Luigi Villani

Curriculum vitæ

Department of Electrical Engineering
and Information Technologies
University of Naples Federico II
via Claudio 21,80125 Napoli, Italy
✉ *luigi.villani@unina.it*
wpage.unina.it/lvillani

Biosketch

Luigi Villani was born on December 1966. He is Full Professor of Automatic Control at the University of Naples Federico II, where he graduated in Electronic Engineering in 1992 and received the Research Doctorate degree in Electrical Engineering and Computer Science in 1996. In 1995 he was visiting scientist at the Laboratoire d'Automatique de Grenoble, Institut National Polytechnique de Grenoble, France, with a grant of the European research network ERNET. In 2000, he became eligible for the position of Associate Professor and in 2005 he received the attestation of scientific merit for the position of Full Professor conferred by CIRA–Italian Inter-University Centre of Research in Automatic Control. He is currently a member of the Scientific Council of the Interdepartmental Center for Advances in Robotic Surgery of the University of Naples Federico II and of the Programme Committee of the Research Doctorate on Molecular Oncology, Experimental Immunology and Development of Innovative Therapeutics of the University Magna Græcia of Catanzaro. Since 1999, he mostly teaches courses of Dynamic Systems and Automatic Control for the 1st level *Laurea* and 2nd level *Laurea magistrale* degrees in Automation Engineering, Electical Engineering, Computer Engineering, Telecommunications Engineering, and Management Engineering, with an average of 15 CFU/ECTS per academic year. Luigi Villani is co-author of the textbook (in Italian) *Fondamenti di Sistemi Dinamici*, McGraw-Hill, 2003, and of the textbook *Robotics – Modelling, Planning and Control*, Springer, 2009, translated in Italian (2008), Greek (2014) and Chinese (2015). He is Senior Member IEEE. He was Associate editor of IEEE Transactions on Control Systems Technology from 2005 to 2011, Associate editor of IEEE Transactions on Robotics from 2007 to 2011, Associate editor of the Conference Editorial Board of IEEE Control System Society from 2000 to 2010, as well as Program Committee member of various international conferences with peer-reviewed papers. Since June 2015 he is Associate Editor of IEEE Robotics and Automation Letters. He is one of the founders of PRISMA Lab. His research mostly focuses on the control of robotic systems, and includes theoretical, technological and experimental contributions published in internationally renowned conference proceedings and journals. A major research topic is the force control of robot manipulators, on which he has published numerous articles in journals with high impact factor, a well cited monograph –B. Siciliano, L. Villani, *Robot Force Control*, Kluwer Academic Publishers, 1999– as well as contributions to *Springer Handbook of Robotics* (2008), which received the AAP PROSE Award for Excellence in the categories Physical Sciences & Mathematics and Engineering & Technology, and to *Springer Encyclopedia of Systems and Control* (2014). Other themes of research are control based on artificial vision, manipulation with robotic hands, and fault detection of mechatronic systems, on which, in addition to scientific publications, he has participated in various funded research projects (PRIN, FP6, FP7, ASI, CNR, POR Campania). He is also interested to surgical robotics and to the control for safe physical interaction between humans and robots. This latter was the theme of the two-year project PRIN 2009 ROCOCÒ, and of the four-year large scale integrating project FP7 SAPHARI, led as local principal investigator. Some of the research achievements were the subject of technology transfer through partnerships with Italian companies such as Comau Robotics, the leading Italian industrial robotics company, and Danieli Automation, a leading company in the field of process control and automation in the production of steel.

Positions

Dec. 2016 **Full Professor**, *ING-INF/04 - Automatica*, University of Naples Federico II.
Nov. 2002 **Associate Professor**, *ING-INF/04 - Automatica*, University of Naples Federico II.
Nov. 1999 **Researcher**, *ING-INF/04 - Automatica*, University of Naples Federico II.

Qualifications

Oct. 2014 **Full Professor**, *09/G1 - Automatica*, National Scientific Qualification.
Procedure 2013

Jan. 2014 **Full Professor**, *09/G1 - Automatica*, National Scientific Qualification.
Procedure 2012

Dec. 2005 **Full Professor**, *ING-INF/04 - Automatica*, Attestation of Scientific Merit.
Conferred by the Committee for Scientific Merit of CIRA–Italian Inter-University Centre of Research in Automatic Control

Sep. 2000 **Associate Professor**, *ING-INF/04 - Automatica*, Eligible for the position of Associate Professor.
Public selection procedure, University of Verona

Nov. 1992 **Professional engineering certificate**.

Education

Nov. 1996 **Research Doctorate**, *Electronic and Computer Engineering*, University of Naples Federico II.
Curriculum in Automatic Control, Systems Engineering and Robotics

Apr. 1992 **Laurea**, *Electronic Engineering*, University of Naples Federico II, magna cum laude.
Curriculum in Control and Systems Engineering

Other employments

Sep. 1997–Aug. 1998 **Post-Doctorate**, University of Naples Federico II.
Research grant

Jun. 1995–Nov. 1995 **Visiting scientist**, *Laboratoire d'Automatique de Grenoble*, Institut National Politechnique de Grenoble, France.
funded by ERNET–European Robotics NETwork, funded by the Human Capital and Mobility Programme of the European Commission

Academic committees

Local

2016–pres. **Member**, *Scientific Council*, Interdepartmental Center for Advances in Robotic Surgery, University of Naples Federico II.

2013–2015 **Member**, *Executive Board*, Department of Electrical Engineering and Information Technologies, University of Naples Federico II.

Oct. 2015 **Member**, *Admission Committee*, Research Doctorate in Information Technology and Electrical Engineering, University of Naples Federico II.

2001–2014 **Member**, *Doctoral Programme Committee*, Computer and Systems Engineering, University of Naples Federico II.

Apr. 2013 **Member**, *Admission Committee*, Research Doctorate in Computer and Systems Engineering, University of Naples Federico II.

2007–2008 **President**, *Professional Engineering Qualification Committee*, Information and Communications Technology, University of Naples Federico II.

Dec. 2008 **Member**, *Admission Committee*, Research Doctorate in Computer and Systems Engineering, University of Naples Federico II.

Dec. 2003 **Member**, *Admission Committee*, Research Doctorate in Computer and Systems Engineering, University of Naples Federico II.

National

Nov. 2015 **Reviewer**, *Doctoral Thesis on Computer Engineering*, Politecnico di Milano, Italy.
Matteo Ragaglia, *Towards a safe interaction between humans and industrial robots through perception, planning and control strategies*

2014–2015 **Member**, *Doctoral Programme Commitee*, Molecular Oncology, Experimental Immunology and Development of Innovative Therapeutics, University Magna Græcia of Catanzaro.

Nov. 2012 **Member**, *Admission Committee*, Research Doctorate in Electrical, Electronic, Telecommunications and Systems Engineering, University of Palermo.

Dec. 2012 **Member**, *Final Examination Committee*, Research Doctorate in Electronic Engineering, Second University of Naples.

Apr. 2010 **Member**, *Final Examination Committee*, Research Doctorate Degree in Information Engineering, University of Naples Parthenope.

Feb. 2009 **Member**, *Final Examination Committee*, Research Doctorate Degree in Biomedical Engineering, University Campus Bio-medico, Rome.

Oct. 2008 **Member**, *Committee for Promotion*, Researcher in Automatic Control, University Magna Græcia of Catanzaro.

Mar. 2007 **Member**, *Final Examination Committee*, Research Doctorate Degree in Environmental Engineering, University of Basilicata, Potenza.

International

Oct. 2015 **Faculty opponent**, *Doctor of Philosophy Defense Examination Committee*, Lund University, Sweden.
Andreas Stolt, *Force Controlled Robotic Assembly without a Force Sensor*

Apr. 2013 **Advisor**, *Doctor of Philosophy Thesis Committee*, Isfahan University of Technology, Isfahan, Iran.
Hamid Sadeghian, *Multi-Priority Control in Redundant Robotic Systems: An Application to Physical Human-Robot Interaction*

Dec. 2006 **Rapporteur**, *Doctoral Thesis Defense Examination Committee*, University of Rennes I, France.
Nicolas Mansard, *Enchainement de Taches Robotiques*

Feb. 2006 **External reviewer**, *European Doctor Thesis Committee*, Universidad de Jaen, Spain.
Javier Gamez Garcia, *Sensor Fusion of Force and Acceleration for Compliant Robot Motion Control*

Courses taught

Academic courses

1999–2017 System Dynamics (6 and 9 CFU/ECTS), Automatic Control (6 and 9 CFU/ECTS), Industrial Automation and Process Control (6 and 9 CFU/ECTS) for the *Laurea*, *Laurea Specialistica/Magistrale* and 1st Level *Laurea* in Automation Engineering, Computer Engineering, Electric Engineering, Electronic Engineering, Management Engineering, Mechanical Engineering, Telecommunications Engineering of the University of Naples Federico II (288 CFU/ECTS in total).

2011–2012 Field and Service Robotics (5 CFU/ECTS) for the *2nd Level Master* in Robotics and Intelligent Systems of the University of Naples Federico II.

1996–1997 Control Systems Technology (6 equivalent CFU/ECTS) and Automatic Control (6 equivalent CFU/ECTS) for the *Diploma* in Computer and Control Systems Engineering of the University of Naples Federico II.

1995–1996 System Theory (6 equivalent CFU/ECTS) and Automatic Control (6 equivalent CFU/ECTS) for the *Diploma* in Electronic Engineering of the University of Salerno.

External courses (main)

Nov. 2007 Robotics, Technical Engineering Instruction, Danieli Automation, Buttrio (UD), Italy.

May 2005 Robot Programming, Fundamentals of Automatic Control, Master for Expert Industrial Researchers on Security of Roadway and Railway Infrastructures, Stopfire, Pozzuoli (NA), Italy.

Jul. 2004 Fundamentals of Automatic Control, Technical Engineering Instruction, Elasis, Pomigliano d'Arco (NA), Italy.

Nov. 2000 PLC and Industrial Automation, Technical Engineering Instruction, 3F Data System, Pozzuoli (NA), Italy.

Jul. 1998 Robotics, 2nd Master in Advanced Information and Communication Technology, International Institute for Higher Scientific Studies E.R. Caianiello, Vietri sul Mare (SA), Italy.

Authored textbooks

2009 B. Siciliano, L. Sciavicco, L. Villani, G. Oriolo, *Robotics - Modelling, Planning and Control*, pp. 1–632, London: Springer, ISBN: 9781846286421 with Solutions Manual and MATLAB toolbox, translated in Italian, Greek and Chinese.

2003 S. Chiaverini, F. Caccavale, L. Villani, L. Sciavicco, *Fondamenti di Sistemi Dinamici*, pp. 1–410, Milano: McGraw-Hill, ISBN: 9788838607332.

Research projects

Scientific responsible

2014–2016 **STEPFAR**, *Sviluppo di Materiali e Tecnologie Ecocompatibili, di Processi di Foratura, taglio e di Assemblaggio Robotizzato*, PON R&C 2007–2013 (21 months), National Operative Program funded by MIUR–Italian Ministry of Education, University and Research.

2011–2015 **SAPHARI**, *Safe and Autonomous Physical Human-Aware Robot Interaction*, FP7-ICT-2011-7 (48 months), Large-scale Integrating Project funded by the European Commission under FP7–7th Framework Programme.

2011–2013 **ROCOCÒ**, *RObotica COoperativa e COllaborativa*, PRIN 2009 (24 months), National Interest Research Program funded by MIUR–Italian Ministry of Education, University and Research.

2008–2009 **CAWSYS**, *Software for warehouse control systems*, POR Campania 2000/2006 - 3.17 ICT (15 months), Regional Operative Program funded by Regione Campania.

2007–2009 **ROSED**, *Realization of an experimental setup for cooperative robotics based on ROSED*, ASI I/047/07/0 (21 months), research contract funded by ASI–Italian Space Agency.

2002–2005 **FAIROBOT**, *Web Learning for Human Resources Quality: Internet-based Continuous Learning for Industrial Robotic Systems Control*, SP/6 (36 months), co-financed by the Special Fund for Scientific Research Development of MIUR–Italian Ministry of Education, University and Research.

2002–2004 **ASI-Multirobot**, *HW/SW Architectures and Coordination/Control Algorithms for Multirobot Systems*, ASI I/R/107/02 (24 months), Fundamental Research Project funded by ASI–Italian Space Agency.

Key roles

2017–2020 **REFILLS**, *Robotics Enabling Fully-Integrated Logistics Lines for Supermarkets*, H2020-ICT-2016-1 (30 months), Research and Innovation Action funded by the European Commission under Horizon 2020.
Scientific responsible

2009–2013 **ECHORD**, *European Clearing House for Open Robotics Development*, FP7-ICT-2007-3 (48 months), Large-scale Integrating Project funded by the European Commission under FP7–7th Framework Programme.
Area editor for the evaluation of the proposals of experiments

2008–2012 **DEXMART**, *DEXterous and autonomous dual-arm/hand robotic manipulation with sMART sensory-motor skills: A bridge from natural to artificial cognition*, FP7-ICT-2007-1 (48 months), Large-scale Integrating Project funded by the European Commission under FP7–7th Framework Programme.
Team leader and work package leader

Participation

2017–2019 **RoMoLo**, *Modular Robots for Hospital Logistics*, Horizon 2020 PON I&C 2014–2020 (24 months), National Operative Program funded by MISE–Italian Ministry of Economic Development.

2013–2018 **RoDyMan**, *Robotic Dynamic Manipulation*, Advanced Grant funded by the ERC–European Research Council.

2014–2017 **EuRoC**, *European Robotics Challenges*, Large-scale Integrating Project funded by the European Commission under FP7–7th Framework Programme.

2013–2017 **SHERPA**, *Smart collaboration between Humans and ground-aErial Robots for improving activities in Alpine environments*, Large-scale Integrating Project funded by the European Commission under FP7–7th Framework Programme.

2013–2017 **RockEU**, *Robotics Coordination Action for Europe*, Coordination and Support Action funded by the European Commission under FP7–7th Framework Programme.

2011–2015 **ARCAS**, *Aerial Robotics Cooperative Assembly System*, Large-scale Integrating Project funded by the European Commission under FP7–7th Framework Programme.

2010–2013 **euRobotics**, *European Robotics Coordination Action*, Coordination and Support Action funded by the European Commission under FP7–7th Framework Programme.

2010–2013 **AIRobots**, *Innovative Aerial Service Robots for Remote Inspections by Contact*, Specific Targeted Research Project funded by the European Commission under FP7–7th Framework Programme.

2008–2010 **SICURA**, *Safe Physical Interaction between Robots and Humans*, PRIN 2007, National Research Project funded by MIUR–Ministry of Education, University and Research.

2006–2009 **PHRIENDS**, *Physical Human-Robot Interaction: DepENDability and Safety*, Specific Targeted Research Project funded by the European Commission under FP6–6th Framework Programme.

2008 **SUPER**, *Space Unmanned Planetary Exploration Rover*, Space Technology Research Project funded by ASI–Italian Space Agency.

2004–2008 **EURON 2**, *European Robotics Research Network*, Network of Excellence funded by the European Commission under FP6–6th Framework Programme.

2005–2007 **ETHICBOTS**, *Emerging Technoethics of Human Interaction with Communication, Bionic, and Robotic Systems*, Coordination Action funded by the European Commission under FP6–6th Framework Programme.

2005–2007 **L5-Anticipation**, *An Architecture for Sensorimotor Coordination Based on Attention and Perceptive Anticipation*, Research Project L.R. 5/2002 funded by Regione Campania.

2006 **ROMANCE**, *RObotics for Moon AutomatioN and Cosmic Exploration*, Space Technology Research Project funded by ASI–Italian Space Agency.

2005–2006 **PHRIDOM**, *Physical Human-Robot Interaction in anthropic DOMains: safety and dependability*, Prospective Research Project funded by the Network of Excellence EURON 2 under FP6– 6th Framework Programme.

2002–2006 **ROBOGAT**, *A Fire Fighting and Permanent Environmental Monitoring Robotic System for Road and Railway Tunnels*, PON Ricerca 2000–2006 funded by MIUR–Ministry of Education, University and Research.

2004 **ASI-Servicing**, *Robotic Technologies for On-Orbit Servicing*, Space Technology Research Project funded by ASI–Italian Space Agency.

2003–2004 **MATRICS**, *Methodologies Applications and Technologies for Robot Interaction Cooperation and Supervision*, PRIN 2002, National Interest Research Program funded by MIUR–Ministry of Education, University and Research.

2000–2004 **EURON**, *European Robotics Research Network*, Network of Excellence funded by the European Commission under FP5–5th Framework Programme.

2002–2003 **PRIN-Mechatronics**, *Methods and innovative tools for the design of innovative mechatronic systems*, PRIN 2001, National Interest Research Program funded by MIUR–Ministry of Education, University and Research.

2001–2002 **MISTRAL**, *Methodologies and Integration of Subsystems and Technologies for Anthropic Robotics and Locomotion*, PRIN 2000, National Interest Research Program funded by MIUR–Ministry of Education, University and Research.

2000–2002 **ASI-Testbed**, *Development of a Testbed for Robotic Manipulation in Space Environment*, Fundamental Research Project funded by ASI–Italian Space Agency.

1999–2000 **RAMSETE**, *Articulated and Mobile Robotics for SErvice and TEchnology*, PRIN 1998, National Interest Research Program funded by MURST–Ministry of University, Scientific Research and Technology.

1994–1998 **ASI-Flexible**, *Modelling and Control of Space Flexible Manipulators*, Fundamental Research Project funded by ASI–Italian Space Agency.

1997 **CNR-Dexterity**, *Robotic Manipulation: Cooperation and Dexterity*, Coordinated Research Project funded by CNR–National Research Council.

1996–1997 **PNR-Robots**, *Control Systems for Robots Operating in Structured and Unstructured Environments*, PNR 1996, National Research Project funded by MURST–Ministry of University, Scientific Research and Technology.

1993–1996 **ERNET**, *European Robotics Network*, Human Capital and Mobility Programme funded by the European Commission under FP3–3rd Framework Programme.

Reviewer

2017 CONICYT - Chilean National Science and Technology Commission.

2011 FWO - Research Foundation Flanders.

Technology transfer (main)

2001–2010 **Consultant**, *CREATE consortium*, for COMAU Robotics, Beinasco (Torino), Italy.
Design and development of algorithms for dynamic identification, model-based control, trajectory planning, collision detection and compliant control of industrial robots

2006–2008 **Consultant**, *CREATE consortium*, for Danieli Automation, Buttrio (Udine), Italy.
Development and implementation of robotized processes in continuous casting moulds

Journal and conference service

Journal Editorial Board

2015–pres **Associate editor**, *IEEE Robotics and Automation Letters*.

2007–2011 **Associate editor**, *IEEE Transactions on Robotics*.

2005–2011 **Associate editor**, *IEEE Transactions on Control System Technology*.

2000 **Guest co-editor**, *Machine Intelligence and Robotic Control*, special issue on *Force Control of Advanced Robotic Systems*, vol. 2, no. 2, with prof. Urbano Nunes, University of Coimbra.

Conference Editorial Board

2000–2010 **Associate editor**, *IEEE Control Systems Society*, annual conferences IEEE Conference on Decision and Control and American Control Conference.

International Program Committee member

2015 IEEE International Conference on Robotics and Automation, Seattle, WA.

2014 IEEE International Conference on Robotics and Automation, Hong Kong, China.

2012 9th International Conference on Informatics in Control, Automation and Robotics, Rome, Italy.

12th Conference on Autonomous Robot Systems and Competitions, Guimaraes, Portugal.

2011 Robotics: Science and Systems Conference, Los Angeles, CA.

IEEE International Conference on Intelligent Robotics, Automations and Applications, Gwangju, Korea.

11th Conference on Autonomous Robot Systems and Competitions, Lisboa, Portugal.

8th Int. Conf. on Informatics in Control, Automation and Robotics, Noordwijkerhout, The Netherlands.

2010 Robotics: Science and Systems Conference, Zaragoza, Spain.
IEEE/RSJ International Conference on Intelligent Robots and Systems, Taipei, Taiwan.
10th Conference on Autonomous Robot Systems and Competitions, Leiria, Portugal.
2009 IEEE/RSJ International Conference on Intelligent Robots and Systems, St Louis, MO.
2008 Robotics: Science and Systems Conference, Zurich, Switzerland.
5th Int. Conf. on Informatics in Control, Automation and Robotics, Funchal, Portugal.
8th Conference on Autonomous Robot Systems and Competitions, Aveiro, Portugal.
2007 IEEE Int. Workshop on Safety, Security, and Rescue Robotics, Rome, Italy.
4th Int. Conf. on Informatics in Control, Automation and Robotics, Angers, France.
IEEE/ASME Advanced Intelligent Mechatronics, Zurich, Switzerland.
7th Conference on Autonomous Robot Systems and Competitions, Paderne, Portugal.
2006 IEEE Int. Workshop on Safety, Security, and Rescue Robotics, Washington DC.
12th IASTED International Conference on Robotics and Applications, Honolulu, Hawaii.
IEEE/RSJ International Conference on Intelligent Robots and Systems, Beijing, China.
8th IFAC Symposium on Robot Control, Bologna, Italy.
2005 IEEE International Workshop on Safety, Security, and Rescue Robotics, Kobe, Japan.
IEEE International Conference on Robotics and Automation, Barcelona, Spain.
2004 IASTED International Conference on Robotics and Applications, Honolulu, HI.
IEEE International Conference on Robotics and Automation, New Orleans, LA.
2003 IEEE/RSJ International Conference on Intelligent Robots and Systems, Las Vegas, NV.
IEEE International Symposium on Intelligent Control, Houston, TX.
8th International Symposium on Experimental Robotics, Sant'Angelo d'Ischia, Italy.
IEEE International Conference on Robotics and Automation, Taipei, Taiwan.
2000 IEEE International Conference on Robotics and Automation, San Francisco CA.

Reviewer

Reviewer for the main international conferences in robotics and control and for the journals:

Advanced Robotics; ASME Journal of Dynamic Systems, Measurement, and Control; Automatica; Autonomous Robots; Control Engineering Practice; Dynamics and Control; European Journal of Control; IASTED International Journal of Robotics and Automation IEE Proceedings - Control Theory and Applications; IEEE Control Systems Magazine; IEEE Robotics and Automation Magazine; IEEE Transactions on Automatic Control; IEEE Transactions on Control Systems Technology; IEEE Transactions on Industrial Electronics; IEEE Transactions on Robotics and Automation; IEEE Transactions on Robotics; IEEE Transactions on Systems, Man and Cybernetics; IEEE/ASME Transactions on Mechatronics; International Journal of Humanoid Robotics; International Journal of Non-Linear Mechanics; International Journal of Robotics Research; International Journal of Robust and Nonlinear Control; Iranian Journal of Control; Journal of Intelligent & Robotic Systems; Journal of Robotic Systems; Journal of Robotics and Computer Integrated Manufacturing; Machine Intelligence and Robotic Control; Mechatronics; Robotica; Robotics and Autonomous Systems.

Organizing Committees

Conferences

2017 **Workshops/Tutorials co-chair**, *IEEE International Conference on Robotics and Automation*, Marina Bay Sands, Singapore.

Workshops

Oct. 2002 **Co-organizer**, *Workshop on Fault Diagnosis and Fault Tolerance for Dynamic Systems*, at IEEE International Symposium on Intelligent Control, Vancouver, Canada.

PhD schools

Jul. 2010 **Co-organizer**, *Annual National PhD School of SIDRA–Italian Society of Automatic Control*, topic: Robotics, duration: 1 week - full day, Bertinoro (FC), Italy.

Jul. 2003 **Co-organizer**, *Annual National PhD School of CIRA–Italian Inter-University Centre of Research in Automatic Control*, topic: Visual Servoing, duration: half day, Bertinoro (FC), Italy.

Honours

Sep. 2015 Co-author, with F. Ruggiero (recipient), V. Lippiello and B. Siciliano of the paper "Visual Grasp Planning for Unknown Objects Using a Multifingered Robotic Hand", published in *IEEE/ASME Transactions on Mechatronics* in June 2013, awarded with the *2015 IEEE RAS Italian Chapter Young Author Best Paper Award*.

Feb. 2009 Co-author, with J. De Schutter (University of Leuven, Belgium), of the chapter "Force Control" of the Springer Handbook of Robotics that received the *AAP PROSE Awards for Excellence in the categories: Physical Sciences & Mathematics, and Engineering & Technology*.

Nov. 2003 Senior Member IEEE

Invited talks

Conferences & Workshops

Jun. 2012 **Introductory speaker**, *Null-space impedance control for physical human-robot interaction*, 9th CISM-IFToMM Symposium on Robot Design, Dynamics, and Control, Paris, France.

Oct. 2011 *Grasping and control of multifingered hands*, 11th IEEE-RAS International Conference on Humanoid Robots, workshop The DEXMART project for advanced bimanual manipulation, Bled, Slovenia.

Jun. 2009 **Plenary speaker**, *Human-aware interaction control of robot manipulators based on force and vision*, 7th Workshop on Robot Motion and Control, Czerniejewo, Poland.

PhD schools

Jul. 2015 *Control of Physical Robot Interaction*, Annual National PhD School of SIDRA–Italian Society of Automatic Control, Bertinoro (FC), Italy.

Feb. 2015 *Impedance control of redundant manipulators for human-robot co-manipulation*, NMMI Winter School closing workshop, DIAG, Sapienza Università di Roma, Italy.

Jul. 2010 *Robot Modelling and Control*, *Force Control*, *Visual Servoing*, Annual National PhD School of SIDRA–Italian Society of Automatic Control, Bertinoro (FC), Italy.

Jul. 2003 *Impedance Control*, *Introduction to Visual Servoing*, Annual National PhD School of CIRA–Italian Inter-University Centre of Research in Automatic Control, Bertinoro (FC), Italy.

Seminars in foreign institutions

Oct. 2015 *Control Tools for Safe Physical Human-Robot Interaction*, Lund University, Department of Automatic Control, Sweden.

Apr. 2013 *Safe Physical Human-Robot Interaction*, Jaotong University, Xi'an, China.

Mar. 2013 *Safe Physical Human-Robot Interaction*, Beijing Institute of Technology, Beijing, China.

Feb. 2006 *Robot interaction control using vision and force*, German Aerospace Center (DLR), Institute of Robotics and Mechatronics, Oberpfaffenhofen, Germany.

Oct. 2004 *An overview of research projects at PRISMA Lab*, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germamy.

Oct. 2000 *Robot force control*, University of Coimbra, Institute for Systems and Robotics, Coimbra, Portugal.

Jul. 1997 *Spatial impedance control*, University of California at Davis, Department of Electrical and Computer Engineering, Davis, CA.

Jul. 1995 *Robot force control with stiffness adaptation*, Laboratoire d'Automatique de Grenoble, Institut National Politechnique de Grenoble, Francia.

Research Doctorate students and Post-Doctorate researchers

Research Doctorate

2011–2014 **Advisor**, *Salvatore Iengo*, Human gesture recognition and robot attentional regulation for human-robot interaction.

2010–2013 **Advisor**, *Luigi Pelliccia*, HuPOSE: Human-like posture generation and biomechanical analysis for human figures.

2007–2010 **Advisor**, *Fanny Ficuciello*, Modelling and control for soft finger manipulation and human-robot interaction.

2001–2004 **Advisor**, *Vincenzo Lippiello*, Multi-object and multi-camera robotic visual servoing.

Visiting Research Doctorate

2012–2013 **Co-Advisor**, *Hamid Sadeghian*, Compliant control of redundant robots for safe human-robot physical interaction, visiting PhD student from Isfahan University of Technology, Iran.

Post-Doctorate

2012–2015 **Advisor**, *Maria Carla Staffa*, Architectures for human-robot interaction control and execution of collaborative tasks.

2012–2014 **Advisor**, *Fanny Ficuciello*, Interaction control strategies for robots with passive compliant joints and Variable Impedance Actuators.

2012–2013 **Advisor**, *Francesca Cordella*, Control of physical human-robot interaction.

Publications

[1] G. A. Fontanelli, L. R. Buonocore, F. Ficuciello, L. Villani, and B. Siciliano, "A novel force sensing integrated into the trocar for minimally invasive robotic surgery", in *Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems*, Vancouver, CA, 2017.

[2] G. Fontanelli, F. Ficuciello, L. Villani, and B. Siciliano, "Modelling and identification of the Da Vinci Research Kit robotic arms", in *Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems*, Vancouver, CA, 2017.

[3] A. Petit, F. Ficuciello, G. Fontanelli, L. Villani, and B. Siciliano, "Using physical modeling and RGB-D registration for contact force sensing on deformable objects", in *Proc. of the 14th International Conference on Informatics in Control, Automation and Robotics*, vol. 2, pp. 24–33, Setúbal, Portugal: ScitePress, 2017. DOI: 10.5220/0006415900240033.

[4] A. Cirillo, F. Ficuciello, C. Natale, S. Pirozzi, and L. Villani, "A conformable force/tactile skin for physical human–robot interaction", *IEEE Robotics and Automation Letters*, vol. 1, no. 1, pp. 41–48, Piscataway, NJ: IEEE, 2016. DOI: 10.1109/LRA.2015.2505061.

[5] A. Cirillo, F. Ficuciello, C. Natale, S. Pirozzi, and L. Villani, "A conformable force/tactile skin for physical human–robot interaction", in *IEEE International Conference on Robotics and Automation*, Stockholm, SE, 16–21 May 2016.

[6] F. Fazioli, F. Ficuciello, G. Fontanelli, B. Siciliano, and L. Villani, "Implementation of a soft-rigid collision detection algorithm in an open-source engine for surgical realistic simulation", in *Proc. of IEEE International Conference on Robotics and Biomimetics*, pp. 2204–2208, Piscataway, NJ: IEEE, 2016. DOI: 10.1109/ROBIO.2016.7866657.

[7] F. Fazioli, F. Ficuciello, A. Fontanelli, B. Siciliano, and L. Villani, "Collision algorithm for a clamp grabbing deformable materials: Implementation in an open-source engine", in *Proc. of 9th International Workshop on Human–Friendly Robotics*, Genova, I: Istituto Italiano di Tecnologia, 29–30 September 2016, extended abstract.

[8] F. Fazioli, F. Ficuciello, A. Fontanelli, B. Siciliano, and L. Villani, "Implementation of a soft-rigid collision algorithm in an open-source engine for surgery realistic simulation", in *Proc. of 6th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery*, Pisa, I: Scuola Superiore Sant'Anna, 12–14 September 2016, extended abstract.

[9] F. Ficuciello, L. Villani, and B. Siciliano, "Redundancy resolution in human-robot co-manipulation with Cartesian impedance control", in *Experimental Robotics – The 14th International Symposium on Experimental Robotics*, M. Ani Hsieh, O. Khatib, and V. Kumar, Eds., vol. STAR 109, pp. 165–176, Switzerland: Springer, 2016. DOI: 10.1007/978-3-319-23778-7_12.

[10] F. Ficuciello, L. Villani, and B. Siciliano, "Impedance control of redundant manipulators for safe human-robot collaboration", *Acta Polytechnica Hungarica*, vol. 13, no. 1, pp. 223–238, Budapest, HU: Óbuda University, 2016. DOI: 10.12700/APH.13.1.2016.1.15.

[11] F. Ficuciello, L. Villani, and B. Siciliano, "Variable impedance control of redundant manipulators for intuitive human-robot physical interaction", *IEEE Transactions on Robotics*, vol. 31, no. 4, pp. 850–863, Piscataway, NJ: IEEE, 2015. DOI: 10.1109/TRO.2015.2430053.

[12] F. Ficuciello, D. Zaccaria, B. Siciliano, and L. Villani, "Experimental test of synergies computed on the SCHUNK S5FH under–actuated hand", in *Proc. of 8th International Workshop on Human–Friendly Robotics*, Munich, D: Technische Universität München, 21–23 October 2015, extended abstract.

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