Companions?
17:05	17:50	*R. Chatila* Human-aware robots: for the worse or for the better?
17:50	18:35	*R. Von Schomberg* From the Ethics of Technology to the Ethics of Knowledge Assessment
18:35	19:00	*Discussion*

Chi progetterà queste macchine e saprà affrontare questi problemi?

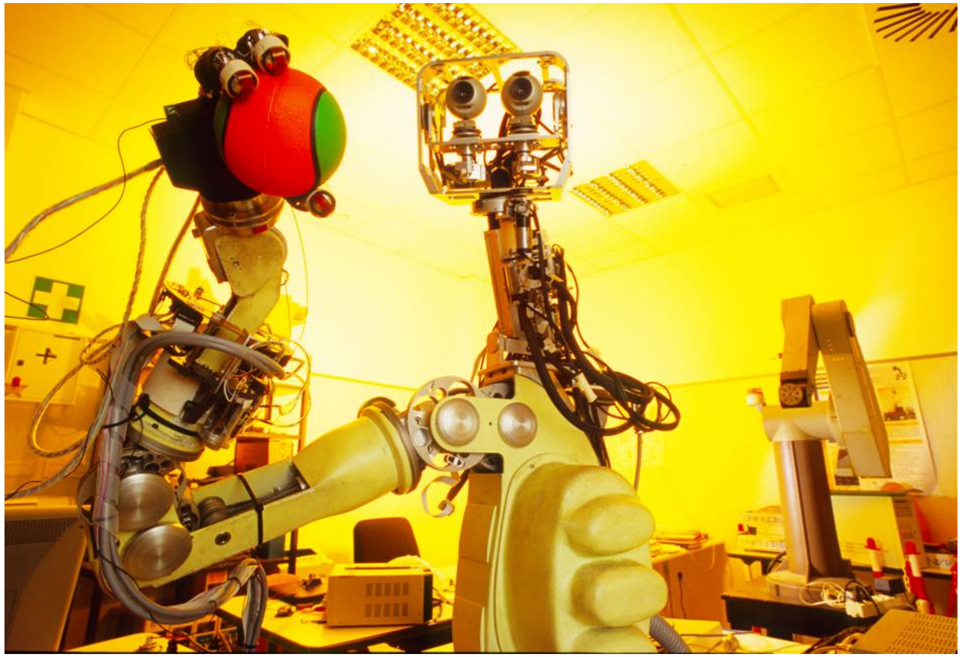
Una possibile risposta:

un “nuova” figura di ingegnere,

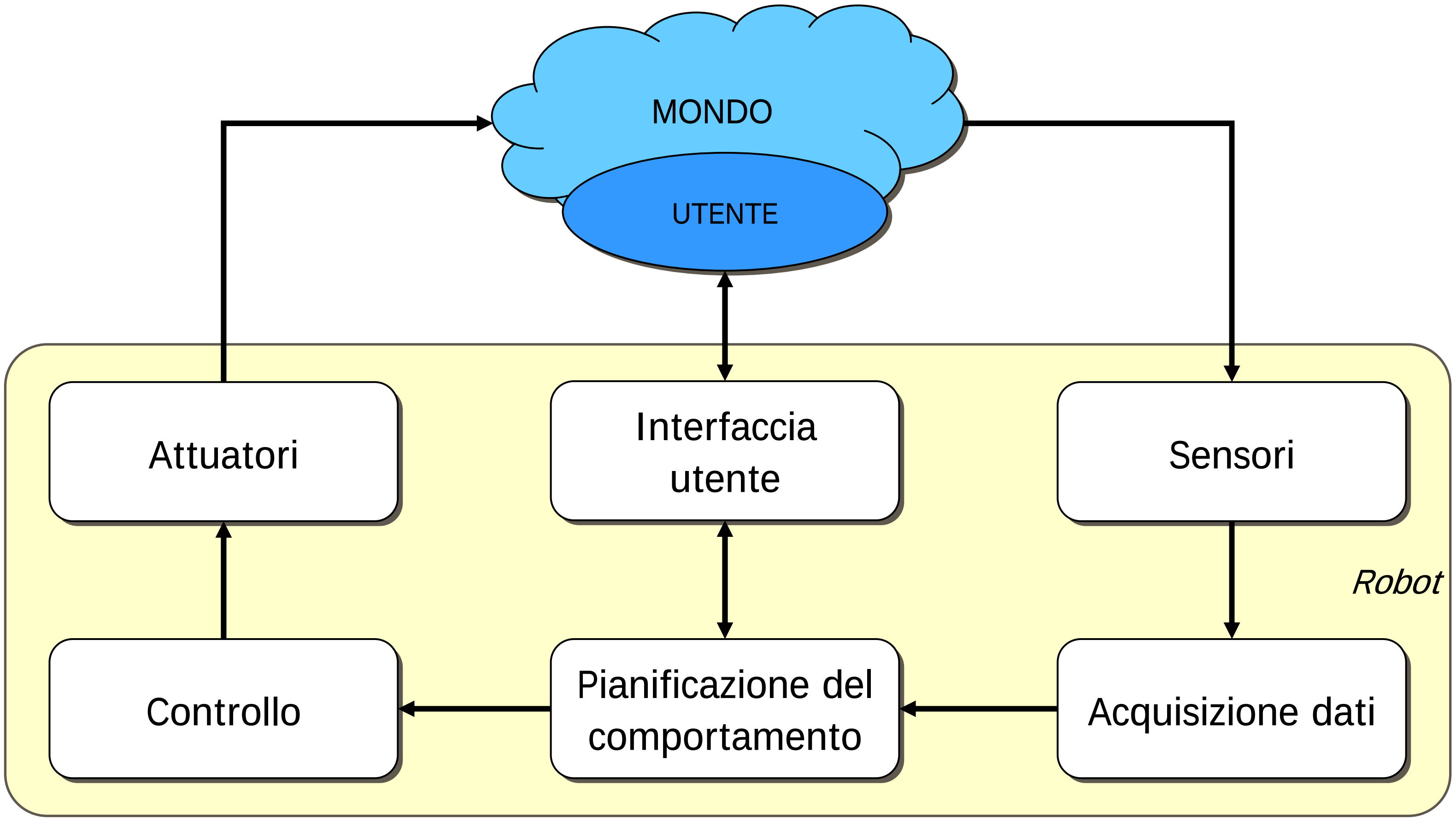
- **che sappia fondere scienza e ingegneria,**
- **che sappia integrare diverse competenze tecniche,**
- **che sappia gestire gli aspetti culturali di tipo umanistico, come le implicazioni etiche**



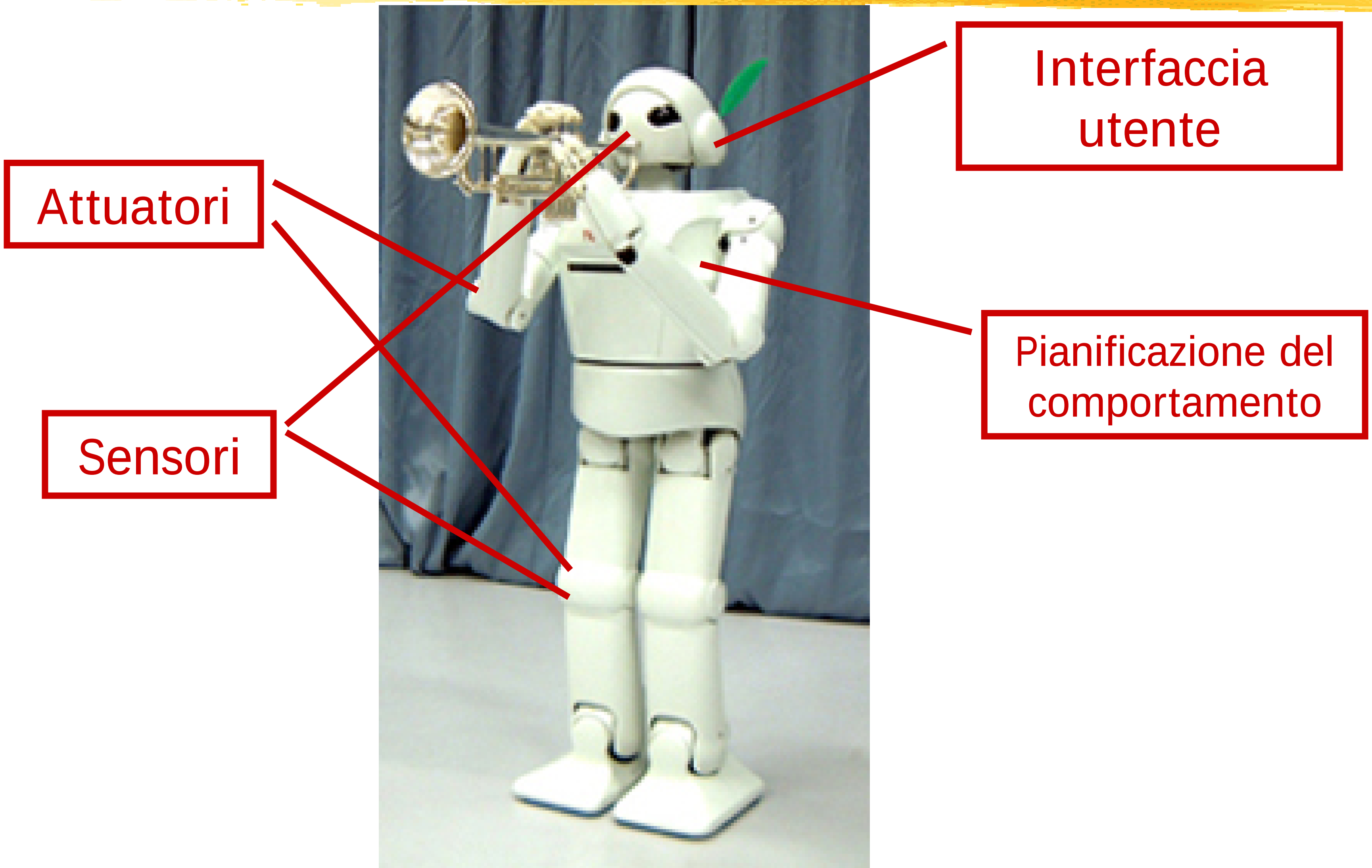
Ricerca di frontiera, grandi sfide e nuove opportunità



Schema tipico di un sistema robotico



Componenti fondamentali di un sistema robotico



Componenti fondamentali di un sistema robotico