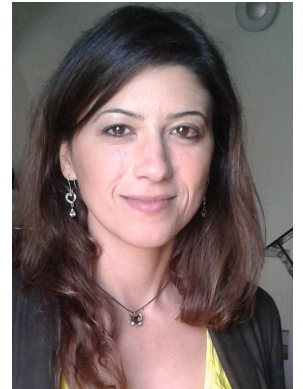


# Curriculum Vitae Fanny Ficuciello



## Personal information

Surname(s) / First name(s)	<b>Ficuciello Fanny</b>
Address(es)	Corso Vittorio Emanuele II, 96, 84014, Nocera Inferiore, Salerno, Italy
Telephone(s)	+39 08176 83916 (Work)      Mobile: +39 328 3296757
Nationality(-ies)	Italian
Date of birth	20 Ott 1974, Nocera Inferiore (SA)
Gender	F
Researcher unique identifier(s)	Scopus Author ID: 36801496500 orcid.org/0000-0001-9214-9977
Web site	<a href="http://wpage.unina.it/fanny.ficuciello">http://wpage.unina.it/fanny.ficuciello</a>
Skype	fficuciello

## Education and training

Dec 2010	Research Doctorate degree in Computer Science and Automation Engineering, XXIII cycle, University of Naples Federico II, Department of Computer and Systems Engineering (DIS). Ph.D. Thesis title: "Modelling and Control for Soft Finger Manipulation and Human-Robot Interaction". Thesis Supervisor: Prof. Luigi Villani.
Sep 2009-Mar 2010	Visiting scholar in the Control Engineering Group at the University of Twente (Netherlands) under the supervision of Prof. Stefano Stramigioli.
Sep 2007	Laurea degree magna cum laude in Mechanical Engineering at University of Naples Federico II. Thesis title: "Tecniche di controllo di robot leggeri con elasticità ai giunti per una interazione sicura uomo-robot". Supervisor: Prof. Bruno Siciliano.

## Actual Position

Assistant professor of Industrial Bioengineering at University of Naples and member of PRISMA (Projects of Industrial and Service Robotics, Mechatronics and Automation) team headed by Prof. Bruno Siciliano, and member of ICAROS center (Interdepartmental Center for Advances in Robotic Surgery) of the University of Naples Federico II.

## Past Positions

Oct 2016-Dic 2016	Agreement for scientific project executor assigned by C.R.E.A.T.E.(Consorzio di Ricerca per l'Energia e le Applicazioni Tecnologiche dell'Elettromagnetismo) for advisory activity on synergy-based control and learning strategies for dynamic non-prehensile manipulation within the project RoDyMan – RObotic Dynamic MANipulation (ERC-AdG-320992, 2013-2018 <a href="http://www.rodyman.eu">http://www.rodyman.eu</a> ).
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Oct 2014-Sep 2016	Research Associate (Post-doc) in the research unit of the Department of Electrical Engineering and Information Technology (DIETI), University of Naples Federico II, with a fellowship in "Sviluppo ed implementazione di tecniche di controllo per mani antropomorfe basate sulle sinergie e finalizzate alla manipolazione robotica" within the project RoDyMan – RObotic Dynamic MANipulation (ERC–AdG–320992, 2013–2018 <a href="http://www.rodyman.eu">http://www.rodyman.eu</a> ).
Jun 2014-Sep 2014	Agreement for scientific project executor assigned by C.R.E.A.T.E.(Consorzio di Ricerca per l'Energia e le Applicazioni Tecnologiche dell'Elettromagnetismo) for advisory activity on control of anthropomorphic robot hands within the project RoDyMan – RObotic Dynamic MANipulation (ERC–AdG–320992, 2013–2018 <a href="http://www.rodyman.eu">http://www.rodyman.eu</a> ).
Jun 2012-May 2014	Research Associate (Post-doc) in the research unit of the Department of Electrical Engineering and Information Technology (DIETI), University of Naples Federico II, with a fellowship in "Controllo della Interazione di robot con giunti elastici passivi e a impedenza variabile" within the International European project SAPHARI – Safe and Autonomous Physical and Human-Aware Robot Interaction (FP7–ICT–287513, 2011-2015, <a href="http://www.saphari.eu">www.saphari.eu</a> ).
Feb 2009-Dec 2012	Component of the research unit of the Department of Computer and Systems Engineering (DIS), University of Naples Federico II, with a fellowship in "Controllo di sistemi di manipolazione bimanuale" within the International European project DEXMART – DEXterous and autonomous dual-arm/hand robotic manipulation with sMART sensory-motor skills: A bridge from natural to artificial cognition (FP7–ICT–216239, 2008–2015, <a href="http://www.dexmart.eu">www.dexmart.eu</a> ).
Dec 2007-Sept 2009	Component of the research unit of the Department of Computer and Systems Engineering (DIS), University of Naples Federico II, with a fellowship in "Controllo dell'interazione tra uomo e robot" within the International European project PHRIENDS – PHRIDOM Physical Human Robot Interaction in anthropic DOMains: safety and dependability (FP6–STReP–IST–045359).

## Participation in National and International Projects

Component of the research unit of the Department of Electrical Engineering and Information Technology (DIETI), University of Naples Federico II, within the project RoDyMan – RObotic Dynamic MANipulation (ERC–AdG–320992, 2013–2018 <http://www.rodyman.eu>).

Component of the research unit of the Department of Electrical Engineering and Information Technology (DIETI), University of Naples Federico II, within the International European project SAPHARI – Safe and Autonomous Physical and Human-Aware Robot Interaction (FP7–ICT–287513, 2011-2015, [www.saphari.eu](http://www.saphari.eu)).

Component of the research unit of the Department of Computer and Systems Engineering (DIS), University of Naples Federico II, within the International European project DEXMART – DEXterous and autonomous dual-arm/hand robotic manipulation with sMART sensory-motor skills: A bridge from natural to artificial cognition (FP7–ICT–216239, 2008–2015, [www.dexmart.eu](http://www.dexmart.eu)).

Component of the research unit of the Department of Computer and Systems Engineering (DIS), University of Naples Federico II, within the International European project PHRIENDS – PHRIDOM Physical Human Robot Interaction in anthropic DOMains: safety and dependability (FP6–STReP–IST–045359).

## Principal Investigator and WP Leader in National and International Projects

Principal Investigator

*Junior Principal Investigator Grant under the Program STAR 2016 for the project **MUSHA – Multifunctional Smart HANDs**: new technological insight for mini-invasive surgical tools and artificial anthropomorphic hands (24 month) – Abstract: "MUSHA aims at creating future generations of bio-inspired tools and advanced bio-aware manipulation paradigms toward breakthrough mini-invasive surgical instruments and android robotic hands. Bio-inspired mechanical design will address the reduction of tools weight and dimension by limiting the number of actuators while preserving dexterity and manipulation capabilities. Fiber optic sensor will be suitably integrated to measure the contact forces exchanged with the environment and the temperature of the touched materials. Finally, an integrated framework merging vision and touch information in reasoning to carry out complex manipulation tasks will be developed. MUSHA arises from the need to replicate human manipulation capabilities in various fields where robotics can help to improve life. This includes unstructured environments in which a humanoid robot must replace the human being or parts of the body to address daily-life tasks, but also minimally invasive robotic surgery where the surgeon is unable to use hands to manipulate organs and tissues while feeling its anatomy, consistency and temperature. In both cases, the lack of knowledge on object or tissue textures, due to missing tactile and temperature information, entails a loss of performance in task execution as well as wrong decisions. Moreover, the study of smart correlation patterns between perception and action, inspired by the observation of humans, will enhance the performance of planning and control strategies."*

Responsible of Research Objective

*Responsible of the research objective "MRI-TRUS fusion algorithms and control strategies for robot-assisted biopsy" for the national project "Bioptic Advanced Robotic Technologies in OncoLOgy - B.A.R.T.O.LO".*

## Research Activities

Fanny Ficuciello research interests include: biomechanical design and bio-aware control strategies for anthropomorphic artificial hands, grasping and manipulation with hand/arm and dual hand/arm robotic systems, human-robot interaction control, variable impedance control and redundancy resolution strategies. Recently she is involved also on surgical robotics research projects, as a member of the ICAROS center (Interdepartmental Center for Advances in Robotic Surgery) of the University of Naples Federico II. During the research activity Fanny Ficuciello has developed planning and control strategies based on postural synergies and supervised learning and reinforcement learning techniques for anthropomorphic hands; impedance based control strategies for hand-arm and dual hand-arm systems and intentional-aware human-robot interaction. She has established several partnerships on the different research topics.

Major Scientific Collaboration

- 2017 Collaboration on "*Vision-based suturing needle tracking*" with Prof. Marilena Venditelli, Università la Sapienza, Roma. Related publications: [IC-23].
- 2017 Collaboration on "*learning-based adaptive control*" with PhD. Sylvain Calinon, Idiap Research Institute, Switzerland. Related publications: [IJ-10].
- 2017 Collaboration on "*learning and dimensionality reduction*" with PhD. Pietro Falco, Technical University of Munich, Germany. Related publications: [IJ-10].
- 2017 Collaboration on "*Learning and Attentional Supervision*" with Prof. Dongheui Lee, Human-centered Assistive Robotics group, Technical University of Munich, Germany. Related publications: [UR-21].
- 2014 Collaboration on "*Human-Robot Physical Interaction*" with Prof. Ciro Natale, Department of Industrial and Information Engineering (DIII) Second University of Naples, within DEXMART (FP7-ICT-216239, 2008-2015, [www.dexmart.eu](http://www.dexmart.eu)). Related publications: [UR-1].

- 2011-2014 Collaboration on "*Postural Synergies*" with Prof. Gianluca Palli, Prof. Cladio Melchiorri, Automation and Robotics Lab (LAR-DEI), Department of Electrical Engineering and Information Technology, University of Bologna, within DEXMART (FP7-ICT-216239, 2008-2015, [www.dexmart.eu](http://www.dexmart.eu)). Related publications: [IJ-1], [IJ-2], [BC-1]-[BC-3], [IC-2]-[IC-4], [IC-7]-[IC-9].
- 2010 Collaboration on "*Port-Hamiltonian Modeling*" with Prof. Stefano Stramigioli, Control Engineering Group at the University of Twente (Netherlands), within the DEXMART (FP7-ICT-216239, 2008-2015, [www.dexmart.eu](http://www.dexmart.eu)). Related publications: [IC-1].
- 2008 Collaboration on "*Haptic simulator for rehabilitation*" with Prof. S. Di Martino, Department of Physical Science, University of Naples Federico II, within DEXMART (FP7-ICT-216239, 2008-2015, [www.dexmart.eu](http://www.dexmart.eu)). Related publications: [NC-1].

## Main research contributions

Control of a complex hand-arm robotic system during grasping

The results obtained by Fanny Ficuciello during her research activity, published in journals and proceedings of the robotic international community, are here resumed.

The problem of controlling a complex hand-arm robotic system during grasping tasks has been addressed in [IC-5]. Such a system can interact with the environment or with a human being, for example during the exchange of an object. The applied control is in charge of ensuring that the hand firmly grasps the object and that the arm is compliant with respect to external forces applied to the grasped object. Relying on grasping theory, the reconstruction of the external forces applied to the object by means of the force measurements at the fingertips is used in the control action. Force measurements are also used to ensure the adjustment of the internal forces exerted on the object to have a stable grasp during the interaction with the environment.

Control of two arms robotic system during grasping

With regards to safe human-robot interaction control, an algorithm, that enhances safety and reliability, based on the impedance control of a two arms system that grasps an object and interacts with the environment, has been developed in [IC-6]. To obtain a safe behavior of the system during the intentional interaction with the object and unintentional interaction on the body, a compliant behavior of the entire system is ensured by applying an impedance control at three levels, i.e. object, end-effector and body level. A centralized impedance control strategy is provided to confer a compliant behavior to the object, while an active decentralized impedance with force tracking control is enforced to the end-effectors to control internal forces on the object. Furthermore, a compliant behavior on the body of the dual-arm system is obtained by means of null-space impedance control while the manipulability measure of the whole system is locally maximized.

Control of anthropomorphic hands

Fanny Ficuciello has developed techniques of planning and control based on the notion of postural synergies and neural networks inspired by neuroscience studies carried out on human hand and the functioning of the human brain. In [IJ-1, IC-2, IC-3, IC-4], different techniques to obtain the synergies subspace of an anthropomorphic robotic hand, using the human hand as a guide, have been tested and compared. In [IJ-2, IC-7, IC-8], a set of grasping postures performed by five subjects in grasping commonly used objects has been mapped to a robotic hand assuming its own kinematics as a simplified model of the human hand. Using an RGB camera and depth sensor for 3D motion capture, the human hand palm pose and fingertip positions have been measured for the reference set of grasps. In [BC-3] a neural network model has been designed for planning grasps of a cybernetic hand prototype by means of postural synergies. In [IC-9], the problem of in-hand dexterous manipulation has been addressed on the base of postural synergies analysis.

In [IC-1], the theory of port-Hamiltonian systems has been explored to model a multi-fingered robotic hand, with soft-pads, while grasping and manipulating an object. The theory of port-Hamiltonian systems allows to describe the system behavior in a coordinate-free way and can be naturally extended to include constrained systems and compliant contact models. The viscoelastic behavior of the contact is described in terms of energy storage and dissipation. Using the concept of power ports, the dynamics of the hand, the contact, and the object are described in a coordinate-free way. Moreover, an IPC is applied to control the motion of the object and to regulate the internal forces. The main advantage of the port-Hamiltonian formulation for constrained systems is that we do not need to modify the dynamic equations when a change occurs in the contact state. Instead, it is possible to represent both cases in a time-dependent geometrical structure, that satisfies the power continuity conditions in every contact state. This framework allows to approach the problem in a more intuitive and compact way.

In [IC-26], a three-fingered underactuated miniature tool for robot-aided laparoscopic surgery has been designed. A prototype has been realized in scale 2:1 with 3D printing. The design is conceived to realize a closed hand configuration allowing the insertion of the tool into the abdomen cavity through the trocar in one step and to reach different grasping as well as pushing/holding configurations. A tendon-based transmission system is activated by four motors. The hand fingertips are provided with force sensors based on Fiber Bragg grating technology. The force sensor is composed by three Bragg gratings for each finger. Each optical fiber has been glued inside columns disposed at 120 degrees to decouple the three force components. The whole concept and the need of such anthropomorphic tool is discussed with surgeons to highlight constraints and potentials in surgical tasks. In [J-8] a new concept of needle-driver tool is presented which takes inspiration from the human hand model. The idea is to modify a standard laparoscopic tool by introducing an additional degree of freedom which allows in-hand reorientation of the suturing needle. In [IC-24] a new solution for a force sensor placed at the end-tip of the trocar is presented. This solution allows measuring the interaction forces between the surgical instrument and the environment without any changes to the instrument structure and with full adaptability to different robot platforms and surgical tools. A prototype of the sensor has been realized with 3D printed technology for a proof of concept. The static and dynamic characterization of the sensor is provided together with experimental validation.

The da Vinci Research Kit (DVRK) is a telerobotic surgical research platform endowed with an open controller that allows position, velocity and current control. The problem of modelling and identification of both the Patient Side Manipulators (PSMs) and of the Master Tool Manipulators (MTMs) of the platform is addressed in [IC-22]. This problem is relevant when realistic dynamic simulations have to be performed using standard software tools, but also for the design of model-based control laws, and for the implementation of sensorless strategies for collision detection or contact force estimation. A LMI-based approach is used for the identification of the robot dynamics in order to guarantee the physical feasibility of the parameters that is not ensured by standard least-squares methods. In [IC-25] a machine learning algorithm for automatic segmentation of surgical subtasks in teleoperated robotassisted minimally-invasive surgery (RAMIS) is presented. A dimensionality reduction technique in the pre-processing step is used to project a dataset onto a lower-dimensional space with good class-separability. Then the classification of the surgical states is performed using a Gaussian Mixture Models (GMM) combined with Hidden Markov Models (HMM) to infer the more explicable hidden states of suturing procedures. The experiments are performed using data retrieved from the da Vinci Research Kit (DVRK) and a Force/Torque sensor integrated in a phantom used for suturing. The results demonstrate that the use of force measurements improve the accuracy of the surgical gestures recognition.

Underactuated hands require the investigation of planning and control methods that disregard accurate definition of the desired contact points on the object and guarantee robustness with respect to variability of shape and size. To overcome these problems, Fanny Ficuciello has developed control and learning algorithms that rely on the synergies concept. The contribution is divided in three parts concerning synergies computation, control and learning. Those parts are different aspects of the same research that goes towards the realization of human-like prehensile capabilities and autonomous learning skills for a robotic upper limb system with anthropomorphic design. In [IC-13], the same data set of grasps, measured on five human subjects and available from [IC-8], is used to evaluate the grasping capabilities of an underactuated robot hand in a synergy-based framework. Once the synergy matrix of an underactuated hand has been computed, in order to test the efficiency of the mapping method, different grasps can be reproduced in the three dimensions synergies subspace. Actually, since mechanical synergies of the underactuated hand affect the mapping from the human hand, the projection of a grasp from the data set in the synergies subspace is not so effective as for the full-actuated anthropomorphic hands. This means that a control strategy is required to adjust the reference grasp in order to let the hand adapting to the object while moving in the synergies subspace. The synergies subspace has been tested for the hand control using a kinematic algorithm based on has been adopted. The fingertips desired positions are modified in the control algorithm in order to reduce their distance with respect to the centroid of a virtual object computed as the centroid of the fingertips involved in the desired grasp. Moreover, in order to limit the grasping forces, the desired target is further modified on the basis of the measured motor current and of a defined threshold that is related to the texture of the object. The experiments demonstrate that the synergies subspace is suitable for hand control in grasping a wide variety of objects, i.e. the algorithm is stable and effectively regulates the grasping forces by modifying the motor positions in the synergies subspace. Moreover, to improve the grasping capabilities strategies based on quality indexes to close the hand toward the object in the synergies subspace have been developed in [R-2]. Model-based control strategies relying on synergistic models of manipulation activities learned from human experience can be integrated with real-time learning from actions strategies. The use of supervised learning, such as artificial neural networks, or reinforcement learning techniques, serves for the parameterization of synergies depending on task requirements. Fanny Ficuciello has developed Supervised Learning (SL) and Reinforcement Learning (RL) strategies. In [C-18] a supervised learning strategy has been applied in conjunction with a control strategy to provide anthropomorphic hand-arm systems with autonomous grasping capabilities. Both learning and control algorithms have been developed in a synergy-based framework in order to address issues related to high dimension of the configuration space, that typically characterizes robotic hands and arms with human-like kinematics. An experimental setup has been built to learn hand-arm motion from humans during reaching and grasping tasks. Then, a Neural Network (NN) has been realized to generalize the grasps learned by imitation. Since the NN approximates the relationship between the object characteristics and the grasp configuration of the hand-arm system, a synergy-based control strategy has been applied to overcome planning errors. In [C-17] is demonstrated that a synergy based approach is powerful for reinforcement learning of grasping with anthropomorphic hands due to configuration space dimensionality reduction that guarantees the convergence and efficiency of the learning algorithm. The design of appropriate policy representations is essential for RL methods to be successfully applied to real-world robots. PCA and human grasps data set serve as data structures to define a policy and its initial parameters for a RL algorithm. Indeed, starting from a good enough demonstration, the algorithm can optimize the policy parameters to gradually refine a stable grasp. When a clear measure about the success of the task is available, RL adaptability to new objects is ensured. A key point is the adoption of a suitable reward function representing the goal of the task and ensuring one-step performance evaluation.

Impedance control strategies with redundancy resolution for human-robot intuitive co-manipulation

Physical modeling for haptic rendering and contact force sensing

The control of safe and efficient physical interaction between a human and the robot co-worker has been addressed in [IC-10, BC-4] by investigating new and efficient approach to redundancy resolution and variable impedance control strategies. Redundancy has been exploited to make the robot equivalent inertia at the end-effector as close as possible to the desired inertia. In particular, since co-manipulation tasks typically require a decoupled impedance along the Cartesian directions, the redundant degrees of freedom are used to reduce as much as possible the dynamic coupling of the end-effector equivalent inertia. In [IJ-3, IJ-5, IC-11], a study on variable impedance control for a redundant robot arm to enable an intuitive and safe physical interaction with humans during the execution of co-manipulation tasks has been proposed. The impedance parameters are modulated on-line according to the human behaviour during the interaction.

Recently, the research activities of Fanny Ficuciello have been extended also to surgical robotics. In [IC-19] a soft-rigid collision algorithm has been integrated in an open source physics engine, Bullet Physics. In surgical applications this can be the case of a clamp grabbing deformable organic materials or of a spatula opening a brain fissure. The default soft-rigid collision algorithm proposed in Bullet is not very effective in the case of thin tools interacting with deformable objects. In particular, if the rigid body (surgical tool) moves slowly, i.e. its displacement covers a small distance compared to the simulation step size, the collision is detected regularly, otherwise the default algorithm does not recognize the collision. As a consequence, the object penetrates into the soft body. Besides the implementation of the soft-rigid collision algorithm, the new contribution consists on generalizing the algorithm to different shaped rigid object such as convex rigid bodies with thin thickness along one of the three main directions. Moreover, the haptic rendering has been realized by controlling the spatula in the 3D virtual space with the Novint Falcon 3D Haptic Controller. The default linear elastic model of the interaction force has been replaced with a more realistic and physical consistent non-linear viscoelastic model. As a second step, the algorithm has been further extended to a clamp constituted by two rigid colliding objects grabbing deformable materials. In [IC-22] a method to estimate the force is applied to a manipulated deformable object by resorting to a realistic mesh-based Finite Element Method (FEM) model and by processing information provided by an external vision sensor. The idea is to retrieve the contact force which minimises the deviation between the measured deformations through a registration technique and the simulated deformations by employing a fitting process. The elastic parameters of the FEM model to accurately model deformations are estimated in advance using the vision system and a force sensor. Experimental results are presented for the case of a compressive point-wise contact force applied, at static equilibrium, on a deformable object.

## Publications

### Books

[B-1]

**F. Ficuciello**, F. Ruggiero, A. Finzi, "Human Friendly Robotics, 10th International Workshop", *Springer Proceedings in Advanced Robotics*, 2018, in press.

### International journal papers (refereed)

[IJ-10]

**F. Ficuciello**, P. Falco, S. Calynon, "A Brief Survey on the Role of Dimensionality Reduction in Manipulation Learning and Control Strategies", *IEEE Robotics and Automation Letters*, 2018, accepted.

[IJ-9]

A. Mashayekhi, S. Behbahani, **F. Ficuciello**, B. Siciliano, "Analytical stability criterion in haptic rendering: the role of damping", *IEEE/ASME Transactions on Mechatronics*, 2018, DOI: 10.1109/TMECH.2018.2797688, in press.

[IJ-8]

G. A. Fontanelli, M. Selvaggio, L. R. Buonocore, **F. Ficuciello**, L. Villani, B. Siciliano, "A New Laparoscopic Tool with In-Hand Rolling Capabilities for Needle Reorientation", *IEEE Robotics and Automation Letters*, doi:10.1109/LRA.2018.2809443, in press.

[IJ-7]

I. Cerulo, **F. Ficuciello**, V. Lippiello, B. Siciliano, "Teleoperation of the SCHUNK S5FH under-actuated anthropomorphic hand using human hand motion tracking", *Robotics and Autonomous Systems*, 89: 75–84, 2016, doi: 10.1016/j.robot.2016.12.004.

- [IJ-6] **F. Ficuciello**, B. Siciliano, "Learning in robotic manipulation: The role of dimensionality reduction in policy search methods. Comment on Hand synergies: Integration of robotics and neuroscience for understanding the control of biological and artificial hands by Marco Santello, Matteo Bianchi, Marco Gabiccini, Emiliano Ricciardi, Gionata Salvietti et al.", *Physics of Life Reviews*, 17:36-37 2016, doi: 10.1016/j.plrev.2016.04.002.
- [IJ-5] **F. Ficuciello**, L. Villani, B. Siciliano, "Impedance control of redundant manipulators for safe human-robot collaboration", *Acta Polytechnica Hungarica, Journal of Applied Science, Special Issue on Recent Advances in Robotics - In Memoriam Antal K. Bejczy* Guest Editors: Imre J. Rudas, Tamás Haidegger, 13(1):223-238, 2016, doi: 10.12700/APH.13.1.2016.1.15.
- [IJ-4] A. Cirillo, **F. Ficuciello**, C. Natale, S. Pirozzi, L. Villani, "A conformable force/tactile skin for physical human-robot interaction", *IEEE ROBOTICS AND AUTOMATION LETTERS*, 1(1):41-48, 2015, doi: 10.1109/LRA.2015.2505061.
- [IJ-3] **F. Ficuciello**, L. Villani, B. Siciliano, "Variable impedance control of redundant manipulators for intuitive human-robot physical interaction", *IEEE Transactions on Robotics*, 31(4):850-863, 2015, doi: 10.1109/TRO.2015.2430053.
- [IJ-2] G. Palli, C. Melchiorri, G. Vassura, U. Scarcia, L. Moriello, G. Berselli, A. Cavallo, G. De Maria, C. Natale, S. Pirozzi, C. May, **F. Ficuciello**, B. Siciliano, "The DEXMART hand: mechatronic design and experimental evaluation of synergy-based control for human-like grasping", *The International Journal of Robotics Research*, 33(5):799-824, 2014, doi: 10.1177/0278364913519897.
- [IJ-1] **F. Ficuciello**, G. Palli, C. Melchiorri, B. Siciliano, "Postural synergies of the UB hand IV for human-like grasping", *Robotics and Autonomous Systems*, 62(4): 515-527, 2014, doi: 10.1016/j.robot.2013.12.008.

#### Book chapters (refereed)

- [BC-9] M. Monforte, **F. Ficuciello**, B. Siciliano, "Human Cognition Inspired Robotic Grasping", *Cognitive Architecture. Series title: Intelligent Systems, Control and Automation: Science and Engineering*, M. I. A. Ferreira, J. S. Sequeira and R. Ventura (eds), Springer, 2018, in press.
- [BC-8] M. Monforte, **F. Ficuciello**, B. Siciliano, "Multifunctional Principal Component Analysis for Human-like Grasping", *Springer Proceedings in Advanced Robotics*, F. Ficuciello, F. Ruggiero, A. Finzi (eds), Springer, 2018, in press.
- [BC-7] **F. Ficuciello**, A. Federico, V. Lippiello, B. Siciliano, "Synergies evaluation of the SCHUNK S5FH for grasping control", *Springer Proceedings in Advanced Robotics*, J. Lenarčič, J.P. Merlet (eds), Springer, vol. 4, pp. 225-233, 2017, doi: 10.1007/978-3-319-56802-7\_24.
- [BC-6] **F. Ficuciello**, D. Zaccara, B. Siciliano, "Learning grasps in a synergy-based framework", *Springer Proceedings in Advanced Robotics*, D. Kulić, Y. Nakamura, O. Khatib, G. Venture (eds), Springer, vol. 1, pp. 125-135, 2016, doi: 10.1007/978-3-319-50115-4\_12.
- [BC-5] **F. Ficuciello**, L. Villani, B. Siciliano "Redundancy resolution in human-robot co-manipulation with cartesian impedance control", *Springer Tracts in Advanced Robotics (STAR), Experimental Robotics*, M. A. Hsieh, O. Khatib, V. Kumar (Eds.), Springer, no.109, pp. 165-176, 2015, doi: 10.1007/978-3-319-23778-7\_12.
- [BC-4] **F. Ficuciello**, A. Romano, V. Lippiello, L. Villani, B. Siciliano "Human motion mapping to a robot arm with redundancy resolution" in *Latest Advances in Robot Kinematics*, J. Lenarčič and O. Khatib (Eds.), Springer, pp. 193-201, 2014, doi: 10.1007/978-3-319-06698-1\_21.
- [BC-3] **F. Ficuciello**, G. Palli, C. Melchiorri, B. Siciliano, "Postural synergies and neural network for autonomous grasping: a tool for dextrous prosthetic and robotic hands", *Converging Clinical and Engineering Research on Neurorehabilitation, Biosystems & Biorobotics*, J.Pons et al. (Eds.), Springer Berlin Heidelberg, no. 1, pp. 467-480, 2013, doi: 10.1007/978-3-642-34546-3\_76.
- [BC-2] **F. Ficuciello**, G. Palli, C. Melchiorri, B. Siciliano, "Mapping grasps from the human hand to the DEXMART hand by means of postural synergies and vision", *Springer Tracts in Advanced Robotics (STAR), Experimental Robotics*, O. Khatib, V. Kumar, G. Sukhatme (Eds.), Springer, no.88, pp. 515-529, 2013, doi: 10.1007/978-3-319-00065-7\_35.



- [BC-1] L. Villani, **F. Ficuciello**, V. Lippiello, G. Palli, F. Ruggiero, B. Siciliano, "Grasping and control of multifingered hands", *Springer Tracts in Advanced Robotics (STAR), Advanced bimanual manipulation*, B. Siciliano (Eds.), Springer, vol. 80, pp. 219-266, 2012, doi: 10.1007/978-3-642-29041-1\_5.
- International conference papers (refereed)**
- [IC-26] G.A. Fontanelli, M. Selvaggio, **F. Ficuciello**, B. Siciliano, *The MUSHA hand: a new three fingered underactuated hand for minimally invasive robotic surgery*, 29th Conference of the international Society for Medical Innovation and Technology (SMIT), Torino, Italy, 9-10 November, 2017.
- [IC-25] M. Selvaggio, G.A. Fontanelli, **F. Ficuciello**, L. Villani and B. Siciliano, *Task classification of robotic surgical reconstructive procedures using force measurements*, 7th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery (CRAS), Montpellier, Italy, 14-15 September, 2017.
- [IC-24] G.A. Fontanelli, **F. Ficuciello**, L. Villani, B. Siciliano, *A novel force sensor integrated into the da Vinci trocar for minimally invasive robotic surgery*, 7th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery (CRAS), Montpellier, Italy, 14-15 September, 2017.
- [IC-23] M. Ferro, G. A. Fontanelli, **F. Ficuciello**, B. Siciliano, M. Vendittelli, *Implementation of a soft-rigid collision algorithm in an open-source engine for surgery realistic simulation*, 7th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery (CRAS), Montpellier, Italy, 14-15 September, 2017.
- [IC-22] G.A. Fontanelli, **F. Ficuciello**, L. Villani, B. Siciliano, *Modelling and identification of the Da Vinci Research Kit robotic arms*, IEEE/RSJ International Conference on Intelligent Robots and Systems, Vancouver, Canada, September, 2017, to appear.
- [IC-21] G.A. Fontanelli, Luca Rosario Buonocore, **F. Ficuciello**, L. Villani, B. Siciliano, *A novel force sensing integrated into the trocar for minimally invasive robotic surgery*, IEEE/RSJ International Conference on Intelligent Robots and Systems, Vancouver, Canada, September, 2017, to appear.
- [IC-20] A. Petit, **F. Ficuciello**, G.A. Fontanelli, L. Villani, B. Siciliano, *Using physical modeling and RGB-D registration for contact force sensing on deformable objects*, 14th International Conference on Informatics in Control, Automation and Robotics, Madrid, SP, 26-28 July 2017, pp. 24-33, doi: 10.5220/0006415900240033.
- [IC-19] R. Caccavale, M. Saveriano, G. Fontanelli, **F. Ficuciello**, D. Lee, A. Finzi *Imitation learning and attentional supervision of dual-arm structured tasks*, IEEE International Conference on Development and Learning and on Epigenetic Robotics (ICDL-EPIROB), Portugal, 18-21 September, 2017.
- [IC-18] F. Fazioli, **F. Ficuciello**, G.A. Fontanelli, B. Siciliano, L. Villani, *Implementation of a soft-rigid collision algorithm in an open-source engine for surgery realistic simulation*, IEEE International Conference on Robotics and Biomimetics, Qingdao, China, 3-7 December, 2016, pp. 2204-2208, doi: 10.1109/ROBIO.2016.7866657.
- [IC-17] **F. Ficuciello**, D. Zaccara, B. Siciliano, *Synergy-based policy improvement with path integrals for anthropomorphic hands*, IEEE/RSJ International Conference on Intelligent Robots and Systems, Daejeon, Korea, 9-14 September, pp. 1940-1945, 2016, doi: 0.1109/IROS.2016.7759306.
- [IC-16] F. Fazioli, **F. Ficuciello**, G.A. Fontanelli, B. Siciliano, L. Villani, *Collision algorithm for a clamp grabbing deformable materials: implementation in an open-source engine*, 9th International Workshop on "Human-Friendly Robotics" (HFR), Genova, Italy, 29-30 October, 2016.
- [IC-15] **F. Ficuciello**, D. Zaccara, B. Siciliano, *Learning strategies for anthropomorphic hands in a synergy-based framework*, 9th International Workshop on "Human-Friendly Robotics" (HFR), Genova, Italy, 29-30 October, 2016.
- [IC-14] F. Fazioli, **F. Ficuciello**, G.A. Fontanelli, B. Siciliano, L. Villani, *Implementation of a soft-rigid collision algorithm in an open-source engine for surgery realistic simulation*, 6th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery (CRAS), Pisa, Italy, 12-14 September, 2016.
- [IC-13] **F. Ficuciello**, D. Zaccara, L. Villani, B. Siciliano, *Experimental test of synergies computed on the SCHUNK S5FH under-actuated hand*, 8th International Workshop on "Human-Friendly Robotics" (HFR), Munich, Germany, 21-23 October, 2015.

- [IC-12] **F. Ficuciello**, L. Villani, B. Siciliano, *The role of impedance modulation and redundancy resolution in human-robot interaction*, IEEE International Conference on Robotics and Automation, Workshop on "Compliant and Versatile Robot Control in Human Environments: Bridging the Gap between Learning and Control", Seattle, Washington, 26-30 May, 2015.
- [IC-11] **F. Ficuciello**, A. Romano, L. Villani, B. Siciliano, *Cartesian impedance control of redundant manipulators for human-robot co-manipulation*, IEEE/RSJ International Conference on Intelligent Robots and Systems, Chicago, Illinois, 14–18 September, 2014, pp. 2120-2125, doi: 10.1109/IROS.2014.6942847.
- [IC-10] G. Palli, **F. Ficuciello**, U. Scarcia, C. Melchiorri, B. Siciliano, *Experimental evaluation of synergy-based in-hand manipulation*, IFAC World Congress, Cape Town, South Africa, 24-29 August, 2014, pp. 299-304, doi: 10.3182/20140824-6-ZA-1003.00784.
- [IC-9] U. Scarcia, L. Moriello, A. Pepe, A.M. Galiano, G. Palli, C. Melchiorri, **F. Ficuciello**, B. Siciliano, "Experimental evaluation of synergy-based in-hand manipulation", 6th International Workshop on Human-Friendly Robotics, Roma, Italy, 25-26 September, 2013.
- [IC-8] **F. Ficuciello**, G. Palli, C. Melchiorri, B. Siciliano. *A model-based strategy for mapping human grasps to robotic hands using synergies*, IEEE/ASME International Conference on Advanced Intelligent Mechatronics, Wollongong, Australia, 9-12 July, 2013, pp. 1737-1742, doi: 10.1109/AIM.2013.6584348.
- [IC-7] **F. Ficuciello**, G. Palli, C. Melchiorri, B. Siciliano, *A model-based strategy for transferring human hand synergies: experimental validation on the DEXMART hand*, IEEE International Conference on Robotics and Automation, Workshop on Hand Synergies — How to Tame the Complexity of Grasping, Karlsruhe, Germany, 6-10 May, 2013.
- [IC-6] H. Sadeghian, **F. Ficuciello**, L. Villani, M. Keshmiri, *Global impedance control of dual-arm Manipulation for safe human-robot interaction*, 10th International IFAC Symposium on Robot Control, Dubrovnik, Croatia, 5-7 September, 2012, pp. 767-772, doi: 10.3182/20120905-3-HR-2030.00154.
- [IC-5] **F. Ficuciello**, L. Villani, *Compliant hand-arm control with soft fingers and force sensing for human-robot interaction*, IEEE International Conference on Biomedical Robotics and Biomechanics, Roma, Italy, 24-27 June, 2012, pp. 1961-1966, doi: 10.1109/BioRob.2012.6290863.
- [IC-4] **F. Ficuciello**, G. Palli, C. Melchiorri, B. Siciliano, *Planning and control during reach to grasp using the three predominant UB Hand IV postural synergies*, IEEE International Conference on Robotics and Automation, St. Paul, Minnesota, 14-18 May, 2012, pp. 2255-2260, doi: 10.1109/ICRA.2012.6224922.
- [IC-3] **F. Ficuciello**, G. Palli, C. Melchiorri, B. Siciliano, *Experimental evaluation of postural synergies during reach to grasp with the UB Hand IV*, IEEE/RSJ International Conference on Intelligent Robots and Systems, San Francisco, California, 25-30 September, 2011, pp. 1775–1780, doi: 10.1109/IROS.2011.6094671.
- [IC-2] **F. Ficuciello**, G. Palli, C. Melchiorri, B. Siciliano, *Experimental evaluation of the UB Hand IV postural synergies*, IEEE International Conference on Robotics and Automation, Workshop on Autonomous Grasping, Shanghai, China, 9-13 May, 2011.
- [IC-1] **F. Ficuciello**, R. Carloni, L.C. Visser, S. Stramigioli, *Port-Hamiltonian modeling for soft-finger manipulation*, IEEE/RSJ International Conference on Intelligent Robots and Systems, Taipei, Taiwan, 18-22 October, pp. 4281–4286, 2010, doi: 10.1109/IROS.2010.5650866.

#### National conference papers (refereed)

- [NC-5] **F. Ficuciello**, *Synergies and underactuation: learning and control strategies for anthropomorphic hands*, Convegno Annuale dei docenti e ricercatori italiani in AUTOMATICA, Roma, Italy, 5-7 September, 2016.
- [NC-4] F. Fazioli, **F. Ficuciello**, G.A. Fontanelli, L. Villani, B. Siciliano, *Soft-rigid collision algorithm for surgery realistic simulation in an open-source engine*, V Congresso del Gruppo Nazionale di Bioingegneria (GNB), Naples, Italy, 20-22 June 2016.
- [NC-3] **F. Ficuciello**, D. Zaccara, B. Siciliano, *Artificial neural network for grasp learning in a synergy-based framework*, V Congresso del Gruppo Nazionale di Bioingegneria (GNB), Naples, Italy, 20-22 June 2016.

[NC-2] **F. Ficuciello**, L. Villani, B. Siciliano, *The role of redundancy resolution in human-robot co-manipulation*, Convegno Annuale dei docenti e ricercatori italiani in AUTOMATICA, Bergamo, Italy, 8-10 September, 2014.

[NC-1] S. Di Martino, F. Ferrucci, **F. Ficuciello**, V. Lippiello, *A virtual reality-based haptic simulator for rehabilitation*, Workshop on Multimodal Interaction Through Haptic Feedback, Napoli, May 2008.

#### Other contributions (not refereed)

**F. Ficuciello**, V. Lippiello, F. Ruggiero, B. Siciliano, L. Villani, *Grasping and control of multifingered hands*, International Expert Days organized by Schunk, Hause, 2012.

L. Villani, V. Lippiello, F. Ruggiero, **F. Ficuciello**, B. Siciliano, G. Palli, *Grasping and control of multifingered hands*, 11th IEEE-RAS International Conference on Humanoid Robots, Bled, Slovenia, 26-28 October, 2011.

**F. Ficuciello**, *Kinematic patterns of the first three postural synergies of UB Hand IV*, 1th Convegno PRISMA, Forio d'Ischia, 2-4 June, 2011.

**F. Ficuciello**, V. Lippiello, F. RUGGIERO, B. Siciliano, L. Villani, *Grasping unknown objects with robotics hands using vision and touch*, Italian National Meeting SIDRA, Siracusa, Italy, 17-19 September, 2009.

#### Ph.D. Thesis

[TH]

**F. Ficuciello**, *Modelling and control for soft finger manipulation and human-robot interaction*, Ph.D Thesis, Dec 2010.

#### Patents

[P1]

G. A. Fontanelli, L.R. Buonocore, **F. Ficuciello**, *Strumento laparoscopico in grado di attuare un moto di rotazione di un ago da sutura*, Dec 2017, patent pending.

#### Honors

ICINCO 2017 Best Paper Award candidate

The paper "Using physical modeling and RGB-D registration for contact force sensing on deformable objects", authored by A. Petit, **F. Ficuciello**, G.A. Fontanelli, L. Villani, B. Siciliano, has received the nomination for the Best Paper Award at the 14th International Conference on Informatics in Control, Automation and Robotics, held in Madrid, July 2017.

CRAS 2017 Best Paper Award candidate

The paper "A novel force sensor integrated into the da Vinci trocar for minimally invasive robotic surgery", authored by G.A. Fontanelli, **F. Ficuciello**, L. Villani, B. Siciliano, has received the nomination for the Best Paper Award at the 7th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery (CRAS), held in Montpellier, September, 2017.

#### Invited speaker and delivered seminars in other institutions

Jan 2018

**F. Ficuciello**, Colloquium on *Robotics@Prisma Lab: Advances in autonomous robotic manipulation and surgical tasks*, IIT, Genova, Italy.

Nov 2017

**F. Ficuciello**, Colloquium on *Underactuated Artificial Hands: Design and Control in a Synergy-based Framework*, University of Leeds, Leeds, United Kingdom.

Nov 2017

**F. Ficuciello**, Colloquium on *Underactuated Artificial Hands: Design and Control in a Synergy-based Framework*, Workshop title: "Towards robust grasping and manipulation skills for humanoids", IEEE-RAS International Conference on Humanoid Robots Birmingham, United Kingdom.

June 2017

**F. Ficuciello**, Colloquium on *Advances in autonomous robotic manipulation*, Inria Grand Est, MIMESIS, Strasbourg, France.

March 2017

**F. Ficuciello**, Colloquium on *Synergies and underactuation: control issue for anthropomorphic hands*, INRIA center of Lille-North Europe, DEFROST team, Lille, France.

October 2016

**F. Ficuciello**, Colloquium on *Synergies framework for design and control of underactuated artificial hands*, Department of Systems Science, Kyoto University, Yoshida Campus, Japan.

October 2016	<b>F. Ficuciello</b> , Colloquium on <i>The role of dimensionality reduction toward autonomous grasping with anthropomorphic hands</i> , Mechatronics lab, Graduate School of Engineering, Kyoto University, Katsura Campus, Japan.
October 2016	<b>F. Ficuciello</b> , Colloquium on <i>Synergies and underactuation: learning and control strategies for anthropomorphic hands</i> , School of Mechanical and Aerospace Engineering, Seoul National University, Korea.
November 2012	<b>F. Ficuciello</b> , Colloquium on <i>Autonomous Grasping for dexterous anthropomorphic hands</i> , Department of Information Engineering, University of Siena, Italy.
March 2011	<b>F. Ficuciello</b> , D. D'auria <i>Nuova frontiera della robotica: interazione e cooperazione con l'uomo</i> , Mostra: Donne e Scienza, Città della Scienza, Napoli.
April 2010	<b>F. Ficuciello</b> , Colloquium on <i>Port-based modeling and control of a multifingered robotic hand with soft pad</i> , Control Engineering-EEMCS, University of Twente.
<b>Journal and conference service</b>	
From 2018	She is member of the Technology Committee of the European Association of Endoscopic Surgery (EAES).
From 2017	Senior Member of the Institute of Electrical and Electronics Engineers (IEEE).
From 2008 to 2017	Member of the Institute of Electrical and Electronics Engineers (IEEE) and of the IEEE-Robotics and Automation Society (RAS).
Associate Editor	IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), from 2012-until now. IEEE International Conference on Robotics and Automation (ICRA), from 2014 to 2015.
Editor	Journal of Intelligent Service Robotics (JIST), from 2016.
Program Committee member	IEEE International Conference on Robotics and Biomimetics (ROBIO), 2014, 2016 14th International Conference on Informatics in Control, Automation and Robotics (ICINCO), 2017 7th Joint Workshop on New Technologies for Computer/Robot Assisted Surgery (CRAS), 2017.
Organization of International Conference and Workshop	Chair of the 10th International Workshop on Human-friendly Robotics, 2017 (two days workshop). Registration Chair of the International Conference FUZZ-IEEE 2017. Organizer of the Special Section "Fuzzy Logic in Autonomous Robots" in the International Conference FUZZ-IEEE 2017. Organizer of the Workshop "Learning and control for autonomous manipulation systems: the role of dimensionality reduction in anthropomorphic design" in the IEEE International Conference on Robotics and Automation (ICRA) 2017. Chair of "Manipulation Section" in the 15th International Symposium on Experimental Robotics, 2016. Special section chair of the IEEE International Conference on Advanced Robotics and Mechatronics (ICARM), 2017.
Journal Guess Editor	IEEE Transactions on Industrial Informatics, Special Issue on "Bio-inspired Embodiment for Intelligent Sensing and Dexterity in Fine Manipulation", December 2017.
Speaker in conference sessions	IEEE Robotics and Automation Letters, Special Issue on "Learning and Control for Autonomous Manipulation Systems: the Role of Dimensionality Reduction", November 2017. IEEE RAS International Conference on Humanoid Robots, 2017. IEEE International Conference on Robotics and Automation, 2017. IEEE/RSJ International Conference on Intelligent Robots and Systems, 2016. 15th International Symposium on Experimental Robotics, 2016. 14th International Symposium on Experimental Robotics, 2014. IEEE International Conference on Biomedical Robotics and Biomechatronics, 2012. 14th International Symposium on Experimental Robotics, 2012. IEEE International Conference on Robotics and Automation, 2011.

Reviewer for international journals

IEEE/RSJ International Conference on Intelligent Robots and Systems, 2011.  
IEEE/RSJ International Conference on Intelligent Robots and Systems, 2010.  
The International Journal of Robotics Research, IEEE Robotics and Automation Letters, Robotics and Automation Magazine, IEEE Transactions on Robotics, IEEE Transactions on Mechatronics, Robotics and Autonomous Systems, Journal of NeuroEngineering and Rehabilitation, IEEE Transactions on Cybernetics, IEEE Transactions on Control Systems Technology, Journal of Robotics and Computer Integrated Manufacturing, International Journal of Humanoid Robotics, Transaction on Industrial Electronics, International Journal of Advanced Robotic Systems, Intelligent Service Robotics.

Reviewer for international conferences

IEEE International Conference on Robotics and Automation, IEEE/RSJ International Conference on Intelligent Robots and Systems, International IFAC Symposium on Robot Control, IEEE/RSJ International Conference on Advanced Intelligent Mechatronics, IEEE Multi-conference on Systems and Control, IEEE Conference on Decision and Control, International Conference on Applied Bionics and Biomechanics, IFAC Symposium on Robot Control, International Conference on Human Robot Interaction, International Symposium on Experimental Robotics, International Symposium on Advances in Robot Kinematics, International Conference on Humanoid Robots, IEEE International Conference on Automation Science and Engineering.

### Attended seminar, tutorial and workshops

7 Jun 2017	Seminar on "Deep Learning for Robot Navigation and Perception", delivered by Prof. Wolfram Burgard, Albert-Ludwigs-Universität Freiburg, Technische Fakultät, at University of Naples Federico II. 2 hours.
21 Dec 2016	Seminar on "Cognitive Computing and Healthcare, delivered by Dott. Pietro Leo, IBM Italy and Prof. Paolo Maresca, at University of Naples Federico II. 2 hours.
21 Dec 2016	Seminar on "Neuro-Robotics: Modelling Sensor-Motor Control Functionalities with Spiking Neural Networks – The Renaissance of Bio-Cybernetics?", delivered by Prof. Rüdiger Dillman, Karlsruhe Institute of Technology, at University of Naples Federico II. 2 hours.
28 Oct 2016	Seminar on "Legged robots for challenging environments", delivered by Prof. Marco Hutter, ETH Zurich, at University of Naples Federico II. 1 hour.
9 May 2016	Seminar on "Medical Robots Research at IPR – KIT Karlsruhe", delivered by Prof. Heinz Wörn, Institute of Process Control and Robotics Karlsruhe Institute of Technology, at University of Naples Federico II. 1 hour.
1 Dec 2015	Seminar on "Armi Autonome: Problemi Etici e Decisioni Politiche", delivered by Prof. Guglielmo Tamburrini, at University of Naples Federico II. 1 hour.
21-23 Oct 2015	8th Workshop on " <i>Human friendly Robotics</i> ", Munich, Germany. 18 hours.
10-12 Sep 2015	5th Joint Workshop on " <i>New Technologies for Computer/Robot Assisted Surgery</i> ", Brussels, Belgium. 18 hours.
3 Sep 2015	"Overview of Robotics and Autonomous Systems Activities at QUT by Prof Tristan Perez", delivered by Prof Tristan Perez, Queensland University of Technology in Brisbane Australia, at at University of Naples Federico II. 1 hour.
21 Apr 2015	Seminar on "Colloquium on robotics: Six keynote talks by International Experts 2015", organized by Prof. B. Siciliano, speakers: Prof. O. Khatib, Prof. T. Asfour, Prof. R. Lumia, Prof. G. Indiveri, Prof. K. Kyriakopoulos, Dr. R. Madhavan, at Università degli Studi di Napoli Federico II. 4 hours.
29 Jan 2015	Seminar on " <i>Perceptual Cues and Motion Control in Feature Networks</i> ", delivered by Dr. John Baillieul, Boston University, at University of Naples Federico II. 1 hour.
15 Jan 2015	Seminar on " <i>Mechanics of solids: From beam theory to rapid prototyping for surgery planning</i> ", delivered by Prof. F. Auricchio, at University of Naples Federico II. 2 hours.
14 Jan 2015	Seminar on " <i>Smoothed particle machine perception: A proposed method for sensor fusion and physical-spacial perception</i> ", delivered by Dr. N. Hockings, at University of Naples Federico II. 1 hour.
16 Sep 2014	Seminar on " <i>Towards agile flight of vision-controlled micro-flying robots: From frame-based to event-based vision</i> ", delivered by Prof. D. Scaramuzza, at University of Naples Federico II. 1 hour.

23 Jun 2014	Seminar on <i>"Control systems design using energy properties of physical systems"</i> , delivered by Dr. A. Donaire, at University of Naples Federico II. 1 hour.
12 Jul 2012	Seminar in <i>"Vibro-elastography and image guidance for prostate cancer interventions"</i> , delivered by Prof. T. Salcudean, at University of Naples Federico II. 2 hours.
15 Jun 2012	Seminar on <i>"Reengineering the Hand: Novel Approaches to Robotic Manipulation"</i> , delivered by Prof. A. Dollar, at University of Naples Federico II. 2 hours.
17 May 2012	Seminar on <i>"Body intelligence in the hand: From human to artificial haptic"</i> , delivered by Prof. A. Bicchi, at University of Naples Federico II. 2 hours.
23 Nov 2011	Seminar on <i>"Building Energy Doctors: SPC and Kalman Filter-based Fault Detection"</i> , delivered by Prof. P.B. Luh, at University of Naples Federico II. 2 hours.
17 Nov 2011	Seminar on <i>"Guidance and control of fish shoals using biomimetic robots"</i> , delivered by Prof. M. Porfiri, at University of Naples Federico II. 2 hours.
16 Nov 2011	Seminar on <i>"e-Heritage Projects in Italy, Cambodia, and Japan: Lesson learned"</i> , delivered by Prof. K. Ikeuchi, at University of Naples Federico II. 2 hours.
24 Oct 2011	Seminar on <i>"Human-friendly robotics"</i> , delivered by Prof. O. Khatib, at University of Naples Federico II. 2 hours.
19 Oct 2011	Seminar on <i>"Mobile manipulation — A key technology for the factory of the future"</i> , delivered by Dr. R. Bischoff, at University of Naples Federico II. 2 hours.
30 Sep 2011	Workshop on <i>"Robotics for Neurology and Rehabilitation"</i> , at IROS 2011, San Francisco, California, 8 hours.
4 May 2011	Seminar on <i>"A mechatronic approach to modeling and control of non-rigid robots in industrial practice"</i> , delivered by Eng. A. Bottero, at University of Naples Federico II. 2 hours.
27 Apr 2011	Seminar on <i>"Robot Hands: Current Trends in Design and Control"</i> , delivered by Prof. C. Melchiorri, at University of Naples Federico II. 2 hours.
23 Mar 2011	Seminar on <i>"Fault diagnosis for robotic systems: From theory to practical implementation"</i> , delivered by Prof. F. Caccavale, at University of Naples Federico II. 2 hours.
22 Oct 2010	Workshop on <i>"Performance Evaluation and Benchmarking for Intelligent Robots and Systems with Cognitive and Autonomy Capabilities"</i> , at IROS 2010, Taipei, Taiwan. 4 hours.
18 Oct 2010	Workshop on <i>"Grasp planning and task learning by imitation"</i> , at IROS 2010, Taipei, Taiwan. 8 hours.
6 Oct 2010	Workshop on <i>"Actuation and Sensing in Robotics"</i> , within DEXMART review meeting at Saarbrücken Rathaus. 8 hours.
Sep 2010	Workshop on <i>"Hyperflexible Robotic Workcells"</i> , delivered by Prof. F. Basile and P. Chiacchio, Salerno, 8 hours.
16 Dec 2009	Seminar on <i>"Microvibration Control of Precision Mechanism Using Active/Passive Piezoelectric Shunt Technique"</i> , delivered by Dr. Hao Sun, at University of Twente. 2 hours.
3 Nov 2009	Seminar on <i>"Dirac structures and Port-Hamiltonian systems"</i> , delivered by Prof. Stefano Stramigioli, at University of Twente. 3 hours.
30 Oct 2009	Seminar on <i>"Using simple models to guide the design of an energy-saving prosthetic foot"</i> , delivered by Dr. Steve Collins, Delft University of Technology – Delft Biorobotics Lab, at University of Twente. 2 hours.
29 Oct 2009	Seminar on <i>"Realistic modeling of medical interventions involving tool-tissue interactions has been considered to be"</i> , delivered by Prof. Sarthak Misra, MIRA Biomedical Technology and Technical Medicine, at University of Twente. 2 hours.
22 Oct 2009	Seminar on <i>"Some researches and teaching experiences on mechanical engineering at Bologna University"</i> , delivered by Dr. Andrea Zucchelli, University of Bologna, Mechanical Engineering Department, at University of Twente. 2 hours.
3 Jun 2009	Seminar on <i>"Human - Centered Robotics"</i> , delivered by Prof. Oussama Khatib, at University of Naples Federico II. 1 hour.
21 May 2009	Seminar on <i>"Robot: sogno e bisogno"</i> , delivered by Prof. Bruno Siciliano in Centro Congressi Federico II, Naples. 2 hours.

26 Jan 2009	Seminar on " <i>Measuring Fingertip Forces by Imaging the Fingernail</i> ", delivered by Prof. John Hollerback, School of Computing, University of Utah, at University of Naples Federico II. 2 hours.
18 Dec 2008	Seminar on " <i>Mirror neurons and point of view independence</i> ", delivered by Dr. R.Prevete, at University of Naples Federico II. 1 hour.
18 Dec 2008	Seminar on " <i>Mirror neurons and interaction</i> ", delivered by Eng. V.Cangiano, at University of Naples Federico II. 1 hour.
24 Oct 2008	Workshop on " <i>First workshop for young researchers on Human-friendly robotics</i> ", at Palazzo dell'Innovazione e della Conoscenza, Naples, Italy. 7 hours
22-26 Sep 2008	Workshop on " <i>Grasp and task learning by imitation</i> ", at IROS 2008, Nice, France. 8 hours.
15 Sep 2008	" <i>1st Dexmart Internal Workshop</i> ", at LAAS-CNRS, Toulouse, France. 4 hours.
Jul 2008	Doctorate class on " <i>Analysis, Simulations and Applications of Nonsmooth Systems</i> ", delivered by Prof. P.T.Piironen, at University of Naples Federico II. 8 hours.
Jun 2008	Doctorate class on " <i>H-infinity optimal control</i> ", delivered by Prof. A.Pironti, at University of Naples Federico II. 15 hours.
31 May 2008	Workshop on " <i>Multimodal Interaction Through Haptic Feedback</i> ", MITH 2008, Napoli. 8 hours.
May 2008	Doctorate class on " <i>Fuzzy Logic and Soft Computing</i> ", delivered by Prof. L.Iandoli, at University of Naples Federico II. 16 hours.
14 Mar 2008	Seminar on " <i>Robotics and disability</i> ", delivered by Prof. A.Casals, at University of Naples Federico II. 2 hours.
20 Feb 2008	Seminar as part of the International Congress " <i>Robotics: A New Science</i> ", Accademia Nazionale dei Lincei, Roma. 10 hours.
24 Oct 2007	Seminar on " <i>Art and Robotics</i> ", delivered by Prof. Katsushi Ikeuchi, Pan, Palazzo delle arti, Naples. 4 hours.
14 Apr 2007	Tutorial on " <i>Nonlinear control of flexible joint robots</i> ", at ICRA 2007, Roma. 8 hours.

## PhD school and courses

26-30 Nov 2012	Doctorate school " <i>Advanced Robotic Grasping</i> " delivered by Prof. Domenico Prattichizzo at University of Siena, 40 hours.
18-23 Sep 2011	Doctorate school HYPER 2011/IEEE Summer school on " <i>Neurorehabilitation: Emerging Technologies</i> ", La Alberca, Salamanca (Spagna). 40 hours.
15 Jun 2011	Doctorate school "F. Gasparini", lecture on " <i>Bioelectric and biomagnetic signals of the brain: from measurement to source reconstruction</i> ", University of Bologna. 8 hours.
12-17 Jul 2010	Doctorate school SIDRA Antonio Ruberti on " <i>Robotics</i> ", delivered by Prof. G. Oriolo, Prof. D. Prattichizzo and Prof. L. Villani, at Bertinoro Congress Center. 40 hours.
13-18 Jul 2009	Doctorate school SIDRA Antonio Ruberti on " <i>Lyapunov techniques for robust control of dynamic systems</i> ", delivered by Prof. F. Blanchini, at Bertinoro Congress Center. 40 hours.
16-20 Feb 2009	Doctorate school on " <i>Information Engineering</i> ", at University of Naples Federico II. 40 hours.
14-19 Jul 2008	Doctorate school SIDRA Antonio Ruberti on " <i>Introduction on non linear systems control</i> ", in Italian, delivered by Prof. A.Isidori, at Bertinoro Congress Center. 40 hours.
2008	M.SC Course on " <i>Controlli non lineari I</i> ", delivered by Prof. Mario Di Bernardo, University of Naples Federico II. 60 hours.
2008	M.SC Course on " <i>Identificazione e Controllo Ottimo</i> ", delivered by Prof. Francesco Garofano, University of Naples Federico II. 60 hours.
2008	M.SC Course on " <i>Controllo Robusto</i> ", delivered by Prof. Alfredo Pironti, University of Naples Federico II. 60 hours.
2008	M.SC Course on " <i>Robotica Avanzata</i> ", delivered by Prof. Bruno Siciliano, University of Naples Federico II. 60 hours.

## Teaching activities

From 2018	Professor for the class " <i>Robotics for Bioengineering</i> ", 'Laurea Specialistica' on Industrial Bioengineering, School of Engineering, University of Napoli Federico II.
2008-until now	Teaching assistant for the class " <i>Robot Control</i> ", delivered by Prof. B. Siciliano, 'Laurea Specialistica' degree, School of Engineering, University of Napoli Federico II.
2014-2015	Teaching assistant for the class " <i>Automatica</i> ", delivered by Prof. Luigi Villani, 'Laurea Triennale' degree, School of Engineering, University of Napoli Federico II.
2008-2009	Teaching assistant for the class " <i>Fondamenti di Automatica</i> ", delivered by Prof. Luigi Villani, 'Laurea Triennale' degree, School of Engineering, University of Napoli Federico II.

## Summary about teaching activities

Teaching support	During the above mentioned teaching activities, Fanny Ficuciello carried out several lessons both theoretical and practical, giving also personal didactic assistance to the students.
Supervision of students during their Bachelor and Master theses	Supervisor of around 50 students from the Faculty of Engineering, for both Bachelor degree and Master's degree thesis. This supervision activity has led to the realization of a number of interesting applications in the robotic field with both experimental work in laboratory and theoretical/simulation studies. From students supervision activities have followed later also scientific publications.

## Personal skills and competences

Mother tongue(s)	<b>Italian language</b>
Other language(s)	English language
Computer skills and competences	
Programming languages	Very good knowledge of MATLAB-SIMULINK environment, LaTeX, FRI Library. Good knowledge of the programming language C++. Good knowledge of, 20-sim, Graspit!, Inkscape. Good knowledge of the robot oriented programming language RAPID. Basic knowledge of the programming languages BASIC, PASCAL, FORTRAN. Basic knowledge of ROS (Robot Operating Systems).
Middleware	Windows. Linux.
Operating systems	

## Additional information

Hobbies and personal interests	Sports: Swimming, Yoga Musical instruments: Piano
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Fanny Ficuciello is aware that, pursuant to and in accordance with Art. 26 about the law 15/68, mendacious statements, false acts and use of false acts are punishable pursuant to and in accordance with the penal code and special laws. The undersigned allows the use of personal data pursuant to and in accordance with Law 196/03.