

Curriculum Vitae

Personal Information

Andrea Giusti

Degree: Doctorate (German degree “Dr.-Ing.”)

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Education

2014 - 2018	Technical University of Munich (TUM) - Germany Doctorate with dissertation “Automatic design of controllers for modular reconfigurable robot manipulators”
2010 - 2013	University of Trento - Italy Master degree in Mechatronic Engineering (<i>110 cum laude/110</i>) with the thesis “Drag free control design for cold gas thrusters”
2007 - 2010	University of Trento - Italy Bachelor degree in Telecommunications Engineering with the thesis (written in Italian): “Studio e realizzazione di un sistema di misura di impedenza ad alta frequenza per fotomoltiplicatori in silicio”

Research experience

November 2020 - in progress	Researcher, head of the unit “Robotics and Intelligent Systems Engineering” at Fraunhofer Italia Research s.c.a.r.l. (Bolzano, Italy).
November 2017 - November 2020	Researcher in the unit “Automation and Mechatronics Engineering” at Fraunhofer Italia Research s.c.a.r.l. (Bolzano, Italy). (since Jan. 2019) scientific coordination for the Fraunhofer Italia’s application center “Area for Research and Innovative Applications”- ARENA including management of industrial/academic synergies for the application center, the definition of research lines and technical specifications of demonstrators part of ARENA.
July 2014 - October 2017	Researcher within the project EU-FP7 Marie-Curie ITN “Sustainable Manufacturing through Advanced Robotics Training in Europe” (SMART-E), at the Chair of Robotics, Artificial Intelligence and Real-time Systems, Technical University of Munich (TUM) (Garching, Germany)
February 2017 - March 2017 April 2016 - July 2016	Visiting researcher at the Italian Institute of Technology - IIT (Genova, Italy), Department of Advanced Robotics.
July 2013 - May 2014	Project engineer at Whirlpool R&D (Cassinetta, Italy), global advanced development cross-category product.

Teaching experience

Academic year 2023/2024	Contract lecturer for the course “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).
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Academic year 2022/2023	Contract lecturer for the course “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	Lecturer/tutor for the 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	Lecturer/tutor for the 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	Tutor for the seminar “Cyber-Physical Systems” at the Technische Universität München. Commitment of 2 SWS (weekly hours per semester)
Winter Semesters 2014/15 and 2015/16	Teaching assistant for the course “Grundlagen der Künstlichen Intelligenz” (fundamentals of artificial intelligence) at the Technische Universität München. Commitment of 1 SWS (weekly hours per semester).

Participation in scientific events

2023	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.
2021	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.
2021	Chair for the session “Human Robot Interaction: Safety” at the IEEE International Conference on Robotics and Automation (ICRA), 2021, held online on 01/06/2021.
2021	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.
2019	Speaker at the event “Giornate del Tirolo – Forum Europeo Alpbach” as a finalist for the Euregio young researchers award, Alpbach, Austria, 2019.
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.
2016	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.

2015-2023

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".

Recognitions for the research activity

2020	Finalist for the IEEE I-RAS Young Author Best Paper Award, 2020 with the paper "On the Combined Inverse-Dynamics/Passivity-Based Control of Elastic-Joint Robots", IEEE Transactions on Robotics, 2018.
2019	Finalist for the Euregio Young Researchers Award 2019, Alpbach.
2019	3 rd place for the best application paper award with the paper "Collaborative Robotics Safety Control Application Using Dynamic Safety Zones Based on the ISO/TS 15066:2016" at the International Conference on Robotics in Alpe-Adria-Danube Region (RAAD), 2019.

Complementary trainings

2015-2016	Training at the Advanced Manufacturing Research Centre (AMRC) of the University of Sheffield (UK). Feb. 2015: Business skills and project management. Sept. 2015: Technology development and entrepreneurial skills. Nov. 2016: Implementing technology (e.g., EU research funding possibilities, writing research project proposals).
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Service to academic community

- Supervision of students for master/bachelor's theses at Fraunhofer Italia in collaboration with universities (Free University of Bolzano-Bozen, University of Innsbruck, and University of Trento).
- Guest editor for the special issue "Trajectory Planning for Intelligent Robotic and Mechatronic Systems" in collaboration with Dr. Lorenzo Scalera and Prof. Renato Vidoni for MDPI Applied Sciences (ISSN 2076-3417), section Robotics and Automation.
- Associate editor for IEEE Robotics and Automation Letters since January 2024.

Affiliations/memberships

- Member of the association "International Federation for the Promotion of Mechanism and Machine Science" - IFToMM Italy since 07/06/2022.
- IEEE Member since 12/04/2020.

Italian National Scientific qualification (ASN)

- Since 06/02/2023, obtainment of the National Scientific qualification ("Abilitazione Scientifica Nazionale") as associate ("professore universitario di seconda fascia") in the Italian higher education system for the disciplinary field of 09/A2 - Applied mechanics ("Meccanica Applicata alle Macchine").

Languages

Italian: first language

English: fluent (C1)

German: elementary (A1)

Involvement in research projects

Project title, ID, status, project website	Funding body	Role in the project
Configurable Collaborative Robot Technologies (CONCERT), ID 101016007, ongoing, https://concertproject.eu/	EU, H2020-ICT-2020-2	Project responsible 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	Project responsible 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	Project 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.
Virtual SimUlator for Automation Laboratory (VISUAL), CUP B51G17000280001, completed, https://www.fraunhofer.it/en/Research/flexible-production-systems/visual.html	European Regional Development Fund (EFRE/FESR) Autonomous province of Bozen/Bolzano - Investment for Growth and Jobs Programme 2014 – 2020	Team member at Fraunhofer Italia Research s.c.a.r.l.
Decentralized Control of Production processes, CUP B56J16001730001, completed, https://www.fraunhofer.it/en/Research/flexible-production-systems/deconpro.html	European Regional Development Fund (EFRE/FESR) Autonomous province of Bozen/Bolzano - Investment for Growth and Jobs Programme 2014 – 2020	Team member at Fraunhofer Italia Research s.c.a.r.l.
Sustainable Manufacturing through Advanced Robotics Training in Europe (SMART-E), ID 608022, completed, https://cordis.europa.eu/project/id/608022/it	FP7-PEOPLE-2013-ITN - Marie-Curie Action: "Initial Training Networks"	Marie-Curie Early-Stage Researcher at the Technische Universität München (TUM)

List of publications

Journal papers	
J13	L. Scalera, C. Nainer, A. Giusti , A. Gasparetto, “Robust Safety Zones for Manipulators with Uncertain Dynamics in Collaborative Robotics,” International Journal of Computer Integrated Manufacturing, 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,” IEEE Open Journal of Control Systems, 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,” The International Journal of Advanced Manufacturing Technology, 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,” Robotics, 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,” IEEE Robotics and Automation Letters, 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,” IEEE Transactions on Control Systems Technology, 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,” Appl. Sci. 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” Robotics, 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,” International Journal of Mechanics and Control, 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”, Science Robotics, 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,” IEEE Transactions on Robotics, 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,” IEEE Robotics and Automation Magazine, 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,” IEEE Transactions on Control Systems Technology, 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”, International Conference on Construction Logistics, Equipment, and Robotics, 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," Proc. of the Second IEEE International Conference on Robotic Computing (IRC), 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," Procedia Manufacturing, 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," Proc. of the IEEE International Conference on Robotics and Automation (ICRA), 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," Proc. of the 20th IFAC World Congress (IFAC-PapersOnLine), 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," Proc. of the First IEEE International Conference on Robotic Computing (IRC), 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," Proc. of the American Control Conference (ACC), 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

Bolzano, 04/02/2024

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