Marta Lagomarsino

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IIT page

Languages

English — Professional

Italian — Native

I am pursuing a PhD on human-robot interaction strategies to improve cognitive ergonomics in hybrid industrial environments. I consider myself an inquisitive person with a strong work ethic, quick learning capabilities and problem-solving skills. My passion for cutting-edge technology drives me to constantly look for new challenges, with the ambition of broadening my horizons and my knowledge.

Work Experience

2020–today **PhD Student - Istituto Italiano di Tecnologia (IIT) & Politecnico di Milano**
Human Robot Interfaces and Interaction (HRII) Lab. - Supervisor: Dr. A.Ajoudani
The main purpose of my PhD is to monitor how workers' cognitive load develops while performing industrial tasks and to create advanced human-robot collaboration control schemes capable of adapting online to address human distress and needs.

2018–2019 **Part-time student Assistant - Università degli Studi di Genova (UNIGE)**
- Secretarial activities, such as assistance in document delivery and scanning;
- Answer questions about information and directional policies of university courses.

Education

2020 **Erasmus+ Scholarship for Master Thesis - University of Twente (Netherlands)**
Robotics and Mechatronics (RaM) Department
Thesis:"Tracking and Compensation of Breast Deformation in Robot-Assisted Biopsy" - Supervisors: Prof. M.Casadio, V.Groenhuis, S.Stramigioli.
A novel robot-assisted approach to support the radiologist in targeting breast tumours by enabling auditory, visual and tactile feedback. The system inserts the needle toward a cancerous area under the guidance of different imaging modalities and accounts for tissue deformations. The work has also been awarded by GNB and UBCM di Roma as the **best 2021 thesis** in the Biomedical Robotics' field.

2018–2020 **Master's degree in Robotics Engineering - Università degli Studi di Genova (UNIGE)**
(110/110 cum Laude)
Local track of the EMARO+ double degree international Master.
The programme of study, totally in English, provided a solid education across the main areas of robotics (cognition, action, perception).

2015–2018 **Bachelor's degree in Bioengineering and Biomedical Engineering - UNIGE**
(110/110 cum Laude)
Thesis: "Eye movements tracking and their characterization when subjects interact with an intrinsically ambiguous visual stimulus" - Supervisor: Prof. S.P.Sabatini.

Projects

2021–today **Socio-Physical Interaction Skills for Cooperative Human-Robot Systems** H2020 SOPHIA
Designing advanced robot control strategies to simultaneously optimise the human cognitive workload and productivity during the collaboration in agile production [2]. The paper [1] proposed the online adaptation of the robot trajectory in terms of smoothness and total execution time according to the user's mental fatigue continuously monitored by analysing the heart rate variability.

2021–today **Online Cognitive Load Assessment in Manufacturing** ERC Ergo-Lean
Developing an online and quantitative method [3] to monitor the cognitive workload of human operators by analysing the attention distribution and detecting motion patterns in assembly activities directly from the input images of an RGB-D camera. The framework [4] was then extended to hybrid manufacturing environments. The research aimed to appraise the impact of industrial collaborative robots on operators' cognitive load and investigate the trust in automated assistance.

2020 **Image-guided and Robotic-assisted Breast Biopsy** H2020 MURAB
Developing a robotic system to improve biopsy accuracy and efficiency of MRI-visible tumour lesions in the breast. The approach [6] benefits from fusion of preoperative images with intraoperative optical tracking of markers attached to the patient's skin.

2020 **Gesture Based Interface Suited for the Baxter Robot** EU Erasmus+ grant EMARO+
Implementation of an interface [5] for the Baxter robot, designed to control robots in a very easy and intuitive way, by wearing a smartwatch in charge of recognising a set of gestures. The experimental apparatus is equipped with a Kinect camera and Bluetooth beacons to improve robot management and enforce the overall security.

2019–2020 **Virtual Robot Assistant for Elderly Care** H2020 CARESSES
Developing a Cloud platform [8, 9] providing services for culturally competent interaction to expand the capabilities of Socially Assistive Robots and virtual assistants interacting with older people.

Computer Skills

Operating Systems:
Linux, Microsoft Windows, and macOS.

Programming Languages, with professional knowledge:
Python, C++, MATLAB, TeX.

Informatic Softwares, with professional knowledge:
- *Robotics middleware* ROS (Robot Operating System) and its 3D visualizer Rviz;
- *Simulation software:* Gazebo Simulator, Matlab Simulink;
- *Version control software:* Git in the GitHub/GitLab community;
- *Word processors and Documentation generator:* Microsoft Word, Overleaf, Doxygen;
- *Integrated development environments:* PyCharm, Visual Studio, App Designer Matlab;
- *Spreadsheet and Presentation softwares:* Microsoft Excel, PowerPoint, Lucidchart;
- *CAD design softwares:* PTC Creo, Solidworks, Autodesk Fusion 360;

Personal Skills

Languages
English: Fluent in both spoken and written English:
- C1 Advanced - Erasmus Final Language Assessment;
- 6.5 IELTS Academic.

Italian: Native.

Quick Learning Capability, Strong work ethic and Problem-solving skills
Developed during my educational program and my everyday life experiences.

Teamwork
Motivated individual who works well in a team, strives to achieve organizational goals, and is driven to succeed in each task.

Publications

[1] Lagomarsino, M., Lorenzini, M., De Momi, E., and A. Ajoudani, A., "Robot Trajectory Adaptation to Optimise the Trade-off between Human Cognitive Ergonomics and Workplace Productivity in Collaborative Tasks," Proceedings of International Conference on Intelligent Robots and Systems (IROS), IEEE, 2022.

[2] Lorenzini, M.*, Lagomarsino, M.*, Fortini, L., Gholami, S., Ajoudani, A., "Ergonomic Human-Robot Collaboration in Industry: A Review," Frontiers in Robotics and AI, 2022.

[3] Lagomarsino, M., Lorenzini, M., De Momi, E., and A. Ajoudani, A. "An Online Framework for Cognitive Load Assessment in Industrial Tasks," Robotics and Computer-Integrated Manufacturing, Elvesier, 2022.

[4] Lagomarsino, M., Lorenzini, M., Balatti P., De Momi, E., and A. Ajoudani, A., "Pick the Right Co-Worker: Online Assessment of Cognitive Ergonomics in Human-Robot Collaborative Assembly," IEEE Transactions on Cognitive and Developmental Systems, IEEE, 2022.

[5] Bongiovanni, A.*, Lagomarsino, M.*, ..., Mastrogiovanni, F., "Gestural and Touchscreen Interaction for Human-Robot Collaboration: a Comparative Study," Proceedings of International Conference on Intelligent Autonomous Systems (IAS), IEEE, 2022.

[6] Lagomarsino M., Groenhuis, V., Casadio, M., Welleweerd, M., Siepel, F., Stramigioli, S., "Image-guided Breast Biopsy of MRI-visible Lesions with a Hand-mounted Motorised Needle Steering Tool," Proceedings of International Symposium on Medical Robotics (ISMR), IEEE, 2022.

[7] Lagomarsino, M., Tracking and Compensation of Breast Deformation in Robot-Assisted Biopsy, Master Thesis, 2020.

[8] Gava, L.*, Grassi, L.*, Lagomarsino M.*, Recchiuto, C., Sgorbissa, A., "Physical Embodiment of Conversational Social Robots," Proceedings of International Conference on Ubiquitous Robots (UR), IEEE, 2020.

[9] Recchiuto, C., ..., Lagomarsino, M., ..., Sgorbissa, A., "Cloud services for culture aware conversation: Socially assistive robots and virtual assistants," Proceedings of International Conference on Ubiquitous Robots (UR), IEEE, 2020.