

CURRICULUM VITAE

PERSONAL INFORMATION

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Place and Date of birth	ISEO (BS), June 26th, 1979

1 RESEARCH ACTIVITY

1.1 QUALITY INDEXES

1.1.1 GOOGLE SCHOLAR

	All	Since 2014
Citations	584	541
h-index	13	13
i10-index	21	18

1.1.2 ELSEVIER SCOPUS

Documents by author	Total citations	h-index:
68	412 by 324 documents	11

1.1.3 CLARIVATE ANALYTICS

Docs	Times Cited	Citation Impact	%Q1	%Top 1%	h-index
55	233	1.61	55%	0	8

1.1.4 REASERCHGATE

Total Research Interest	Citations	Recommendations	Reads
419,4	420	16	11544

1.2 RESEARCH FIELDS

1.2.1 ELASTO-DYNAMICS MODELLING AND CONTROL

DEC/2011 - ON GOING

The attempt to use industrial robots for technological and interaction tasks, i.e., robotic machining and robotic assembling, implies, on the one hand, the knowledge of the interaction force, on the other hand, the reduction of physical sensors. The research is aimed at defining the best models with lumped-parameters (both rigid and elasto-dynamic models) for the prediction of the behavior of a manipulator's cups during the execution of generic trajectories. Integration of advanced models in robust/optimal adaptive controls. Furthermore, the aim of this work is the development of a virtual force sensor to estimate the interaction force.

Related Pojects: PR.1, PR.3, PR.5, PR.8

Related Publications: PU.4, PU.10, PU.15, PU.15, PU.16

Team: Beschi, Villagrossi, Vertechy (UniBo), Bocchieri (UniBo) Visioli (UniBS), Ghidini

1.2.2 FORCE AND IMPEDANCE CONTROL

JUL/2011 - ON GOING

The research focuses on force-tracking impedance controllers granting a free-overshoots contact force (mandatory performance for many critical interaction tasks such as polishing) for partially unknown interacting environments (such as leather or hard-fragile materials). The robot has to gently approach the target environment (whose position is usually not well-known), then execute the interaction task. The research deals with both the free space approaching motion and the succeeding contact task without switching from different control logics.

Related Pojects PR.1, PR.3, PR.4, PR.8, PR.10, PR.13, PR.24
Related Pubblications PU.7, PU.11, PU.14,, PU.15, PU.16
Team Roveda (CNR), Beschi (CNR), Villagrossi (CNR), Legnani (UniBS), Marini (CNR)

1.2.3 ROBOTIZED PROCESSES AND CONTROL

DEC/2011 - ON GOING

Investigation on the adoption of industrial robots for additive and traditional technologies and processes. Laser-based direct metal deposition (LBDMD) is a promising additive manufacturing technology that is well suited for the production of complex metal structures, low-volume manufacturing, and high-value component repair or modification. It finds broad application in the automotive, biomedical, and aerospace industries. The research focuses on the optimization of the path planning when redundant axes are present (robot + external axes) and the operations are only partially constrained in the Cartesian space. Furthremore, the integrated control of the robot motion and the process may increase dramatically the results in both additive and subtractive technologies. Wlhint the research fied, methodologies on virtual sensors exploiting the hindsight robot knowledge about the process are also investigated.

Related Pojects PR.8, PR.4, PR.14, PR.15, PR.16, PR.17
Related Pubblications PU.2, PU.3, PU.4, PU.5, PU.6, PU.9, PU.10, PU.11, PU.17, PU.19, PU.20
Team Roveda (CNR), Beschi (CNR), Villagrossi (CNR), Legnani (UniBS), Pulikottil (CNR), Simoni (UniBs), Visioli (UniBs), Pola (UniBs), Previtali (PoliMi)

1.2.4 LEAD-THROUGH PROGRAMMING

DEC/2011 - ON GOING

Human-robot cooperation is increasingly demanded in industrial applications. Many tasks require the robot to enhance the capabilities of humans, allowing them to execute onerous tasks or improving their functionalities. Besides wearable robotics, standard industrial manipulators are common solutions adopted to empower humans. The research focus on control approaches for assisting human operator in onerous industrial applications. The methodologies focused on the mecatronic design of new devices (up to 2015) and then in control strategies to ease the Cartesian lead through programming of the standard collaborative robot (with fully-sensorized joints)

Related Pojects PR.1, PR.2, PR.3, PR.4, PR.8, PR.11
Related Pubblications PU.16, PU.18
Team Parazzoli, Cevasco, Villagrossi, Ghidini, Beschi, Roveda, Plokottil

1.2.5 DIS/ASSEMBLY

JAN/2013 - ON GOING

The productivity associated with commonly available dis/assembly methods today seldomly makes dis/assembly among the most request from industrial practice. Remarkably, economic models demonstrate that the efficiency of disassembly operations should be increased an order of magnitude to assure the competitiveness of ecologically preferred, disassembly oriented end-of-life scenarios for the large waste of electric and electronic equipment (WEEE) streams.

Related Pojects PR.1, PR.2, PR.4, PR.13, PR.18, PR.19
Related Pubblications PU.9, PU.10, PU.18
Team Roveda (CNR), Beschi (CNR), Franceshi (CNR)

1.2.6 ROBOT KINEMATICS ANALYSIS AND SYTHESIS

JUL/2017 – ON GOING

Research in the optimum design of a manipulator has taken different directions. One of those was to define the kinematic or dynamic parameters that determine the characteristics of the manipulator in order to justify the best design. In most of the studies that are under way, the possible solutions are restricted to one feasible region in which all of the geometrical and dynamic restrictions as well as the power input on the drives have to be met with. The research aims at investigating solutions through an energy approach where the optimum design in a multiple link system is achieved by redundant actuation and elastic elements in the chain.

Related Pojects PR.1, PR.5, PR.10
Related Pubblications PU.21
Team Roveda, Vertechy (UniBo)

1.2.7 ON-LINE MOTION PLANNING FOR HUMAN-ROBOT COOPERATION

JUL/2014 – ON GOING

Le attività di ricerca sulla cooperazione uomo-robot (HRC) si sono concentrate sullo sviluppo di nuove metodologie per la generazione on-line di traiettorie di robot sicure durante attività collaborative. Random

Related Pojects PR.2, PR.3, PR.4, PR.6, PR.23
Related Pubblications PU.1, PU.7
Team Pellegrinelli (CNR), Beschi (CNR), Faroni (CNR), Mutti (CNR), Giorgio Nicola (CNR-UniPD)

1.2.8 OFF-LINE MOTION PLANNING FOR HUMAN-ROBOT COOPERATION JUL/2014 – ON GOING

Step-changes in safety technologies have opened robotic cells to human workers in real industrial scenarios. However, the lack of methodologies for a productive and effective motion planning and scheduling of human–robot cooperative (HRC) tasks is still limiting the spread of HRC systems. Standard methods fail due to the high-variability of the robot execution time, caused by the necessity to continuously modify the robot motion to grant human safety. In this context, the research focuses on motion planning and scheduling methodology that (i) provides a set of robot trajectories for each task and (ii) optimizes, at relevant time steps, a task plan, minimizing the cycle time through trajectory selection, task sequence, and task allocation. Statistical off-line methods are deeply-investigated.

Related Pojects PR.2, PR.3, PR.4, PR.6
Related Pubblications PU.5, PU.6, PU.7, PU.11, PU.13
Team Pellegrinelli (CNR), Beschi (CNR), Faroni (CNR), Mutti (CNR), Giorgio Nicola (CNR-UniPD)

1.2.9 ROBOTIC RESOURCES ALLOCATION AND OPTIMIZATION JUL/2014 – DEC/2016

Support of internal co-tutoring of Stefania Pellegrinelli's doctoral thesis to the development of methodologies for off-line programming of multi-robot cells in order to optimize cycle time and avoid collisions between robots and objects that constitute the environment. Study of the behavior of the person in the space of a robot, and optimization of the configuration of the cell

Related Pojects PR.2, PR.4, PR.24
Related Pubblications PU.12, PU.19
Team Stefania Pellegrinelli (CNR)

1.2.10 REHABILITATION ROBOTICS JUL/2009 - DEC/2012

The increasing interest from the medical rehabilitation world towards robotic technologies for the recovery of neuromotor functions has led to the development of the Rehabilitation Multi Sensory Room (RehaMSR), a multisensory robotic platform to be used as an aid to neuromotor rehabilitation for the execution of rehabilitation exercises. This platform consists of a set of hardware and software components coordinated by a central control system, able to interact with the patient and adapt to it.

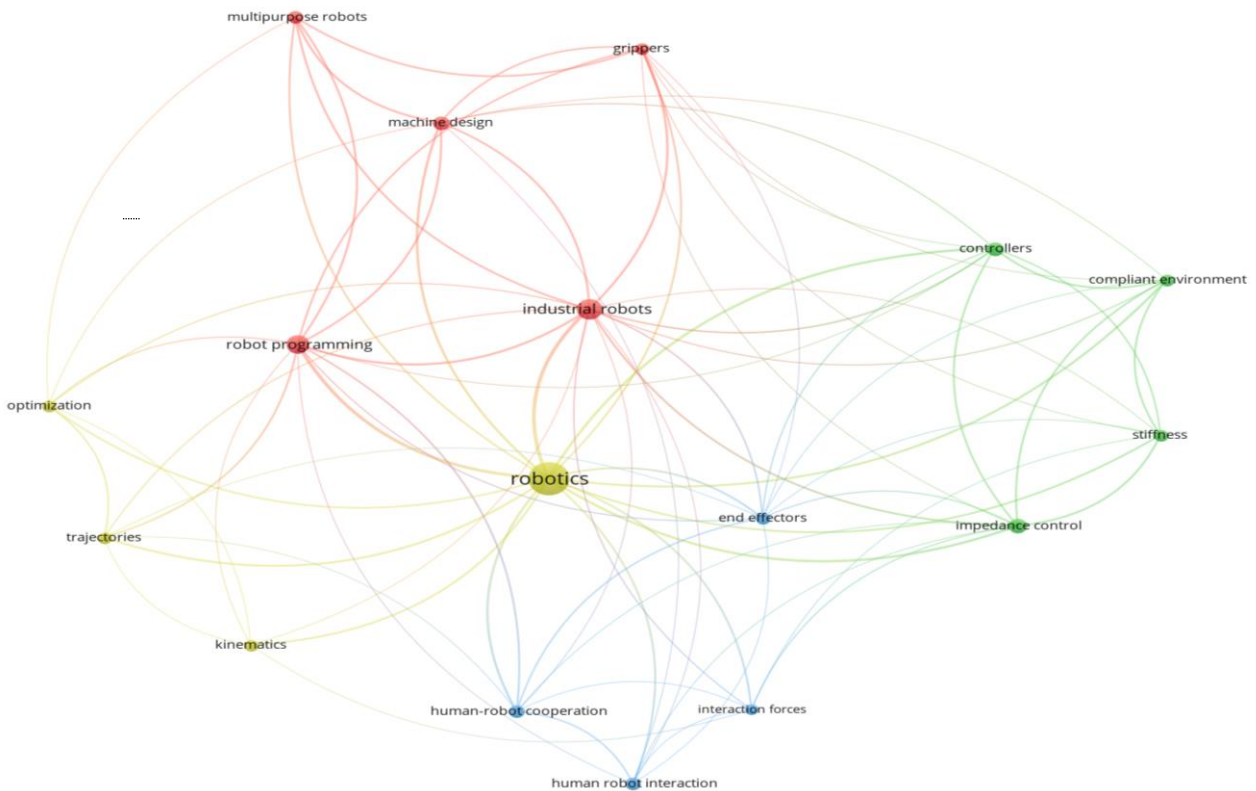
Related Pojects PR.20, PR.21
Related Pubblications PU.18
Team Matteo Malosio (CNR), Marco Caimmi (CNR)

1.2.11 HUMAN-ROBOT SAFE INTERACTION JUL/2008 – DEC/2014

Activities Development of control algorithms for collision avoidance and online rescheduling based on the estimated position of people within the robot's operating space. Development of methodologies for functional safety certification of non-certified sensor networks.

Related Pojects PR.1, PR.4, PR.10
Related Pubblications [PU.37]-[PU.43] [PU.94]0[PU.95]PU.21
Team Federico Vicentini (CNR)

1.2.12 CONNECTION DIAGRAM OF PUBBLICATIONS KEYWORD (VOSVIEWER, SCOPUS DATABASE)



2 HEAD OF ROBOT MOTION CONTROL AND ROBOTIZED PROCESSES LABORATORY OF IRAS-DIVISION WITH CNR-STIIMA

Inside the IRAS division of CNR-STIIMA, I have been appointed for the coordination of the activities related to the robot motion control and robotized process in 2014, with the possibility to handle the budget related to the project from May 2014.

2.1 PRODUCTIVITY INDEXES

2.1.1 PUBLICATIONS OVER THE LAST 5 YEAR (2014-2015)

	n. of items
INTERNATIONAL ISI JOURNAL	20
INTERNATIONAL PEER REVIEWD JOURNAL	9
BOOK CHAPTER	0
ABSTRACT ON ISI JOURNAL	0
MONOGRAPHY	1
PEER REVIEWED INTERNATIONAL CONFERENCE	20
PEER REVIEWED ITERNATIONAL WORKSHOP	0
PATENT	4

2.1.2 MEMBERS OF THE COORDINATED TEAM

	2014	2015	2016	2017	2018	2019
1. Pellegrinelli Stefania		TD	TD	TD	TD	TD
2. Manuel Beschi	TD	TD	TD	TD	TD	TI
3. Loris Roveda	FR	FR	TD	TD	TD	TD
4. Enrico Villagrossi	PhD/ RF	PhD/ RF	PhD/ RF	PhD/ RF	RF	RF
5. Paolo Magnoni	PhD/ RF	PhD/ RF	PhD/ RF	PhD/ RF	PhD/ RF	RF
6. Tito Dinon	RF					
7. Alberto Marini		RF	RF			
8. Terrin Pulikottil Babu				RF	RF	RF

9. Federico Lorenzo Moro	SRF	SRF	SRF											
10. Paolo RFanceschi								RF	RF	RF	RF			
11. Stefano Mutti								RF	RF	RF	PhD	PhD		
12. Giorgio Nicola								RF	RF	PhD	PhD	PhD		
13. Guido Boccheri								PhD	PhD	PhD	PhD	PhD		
14. Stefano Ghidini								RF	RF	RF	RF	RF		
15. Marco Faroni										RF	RF	RF		
16. Arash Abdi										RF	RF	RF		
Lab Personnel			5	5	6	6	6	8	7	8	10	10	9	9

Tl: permanent staff; TD: fixed term staff; RF: Research Fellow; SRF: Senior Research Fellow; PhD student/with fellowship;

2.1.3 PROJECTS SUMMARY OVER THE LAST 5 YEAR (2014-2019)

Type	Role	Num Projects	overall stiima-budget	stiima-budget from 2014 to 2019
International	Coordinator, Funding Raised by Nicola Pedrocchi	1	807.625,00€	672.500,00€
International	Principal Investigator, Funding Raised by Nicola Pedrocchi	3	1.117.582,00€	829.417,00€
International	Scientific Representative, Funding Raised by the PI of the project with a strong support by Nicola Pedrocchi	4	741.578,00€	479.078,00€
International	Team Member, Limited Support in Funding Raising	1	856.993,00€	214.250,00€
National	Principal Investigator, Funding Raised by Nicola Pedrocchi	1	700.000,00€	420.000,00€
National	Scientific Representative, Funding Raised by PI of the project with a strong support by Nicola Pedrocchi	2	220.500€	172.500€
National	Team Member, Support in Funding Raising	9	805.966,08€	605.000,00€
Ind. Contract	Principal Investigator, Funding Raised by Nicola Pedrocchi	1	15.000,00€	15.000,00€
Ind. Contract	Scientific representative Limited Support in Funding Raising	1	150.000,00€	150.000,00€
Tot		23	5.415.244,80€	3.981.035,00€

2.2 INTERNATIONAL FUNDED PROJECTS

2.2.1 COORDINATOR

[PR.1] EU-H2020-CLEANSKY2-EURECA

From-to 2/2017 - 2/2020

Budget Tot. 1.403.000€ STIIMA 807.625€

Website www.cleansky-eureca.com

EU Link <https://cordis.europa.eu/project/rcn/208063/factsheet/en>

Team Loris Roveda, Paolo Franceschi, Stefano Mutti, Manuel Beschi, Stefano Ghidini, Arash Abdi

Collaboration IT+Robotics, UniPD, PROTOM spa, Fraunhofer-IFAM, IK4-CEIT

Role Coordinator, 1st representative, Scientific Representative, WP Leadership of WP2 and WP3

Description EURECA put the worker needs at the centre of the working scene. The increase in productivity, as well as the ergonomics improvement, are the main goal of the project. Automation-as-needed is therefore considered as the winning automation strategy for the next aircraft interiors assembly. The EURECA project framework is dedicated to innovating the assembly of aircraft interiors using advanced human-robot collaborative solutions. A pool of devices/frameworks will be deployed for teaming up with human operators in a human-centred assistive environment. The main benefits are the substantial improvement of ergonomics in workloads, the increase in the usability level of assembly actions, the digitalization of procedures with logs and visuals for error prevention through dedicated devices. Solutions are peculiarly designed for addressing both the working conditions and the management of the cabin-cargo installation process, such as limited maneuvering space, limited weight allowed on the cabin floor, reducing lead time and recurring costs. With this aim, EURECA brings together research advancements spanning across design, manufacturing, and control, robotized hardware, and software for the specific use-cases in the cabin-cargo final assembly.

2.2.2 PRINCIPAL INVESTIGATOR / CNR FIRST REPRESENTATIVE / BUDGET RESPONSABILITY

[PR.2] H2020-ICT-2018 -1 – RIA – SHAREWORK

From-to 11/2018 – 11/2022

Budget Tot. 7.351.467€ CNR 605.875€ STIIMA 362.500€

Website <https://sharework-project.eu>

EU link <https://cordis.europa.eu/project/rcn/220005/factsheet/en>

Team Stefano Mutti, Manuel Beschi, Marco Faroni, Giorgio Nicola

Colaboration CNR-ISTC, EURECAT, Fraunhofer-IWS, TUDA, LMS, CEMBRE, MCM, AACHEN University

Role Principal Investigator, CNR 1st representative, WP Leadership of WP3
Description SHAREWORK's main objective is to endow an industrial work environment of the necessary "intelligence" and methods for the effective adoption of Human Robot Collaboration (HRC) with not fences, providing a system capable of understanding the environment and human actions through knowledge and sensors, future state predictions and with the ability to make a robot act accordingly while human safety is guaranteed and the human-related barriers are overcome. SHAREWORK will develop the needed technology for facing the new production paradigm compiling the necessary developments in a set of modular hardware, software, and procedures to face different HRC applications in a systematic and effective way.

[PR.3] H2020-FoF-2014 – IA- FOURBYTHREE

From-to 12/2014 - 12/2017
Budget Tot. 6.859.721,75€ CNR 747.015,00 CNR-STIIMA € 447.182,50
Website www.fourbythree.eu
EU link <https://cordis.europa.eu/project/rcn/193464/reporting/en>
Team Manuel Beschi, Stefano Ghidini, Stefania Pellegrinelli,
Collaboration IK-Tekniker, DFKI, Queens' Mary Uni., Fraunhofer-IFF
Role Principal Investigator, CNR 1st representative, WP Leadership: WP4
Description FourByThree proposes the development of a new generation of modular industrial robotic solutions that are suitable for efficient task execution in collaboration with humans in a safe way and are easy to use and program by the factory workers. FourByThree has developed a set of components that help to create a new generation of modular industrial robotic solutions that are suitable for efficient task execution in collaboration with humans in a safe way and are easy to use and program by the factory worker. As a result of the project, system-integrators have at their disposal a kit of hardware and software elements that allow creating the custom robotic solution that best fits their needs, including the robotic arm (actuators, links, electrical cabinet, control, and programming software), interaction and safety mechanisms.

[PR.4] FP7-2013-NMP-ICT-FOF-IA-EUROC-PIROS

From-to 1/01//2014 – 31/12/2015
Budget Tot. 22.726.345€ CNR-STIIMA 307.900,00€
Website <http://www.euroc-project.eu/index.php?id=piros>
EU link <https://cordis.europa.eu/project/rcn/110374/factsheet/en>
Team Enrico Villagrossi, Paolo Magnoni, Manuel Beschi, Stefania Pellegrinelli, Niccolò Iannacci, Matteo Giussani
Collaboration McM, TelerotobLab, Fraunhofer-IPA
Role Principal Investigator, CNR 1st representative, WP Leadership of the Qualification Stage, Stage I-a/I-b/I-c
Description The PIROS Challenge is committed to deploying human-robot cooperative technologies in an application where robot collaboration is reckoned as a key competitive factor by the end user. The application is the high-skill preparation of complex pallets before/after machining in flexible manufacturing systems (FMS). Pallet preparation is critical for any CNC operation and it is the only manual task left in highly automated FMSs. Pallet setup involves hundreds of configurations, continuously changed for the production of small batches: mounting errors may generate substantial production losses. The introduction of robot technologies in pallet preparation will benefit the machine tool builders and, the machine tools customers in a variety of ultimate end-users businesses where machining is essential.

2.2.3 SCIENTIFIC REPRESENTATIVE

[PR.5] H2020-ICT-2016-1-IA-ROSIN-ROSDyn

From-to 5/2018 TO 12/2019
Budget Tot. 7 651 236,255€ CNR-STIIMA 60.000,00€
Website <http://rosin-project.eu/ftp/rosdyn>
EU link <https://cordis.europa.eu/project/rcn/206395/factsheet/en>
Team Manuel Beschi (Principal Investigator), Stefano Ghidni, Terrin Babu Pulikottil, Arash Abdi
Collaboration Delft University, Fraunhofer-IPA
Role Support in the submission, scientific coordination in agreement with PI, WP Leadership of "Phase 2"
Description The goal of the project ROSdyn is to realize a ROS-based package that implements a fully automated procedure able to calibrate the robot dynamics model. The use of the ROS ecosystem enables the standardization of several steps of the procedure such as the messages exchanged between nodes. A further step towards standardization is represented by the use of ROS-I robot drivers that allow standard access to all the robot information enabling the dynamics model calibration on IR.

[PR.6] H2020-ICT-2017-1 – IA – PICKPLACE

From-to 1/2018 - 1/2020
Budget Tot. 6.859.721,75€ CNR-STIIMA 331.578,00€
Team Manuel Beschi (Principal Investigator), Stefano Ghidni, Marco Faroni
Role Support in the submission, scientific coordination in agreement with PI, WP Membership of WP4
Collaboration IK4-Tekniker, Ulma, Fraunhofer-IFF

Description PICK-PLACE focuses on flexible, safe and dependable robotic part-handling in industrial environments. The project proposes a combination of human and robot capabilities in order to achieve this efficient hybrid pick-and-place / pick-and-package solution. It includes dynamic package configuration, flexible grasping strategies using an innovative multifunctional gripper, robust environment perception and mechanisms and strategies for human-robot collaboration.

[PR.7] FP7-2013-NMP-ICT-FOF-IA-EUROC-PIROS (see the previous Section)

From-to 12/2015 - 12/2017
Team Federico Vicentini (Principal Inv.), Loris Roveda, Matteo Giussani, Niccolò Giussani, Enrico Merlo
Role scientific coordination in agreement with PI, WP Membership of Stage II, Stage III
Description (see previous Section).

[PR.8] FP7-NMP- FLEXICAST

From-to 12/2011 - 12/2015
Budget Tot. 9.174.941,50€ STIMA: 350.000,00€
Website <http://www.flexicast-euproject.com>
EU link <https://cordis.europa.eu/project/rcn/104690/factsheet/en>
Team Enrico Villagrossi, Manuel Beschi, Luca Cevasco, Diago Parazzoli
Collaboration ASCAMM, University of Catalugna, CNR-IMAMOTER
Role Support in the submission, scientific coordination in agreement with PI (Lorenzo Molinari Tosatti), WP Leadership of WP6
Description The FLEXICAST project presents knowledge-based technologies that aim to follow the way to transform the conventional (batch-by-batch) foundry process into a flexible (mold-by-mold) process. Vision systems 3D, lead through programming, deburring, robotized processes control

[PR.9] EU-FP7-ICT-NMP-ROBOFOOT

From-to 7/2011 TO 2/2013
Budget Tot. 3.685.073,00 €; STIMA 413 088,00 €
Website www.robofoot.eu
EU link <https://cordis.europa.eu/project/rcn/95549/factsheet/en>
Team Enrico Villagrossi, Luca Cevasco, Diego Parazzoli
Collaboration IK4-TEKNIKER, DFKI, INESCOP
Role Support in the submission, scientific coordination in agreement with PI (Lorenzo Molinari Tosatti), WP Leadership of WP2
Description Fashion Footwear production is currently mainly handcrafted. Some manufacturing processes (for footwear and its components) are assisted by specialized machinery (last manufacture, cementing, and cutting) and there exist highly automated lines in mass production of technical shoes (i.e. safety footwear). But most production is still handmade, being especially true in the case of high added value shoe production, where Europe maintains its leadership. The introduction of robotics will contribute to overcoming the complexity in the automation of the processes of this industry that accounts for some of the shortest production runs to be found (eight pairs of shoes is the average order size).

2.2.4 TEAM MEMBER

[PR.10] EU-FP7-ICT-ACTIVE

From-to 7/2011 TO 9/2014
Budget Tot. 5.778.000,00€; STIMA 856.993,00€
Website www.robofoot.eu
EU link <https://cordis.europa.eu/project/rcn/97338/factsheet/en>
Team Federico Vicentini, Matteo Malosio, Simone Pio Negri
Collaboration PoliMi, King's College, Karlsruhe Technical University
Role Support in the submission, WP Leadership of WP7, WP membership of WP3
Description The ACTIVE project exploits ICT and other engineering methods and technologies for the design and development of an integrated redundant robotic platform for neurosurgery. A light and agile redundant robotic cell with 20 degrees-of-freedom (DoFs) and an advanced processing unit for pre- and intra-operative control will operate both autonomously and cooperatively with surgical staff on the brain, a loosely structured environment. Two cooperating robots will interact with the brain that will deform for the tool contact, blood pressure, breathing, and deliquoration. Human factors are considered by allowing easy interaction with the users through a novel haptic interface for tele-manipulation and by a collaborative control mode ("hands-on"). Force and video feedback signals will be provided to surgeons.

[PR.11] EU-FP7-NMP-TRANS-IND

From-to 1/07/2011-30/06/2013
Budget Tot. 6 099 175,00€ STIIMA 251 635€

EU Link <https://cordis.europa.eu/project/rcn/92583/factsheet/en>
 Team Luca Cevasco, Diego Parazzoli
 Role Support for activities
 Description The overall objective of the Trans-IND project is to develop a cost-effective integrated construction process that will enable the maximum capability of industrialisation of components for transport infrastructures (road and pedestrian bridges, underpass, containing walls, acoustic and safety barriers) using polymer based materials (carbon fibre, glass fibre). It will be demonstrated, as a pilot case, for components of a bridge (beams and preslabs) due to higher complexity in the bridge components manufacturing and assembly compared to other applications.

[PR.12] EU-FP7- ICT-NMP-ECHORD-EASYPRO

From-to 1/07/2011 - 01/09/2012
 Budget Tot. 6 099 175,00€ STIIMA 251 635€
 Website <http://www.echord.info/wikis/website/easypro.html>
 EU Link <https://cordis.europa.eu/project/rcn/92583/factsheet/en>
 Team Luca Cevasco, Diego Parazzoli
 Collaboration IK4-Tekniker
 Role Support for activities
 Description The ECHORD experiment support the Industrial Innovation and Technology Transfer helping in bridging the gap between research and innovation. There are multiple manufacturing processes where robots play (or might play) an important role. It is well known their use in welding, deburring and other un-safe or risky operations. Despite the intrinsic usefulness of robot manipulators of anthropomorphic type, normal utilization does not reach beyond a reiteration of pre-programmed trajectories. While static robot programs may be sufficient for high volume manufacturers, they are not adequate in one-off or small-batch manufacturing. The result is that industrial robots are hardly ever used for small- batch and one-off manufacturing. The objective of our EasyPro experiment is to facilitate robot programming by combining hand guided end-effector rough movement planning and 3D visual servoing based accurate trajectory following. EU-FP7.

2.3 NATIONAL FUNDED PROJECT

2.3.1 PRINCIPAL INVESTIGATOR/BUDGET RESPONSABILITY

[PR.13] Progetti Regione Lombardia – SMART4CPPS

From-to 1/03/2017 - 01/03/2020
 Budget Tot. 7.354.800,00€ STIIMA 700.000€ (NOT FUNDED FOR ADMINISTRATIVE ISSUES)
 Website <https://cal.unibg.it/projects/smart4cpps/>
 Team Federico Vicentini
 Collaboration PoliMi, UniBG, COSBERG spa, INDEVA spa
 Role Principal Investigation, Scientific Representative, Responsible for Pilot 4
 Description Smart solutions for Cyber - Physical Production systems - is a project created within the Smart Manufacturing working group of "Associazione Fabbrica Intelligente Lombardia", which uses the Cyber-Physical System (CPS), an Industry 4.0 paradigm, on the peculiarity of the Lombard manufactory with its excellences in the components and machines production. The proposed paradigm consists of Smart-CPS, i.e. it foresees that ICT technologies are no longer just support for production processes, but they are integrated into components, machines, and environments that become intercommunicating and intelligent CPS. This requires modular digital infrastructures allowing management of industrial data at all stages of its life cycle; innovative and low-cost smart components; smart machines that evolve in order to maintain always maximum productivity; tools for the smart factory.

2.3.2 SCIENTIFIC REPRESENTATIVE

[PR.14] Progetti Regione Lombardia – MADE4LO

From-to 1/08/2017 - 01/08/2020
 Budget Tot. 6.626.426,34€ STIIMA 150.000,00€ (AS THIRD PARTY OF CONSORTIUM PARTENR BLM)
 Website <https://openinnovationlombardia.it/it/case-histories/made4lo>
 Team Terrin Pulikottil, Paolo Magnoni, Stefano Mutti
 Role Principal Investigation, Scientific Representative
 Description A “widespread” factory for the development of metal 3D printing technology: this is the objective of Metal ADDitive for LOMbardy (MADE4LO). The project was born thanks to a network of excellence in Lombardy – an Italian region on the wave of digital transformation – that decided to share their skills, know-how and resources to cover the entire metals value chain – from equipment supply to the finished product – through Additive Manufacturing, one of the enabling technologies of Industry 4.0. The ultimate goal of MADE4LO is to create a new model of factory based on 3D manufacturing, network infrastructure and digital processes accessible to several partners, and intensive training activities of the technical staff involved.

[PR.15] Cariplo-Regione Lombardia – Hybrid Aluminium Forming - HAF

From-to 1/01/2014 - 01/05/2016
 Budget Tot. € 248500,00; Budget CNR-STIIMA: € 82.500,00
 Website <http://www.haf-wheels.it/>
http://www.fondazionecariplo.it/static/upload/rs_/rs_attrattivitaricerca_cda3dic13.pdf
 Team Aberto Marini, Manuel Beschi, Enrico Villagrossi, Paolo Magnoni
 Collaboration UNiBs
 Role Scientific Representative, workgroup coordination
 Description One of the most important priority for the automotive company, in order to comply with the European standards regarding the greenhouse gases emission (carbon dioxide), is the reduction of fuel consumption through the weight reduction of the components used (engine, wheels, steering gear box, "body-in-white", etc. ...). The lightening of the various parts composing a motor vehicle, namely the reduction of the thicknesses, has to ensure the achievement of the maximum performance required for the specific application. This aim can be pursued by modifying the materials currently in use, choosing some others with lower density but higher performance compared to those used, or by adopting alternative/innovative production technologies able to increase the mechanical properties of the products today on the market while maintaining low costs. The aim of this research project is precisely to meet this need through the development and optimization of new technology for the production of light alloy castings, which can be considered as the combination of forging and casting in low-pressure die-casting, named Hybrid Aluminium Forming (HAF).

2.3.3 TEAM MEMBER**[PR.16] CNR-ITALIA-RUSSIA**

From-to 1/01/2015 - 31/12/2017
 Budget Tot. 210.000,00€; CNR-STIIMA: € 120.000,00
 Team Manuel Beschi, Enrico Villagrossi, Loris Roveda, Stefania Pellegrinelli
 Collaboration Stanskin University, Moscow, Russia
 Role Scientific Representative, workgroup coordination
 Description of Conventional material removal techniques, like CNC milling machines, have proven to be very effective and accurate. Their major drawbacks are the cost, the restricted working area and the limitations on the allowed work piece geometry. In principle, industrial robots could provide an excellent solution for machining, being both flexible and cost efficient, but today they don't offer a positioning accuracy, are unable to reject disturbances due to process forces and lack reliable programming and simulation tools. These critical limitations currently prevent the use of robots in typical machining applications especially for hard materials, like steel and titanium. This project aims at developing innovative robotic machining systems that are flexible, reliable and predictable with an average of 30% cost efficiency savings in comparison to machine tools. The main developments will be in the field of process aware path planning, machining strategies, and axis control, optimal tool design, active damping devices. This ambitious goal will be reached exploiting the complementary skills of CNR-ITIA and MSUT and the enabling results they have obtained in running and recent projects, funded by National and European initiatives, summarized in the following.

[PR.17] Fabbrica del Futuro 2, FdF-SP2-T2.1 - PRO2EVO

From-to 1/2/2014 - 1/2/2015
 Budget Tot. 250.000,00€; Budget CNR-STIIMA: 22.377,80€
 Website <http://www.fabbricadelfuturo-fdf.it/projects/subproject-2/pro2evo-project/?lang=en>
 Role Support for the activity
 Description The project will address the use of zero-point modular fixtures as a reconfiguration enabler in FMSs. This class of equipment provides the capability of rapidly reconfiguring the pallets to match the production requirements, without the need of halting the system for setup, thus providing a strategic tool to manage the joint evolution of products and processes. The research activities will address the pallet configuration and process planning problem using a non linear and distributed process representation modeling a wide range of alternative operation sequences. Moreover, the problem of pallet checking will be considered using a laser scanning system able to verify the correct configuration and load of the pallet. Finally, the effectiveness and benefits of zero-point modular fixtures will be assessed evaluating their impact on the performance of an FMS and providing managing policies to exploit the available degrees of freedom. All the activities will refer to an industrial case.

[PR.18] Regione Lombardia - CNR – FIDEAS

ID Convenzione operativa nell'ambito dell'Accordo Quadro di collaborazione tra la Regione Lombardia e il Consiglio Nazionale delle Ricerche (CNR) sottoscritto il 16 luglio 2012, Delibera di Giunta Regionale n. 3728 dell'11 luglio 2012
 From-to 1/10/ 2013 – 1/6/2015
 Budget tot. 800k€ Robotic Group 78665k€
 Website http://www.irea.cnr.it/index.php?option=com_k2&view=item&id=649:fideas&Itemid=169
 Ruolo Development of robotic systems to support the disassembly of mechatronic elements. Control by robot force. Multimedia interface to simplify robot programming. Robot cell control integration and plant control.

[PR.19] Regione Lombardia – CNR - Cybersort

From-to 1/01/2017 – 1/01/2018
Budget 1.000.00,00€ STIIMA 150.000,00€
Team Manuel Beschi (Principal Investigator for the Robotized Processes and control laboratory), Stefania Pellegrinelli, Giorgio Nicola, Stefano Mutti
Collaboration CNR-IEIIT
Role Member of the working team
Description The objective of the Cyber-Sort project is to develop innovative models and advanced technologies for the identification, sorting, and separation of valuable materials from End-of-Life (EoL) waste stream, with the aim to increase the market uptake of secondary raw materials. The achievement of this objective will support the transition towards a circular economy, where the value of materials, products, and resources is preserved as long as possible and the waste production is minimized. The focus of the project will be the treatment of EoL products from the industrial sector, which covers 90% of the total waste production, such as: construction and demolition waste, mechatronics and electronics waste products, waste from iron and steel industry and from incinerators, car fluff and industrial by-products in general. Innovative sensing and automated robotic sorting technologies will be developed during the project for the recognition of different materials, such as metal, wood, inert materials, plastic, paper, glass, and ceramic. In particular, the project will synergically and systematically develop a pilot plant integrating the EoL strategies through the following steps: i) on line waste matrix characterization, ii) macro and micro automated sorting; iii) waste recovery and valorization.

[PR.20] Convenzione Regione Lombardia – CNR - FHfC

From-to 14/12/2016 - 14/12//2018
Ruolo Member of the working team, support in the deployment of enabling technologies
Budget tot. 800k€ Robotic Group 78665k€
Website <http://www.fhffc.it>
Team Stefania Pellegrinelli, Terrin Babu Pulokottil
Role Memembr of the team, coordiantion of work of Stefania Pellegrinelli and Terrin Babu Pulokottil
Description The Future Home for Future Communities, a research project funded within the Third Framework Agreement between the CNR and the Lombardy Region and located in the area of specialization of the Regional strategy dedicated to Smart Cities, has the ambitious goal of bringing new results technological and methodological in the fields of Smart Living and Smart Care. The research activity of FHfFC develops over two years and touches on topics deeply connected with everyday life, such as the inclusiveness of living environments, the creation of services for the person aimed at improving well-being, the protection of health and of the food security of the inhabitants of the house, the spread of digital services to support local communities.

[PR.21] LOMBARDY REGION AND CARIPLIO FOUNDATION - MAJOR EMBLEMATIC DISBURSEMENTS 2016 - REF. 2016-1428. - EMPATIA

From-to 1/2017 – 12/2019
Website <http://www.leccolivinglab.com/en/progetti>
Team Stefania Pellegrinelli (PI for the Laboratory), Terrin Babu Pulikottil
Role Support to activities, coordination of activities of the working group; Development of natural communication systems between robots and people to support people with functional disabilities
Description The EMPATIA @ Lecco project proposal is the third chapter (after Hint @ Lecco and Spider @ Lecco) of a specific emblematic action of Fondazione Cariplo, to which the Lombardy Region has made an important contribution, on the theme of rehabilitation in the Lecco area, with a specific attention to disabilities due to congenital or acquired lesions of the nervous system. Briefly, the EMPATIA @ Lecco project aims to deliver new tools to the patient and his family to cope with the chronic disease, enhance his ability to cope with daily life, develop more informed behaviors and more suitable to manage the evolution of home sickness, and give back to the fragile subject the dignity of his person and a better quality of life. A part of the budget is destined to the creation of a shared and distributed Laboratory (LILL-LAB), centered on the Campus of the Polo of Lecco of the Politecnico di Milano, which puts all the laboratories and the skills of the partners of the territory into a system, and concretizes the view of Lecco Innovation Living Lab open to users, companies, other research institutions. LILL-LAB lays the foundations for the design, co-design and acquisition of the necessary technological-organizational and infrastructure equipment to develop a service mission that the system can deliver to subjects, patients, companies and / or institutions / institutions .

[PR.22] Cluster Tecnologico Nazionale – Fabbrica Intelligente – Progetto 1 – Sustainable Manufacturing

From-to 1/12/2014 – 1/12/2016
Role Member of the working team, support in the deployment of enabling technologies
Description The great vocation and Italian industrial culture, the ability to create products that combine eco-design, cutting-edge technologies, and customization and the traditional attention to advanced industrial sectors, such as the production of innovative machine tools and de-production, are the main strategic and technological levers underlying Project 1 "Sustainable Manufacturing". The project, which brings together as many as 37 partners, including industrial realities of various sizes, universities and research centers, for a total budget of over 11.1 million euros, intends to pursue various objectives of strategic importance, which represent the synthesis

between valorisation made in Italy and a strong sense of technological anticipation traditionally expressed by the Italian manufacturing sector as a whole. In particular, the “Sustainable Manufacturing” project intends to pursue the objective of environmental sustainability of processes, production systems and factories, which will have to efficiently use the planet's resources, within new manufacturing / de-manufacturing paradigms, implementing a systemic view of the manufacturing structure, from innovative processes to machines, systems and business models that justify their existence in the market. The project also pays great attention to the centrality of people and the enhancement of their advanced skills, increasing safety levels in the workplace, in compliance with the high standards of well-being required and the renewed social and cultural sensitivity of our country. The enabling methodologies and technologies that will be developed and implemented will have important applications in different industrial areas, including the polymer formulation industry, eco-factories based on the use of eco-compatible production processes and machinery, the de-production factories, the safety of men.

[PR.23] Progetto Bandiera – Fabbrica del Futuro – SP1 – FACTOTHUMS

From-to 01/10/2013 – 01/09/2015
Budget 572.805,00 € CNR-STIIMA 150.000,00
Website http://www.fabbricadelfuturo-fdf.it/wp-content/uploads/SchedaProgetto_FACTOTHUMS.pdf
Role Member of the working team, support in the deployment of enabling technologies
Description FACTOTHUMS is a project selected within the MIUR initiative "La Fabbrica del Futuro". The duration of the project lasts two years and it comprises three teams of three CNR institutes: IMM, ITIA, and IMAMOTER. Dr. Alessandro Pecora is the principal investigator and the coordinator of the project. The aim of the project is related to the development of new technological solutions for the definition of a safer workplace in scenarios where human-robot interactions are requested. Nowadays, to face the new manufacturing challenges, smart factories must speed up their processes and, at the same time, demonstrate an extremely high degree of flexibility to reduce costs and time. This kind of issues can be solved only by the cooperation between humans and robots in a mixed human-robot working environment. In this complicate scenario of the co-shared workplace and continuous human-robot interaction, safe strategies and architectures are a key requirement to avoid possible injuries to humans or fatal accidents.

[PR.24] INDUSTRIA 2015 – FLEXPROD

From-to 1/01/2012- 1/12/2015
Budget 4.929.850,00€ CNR-STIIMA 284,924€
Website Member of the working team, support in the deployment of enabling technologies *PL34, PL35, PL36, e PL69, PL70.*
Description Use of robotic tools to increase plant flexibility in the automotive sector (body-in-white assembly, motor head assembly, sheet metal element welding). Control in force of robots for assembly problems, development of secure control architecture, support for the development of algorithms for automatic cell configuration for body-in-white assembly.

2.4 INDUSTRIAL CONTRACTS

[PR.25] Motion Planner in cluttered environment - Polibrixia

From-to 1/04/2019 – 1/09/2019
Team Manuel Beschi, Marco Faroni
Ruolo *Coordinating the consultancy*

[PR.26] EVOlaser –BLM spa

From-to Attivo al 1/07/2018-ON GOING
Ruolo *Coordinamento Attività. Sviluppo di software hard real-time*

[PR.27] Adige 2

From-to Attivo al 1/07/2011-30/06/2012
Ruolo *Supporto alle attività tecniche. Sviluppo di software hard real-time*

[PR.28] Contratto industrial: Adige 3

From-to Dicembre 2011-30/06/2013
Ruolo *Supporto alle attività tecniche. Sviluppo di software hard real-time*

[PR.29] Pomini

From-to Gennaio 2012-30/06/2013
Ruolo *Supporto alle attività tecniche. Sviluppo di software hard real-time*

3.1 PEER REVIEWED PUBLICATIONS

3.1.1 INTERNATIONAL ISI JOURNAL

- [PU.1] Faroni, Marco; Beschi, Manuel; Pedrocchi, Nicola; Visioli, Antonio, Predictive Inverse Kinematics for Redundant Manipulators With Task Scaling and Kinematic Constraints, *IEEE transactions on robotics* ISSN: 1552-3098 Institute of Electrical and Electronics Engineers,, 35, pp. 278-285, (2019). doi:10.1109/TRO.2018.2871439, SJR:1.822, Quartile: Q1, IF:4.264
- [PU.2] Lara Rebaioli, Paolo Magnoni, Irene Fassi, Nicola Pedrocchi, Lorenzo Molinari Tosatti, Process parameters tuning and online re-slicing for robotized Additive Manufacturing of big plastic objects, *Robotics and computer-integrated manufacturing* (Print) ISSN: 0736-5845 Pergamon, 55, pp. 55-64, (2019). doi:10.1016/j.rcim.2018.07.012, SJR:1.041, Quartile: Q1, IF:3.464
- [PU.3] Enrico Villagrossi, Nicola Pedrocchi, Manuel Beschi, Lorenzo Molinari Tosatti, A human mimicking control strategy for robotic deburring of hard materials, *International journal of computer integrated manufacturing* (Online) ISSN: 1362-3052 Taylor & Francis,, False, pp. False-False, (2018). doi:10.1080/0951192X.2018.1447688, SJR:0.773, Quartile: Q1, IF:1.995
- [PU.4] Villagrossi, E.; Simoni, L.; Beschi, M.; Pedrocchi, N.; Marini, A.; Molinari Tosatti, L.; Visioli, A., A virtual force sensor for interaction tasks with conventional industrial robots, *Mechatronics* (Oxf.) ISSN: 0957-4158 Pergamon,, 50, pp. 78-86, (2018). doi:10.1016/j.mechatronics.2018.01.016, SJR:0.79, Quartile: Q1, IF:2.423
- [PU.5] Magnoni, Paolo; Pedrocchi, Nicola; Thieme, Sebastian; Legnani, Giovanni; Molinari Tosatti, Lorenzo, Optimal planning in robotized cladding processes on generic surfaces, *Robotica* (Camb., Print) ISSN: 0263-5747 Cambridge University Press,, 36, pp. 787-808, (2018). doi:10.1017/S0263574718000048, SJR:0.375, Quartile: Q1, IF:1.177
- [PU.6] Loris Roveda, Niccolò Iannacci, Lorenzo Molinari Tosatti, Discrete-Time Formulation for Optimal Impact Control in Interaction Tasks, *Journal of intelligent & robotic systems* ISSN: 0921-0296 Kluwer Academic Publishers, False, pp. False-False, (2017). doi:10.1007/s10846-017-0683-6, SJR:0.537, Quartile: Q1, IF:1.583
- [PU.7] Pellegrinelli, S.; Pedrocchi, N., Estimation of robot execution time for close proximity human-robot collaboration, *Integrated computer-aided engineering* ISSN: 1069-2509 John Wiley,, False, pp. False-False, (2017). doi:10.3233/ICA-170558, SJR:0.665, Quartile: Q1, IF:3.667
- [PU.8] E. Villagrossi; C. Cenati; N. Pedrocchi; M. Beschi; Lorenzo Molinari Tosatti, Flexible robot-based cast iron deburring cell for small batch production using single-point laser sensor, *International journal, advanced manufacturing technology* ISSN: 0268-3768 Springer, False, pp. False-False, (2017). doi:10.1007/s00170-017-0232-2, SJR:0.994, Quartile: Q1, IF:2.601
- [PU.9] Loris Roveda, Manuel Beschi, Nicola Pedrocchi, Lorenzo Molinari Tosatti, High- Accuracy Robotized Industrial Assembly Task Control Schema with Force Overshoots Avoidance, *Control engineering practice* ISSN: 0967-0661 Pergamon Press,, False, pp. False-False, (2017). doi:10.1016/j.conengprac.2017.10.015, SJR:1.069, Quartile: Q1, IF:2.616
- [PU.10] Loris Roveda, Giacomo Pallucca, Nicola Pedrocchi, Francesco Braghin, Lorenzo Molinari Tosatti, Iterative Learning Procedure with Reinforcement for High-Accuracy Force Tracking in Robotized Tasks, *IEEE transactions on industrial informatics* ISSN: 1551-3203 Institute of Electrical and Electronics Engineers,, False, pp. False-False, (2017). doi:10.1109/TII.2017.2748236, SJR:1.599, Quartile: Q1, IF:5.43
- [PU.11] Pellegrinelli S.; Orlandini A.; Pedrocchi N.; Umbrico A.; Tolio T., Motion planning and scheduling for human and industrial-robot collaboration, *CIRP annals* ISSN: 0007-8506 Elsevier Ltd, 66, pp. 1-4, (2017). doi:10.1016/j.cirp.2017.04.095, SJR:2.034, Quartile: Q1, IF:3.333
- [PU.12] Pellegrinelli S.; Pedrocchi N.; Tosatti L.M.; Fischer A.; Tolio T., Multi-robot spot-welding cells for car-body assembly: Design and motion planning, *Robotics and computer-integrated manufacturing* (Print) ISSN: 0736-5845 Pergamon, 44, pp. 97-116, (2017). doi:10.1016/j.rcim.2016.08.006, SJR:1.041, Quartile: Q1, IF:3.464
- [PU.13] Pellegrinelli, Stefania; Moro, Federico Lorenzo; Pedrocchi, Nicola; Molinari Tosatti, Lorenzo; Tolio, Tullio, A probabilistic approach to workspace sharing for human-robot cooperation in assembly tasks, *CIRP annals* ISSN: 0007-8506 Elsevier Ltd, 65, pp. 57-60, (2016). doi:10.1016/j.cirp.2016.04.035, SJR:2.034, Quartile: Q1, IF:3.333
- [PU.14] Loris Roveda, Nicola Pedrocchi, Federico Vicentini, Lorenzo Molinari Tosatti, An Interaction Controller Formulation to Systematically Avoid Force Overshoots through Impedance Shaping Method with Compliant Robot Base, *Mechatronics* (Oxf.) ISSN: 0957-4158 Pergamon,, False, pp. False-False, (2016). doi:10.1016/j.mechatronics.2016.08.001, SJR:0.79, Quartile: Q1, IF:2.423
- [PU.15] Loris Roveda, Nicola Pedrocchi, Lorenzo Molinari Tosatti, Exploiting Impedance Shaping Approaches to Overcome Force Overshoots in Delicate Interaction Tasks, *International journal of advanced robotic systems* (Print) ISSN: 1729-8806 Institute for Production Engineering. Intelligent Manufacturing Systems. Vienna University of Technology., False, pp. False-False, (2016). doi:10.1177/1729881416662771, SJR:0.327, Quartile: Q3, IF:0.952
- [PU.16] Loris Roveda, Nicola Pedrocchi, Federico Vicentini, Lorenzo Molinari Tosatti, Industrial Compliant Robot Bases in Interaction Tasks: a Force Tracking Algorithm with Coupled Dynamics Compensation, *Robotica* (Camb., Print) ISSN: 0263-5747 Cambridge University Press,, False, pp. False-False, (2016). doi:10.1017/S0263574716000461, SJR:0.375, Quartile: Q1, IF:1.177
- [PU.17] Caimmi, Marco; Guanziroli, Eleonora ; Malosio, Matteo; Pedrocchi, Nicola; Vicentini, Federico; Molinari Tosatti, Lorenzo; and Molteni, Franco, Normative Data for an Instrumental Assessment of the Upper-Limb Functionality, *BioMed Research*

International (Online) ISSN: 2314-6141 Hindawi Publishing Corporation, Volume 2015 (2015), pp. False-False, (2015). doi:10.1155/2015/484131, SJR:0.935, Quartile: Q2, IF:2.583

- [PU.18] Pedrocchi, N. and Villagrossi, E. and Cenati, C. and Molinari Tosatti, L., Design of Fuzzy Logic Controller of Industrial Robot for Roughing the Uppers of Fashion Shoes, International journal, advanced manufacturing technology ISSN: 0268-3768 Springer, False, pp. False-False, (2014). doi:10.1007/s00170-014-6501-4, SJR:0.994, Quartile: Q1, IF:2.601
- [PU.19] Pellegrinelli, Stefania; Pedrocchi, Nicola; Molinari Tosatti, Lorenzo; Fischer, Anath; Tolio, Tullio, Multi-robot spot-welding cells: An integrated approach to cell design and motion planning, CIRP annals ISSN: 0007-8506 Elsevier Ltd, 63, pp. 17-20, (2014). doi:10.1016/j.cirp.2014.03.015, SJR:2.034, Quartile: Q1, IF:3.333
- [PU.20] Vicentini, Federico; Pedrocchi, Nicola; Malosio, Matteo; Molinari Tosatti, Lorenzo, SafeNet: A methodology for integrating general-purpose unsafe devices in safe-robot rehabilitation systems, Computer methods and programs in biomedicine (Print) ISSN: 0169-2607 Elsevier, 116, pp. 156-168, (2014). doi:10.1016/j.cmpb.2014.03.001, SJR:0.786, Quartile: Q1, IF:2.674
- [PU.21] N. Pedrocchi, F. Vicentini, M. Malosio and L. Molinari Tosatti1, Safe Human-Robot Cooperation in an Industrial Environment, International journal of advanced robotic systems (Print) ISSN: 1729-8806 Institute for Production Engineering. Intelligent Manufacturing Systems. Vienna University of Technology., 10, pp. False-False, (2013). doi:10.5772/53939, SJR:0.327, Quartile: Q3, IF:0.952
- [PU.22] Tosi, D. ; Legnani, G. ; Pedrocchi, N. ; Righettini P. ; Giberti H., Cheope: A new reconfigurable redundant manipulator, Mechanism and machine theory ISSN: 0094-114X Pergamon,, 45, pp. 611-626, (2010). doi:10.1016/j.mechmachtheory.2009.11.005, SJR:1.301, Quartile: Q1, IF:2.796

3.1.2 INTERNATIONAL PEER REVIEWD JOURNAL

- [PU.23] Faroni, Marco; Beschi, Manuel; Pedrocchi, Nicola; Visioli, Antonio, Viability and feasibility of constrained kinematic control of manipulators, Robotics (Crows Nest) ISSN: 0814-6330 Australian Robotics Journal., 7, pp. False-False, (2018). doi:10.3390/robotics7030041, SJR: N/A, Quartile: N/A, IF: N/A
- [PU.24] Leonesio, Marco; Villagrossi, Enrico; Beschi, Manuel; Marini, Alberto; Bianchi, Giacomo; Pedrocchi, Nicola; Tosatti, Lorenzo Molinari; Grechishnikov, Vladimir; Ilyukhin, Yuriy; Isaev, Alexander, Vibration Analysis of Robotic Milling Tasks, Procedia CIRP ISSN: 2212-8271, 67, pp. 262-267, (2018). doi:10.1016/j.procir.2017.12.210, SJR:0.668, Quartile: Q2, IF:True
- [PU.25] Paolo Magnoni, Lara Rebaioli, Irene Fassi, Nicola Pedrocchi, Lorenzo Molinari Tosatti, Robotic AM system for plastic materials: tuning and on-line adjustment of process parameters, Procedia manufacturing ISSN: 2351-9789 Elsevier, 11C, pp. 346-354, (2017). doi:10.1016/j.promfg.2017.07.117, SJR:0.201, Quartile: Q2, IF:True
- [PU.26] Loris Roveda ; Niccolò Iannacci ; Federico Vicentini ; Nicola Pedrocchi ; Francesco Braghin ; Lorenzo Molinari Tosatti, Optimal impedance force-tracking control design with impact formulation for interaction tasks, IEEE Robotics and Automation Letters ISSN: 2377-3766 IEEE, False, pp. False-False, (2016). doi:10.1109/LRA.2015.2508061, SJR: N/A, Quartile: N/A, IF: N/A
- [PU.27] V.A. Grechishnikov, A.V. Isaev, Yu.V. Ilyukhin, P.M. Pivkin, A.A. Vorotnikov, A.N. Kharchenko, G. Bianchi, M. Leonesio, N. Pedrocchi, Tosatti L. Molinari, Building principles of robotic machining systems and their cutting tool system, Bulletin of Moscow State Technical University (STANKIN) ISSN: 2072-3172 Moscow State Technical University (STANKIN), 4, pp. 46-51, (2015). doi:True, SJR: N/A, Quartile: N/A, IF: N/A
- [PU.28] Pellegrinelli, Stefania; Borgia, Stefano; Pedrocchi, Nicola; Villagrossi, Enrico; Bianchi, Giacomo; Tosatti, Lorenzo Molinari, Minimization of the energy consumption in motion planning for single-robot tasks, Procedia CIRP ISSN: 2212-8271, 29, pp. 354-359, (2015). doi:10.1016/j.procir.2015.02.174, SJR:0.668, Quartile: Q2, IF:True
- [PU.29] Stefania Pellegrinelli Nicola Pedrocchi Lorenza Molinari Tosatti Anath Fischer Tullio Tolio, Validation of an Extended Approach to Multi-robot Cell Design and Motion Planning, Procedia CIRP ISSN: 2212-8271, 36, pp. 6-11, (2015). doi:10.1016/j.procir.2015.01.062., SJR:0.668, Quartile: Q2, IF:True
- [PU.30] Pellegrinelli, S.; Pedrocchi, N.; Molinari Tosatti, L.; Tolio, T., Integrated approach for multi-robot spot-welding cell design and welding-point allocation, Key engineering materials ISSN: 1013-9826 distributed by Transtec Publications [etc.], 572, pp. 648-651, (2014). doi:10.4028/www.scientific.net/KEM.572.648, SJR:0.18, Quartile: Q4, IF:True
- [PU.31] Pellegrinelli, Stefania; Pedrocchi, Nicola; Molinari Tosatti, Lorenzo; Fischer, Anath and Tolio, Tullio, Multi-robot spot-welding cell design: problem formalization and proposed architecture, Procedia CIRP ISSN: 2212-8271, False, pp. 0-8, (2014). doi:10.1016/j.procir.2014.03.164, SJR:0.668, Quartile: Q2, IF:True
- [PU.32] Cenati, C. and Pedrocchi, N. and Molinari Tosatti, L., Low Cost Scanning Device Application for Footwear Industry, Procedia CIRP ISSN: 2212-8271, 12, pp. 222-227, (2013). doi:10.1016/j.procir.2013.09.039, SJR:0.668, Quartile: Q2, IF:True
- [PU.33] Malosio M.; Pedrocchi N.; Molinari Tosatti L., Algorithm to Offset and Smooth Tessellated Surfaces, Computer-Aided Design and Applications ISSN: 1686-4360 CAD Solutions., 6(3), pp. 351-363, (2009). doi:10.3722/cadaps.2009.351-363, SJR:0.316, Quartile: Q3, IF:True
- [PU.34] Panvini, Andrea; Antonini, Massimo; Pedrocchi, Nicola, A new software approach to die engineering and optimisation, Foundry trade journal ISSN: 0015-9042 Fuel & Metallurgical Journals, Ltd., 181, pp. 294-295, (2008). doi:True, SJR: N/A, Quartile: N/A, IF: N/A

- [PU.35] G. Ziliani, G. Legnani, Pedrocchi n., A. Visioli, Progetto mecatronico per la sbavatura robotizzata, Automazione & strumentazione ISSN: 0005-1284 Dott. Antonio Barbieri., Gennaio, pp. 80-86, (2006). doi:True, SJR: N/A, Quartile: N/A, IF: N/A
- [PU.36] D. Tosi (1), G. Ziliani (1), N. Pedrocchi (1), G. Legnani(1), Un manipolatore particolare, Progettare (Milano, 1980) ISSN: 1125-1549 Gruppo editoriale Jackson., 299, pp. 77-79, (2006). doi:True, SJR: N/A, Quartile: N/A, IF: N/A

3.1.3 BOOK CHAPTER

- [PU.37] **N. Pedrocchi**, M. Malosio, F. Vicentini, L. Molinari Tosatti, C. Marco, and F. Molteni, "Robotics in Rehabilitation - Part I: Requirements and Control Issues," in *Manipulators: Theory, types and applications*, Nova Science Publishers, 2013, pp. 265–298.
- [PU.38] M. Malosio, **N. Pedrocchi**, F. Vicentini, L. Molinari Tosatti, M. Caimmi, and F. Molteni, "Robotics in Rehabilitation - Part II: Design of Devices and Mechanisms.," in *Manipulators: Theory, types and applications*, G. Legnani and I. Fassi, Eds. Nova Science Publishers, 2013, pp. 265–298.

3.1.4 ABSTRACT ON ISI JOURNAL

- [PU.39] M. Caimmi, M. Malosio, **N. Pedrocchi**, F. Vicentini, L. M. Tosatti, F. Molteni, A. Scano, and L. Molinari Tosatti, "Upper limb robotic rehabilitation: Treatment customization," *Gait Posture*, vol. 37, pp. S13–S14, Apr. 2013.
- [PU.40] M. Caimmi, M. Malosio, **N. Pedrocchi**, F. Vicentini, L. M. Tosatti, and F. Molteni, "Robot-assisted reaching against gravity: EMG activity, movement perception, and biomechanics," *Gait Posture*, vol. 36, p. S42, Jun. 2012.
- [PU.41] M. Caimmi, M. Malosio, **N. Pedrocchi**, F. Vicentini, L. M. Tosatti, and F. Molteni, "Robot assisted training: The impact of trajectories and velocities on the subject's perception of the movement," *Gait Posture*, vol. 35, pp. S27–S28, Apr. 2012.
- [PU.42] M. Caimmi, M. Malosio, **N. Pedrocchi**, F. Vicentini, L. M. Tosatti, and F. Molteni, "Reaching against gravity: Motor control strategies in Friedreich and stroke patients," *Gait Posture*, vol. 35, p. S23, 2012.
- [PU.43] M. Caimmi, M. Malosio, **N. Pedrocchi**, F. Vicentini, L. M. Tosatti, and F. Molteni, "The biomechanics of the reaching movement in Friedreich and stroke patients," *Gait Posture*, vol. 36, no. 0, p. S88, 2012.

3.1.5 MONOGRAPHY

- [PU.44] Grechishnikov V. A., Isaev A. V., Ilyukhin Yu. V., Pivkin P. M., Vorotnikov A. A., Kharchenko A. N., Bianchi G., Leonesio M., Pedrocchi N., Molinari Tosatti L., *Robotic complexes for metalworking and their tooling systems*, None, STANKIN UNIVERSITY, Mosca (RUS), 978-5-7028-0683-9, (2015). doi: N/A.

3.1.6 PEER REVIEWED INTERNATIONAL CONFERENCE

- [PU.45] Loris Roveda, Shaghayegh Haghshenas, Alessio Prini, Tito Dinon, Nicola Pedrocchi, Francesco Braghin, and Lorenzo Molinari Tosatti, Fuzzy Impedance Control for Enhancing Capabilities of Humans in Onerous Tasks Execution, 15TH INTERNATIONAL CONFERENCE ON UBIQUITOUS ROBOTS, pp. None-None, None, 2018. doi:10.1109/UROI.2018.8441800
- [PU.46] Loris Roveda, Nicola Castaman, Paolo Franceschi, Stefano Ghidoni, Nicol? Boscolo, Nicola Bagarello, Enrico Pagello, Nicola Pedrocchi, Lorenzo Molinari Tosatti, H2020 CleanSky 2 EURECA project: control architecture design for a multi-robot framework assisting human operators in the aerospace industry, 8th EASN-CEAS International Workshop on Manufacturing for Growth & Innovation, pp. None-None, None, 2018. doi: N/A.
- [PU.47] Loris Roveda, Tito Dinon, Filippo Lucetti, Nicola Pedrocchi, Lorenzo Molinari Tosatti, H2020 CleanSky 2 EURECA: Design and Control of a Cooperative Manipulator for Industrial Installation Tasks, WeRob 2018, pp. None-None, None, 2018. doi: N/A.
- [PU.48] Simoni, Luca; Villagrossi, Enrico; Beschi, Manuel; Marini, Alberto; Pedrocchi, Nicola; Molinari Tosatti, Lorenzo; Legnani, Giovanni; Visioli, Antonio, On the use of a temperature based friction model for a virtual force sensor in industrial robot manipulators, 22nd IEEE International Conference on Emerging Technologies and Factory Automation (ETFA), 2017, pp. 1-6, Limassol, Cyprus, 2018. doi:10.1109/ETFA.2017.8247655
- [PU.49] Cesta, Amedeo; Molinari Tosatti, Lorenzo; Orlandini, Andrea; Pedrocchi, Nicola; Pellegrinelli, Stefania; Tollo, Tullio; Umbrico, Alessandro, Planning and execution with robot trajectory generation in industrial human-robot collaboration, Italian Workshop on Artificial Intelligence and Robotics (AIRO), pp. 47-52, Bari, Italia, 2018. doi: N/A.
- [PU.50] Loris Roveda, Nicola Castaman, Stefano Ghidoni, Paolo Franceschi, Nicol? Boscolo, Enrico Pagello, Nicola Pedrocchi, Shared Human-Robot Cooperative Interaction Control for the Installation of Heavy and Bulky Components, Conference: 2018 IEEE International Conference on Systems, Man, and Cybernetics (SMC2018), pp. None-None, None, 2018. doi: N/A.
- [PU.51] Loris Roveda, Alessio Prini, Tito Dinon, Shaghayegh Haghshenas, Nicola Pedrocchi, Francesco Braghin and Lorenzo Molinari Tosatti., On the Design and Control of an Empowering Manipulator to Increase the Capabilities of Humans in Industrial Applications., International Conference on Climbing and Walking Robots and Support Technologies for Mobile Machines (CLAWAR 2017), pp. None-None, None, 2017. doi: N/A.
- [PU.52] Luca Simoni, Enrico Villagrossi, Manuel Beschi, Alberto Marini, Nicola Pedrocchi, Lorenzo Molinari Tosatti, Giovanni Legnani, Antonio Visioli, On the use of a temperature based friction model for a virtual force sensor in industrial robot

manipulators, 22nd IEEE International Conference on Emerging Technologies And Factory Automation, pp. None-None, Limassol, Cyprus, 2017. doi: N/A.

- [PU.53] Amedeo Cesta, Lorenzo Molinari Tosatti, Andrea Orlandini, Nicola Pedrocchi, Stefania Pellegrinelli, Tullio Tolio, Alessandro Umbrico, Planning and Execution with Robot Trajectory Generation in Industrial Human-Robot Collaboration, 4th Italian Workshop on Artificial Intelligence and Robotics, pp. None-None, Bari, Italia, 2017. doi: N/A.
- [PU.54] Loris Roveda, Giacomo Pallucca, Nicola Pedrocchi, Francesco Braghin, and Lorenzo Molinari Tosatti, Cartesian Tasks Oriented Friction Compensation Through a Reinforcement Learning Approach, AIM 2016, pp. None-None, None, 2016. doi: N/A.
- [PU.55] Murtua, Inaki; Pedrocchi, Nicola; Orlandini, Andrea; Fernandez, Jose De Gea; Vogel, Christian; Geenen, Aaron; Althoefer, Kaspar; Shafti, Ali, FourByThree: Imagine humans and robots working hand in hand, IEEE International Conference on Emerging Technologies and Factory Automation, pp. None-None, Berlin, Germany, 2016. doi:10.1109/ETFA.2016.7733583
- [PU.56] Beschi, Manuel; Villagrossi, Enrico; Villagrossi, Enrico; Pedrocchi, Nicola; Tosatti, Lorenzo Molinari, A general analytical procedure for robot dynamic model reduction, 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 4127-4132, Hamburg, Germany, 2015. doi:10.1109/IROS.2015.7353960
- [PU.57] Roveda, Loris; Vicentini, Federico; Pedrocchi, Nicola; Tosatti, Lorenzo Molinari, Impedance Control based Force-tracking Algorithm for Interaction Robotics Tasks: An Analytically Force Overshoots-free Approach, ICINCO 2015 - 12th International Conference on Informatics in Control, Automation and Robotic, pp. 386-391, University of Haute Alsace, France, 2015. doi:10.5220/0005565403860391
- [PU.58] Roveda, Loris; Roveda, Loris; Vicentini, Federico; Pedrocchi, Nicola; Braghin, Francesco; Tosatti, Lorenzo Molinari, Impedance shaping controller for robotic applications involving interacting compliant environments and compliant robot bases, Intenational Conference on Robotics and Automation, pp. 2066-2071, Seattle, Washington, US, 2015. doi:10.1109/ICRA.2015.7139470
- [PU.59] Villagrossi, E. and Pedrocchi, N. and Cenati, C. and Molinari Tosatti, L., A Robotized Solution for Roughing the Uppers of Fashion Shoes, ISR/Robotik 2014; 41st International Symposium on Robotics, pp. 468-474, Munich, Germany, 2014. doi: N/A.
- [PU.60] Pellegrinelli, Stefania; Pedrocchi, Nicola; Tosatti, Lorenzo Molinari; Fischer, Anath; Tolio, Tullio, Design and motion planning of body-in-white assembly cells, 2014 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 4489-4496, Chicago, IL, US, 2014. doi:10.1109/IROS.2014.6943198
- [PU.61] Roveda, L. and Vicentini, F. and Pedrocchi, N. and Molinari Tosatti, L. and Braghin, F., Development of Impedance Control Based Strategies for Light-Weight Manipulator Applications Involving Compliant Interacting Environments and Compliant Bases, ASME 2014 12th Biennial Conference on Engineering Systems Design and Analysis (ESDA2014), pp. V003T17A003-None, Copenhagen, Denmark, 2014. doi:10.1115/ESDA2014-20136
- [PU.62] Vicentini, Federico and Pedrocchi, Nicola and Giussani, Matteo and Molinari Tosatti, Lorenzo, Dynamic safety in collaborative robot workspaces through a network of devices fulfilling functional safety requirements, ISR/Robotik 2014; 41st International Symposium on Robotics, pp. 1-7, Munich, Germany, 2014. doi: N/A.
- [PU.63] Roveda, L. and Vicentini, F. and Pedrocchi, N. and Molinari Lorenzo, L., Force-tracking impedance control for manipulators mounted on compliant bases, 2014 IEEE International Conference on Robotics and Automation (ICRA), pp. 760-765, Hong Kong, China, 2014. doi:10.1109/ICRA.2014.6906940
- [PU.64] Roveda, L. and Vicentini, F. and Pedrocchi, N. and Braghin, F. and Molinari Tosatti, L., Impedance Shaping Controller for Robotic Applications in Interaction with Compliant Environments, 11th International Conference on Informatics in Control, Automation and Robotics, pp. 444-450, Vien, Austria, 2014. doi:10.5220/0005059504440450
- [PU.65] Villagrossi, E. and Legnani, G. and Pedrocchi, N. and Vicentini, F. and Molinari Tosatti, L. and Abb?, F. and Bottero, A., Robot Dynamic Model Identification Through Excitation Trajectories Minimizing the Correlation Influence among Essential Parameters, 11th International Conference on Informatics in Control, Automation and Robotics, pp. 475-482, Vien, Ausria, 2014. doi:10.5220/0005060704750482
- [PU.66] Pedrocchi, Nicola and Villagrossi, Enrico and Vicentini, Federico and Tosatti, Lorenzo Molinari, Robot-dynamic calibration improvement by local identification, 2014 IEEE International Conference on Robotics and Automation (ICRA), pp. 5990-5997, Hong Kong, China, 2014. doi:10.1109/ICRA.2014.6907742
- [PU.67] V. Rampa, F. Vicentini, S. Savazzi, N. Pedrocchi, M. Ioppolo, M. Giussani, Safe Human-Robot Cooperation through Sensorless Radio Localization, IEEE International Conference on Industrial Informatics (INDIN 2014), pp. 683-689, Porto Alegre, Brail, 2014. doi:10.1109/INDIN.2014.6945596
- [PU.68] Malosio, Matteo; Negri, Simone Pio; Pedrocchi, Nicola; Vicentini, Federico; Molinari Tosatti, Lorenzo, A 3T2R parallel and partially decoupled kinematic architecture, 2013 IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 444-449, Tokyo, Japan, 2013. doi:10.1109/IROS.2013.6696389
- [PU.69] Pedrocchi, Nicola; Villagrossi, Enrico; Vicentini, Federico; Molinari Tosatti, Lorenzo, On robot dynamic model identification through sub-workspace evolved trajectories for optimal torque estimation, 2013 IEEE/RSJ International Conference on Intelligent Robots and System, pp. 2370-2376, Tokyo, Japan, 2013. doi:10.1109/IROS.2013.6696689
- [PU.70] Villagrossi, E. and Pedrocchi, N. and Vicentini, F. and Molinari Tosatti, L., Optimal robot dynamics local identification using genetic-based path planning in workspace subregions, 2013 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), pp. 932-937, Wollongong, New South Wales, Australia, 2013. doi:10.1109/AIM.2013.6584213

- [PU.71] F. Vicentini, N. Pedrocchi, L. Molinari Tosatti, SafeNet of Unsafe Devices extending the robot safety in collaborative workspaces, 10th International Conference on Informatics in Control, Automation and Robotics (ICINCO), pp. None-None, Reykjavik, 2013. doi: N/A.
- [PU.72] Malosio, M. and Negri, S.P. and Pedrocchi, N. and Vicentini, F. and Caimmi, M. and Molinari Tosatti, L., A Spherical Parallel Three Degrees-of-Freedom Robot for Ankle-Foot Neuro-Rehabilitation, 34th Annual International Conference of the IEEE EMBS, pp. 3356-3359, San Diego, California USA, 2012. doi:10.1109/EMBC.2012.6346684
- [PU.73] A. Brusaferrri, (1), M. Colledani (1,2), G. Copani (1), N. Pedrocchi (1), M. Sacco (1), T. Tolio (1,2), Integrated De-Manufacturing Systems as New Approach To End-Of-Life Management Of Mechatronic Devices, 10th Global Conference on Sustainable Manufacturing Towards Implementing Sustainable Manufacturing, pp. None-None, Istanbul, Turkey, 2012. doi: N/A.
- [PU.74] C. Cenati, N. Pedrocchi, L. Molinari Tosatti, Low Cost Scanning Device Application for Footwear Industry, CIRP ICME 2012 - 8th CIRP Conference on Intelligent Computation in Manufacturing Engineering, pp. None-None, Ischia, 2012. doi: N/A.
- [PU.75] Caimmi, M. and Pedrocchi, N. and Scano, A. and Malosio, M. and Vicentini, F. and Molinari Tosatti, L. and Molteni, F., Proprioceptivity and upper-extremity dynamics in robot-assisted reaching movement, 2012 4th IEEE RAS & EMBS International Conference Biomedical Robotics and Biomechatronics (BioRob), pp. 1316-1322, Rome, 2012. doi:10.1109/BioRob.2012.6290762
- [PU.76] Malosio, M. and Negri, S.P. and Pedrocchi, N., and Vicentini, F. and Cardinale, F. and Molinari Tosatti, L., The kinematic architecture of the Active Headframe: a new head support for awake brain surgery, 34th Annual International Conference of the IEEE EMBS, pp. 1417-1421, San Diego, California USA, 2012. doi:10.1109/EMBC.2012.6346205
- [PU.77] Malosio, Matteo; Pedrocchi, Nicola; Vicentini, Federico; Molinari Tosatti, Lorenzo, Analysis of elbow-joints misalignment in upper-limb exoskeleton, 2011 IEEE International Conference on Rehabilitation Robotics (ICORR), pp. 1-6, Zurich, 2011. doi:10.1109/ICORR.2011.5975393
- [PU.78] Vicentini, F. and Pedrocchi, N. and Malosio, M. and Molinari Tosatti, L., High-accuracy hand-eye calibration from motion on manifolds, 2011 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 3327-3334, None, 2011. doi:10.1109/IROS.2011.6094587
- [PU.79] Pedrocchi N., Malosio M., Vicentini F., Molinari Tosatti L., Influence of robotic orthoses kinematics on usability and wearability, Scientific Seminar on New Technologies for Rehabilitation, Prosthesis and Surgery, pp. None-None, Milano, IT, 2011. doi: N/A.
- [PU.80] Pedrocchi N., Malosio M., Vicentini F., Molinari Tosatti L., Alternative solutions for upper limb robot-assisted neuro-rehabilitation, Italian-Israeli Conference on High-Tech and Recovery of Function: New Technologies for Rehabilitation Medicine, pp. None-None, Haifa, Israel, 2010. doi: N/A.
- [PU.81] N. Pedrocchi, M. Malosio, F. Vicentini, L. Molinari Tosatti, and G. Legnani, Commercial Controllers enhancements and Open Source Robot Control Software: Addressed solutions for demanding applications, ICRA 2010 Workshop on Innovative Robot Control Architectures for Demanding (Research) Applications, pp. 22-29, Anchorage, Alaska, 2010. doi: N/A.
- [PU.82] De Momi, Elena¹ Frasson, Luca¹ De Lorenzo, Danilo¹ Vaccarella, Alberto¹ Khreis, Ghassan¹ Daniele, Mirko¹ Vicentini, Federico² Pedrocchi, Nicola² Malosio, Matteo² Molinari Tosatti, Lorenzo² Rodriguez y Baena, Ferdinando³ Ferrigno, Giancarlo¹, ROBOCAST and ACTIVE : Advanced Robotic Systems for Neurosurgery, Proceedings of the 1st Workshop on the Life Sciences at Politecnico di Milano, pp. None-None, Milan, Italy, 2010. doi: N/A.
- [PU.83] Malosio M.; Pedrocchi N.; Molinari Tosatti, L., Robot-assisted upper-limb rehabilitation platform, 5th ACM/IEEE International Conference on Human-Robot Interaction, HRI 2010, pp. None-None, Osaka, 2010. doi:10.1145/1734454.1734499
- [PU.84] Malosio M., Pedrocchi N., Vicentini F., Molinari Tosatti L., Shoulder Adaptable and Elbow Singularity-free Exoskeleton, 1st International Conference on Applied Bionics and Biomechanics (ICABB), pp. None-None, Venezia, Italia, 2010. doi: N/A.
- [PU.85] Malosio M.; Pedrocchi N.; Molinari Tosatti L., Algorithm to Offset and Smooth Tessellated Surfaces, CAD '09 - International CAD Conference and Exhibition, pp. None-None, Reno, NV, USA, 2009. doi: N/A.
- [PU.86] N. Pedrocchi; M. Malosio; L. Molinari Tosatti; G. Ziliani; Obstacle Avoidance Algorithm for Safe Human-Robot Cooperation in Small Medium Enterprise Scenario, 40th International Symposium on Robotics, pp. 49-54, Barcellona, 2009. doi: N/A.
- [PU.87] Vertuan, Angelo; Legnani, Giovanni; Adamini, Riccardo; Tosi, Diego; Pedrocchi, Nicola, Performance analysis of a reconfigurable redundant parallel manipulator, Reconfigurable Mechanisms and Robots, 2009. ReMAR 2009. ASME/IFTOMM International Conference, pp. 593-601, London, 2009. doi: N/A.
- [PU.88] Pedrocchi, N.; Malosio, M.; Molinari Tosatti, L., Safe Obstacle Avoidance for Industrial Robot Working Without Fences, Intelligent Robots, and Systems, 2009. IROS 2009. IEEE/RSJ International Conference on, pp. 3435-3440, St. Louis, MO, USA, 2009. doi:10.1109/IROS.2009.5353980
- [PU.89] Panvini A., Antonini M., Pedrocchi N., A novel software approach to PQ2 die design calculations for zamak parts, Zinc Diecasting Focus 2008 International conference, pp. None-None, Barcellona (E), 2008. doi: N/A.
- [PU.90] Pedrocchi N., Visioli A., Ziliani C., Legnani G., On the elasticity in the Dynamic decoupling of Hybrid force/velocity control in the contour tracking task, IEEE/RSJ - "Int.l Conference on Intelligent Robots and Systems" - IROS 2008, pp. 955-960, Nice (F), 2008. doi:10.1109/IROS.2008.4650883

- [PU.91] Panvini A., Faglia R., Antonini M., Pedrocchi N., Simulation techniques for mould and dies designers, World Computer Congress 2008, pp. None-None, Milano (I), 2008. doi: N/A.
- [PU.92] Legnani G.; Visioli A.; Ziliani G.; Pedrocchi N.; Automatic deburring of pieces of unknown shape and other force control applications, ISR 2007 - International Symposium on Robotics, pp. None-None, Chicago, IL - (USA), 2007. doi: N/A.
- [PU.93] Tosi, D.; Legnani, G.; Pedrocchi, N., A new pose measuring system based on a spatial four bar linkage with RSSR chain, International Symposium on Robotics ISR, 37th, pp. 273-279, Munich, 2006. doi: N/A.

3.1.7 PEER REVIEWED INTERNATIONAL WORKSHOP

- [PU.94] N. Pedrocchi, M. Malosio, F. Vicentini, L. Molinari Tosatti, M. Caimmi, and F. Molteni, "Evaluation Of The Impact Of Force Control And Motion Laws In Rehabilitation," in Workshop on "New and Emerging Technologies in Assistive Robotics" – 2011 IEEE/RSJ Int Conf on Intelligent, 2011, vol. 27, no. 4, p. -.

3.1.8 PATENT

- [PU.95] Maccagnan Giorgio Magnoni Paolo Pedrocchi Nicola Cevasco Luca Maccagnan Simone, **System for additive manufacturing processes and related control method**, 102016000128438,
<https://patents.google.com/patent/WO2018116075A1/en?q=B29C64%2f118&inventor=Giorgio+Maccagnan&before=publication:20181230&after=publication:20180101>, 2019, doi: None
- [PU.96] Matteo Malosio, Simone Pio Negri, Nicola Pedrocchi, Marco Caimmi, Federico Vicentini, Lorenzo Molinari Tosatti, **Device for the rehabilitation of movements of the foot**, EP2793793 (B1)
http://sobjprd.questel.fr/sobj/servlet/get_pds/WO201393787A1.pdf?userid=QPTCZ208&type=0&pdfid=49352664&ekey=981&id=945974068, 2017, doi: None
- [PU.97] Malosio Matteo, Molinari Tosatti Lorenzo, Pedrocchi Nicola, Vicentini Federico, Negri Simone Pio, **Device for supporting and for adjusting the position of a patient's head during surgeries**, EP2692307 (B1),
http://sobjprd.questel.fr/sobj/servlet/get_pds/EP2692307A1.pdf?userid=QPTCZ208&type=0&pdfid=52222222&ekey=905&id=97242447, 2015, doi: None
- [PU.98] Malosio, Matteo; Pedrocchi, Nicola; Molinari Tosatti, Lorenzo, Biomedical device for robotized rehabilitation of a human upper limb, particularly for neuromotor rehabilitation of the shoulder and elbow joint, US8801639 (B2),
http://sobjprd.questel.fr/sobj/servlet/get_pds/US8801639B2.pdf?userid=QPTCZ208&type=0&pdfid=56475662&ekey=984&id=-422659650, 2014, doi: None
- [PU.99] Matteo Malosio, Simone Pio Negri, Nicola Pedrocchi, Lorenzo Molinari Tosatti, Federico Vicentini, Dispositivo per il supporto e per la regolazione della posizione della testa di un paziente durante interventi chirurgici, 0001412817,
http://www.uibm.gov.it/uibm/dati/Avanzata.aspx?load=info_list_uno&id=2071907&table=Invention&#ancoraSearch, 2014, doi: None
- [PU.100] Malosio Matteo, Molinari Tosatti Lorenzo, Pedrocchi Nicola, Vicentini federico, Negri Simone Pio, Caimmi Marco, **Dispositivo per la Riabilitazione dei Movimenti del Piede**, 0001409069,
http://www.uibm.gov.it/uibm/dati/Avanzata.aspx?load=info_list_uno&id=2003610&table=Invention&#ancoraSearch, 2014, doi: None
- [PU.101] Vicentini F., Pedrocchi N., Malosio M., Safety device for the safe use of industrial apparatuses and robots, and control method for realtime verification of the kinematic state values of a robotized apparatus, WO-IB54246,
http://sobjprd.questel.fr/sobj/servlet/get_pds/WO201242470A1.pdf?userid=QPTCZ208&type=0&pdfid=36396772&ekey=1003&id=-1738213846, None, doi: None
- [PU.102] MALOSIO MATTEO; PEDROCCHI NICOLA; VICENTINI FEDERICO, Apparecchiatura robotizzata con dispositivo di sicurezza perfezionato e metodo di controllo per la verifica in tempo reale delle grandezze cinematiche di stato dell'apparecchiatura robotizzata., 0001401977,
http://www.uibm.gov.it/uibm/dati/Avanzata.aspx?load=info_list_uno&id=1872582&table=Invention&#ancoraSearch, 2013, doi: None
- [PU.103] Malosio M., Pedrocchi N., Molinari Tosatti L., Dispositivo biomedico per la riabilitazione robotizzata dell'arto superiore umano, particolarmente per la riabilitazione neuromotoria dell'articolazione della spalla e del gomito, 0001401979
http://www.uibm.gov.it/uibm/dati/Avanzata.aspx?load=info_list_uno&id=1872592&table=Invention&#ancoraSearch, 2013, doi: None. Matteo Malosio, Negri Simone Pio, Nicola Pedrocchi, Marco Caimmi, Federico Vicentini, Molinari Lorenzo Tosatti, "Device for the rehabilitation of movements of the foot", WO 2013093787 A1, 2013.

3.2 TECHNICAL REPORTS AND DELIVERABLES

- [DE.1] Nicola Pedrocchi, EURECA - D1.2 Proof of signature of the Internal Consortium Agreement & Implementation [CNR], Rapporto intermedio di progetto, ---, (2017)
- [DE.2] Nicola Pedrocchi; Manuel Beschi; Enrico Villagrossi; Stefania Pellegrinelli; Amedeo Cesta; Andrea Orlandini, FOurByThree - Deliverable 7.3 Periodical reports on experiments (III), Rapporto intermedio di progetto, ---, (2017)

- [DE.3] Manuel Beschi; Enrico Villagrossi; Nicola Pedrocchi, FourByThree - D2.3 Robot Identification Tools, Rapporto intermedio di progetto, ---, (2016)
- [DE.4] Stefania Pellegrinelli; Nicola Pedrocchi, FourByThree - D3.2 Motion planning and control of robots in collaboration with humans, Rapporto intermedio di progetto, ---, (2016)
- [DE.5] Manuel Beschi; Enrico Villagrossi; Nicola Pedrocchi, FourByThree - D3.3 Motion Interpolator, Rapporto intermedio di progetto, ---, (2016)
- [DE.6] Nicola Pedrocchi; Manuel Beschi; Stefania Pellegrinelli; Enrico Villagrossi; Loris Roveda, FourByThree - D7.1 Periodical reports on experiments (I), Rapporto intermedio di progetto, ---, (2016)
- [DE.7] Nicola Pedrocchi; Manuel Beschi; Enrico Villagrossi; Stefania Pellegrinelli; Amedeo Cesta; Andrea Orlandini, FourByThree - D7.2 Periodical reports on experiments (II), Rapporto intermedio di progetto, ---, (2016)
- [DE.8] N. Pedrocchi, L. Molinari Tosatti, S Pellegrinelli, PL104 - REPORT: Software structure for robotic solutions (Italian) - FlexProd - Sistemi di produzione flessibile ed eco-efficienti per veicoli su gomma Industria - 2015 - Mobilit? sostenibile", Rapporto intermedio di progetto, ---, (2016)
- [DE.9] N. Pedrocchi, L. Molinari Tosatti, S Pellegrinelli, PL108 - REPORT: Software structure for robotic solutions (Italian) - FlexProd - Sistemi di produzione flessibile ed eco-efficienti per veicoli su gomma Industria - 2015 - Mobilit? sostenibile, Rapporto intermedio di progetto, ---, (2016)
- [DE.10] N. Pedrocchi, L. Molinari Tosatti, S Pellegrinelli, PL36 - REPORT: Software structure for robotic solutions (Italian) - FlexProd - Sistemi di produzione flessibile ed eco-efficienti per veicoli su gomma Industria - 2015 - Mobilit? sostenibile, Progetto esecutivo, ---, (2016)
- [DE.11] Nicola Pedrocchi, Manuel Beschi, Stefania Pellegrinelli, Enrico Villagrossi, Andrea Orlandini, Amedeo Cesta, FourByThree - D1.3 System architecture, Rapporto intermedio di progetto, ---, (2015)
- [DE.12] Amedeo Cesta; Andrea Orlandini; Nicola Pedrocchi; Stefania Pellegrinelli, FourByThree - D1.5 Definition of Experiment & Validation Procedure, Rapporto intermedio di progetto, ---, (2015)
- [DE.13] Nicola Pedrocchi; Manuel Beschi; Stefania Pellegrinelli; Amedeo Cesta; Andrea Orlandini, FourByThree - D6.1 Scenario analysis and specification and configuration of the scenarios at the end users, Rapporto intermedio di progetto, ---, (2015)
- [DE.14] Nicola Pedrocchi; Amedeo Cesta, FourByThree - D8.1 Detailed Communication Strategy, Rapporto intermedio di progetto, ---, (2015)
- [DE.15] N. Pedrocchi, L. Molinari Tosatti, S Pellegrinelli, PL34 - REPORT: Software structure for robotic solutions (Italian) - FlexProd - Sistemi di produzione flessibile ed eco-efficienti per veicoli su gomma Industria - 2015 - Mobilit? sostenibile, Rapporto intermedio di progetto, ---, (2015)
- [DE.16] N. Pedrocchi, L. Molinari Tosatti, S. Pellegrinelli, PL35 - REPORT: Software development for robotic solutions (Italian) - FlexProd - Sistemi di produzione flessibile ed eco-efficienti per veicoli su gomma Industria - 2015 - Mobilit? sostenibile, Rapporto intermedio di progetto, ---, (2015)
- [DE.17] Nicola Pedrocchi, Enrico Villagrossi, Claudio Cenati, Pedro Roquet, Robotic requirements for foundry process (calibration/programming tools), Rapporto intermedio di progetto, ---, (2015)
- [DE.18] N. Pedrocchi, L. Molinari Tosatti, S Pellegrinelli, PL70 - REPORT: OTTIMIZZAZIONE E IMPLEMENTAZIONE, Rapporto intermedio di progetto, ---, (2014)
- [DE.19] Nicola Pedrocchi, Antonio Bonanno, Enrico Villagrossi, Pedro Roquet, Robotic requirements for foundry processes, Rapporto intermedio di progetto, ---, (2014)
- [DE.20] Albert Tellez, Miquel Carbonell, Pere Roquet, Nicola Pedrocchi, Enrico Villagrossi, Test samples cell, Rapporto intermedio di progetto, ---, (2014)
- [DE.21] Nicola Pedrocchi, Enrico Villagrossi, Federico Vicentini, COMAU, TEKNIKER, Advanced sensor based robot control solutions, Rapporto intermedio di progetto, ---, (2013)
- [DE.22] Nicola Pedrocchi, Fabio Abb?, Gianluca Guadagno, Enrico Villagrossi, Aldo Bottero, Marco Leonesio, Pedro Roquet, Cast iron robotic cells., Rapporto intermedio di progetto, ---, (2013)
- [DE.23] Nicola Pedrocchi; Lorenzo Molinari Tosatti, Echord-EasyPro -FINAL REPORT, Rapporto intermedio di progetto, ---, (2013)
- [DE.24] TEKNIKER, AYCN, Nicola Pedrocchi, Enrico Villagrossi, Final pilot implementation and evaluation, Rapporto intermedio di progetto, ---, (2013)
- [DE.25] N. Pedrocchi, L. Molinari Tosatti, S Pellegrinelli,, PL69 - REPORT: RICERCA DI SOLUZIONI INNOVATIVE PER I SISTEMI DI CONTROLLO, Rapporto intermedio di progetto, ---, (2013)
- [DE.26] COMAU, CNR-ITIA, INESCOP, TEKNIKER, QDESIGN, ROBOFOOT Project - Smart robotics for high added value footwear industry - D4.2 Advanced sensor based robot programming., Rapporto intermedio di progetto, ---, (2013)
- [DE.27] nicola pedrocchi; lorenzo molinari tosatti, Echord-EasyPro - D4: Test results, Rapporto intermedio di progetto, ---, (2012)
- [DE.28] Malosio, Matteo; Negri, Simone Pio; Paolucci, Francesco; Pedrocchi, Nicola, D5.3 - Full AH test report, None, ---, (2013)
- [DE.29] CNR-ITIA, COMAU , TEKNIKER, INESCOP, ROBOFOOT Project - Smart robotics for high added value footwear industry - D4.3 Advanced sensor based robot control Solutions, None, ---, (2013)

- [DE.30] COMAU, ITIA-CNR, TEKNIKER, INESCOP, ROBOFOOT Project - Smart robotics for high added value footwear industry - D4.4 Control and programming prototype, None, ---, (2012)
- [DE.31] Nicola Pedrocchi, Enrico Villagrossi, Lorenzo Molinari Tosatti, ROBOFOOT Project - Smart robotics for high added value footwear industry - Deliverable D2.3 Safety issues for robot assisted shoe production, None, ---, (2012)
- [DE.32] INESCOP, TEKNIKER, DFKI, CNR-ITIA, AYCEN, "ROBOFOOT Project" - Smart robotics for high added value footwear industry - Deliverable 6.1 Definition of the Demonstrator, None, ---, (2011)
- [DE.33] ROBOFOOT Consortium, ROBOFOOT Project - Smart robotics for high added value footwear industry - D1.1 Robots in Footwear Industry: requirements, None, ---, (2011)
- [DE.34] ROBOFOOT Consortium, ROBOFOOT Project - Smart robotics for high added value footwear industry - D1.2 Scenarios definition and validation plan, None, ---, (2011)
- [DE.35] CNR-ITIA, ROBOFOOT Consortium, ROBOFOOT Project - Smart robotics for high added value footwear industry - D2.1 Robot assisted footwear manufacturing redesign, None, ---, (2011)
- [DE.36] INESCOP, CNR-ITIA, QDESIGN, CNR-ITIA, COMAU, TEKNIKER, ROBOFOOT Project - Smart robotics for high added value footwear industry - Deliverable 4.1 Advanced CAD based programming, None, ---, (2011)
- [DE.37] Pedrocchi N., Malosio M., Parazzoli D., Danesi M., Cevasco L., Contratto Comau: Controllo di Forza: Analisi di fattibilit? e Prestudio HW/SW per device di esterno, None, ---, (2009)
- [DE.38] Berthilsson R.; Ard? H.; Malosio M.; Pedrocchi N., SMERobot Deliverable DR4.11, None, ---, (2009)
- [DE.39] Pedrocchi N.; Malosio M.; Dallefrate D.; Ziliani G.; Ledermann T.; Winkler B.; Zimmermann U.; Heiligensetzer P.; Romanelli F.; Tampalini F.; Bertone M.; Berthilsson R.; Ardo H.; Sepp W.; Nilsson K.; Suppa M.; Dresselhaus M., SMERobot Deliverable DR4.14, None, ---, (2009)
- [DE.40] Pedrocchi N., SMERobot: Annual WP Report - Workpackage R4, None, ---, (2009)
- [DE.41] Pedrocchi N., Malosio M., Parazzoli D., Molinari Tosatti L., SMERobot: DR4.14 The safe and productive robot working without fences: state of art of the developed HW and SW solutions in the whole work-package, None, ---, (2009)
- [DE.42] Pedrocchi N., Malosio M., Parazzoli D., Molinari Tosatti L., SMERobot: Interim Activity Report, None, ---, (2009)
- [DE.43] Pedrocchi N., SMERobot, None, ---, (2008)
- [DE.44] Ziliani G., Pedrocchi N., Tampalini F., SMERobot Deliverable DR4.10"Experiment assessment of collision avoidance reaction/navigation strategies by means of test beds", None, ---, (2008)

4 DISSEMINATION, COMMUNICATION, SPEECH, CLASSES

4.1 4 DISSEMINATION

Dissemination activities consisted of attending various international conferences where articles PU.12, PU.18, PU.23, PU.29 were presented. All other articles published in international conferences were presented by the co-authors. Other dissemination activities were presentations at the final events of the projects: PR.2, PR.4, PR.5, PR.6.

4.2 CLASSES / SEMINAR

No teaching at university courses was supported. However, the following seminars have been held:

- [SE.1] Seminar on robot control in the area of collaborative robotized collaboration, Politecnico di Milano, 2017.
Invitation to hold a seminar on robot control in Germany by Prof. Pellegrinelli in the Automated Advanced Production System, Mechanical Engineering Department, Polytechnic of Milan.
- [SE.2] Seminar on robot control in the area of collaborative robotized collaboration, Politecnico di Milano, 2016.
Invitation to hold a seminar on robot control in Germany by Prof. Pellegrinelli in the Automated Advanced Production System, Mechanical Engineering Department, Polytechnic of Milan.
- [SE.3] Seminar on collaborative robotics, University of Bologna, 2015.
Invitation to hold a seminar on the control in force by Prof. Vertechy within the course of Industrial Robotics, Department of Mechanical Engineering, University of Bologna.
- [SE.4] Seminar on robot force control, Politecnico di Milano, 2013.
Invitation to hold a seminar on the control in force by Prof. Giovanni Legnani within the course of Industrial Robotics, Department of Mechanical Engineering, Polytechnic of Milan.
- [SE.5] Seminar on robot force control, Politecnico di Milano, 2013.
Invitation to hold a seminar on the control in force by Prof. Giovanni Legnani within the course of Industrial Robotics, Department of Mechanical Engineering, Polytechnic of Milan.
- [SE.6] Seminar on robot force control, Politecnico di Milano, 2011.

Invitation to hold a seminar on the control in force by Prof. Giovanni Legnani within the course of Industrial Robotics, Department of Mechanical Engineering, Polytechnic of Milan.

[SE.7] Seminar on robot force control, *Corso SIRI 2013*. Invited teacher

4.3 TRADE FAIR

- [FE.1] 2018, MECSPE, Marzo, Parma, Italia.
Invited speaker
- [FE.2] 2017, MECSPE, Marzo, Parma, Italia.
Invited speaker
- [FE.3] 2017, MECSPE, Marzo, Parma, Italia.
Exhibitor
- [FE.4] European Robotic Forum - ERF, March 2018, Finlandia.
Invited speaker
- [FE.5] European Robotic Forum - ERF, Aprile, 2017, Edinburgo, Scotland, UK.
Invited speaker
- [FE.6] European Robotic Forum - ERF, Aprile 2016, Lubiana, Slovenia. Invited speaker
- [FE.7] RoboBusiness EUROPE, 2014, Billund, Denmark.
- [FE.8] Invited speaker
- [FE.9] European Robotic Forum - ERF, March 26-27, 2014, Rovereto, Italy.
Exhibitor
- [FE.10] Presentazione Impianto Pilota CNR-IITA - 11 giugno 2013.
Organizzazione e Speaker.
- [FE.11] Mecha-Tronika – 23-26 Ottobre 2013 – Fiera Rho – Milano.
Allestimento e presenza stand CNR-ITIA
- [FE.12] Robotica – 7-9 Novembre 2012 – Fiera Rho – Milano.
Allestimento e presenza stand CNR-ITIA.

5 INSTITUTIONAL ROLES

5.1 RESEARCH COLLABORATION

- [RI.1] Fraunhofer IFF, Magdeburg, 2014 - ongoing, partner in research funded projects
- [RI.2] Fraunhofer IWS, Dresda, 2015, co-tutor PhD
- [RI.3] Fraunhofer IPK, Berlino, 2014, co-tutor PhD
- [RI.4] Fraunhofer IPA, Stoccarda, da 2015 per progettualità in RIC (Ros Industrial Consortium)
- [RI.5] Università degli Studi di Bologna, funded PhD about flexible mechanism and control, from 2017
- [RI.6] Università degli Studi di Padova, funded PhD about machine learning for motion planning di robot in applicaioni cooperative, from 2018
- [RI.7] CNR-ISTC, AI for industrial robotics, from 2015
- [RI.8] Università degli Studi di Brescia, collaborazione sul controllo di meccanismi attraverso bus di campo ad alte prestazioni
- [RI.9] CNR-ISTC, 2014-ongoing, partner in research project
- [RI.10] CNR-IMAMOTER, 2012-2016, partner in research project
- [RI.11] CNR-IEIIT, utilizzo sensori innovativi in scenari di collaborazione uomo robot

5.2 ROLES

- [RI.12] Head of robot motion control and robotized processes laboratory of iras division of cnr-stiima
From-to 29 May 2014 - ongoing
- [RI.13] Chair of Scientific Advisory Board di CNR-STIIMA
From-to 3/2017 – 12/2018 (formal appointment in July 2018)
- [RI.14] Memembr of Quality Assurance Board di CNR-STIIMA
From-to 1/2014 – 12/2017 (no formal appointment)

- [RI.15] Rappresentante CNR-ITIA nel Consorzio ROS-I (RIC-EU).
From-to 4/2014
- [RI.16] Membro del Consiglio del corso di Dottorato in Meccanica Applicata, Università di Brescia.
From-to 11/2012 – 11/2014
- [RI.17] Tutoraggio del dottorato di ricerca di Guido Boccheri, UniBo
From-to 11/2017 – ON GOING
- [RI.18] Tutoraggio del dottorato di ricerca di Giorgio Nicola, UniPD
From-to 11/2018 – ON GOING
- [RI.19] Tutoraggio del dottorato di ricerca di Enrico Villagrossi.
From-to 11/2012 a 11/2016
- [RI.20] Tutoraggio del dottorato di ricerca di Marco Caimmi.
From-to 11/2012 a 11/2015
- [RI.21] Tutoraggio del dottorato di ricerca di Paolo Magnoni.
From-to 12/2013 a 12/2016
- [RI.22] Reviewer for FP7-ICT-ECHORD++ project.
From-to Novembre 2017 - Dicembre 2018
- [RI.23] Reviewer for for FP7-ICT-SMErobotics.
From-to 11/2012
- [RI.24] Memebr of the Strategic Board of the CNR-ITIA Pilot Plant
From-to 03/2013 – 1/1/2015 (no formal appointment available)