CECILIA LASCHI
Curriculum Vitae et Studiorum

PERSONAL DATA

First Name:	Cecilia
Family Name:	Laschi
Gender:	Female
Birth place and date:	Piombino (Livorno), Italy, October 6th, 1968
Home address:	Via Edda Fagni 47, 57123 Livorno, Italy
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ACADEMIC POSITIONS

- Currently **Full Professor** of Biorobotics (Italian academic sector of Biomedical Engineering, ING-IND/34) at the Scuola Superiore Sant'Anna in Pisa, Italy, since August 2014.

- **Associate Professor** of Biorobotics (Italian academic sector of Biomedical Engineering) at the Scuola Superiore Sant'Anna in Pisa, Italy, from July 2006 to July 2014.

- **Assistant Professor** of Biorobotics (Italian academic sector of Biomedical Engineering) at the Scuola Superiore Sant'Anna in Pisa, Italy, from May 2000 to June 2006.

- **Visiting Researcher** at the Humanoid Robotics Institute of Waseda University, Tokyo, Japan, from July 2001 to June 2002.

- **Post-Doc Research Assistant in Biomedical Engineering** (Assegno di Ricerca) at the Scuola Superiore Sant'Anna, Pisa, Italy, from May 1999 to April 2000.

EDUCATION

- **Ph. D. in Robotics** from the University of Genova, Italy, in May 1998.

- **Master Degree in Computer Science** from the University of Pisa in December 1993.

AWARDS

- **Post-Doc Fellowship**. The fellowship was provided by JSPS (Japan Society for the Promotion of Science) on a competitive call, for supporting research activities in Japan for 1 year, from July 2001 to June 2002.

- **Best Ph.D. Thesis in Biomedical Engineering Award**. The award was assigned to the 3 best theses in this field in Italy in 1998, by the Italian National Group of Biomedical Engineering (GNB).

- Listed among the 25 most influential women in robotics in 2015 by RoboHub

- Inclusion by the Italian **Presidenza del Consiglio dei Ministri** (Prime Minister Cabinet) in a gallery of journalistic portraits of women considered representative of Italian culture and politics, for the celebrations of the 150th anniversary of Italy unification, in 2011.

- Testimonial for science and technology for the Tuscany Region, for the celebrations of the 150th anniversary of Italy unification, in 2011.

- Awards from local branches of international associations, like Zonta and Rotaract, and from local administrations and associations.

ACADEMIC RESPONSIBILITIES

- **Rector's delegate** to research and PhD, since 2013.
- **Rector's delegate** to disability and member of the Italian National Conference of Delegates to Disability (CNUDD), since 2007.
- Elected member of the **Academic Senate (Senato Accademico)** of the Scuola Superiore Sant'Anna, November 2010 – December 2013.
- **Deputy Director of the BioRobotics Institute** of the Scuola Superiore Sant'Anna, 2012-2014.
- **Area Leader** of the area "Soft Robotics" of the BioRobotics Institute of the Scuola Superiore Sant'Anna since 2011
- **Responsible person** for the Research Center on Sea Technologies and Marine Robotics of the Scuola Superiore Sant'Anna in Livorno (sssa.marinerobotics.it).

Scientific and Technical Committees
- Member of the **Technical Committee of the Revolving Fund** of the Chamber of Commerce of Pisa, as representative of the Scuola Superiore Sant'Anna, for years 2010-2016.
- Member of the Scientific Committee of **Toscana Life Sciences Foundation**, as representative of the Scuola Superiore Sant'Anna, since 2013.
- Member of the Scientific Committee of the **joint laboratory** on biorobotics of the Scuola Superiore Sant'Anna and STMicroelectronics in Catania, since 2011.
- Member of the Scientific Committee of **RoboCasa joint laboratory** on humanoid and personal robotics of the Scuola Superiore Sant'Anna and the Waseda University in Tokyo, since 2003.

Academic Boards
- Member of the **Executive Board (Giunta)** of the BioRobotics Institute of the Scuola Superiore Sant'Anna, 2012-2014.
- Member of the **Faculty Board (Collegio dei Docenti)** of the PhD course in BioRobotics of the Scuola Superiore Sant'Anna, since 2011.
- Member of the **Faculty Board (Collegio dei Docenti)** of the PhD course in Biomedical Engineering of the University Campus Bio-Medico in Rome, Italy, since 2006.
- Member of the **Faculty Board (Collegio dei Docenti)** of the PhD course in Microsystem Engineering of the University of Rome Tor Vergata, Italy, since 2003.
- Elected member of the **Board of the Class of Experimental Science** (Consiglio della Classe di Scienze Sperimentali) of the Scuola Superiore Sant'Anna, as representative person of the assistant professors of the Engineering sector (years 2004-2006).
- Member of **Boards** of the Scuola Superiore Sant'Anna for PhD defences, Master and Bachelor graduations, admission to PhD positions, selection of laboratory technician, selections for post-doc assistants and collaborators.
- Member of a Board for **PhD defences** and **Master graduations** in Biomedical Engineering, Computer Science, Mechanical Engineering, Electronic Engineering, Philosophy, Automation Engineering, in Italy and abroad.

RESEARCH ACTIVITY

The wide framework for my research activities to date is **Biorobotics**.

At present, my major research challenge is **Soft Robotics**, a recent research field that I pioneered, investigating the use of soft materials for building robots with enhanced capabilities for interaction, with the environment and with humans, improved embodied intelligence, and ultimately better performance in real-world tasks. This field is rapidly progressing with prominent scientists from main universities and research centres worldwide and I am still recognised as one of the leading actors.

The path to Soft Robotics has evolved from studies in bioinspired robotics, from the challenges taken and the expertise built in studying living systems for adopting novel approaches to robotics.

Starting from the basic robotics expertise on artificial perception, developed along my educational pathway, I first applied my robotics knowledge and achievements to **Assistive Robotics**. In this field, my research mainly addressed the integration of robotic systems that can operate in unstructured environments and can accomplish tasks of daily life in support of people with special needs, like the disabled and the elderly. My personal contribution in this research area was the development of artificial perception (vision and touch) techniques for the robotic systems and of sensory-motor coordination schemes for the robot grasping tasks. In this phase of research, I acquired additional expertise on user-oriented design and I gave a personal contribution to the set-up, accomplishment and analysis of experimental trials with robot prototypes and samples of end users. This activity required the integration of my expertise within multidisciplinary teams and strict interaction with clinical partners in rehabilitation.

I carried out further basic research in robotics in the field of **Neuro-Robotics**, that is the application of robotics technology and bioengineering design principles and experimental tools in the development of robotic models of human beings for neuroscience research. On one side, models of the human brain can contribute to the implementation of perception-action functions in robots. On the other side, the advances of humanoid robotics allow its application in the study of humans, as an experimental tool for neuroscientists, neurophysiologists, and physiologists, in the validation of their hypotheses and models. Though a pioneering activity when started, this concept is nowadays well recognized in the international scientific communities of robotics and neuroscience. I gave a significant contribution in writing and carrying on the seminal EU-funded ICT-FET NEUROBOTICS project in this field.

In the two-fold relation between neuroscience and robotics, human motor control can suggest solutions for the control of the sophisticated sensory-motor functions of humanoid platforms. In this context, a part of my research effort was devoted to the study and implementation of **neurocontrollers**, i.e. control systems based on neural networks that learn motor control, inspired by the learning phase of infants. Based on this model, we developed and experimentally validated different neurocontrollers: a neurocontroller for positioning and orienting a robot hand in the 3D Cartesian space; a neurocontroller for positioning the robot fingers in order to obtain a stable grasp; and a neurocontroller for gazing a point in the 3D space, with the ARTS humanoid robot head, by controlling the neck and eye movements. My personal contribution concerned the identification of the robotic problems and the formulation of the overall coordination schemes. The main achievement of this research work was to show that a neural approach based on learning allows to reach effective robot control; the experimental work allowed to measure the performance and to compare it with traditional methods.

After these experiences, I re-investigated the problem of formulating a robot perception-action scheme, based on recent neuroscience findings. I carried out this investigation with a contribution from philosophers of science (epistemologists), from the Department of Philosophy of the University of Pisa (Prof. Guglielmo Tamburrini). With this work, we formulated a novel scheme of "**Expected Perception**" for robot sensory-motor coordination. In this scheme, the perception-action loop is not based on the traditional feedback concept, but on the 'prediction' of perception, to be compared with the actual one. This comparison allows to simplify drastically the perception phase and to obtain better robot performance in terms of execution time and effectiveness, in the same way as it is now hypothesised to happen in humans. The collaboration with the philosophers concretised in a graduation work in epistemology in 2002 (Edoardo Datteri) and the results of the work led to an industrial research project, funded by a big Japanese company, in which we continued this study and made a robotic implementation, for the case of tactile perception in grasping. The final robot task was 'adaptable grasping', that is the robot was capable of

looking at an object, determining the position of the hand for grasping, predicting the tactile image, and accomplishing the grasping action by using the tactile perception with an expected perception control loop. These results brought not only to publications but also to patents. Further studies were then carried out on the tactile sensory system, in collaboration with the same big Japanese company, specifically for the processing of large amounts of data, like those coming from a bioinspired skin, developed at the CRIM Lab of the Scuola Superiore Sant'Anna.

In the following years, my research in this field addressed wider studies on **eye movements** and it led to the robotic implementation on the head of the ARTS humanoid and on the iCub robot of neuroscientific models of: saccades, based on models of the generation of saccades in the Superior Colliculus; smooth pursuit, with prediction and learning of the target trajectory, and with catch-up saccades; VOR, integrating visual and vestibular information to stabilize images on the retina; and an integrated system with a decisional module based on a model of basal ganglia, for coordinating the different eye movements and generating gaze movements. In collaboration with Prof. Alain Berthoz (neuroscientist, College de France, Paris), we implemented a novel model of saccades, explaining the neural circuit from the retina to the superior culliculus in the brain and then to the eye muscles, on the ARTS humanoid head. We included the coordination of the eye and neck movements, still based on a neuroscientific model. Smooth pursuit is interesting because it requires predictions of the target velocity and positions. A model of smooth pursuit with prediction and learning has been implemented on the iCub platform, also integrated with so-called catch-up saccades and with the strategy used by the human brain to overcome occlusions. Still on the iCub, two different models of VOR have been implemented and compared experimentally. Most originally, a model of basal ganglia allows the integration of the different eye movements in one system and provides the robot with the capability of deciding which eye movement to start, depending on the external visual stimulus.

The topics of predictive behavior, eye movements, and biped locomotion have been investigated in an integrated way, in collaboration with the groups of Prof. Berthoz, Prof. Takanishi at Waseda University in Japan and Prof. Santos-Victor at the Technical University of Lisbon. This research was strongly based on the concept of *sense of movement* proposed by Prof. Berthoz and led to gaze-guided locomotion in a biped robot, with a predictive behavior and with integrated eye movements and whole-body coordination. The robotic platform used here is the state-of-the-art **Sabian** humanoid developed at the BioRobotics Institute in collaboration with Waseda University, at the Robot-An joint Lab. This research has been funded by the European Commission in the RoboSoM ("A Robotic Sense of Movement") project, following the evaluation of the proposal that I prepared, which received an extremely good evaluation (score of 14, over 15) and was ranked 1st among the 109 proposals submitted to the same funding programme (ICT, Cognitive Systems, Interaction and Robotics).

The use of humanoid robots in neuroscience research is also part of the EU-funded large-scale initiative **Human Brain Project** FET-Flagship, in which I am PI for the Scuola Superiore Sant'Anna within the NeuroRobotic Platform Sub-Project.

More application-oriented research concerns **service robotics**. Significant experiences and accomplishments include the development of a urban robot for garbage collection and street cleaning, funded by the European Commission with the DustBot project, and of **marine robots** for water monitoring, funded by the Environment programme of the European Commission (HydroNet project) and the Tuscany Region (V-FIDES).

Neurodevelopmental Engineering is a recent interdisciplinary research area at the intersection of developmental neuroscience and bioengineering, mainly concerned with quantitative analysis and modeling of human behavior during neuro-motor development. Along such a line, my research started by focusing on early diagnosis of neurodevelopmental disorders such as autism. In collaboration with clinical partners from the University Campus Bio-Medico in Rome, we proposed a novel approach to the assessment of basic patterns of goal-directed actions in babies, in the range of 0-24 months of age, based on novel sensory systems and mechatronic devices, embedded into toys. My research in this field continued on infants with neurological disorders, in collaboration with clinical partners from the Stella Maris IRCCS (hospital and research institute in developmental neuroscience) and aims at developing sensorized toys for assessing their grasping actions, as an evaluation of their motor development. Different kinds of sensors are used for this purpose, including contact sensors, pressure sensors, inertial sensors,

gaze trackers. Prototypes have been developed and tested in clinical trials (RCT) with few-month-old infants at risk, within the EU-funded CareToy project, which enlarged the scope from diagnosis to rehabilitation. Current activities further enlarge the scopes in terms of pathologies and age range.

More recently, I extended my research on bioinspired robotics and on neuro-robotics from humans to a wider range of animal models. **Biomimetic robots** can be used, as well, as robotic models to study complex control, coordination, or behavioural mechanisms of their biological counterparts. These robots are designed by a biomechatronic approach, in order to have biomorphic features, to the extent that they significantly replicate animals properties in focused biological experiments. The objective of a first work in this research line was to design and develop a bioinspired legged rat robot, as an experimental tool for studying social interaction between rats and robots. We designed and developed a prototype legged rat robot, which was used in experiments with a real rat at the RoboCasa joint lab, in Tokyo. The results presented at a biomimetic robotics conference received the best paper award.

Further activities in this field led to the design and developed of a soft-bodied robot inspired to the octopus. This new line of research has addressed the challenging and original problem, at international level, of obtaining a robotic system without rigid links, founding the field of **soft robotics**, intended as the use of soft materials in robotics. Robotics has based all theories and techniques on the concept of rigid links. The use of soft materials, widely evident in biological systems, hinders robotics technologies at their foundations. The octopus represents an ideal model for soft robotics, as well as for embodied intelligence, a modern view of intelligence giving a stronger role to the physical body. The objective of this research has been investigating and understanding the principles that give rise to the octopus sensory-motor capabilities and using them in developing the technologies to build the first completely soft robot, broadly based on the anatomy of the 8-arm body of an octopus, and with similar performance in water, in terms of dexterity, speed, control, flexibility, and applicability. This research has been funded by the European Commission in a large-scale project (IP), named OCTOPUS, under my coordination. The OCTOPUS proposal that I prepared for the FET programme received an extremely positive evaluation and a score of 14 (over 15) which ranked it first among the FET proposals. The results obtained include prototypes of soft robot arms and a crawling soft robot with 8 arms, as well as few findings on the octopus.

As an evidence of the growing interest in research in soft robotics, at international level, and the growing international acknowledgement of my contribution in this field, a Coordination Action (CA) on Soft Robotics was recently approved by the FET-Open programme, under my coordination, with a score of 15 (over 15).

As mentioned, this is at present my main field of research, where I have been developing new technologies for soft actuators and sensors, new modelling techniques and control schemes for soft robots, an original approach to the design of soft robots based on evolutionary algorithms, and complete soft robotic systems.

The research area of soft robotics born with the studies on the octopus has brought to applications in diverse fields: surgery (EU STIFF-FLOP project), for developing a variable-stiffness endoscope; assistive robotics (EU I-Support project), for building a soft robot helping elderly people in bathing; human body simulators, like artificial vocal cords and pre-term infants' lungs; marine robotics (PoseiDRONE), proposing an original concept of soft underwater robots, that can work in contact with the seafloor or reefs, as well as man-made structures to explore or maintain underwater; manufacturing (Smart-e Marie Curie Action), for assembly tasks and soft manipulation, and many others.

The accomplishment of the research activities described above required a significant effort from the scientific and technical viewpoint. I spent such effort in the study of the problems addressed and in the synthesis of solutions with a bioengineering method which, starting from the knowledge of the biological systems taken as reference, allowed to formulate theoretical models and to design, develop and experiment (clinically, where appropriate) the proposed solutions. In addition to this, I carried out most activities in multidisciplinary teams, which sometimes I personally coordinated. This required specific capabilities of teamwork and coordination of research team, as well as of interaction and collaboration with international partners and with clinical and biological partners. Furthermore, on each research theme addressed, I devoted a personal effort to obtain financial support from national and European agencies and companies, through the preparation of adequate project proposals and the successive accomplishment of the projects, not only concerning the scientific and technical aspects but also in the coordination and management issues.

(on June 22, 2016)	# publications	# journal publications	# citations	h-index
ISI WoS	211	91	1006	16
Scopus	240	74	1481	19
Google Scholar	286	-	2929	27
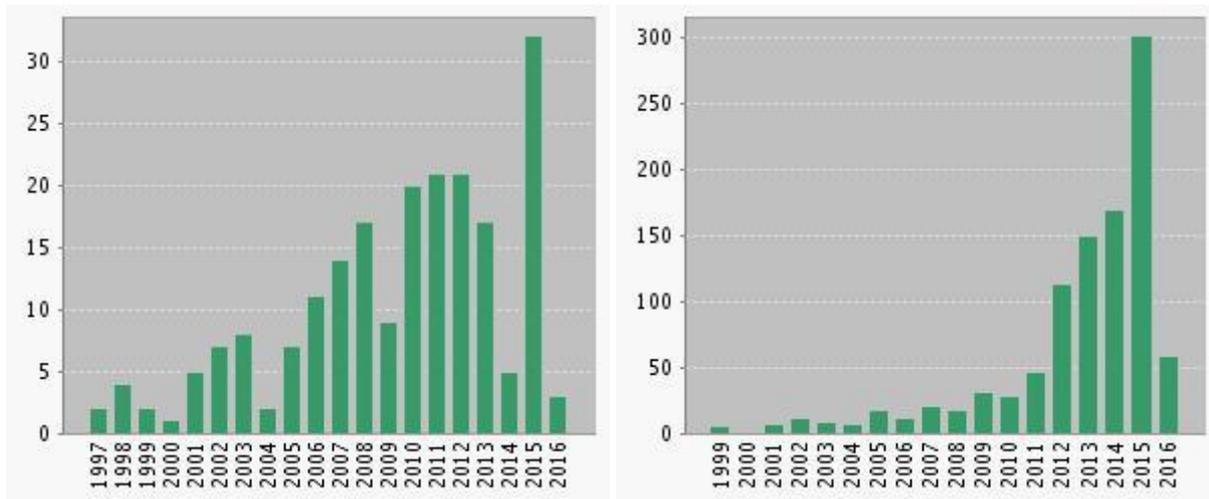
Publications per year (left) and Citations per year (right). Source: ISI WoS, June 22, 2016
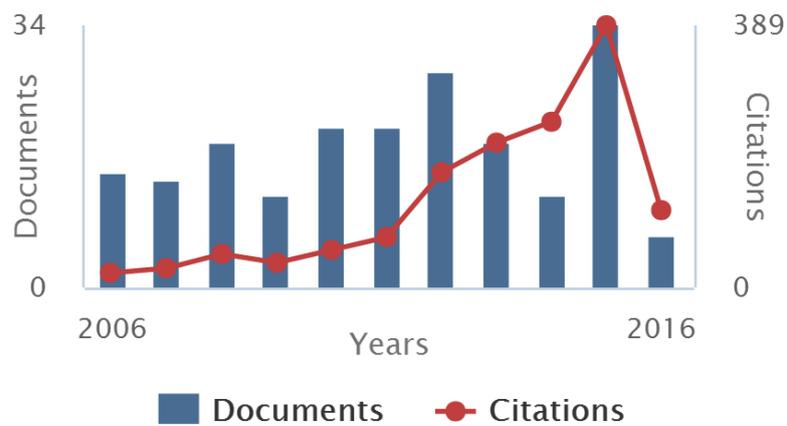
Source: Scopus, June 22, 2016

VQR 2004-2010 (Italian evaluation of research product quality): all 5 requested papers evaluated as **1** (Excellent, top score).

The full list of publications available at http://www.santannapisa.it/en/personale/cecilia-laschi.

SCIENTIFIC RESPONSIBILITIES

Projects

- Coordinator of the RoboSoft Coordination Action (CA) ("A Coordination Action for Soft Robotics"), funded by the European Commission in the ICT-FET Open Programme, under contract 619319, total cost: 1,064,973€, total grant: 952,960€, SSSA grant: 395,869€, 2013-2016.

- Coordinator the PoseiDRONE Project (A Soft Robot for Marine Applications), funded by Fondazione Livorno, total cost: 400,000€, total grant: 200,000€, for years 2012, 2013 and 2014-2015.

- Principal investigator for the Scuola Superiore Sant'Anna in the Human Brain Project, funded by the European Commission in the FET Flagship programme, 2013-2016 and 2016-2019.

- Principal investigator for the Scuola Superiore Sant'Anna in the I-Support project ("ICT-Supported Bath Robots"), funded by the European Commission in the PHC19 programme, under contract 643666, 2015-2018.

- Principal investigator for the Scuola Superiore Sant'Anna in the Marie Curie project SMART-e ("Sustainable Manufacturing through Advanced Robotics Training in Europe"), for an international PhD programme, 2013-2017.

- Coordinator of the OCTOPUS Integrating Project (IP) ("Novel Design Principles and Technologies for a New Generation of High Dexterity Soft-bodied Robots Inspired by the Morphology and Behaviour of the Octopus"), funded by the European Commission in the ICT-FET Programme "Embodied Intelligence", under contract 231608, total cost: 9,745,238 €, total grant: 7,600,000 €, SSSA grant: 2,000,000 €, 2009-2013.

- Coordinator of the CFD-OCTOProp project ("Computational Fluid Dynamics Aided Design of the Propulsion and Locomotion Systems of a Bioinspired Robot Octopus"), funded by the European Commission in the Marie Curie programme, as a reintegration grant, 2011-2014.

- Co-Leader of the RTD-A2 "Morphological Computation" of the FET Flagship candidate "Robot Companions for Citizens", 2012

- Principal Investigator for the Scuola Superiore Sant'Anna and board of the Board of Management of the EU-funded RobotCub Integrated Project (Robotic Open-architecture Technology for Cognition, Understanding and Behavior), funded by the European Commission in the IST programme "Cognitive Systems", 2006 – 2011.

- Principal Investigator for the Scuola Superiore Sant'Anna of the project "Bio-inspired models for the control of robot ocular movements during active vision and 3D exploration", funded by the Italian Ministry of University and Research in the PRIN Programme, 2008-2011.

- Member of the Editorial Board of CARE (Coordination Actions for Robotics in Europe), a Coordination Action funded by the European Commission in the ICT-Challenge 2 programme "Cognitive Systems, Interaction and Robotics", 2007-2009.

- Principal Investigator for the Scuola Superiore Sant'Anna of the EU-funded TACT Project (Thought in action), in the NEST Programme, 2005-2008.

- Assistance to the coordination of the NEUROBOTICS Integrated Project (The Fusion of Neuroscience and Robotics), funded by the European Commission in the IST-FET "Beyond Robotics" programme, 2004-2008.

- Principal Investigator for the Scuola Superiore Sant'Anna of the EU-funded ETHICBOTS Project (Emerging Technoethics of Human Interaction with Communication, Bionic, and robOTic Systems), a Coordination Action in the "Science and Society" Programme, April 2005 - March 2007.

- Project Leader of the ExPer and Exper2 industrial projects, funded by Toyota Motor Corporation, from September 2003 to October 2005 and October 2006 to October 2007.

- Member of the Team at Scuola Superiore Sant'Anna in the following (selected) EU-funded projects (with active role in the proposal preparations):

- CareToy (A Modular Smart System for Infants' Rehabilitation At Home based on Mechatronic Toys), ICT-Challenge 5, FP7, contract #297932, 2011-2014;
- RoboSoM (A Robotic Sense of Movement), a STREP in ICT-Challenge 2 "Cognitive Systems, Interaction and Robotics", FP7, contract #248366, 2010-2012;
- HydroNet (Floating Sensorised Networked Robots for Water Monitoring), a STREP in the "Environment" programme, FP7, 2008-2012;
- DustBot (Networked and Cooperating Robots for Urban Hygiene), a STREP in the IST "Advanced Robotics" programme, FP6, 2006-2009;
- URUS (Ubiquitous Networking Robotics in Urban Environments), a STREP in the IST "Advanced Robotics" programme, FP6, 2006-2009;
- Support to the activities of the Interest Group on Biomedical Robotics and of the Key Area on Research Coordination, chaired by Prof. Paolo Dario, Scuola Superiore Sant'Anna, in the framework of the Excellence Network EURON, European Robotics Research Network, January 2001 to December 2003.

- Member of the Team at Scuola Superiore Sant'Anna in the SeedBot Project (Plant-inspired robots for planetary exploration), funded by ESA in ARIADNA program "Bio-inspiration from Plants' Roots", 2007.
- Member of the Team at Scuola Superiore Sant'Anna in many national and regional projects.

Research Centres and Laboratories

- Contribution to the start-up and coordination of the **Research Center on Sea Technologies and Marine Robotics** of the Scuola Superiore Sant'Anna in Livorno (sssa.marinerobotics.it), since 2009. This is part of a major initiative of the municipality of Livorno, with an investment of 4M€.
- Contribution to the design and to the operational coordination of the research activities of the **RTR Centre** (research centre on rehabilitation bioengineering) of INAIL (Italian National Institute for Insurance against Work-related Injuries and Vocational Diseases), in Viareggio (Lucca), in 1997-1998.
- Coordinator of the **RTR Centre** (research centre on rehabilitation bioengineering) of INAIL (Italian National Institute for Insurance against Work-related Injuries and Vocational Diseases), in 1999-2000.
- Contribution to the start-up and coordination of activities of **Centro Auxilia**, Livorno, for assistive technology validation and services to disabled people, in 1996-1998.

INTERNATIONAL SCIENTIFIC ACTIVITY

Project Evaluations and Reviewing

- Evaluator for the **EC** in ICT-24 ("Robotics") and PHC-25 ("Advanced ICT systems and services for Integrated Care"), in 2015.
- Evaluator for the **ERC** (European Research Council), 2010, 2012, 2013, 2016.
- Member of the Evaluation Panel of the **FWO** (Research Agency of the Flanders), in 2012, 2013, 2014, 2015 and 2016.
- Member of the Evaluation Panel and evaluator of the programme **CONSOLIDER** of the Ministry of University of Spain, in 2010 and 2009, respectively.
- Reviewer for the **Slovenian Research Agency**, in 2012, 2013, 2015 and 2016.
- Reviewer for the **IWT** funding agency of the Flemish (Belgian) government, 2014 and 2015.
- Reviewer for the **French Research Agency (ANR)**, 2012, 2014 and 2015.
- Reviewer for the **French Research Agency (FNRS)**, 2014 and 2015.
- Reviewer for the **Research Agency of the Greece**, 2014.
- Reviewer for the **Research Agency of the Netherlands**, 2011.
- Reviewer for the **Swiss National Science Foundation**, 2008 and 2015.

PhD Awards

- Member of the Committee for PhD Best Thesis Award of GNB, the Italian Group of Biomedical Engineering, since 2009.
- Member of the Board for PhD Best Thesis Award "George Giralt" of EURON, the European Network of Robotics, 2006-2010.

Lectures and talks

- Participation, as speaker, in many international and national conferences on the themes of robotics, biorobotics, bioinspired robotics and biomimetics, soft robotics, humanoid robotics, neuro-robotics, rehabilitation and assistive robotics.
- Organization of many special sessions and workshops at major robotics conferences.

Invited Talks (last 5 years):

- IEEE Cairo International Biomedical Engineering Conference (CIBEC 2016), Cairo, Egypt, December 15, 2016
- CISCO IoE Talk, Parma, Italy, May 24, 2016
- TEDx Padova, Italy, April 30, 2016
- IEEE Life Sciences Grand Challenges Conference, Abu Dhabi, United Arab Emirates, January 26, 2016
- Italy-Japan 2015 Workshop "Can robots save the global economy?", Tokyo, Japan, November 30, 2015
- Italy-Japan 2014 Workshop "Robot Co-Workers", Tokyo, Japan, December 11, 2014
- ESF-EMBO "Minibrains: Flies, worms, and robots: combining perspectives on minibrains and behaviour", Sant Feliu de Guixols, Spain, November 10, 2014
- IROS – IEEE/RSJ Int. Conf. on Intelligent Robots and Systems, Chicago, USA, September 15, 2014
- EuroEAP, Linkoping, Sweden, June 10, 2014
- Workshop on "Soft Robotics", Monte Verità, Switzerland, July 15-19
- Italy-Japan 2012 Workshop "Assistance Robots for Disasters", Tokyo, Japan, December 3, 2012
- ETH Summer School on Soft Robotics, Zurich, Switzerland, June 18-22, 2012
- NIDays, Rome, Italy, February 29, 2012
- Italy-Japan 2011 Workshop "New Critical Challenges in Robotics", Tokyo, Japan, November 10-11, 2011
- FET11 Session "RoboCom: Dream of Robot Companions for Citizens (FET Flagship Pilot)", May 4, 2011
- COST Strategic Workshop on "Principles and Development of Bio-inspired Materials", Vienna, Austria, April 14, 2010
- Japan-Switzerland Seminar on "Soft Robotics", Tokyo, Japan, June 21, 2010

International journals

- Specialty Chief Editor of the Section on "Soft Robotics" of Frontiers in Robotics & AI and Frontiers in Bioengineering and Biotechnology.
- Member of the Editorial Board of *Frontiers in Bionics and Biomimetics, Bioinspiration and Biomimetics, Robotics and Automation Letters, Advanced Robotics, Applied Bionics and Biomechanics.*
- Guest Co-Editor of Special Issues of *Bioinspiration and Biomimetics, IEEE Transactions of Robotics, Autonomous Robots, Advanced Robotics, Applied Bionics and Biomechanics.*
- Reviewer for ***Nature***, *Science Robotics, PlosOne, Bioinspiration and Biomimetics, Journal of the Royal Society Interface, Royal Society Open Science, IEEE Transactions on Robotics, IEEE Robotics and Automation Magazine, International Journal of Robotics research, IEEE Transactions on Mechatronics, Automomous Robots, Advanced Robotics, Journal of Applied Bionics and Biomechanics, International Journal of Field Robotics, International Journal of Social Robotics*.

International scientific Societies:

- IEEE (www.ieee.org) Senior Member since 2012, Member since 2000.
- Member of the IEEE Robotics & Automation Society (RAS) since 2000
- Member of the IEEE Engineering in Medicine and Biology Society (EMBS) since 2001
- Elected Member of the AdCom of the IEEE RAS for years 2011-2013

- IEEE RAS representative in the AdCom of the IEEE Sensors Council for years 2011, 2012 and 2013
- Co-Chair of the TC (Technical Committee) on Soft Robotics of the IEEE RAS since 2012
- Member of the Ad-hoc committee on automation of the IEEE RAS since 2012
- Member of the Publication Ethics Committee of the IEEE RAS for years 2012-2013
- Member of the Publication Activity Board of the IEEE RAS for years 2012-2013
- Member of the Member Activity Board of the IEEE RAS for years 2012-2013
- Member of the George Saridis Leadership Award in Robotics and Automation + Distinguished Service Award Nomination Committee of the IEEE RAS in 2012-2013
- Co-chair of the TC (Technical Committee) on Human-Robot Interaction and Coordination of the IEEE RAS, from 2001 to 2009.

Conferences and other scientific events (last 5 years):
- Program Chair of IEEE/RSJ IROS 2018, Madrid, Spain
- Area Chair of RSS 2016, Ann Arbor, Michigan, USA
- Editor for the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2012-2013
- Associate Editor for the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2014 and 2015
- Associate Editor for the IEEE Workshop on Advanced Robotics and its Social Impacts (ARSO), 2014
- Associate Editor for the IEEE RAS International Conference on Humanoid Robots (Humanoids), 2013
- Publicity co-chair of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2013), Tokyo, Japan, November 2-7, 2013
- Member of the Advisory Board of the International Workshop on Soft Robotics and Morphological Computation, Monte Verità, Switzerland, July 15-19, 2013
- Area Chair for the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2012), Vilamoura, Algarve, Portugal, October 7-11, 2012
- Associate Editor for the IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob 2012), Rome, Italy, June 24-28, 2012
- Workshop and tutorial Chair of the International Conference on Advanced Robotics (ICAR 2011), Tallinn, Estonia, June 20-23, 2011
- Co-organizer of the workshop "Scientific Collaboration in Embodied Intelligence in Europe", at ICRA 2011, Shanghai, China, May 13, 2011
- Regional Chair of the First International Conference on Applied Bionics and Biomechanics (IABB 2010), Venice, Italy, October 14-16, 2010
- Track Chair and Session Chair (on Biomimetic Robotics) of the IEEE Annual International Conference of the Engineering in Medicine and Biology Society (EMBC 2010), Buenos Aires, Argentina, August 31 – September 2, 2010

TEACHING ACTIVITIES

Academic teaching

- Courses for PhD students and Master students at the Scuola Superiore Sant'Anna since A.Y. 2000-2001, on "Soft Robotics", "Human and animal models for biorobotics", "Fundamentals of bioinspired robotics with introduction to the humanoid robotic platform", "Rehabilitation robotics", "Biomechatronic sensory systems for biorobotics", "Fundamentals of Artificial Intelligence and learning in robots", "Artificial perception in anthropomorphic robotics", "Artificial perception and sensory-motor coordination in robot manipulation"

- Course "Human and Animal Models in Biorobotics" in the joint MS in Bionics of Scuola Superiore Sant'anna and University of Pisa.

- Course "Rehabilitation Engineering" at the School of Biomedical Engineering of the University of Pisa (MS in Biomedical Engineering), A.Y. 2008-2009 to A.Y. 2014-2015.

- Course "Robotics" at the School of Computer Science of the University of Pisa (MS in Computer Science), since A.Y. 2009-2010.

- Course "Robotic Perception" at the School of Computer Science of the University of Pisa (MS in Computer Science), A.Y. 2003-2004 to 2008-2009.

- Lectures at the Master "Smart Solutions, Smart Communities" organized by the Scuola Superiore Sant'Anna and Telecom Italia, in 2013 and 2014.

- Lectures on "Bio-Mechatronic Sensory Systems for Bio-Robotics" at the International Master in Robotics and Mechatronics, Scuola Superiore Sant'Anna, A.Y. 2006-2007.

Tutoring and supervision of students:

- Tutor of a number of PhD students between 6 and 12 per academic year.

- Tutor of undergraduate and Master students of the Scuola Superiore Sant'Anna, 2-3 per year.

- Advisor (relatore) of Master theses (Tesi di Laurea Magistrale), mainly in Biomedical Engineering and Computer Science, 5 to 10 per year, most of them obtained with honors.

Other teaching experiences

- Contribution to the ShangAI Lectures, a worldwide educational initiative with internet broadcasting, in 2010 and 2013, included in the ShangAI lectures repository.

- Lectures at International Summer Schools for PhD Students since 2006 (Waseda-SSSA-KIST, OCTOPUS, RoboSoft, Smart-e).

- Orienting Schools of Scuola Superiore Sant'Anna and Scuola Normale Superiore.

ACTIVITY OF EXPLOITATION OF RESEARCH RESULTS

Spin-off companies

Co-Founder in 2004 of the academic spin-off company of the Scuola Superiore Sant'Anna "RoboTech srl", in the field of edutainment robotics. RoboTech received the EURON (European Robotics Research Network) Technology Transfer Award in 2008.

Share-holder from 2001 to 2004 of the academic spin-off company of the Scuola Superiore Sant'Anna "MicroTech srl", in the field of biomedical micro-engineering for minimally invasive surgery.

Patents

#	Title	Authors	Year	Type	Number
1	Bio-inspired continuous robotic limb	Cianchetti, Matteo; Follador, Maurizio; Arienti, Andrea(...) (SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO SANT'ANNA)	2016	United States Patent and Trademark Office Granted Patent	US9314923
2	Robot having soft arms for locomotion and grip purposes	Calisti, Marcello; Arienti, Andrea; Giorelli, Michele(...) (SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO SANT'ANNA)	2016	United States Patent and Trademark Office Granted Patent	US9314933
3	AUTONOMOUS VARIABLE BUOYANCY DEVICE | [AUTONOME VORRICHTUNG MIT VERÄNDERLICHEM AUFTRIEB]	FORNAI, Francesco; FERRI, Gabriele; SAVIOZZI, Giacomo(...) (Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna (...))	2014	European Patent Application	EP2776310
4	ROBOT HAVING SOFT ARMS FOR LOCOMOTION AND GRIP PURPOSES	Calisti, Marcello; Arienti, Andrea; Giorelli, Michele(...) (Calisti, Marcello (...))	2014	United States Patent and Trademark Office Pre-Granted Publication	US20140083230
5	ROBOT HAVING SOFT ARMS FOR LOCOMOTION AND GRIP PURPOSES | [ROBOTER MIT WEICHEN ARMEN FÜR FORTBEWEGUNGS- UND GREIFZWECKE]	CALISTI, Marcello; ARIENTI, Andrea; GIORELLI, Michele(...) (Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna)	2014	European Patent Application	EP2704881
6	BIO-INSPIRED CONTINUOUS ROBOTIC LIMB | [BIOINSPIRIERTE KONTINUIERLICHE ROBOTERGLIEDMASSE]	CIANCHETTI, Matteo; FOLLADOR, Maurizio; ARIENTI, Andrea(...) (Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna)	2013	European Patent Application	EP2616220
7	BIO-INSPIRED CONTINUOUS ROBOTIC LIMB	Cianchetti, Matteo; Follador, Maurizio; Arienti, Andrea(...) (Cianchetti, Matteo (...))	2013	United States Patent and Trademark Office Pre-Granted Publication	US20130167683
8	AUTONOMOUS VARIABLE BUOYANCY DEVICE | [DISPOSITIF DE FLOTTABILITÉ VARIABLE AUTONOME]	FORNAI, Francesco; FERRI, Gabriele; SAVIOZZI, Giacomo(...) (SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO SANT'ANNA (...))	2013	Patent Cooperation Treaty Application	WO2013068941
9	Methods and systems for data processing and their applications	Ascari, Luca; Bertocchi, Ulisse; Corradi, Paolo(...) (Toyota Motor Europe NV)	2013	United States Patent and Trademark Office Granted Patent	US8401825
10	ROBOT HAVING SOFT ARMS FOR LOCOMOTION AND GRIP PURPOSES | [ROBOT À BRAS FLEXIBLES UTILISÉ À DES FINS DE LOCOMOTION ET DE PRÉHENSION]	CALISTI, Marcello; ARIENTI, Andrea; GIORELLI, Michele(...) (SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO SANT'ANNA (...))	2012	Patent Cooperation Treaty Application	WO2012150551
11	BIO-INSPIRED CONTINUOUS ROBOTIC LIMB | [MEMBRE ROBOTIQUE CONTINU INSPIRÉ PAR LA NATURE]	CIANCHETTI, Matteo; FOLLADOR, Maurizio; ARIENTI, Andrea(...) (SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO SANT'ANNA (...))	2012	Patent Cooperation Treaty Application	WO2012035064
12	METHODS AND SYSTEMS FOR DATA PROCESSING AND THEIR APPLICATIONS	Ascari, Luca; Bertocchi, Ulisse; Corradi, Paolo(...) (ASCARI LUCA (...))	2010	United States Patent and Trademark Office Pre-Granted Publication	US20100235145
13	METHODS AND SYSTEMS FOR DATA PROCESSING AND THEIR APPLICATIONS | [VERFAHREN UND SYSTEME ZUR DATENVERARBEITUNG UND IHRE ANWENDUNGEN]	ASCARI, Luca; BERTOCCHI, Ulisse; CORRADI, Paolo(...) (Toyota Motor Europe NV)	2010	European Patent Application	EP2188728
14	METHODS AND SYSTEMS FOR DATA PROCESSING AND THEIR APPLICATIONS | [PROCÉDÉS ET SYSTÈMES DE TRAITEMENT DE DONNÉES ET LEURS APPLICATIONS]	ASCARI, Luca; BERTOCCHI, Ulisse; CORRADI, Paolo(...) (TOYOTA MOTOR EUROPE NV (...))	2009	Patent Cooperation Treaty Application	WO2009027486
15	Optical terminal | [Optisches Endgerät]	Ascari, Luca; Laschi, Cecilia; Corradi, Paolo(...) (Toyota Motor Europe NV)	2009	European Patent Application	EP2031427
16	ROBOT, AND ROBOT CONTROL METHOD | [ロボットとロボットの制御方法]	KONOSU HITOSHI; OTA YASUHIRO; PAOLO DARIO(...) (TOYOTA MOTOR CORP)	2007	Patent Abstracts of Japan	JP2007245326

LANGUAGES

Italian mother tongue.

Fluent spoken and written **English**.

Basic **Japanese**, learnt on-site.

CECILIA LASCHI
Selected journal publications[*]

SOFT ROBOTICS

[1] M. Cianchetti, C. Laschi, "Pleasant to the Touch: By Emulating Nature, Scientists Hope to Find Innovative New Uses for Soft Robotics in Health-Care Technology", *IEEE Pulse*, 7 (3), pp.34-37, 2016.

[2] F. Renda, F. Giorgio-Serchi, F. Boyer, C. Laschi, "Modelling cephalopod-inspired pulsed-jet locomotion for underwater soft robots", *Bioinspiration and Biomimetics*, 10 (5), 2015.

[3] M. Calisti, F. Corucci, A. Arienti, C. Laschi, "Dynamics of underwater legged locomotion: Modeling and experiments on an octopus-inspired robot", *Bioinspiration and Biomimetics*, 10 (4), 2015.

[4] F. Renda, M. Giorelli, M. Calisti, M. Cianchetti, C. Laschi, "Dynamic Model of a Multibending Soft Robot Arm Driven by Cables", *IEEE Transactions on Robotics*, No. 30; pp.1109-1122, 2014

[5] M. Cianchetti, A. Licofonte, M. Follador, F. Rogai, C. Laschi, "Bioinspired Soft Actuation System Using Shape Memory Alloys", *Actuators*; N. 3; 226:244, 2014

[6] C. Laschi, M. Cianchetti, "Soft Robotics: New Perspectives for Robot Bodyware and Control", *Frontiers in Bioengineering and Biotechnology*, No.2, 2014

[7] S. Kim, C. Laschi, B. Trimmer, "Soft robotics: a bioinspired evolution in robotics", *Trends in Biotechnology*, No.31, 2013, pp.287-294.

[8] M. Follador, M. Cianchetti, A. Arienti, C. Laschi, "A general method for the design and fabrication of shape memory alloy active spring actuators", *Smart Materials and Structures*, Vol.21:115029, 2012.

[9] F. Giorgio-Serchi, A. Arienti, C. Laschi, "Biomimetic vortex propulsion: towards the new paradigm of soft unmanned underwater vehicles", *IEEE Transactions on Mechatronics*, Vol.PP, pp.1-10, 2012.

[10] L. Margheri, B. Mazzolai, P. Dario, C. Laschi, "A bioengineering approach for in vivo measurements of the octopus arms", *Journal of Shellfish Research*, Vol.30, 2012.

[11] F. Renda, M. Cianchetti, M. Giorelli, A. Arienti, C. Laschi, "A 3D Steady State Model of a Tendon-Driven Continuum Soft Manipulator Inspired by Octopus Arm", *Bioinspiration & Biomimetics*, Vol.7, No.2, June 2012.

[12] L. Margheri, C. Laschi, B. Mazzolai, "Soft robotic arm inspired by the octopus. I. From biological functions to artificial requirements", *Bioinspiration & Biomimetics*, Vol.7, No.2, June 2012.

[13] B. Mazzolai, L. Margheri, M. Cianchetti, P. Dario, C. Laschi, "Soft robotic arm inspired by the octopus. II. From artificial requirements to innovative technological solutions", *Bioinspiration & Biomimetics*, Vol.7, No.2, June 2012.

[14] C. Laschi, B. Mazzolai, M. Cianchetti, L. Margheri, M. Follador, P. Dario, "A Soft Robot Arm Inspired by the Octopus", *Advanced Robotics (Special Issue on Soft Robotics)*, Vol.26, No.7, 2012.

[15] L. Margheri, G. Ponte, B. Mazzolai, C. Laschi, G. Fiorito, "Non-invasive study of Octopus vulgaris arm morphology using ultrasound", *The Journal of Experimental Biology*, Vol.214, 2011, pp.3727-3731.

[16] M. Calisti, M. Giorelli, G. Levy, B. Mazzolai, B. Hochner, C. Laschi, P. Dario, "An octopus-bioinspired solution to movement and manipulation for soft robots", *Bioinspiration & Biomimetics*, Vol.6, No.3, 2011, 10 pp.

[17] M. Cianchetti, A. Arienti, M. Follador, B. Mazzolai, P. Dario, C. Laschi, "Design concept and validation of a robotic arm inspired by the octopus", *Materials Science and Engineering C*, Vol.31, 2011, pp.1230-1239.

[18] B. Mazzolai, A. Mondini, P. Corradi, C. Laschi, V. Mattoli, and P. Dario, "A Miniaturized Mechatronic System Inspired by Plant Roots", *IEEE Transactions on Mechatronics*, Vol.99, 2010, pp.1-12. **BEST PAPER AWARD WINNER**.

[19] M. Cianchetti, V. Mattoli, B. Mazzolai, C. Laschi, P. Dario, "A new design methodology of electrostrictive actuators for bioinspired robotics", *Sensors and Actuators Part B*, Vol.142, No.1, 2009, pp.288-297.

[20] C. Laschi, B. Mazzolai, V. Mattoli, M. Cianchetti, P. Dario, "Design of a biomimetic robotic octopus arm", *Bioinspiration & Biomimetics*, Vol.4, No.1, 2009.

NEURO-ROBOTICS AND HUMANOID ROBOTICS

[21] N. Cauli, E. Falotico, A. Bernardino, J. Santos-Victor, C. Laschi, "Correcting for Changes: Expected Perception-Based Control for Reaching a Moving Target", *IEEE Robotics and Automation Magazine*, 23 (1), pp.63-70, 2016.

[22] D. Zambrano, E. Falotico, L. Manfredi, C. Laschi, "A model of the smooth pursuit eye movement with prediction and learning", *Journal of Applied Bionics and Biomechanics*, Vol.7, Issue 2, June 2010, pp.109-118.

[23] M.I. Gobbini, C. Gentili, E. Ricciardi, C. Bellucci, P. Salvini, C. Laschi, M. Guazzelli, J.V. Haxby, P. Pietrini P., "Overlapping neural responses to robotic and human facial expressions", *Neuroimage*, No.47, 2009, p.S135.

[24] C. Laschi, G. Asuni, E. Guglielmelli, G. Teti, R. Johansson, H. Konosu, Z. Wasik, M.C. Carrozza, P. Dario, "A bio-inspired predictive sensory-motor coordination scheme for robot reaching and preshaping", *Autonomous Robots*, Vol.25, 2008, pp.85-101.

[25] C. Laschi, F. Patanè, E.S. Maini, L. Manfredi, G. Teti, L. Zollo, E. Guglielmelli, P. Dario, "An Anthropomorphic Robotic Head for Investigating Gaze Control", *Advanced Robotics*, Vol.22, No.1, 2008, pp.57-89.

[26] 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.

NEURO-DEVELOPMENTAL BIOENGINEERING

[27] F. Cecchi, G. Sgandurra, M. Mihelj, L. Mici, J. Zhang, M. Munih, G. Cioni, C. Laschi, P. Dario, "CareToy: An Intelligent Baby Gym for Intervention at Home in Infants at Risk for Neurodevelopmental Disorders", *IEEE Robotics and Automation Magazine*, in Press (2016).

[28] A. Grassi, F. Cecchi, G. Sgherri, A. Guzzetta, L. Gagliardi, C. Laschi, "Sensorized pacifier to evaluate non-nutritive sucking in newborns", *Medical Engineering and Physics*, 38 (4), pp.398-402, 2016.

[29] R.T. Scaramuzzo, M. Ciantelli, I. Baldoli, L. Bellanti, M. Gentile, F. Cecchi, E. Sigali, S. Tognarelli, P. Ghirri, S. Mazzoleni, A. Menciassi, A. Cuttano, A. Boldrini, C. Laschi, P. Dario, "MEchatronic REspiratory System SImulator for Neonatal Applications (MERESSINA) project: a novel bioengineering goal", *Medical Devices*, No.6, 2013, pp.115-121

[30] G. Sgandurra,F. Cecchi, S.M. Serio, M. Del Maestro, C. Laschi, P. Dario, G. Cioni, "Longitudinal study of unimanual actions and grasping forces during infancy", *Infant Behavior & Development*, 2012.

[31] M. Del Maestro, F. Cecchi, S.M. Serio, C. Laschi and P. Dario, "Sensing Device for Measuring Infants' Grasping Actions", *Sensors and Actuators A: Physical*, Vol.165, 2011, pp.155-163.

[32] D. Campolo, C. Laschi, F. Keller, E. Guglielmelli, "A mechatronic platform for early diagnosis of neurodevelopmental disorders", *Advanced Robotics*, Vol.21, No.10, pp.1131–1150, June 2007.

ASSISTIVE ROBOTICS

[33] P. Dario, C. Laschi, E. Guglielmelli, "Design and experiments on a personal robotic assistant", *Advanced Robotics*, Vol.13, No.2, 1999, pp.153-169.

[34] P. Dario, E. Guglielmelli, C. Laschi, G. Teti, "MOVAID: a personal robot in everyday life of disabled and elderly people", *Technology and Disability Journal*, Vol.10, No.2, 1999, pp.77-93.

Pisa, 23/6/2016

Cecilia Laschi