Martina Lippi

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CURRENT POSITION

Assistant Professor at Roma Tre University, Italy

EMPLOYMENT

Assistant Professor June 2022 - Present
Roma Tre University, Rome (RM), Italy
- **Activities:** the research activity focuses on distributed control of multi-agent systems in precision agriculture contexts. The activities also include the participation in the H2020 European project.

Postdoctoral Researcher Nov. 2020 - May 2022
Roma Tre University, Rome (RM), Italy
- **Activities:** the research activity concerns the distributed control and optimization of multi-agent systems in precision agriculture contexts. The activities also include the participation in the H2020 European projects PANTHEON and CANOPIES and the regional projects AGR-O-RAMA and PARADISE. The activities are under the supervision of Prof. Andrea Gasparri

PhD Student Nov. 2017 - Oct. 2020
University of Salerno, Fisciano (SA), Italy
- **Activity:** design, development and experimental validation of methodologies for the distributed control of multi-robot systems that can interact with human operators

Scolarship in Robotics May 2017 - Oct. 2017
University of Salerno, Fisciano (SA), Italy
- **Activity:** design and development of control algorithms for the decentralized control of cooperative manipulators and testing on a work-cell composed of 2 Comau SmartSix

Internship in Artificial Vision Aug. 2014 - Oct. 2014
A.I. Tech s.r.l, Fisciano (SA), Italy
- **Activity:** design and development of an application for people counting based on video analysis techniques

EDUCATION

PhD Degree in Information Engineering Nov. 2017 - Oct. 2020
University of Salerno, Fisciano (SA), Italy

- **Final mark:** Excellent
- **Research topics:** the research activity concerned the distributed control of multi-robot systems that may operate in the presence and/or collaboration of human operators; it was under the supervision of Prof. Alessandro Marino and Prof. Pasquale Chiacchio
- **Exams:** academic writing and publishing, patents and startups, funding and management of research projects, English, natural computing, numerical signal processing, industrial information systems

Visiting PhD Student in Information Engineering Feb. 2020 - Mar. 2020
University of Cassino and Southern Lazio, Cassino (FR), Italy

- **Research topics:** the research activity focused on recognizing and classifying forces that a manipulator exchanges with the environment and finally on reacting accordingly

Visiting PhD Student in Information Engineering Apr. 2019 - Dec. 2019
KTH Royal Institute of Technology, Stockholm, Sweden

- **Research topics:** the research activity focused on multi-manipulator systems aimed at co-manipulating deformable objects; it was under the supervision of Prof. Danica Kragic and included the collaboration with the group lead by Prof. Carme Torras at UPC Universitat Politècnica de Catalunya, Barcelona, Spain

Master's Degree in Computer Engineering Jan. 2015 - Feb. 2017
University of Salerno, Fisciano (SA), Italy

- **Final Mark:** 110/110 cum laude
- **Thesis:** *Decentralized control of cooperative mobile manipulators: synthesis and experiments*, Supervisors: Prof. Alessandro Marino, Prof. Pasquale Chiacchio
- **Exams:** software engineering, advanced programming techniques, advanced automatic controls, information coding and compression, embedded systems, computer architectures, automation and robotics, distributed programming, computer network security, semantic technologies for enterprise systems, artificial intelligence, telecommunication networks, model and systems for artificial vision

Bachelor's Degree in Computer Engineering Oct. 2011 - Dec. 2014
University of Salerno, Fisciano (SA), Italy

- **Final Mark:** 110/110 cum laude
- **Thesis:** *Design, implementation and performance comparison of three algorithms based on artificial vision for people counting*, Supervisors: Prof. Mario Vento, Prof. Alessia Saggese
- **Exams:** mathematics I, mathematics II, mathematics III, physics, logic networks, programming fundamentals, algorithms and data structures, computer organization, electrotechnics, fundamentals of automatic control, signal theory, databases, objected oriented programming, computer networks: architectures and services, antenna and wireless links, software tecnologies for the WEB, computer technologies for automatic control, theory and techniques of telecommunications, digital circuits, operative systems

Scientific High School Degree Sep. 2006 - Jul. 2011
Scientific High School "G. Da Procida", Salerno (SA), Italy

- **Final Mark:** 100/100

TRAINING EXPERIENCE

Grenoble Summer School on Data and Learning for Control organized by GIPSA-lab Sept. 2021
GIPSA-lab, Grenoble, France (online course)

- **Topics:** Different methodologies for data-driven control were presented.

Model Predictive Control Course organized by IMT Lucca Jun. 2020
School for Advanced Studies Lucca, Lucca, Italy (online course)

- **Topics:** General concepts of Model Predictive Control were introduced as well as linear time-varying, non linear, hybrid, stochastic and data-driven cases were addressed.

PhD Summer School organized by IEEE Robotics and Automation Society Jul. 2019
Czech Technical University, Prague, Czech Republic

- **Topics:** multi-robot systems were analyzed from different point of views: from the control perspective to the planning part up to the learning one. Experimental activity on a setup composed of three aerial vehicles has also been carried out.

PhD Summer School organized by the Italian Association of Professors and Researchers in Automation (SIDRA) Jul. 2018
Ce. U. B, Bertinoro (FC), Italy

- **Topics:** two modules were attended, which are "Adaptive Control: analysis and design methods" coordinated by Prof. Andrea Serrani and "Optimization Methods for Decision Making over Networks", coordinated by Prof. Giuseppe Notarstefano and Prof. Maria Prandini. The final test for the certification of credits has been passed

English Course "Trinity GESE" Level 7 (B2) Nov. 2007 - Apr. 2008
Scientific High School "G. Da Procida", Salerno (SA), Italy

TEACHING

Teacher for the course "Robotics" (7 CFU) Sept. 2022 - Jan. 2023
Roma Tre University, Rome (RM), Italy

- **Activity:** teaching in the field of industrial robotics to the students enrolled in the second year of the Master's Degree of Automation Engineering (class of about 10 students); the activity consists in 60 hours of lesson (3 weekly lessons of 2 hours each)

Teacher for the course "Complements of Automatic Controls" (3 CFU) Sept. 2020 - Dec. 2020
Roma Tre University, Rome (RM), Italy

- **Activity:** teaching in the field of Automatic Controls to the students enrolled in the second year of the Master's Degree of Mechanical Engineering (class of about 20 students); the activity consists in 24 hours of lesson (3 weekly lessons of 2 hours each)

Academic tutor for the course "Fundamentals of Automatic Controls" Mar. 2018 - Jun. 2018
University of Salerno, Fisciano (SA), Italy

- **Activity:** didactic support in the field of Automatic Controls to the students enrolled in the second year of the Bachelor's Degree of Computer Engineering (class of about 100 students); the activity included the preparation of exercises and 1 weekly lesson of 3 hours each

Academic tutor for the course "Fundamentals of Programming " Oct. 2016 - Gen. 2017
University of Salerno, Fisciano (SA), Italy

- **Activity:** didactic support in the field of Computer Science to the students enrolled in the first year of the Bachelor's Degree of Electronic Engineering (class of about 35 students); the activity included the preparation of exercises and 2 weekly lessons of 2 hours each

COMPUTER SKILLS

Experienced in:

- C, C++, Matlab, Python, Java, PHP, HTML, CSS, JavaScript, LaTex languages;
- ROS and OROCOS frameworks;
- V-REP and Gazebo simulation tools;
- MySql and PostgreSQL databases;
- GIT and SVN version control systems;
- Linux-based (also real-time) and Windows operative systems.

PUBLICATIONS

[1] **M. Lippi***, M. Santilli*, R. F. Carpio*, J. Maiolini*, E. Garone, V. Cristofori and A. Gasparri, "An Autonomous Sucker Management Architecture for Large-scale Hazelnut Orchards ," *Journal of Field Robotics*, 2023

[2] **M. Lippi**, P. Di Lillo and A. Marino, "A Task Allocation Framework for Human Multi-Robot Collaborative Settings," *IEEE International Conference on Robotics and Automation (ICRA)*, 2023

[3] **M. Lippi**, J. Gallou, J. Palmieri, A. Gasparri and A. Marino, "Human-Multi-Robot Task Allocation in Agricultural Settings: a Mixed Integer Linear Programming Approach," *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, 2023

[4] M. C. Welle*, **M. Lippi***, H. Lu, J. Lundell, A. Gasparri and D. Kragic, "Enabling Robot Manipulation of Soft and Rigid Objects with Vision-based Tactile Sensors," *IEEE International Conference on Automation Science and Engineering (CASE)*, 2023

[5] **M. Lippi**, J. Gallou, J. Palmieri, A. Gasparri and A. Marino, "An Optimal Allocation and Scheduling Method in Human-Multi-Robot Precision Agriculture Settings," *IEEE Mediterranean Conference on Control and Automation (MED)*, 2023

[6] A. Arlotta, **M. Lippi** and A. Gasparri, "A ROS-based Architecture for Object Detection and Relative Localization for a Mobile Robot with an Application to a Precision Farming Scenario," *IEEE Mediterranean Conference on Control and Automation (MED)*, 2023

[7] A. Furchì, **M. Lippi**, R. F. Carpio and A. Gasparri, "Route Optimization in Precision Agriculture Settings: A Multi-Steiner TSP Formulation," *IEEE Transactions on Automation Science and Engineering*, 2022

[8] **M. Lippi***, P. Poklukar*, M. C. Welle*, A. Varava, H. Yin, A. Marino, and D. Kragic, "Enabling Visual Action Planning for Object Manipulation through Latent Space Roadmap," *IEEE Transactions on Robotics*, 2022

[9] **M. Lippi**, A. Furchì, A. Marino, A. Gasparri, "An Adaptive Distributed Protocol for Finite-time Infimum or Supremum Dynamic Consensus", *IEEE Control Systems Letters (L-CSS) and IEEE Conference on Decision and Control (CDC)*, 2022

[10] **M. Lippi***, M. C. Welle*, P. Poklukar, A. Marino, and D. Kragic, "Augment-Connect-Explore: a Paradigm for Visual Action Planning with Data Scarcity," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022

[11] C. Chamzas*, **M. Lippi***, M. C. Welle*, A. Varava, L. E. Kavraki, D. Kragic, "State Representation Learning with Task-Irrelevant Factors of Variation in Robotics," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),* 2022

[12] **M. Lippi**, A. Furchì, A. Marino, A. Gasparri, "Finite-Time Distributed Protocol for Tracking the Upper (Lower) Bound For a Set of Time-Varying Reference Signals", *Mediterranean Conference on Control and Automation (MED)*,2022

[13] **M. Lippi**, R. F. Carpio, M. Contarini, S. Speranza and A. Gasparri, "A Data-Driven Monitoring System for the Early Pest Detection in the Precision Agriculture of Hazelnut Orchards," *IFAC Conference on Sensing, Control and Automation Technologies for Agriculture (AGRICONTROL)*, 2022

[14] **M. Lippi** and A. Marino, "Human Multi-Robot Physical Interaction: A Distributed Framework," *Journal of Intelligent and Robotic Systems*, vol. 101(2), pp. 1-20, 2021

[15] **M. Lippi**, M. Santilli, G. Oliva, and A. Gasparri, "A Finite-time Distributed Protocol for Link Prediction in Networked Multi-Agent Systems," *IEEE Conference on Decision and Control (CDC)*, 2021

[16] **M. Lippi**, G. Gillini, F. Arrichiello and A. Marino, "A Data-Driven Approach for Contact Detection, Classification and Reaction in Physical Human-Robot Collaboration," *IEEE International Conference on Robotics and Automation (ICRA)*, 2021

[17] **M. Lippi**, N. Bonucci, R. F. Carpio, M. Contarini, S. Speranza and A. Gasparri, "A YOLO-Based Pest Detection System for Precision Agriculture," *IEEE Mediterranean Conference on Control and Automation (MED)*, 2021

[18] **M. Lippi** and A. Marino, "A Control Barrier Function Approach to Human-multi-robot Safe Interaction," *IEEE Mediterranean Conference on Control and Automation (MED)*, 2021

[19] **M. Lippi** and A. Marino, "Enabling Physical Human-Robot Collaboration Through Contact Classification And Reaction," *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, pp. 1196-1203, 2020 2021

[20] **M. Lippi** and A. Marino, "Human Multi-Robot Safe Interaction: A Trajectory Scaling Approach Based On Safety Assessment," *IEEE Transactions on Control Systems Technology*, pp. 1-16, 2020

[21] **M. Lippi***, P. Poklukar*, M. C. Welle*, A. Varava, H. Yin, A. Marino, and D. Kragic, "Latent Space Roadmap for Visual Action Planning of Deformable and Rigid Object Manipulation," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2020

[22] **M. Lippi** and A. Marino, "Enabling Physical Human-Robot Collaboration Through Contact Classification And Reaction," *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, pp. 1196-1203, 2020

[23] I. Garcia-Camacho*, **M. Lippi***, M. C. Welle, H. Yin, R. Antonova, A. Varava, J. Borras, C. Torras, A. Marino, G. Alenyà and D. Kragic, "Benchmarking Bimanual Cloth Manipulation", *Robotics and Automation Letters*, 2020

[24] G. Gillini, **M. Lippi**, F. Arrichiello, A. Marino and F. Pierri,"Distributed Fault Detection and Isolation Strategy for a Team of Cooperative Mobile Manipulators", *IET BOOK: Fault Diagnosis and Fault-tolerant Control of Robotic Systems*, Chap. 7, pp. 143-166, 2020

[25] **M. Lippi**, A. Marino and S. Chiaverini, "A Distributed Approach To Human Multi-Robot Physical Interaction," *IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, 2019

*Contributed equally

[26] G. Gillini, **M. Lippi**, F. Arrichiello, A. Marino and F. Pierri, "Distributed Fault Detection and Isolation for Cooperative Mobile Manipulators," *IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, 2019, **Finalist of the Best Student Paper Award**

[27] **M. Lippi** and A. Marino, "Safety In Human-Multi Robot Collaborative Scenarios: A Trajectory Scaling Approach," *12th IFAC Symposium on Robot Control (SYROCO)*, 2018

[28] **M. Lippi** and A. Marino, "Distributed Kinematic Control and Trajectory Scaling for Multi-Manipulator Systems in Presence of Human Operators," *IEEE Mediterranean Conference on Control and Automation (MED)*, 2018

[29] **M. Lippi** and A. Marino, "Cooperative Object Transportation by Multiple Ground and Aerial Vehicles: Modeling and Planning," *2018 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 1084-1090, 2018

Workshops:

[W1] J. Palmieri, P. Di Lillo, **M. Lippi** and A. Marino, "A safety planner based on trajectory scaling and path deviation for human-robot interaction," *IEEE International Conference on Robotics and Automation (ICRA) 3rd Annual Workshop on Robot Teammates in Dynamic Unstructured Environments (RT-DUNE)*, 2023

[W2] C. Chamzas*, **M. Lippi***, M. C. Welle*, A. Varava, A. Marino, L. E. Kavraki, D. Kragic, "State Representations in Robotics: Identifying Relevant Factors of Variation using Weak Supervision," Conference Neural Information Processing Systems (NeurIPS) 3rd Robot Learning Workshop: Grounding Machine Learning Development in the Real World, 2020

[W3] **M. Lippi***, P. Poklukar*, M. C. Welle*, A. Varava, H. Yin, A. Marino, and D. Kragic, "Latent Space Roadmap for Visual Action Planning," *Robotics: Science and Systems (RSS) Workshop on Visual Learning and Reasoning for Robotic Manipulation*, 2020

ACTIVITIES IN CONFERENCES, WORKSHOPS AND EVENTS

The following workshops at national and international conferences have been organized:

- "3rd Workshop on Representing and Manipulating Deformable Objects", co-organized with M. C. Welle, D. Seita, F. Zhang at *IEEE International Conference on Robotics and Automation (ICRA)*, 2023, `https://deformable-workshop.github.io/icra2023/`;
- "Human-robot collaboration: needs, challenges and directions in different application domains", main organizer and co-organized with A. Marino at *Italian Conference on Robotics and Intelligent Machines (I-RIM)*, 2022, `https://m-lippi.github.io/irim-2022-hrc/`;
- "2nd Workshop on Representing and Manipulating Deformable Objects", main organizer and co-organized with M. C. Welle, D. Seita at *IEEE International Conference on Robotics and Automation (ICRA)*, 2022, `https://deformable-workshop.github.io/icra2022/`;
- "Representing and Manipulating Deformable Objects", main organizer and co-organized with A. Varava, M. C. Welle at *IEEE International Conference on Robotics and Automation (ICRA)*, 2021, `https://deformable-workshop.github.io/icra2021/`;
- "Control, Robotics, Sensing and Artificial Intelligence for Precision Agriculture", co-organized with A. Gasparri, D. Nardi at *IEEE Mediterranean Conference on Control and Automation (MED)*, 2021.

The following special sessions have been organized:

- "Learning methods in modeling and control of robotic systems" at the 9th International Conference on Control, Decision and Information Technologies (CODIT), `https://codit2023.com/Special-Sessions/Special-Session-13.pdf`, held in Rome, Italy in July 2023;

- "Multi-Robot Systems Interacting with Humans" at the IEEE International Conference on Systems, Man, and Cybernetics (SMC), held in Bari, Italy in October 2019.

The following international conferences have been attended as speaker:
- *IEEE International Conference on Robotics and Automation (ICRA), London, United Kingdom, in May-June 2023;*
- *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Kyoto, Japan, in October 2022;
- *IFAC Conference AGRICONTROL*, virtually held, in September 2022;
- *IEEE International Conference on Decision and Control (CDC)*, virtually held, in December 2021;
- *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, virtually held, in August 2021;
- *IEEE Mediterranean Conference on Control and Automation (MED)*, virtually held, in June 2021 (also chair of the session "Artificial Intelligence");
- *IEEE International Conference on Robotics and Automation (ICRA)*, virtually held, in June 2021 (also co-chair of the session "Human-Robot Interaction: Detection");
- *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, virtually held, in August-September 2020;
- *Robotics: Science and Systems (RSS)*, virtually held, in July 2020;
- *IFAC Symposium on Robot Control (SYROCO)*, held in Budapest, Hungary in August 2018;
- *IEEE Mediterranean Conference on Control and Automation (MED)*, held in Zara, Croatia in June 2018.

The following invited talks have been made:
- "Task allocation in human multi-robot settings" at the IEEE International Conference on Robotics and Automation (ICRA) 3rd Annual Workshop on Robot Teammates in Dynamic Unstructured Environments (RT-DUNE), London, United Kingdom, in June 2023 (`http://rtdune.com/`)
- "Human Multi-Robot Teams: From Safety to Task Allocation" at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop Human-Multi-Robot Systems: Challenges for Real World Applications, Kyoto, Japan, in October 2022 (`https://sites.google.com/view/hmrs-iros2022`)
- "Il Ruolo dei Robot nell'Agricoltura di Precisione" for the European Researchers' Night at Roma Tre University, in September 2022
- "Human multi-robot interaction: from safety to task allocation" at the National Research Council, Institute of Cognitive Sciences and Technologies (ISTC-CNR), virtually held, in February 2022
- "La Robotica nell'Agricoltura di Precisione" for the European Researchers' Night at Roma Tre University and Tuscia University, virtually held, in September 2021
- "Visual Planning for Human-Robot Interaction", at the Italian Conference on Robotics and Intelligent Machines (I-RIM), Workshop on Task and Motion Planning for Effective Human-Robot Collaboration, virtually held, in December 2020;
- "Multi-robot distributed control" at KTH Royal Institute of Technology, RPL Department, in May 2019

CHAIRING AND MEMBERSHIPS

- Co-chair of the Working Group on Human-Robot Interaction of the Robotics and Intelligent Machines Institute (I-RIM)
- Member of the Program Committee for the Italian conference *Conference on Robotics and Intelligent Machines (I-RIM)* (`https://i-rim.it/en/conference-i-rim-2022/`), 2022

- Member of the National Program Committee for the international conference *Workshop on Discrete Event Systems (WODES)* (http://wodes2018.unisa.it/committees.php), 2018
- Member of the Workshop Program Committee for the *Workshop on Agricultural Robotics and Automation* (https://sites.google.com/view/icra22agriws/programme-committee?authuser=0) at the IEEE International Conference on Robotics and Automation (ICRA), 2022
- Member of the Workshop Program Committee for the research Workshop *Towards the factory of the future: advancements in planning and control of industrial robots* (https://2022.ieee-etfa.org/static/files/ws_cfps/WS08_FactoryofFuture.3c4176567f30.pdf) at the IEEE International Conference on Emerging Technologies and Factory Automation (ETFA), 2021

SUPERVISION ACTIVITIES

- The following Master's students have been co-supervised: Cecilia Palmieri (Roma Tre University), Giulia Maffucci (Roma Tre University), Francesca Patriarca (University of Cassino), Ines Sorrentino (University of Salerno), Paolo Vigilante (University of Salerno)
- The following Bachelor's students have been co-supervised: Andrea Ferrari (Roma Tre University), Niccolò Bonucci (Roma Tre University), Davide Portunato (Roma Tre University)