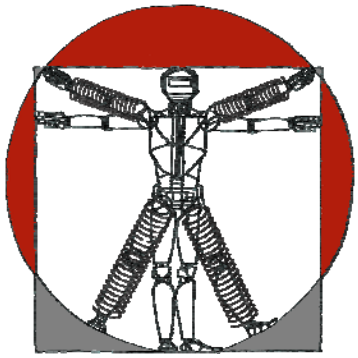

FP7-ICT-2007-3-231554

VIACTORS
Variable Impedance ACTuation: systems embodying advanced interaction behaviORS

Specific Targeted Research or Innovation Project
Seventh Framework Programme
Information Society Technologies IST

Deliverable 7.3
Final Report on Dissemination & Exploitation

Project co-funded by the European Commission within the Seventh Framework Programme (2007-2011)		
Dissemination Level		
PU	Public	**PU**
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Executive Summary

Deliverable 7.3 summarizes the dissemination activities carried out during the third and last year of the VIACTORS project (period February 2011 – February 2012), and the exploitable knowledge developed. The results and activities of the first two years of the project are described in Deliverable 7.2 (Period February 2009 – February 2010) and in the Second Dissemination Report (February 2010 – February 2011).
The basic aim of the Dissemination strategy adopted was to guarantee an effective impact of the communication activity on all the intended recipients.

Contents

Chapter 1

Introduction

Dissemination is understood primarily as a means of creating and spreading awareness about the project, its goals and results, while Exploitation is meant as the application of VIACTORS technologies to real-life cases.

During the three years of the project the following promotional activities related to VIACTORS were carried on:

- promotion via Internet: VIACTORS Web site;
- promotion in the scientific community: organization of Seminars, Conferences, Workshops, PhD Schools; participation and presentations given to Conferences, Workshops, Conferences, PhD Schools.
- preparation and diffusion of material for dissemination and publication including a Project Brochure and two project Poster (Annexes 1, 2 and 3);
- promotion to general public by means of articles, TV and Radio, participation to events promoting science.

Chapter 2

Dissemination Activities

2.1 Classification of Dissemination Activities

The Knowledge and Dissemination Plan (D 7.2) described several distinct and complementary levels for dissemination activities: the global (central), national (local), consortium (internal), and cross fertilization (similar projects) level.

- Central dissemination activities include organization of conferences and workshops, participation in related events and exhibitions, and preparation of dissemination material;

- Local activities include initiatives carried out at national level by VIACTORS partners, according to the specificity of their organisation and the communities they are able to reach;

- Internal dissemination aims at developing solid links between consortium partners and the VIACTORS project itself;

- Cross fertilization activities are devoted to identify other European research projects whose research topics are of interested for the VIACTORS Project;

In order to monitor the different levels of dissemination activities, each partner was requested to fill out a questionnaire twice a year, reporting the international, national, local and internal events attended and organized. All the questionnaires were included in the Final Dissemination Reports.

2.2 Target of Dissemination Activities

Due to its interdisciplinary nature, the project produced important results both in theoretical (i.e. in neurophysiology, control theory, robotics) and in technological knowledge (i.e. mechatronics).

For this reason, dissemination was carried out following a carefully established strategy in order to convey the information about the results of the project to different categories of recipients.

The first recipient of the dissemination activities was the research community by means of conference participations, organization of events, submission of papers to technical journals, press releases.

The spreading of information about the project, secondly, regarded students of different disciplines, by means of the organization of seminars, workshops or other educational activities.

The third target was society in general, by means of articles on journals and magazines and press releases.

The differentiated contents included:

- Easy-to-understand information for citizens and non-technical media, clearly explaining the content, the aim and the intended results of the project e.g. through the website, videos, demonstrations. In order to give an overview that is as exact as possible retaining a non-technical format;

- Information meant for specialized journals and the scientific community in general. The contents were more technical and precise, focusing on the main scientific results clearly and concisely explained;

- Detailed explanatory material for the specialists and for the interested media, containing a lengthy and technical description of the project;

2.3 Tools of Dissemination Activities

2.3.1 Events and Workshops

The most suitable events have been selected having considered the following criteria.

Geographical criteria	The events were selected and monitored taking into account their geographical location, in order to make easier and less expensive the participation of each partner, but also to reach a proper target.
Sector criteria	The events were selected and monitored considering their connection with VIACTORS topics.
Audience criteria	The monitored events were considered also under an attendance criteria: they should be attended by a large and qualified audience.
Organisational Criteria	In order to select the most suitable events, partners took into consideration which type of organisation is responsible for carrying out the event and its own competencies.

According to these criteria, different activities have been carried on during the three years of the project:

- Education: the research results have been presented in the partners academic institutions, representing significant universities in four different countries; Moreover, summer schools were organized, as the STIFF/VIACTORS Summer School, held on July 2011.

- Participations to the major robotics conferences (ICRA, IROS) as well as at specialized conferences such as Humanoids Conference, HRI – Human-Robot Interaction Conference, Biorob, IARP Workshop on Technical Challenge for dependable Robots in Human Environments; the VIACTORS Brochure was distributed during ICRA 2010

- Participation to major motor control and bioengineering conferences and meetings such as Neuroscience, NCM, EMBC, the Haptic symposium;

- Organization of international workshops and workshops in the framework of the major international Conferences, such as “Challenges in Robotics: To space and Down to Earth, November 2011; the annual Workshop on Human-Friendly Robotics; the workshop “Towards Autonomous Physical Human-Robot Interaction” in the framework of ICRA2011, the EMBODY session “Robots Interacting with Humans – Embodied Intelligence for Better Robots”, in the framework of fet11 – The European Future Technologies Conference and Exhibition; the “Variable Impedance Actuation Workshop”, in the framework of ICRA 2010, the Workshop DLR Workshop: Grasp Acquisition: How to Realize Good Grasps”, in the framework of RSS conference 2010;

- Participation in initiatives to increase the knowledge of the general public about science and technology, such as the "Science Weeks" organized in several countries, in order to open a dialogue with the civil society; in the first year the project has been presented at Genoa Science Festival (Italy), the project brochure has been distributed at Florence and Naples Science festivals. Moreover, a conference about project topics has been held at Rome science festival; during the second year the Consortium participated to the Robotics Fair AUTOMATICA 2010 and presented the project in events involving high schools, such as "Raccontare i robot" Genoa, Italy: on December 2011 the Consortium participated to the Science Open Days at the University of Pisa.

2.3.2 Publications and Press

Consortium members monitored newspapers and specialised journals and magazines with the objective to obtain a greater visibility among the potential user communities, especially through very well targeted press releases. Press channels were monitored with regard to their visibility among the user communities. The monitored and selected press channels will be among those recognised as opinion authorities among the reader's communities

During the three years of VIACTORS, knowledge about the project has been spread by means of:

- The central website as well as the websites of all partners;
- Magazines and newspapers;
- Technical journals;
- Press releases;
- Distribution through the press centres of the partner institutions, working in coordination with the communication manager of the project.
- Posters and leaflets

2.3.3 Viactors Website

The VIACTORS web site was developed and published at Month 2 of the project (see deliverable 7.1). The address is: www.viactors.org and it is hosted by DLR.

The objective was to give general information about the project ideas and to publish updated information on main achievements.

A project File Repository was created and it is hosted by DLR.

Here below an overview of the structure of the website. Note that during the last year of the project the section "VSA data sheets" was added:

Home	Project	News	Downloads	Links	File Repository	Imprint
	Objectives Impact Consortium Management Workpackages	Events Press	Documents Conference Papers Presentations Posters and leaflets VSA Datasheet			

The coordinator of the project, Deutsches Zentrum für Luft und Raumfahrt (DLR), created a secure repository web site at the link https://extsites.dlr.de/rm/viactors, where all Deliverables, Milestones and Reports can be posted. The domain www.viactors.org has also been registered by DLR.

Figure 1 – VIACTORS Home Page

2.3.4 Informative Material

The VIACTORS logo was created by DLR, in order to establish the project identity. The logo was associated and included in all the material for dissemination.

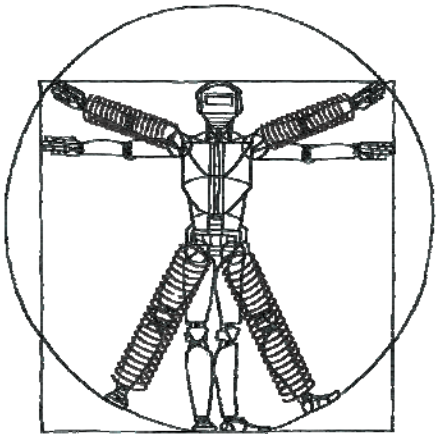

Figure 2 – Official logo of the VIACTORS project

A brochure was produced during the first year in order to raise the attention of the scientific community, general public and media on the events organized by the Consortium and on the general aim and content of the project. A printable version is available on the website (see Annex 1).

2.3.5 Organization of the Work

The work was coordinated by the University of Pisa, with the proactive participation of every member of the Consortium

All partners:

- Issued a press release on the project launch;
- Presented the project scope and results to stakeholders and other groups of interest in conferences, workshops and internally in their own organizations;
- Issued scientific papers;

In relation to conferences, workshops and other events, the information related to these relevant events was made available internally. The partner involved produced the related material to be uploaded on the project website together with photographs and related press releases, if any.

2.3.6 Joint Collaborative Tasks

As a STREP FET-Proactive project in the area of Embodied Intelligence, VIACTORS cooperated with the FET projects of the same area. Multidisciplinary cooperation in the field of Embodied Intelligence was meant to give an answer to the needs of society and industry by building a research network able to cover the key areas of “morphology and Behaviour”, “mind-body co-development” and “co-evolution or design for emergence”.

The development of strategic partnerships on international cooperation was reached by means of participating to FET Proactive Initiatives and to the FET meetings scheduled.

The VIACTORS Consortium participated in the annual FET Conference (Prague, April 21-23 2009 and Budapest, May 4 – 6 2011).

VIACTORS is part of EMBODYi, “Embodied Intelligence” projects, involving the projects EMORPH, ANGELS, EVRYON, OCTOPUS, LOCOMORPH. The Consortium participated in the first EMBODYi workshop (March 2010), to the Workshops “Scientific collaboration in Embodied Intelligence in Europe: the FET EMBODYi programme of the European Commission and the new actions for 2011-2012 (Flagships and FP8)”, organized in ICRA 2011.

Chapter 3

Dissemination Report (period March 2011 – March 2012)

2.4 Organization of Conferences, Workshops and Meetings

Conference, Seminar, Workshop, etc. organised by partners, at local, national and international level.

No	Type	Organisation	Title	Date	Venue
	Workshop	DLR	Challenges in Robotics: To space and Down to Earth	21-22.11.2011	German Aerospace Center, Institute of Robotics and Mechatronics
	Workshop	University of Twente	4th Workshop on Human-Friendly Robotics	8-9 Nov 2011	University of Twente, Enschede, The Netherlands

	Seminar	UNIPI	Alexander V. Terekhov, Université Pierre et Marie Curie, Institute of Intelligent Systems and Robotics, Paris, France “Inverse Optimization:Theoretical Advances and Experimental Findings”	17.11.2011	University of Pisa
	Seminar	UNIPI	Rene Mayorga , W.I.S.E (Wise & Intelligent Systems & Entities) Lab “towards artificial/computational science (wisdom)”	08.11.2011	University of Pisa
	National Conference	UNIPI	Automatica.it 2011	September 7 – 9, 2011	Pisa, Italy
	Summer School	DLR	STIFF/VIACTORS summer school	July 24 – 29, 2011	Bavaria, Germany
	Workshop	IMPERIAL	Motor Skill Learning and Neurorehabilitation, in the context of the IEEE Int. Conference on Rehabilitation Robotics (ICORR)	July 1st, 2011	Zurich, Switzerland
	Workshop	UNIPI	New Frontiers of Robotics Science and Technology, a Brainstorming Jam Session (http://www.centropiaggio.unipi.it/index.php/guestbook/319-new-frontiers-of-robotics-science-and-technology-14-e-15-giugno-2011).	14-15 June 2011	Pisa, Italy
	Meeting	IMPERIAL	2011 UK sensorimotor control meeting	13 June, 2011	Imperial College , London
	Workshop	DLR	Workshop “Towards Autonomous Physical Human-Robot Interaction” in the framework of ICRA2011	May 13, 2011	Shangai, China
	Workshop	DLR	fet11 – The European Future Technologies Conference and Exhibition. EMBODY session “Robots Interacting with Humans – Embodied Intelligence for Better Robots”	May 04 – 06, 2011	Budapest, Hungary
	Seminar	UNIPI	Gugliemo Tamburrini, Università di Napoli Federico II Why do we want to live with robots? Analysing rational, irrational, and ideological motives	April 8, 2011	Pisa, Italy

2.5 Participation in Related Events/Presentations by partners

Presentations given at VIACTORS related events (Conference, Seminar, Workshop, etc.).

No	Date	Venue	Description	Local / national /International
1.	14 December 2011	CNRS, Institut des sciences informatiques et de leurs interactions, France	Robotics panel, Etienne Burdet (Imperial) keynote speaker: "Human robotics"	national
2.	14 December 2011	Palazzo Reale, Pisa, Italy	Science Open Day Antonio Bicchi (UNIPI) “Taming the Complexity of Artificial Manipulation and Sensing: The Role of Haptic Synergies”	local
3.	December 7-11, 2011	Phuket Island, Thailand	2011 IEEE International Conference on Robotics and Biomimetics (IEEE-ROBIO) Tele-Impedance: Preliminary Results on Measuring and Replicating Human Arm Impedance in Tele Operated Robots A. Ajoudani (UNIPI)	international
4.	21-22 November 2011	German Aereospace Center, Germany	Workshop “Challenges in Robotics: To space and Down to Earth” Antonio Bicchi (UNIPI) “Taming the Complexity of Artificial Manipulation and Sensing: The Role of Haptic Synergies”	national
5.	08-09 November 2011	University of Twente, The Netherlands.	4th International Workshop on Human-Friendly Robotics (HFR 2011) Presentations A. Ajoudani, N.G. Tsagarakis, A. Bicchi (UNIPI) “Tele-impedance: an approach for skill based body-machine interface” Invited Speaker Alin Albu-Schäffer (DLR) “Design and control of robots with variable stiffness actuation” Stefano Stramigioli (UT “)Modeling and control of interaction using port-based robotics”	
6.	26 October 2011	Blend, Slovenia	Workshop on New Bodies for Cognitive Humanoids, Humanoids 2011, Bled, Slovenia, October 2011 Invited Talk: "Developing Actuators with Rich Motor Properties for Emerging Humanoids", Nikos	International

			Tsagarakis (IIT)	
7.	26 October 2011	Blend, Slovenia	Workshop ,Dynamic Models and Optimal Control of Robots Humanoids 2011 Francesco Nori (IIT) Active /Passive compliance and stochastic optimacontrol in movement planning Christian Ott (DLR) Humanoid Walking Control using the Capture Point	International
8.	26 October 2011	Blend, Slovenia	Workshop on humanoid service robot navigation in crowded and dynamic environments Humanoids 2011 Nikolaos Tsagarakis (IIT) "COMAN" A Highly Adaptable Humanoid Platform with Intrinsic Elasticity	International
9.	26 -28 October 2011	Blend, Slovenia	Presentations: Serena Ivaldi, Matteo Fumagalli, Francesco Nori, Marco Randazzo, Giorgio Metta, Giulio Sandini (IIT) Computing robot internal/external wrenches by means of inertial, tactile and F/T sensors: theory and implementation on the iCub Federico Moro, Nikos Tsagarakis, Darwin Caldwell (IIT) A human-like walking for the COmpliant huMANoid COMAN based on CoM trajectory reconstruction from kinematic motion primitives. Poster presentation	
10.	21 October 2011	La Rochelle, France	Journées Françaises de la Recherche en Robotique Etienne Burdet (Imperial) keynote speaker: "Adaptive motion guidance: in human, for robot, for humans"	National
11.	25-30 September 2011	S. Francisco, USA	IROS 2011 Plenary session I: Design. Gerd Hirzinger (DLR) J. Vogel, C. Castellini and P. van der Smagt (DLR): "EMG-based Teleoperation and Manipulation with the DLR LWR-III" W. Friedl, M. Chalon, J. Reinecke, M. Grebenstein (DLR): "FAS a flexible Antagonistic Spring Element for a High Performance Over Actuated Hand" W. Friedl, H. Höppner, F. Petit, G. Hirzinger (DLR): "Wrist and Forearm Rotation of the DLR Hand Arm System: Mechanical Design, Shape Analysis and Experimental Validation" M. Chalon, W. Friedl, J. Reinecke, T. Wimbck, A. Albu-Schffer (DLR) "Impedance Control of a Non-	

			Linearly Coupled Tendon Driven Thumb" T. Wimböck, B. Jahn, G. Hirzinger (DLR): "Synergy Level Impedance Control for Multifingered Hands" M. Garabini, A. Passaglia, F. A. W. Belo, P. Salaris, and A. Bicchi (UNIPI). "Optimality Principles in Variable Stiffness Control: the VSA Hammer".	
12.	30 September, 2011	San Francisco, USA	Workshop on Robotics for Neurology and Rehabilitation at IEEE/RSJ IROS 2011 Etienne Burdet (IMPERIAL) invited speaker: "Adaptive motion guidance: in humans, for robots, for humans"	International
13.	30 September, 2011	San Francisco, USA	Workshop on Methods for Safer Medical Procedures , in the framework of IROS 2011 Stefan Jörg (DLR), "Robotic System Simulation and Modelling"	International
14.	28 September, 2011	San Francisco, USA	Symposium: Hardware and Software Design for Haptic Systems, organized in the context of the IEEE/RSJ International Conference on Intelligent Robots and Systems Etienne Burdet (IMPERIAL) invited speaker: "Adaptive motion guidance: in humans, for robots, for humans"	International
15.	26 September, 2011	San Francisco, USA	New and Emerging Technologies in Assistive Robotics Workshop at IEEE/RSJ IROS 2011 Bram Vanderborght (VUB) invited speaker: "KNEXO: a Knee Exoskeleton to test design and control concepts for gait rehabilitation"	International
16.	25-30 September, 2011	San Francisco, USA	IROS 2011 • M. Garabini, A. Passaglia, F. A. W. Belo, P. Salaris, and A. Bicchi (UNIPI). "Optimality Principles in Variable Stiffness Control: the VSA Hammer".	International
17.	23 September 2011	La Alberca, Salamanca (Spain)	HYPER summer school of rehabilitation robotics Etienne Burdet (Imperial) invited speaker: "Neuroscience based rehabilitation" International	International
18.	22 September, 2011	Bristol, UK	Johns Hopkins Scientific Seminar Sami Haddadin (DLR) "Next Generation Robots: From Robotic Co-Workers and Service Assistants to Human-Inspired Robot Design"	International

19.	9 September, 2011	Barcelona, Spain,	F. Carpi (University of Pisa), “Electromechanically active polymer artificial muscles for future soft robotics and biomimetics”, invited talk at “Barcelona Cognition, Brain and Technology Summer School 2011”	International
20.	9 September 2011		RobotCom workshop, Body group section Etienne Burdet (Imperial) invited speaker: "Motor learning: hi human, for robots, for humans"	International
21.	7 -9 September, 2011	Pisa, Italy	Automatica.it 2011 – Italian National Conference of Automation Poster presentation G. Grioli, M. G. Catalano, M. Garabini, F. Bonomo, A. Serio, P. Salaris, F. A. W. Belo, M. Mancini, A. Bicchi, and A. Passaglia (UNIPI) “Variable stiffness actuators: muscles for the next generation of robots”	National
22.	6 September, 2011	Bristol Robotics Lab, UK	M. Grebenstein, invited talk “An anthtropomorphic variable stiffness robot”, The third INTRO workshop and seminar (INteractive RObotics research network), September 5-7, 2011.	International
23.	30 August – 03 September, 2011	Boston, USA	IEEE/EMBS International Conference of Engineering in Medicine and Biology Society • S.M. Behrens, R. Unal, E.E.G. Hekman, R. Carloni, S. Stramigioli, and H.F.J.M. Koopman (UT) “Design of a Fully-Passive Transfemoral Prosthesis Prototype”. • S. Rao, R. Carloni, S. Stramigioli (UT) “A novel energy-efficient rotational variable stiffness actuator”.	International
24.	24 August–1 September, 2011	Milan, Italy	2011 Congress of the International Federation of Automatic Control - IFAC 2011 • L. C. Visser (UT) A. Bicchi (UNIPI). “Embodying Desired Behavior in Variable Stiffness Actuators”. • M. Jafarian, G. van Oort, R. Carloni, and S. Stramigioli, (UT) Performance Comparison of a Planar Bipedal Robot with Rigid and Compliant Legs” • G. van Oort, R. Reinink and S. Stramigioli (UT), New ankle actuation mechanism for a humanoid robot	International
25.	September 1st, 2011	Boston, USA	workshop on "What Is Motor Skill and Can Technology Enhance It?", organized in the context of the Annual International Conference of the IEEE Engineering in	International

			Medicine and Biology Society Etienne Burdet (IMPERIAL) invited speaker: “Sensory substitution to simplify rehabilitation"	
26.	24 – 29 July, 2011	Bavaria, Germany	STIFF/VIACTORS summer school • Alin Albu-Schäffer, DLR “Soft Robotics Design and Control” • Antonio Bicchi, UNIPI “Controlling and Measuring Impedance in Variable Stiffness Actuators for Robotics” • Etienne Burdet, IMPERIAL “Robots can learn to control haptic interactions as humans do” • Patrick van der Smagt, DLR “From human to robot impedance: lessons learned”ù • Bram Vanderborght (VUB) ‘Human Legs/Robot legs’	International
27.	18-21 July, 11	University of Jena, Germany	Dynamic Walking Workshop poster presentation L.C. Visser, S. Stramigioli, and R. Carloni (UT), “Improving Robustness in Bipedal Walking by using Variable Stiffness Actuation” Poster presentation P. Beyl, V. Grosu, M. Van Damme, R. Van Ham, B. Vanderborght, D. Lefeber (VUB) KNEXO: a Knee Exoskeleton to Study Design and Control Concepts for Walking presented by V. Grosu.	International
28.	11-15 July, 2011	ETH Zurich	Summer school on Dynamic Walking and Running with Robots , Stefano Stramigioli speaker (UT)	International
29.	July 15, 2011	EPFL - École polytechnique fédérale de Lausanne	Invited talk on “Adaptive motion guidance: in human, for robot, for humans” Etienne Burdet (IMPERIAL)	International
30.	July 1st, 2011	Zurich, Switzerland	workshop on "Motor Intention and Sensory Feedbacks in Rehabilitation", in the context of the IEEE Int Conference on Rehabilitation Robotics (ICORR) Invited presentation on "Sensory substitution to simplify rehabilitation", Etienne Burdet (IMPERIAL)	International
31.	14-15 June 2011	Pisa, Italy	Workshop New Frontiers of Robotics Science and Technology, a Brainstorming Jam Session • Darwin Caldwell (IIT) “Compliance and Humanoid Robots” • Antonio Bicchi (UNIPI) “Embodied Intelligence and Variable Impedance Actuation”	Local
32.	8 June 2011	Pisa, Italy	F. Carpi (University of Pisa), “Towards variable-stiffness dynamic hand splints based on dielectric	International

			elastomer transducers", conference "EuroEAP 2011 - First International conference on Electromechanically Active Polymer (EAP) transducers & artificial muscles"	
33.	17.06.2011	Villa Guastavillani - Bologna, Italy	invited talk "Il corpo della mano. Esperienze di ricerca tra robotica e neuroscienze" • Antonio Bicchi (UNIPI), invited speaker "Dalla teoria del controllo all'automazione pervasiva: come la ricerca accademica abilita la tecnologia al servizio dell'uomo"	national
34.	20 May, 2011	Delft, The Netherlands	Compliant Mechanisms Symposium Poster presentation S.S. Groothuis, G. Rusticelli, A. Zucchelli, S. Stramigioli, and R. Carloni (UT) "The vsaUT-II: a Novel Rotational Variable Stiffness Actuator"	International
35.	13 May, 2011	Shanghai, China	Scientific collaboration in Embodied Intelligence in Europe: the FET EMBODYi programme of the European Commission and the new actions for 2011-2012 (Flagships and FP8) – Alin Albu Schaeffer (DLR) (speaker), Antonio Bicchi (UNIPI)	International
36.	13 May, 2011	Shanghai, China	Workshop "Manipulation under Uncertainity" in the framework of ICRA 2011 Presentation T. Wimboeck, M. Grebenstein, M. Chalon, W. Friedl, Ch. Ott, A. Albu-Schaeffer and Gerd Hirzinger. "From Actively Impedance Controlled Light-weight Robot Hands to Intrinsically Compliant Systems"	International
37.	13 May, 2011	Shanghai, China	Workshop "Towards Autonomous Physical Human-Robot Interaction" in the framework of ICRA2011 • Dr. Alin Albu-Schaeffer (DLR) "Soft Robotics Control Concepts for Robots Interacting with Humans and their Environments" • Prof. Antonio Bicchi (UNIPI) "Tele-Impedance: preliminary results on measuring and replicating human arm impedance in robots"	International
38.	13 May, 2011	Shanghai, China	Presentations at ICRA 2011 • M. G. Catalano, G. Grioli, M. Garabini, F. Bonomo, M. Mancini, N. Tsagarakis, and A. Bicchi (UNIPI/IIT). "VSA - CubeBot. A modular variable stiffness platform for multi degrees of freedom systems". • G. Grioli and A. Bicchi (UNIPI). "A Real-time Parametric Stiffness Observer for VSA devices" • A. Serio, G. Grioli, I. Sardellitti, N. G. Tsagarakis, and A. Bicchi (UNIPI/IIT). "A decoupled Impedance observer for a Variable	International

			Stiffness Robot". • G. van Oort, R. Carloni, D.J. Borgerink, and S. Stramigioli (UT) "An Energy Efficient Knee Locking Mechanism for a Dynamically Walking Robot". • G. van Oort, and S. Stramigioli (UT) "Geometric interpretation of the Zero-Moment point"	
39.	6 May, 2011	Budapest, Hungary	fet11 – Future Emerging Technologies EMBODY session "Robots Interacting with Humans – Embodied Intelligence for Better Robots". Alin Albu-Schäffer, (DLR) Antonio Bicchi (UNIPI) Bram Vanderborght (VUB) Herman van der Kooij, (UT) speakers	International
40.	4 May, 2011	Budapest, Hungary	fet11 – Future Emerging Technologies • Poster presentations: the VIACTORS project • "Embodied Intelligence by Compliant Actuators for Cognitive and Physical Human-Robot Interaction" by Bram Vanderborght (VUB)	International
41.	29 April 2011.	University of Potsdam, Germany,	F. Carpi (University of Pisa), "Dielectric Elastomer Transducers: a Great Potential Beyond High Potentials", seminar.	International
42.	27 April, 2011	Utrecht, The Netherlands	Roboned Conference http://www.roboned.nl/IIP-RN-kanaal/IIP_RoboNED-Presentations.html	National
43.	April 15, 2011	Lisboa, Portugal	3rd workshop on Biomedical Engineering Invited lecture "Robot-assisted, neuroscience-based rehabilitation of the hand function", Etienne Burdet (IMPERIAL)	International
44.	8 March 2011	San Diego, USA	F. Carpi (University of Pisa), "Dielectric elastomer actuators with granular coupling", conference "Smart Structures and Materials 2011: Electroactive Polymer Actuators and Devices",	International

2.6 Participation in Internal Events

No	Date	Venue	Description
	10-11 October 2011	Brussel, Vrije Universiteit Brussel	Annual Meeting
1.	13 May, 2011	Shanghai, China (ICRA 2011)	Internal project meeting related to the ICRA Workshop organized by VIACTORS

2.	29-30 March, 2011	Genova, Italian Institute of Technology	Review Meeting

2.7 Scientific Publications

The available PDF of the scientific publications are available on the website

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
1.	Conference proceedings	M. G. Catalano, G. Grioli, M. Garabini, F. Bonomo and A. Bicchi **VSA - CubeBot. A modular variable stiffness platform for multi degrees of freedom systems**	International Conference of Robotics and Automation - ICRA 2011, pp. 5090 - 5095	published	UNIPI
2.	Conference proceedings	A. Serio, G. Grioli, I. Sardellitti, N. G. Tsagarakis and A. Bicchi **A decoupled Impedance observer for a Variable Stiffness Robot**	International Conference of Robotics and Automation - ICRA 2011, pp. 5548 - 5553	published	UNIPI/IIT
3.	Conference proceedings	L. C. Visser, S. Stramigioli, and A. Bicchi. **Embodying Desired Behavior in Variable Stiffness Actuators**.	Congress of the International Federation of Automatic Control, Milano, Italy, August 28 - September 2 2011	presented	UNIPI/UT
4.	Conference proceedings	G. Grioli and A. Bicchi **A Real-time Parametric Stiffness Observer for VSA devices**	International Conference of Robotics and Automation - ICRA 2011, pp. 5535 - 5540	published	UNIPI
5.	Conference proceedings	M. Garabini, A. Passaglia, F. A. W. Belo, P. Salaris, and A. Bicchi. **Optimality Principles in Variable Stiffness Control: the VSA Hammer**.	In 2011 IEEE/RSJ International Conference on Intelligent RObots and Systems, S. Francisco, USA, September 25 - 30 2011	presented	UNIPI
6.	Journal paper	F. Carpi, R. Kornbluh, P. Sommer-Larsen, G. Alici, **Electroactive polymer actuators as artificial muscles: are they ready for bioinspired applications?**	Bioinspiration & Biomimetics, Vol. 6(4), pp. 045006-1 – 045006-10, 2011	published	UNIPI
7.	Journal paper	F. Carpi, G. Frediani, M. Nanni and D. De Rossi, **Granularly coupled dielectric elastomer actuators**	IEEE-ASME Transactions On Mechatronics , Vo. 16(1), pp. 16-23, 2011.	published	UNIPI
8.	Conference poster	F. Galantini, G. Gallone, F. Carpi, **Improving performance of dielectric elastomer actuators via corona charging**	Proc. of EuroEAP 2011 - First International conference on Electromechanically Active Polymer (EAP)	published	UNIPI

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
			transducers & artificial muscles, Pisa, 8-9 June 2011 Online database; No issue.		
9.	Conference poster	F. Carpi, G. Frediani, C. A. Gerboni, J. Gemignani, D. De Rossi, **Towards variable-stiffness dynamic hand splints based on dielectric elastomer transducers**,	Proc. of EuroEAP 2011 - First International conference on Electromechanically Active Polymer (EAP) transducers & artificial muscles, Pisa, 8-9 June 2011, Online database; No issue.	published	UNIPI
10.	Conference poster	F. Carpi, G. Frediani, A. Sommovigo, D. De Rossi, **Refreshable Braille cells based on dielectic elastomer actuators**	Proc. of EuroEAP 2011 - First International conference on Electromechanically Active Polymer (EAP) transducers & artificial muscles, Pisa, 8-9 June 2011. Online database; No issue.	published	UNIPI
11.	Conference proceedings	F. Carpi, G. Frediani and D. De Rossi **Hydrostatically coupled dielectric elastomer actuators: new opportunities for haptics**,	In Materials Research Society Symposium Proc., Vol. 1312, mrsf10-1312-hh01-01-1 - mrsf10-1312-hh01-01-10, 2011.	published	UNIPI
12.	Conference proceedings	F. Carpi, G. Frediani, M. Nanni and D. De Rossi **Dielectric elastomer actuators with granular coupling**	Smart Structures and Materials 2011: Electroactive Polymer Actuators and Devices, Y. Bar-Cohen Editor, Proc. of SPIE, Vol. 7976	published	UNIPI
13.	Conference proceedings	F. Carpi, G. Frediani and D. De Rossi **Opportunities of hydrostatically coupled dielectric elastomer actuators for haptic interfaces**	In Smart Structures and Materials 2011: Electroactive Polymer Actuators and Devices, Y. Bar-Cohen Editor, Proc. of SPIE, Vol. 7976	published	UNIPI
14.	Conference proceedings	R. Vertechy, A. Frisoli, M. Bergamasco, F. Carpi, G. Frediani, D. De Rossi, **Modelling and experimental validation of buckling dielectric elastomer actuators**	Proc. of the ASME 2011 Conference on Smart Materials, Adaptive Structures and Intelligent Systems – SMASIS 2011, September 18-21, 2011, Scottsdale, Arizona, USA, pp. 1-8, 2011.	published	UNIPI
15.	Journal paper	H. Wang, S. Cai, F. Carpi, Z. Suo, "Computational model of hydrostatically coupled dielectric elastomer actuators",	Journal of Applied Mechanics - Transactions Of The ASME,	In press.	UNIPI
16.	Journal paper	F. Carpi and D. De Rossi, “Small-strains modeling of helical dielectric elastomer actuators”,	IEEE-ASME Transactions On Mechatronics,	In press.	UNIPI
17.	Conference proceedings	Amir Jafar, N.G.Tsagarakis, and D.G.Caldwell.	IEEE International Conference on	published	IIT

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
		Exploiting Natural Dynamics for Energy Minimization using an Actuator with Adjustable Stiffness	Robotics and Automation Conference, (ICRA 2011), Shanghai.		
18.	Conference proceedings	M. Laffranchi, N.G.Tsagarakis, and D.G.Caldwell. **A Compact Compliant Actuator with Variable Physical Damping**	IEEE International Conference on Robotics and Automation Conference, (ICRA 2011), Shanghai.	published	IIT
19.	Conference proceedings	Amir Jafar, N.G.Tsagarakis, and D.G.Caldwell **AwAS-II: A Novel Actuator with Adjustable Stiffness Based on Variable Ratio Lever Concept**	IEEE International Conference on Robotics and Automation Conference, (ICRA 2011), Shanghai.	Published	IIT
20.	Journal paper	M. Biso, A. Ansaldo, D. N. Futaba, K. Hata and D. Ricci **Cross-Linking Super-Growth Carbon Nanotubes: Boosting Bucky Gel Actuator Performance**	Carbon vol. 49, issue 7 (2011) pages 2253-2257	Published	IIT
21.	Journal paper	L. Ceseracciu, M. Biso, A. Ansaldo, D.N. Futaba, K. Hata, A.C. Barone, D. Ricci **Mechanics and actuation properties of bucky gel-based electroactive polymers**	Sensors and Actuators B: Chemical, 156 (2011) 949-953	Published	IIT
22.	Journal paper	A. Jafari, N.G.Tsagarakis and D. G. Caldwell. **A Novel Intrinsically Energy Efficient Development of a Novel Actuator with Adjustable Stiffness (AwAS).**	IEEE Transactions Mechatronics	accepted	IIT
23.	Journal	M. Laffranchi, N.G.Tsagarakis and D. G. Caldwell **The role of Physical Damping in Compliant Robotic Joints**	IEEE Transactions Mechatronics	accepted	IIT
24.	Journal	A. Jafari, N. G. Tsagarakis, I. Sardellitti and D. G. Caldwell **A New Actuator with Adjustable Stiffness based on a Variable Ratio Lever Mechanism (AwAS-II)**	IEEE/ASME Transaction on Mechatronics	submitted	IIT
25.	Conference proceedings	M. Biso, A. Ansaldo, V. Vintera, D. Ricci **Linear and bending actuation of bucky gel**	Electroactive Polymer Actuators and Devices (EAPAD) XIII San Diego USA, 6-10 March 2011	Published	IIT
26.	Conference proceedings	M. Biso, A. Ansaldo D. N. Futaba, K. Hata and D.Ricci **Linear and Bimorph Bucky Gel Actuators from Cross-Linked Super-Growth Carbon Nanotubes**	XXVth International winterschool on electronic properties of novel materials, February 26 March 5, 2011 Kirchberg/Tirol -	Published	IIT

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
			Austria		
27.	Conference proceedings	M. Biso, A. Ansaldo D. N. Futaba, K. Hata and D.Ricci **Linear and bimorph bucky gel actuators with improved performance thanks to cross-linked super-growth carbon nanotubes**	International conference on Electromechanically Active Polymer (EAP) transducers and artificial muscles, Pisa Italy, 8-9 June 2011	Published	IIT
28.	Conference proceedings	A. Ansaldo, M. Biso, L.Ceseracciu, D. N. Futaba, K. Hata, A.C. Barone, D.Ricci **Boosting Bucky Gel Actuators: Cross-Linked CNTs and Linear Motion**	NT '11: International Conference on the Science and Application of Nanotubes, Cambridge United Kingdom, 11-16th July 2011	Published	IIT
29.	Conference proceedings	N. G. Tsagarakis, I. Sardellitti, D. G. Caldwell **A New Variable Stiffness Actuator (CompAct-VSA): Design and Modelling**	IEEE International Conference of Intelligent Robots and Systems (IEEE IROS 2011	Published	IIT
30.	Conference proceedings	Maurizio Biso, Alberto Ansaldo, Luca Ceseracciu, Don N. Futaba, Kenji Hata, Alberto C. Barone, Davide Ricci **Bending and linear bucky gel actuators from chemically modified carbon nanotubes**	6th World Congress on Biomimetics, Artificial Muscles and Nano-Bio, Cergy-Pontoise France, 25-27 October 2011	Published	IIT
31.	Conference proceedings	Maurizio Biso, Alberto Ansaldo, Luca Ceseracciu, Don N. Futaba, Kenji Hata, Alberto C. Barone, Davide Ricci **Cross-Linking Carbon Nanotubes for Improved Bending and Linear Bucky Gel Actuators**	220th ECS Meeting & Electrochemical Energy Summit, Boston Massachusetts USA, 9-14 October 2011	Published	IIT
32.	Conference proceedings	Berret B., Ivaldi S., Nori F. & Sandini G. **Stochastic optimal control with variable impedance manipulators in presence of uncertainties and delayed feedback**	2011 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),.	Published	IIT
33.	Journal paper	Fiorilla A.E., Nori F. & Masia L. Sandini G **Finger Impedance Evaluation by means of Hand Exoskeleton**	Annals of Biomedical Engineering, vol. 39,no. 12, pp. 2945–2954	Published	IIT
34.	Conference proceedings	Randazzo M., Fumagalli M., Nori F., Natale L., Metta G. & Sandini G. **A comparison between joint level torque sensing and proximal F/T sensor torque estimation: implementation on the iCub**	2011 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2011), San Francisco, USA, September 25-30, 2011	Published	IIT
35.	Conference proceedings	Ivaldi S., Fumagalli M., Randazzo M., Nori F., Metta G. & Sandini G	The 2011 IEEE-RAS International Conference on	Published	IIT

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
		Computing robot internal/external wrenches by means of F/T sensors: theory and implementation on the iCub humanoid	Humanoid Robots (Humanoids2010), Bled, Slovenia, October 26-28, 2011.		
36.	Conference proceedings	A. Jafari, N.G. Tsagarakis, I. Sardellitti, D.G. Caldwell **How Design can affect the Energy Required to Regulate the Stiffness in Variable Stiffness Actuators**	ICRA 2012	accepted	IIT
37.	Conference proceedings	I. Sardellitti, G.M. Cerda, N.G.Tsagarakis, A. Jafari, D.G. Caldwell **A Position and Stiffness Control Strategy for Variable Stiffness Actuators**	ICRA 2012	accepted	IIT
38.	Journal paper	L.C. Visser, R. Carloni, and S. Stramigioli, **Energy-Efficient Variable Stiffness Actuators**.	IEEE Transactions on Robotics, vol. 27, n. 5, pp. 865 - 875	published	UT
39.	Journal paper	L.C. Visser, R. Carloni, and S. Stramigioli, **Variable Stiffness Actuators: a Port-based Power Flow Analysis**	IEEE Transactions on Robotics, vol. 28, n. 1.	accepted	UT
40.	Conference proceedings	M. Jafarian, G. van Oort, R. Carloni, and S. Stramigioli, **Performance Comparison of a Planar Bipedal Robot with Rigid and Compliant Legs**	IFAC World Congress 2011	published	UT
41.	Conference proceedings	G. van Oort, R. Reinink and S. Stramigioli, **New ankle actuation mechanism for a humanoid robot**	IFAC World Congress 2011	published	UT
42.	Conference proceedings	S.M. Behrens, R. Unal, E.E.G. Hekman, R. Carloni, S. Stramigioli, and H.F.J.M. Koopman **Design of a Fully-Passive Transfemoral Prosthesis Prototype.**	IEEE/EMBS International Conference of Engineering in Medicine and Biology Society	published	UT
43.	Conference proceedings	S. Rao, R. Carloni, S. Stramigioli **A novel energy-efficient rotational variable stiffness actuator**.	IEEE/EMBS International Conference of Engineering in Medicine and Biology Society	published	UT
44.	Conference proceedings	G. van Oort, R. Carloni, D.J. Borgerink, and S. Stramigioli, **An Energy Efficient Knee Locking Mechanism for a Dynamically Walking Robot**.	ICRA 2011	published	UT
45.	Conference proceedings	G. van Oort, and S. Stramigioli, **Geometric interpretation of the Zero-Moment point**	ICRA 2011	published	UT

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
46.	Workshop	L.C. Visser, S. Stramigioli, and R. Carloni, **Improving Robustness in Bipedal Walking by using Variable Stiffness Actuation**	Dynamic Walking Workshop	Abstract with no review + poster presentation	UT
47.	Symposium	S.S. Groothuis, G. Rusticelli, A. Zucchelli, S. Stramigioli, and R. Carloni, **The vsaUT-II: a Novel Rotational Variable Stiffness Actuator**	Symposium on Compliant Mechanisms	Abstract with no review + poster presentation	UT
48.	Conference proceedings	L.C. Visser, S. Stramigioli, and R. Carloni, **Robust Bipedal Walking with Variable Stiffness Actuation**	IEEE BIOROB 2012	submitted	UT
49.	Conference proceedings	M. Fumagalli, E. Barrett, S. Stramigioli, and R. Carloni, The mVSA-UT: **a Miniaturized Differential Mechanism for a Continuous Rotational Variable Stiffness Actuator**	IEEE BIOROB 2012	submitted	UT
50.	Conference proceedings	S.S. Groothuis, G. Rusticelli, A. Zucchelli, S. Stramigioli, and R. Carloni, **The vsaUT-II: a Novel Rotational Variable Stiffness Actuator**	ICRA 2012	accepted	UT
51.	Conference proceedings	R. Unal, R. Carloni, S.M. Behrens, E.E.G. Hekman, H.F.J.M. Koopman and S. Stramigioli **Towards a Fully Passive Transfemoral Prosthesis for Normal Walking**	IEEE BIOROB 2012	submitted	UT
52.	PhD dissertation	M. Wassink, On compliant underactuated robotic fingers			UT
53.	PhD dissertation	G. van Oort Analysis, Control and Design of walking robots			UT
54.	Journal paper	B. Vanderborght, N. Tsagarakis, R. Van Ham, I. Thorson, D. Caldwell **MACCEPA 2.0: Compliant Actuator used for Energy Efficient Hopping Robot Chobino1D**	Autonomous Robots, issue 1, vol.31, pp.55 - 65, 2011 http://www.springerlink.com/content/g8n97426522u2277/	Published	VUB, IIT
55.	Conference proceedings	M. Van Damme, P; Beyl, B. Vanderborght, V. Grosu, R. Van Ham, I. Vanderniepen, A. Matthys, D. lefeber. **Estimating Robot End-Effector Force from Noisy Actuator Torque Measurements,**	2011 IEEE International Conference on Robotics and Automation (ICRA2011), https://ras.papercept.net/conferences/scripts/abstract.pl?ConfID=34&Number=1330	Published	VUB
56.	Workshop	R. Van Ham, B. Vanderborght, M. Van Damme, V. Grosu, D. Lefeber **MACCEPA, the Mechanically Adjustable Compliance and Controllable Equilibrium**	IEEE International Conference on Robotics and Automation, May 9-13, 2011, Shanghai International Conference Center,	Published	VUB

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
		Position Actuator: different design options	Shanghai, China, 2011		
57.	Journal paper	K. Goris, J. Saldien, B. Vanderborght, D. Lefeber. **How to Achieve the Huggable Behavior of the Social Robot Probo**	Mechatronics, issue 3, vol.21, pp.490 - 500, 2011 http://dx.doi.org/10.1016/j.mechatronics.2011.01.001	Published	VUB
58.	Journal paper	P. Beyl, K. Knaepen, S. Duerinck, M. Van Damme, B. Vanderborght, D. Lefeber **Safe and compliant guidance by a powered knee exoskeleton for robot-assisted rehabilitation of gait**	Advanced Robotics, from Special Issue on Physical Human-Robot Interaction Through Force Interfaces, issue 5, vol.25, pp.513 - 535, eds. RSJ, published by Brill (Leiden, NL), 2011	Published	VUB
59.	Journal paper	D. Villegas, B. Vanderborght, M. Van Damme, P. Beyl, D. Lefeber **Third Generation Pleated Pneumatic Artificial Muscles for Robotic Applications: Development and Comparison with the McKibben Muscle**	Advanced Robotics	accepted	VUB
60.	Journal paper	P. Beyl, M. Van Damme, R. Van Ham, B. Vanderborght and D. Lefeber **Pleated pneumatic artificial muscle based actuator system as a torque source for compliant lower limb exoskeletons**	Robotica	submitted	VUB
61.	Workshop	P. Beyl, B. Vanderborght , V. Grosu, M. Van Damme, R. Van Ham, D. Lefeber **KNEXO: a Knee Exoskeleton to test design and control concepts for gait rehabilitation**.	New and Emerging Technologies in Assistive Robotics Workshop at IEEE/RSJ IROS 2011, Sep. 26 2011, pp.1 - 2, 2011 http://www.iros2011.org/WorkshopsAndTutorialsProceedings/MW3/iros11ws_assistive_robotics.pdf	Published	VUB
62.	Conference Poster	P. Beyl, V. Grosu, M. Van Damme, R. Van Ham, B. Vanderborght, D. Lefeber **KNEXO: a Knee Exoskeleton to Study Design and Control Concepts for Walking**	Dynamic Walking International Conference, July 18-21, 2011, Friedrich-Schiller University of Jena, Germany, 2011 www.dynamicwalking.uni-jena.de/	Published	VUB
63.	Journal paper	K. Goris,J. Saldien, B. Vanderborght, D. Lefeber **Mechanical Design of the Huggable Robot Probo**	International Journal on Humanoid Robotics, vol.8, n. 3, pp.481 -	Published	VUB

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
			511		
64.	Journal	J. Saldien, B. Vanderborght, K.Goris, M.Van Damme, D. Lefeber **The Motor System of the Huggable Robot Probo and the Influence on the Animacy and Likeability**	Robotics & Autonomous Systems	Submitted	VUB
65.	Journal	B. Brackx, M. Van Damme, A. Matthys, R. Versylius, B. Vanderboght, D. Lefeber **Passive Ankle-Foot Prosthesis Prototype with Extended Push-Off**	Advanced Robotics	Submitted	VUB
66.	Journal	Y. Huang, B. Vanderborght, R. Van Ham, Q. Wang, M. Van Damme, G. Xie, and D. Lefeber **Step Length and Velocity Control of Dynamic Bipedal Walking Robot with Adaptable Compliant Joints**	Transactions on Mechatronics special issue Bio-Inspired Mechatronics	Submitted	VUB
67.	Journal paper	D Campolo, F Widjaja, M Esmaeili, E Burdet **Pointing with the wrist: a postural model for Donders' law.**	Experimental Brain Research 212(3): 417-27.	Published	IMPERIAL
68.	Journal paper	C Yang, G Ganesh, S Haddadin, S Parusel, A Albu-Schaeffer and E Burdet **Human like adaptation of force and impedance in stable and unstable interactions**	IEEE Transactions on Robotics, Vol: 27 Issue:5, pages: 918 - 930 ISSN: 1552-3098 DOI: 10.1109/TRO.2011.2158251	Published	IMPERIAL
69.	Journal paper	J Ueda, E Burdet, J-L Gennisson, M Kaneko, A Mihailidis (Guest Editorial) **Focused Section on Sensing Technologies for Biomechatronics**	IEEE/ASME Transactions on Mechatronics, Volume: 15 Issue:5, pages: 827 - 827	Published	IMPERIAL
70.	Journal paper	A Kadiallah, G Liaw, M Kawato, DW Franklin and E Burdet **Impedance control is selectively tuned to multiple directions of movement**	Journal of Neurophysiology, Vol. 106, no.5, pages: 2737-48	Published	IMPERIAL
71.	Conference Proceedings	L Masia, V Squeri, Devjani, E Burdet, G Sandini, P Morasso **Stabilizing unstable object by means of kinematic redundancy.**	Proc Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) 1: 3698-702.	published	IMPERIAL
72.	Conference Proceedings	S-H Zhou, D Oetomo, Y Tan, E Burdet, I Mareels **Human Motor Computational Model Through Iterative MRAC.**	Proc World Congress of the International Federation of Automatic Control (IFAC)	published	IMPERIAL

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
73.	Conference Proceedings	C Yang and E Burdet **A model of reference trajectory adaptation for interaction with objects of arbitrary shape and impedance.**	Proc IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)	published	IMPERIAL
74.	journal paper	A Kadiallah, DW Franklin and E Burdet **Generalization in adaptation to stable and unstable dynamics**	PLoS ONE (2011),	In press	MPERIAL
75.	journal paper	M Haruno, G Ganesh, E Burdet and M Kawato **Distinct neural correlates of reciprocal- and co-activation of muscles in dorsal and ventral premotor cortices.**	Journal of Neurophysiology 107: 126-33.	published	IMPERIAL
76.	journal paper	S Balasubramanian, A Melendez-Calderon and E Burdet **Arc length smoothness measures for assessing the motor condition, learning and recovery.**	IEEE Transactions on Biomedical Engineering	In press	MPERIAL
77.	conference proceedings	A Melendez, L Bagutti, B Pedrono and E Burdet **A versatile dual-wrist device to study human-human interaction and bimanual control.**	Proc IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2011	published	IMPERIAL
78.	conference proceedings	E Burdet and N Jarasse **From human to robot to humans.**	Proc IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).	published	IMPERIAL
79.	Journal	S. Haddadin, A. Albu-Schäffer, F. Haddadin, J. Rossmann, G. Hirzinger, **Experimental Safety Study on Soft-tissue Injury in Robotics. Part I: Theory, Materials, Methods and Simulation Experiments**	IEEE Robotics & Automation Magazine	Accepted	DLR
80.	Journal	S. Haddadin, A. Albu-Schäffer, F. Haddadin, J. Rossmann, G. Hirzinger, **Experimental Safety Study on Soft-tissue Injury in Robotics. Part II: Experiments with soft materials**	IEEE Robotics & Automation Magazine	Accepted	DLR
81.	Conference proceedings	J. Park, S. Haddadin, J. Song, A. Albu-Schäffer: **Designing Optimally Safe Robot Surface Properties for Minimizing the Stress Characteristics of Human-Robot Collisions**	Int. Conf. on Robotics and Automation (ICRA 2011), pp. pp. 5413 - 5420	Published	DLR

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
82.	Conference proceedings	S. Parusel, S. Haddadin, A. Albu-Shaeffer: **Modular state-based behaviour control for safe human-robot interaction: A lightweight control architecture for a lightweight robot**	IEEE Int. Conf. on Robotics and Automation (ICRA 2011), pp. 4298 - 4305	Published	DLR
83.	Conference proceedings	M. Grebenstein and A.Albu-Schaeffer, T. Bahls, M. Chalon, O. Eiberger, W.Friedl, R. Gruber, S.Haddadin**,** U.Hagn, R. Haslinger, H. Hoeppner, S. Joerg, M. Nickl, A.Nothhelfer, F. Petit, J.Reill, N. Seitz, T. Wimboeck, S. Wolf, T. Wuesthoff, and G.Hirzinger: **The DLR Hand Arm System**	IEEE Int. Conf. on Robotics and Automation (ICRA 2011), pp. 3175 - 3182	Published	DLR
84.	Workshop	S.Haddadin, S. Parusel, R. Belder, A. Albu-Schaeffer, and G. Hirzinger: **Safe Acting and Manipulation in Human Environments: A Key Concept for Robots in our Society**	IEEE ARSO, IEEE ARSO, A Worshop on Advanced Robotics and its Social Impacts, 2011, Half-Moon Bay, USA , October 2-4, 2011	Presented	DLR
85.	Conference proceedings	S. Haddadin, M. Weis, S. Wolf: **Optimal Control for maximizing Link Velocity of Robotic Variable Stiffness Joints**	IFAC 2011, pp. 6863 - 6871	Published	DLR
86.	Conference proceedings	S.Haddadin, R. Belder, and A. Albu-Schaeffer: **Dynamic Motion Planning for Robots in Partially Unknown Environments**	IFAC 2011, pp. 6842 - 6850	Published	DLR
87.	Conference proceedings	A.Chilian, H. Hirschmüller and M. Görner: **Multisensor Data Fusion for Robust Pose Estimation of a Six-Legged Walking Robot**	IEEE IROS, 25-30 Sept. 2011, S. Francisco, USA, pp. 2497 - 2504	Published	DLR
88.	Conference proceedings	M. Chalon, W.Friedl, J. Reinecke, T. Wimboeck, A.Albu-Schaeffer: **Impedance control of a non-linearly coupled tendon driven thumb**	IEEE IROS, 25-30 Sept. 2011, S. Francisco, USA, pp. 4215 - 4221	Published	DLR
89.	Conference proceedings	S. Haddadin, K. Krieger, and A. Albu-Schaeffer: **Exploiting Elastic Energy Storage for Cyclic Manipulation: Modeling, Stability, and Observations for Dribbling**	IEEE CDC 2011	Accepted	DLR
90.	Conference proceedings	S. Haddadin, K. Krieger, M. Kunze, and A.Albu-Schaeffer: **Exploiting potential energy storage for cyclic manipulation: An analysis for elastic dribbling with an anthropomorphic robot**	IEEE IROS, pp. 1789 - 1796	Published	DLR
91.	Conference proceedings	T. Ende, S. Haddadin, S. Parusel, T. Wuesthoff, and A. Albu-Schaeffer: **Exploiting**	IEEE IROS, pp. 1789 - 1796	Published	DLR

Nr.	Type	Name	Issue	Details (published, submitted, accepted)	Partner
		potential energy storage for cyclic manipulation: A Human-Centered Approach to Robot Gesture Based Communication within Collaborative Working Processes			
92.	Conference proceedings	S. Haddadin, R.Belder, and A. Albu-Schaeffer: **Dynamic Motion Planning for Robots in Partially Unknown Environments**	IFAC 2011, Milan, Italy, Vol. 18, part. 1	Published	DLR
93.	Conference proceedings	F. Petit and A. Albu-Schäffer: **State Feedback Damping Control For A Multi DOF Variable Stiffness Robot Arm**	IEEE Int. Conf. on Robotics and Automation (ICRA 2011), pp 5561 - 5567	Published	DLR
94.	Conference proceedings	F.Petit and A.Albu-Schäffer: **Cartesian Impedance Control For A Variable Stiffness Robot Arm**	IEEE: IROS2011, pp. 4180 - 4186	Published	DLR
95.	Conference proceedings	S. Wolf, O.Eiberger and G.Hirzinger: **The DLR FSJ: Energy based design of a variable stiffness joint**	IEEE Int. Conf. on Robotics and Automation (ICRA 2011), pp. 5082 - 5089	Published	DLR
96.	Conference proceedings	W. Friedl, H. Höppner, F. Petit and G.Hirzinger: **Wrist and Forearm Rotation of the DLR Hand Arm System: Mechanical Design, Shape Analysis and Experimental Validation**	IEEE IROS 2011, pp. 1836 - 1842	Published	DLR
97.	Conference proceedings	W. Friedl, M. Chalon, J. Reinecke and M.Grebenstein: **FAS A flexible Antagonistic spring element for a high performance over actuated hand**	IEEE IROS 2011, pp. 1366 - 1372	Published	DLR
98.	Conference proceedings	H. Höppner, D. Lakatos, H. Urbanek, C. Castellini, P van der Smagt **The Grasp Perturbator: Calibrating human grasp stiffness during a graded force task**.	Proc. ICRA International Conference on Robotics and Automation pp. 3312-3316 (2011).	Published	DLR

2.8 General Dissemination

Dissemination for general public: newspapers, press agencies, magazines, radio, Tv etc..

Date	Title and type of Media	Title	Language	Description	Partner involved

Date	Title and type of Media	Title	Language	Description	Partner involved
	EU robotics remote labs, http://robotlabs.gamstv.it				VUB
14 December 2011	Science Open Days		Italian	Talk, Antonio Bicchi	UNIPI
30/11/2011	Behind the Circuits : Robots! (EU Robotics Week)		Dutch	A guided tour of the VUB robotstudios and an initiation workshop Lego NXT Mindstorms. For teachers.	VUB
26/11/2012	Z@PPLive (Dutch television show), EU Robotics Week		Dutch		VUB
26 September, 2011	IALO Company Forum		Dutch		VUB
17 September, 2011		University of Twente – OpenHouse Event	Dutch/English	Demos and Lab tour	UT
26 August, 2011	Dr. Robot, therapeut onder constructie, newspaper article by Bram Vanderborght	De Standaard (26.8.2011): Dr. Robot, therapeut onder constructie	Dutch		VUB
30 April, 2011	Talk in high school (Antonio Bicchi, UNIPI)	Talk about robotics	italian	Dissemination towards high school students	UNIPI
19 April, 2011		Mechatronic Valley Twente	Dutch/English	Demos and Lab tour	UT
25 March 2011	Talk	rehabilitative and assistive robotic competition	English	presentation and demos	IMPERIAL
2011	Youtube video	VIACTORS http://www.youtube.com/watch?v=HSYiA1_ph3A&context=C34607b7ADOEgsToPDskI_DaNKGDn4yfodqLF5n1T9	English	video	UNIPI

2.9 Cross Fertilization

Projects related to VIACTORS topics to be considered relevant for information and result exchange.

Project Name	Project Title	Point of Contact	e-mail
EMBODYi: • EMORPH • VIACTORS • ANGELS • EVRYON • OCTOPUS • LOCOMORPH	Embodied Intelligence	Cecilia Laschi	c.laschi@sssup.it
STIFF	Enhancing biomorphic agility through variable stiffness	Patrick van der Smagt	smagt@dlr.de
DEXMART	DEXterous and autonomous dual-arm/hand robotic manipulation with sMART sensory-motor skills: A bridge from natural to artificial cognition	Gerhard Grunwald	
EVRYON	Evolving Morphologies for Human-Robot Symbiotic Interaction	Eugenio Guglielmelli	e.guglielmelli@unicampus.it
EMORPH	Event–Driven Morphological Computation for Embodied Systems	Chiara Bartolozzi	chiara.bartolozzi@iit.it
ANGELS	ANGuilliform robot with ELectric Sense	Frédéric Boyer	frederic.boyer@emn.fr
OCTOPUS	Novel Design Principles and Technologies for a New Generation of High Dexterity Soft-bodied Robots Inspired by the Morphology and Behaviour of the Octopus	Cecilia Laschi	c.laschi@sssup.it
LOCOMORPH	Locomotion and movement in robots, with enhanced manoeuvrability, self-stabilization, energy efficiency and adaptation, thanks to morhology and morphosis	Dr. Helmut Hauser	helmut.hauser@igi.tugraz.at

PHRIENDS	Physical Human-Robot Interaction: Dependability and Safety	Antonio Bicchi	bicchi@centropiaggio.unipi.it
Reflexleg	Intelligent and energy-efficient actuation and natural bidirectional control interfacing for transfemoral prostheses	Stefano Stramigioli	s.stramigioli@utwente.nl
HUMOUR	HUman behavioral Modeling for enhancing learning by Optimizing hUman-Robot interaction	Vittorio Sanguineti	vittorio.sanguineti_at_unige.it
CORBYS	Cognitive Control Framework for Robotic Systems	Axel Gräser	ag@iat.uni-bremen.de
H2R	H2R: Bringing Human Neuromotor Intelligence to Robots	Etienne Burdet	eburdet@imperial.ac.uk
THE	The Hand Embodied	Antonio Bicchi	bicchi@centropiaggio.unipi.it
AIRobots	Innovative aerial service robots for remote inspections by contact	Prof. Lorenzo Marconi	Lorenzo.marconi@unibo.it

2.10 Awards

Michael Van Damme (VUB), selected as **one of three finalists of the 2011 Georges Giralt PhD Award by EURON** for his PhD titled “Towards Safe Control of a Compliant Manipulator Powered by Pneumatic Muscles”.

Chapter 4

Exploitation

Exploitable Knowledge and its uses.

Exploitable products (or measures)	Use	Patents or other IPR protection	Owner and other partner(s) involved
vsaUT-II	VSA design	Provisional patent	University of Twente
mvsaUT	VSA design	Provisional patent	University of Twente
Meccanismo Elastico non		Italian patent, submission	Antonio Bicchi, Manuel

lineare a caratteristica programmabile		number PI2011A000057	Giuseppe Catalano, Giorgio Grioli (UNIPI)
Variable pliability actuator	actuator	EP10188315.5 (pending)	Antonio Bicchi, Manuel Giuseppe Catalano, Giorgio Grioli (UNIPI)
Device and training paradigm to benefit motor practice and training.	motor assessment and training systems	Japanese patent pending No 2011-027711	E Burdet, G Ganesh, R Osu
Verfahren und Messystem zur Messung der Steifigkeit von Körperteilen	Method and measurement device for measuring stiffness of body parts	DE 102010014895A1 2011.10.20	Smagt, H. Höppner