

## SCIENTIFIC CURRICULUM VITAE

### DR. ING. MICHELE FOLGHERAITER

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#### IN BRIEF

Dr. Ing. Michele Folgheraiter received the degrees of M.S in Computer Science with major in Automation Systems and the PhD in Computer Science from Politecnico di Milano University (Italy), in 2000 and 2004 respectively. His research interests focus on the areas of humanoid robotics, haptic interfaces, bio-inspired control systems and artificial limbs. He is author of more than 40 scientific publications in international peer-reviewed journals and conferences. He is regularly reviewing papers for international Journals, e.g. Journal of Humanoid Robotics, Mechatronics (Elsevier), Integrated Computer-Aided Engineering Journal, IEEE Biomedical Engineering Journal, and international Conferences, e.g. ICRA, IROS, ICINCO, ROMAN, ROBOCUP. He was invited as session chair for the ROBIO (IEEE), ICINCO, and BIODEVICES Conferences respectively in 2006, 2010 and 2011. In 2002, he was awarded a scholarship for an international research program and spent three months at the Intelligent Robotics Laboratory in Portland State University, Oregon, USA. In 2003 he became a member of the Italian Engineering Association. From 2002 to 2007 he held the positions as researcher and teaching assistant in Robotics1 and Robotics 2 classes at Politecnico di Milano. From 2004 to 2006 he held the position as a Contract Professor for the 'Informatica B' class and participated in a EU founded project within FP6 (ION-Project) as a expert in neural networks and data mining. Between 2000 and 2007 he supervised more than 30 M.S. and B.S thesis and guided different robotics projects at the Artificial Intelligence and Robotics Laboratory (AIRLAB) in Politecnico di Milano. Since the end of 2007, he has been working at the DFKI Bremen Robotics Innovation Center as a senior researcher.



#### PERSONAL HOMEPAGE/EMAIL

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## PERSONAL

Born in Trento (Italy) on May 21, 1973. Italian citizenship.

## LANGUAGES

**Italian** Mother Tongue

**English** Fluent

**German** Intermediate

**French** Elementary

## DETAILED SCIENTIFIC CAREER

**2007 September → Present** Senior Researcher at DFKI (Deutsches Forschungszentrum für Künstliche Intelligenz GmbH, Bremen, Germany).

- Scientific and technical coordinator for the Exoskeleton-Team (Capio project, further information on the [Capio address of homepage](#)).
- Team leader in NeTTUN EU project. (further information on the [NeTTUN address of homepage](#)).
- Teaching collaborator at University of Bremen (Bremen, Germany).
- Journals Guest Reviewer: International Journal of Humanoid Robotics, Mechatronics Journal (Elsevier), Integrated Computer-Aided Engineering, IEEE Biomedical Engineering Journal.
- Conferences Reviewer: ROBOCUP2006, ICINCO2007, ICINCO2008, ICRA2009, ICRA2010, IROS2010, BIODEVICES2011.

**2005 → 2007** Collaboration with the Fachhochschule Frankfurt University of Applied Sciences, to design and supply a humanoid Gesture Robot ([2 light humanoid arm with 16DOF each](#)).

**2004 → 2007** Contract Researcher and Professor at Politecnico di Milano.

- Contract Professor (Informatics B) at Politecnico di Milano (Academic Years 2004-2005 and 2005-2006).
- Teaching Assistant in Robotics1 and Robotics2 classes (Prof. Giuseppina Gini).
- Head of many robotics projects at the Artificial Intelligence and Robotics Laboratory ([AIR-LAB](#)).
- Collaborator to the European project ION-Project as a scientific expert in data-mining and predictions.

**2004 September** Receives the title of Doctor in Research (PhD) from Politecnico di Milano, with the thesis: "Study of an Anthropomorphic Artificial Arm for application in Humanoid Robotics".

**2003 September** Becomes a member of the Italian Engineering Association.

**2002 September 21 → 2002 December** Research period at the "Intelligent Robotics Laboratory", Portland State University, Oregon, USA. Was awarded a grant of 6.000 euros for international internship programs.

**2001 April** Admission to the PhD program in Information Engineering at Politecnico di Milano (Italy).

**2000 June** Obtains the Laurea degree at Politecnico di Milano, Italy, in Computer Science with major in Automation. The thesis entitled "Study on the human hand and on a possible artificial equivalent" was presented at the first International Conference on Humanoid Robotics, MIT, Boston, September 2000.

**1998 September** Research collaboration of 6 months at the project "Robot Surgery"(laboratory of Mechanic of the Robot at Politecnico di Milano).

**1992 October** Freshman at the University of Engineering of Trento (Italy).

**1992 June** High school degree from the Technical Institute of Electronic and Telecommunications (ITIS G.Marconi Rovereto (TN), Italy).

#### PERSONAL STATEMENT

I am extrovert in nature and I like cooperating with people that have different points of view and different backgrounds. I am very interested in Biorobotics and in particular in its sub-discipline the Humanoid Robotics. I am fascinated by the methodology adopted by these subjects, and in particular by the usage of the knowledge of different scientific fields to synthesize and control the machine. I have been dealing with robotics since 1998. At that time I have worked on a robot for surgeries applications in the "Meccanica dei Robot"laboratory in the Mechanical Department of Politecnico di Milano for 6 months. Afterwards, I began my collaboration with Prof. Giuseppina Gini in the Artificial Intelligence and Robotics Laboratory at the Department of Electronic and Informatics, DEI, Politecnico di Milano. There I developed an artificial humanoid hand (project "Blackfingers") which I have presented in the first IEEE-RAS International Conference on Humanoid Robots in Boston, in September 2000. Since 2001 I have been involved in many teaching and scientific activities within the Informatics and Electronic Department at Politecnico di Milano (Italy). Working on my PhD thesis (Advisor Prof. Gini Giuseppina, Tutor Prof. Marco Colombetti), my aim was the design and control of an anthropomorphic artificial arm with application in the field of Humanoid Robotics. Meanwhile I was involved in different national and international projects (with various Universities and Companies) related with robotics and artificial intelligence. In 2005 I started a private collaboration with the Fachhochschule Frankfurt University of Applied Sciences, with the goal to design and supply a humanoid Gesture Robot, which continued two years and finished with the delivery of a two light humanoid arms with 16DOF each. Since 2007, I am working as a project leader and senior researcher at DFKI (Deutsches Forschungszentrum fuer Kuenstliche Intelligenz GmbH, Robotics Innovation Center) on an innovative, intrinsically safe, wearable, multipurpose artificial-exoskeleton intended for tele-robotics applications.

#### AREAS OF RESEARCH

**Humanoid Robotics:** Study and development of anthropomorphic manipulation and locomotion systems intended for humanoid robotics applications.

**Bioinspired Control Systems:** Synthesis of combined classical and bio-inspired adaptive control strategies to enhance the behavior of complex robotic systems.

**Haptic Interfaces:** Design and control of haptic interfaces capable to evoke touch and force feedbacks during the interaction with a synthetic or a real environment (e.g. a tele-operated robot).

#### PAST RESEARCH PROJECTS

The main researches I have conducted so far are as follows:

**Research title:** Study of an anthropomorphic artificial arm for application in Humanoid Robotics.

**Abstract:** The main goal of this research was the development of a human-like artificial arm for application in the field of humanoid robotics. Because of its multidisciplinary nature, the research focused on many tasks. A kinematic and dynamic model of the arm was formalized. A neurally-inspired control, emulating the spinal cords circuits, was implemented and tested on the model. The efficacy of a reflex module, in controlling the single joint position and stiffness was validated on the robot, and results compared with those of a human limb. The inverse kinematic was implemented using a neural network and the module was integrated with a high level control system based on the actual knowledge of the human cerebellum and motor cortex. A real robotics arm was also designed and developed, and the basic control strategies tested in real time. In comparison with analogous systems, the artificial arm presents a

novel three degrees of freedom shoulder-joint and one degree of freedom elbow-joint actuated by seven coupled artificial muscles.

**Research Title:** Development and Experimentation of an Haptic Interface to stimulate and measure somatic-sensory quantities.

**Abstract:** This work focused on the study and experimentation of an haptic interface able to generate tactile and force stimuli. A glove equipped with a force sensor and an electro-tactile stimulator was used to allow the interaction of the user with a virtual object. Electrodes and actuators were activated according to the information coming from the real world (position and force of the user's finger) and from a physical model of the object. Via psychophysical experiments conducted on several users it was demonstrated that the superposition of different kinds of feedbacks (force, visual, tactile) allows a more realistic interaction with the virtual world.

**Research Title:** Virtual Immersion for holistic feedback control of semi-autonomous robots.

**Abstract:** The project VI-Bot takes into account and evolves the current state of the art of haptic interfaces both from the hardware and software point of view. The haptic device, namely the Exoskeleton and its control system, thus allows a complex interaction with the user, who is enabled to perform a teleoperation task with a target robotic system. The Exoskeleton is designed on the base of the human arm anatomy. The device is thought to be wearable, lightweight, and adaptable to different user sizes. Its kinematic structure is configured to constrain the movements of the user as less as possible, while offering a high level of comfort within the overall arm workspace. The control strategy, based on a combination of classical and bio-inspired techniques, allows a better harmonization with the human arm's nervous system and additionally implements different safety mechanisms. The development of a general position-force mapping algorithm provides intuitive and effective teleoperation of any complex robotic system of any given morphology.

## RESEARCH GOALS

**Short term goals:** My actual research is focused on formalizing and implementing real time adaptive models intended to enhance the control system of time-variant, nonlinear dynamic systems. More specifically the target is a low pressure hydraulic actuator intended for wearable exoskeletons. The studied block-oriented models have a Wiener-Hammerstein architecture, and integrate a linear static part based on a Auto Regressive eXogenous system (ARX), and a memoryless nonlinear part based on a multi-layers B-spline Neural Networks (BSNN). The adaptation relies on error-driven local adaptation mechanisms for the BSNN part, and a recursive least square algorithm for the ARX part. This particular combination showed better performances compared with Wiener-Hammerstein models having as static part a polynomials or a fuzzy-logic function. Furthermore, the learning step of the BSNN requires lower computational resources in comparison with the widely used least squared method and it is therefore more suitable for real time applications. The main problematics, that arise when integrating such adaptive models into real time control systems, are related with finding good stability and adaptation-stop criteria. Future effort will be dedicated to integrate an adaptive gain in the learning mechanism of the BSNN.

A second line of research I am dealing with is strongly related with the field of computational neuroscience. The main idea here is to use the knowledge on the nervous system of a biological organism (e.g. functional model of the human peripheral nervous system) to synthesize the low-level control strategy of a robot resembling part of its functionalities. In particular I am applying this methodology to control the forearm joint of a wearable arm exoskeleton intended for tele-robotics applications. The implemented controller is based on the architecture of specific neural circuits located in the human spinal cords and responsible to implement reflexes (e.g myotatic, inverse-myotatic) and regulate/coordinate the articulations and muscles of the limb. The controller allows further to directly integrate biosignals (e.g EEG, EMG, temperature, interaction force, etc.) in order to modulate its behavior and to better harmonize with the human nervous system. This paradigm is of particular importance for robotics systems that need to work in strict contact with the human body. Further research effort will be dedicated to furnish

the controller with an adaptation mechanism that will tailor the interface behavior on the basis of the operator's neuro-functional characteristics.

**Long term goals:** My long term research activity and vision is oriented toward the study and the development of a full-size, low-cost, humanoid robot with motor and manipulation capabilities comparable with those of a human being. The approach I will follow in defining the robot architecture differs in many ways from the approach used so far to design most of the state-of-the-art robotics systems. Generally, today industrial and humanoid robots, are intended to perform tasks with high precision and repeatability. Due to this, their mechanical structure is often rigid and the actuation system does not allow a precise impedance modulation. On the contrary, I want to pursue other features that I consider more critical for a humanoid robot, namely adaptability, automatic failure recovery and safe operability in human environments. This will be achieved by using state-of-the-art materials and design processes, innovative actuation and sensory systems, and organizing the inevitable high complex control system in a modular and hierarchical fashion. In particular at the bottom level a set of modules will emulate the behavior of the principal motor-circuits present in the human spinal cords. They will implement different types of reflexes and coordinate the robot actuator's in a human like fashion. In the higher level of the control architecture, other modules will compute the robot inverse kinematics, identify the robot dynamics, and implement the robot learning and cognitive capabilities. These circuits will be mainly based on recurrent dynamical neural networks (RNN). These classes of artificial neural networks were proved to be computationally more powerful than other adaptive models such as feed-forward neural network, hidden Markov models and support vector machine. Indeed they allow to represent continuous internal states. RNN can converge to the optimal solution more quickly than other models; more importantly, due to their dynamical properties they can operate on-line, in real time, and in an unsupervised manner. Most of the movement primitives of the robot cannot be evaluated on the basis of a single point in time, but need to be represented through multiple states. RNN together with a mechanism of long and short term memory will be able to recognize temporal patterns, to generate stable cyclic patterns useful to coordinate movements, to extract information from the robot's sensory system and to recognize events separated in time. Due to the complexity and the ambitious nature of this project I will split it in different sub-tasks with separated sub-goals. The kinematic and dynamic models of the robot will be developed together with its mechanical design. This will allow to test its functionalities and the behavior of its control strategies in advance by simulation, boosting therefore the development phase of the real system.

#### TEACHING INTERESTS AND CAPABILITIES

I have 10 years experience in teaching basic and advanced classes in Robotics, Artificial Intelligence and Fundamentals of Informatics. I have supervised more than 30 M.S. and B.S theses and guided several robotics projects at the Artificial Intelligence and Robotics Laboratory (AIRLAB) in Politecnico di Milano. I am highly capable of motivating students and involve them in the field of study.

My expertise covers the following topics:

**Basic Robotics:** Robotics History, Basics of Linear Algebra, Homogeneous Coordinates, Direct/Inverse Kinematics, Trajectories Planning (Cartesian space, joint space), Sensors and Actuators for Robotics, Manipulators Static/Dynamic Models, Manipulators Control, Mobile Robots Architectures (wheels, legs), Control of Mobile Robots, Fundamentals of Stereo-Vision.

**Advanced Robotics:** Introduction to Humanoid Robotics, Design and Control of Anthropomorphic Arms, Design of Locomotion Systems based on Legs, BioInspired Control Strategies for Mobile Robots, Control Systems based on Neural Networks.

**Fundamentals of Informatics:** Introduction and History of Informatics, Calculator Architecture, Algorithms, Information Representation, Introduction to Operative System functions. Program Language (C): Data types (numbers, characters, strings, vectors, structures, pointers), Conditions, Cycles, Standard

C libraries, Functions, Data Structures (lists, trees ..), Files.

All of these topics are covered by proper didactic material (e.g. slides, references, movies, programs) already prepared for lectures I have given in the past. Further details and the original slides presented during the lessons are available in the **Teach** section of my personal website <http://www.robocys.com/indice.html>.

#### THEORETICAL AND TECHNICAL KNOWLEDGE

During my studies and working experiences, I have developed a technical and scientific curriculum in Electronics, Electrical Engineering and Computer Science. Following the Italian system, I have acquired theoretical knowledge in mathematics, physics, electronics, computer science, and telecommunications. Furthermore, I have also developed a strong experience in experimental devices, robotics and automation systems. More specifically I have practiced in the following topics:

**Programming languages:** C, C++, Java, Basic, Pascal, HTML, VRLM; assembler for PIC micro-processor, PLC language. **Operating systems:** Dos, Windows, Unix. **Mathematical and Simulation Environments:** Matlab, Simulink, Solid Edge, 3D Studio MAX, Autocad, Spice, ADAMS, Maxima. **Telecommunications:** PLL, modem, AM, FM, PWM, PCM, QPSK, local area networks. **Digital electronics:** circuit electronic design, microprocessor systems, ADC, DAC, flip-flop, serial/parallel interfaces, DSP Microcontrollers. **Analogical electronics:** Power Amplifiers, Filters. **Robotics:** usage and programming CRS (A460), ABB (IRB 1400), and SANKYO (scara) robots, laboratory experience with sensors and vision systems. **Sensors:** developing of different sensor prototypes to measure force and position. **Actuators:** developing of a new prototype of Mc. Kibben pneumatic actuator, and a mini-actuators using shape memory alloy and electro-polymers. Development of low pressure hydraulic actuators for humanoid haptic interfaces and humanoid robotics. **Automation:** PID design, PLC, DC motor control, brushless motor, stepper motors control, servo valve control.

#### ADVANCED COURSES ATTENDED

##### Advanced Lectures:

1. Discrete Mathematics: Politecnico di Milano DEI, Prof. Somalvico, Prof.ssa Zagaglia, from 17/9/2001 to 5/11/2001, 20 hours.
2. Introduction to predicative and modal logic: Politecnico di Milano DEI, Prof.ssa Cherubini, from 2/10/2001 to 23/10/2001, 20 hours
3. Logic Models for Informatics applications: Politecnico di Milano DEI, Prof. Bonarini, Prof. Morzenti from 6/11/2001 to 18/12/2001, 20 hours.
4. Research Management: Politecnico di Milano, Doctoral School, 10 hours.
5. Seminars on Research Politics: Politecnico di Milano, Doctoral School, 10 hours.
6. Humanoid Robotics: Politecnico di Milano DEI, Prof.ssa Giuseppina Gini, from 17/05/2002 to 14/06/2002, 20 hours.
7. Soft Computing Theories and Techniques: Politecnico di Milano DEI, Prof. Andrea Bonarini, from 1/07/2002 to 10/07/2002, 20 hours.
8. Logic Models for Multi-agent Systems: Politecnico di Milano DEI, Prof. Marco Colombetti, from 4/03/2002 to 15/03/2002, 20 hours.
9. Application of Information Technologies for Communication with disabled People: Prof. Gesualdo Le Moli, from 18/03/2002 to 3/06/2002, 20 hours.

##### Specialized and Advanced Schools:

1. Summer School in Informatics Engineering 2000, Università degli studi di Padova, Dipartimento di Elettronica ed Informatica, Bressanone, from 17/07/2000 to 21/07/2000, 40 hours.
2. EURON Summer School on Robotics and Biologically-Inspired Manipulation: Benicassim, Spagna from 10 to 14 September 2001, 35 hours.
3. Neuro-Engineering Workshop and advanced School: Università di Genova, from 10/06/2002 to 13/06/2002, 40 hours.
4. Advanced Course on Robotics: Università di Verona, from 17/07/2003 to 19/07/2003, 24 hours.
5. Dynamical Systems, Wave Based Computational and Neuro Inspired Robots: CISM Udine, from 22/09/2003 to 26/09/2003, 40 hours.

#### **International University Classes:**

1. Neural Network I: Portland State University, USA, Prof. George Lendaris, from 25/09/2002 to 10/12/2002, 60 hours.
2. Neurophysiology: Portland State University, USA, Prof. Randy Zelick, from 25/09/2002 to 10/12/2002, 60 hours.

#### **GUEST IN INTERNATIONAL RESEARCH CENTERS AND UNIVERSITY**

**Place:** Portland State University, Oregon, USA.

**Period** from 20/09/2002 to 15/12/2002.

**Achievements:** I have spent a research and study period of three months in the "Intelligent Robotic Laboratory" at Portland State University, as a guest researcher. I have cooperated with Prof. Marek A. Perkowski at the development of an artificial hand. I met with different researchers involved in the field of biorobotics, e.g. Prof. Blake Hannaford director of the Biorobotics Laboratory at University of Washington in Seattle. I also had the opportunity to take two classes intended for graduate students (i.e. Neural Network I and Neurophysiology), and to hold different seminars on my research area.

#### **SEMINARS AS A SPEAKER**

1. *Blackfingers Sviluppo di una mano artificiale per Robot Umanoidi*, Seminar organized by ENEA-MURST, Sirio Project, 2001.
2. "Develop of an Electro-tactile and Force Stimulator Interface for application in Virtual Reality" 12/09/2002 at DEI, Politecnico di Milano.
3. *Blackfingers, hand development for humanoid robots* 10/10/2002 at Electrical and Computer Engineering, Portland State University.
4. *Human-Like Reflex Control for an Artificial Hand* 22/11/2002 at the System Science Department, Portland State University.
5. *Blackfinger: una mano robotica, ispirata alla biologia* 20/01/2004 at Dipartimento di Scienze dell'Informazione, Università degli Studi di Milano
6. *MaximumOne: an Anthropomorphic Arm with a Bio-Inspired Control System*, 12/03/2007 at l'Istituto Dalle Molle di Studi sull'Intelligenza Artificiale (IDSIA), Lugano.
7. *MaximumOne: an Anthropomorphic Arm with a Bio-Inspired Control System*, DFKI-Lab Bremen, Germany 5/09/2007.
8. *BioInspired Robotic Systems Design and Control*, IYTE (Izmir Institute of Technology), Department of Computer Engineering 12-13/05/2010, Turkey.

## TEACHING ACTIVITIES

### Teaching Experiences as a contract Professor:

1. Contract Professor: Fundamentals in Informatics Class, Mechanical Engineering, First Semester, Academic Year. 2004/2005, Politecnico di Milano.
2. Contract Professor: Fundamentals in Informatics Class, Mechanical Engineering, First Semester Academic Year 2005/2006, Politecnico di Milano.
3. Contract Professor: Robotics Project Class, Informatics Engineering, First Semester Academic Year 2005/2006, Politecnico di Milano.
4. Contract Professor: Robotics Project Class, Informatics Engineering, Second Semester Academic Year 2006/2007, Politecnico di Milano.
5. Contract Professor: Robotics Project Class, Informatics Engineering, Second Semester Academic Year 2007/2008, Politecnico di Milano.

### Teaching Experiences as an Assistant Professor:

1. Teaching Assistant: Fundamentals in Informatics Class, Prof. Distante, Politecnico di Milano (Bo-visa), 16 hours, First Semester, 2001/2002.
2. Teaching Assistant: Java Lessons Class, Prof. Cugola, Politecnico di Milano, Corso di Laurea in Disegno Industriale, 16 hours, First Semester, 2001/2002.
3. Teaching Assistant: Robotics A, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 10 hours, First Semester, 2001/2002.
4. Teaching Assistant: Robotics A, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 5 hours, First Semester, 2002/2003.
5. Teaching Assistant: Robotics, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 20 hours, Second Semester, 2002/2003.
6. Teaching Assistant: Robotics A, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 30 hours, First Semester, 2003/2004
7. Teaching Assistant: Robotics, Prof. Caglioti, Politecnico di Milano, Sede Como, 10 hours, First Semester, 2004/2005.
8. Teaching Assistant: Robotics, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 20 hours, Second Semester, 2004/2005.
9. Teaching Assistant: Robotics 2, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 16 hours, Second Semester, 2004/2005.
10. Teaching Assistant: Robotics, Prof. Caglioti, Politecnico di Milano, Sede Como, 10 hours, First Semester, 2005/2006.
11. Teaching Assistant: Robotics Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 20 hours, Second Semester, 2005/2006.
12. Teaching Assistant: Robotics 2, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 16 hours, Second Semester, 2006/2007.
13. Teaching Assistant: Robotics Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 20 hours, Second Semester, 2005/2006.
14. Teaching Assistant: Robotics 2, Prof.ssa Gini, Politecnico di Milano, Campus Leonardo, 16 hours, Second Semester, 2005/2007.



15. Teaching Assistant: Robotics 4, Prof Frank Kirchner, Bremen University, 2 hours, Second Semester, 2008/2009.
16. Teaching Assistant: Robotics 4, Prof Frank Kirchner, Bremen University, 2 hours, Second Semester, 2009/2010.
17. Teaching Assistant: Robotics 4, Prof Frank Kirchner, Bremen University, 4 hours, Second Semester, 2010/2011
18. Teaching Assistant: Robotics 4, Prof Frank Kirchner, Bremen University, 4 hours, Second Semester, 2011/2012

## PUBLICATIONS

### International Journals:

- [1] S. Feyzabadi, S. Straube, M. Folgheraiter, E. Kirchner, S. Kim, and J. Albiez, "Human force discrimination during active arm motion for force feedback design," *IEEE Transactions on Haptic (Accepted)*, 2013.
- [2] G. Gini, M. Arveti, I. Somlai, and M. Folgheraiter, "Acquisition and analysis of emg signals to recognize multiple hand movements for prosthetic applications," *Applied Bionics and Biomechanics*, vol. 9, no. 2, pp. 145–155, 2012.
- [3] M. Folgheraiter, M. Jordan, S. Straube, A. Seeland, S. Kim, and E. Kirchner, "Measuring the improvement of the interaction comfort of a wearable exoskeleton," *International Journal of Social Robotics*, vol. 4, no. 3, pp. 285–302, 2012.
- [4] M. Folgheraiter, J. de Gea, B. Bongardt, J. Albiez, and F. Kirchner, "Bio-inspired control of an arm exoskeleton joint with active-compliant actuation system," *Applied Bionics and Biomechanics*, vol. 6, no. 2, pp. 193–204, Jun. 2009.
- [5] G. Gini, M. Folgheraiter, and U. Scarfogliero, "New joint design to create a more natural and efficient biped," *Applied Bionics and Biomechanics*, vol. 6, no. 1, pp. 27–42, Mar. 2009.
- [6] M. Folgheraiter, G. C. Gini, and D. L. Vercesi, "A multi-modal haptic interface for virtual reality and robotics," *Journal of Intelligent and Robotic Systems*, vol. 52, no. 3-4, pp. 465–488, 2008.
- [7] M. Folgheraiter, G. Gini, and D. Vercesi, "A new haptic device for applications in virtual reality and humanoid robotics," *Integrated Computer-Aided Engineering, IOS press*, vol. 13, no. 3, pp. 249–262, 2006, iSSN: 1069-2509/06.
- [8] M. Folgheraiter and G. Gini, "Human-like reflex control for an artificial hand," *BioSystem Journal*, vol. 76, no. 1-3, pp. 65–74, August 2004.

### National Journals:

- [9] G. Gini, M. Folgheraiter, M. Mulas, and U. Scarfogliero, "Rehabilitation robotics, disability and advanced research at the politecnico di milano," *Journal of the Politecnico di Milano*, no. 10, pp. 84–87, 2006, national Journal.
- [10] M. Folgheraiter, "Robotica umanoide," *AEI Journal*, vol. 89, 2002.

### Books Chapters:

- [11] M. Folgheraiter, M. Jordan, L. M. V. Benitez, F. Grimminger, S. Schmidt, J. Albiez, and F. Kirchner, *Development of a Low-Pressure Fluidic Servo-valve for Wearable Haptic Interfaces and Lightweight Robotic Systems*, ser. Lecture Notes in Electrical Engineering. Springer, 2011, vol. 89, iSSN: 978-3-642-19538-9.

- [12] M. Folgheraiter, U. Scarfogliero, G. C. Gini, and F. Moro, *Humanoid Robots: A Biologically Founded Design and Control of a Humanoid Biped*, B. Choi, Ed., January 2009, ISBN: 978-953-7619-44-2.
- [13] M. Folgheraiter and G. Gini, *Biomimetic Neural Learning for Intelligent Robots, Chapter Title: MaximumOne: An Anthropomorphic Arm with Bio-inspired Control System*, G. P. M. E. Stefan Wermter, Ed. Springer, Heidelberg, July 2005, ISBN: 3-540-27440-5.
- [14] U. Scarfogliero, M. Folgheraiter, and G. Gini, *Biomimetic Neural Learning for Intelligent Robots, Chapter Title: LARP, Biped Robot Conceived as Human Modelling*, G. P. M. E. Stefan Wermter, Ed. Springer, Heidelberg, July 2005, ISBN: 3-540-27440-5.
- [15] M. Folgheraiter, I. Baragiola, and G. Gini, *LNCS, Knowledge Exploration in Life Science Informatics: Teaching Grasping to a Humanoid Hand as a Generalization of Human Grasping Data*, J. L. et al., Ed. Springer-Verlag Berlin Heidelberg, 2004, vol. 3303, INAI 3303.

#### Conferences:

- [16] M. Folgheraiter, M. Jordan, J. Albiez, and F. Kirchner, "A bio-inspired control system for a wearable human-machine interface," in *In International Conference on Adaptive Behaviour*, Odense, August, 2012.
- [17] M. Jordan, L. M. V. Benitez, S. Schmidt, M. Folgheraiter, and J. Albiez, "Model-based control and design of a low-pressure fluid actuation system for haptic devices," in *In Proceedings Actuator 2012*, Bremen, 2012, pp. 295–298.
- [18] M. Folgheraiter, "Dual-arm upper-body exoskeleton for telerobotics and rehabilitation," in *Robotica 2011, Humanoid and Service Robots*. Milano: Artenergy Publishing, November 16-19 2011.
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