

University Academic Curriculum Vitae

Personal information

Andrea Giusti

Education since leaving school

- 2010, Bachelor's degree in Telecommunications Engineering, University of Trento - Italy
- 2013, Master's degree in Mechatronic Engineering (*summa cum laude*), University of Trento - Italy
- 2018, Doctorate (Dr.-Ing.) at the Chair of Robotics, AI and Real-time systems, Technical University of Munich (TUM) – Germany
- 2023, national scientific qualification (ASN) for the role of associate professor in the Italian higher education system for the disciplinary field of 09/A2 – Applied mechanics (ING-IND/13 Meccanica Applicata alle Macchine)

Present appointment

- Head of RISE - „Robotics and Intelligent Systems Engineering“
- Since November 2020
- Level of appointment: Head of unit / Principal investigator
- Research institute: Fraunhofer Italia Research s.c.a.r.l.

Professional experience

From / to	Job title	Name of Institution	Main responsibilities
Nov. 2017/ Nov. 2020	Senior researcher	Fraunhofer Italia Research	Execution, management and writing of research projects in the unit “Automation and Mechatronics Engineering” (since Jan. 2019) scientific coordination for the Fraunhofer Italia's application center ARENA - “Area for Research and Innovative Applications”
Feb. 2017 – Mar. 2017 and Apr. 2016 – Jul. 2016	Visiting/guest researcher	Italian Institute of Technology - IIT	Research activity and development of model-based control methods for reconfigurable robots with elastic joints and tests with prototypes
Jul. 2014 / Oct. 2017	EU-researcher	Technical University of Munich (TUM)	Research and implementation of modelling and control methods for modular reconfigurable robot manipulators Teaching assistant for “Fundamentals of Artificial Intelligence”; Organizer and lecturer of the lab course “Control of Modular Robots”; Tutor for the seminar “Cyber-Physical Systems
Jul. 2013 / May 2014	Project engineer	Whirlpool R&D	Design and test of control methods for food preparation and processing systems, modelling and identification of thermal systems involving high frequency power electronics.

Participation in exhibitions (where applicable)

- Invited speaker at the workshop and open-lab event on Field Robotics, organized by the Free University of Bolzano/Bozen, Bolzano, held on 01/07/2021.
- Speaker at the event “Giornate del Tirolo – Forum Europeo Alpbach” as a finalist for the Euregio young researchers award, Alpbach, Austria, 2019.
- Invited speaker at the congress “Automazione 5.0 – L’uomo, l’intelligenza artificiale e il robot”, Tecniche Nuove, Milano, Italy, held on 02/07/2019.
- Participation as a volunteer on 23-24 July 2016 to the outreach event organized by the European Commission: “Science is a revolution”, museum of Science and Industry of Manchester, UK. The outreach event was a scientific exhibition including hands-on activities for children.
- Presenter of research-paper contributions at the following scientific conferences:
 - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2015, Hamburg, Germany, with the contribution: “Automatic centralized controller design for modular and reconfigurable robot manipulators”;
 - IEEE American Control Conference (ACC), 2016, Boston, Massachusetts, USA, with the contribution: “Ultimate robust performance control of rigid robot manipulators using interval arithmetic”;
 - IEEE International Conference on Robotic Computing (IRC), 2017, Taichung, Taiwan, with the following contribution: “Efficient computation of interval-arithmetic-based robust controllers for rigid robots”;
 - IEEE International Conference on Robotics and Automation (ICRA), 2017, Singapore, with the following contribution: “Combined inverse-dynamics/passivity-based control for robots with elastic joints”;
 - International Conference on Robotics in the Alpe-Adria-Danube-Region (RAAD), 2019, Kaiserslautern, Germany, with the following contribution: “Collaborative robotics safety control application using dynamic safety zones based on the ISO/TS 15066: 2016”;
 - International Conference of IFToMM Italy, 2022, Naples, Italy, with the following contribution: “Inverse Uncertain-Dynamics of Robot Manipulators Using Interval Arithmetic”;
 - IEEE International Conference on Robotics and Automation (ICRA), 2023, London, with the following contribution: “Automatically Deployable Robust Control of Modular Reconfigurable Robot Manipulators”.

Experience in academic teaching

- A.Y. 2023-2024, “AI Applications in Industry” at the Free University of Bozen-Bolzano, part of the program of the master’s degree in industrial mechanical engineering. Commitment of 48 hours (24 hours lectures, 24 hours exercises)
- A.Y. 2022-2023, “AI Applications in Industry” at the Free University of Bozen-Bolzano, part of the program of the master’s degree in industrial mechanical engineering. Commitment of 40 hours (10 hours lectures, 30 hours exercises)
- Summer semester 2017, practical course “Safe Human-Robot Co-Existence” at the Technische Universität München. Commitment of 6 SWS (weekly hours per semester).
- Summer semester 2015, winter semesters 2015/16 and 2016/17, practical course “Control of Modular Robots” at the Technische Universität München. Commitment of 6 SWS (weekly hours per semester).
- Summer semester 2015, 2016 and winter semester 2016/17, seminar “Cyber-Physical Systems” at the Technische Universität München. Commitment of 2 SWS (weekly hours per semester).

- Winter Semesters 2014/15 and 2015/16, “Grundlagen der Künstlichen Intelligenz” (fundamentals of artificial intelligence) at the Technische Universität München. Commitment of 1 SWS (weekly hours per semester).

Other academic responsibilities

- Associate editor, IEEE Robotics and Automation Letters, since Jan. 2024.
- Guest editor for the special issue “Trajectory Planning for Intelligent Robotic and Mechatronic Systems”, MDPI Applied Sciences, section Robotics and Automation, 2024.
- Co-organizer and speaker at the international workshop “Configurable Collaborative Robot Technologies in Construction”, at the IEEE International Conference on Robotics and Automation (ICRA), 2023, London, 29/05/2023.
- Co-organizer and speaker at the international workshop “Modular and Reconfigurable Robot Mechatronics and Control: Challenges and Recent Advancements”, at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021, held online on 27/09/2021.
- Supervision of students for master/bachelor’s theses at Fraunhofer Italia in collaboration with universities (Free University of Bozen-Bolzano, University of Innsbruck, and University of Trento).

Memberships

- Member of IFToMM Italy since 07/06/2022.
- IEEE Member since 12/04/2020.

Research grants (last 5 years only)

Date granted	Award Holder(s)	Funding Body	Title	Amount received
2023	Eurac Research, Fraunhofer Italia Research scarl, SAIDEA SRL, Deltamax Automazione, WATT SERVICE SRL	European Regional Development Fund (EFRE/FESR) Autonomous province of Bozen/Bolzano - Investment for Growth and Jobs Programme 2021 – 2027	Robotica di campo e soluzioni autonome per il settore FV (ROBO&M), CUP D53C23003080007	~0.8M € (whole project) ~300k € (at Fraunhofer Italia)
2020	Fondazione Istituto Italiano di Tecnologia (IIT), Technische Universität München (TUM), Fraunhofer Italia Research scarl, Profactor GmbH, Centralny Instytut Ochrony Pracy - Państwowy Instytut Badawczy, Budimex Spolka Akcyjna	EU, H2020-ICT-2020-2	Configurable Collaborative Robot Technologies (CONCERT), ID 101016007	~3M € (whole project) ~0.5M € (at Fraunhofer Italia)
2020	Free University of Bozen-Bolzano, Fraunhofer Italia Research	The Autonomus Province of Bolzano/Bozen-South Tyrol	Reconfigurable Collaborative Agri-Robots (RECOARO), CUP I52F20000300005	~238k € (whole project) ~95k € (at Fraunhofer Italia)
2020	Fraunhofer Italia Research scarl	European Regional Development Fund (EFRE/FESR)	Sustainable Manufacturing through Application of Reconfigurable and Intelligent	~400k € (at Fraunhofer Italia)

		Autonomous province of Bozen/Bolzano - Investment for Growth and Jobs Programme 2014 – 2020	systems in Production processes (SMART-Pro), CUP B52F20001530009	
2019 - 2024	Fraunhofer Italia Research scarl	Multiple clients	Multiple contracts for research projects	Tot. ~0.5M €

Publications

Journal papers	
J15	L. Scalera, F. Lozer, A. Giusti , A. Gasparetto, "An experimental evaluation of robot-stopping approaches for improving fluency in collaborative robotics," <i>Robotica</i> , 2024, 42(5):1386-1402. DOI: 10.1017/S0263574724000262
J14	M. Todescato, O. Braholli, D. Chaltsev, I. Di Blasio, D. Don, G. Egger, J. Emig, G. Pasetti Monizza, P. Sacco, D. Siegele, D. Steiner, M. Terzer, M. Riedl, A. Giusti , and D. Matt, "Sustainable manufacturing through application of reconfigurable and intelligent systems in production processes: a system perspective," <i>Sci Rep</i> 13, 22374 (2023). DOI: https://doi.org/10.1038/s41598-023-49727-5
J13	L. Scalera, C. Nainer, A. Giusti , A. Gasparetto, "Robust Safety Zones for Manipulators with Uncertain Dynamics in Collaborative Robotics," <i>International Journal of Computer Integrated Manufacturing</i> , 2023. DOI: https://doi.org/10.1080/0951192X.2023.2258111
J12	S. B. Liu, A. Giusti and M. Althoff, "Velocity Estimation of Robot Manipulators: An Experimental Comparison," <i>IEEE Open Journal of Control Systems</i> , vol. 2, pp. 1-11, 2023. DOI: 10.1109/OJCSYS.2022.3222753
J11	L. Scalera, A. Giusti , R. Vidoni, A. Gasparetto, "Enhancing fluency and productivity in human-robot collaboration through online scaling of dynamic safety zones," <i>The International Journal of Advanced Manufacturing Technology</i> , 121 (9-10), 2022. https://doi.org/10.1007/s00170-022-09781-1
J10	R.A. Rojas, A. Giusti , R. Vidoni, "Online Computation of Time-Optimization-Based, Smooth and Path-Consistent Stop Trajectories for Robots," <i>Robotics</i> , 2022, 11(4), 70. https://doi.org/10.3390/robotics11040070
J9	C. Nainer and A. Giusti , "Automatically Deployable Robust Control of Modular Reconfigurable Robot Manipulators," <i>IEEE Robotics and Automation Letters</i> , 2022, DOI: 10.1109/LRA.2022.3155826
J8	A. Giusti , S. B. Liu and M. Althoff, "Interval-Arithmetic-Based Robust Control of Fully Actuated Mechanical Systems," <i>IEEE Transactions on Control Systems Technology</i> , 2021, DOI: 10.1109/TCST.2021.3118488
J7	C. Marcher, A. Giusti , D.T. Matt, "On the Design of a Decision Support System for Robotic Equipment Adoption in Construction Processes," <i>Appl. Sci.</i> 2021, 11, 11415. https://doi.org/10.3390/app112311415
J6	C. Follini, V. Magnago, K. Freitag, M. Terzer, C. Marcher, M. Riedl, A. Giusti , D.T. Matt, "BIM-Integrated Collaborative Robotics for Application in Building Construction and Maintenance" <i>Robotics</i> , 2021, 10, 2. DOI: 10.3390/robotics10010002
J5	L. Scalera, A. Giusti , R. Vidoni, V. Di Cosmo, D.T. Matt, M. Riedl "Application of dynamically scaled safety zones based on the ISO/TS 15066: 2016 for collaborative robotics," <i>International Journal of Mechanics and Control</i> , 2020, 21, 41-49
J4	M. Althoff, A. Giusti , S. B. Liu, A. Pereira, "Effortless creation of safe robots from modules through self-programming and self-verification", <i>Science Robotics</i> , Vol 4, no. 31, eaaw1924, 2019. DOI: 10.1126/scirobotics.aaw1924
J3	A. Giusti , J. Malzahn, N. Tsagarakis, and M. Althoff, "On the combined inverse-dynamics/passivity-based control of elastic-joint robots," <i>IEEE Transactions on Robotics</i> , vol 34, no. 6, 2018. DOI: 10.1109/TRO.2018.2861917
J2	A. Giusti , M.J.A. Zeestraten, E. Icer, A. Pereira, D.G Caldwell, S. Calinon, and M. Althoff, "Towards Flexible Automation Driven by Demonstration: Leveraging Strategies that Simplify Robotics," <i>IEEE Robotics and Automation Magazine</i> , vol. 25, no. 2, 2018. DOI: 10.1109/MRA.2018.2810543
J1	A. Giusti and M. Althoff, "On-the-fly control design of modular robot manipulators," <i>IEEE Transactions on Control Systems Technology</i> , vol. 26, no. 4, pp. 1484-1491, 2018. DOI: 10.1109/TCST.2017.2707336
Conference papers	
C19	A. Gagliardo, S. Garbin, M. Terzer, D.T. Matt, A. Giusti , "A BIM-Integrated Robotics Application for Color Spraying in Construction", <i>International Conference on Construction Logistics, Equipment, and Robotics</i> , Lecture Notes in Civil Engineering, vol. 390, pp. 194-200, 2023.
C18	A. Giusti , C. Nainer, "Inverse Uncertain-Dynamics of Robot Manipulators Using Interval Arithmetic," <i>Advances in Italian Mechanism Science. IFToMM Italy 2022. Mechanisms and Machine Science</i> , vol 122. Springer, Cham. Doi: https://doi.org/10.1007/978-3-031-10776-4_76

C17	L. Scalera, A. Giusti , R. Vidoni, A. Gasparetto, "Online planning of path-consistent stop trajectories for collaborative robotics," <i>Advances in Italian Mechanism Science. IFToMM Italy 2022. Mechanisms and Machine Science</i> , vol 122. Springer, Cham. Doi: https://doi.org/10.1007/978-3-031-10776-4_80
C16	L. Scalera, R. Vidoni and A. Giusti , "Optimal scaling of dynamic safety zones for collaborative robotics," <i>IEEE International Conference on Robotics and Automation (ICRA)</i> , 2021, pp. 3822-3828, doi: 10.1109/ICRA48506.2021.9561611
C15	C. Nainer, M. Feder and A. Giusti , "Automatic Generation of Kinematics and Dynamics Model Descriptions for Modular Reconfigurable Robot Manipulators," <i>IEEE 17th International Conference on Automation Science and Engineering (CASE)</i> , 2021, pp. 45-52, doi: 10.1109/CASE49439.2021.9551680
C14	A. Giusti et al. , "BALTO: A BIM-Integrated Mobile Robot Manipulator for Precise and Autonomous Disinfection in Buildings against COVID-19," <i>IEEE 17th International Conference on Automation Science and Engineering (CASE)</i> , 2021, pp. 1730-1737, doi: 10.1109/CASE49439.2021.9551635
C13	D. Siegele, D. Steiner, A. Giusti , M. Riedl, D.T. Matt "Optimizing Collaborative Robotic Workspaces in Industry by Applying Mixed Reality". In: De Paolis L.T., Arpaia P., Bourdot P. (eds) <i>Augmented Reality, Virtual Reality, and Computer Graphics. AVR 2021. Lecture Notes in Computer Science</i> , vol 12980. Springer, Cham. https://doi.org/10.1007/978-3-030-87595-4_40
C12	W. Ainhauser, J. Gerstmayr, A. Giusti , "Multi-objective Trajectory Tracking Optimization for Robots with Elastic Joints". In: Zeghloul S., Laribi M.A., Sandoval J. (eds) <i>Advances in Service and Industrial Robotics. RAAD 2021. Mechanisms and Machine Science</i> , vol 102. Springer, Cham. DOI: 10.1007/978-3-030-75259-0_27
C11	C. Follini, M. Terzer, C. Marcher, A. Giusti , D.T. Matt, "Combining the Robot Operating System with Building Information Modeling for Robotic Applications in Construction Logistics". In: Zeghloul S., Laribi M., Sandoval Arevalo J. (eds) <i>Advances in Service and Industrial Robotics. RAAD 2020. Mechanisms and Machine Science</i> , vol 84. Springer, Cham. DOI: 10.1007/978-3-030-48989-2_27
C10	G. Egger, D. Chaltsev, A. Giusti , D. T. Matt, "A deployment-friendly decentralized scheduling approach for cooperative multi-agent systems in production systems", <i>Procedia Manufacturing</i> , vol. 52, 2020, pp. 127-132. DOI: 10.1016/j.promfg.2020.11.023
C9	C. Marcher, A. Giusti , C.P. Schimanski, D.T. Matt, "Application of Decision Support Systems for Advanced Equipment Selection in Construction", <i>Proc. of the Int. Conf. on Cooperative Design, Visualization and Engineering, Lecture Notes in Computer Science</i> , 2019. DOI: 10.1007/978-3-030-30949-7_26
C8	V. Di Cosmo, A. Giusti , R. Vidoni, M. Riedl, D.T. Matt, "Collaborative Robotics Safety Control Application Using Dynamic Safety Zones Based on the ISO/TS 15066:2016", In: Berns K., Görges D. (eds) <i>Advances in Service and Industrial Robotics. RAAD 2019. Advances in Intelligent Systems and Computing</i> , vol 980. Springer, Cham. DOI: 10.1007/978-3-030-19648-6_49
C7	M. Wagner, S.B. Liu, A. Giusti , and M. Althoff, "Interval-arithmetic-based trajectory scaling and collision detection for robots with uncertain dynamics," <i>Proc. of the Second IEEE International Conference on Robotic Computing (IRC)</i> , 2018, pp. 41-48. DOI: 10.1109/IRC.2018.00015
C6	W. Gasparetto, G. Egger, A. Giusti , E. Rauch, M. Riedl, D. T. Matt, "Intelligent workpiece carrier for distributed data collection and control in manufacturing environments," <i>Procedia Manufacturing</i> , vol. 24, 2018, pp. 190-195. DOI: 10.1016/j.promfg.2018.06.040
C5	A. Giusti , J. Malzahn, N. Tsagarakis, and M. Althoff, "Combined inverse-dynamics/passivity-based control for robots with elastic joints," <i>Proc. of the IEEE International Conference on Robotics and Automation (ICRA)</i> , 2017, pp. 5281-5288. DOI: 10.1109/ICRA.2017.7989620
C4	F. Hisch, A. Giusti , and M. Althoff, "Robust control of continuum robots using interval arithmetic," <i>Proc. of the 20th IFAC World Congress (IFAC-PapersOnLine)</i> , Vol. 50, Issue 1, 2017, pp. 5660-5665. DOI: 10.1016/j.ifacol.2017.08.1115
C3	A. Giusti and M. Althoff, "Efficient Computation of Interval-Arithmetic-Based Robust Controllers for Rigid Robots," <i>Proc. of the First IEEE International Conference on Robotic Computing (IRC)</i> , 2017, pp. 129-135. DOI: 10.1109/IRC.2017.14
C2	A. Giusti and M. Althoff, "Ultimate robust performance control of rigid robot manipulators using interval arithmetic," <i>Proc. of the American Control Conference (ACC)</i> , 2016, pp. 2995-3001. DOI: 10.1109/ACC.2016.7525375

C1	A. Giusti and M. Althoff, "Automatic centralized controller design for modular and reconfigurable robot manipulators," Proc. of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2015, pp. 3268-3275. DOI: 10.1109/IROS.2015.7353831
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**Publications
about the
applicant**

- Chamber of Commerce, Industry, Crafts and Agriculture of Bolzano, "Il centro applicativo Arena: potenzialità e sfide della fabbrica digitale intelligente", 2023, <https://www.handelskammer.bz.it/en/node/10459> (last accessed 12/06/2024).
- Industria Italiana, 4/12/2020, "Coral, il cobot di Fraunhofer Italia (Noi Techpark) che apprende dall'uomo," di Marco de' Francesco <https://www.industriaitaliana.it/coral-cobot-fraunhofer-italia-noi-techpark/> (last accessed 12/06/2024)
- Fraunhofer Italia, "Relazione annuale 2019", pages 41-42, <https://www.fraunhofer.it/content/dam/fraunhofer-italia/documents/it/Relazione%20Annuale%202019.pdf> (last accessed 12/06/2024).

**Further data
(last 3 years)**

Involvement in research projects

Project title, ID, status, project website	Funding body	Role in the project
Robotica di campo e soluzioni autonome per il settore FV (ROBO&M), CUP D53C23003080007, ongoing, n.a.	European Regional Development Fund (EFRE/FESR) Autonomous province of Bozen/Bolzano - Investment for Growth and Jobs Programme 2021 – 2027	Principal investigator at Fraunhofer
Configurable Collaborative Robot Technologies (CONCERT), ID 101016007, ongoing, https://concertproject.eu/	EU, H2020-ICT-2020-2	Principal investigator at Fraunhofer Italia and leader of a work-package
Reconfigurable Collaborative Agri-Robots (RECOARO), CUP I52F20000300005, ongoing, https://www.fraunhofer.it/en/Research/advanced-robotics/recoaro.html	Autonomous province of Bozen/Bolzano, Research Südtirol/Alto Adige 2019 funds	Principal investigator at Fraunhofer Italia s.c.a.r.l.
Sustainable Manufacturing through Application of Reconfigurable and intelligent systems in Production processes (SMART-Pro), CUP B52F20001530009, ongoing, https://www.fraunhofer.it/en/Research/sustainable-innovation/SMARTpro.html	European Regional Development Fund (EFRE/FESR) Autonomous province of Bozen/Bolzano - Investment for Growth and Jobs Programme 2014 – 2020	Scientific co-responsible and team member at Fraunhofer Italia Research s.c.a.r.l.
Autonomous disinfection of crucial areas based on BIM-integrated Robotics (BALTO), No. Anti-Corona 840241, completed, https://www.fraunhofer.it/en/Research/human-centered-technology/balto.html	Fraunhofer Internal programs grant	Technical lead at Fraunhofer Italia s.c.a.r.l.

**Language
competence**

Italian: first language
English: fluent (C1)
German: elementary (A1)

13/06/2024