

# Europass Curriculum Vitae



## Personal information

Surname(s) / First name(s) **Ferraguti Federica**  
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Nationality(-ies) Italian  
Date of birth September 21st, 1986  
Gender Female



## Education

Dates	January 2012 – March 2015
Certificate or diploma	<b>PhD in Industrial Innovation Engineering</b> <i>Curriculum Mechatronic Engineering</i> XXVII Doctoral period - Academic Year 2012
Thesis	Interaction Control for Autonomous Robotic Surgery
Main topic	Surgical Robotics.
Other research topics	Development of control algorithms and teleoperation systems, control architectures for human-robot cooperation and interaction.
Institution	<i>University of Modena e Reggio Emilia</i> DISMI - Department of Sciences and Methods for Engineering <i>ARSCoNTrol Lab (Automation, Robotics and System Control)</i>
Dates	August 2013 – December 2013
Position	<b>Visiting researcher</b>
Main topics	Surgical Robotics (I-SUR project). <ul style="list-style-type: none"><li>– Development of the interactive controller and the teleoperation system for the I-SUR robot.</li><li>– Development of the overall software architecture using the OROCOS framework and the XENOMAI realtime framework for Linux.</li><li>– Integration of the contributions of the different partners and development of the communication protocols.</li><li>– Development and integration of a planning algorithm for computation of the number and the pose of the iceballs in the cryoablation procedure.</li><li>– Implementation of the demonstrative setup for the autonomous needle insertion and cryoablation of the kidney tumor.</li></ul>
Institution	SUPERVISOR: Prof. Roger Gassert <i>ETH - Zurich, Switzerland</i> <i>Rehabilitation Engineering Lab</i>

Dates January 2012  
Certificate or diploma **Professional practice examination in Industrial Engineering**  
Institution *University of Modena and Reggio Emilia*

Dates September 2008 – April 2011  
Certificate or diploma **Master's Degree in Industrial and Management Engineering**  
Thesis Development of a vision - force control strategy for the localization and grasping of objects by means of an anthropomorphic robot provided with a hand.  
In Italian: Sviluppo di una strategia di controllo visione - forza per la localizzazione e la presa di oggetti mediante un robot antropomorfo dotato di mano.  
Mark 110/110 summa cum laude  
Institution *University of Modena and Reggio Emilia*

Dates July 2010 – August 2010  
Certificate or diploma **English course**  
Institution *Malvern House - London*

Dates October 2005 – July 2008  
Certificate or diploma **Bachelor's Degree in Industrial and Management Engineering**  
Thesis Experimental validation of a new algorithm for the coordination of an AGVs fleet moving on preassigned routes.  
In Italian: Validazione sperimentale di un nuovo algoritmo per la coordinazione di una flotta di AGV che si muovono su percorsi preassegnati.  
Mark 109/110  
Institution *University of Modena and Reggio Emilia*

Dates September 2000 – July 2005  
Certificate or diploma **Scientific High School Diploma**  
Mark 100/100  
Institution *Liceo Scientifico Wiligermo, Modena, Italy*

## Teaching

Dates Academic year 2016-2017  
Course **Teoria dei Sistemi e del Controllo**  
Program Master's Degree course in Informatic Engineering  
Institution *University of Modena and Reggio Emilia*

## Research projects

Dates February 2016 – today  
Project **SYMPLEXITY**  
Project type H2020-FoF-2014  
Objective In nearly every sector of industrial manufacturing polishing techniques are used. But often manual polishing is the only option because the tasks are too complex to be automated. Therefore in SYMPLEXITY Symbiotic Human-Robot Solutions for Complex Surface Finishing Operations are developed.  
Main activities Coordinator of the Work Package on Human-Machine-Interfaces and data handling.

Dates January 2015 – today  
Project **ADAPTIVE MANUFACTURING**

Project type	National Project <b>Cluster Nazionale Fabbrica Intelligente</b>
Objective	Development of robotic systems to improve the flexibility in the manufacturing factories.
Main activities	Development of robot controllers to allow and ease the cooperation between the human operator and the robot.
Dates	May 2011 – December 2014
Project	<b>ISUR - Intelligent Surgical Robotics</b>
Project type	Funded under 7th FWP, Project Reference n. 270396
Objective	Development of a robotic system to carry out autonomously simple surgical actions, such as puncturing, cutting and suturing.
Main activities	Development of a task-level controller to execute the surgical actions and integration of the overall control architecture.

## Work experience

Dates	February 2017 – today
Position	<b>Assistant professor</b>
Employer	<i>University of Modena and Reggio Emilia</i> <b>DISMI</b> - Department of Sciences and Methods for Engineering via Amendola, 2 - 42122 Reggio Emilia, Italy
Main topics	Human-robot cooperation and interaction, teleoperation, control of robots. Implementation of physical human-robot interaction systems in the industrial field.

Dates	March 2015 – January 2017
Position	<b>Research fellow</b>
Employer	<i>University of Modena and Reggio Emilia</i> <b>DISMI</b> - Department of Sciences and Methods for Engineering via Amendola, 2 - 42122 Reggio Emilia, Italy
Main topics	Human-robot cooperation and interaction, teleoperation, control of robots. Involved in the National Project <b>Cluster Nazionale Fabbrica Intelligente</b> - <i>ADAPTIVE MANUFACTURING</i> , aimed at developing robotic systems to improve the flexibility in the manufacturing factories. Collaboration with different companies for research projects.

Dates	May 2011 – December 2014
Position	<b>Research fellow</b>
Employer	<i>University of Modena and Reggio Emilia</i> <b>DISMI</b> - Department of Sciences and Methods for Engineering via Amendola, 2 - 42122 Reggio Emilia, Italy
Main topics	Development of control strategies for surgical robots and teleoperation systems. Involved in the European Project <b>I-SUR - Intelligent Surgical Robotics</b> funded under 7th FWP (Seventh Framework Programme), Project Reference n. 270396, aimed at developing a robotic system to carry out autonomously simple surgical actions, such as puncturing, cutting and suturing.

Dates	September 2010 – April 2011
Position	Research internship within the thesis project for the Master's Degree
Employer	<b>SIR S.p.A</b> - <i>Soluzioni Industriali Robotizzate</i> Research and Development division Strada Nazionale del Canaletto, 450 - 41122 Modena, Italy

Main activities	Development of a novel vision-force control strategy for the localization and grasping of objects by means of an anthropomorphic robot (ABB IRB 140) provided with a mechatronics hand (Schunk Dextrous Hand - SDH).
Dates	April 2008 – July 2008
Position	Research internship within the thesis project for the Bachelor's Degree
Employer	<i>University of Modena and Reggio Emilia</i> <b>DISMI</b> - <i>Department of Sciences and Methods for Engineering</i> via Amendola, 2 - 42122 Reggio Emilia, Italy
Main activities	Experimental validation of a new algorithm for the coordination of an AGVs fleet moving on preassigned routes within a warehouse. The validation was performed by means of Lego Mindstorms NXT and the programming language MATLAB.

## Patents

Patent application for industrial invention.  
**Title: Metodo per il trattamento superficiale di un manufatto.**  
*Company:* GAIOTTO Automation.  
*Patent application number:* 102016000097482  
*Designated inventors:* Fantuzzi Cesare, Secchi Cristian, Ferraguti Federica, Talignani Landi Chiara, Nolli Marco.  
 Date of application: 28/09/2016. Under evaluation.

## Personal skills and competences

Mother tongue(s)

*Self-assessment*  
*European level<sup>(\*)</sup>*

### Italian

Understanding		Speaking		Writing	
Listening	Reading	Spoken interaction	Spoken production		
C1 Proficient user	C1 Proficient user	C1 Proficient user	C1 Proficient user	C1 Proficient user	C1 Proficient user

### English

<sup>(\*)</sup> *Common European Framework of Reference (CEF) level*

Computer skills and technical competences

- Programming: Good competences  
 Programming languages: C, C++, Microsoft Visual Basic .NET  
 Engineering software: MATLAB, HALCON machine vision libraries, OROCOS framework.  
 Robots programming languages: RAPID (ABB), KAREL (FANUC)
- Microsoft Office Package: Advanced knowledge  
 (Word, Excel, Access, PowerPoint, FrontPage and Outlook)
- Operating systems: Good competences  
 Windows (2000, XP, 7, Vista, 10) and Linux.
- Robotic systems: Good competences  
 ABB IRB-140, Barrett WAM 7-DOF, Kuka Light Weight Robot, Universal Robot 5, I-SUR Robot, FANUC LR Mate 200iD/7L.

ECDL certified (European Computer Driving Licence)

Social and organizational skills  
and competences

Good team job's skills, developed working at the different projects and interacting with the Italian and European partners of the consortia.

- *Teacher assistant during the courses of **Automatic Controls** at the University of Modena and Reggio Emilia - Industrial and Management Engineering (2012-2016).*
- *Swimming teacher (2004-today). Swimming course at Polisportiva Polivalente Maranello (2004-2014), Piscina Accademia Militare (2015-today), Piscina Ondablu Formigine (2014-today).*
- *Swimming and Lifesaving Coach (2008-today). Swimming team Nuotatori Modenesi (2008-2014), Swimming team ASI Nuoto Modena (2015-today).*
- *Teacher and organizer of lifeguards courses (2014-2015).*

Good ability to organize my own work, defining priorities and responsibilities, developed also playing sport at high levels (Swim and Lifesaving with participation in the National Team) for 20 years.

Driving license

Italian driving license

## Scientific publications

### International journals

- [1] S. Farsoni, C. Talignani Landi, F. Ferraguti, C. Secchi, and M. Bonfè. **Compensation of Load Dynamics for Admittance Controlled Interactive Industrial Robots using a Quaternion-based Kalman Filter.** *IEEE Robotics and Automation Letters (RA-L)*, 2017
- [2] N. Preda, F. Ferraguti, G. De Rossi, C. Secchi, R. Muradore, P. Fiorini, and M. Bonfè. **A Cognitive Robot Control Architecture for Autonomous Execution of Surgical Tasks.** *Journal of Medical Robotics Research (JMRR)*, 2016
- [3] F. Ferraguti, N. Preda, A. Manurung, M. Bonfè, O. Lambercy, R. Gassert, R. Muradore, P. Fiorini, and C. Secchi. **An Energy Tank-Based Interactive Control Architecture for Autonomous and Teleoperated Robotic Surgery.** *IEEE Transactions on Robotics (T-RO)*, 31(5):1073–1088, 2015
- [4] P. Fiorini, R. Muradore, G. Akgun, D. E. Barkana, M. Bonfè, F. Boriero, G. De Rossi, R. Dodi, O. J. Elle, F. Ferraguti, L. Gasperotti, R. Gassert, K. Mathiassen, D. Handini, O. Lambercy, L. Li, M. Kruusma, A. Manurung, G. Meruzzi, P. Nguyen, N. Preda, A. Ristolainen, A. Sanna, C. Secchi, and A. E. Yantac. **Development of a Cognitive Robotic System for Simple Surgical Tasks.** *International Journal of Advanced Robotic Systems (IJARS)*, 12(37):1–20, 2015

### International conferences

- [5] F. Ferraguti, C. Talignani Landi, C. Secchi, M. Nolli, M. Pesamosca, and C. Fantuzzi. **Walk-Through Programming for Industrial Applications.** In *Proceedings of the 2017 International Conference on Flexible Automation and Intelligent Manufacturing (FAIM)*, Modena, Italy, Jun 2017
- [6] C. Talignani Landi, F. Ferraguti, L. Sabattini, C. Secchi, and C. Fantuzzi. **Admittance Control Parameter Adaptation for Physical Human-Robot Interaction.** In *Proceedings of the 2017 IEEE International Conference on Robotics and Automation (ICRA)*, Singapore, May-Jun 2017
- [7] C. Talignani Landi, F. Ferraguti, C. Secchi, and C. Fantuzzi. **Tool Compensation and Force Password Identification on Admittance-Controlled Robots in Walk-Through Programming.** In *Proceedings of the 2016 Human-Friendly Robotics Workshop (HFR)*, Genova, Italy, Sep 2016
- [8] C. Talignani Landi, F. Ferraguti, C. Secchi, and C. Fantuzzi. **Tool Compensation in Walk-Through Programming for Admittance-Controlled Robots.** In *Proceedings of the 2016 Annual Conference of the IEEE Industrial Electronics Society (IECON)*, Firenze, Italy, Oct 2016
- [9] F. Ferraguti, C. Fantuzzi, and C. Secchi. **Optimizing the Use of Power in Wave Based Bilateral Teleoperation.** In *Proceedings of the 2016 IEEE International Conference on Intelligent Robots and Systems (IROS)*, Daejeon, Korea, Oct 2016
- [10] C. Secchi, F. Ferraguti, and C. Fantuzzi. **Catching the Wave: a Transparency Oriented Wave Based Teleoperation Architecture.** In *Proceedings of the 2016 IEEE International Conference on Robotics and Automation (ICRA)*, Stockholm, Sweden, May 2016
- [11] F. Ferraguti, N. Preda, M. Bonfè, and C. Secchi. **Bilateral Teleoperation of a Dual Arms Surgical Robot with Passive Virtual Fixtures Generation.** In *Proceedings of the 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, Sep-Oct 2015
- [12] R. Muradore, G. De Rossi, M. Bonfè, N. Preda, C. Secchi, F. Ferraguti, and P. Fiorini. **Autonomous Execution of Surgical Tasks: the Next Step in Robotic Surgery.** In *Proceedings of the 2015 Hamlyn Symposium on Medical Robotics*, London, UK, Jun 2015

- [13] F. Ferraguti, N. Preda, G. De Rossi, M. Bonfè, R. Muradore, P. Fiorini, and C. Secchi. **A Two-Layer Approach for Shared Control in Semi-Autonomous Robotic Surgery**. In *Proceedings of the 14th European Control Conference (ECC)*, Linz, Austria, Jul 2015
- [14] M. Bonfè, N. Preda, C. Secchi, F. Ferraguti, R. Muradore, L. Repele, G. Lorenzi, and P. Fiorini. **Distributed Control Architecture for Automated Surgical Task Execution with Coordinated Robot Arms**. In *Proceedings of the 19th World Congress of the International Federation of Automatic Control (IFAC WC)*, Cape Town, South Africa, Aug 2014
- [15] R. Dodi, F. Ferraguti, A. Ristolainen, C. Secchi, and A. Sanna. **Planning and Simulation of Percutaneous Cryoablation**. In *Proceedings of the 2nd AASRI Conference on Computational Intelligence and Bioinformatics (CIB)*, Jeju Island, Korea, Dec 2013
- [16] M. Bonfè, N. Preda, C. Secchi, F. Ferraguti, R. Muradore, L. Repele, G. Lorenzi, L. Gasperotti, and P. Fiorini. **Automated Surgical Task Execution: the Needle Insertion Case**. In *Joint Workshop on New Technologies for Computer/Robot Assisted Surgery (CRAS)*, Verona, Italy, Sep 2013
- [17] F. Ferraguti, N. Golinelli, C. Secchi, N. Preda, and M. Bonfè. **A Component-Based Software Architecture for Control and Simulation of Robotic Manipulators**. In *Proceedings of the 2013 IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*, Cagliari, Italy, Sep 2013
- [18] M. Torricelli, F. Ferraguti, and C. Secchi. **An Algorithm for Planning the Number and the Pose of the Iceballs in Cryoablation**. In *Proceedings of the 35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Osaka, Japan, Jul 2013
- [19] F. Ferraguti, C. Secchi, and C. Fantuzzi. **A Tank-Based Approach to Impedance Control with Variable Stiffness**. In *Proceedings of the 2013 International Conference on Robotics and Automation (ICRA)*, Karlsruhe, Germany, May 2013