Alessandra Bernardini

PhD Robotics Engineer with expertise in control systems, human-robot interaction, and robotic manipulation. Experienced in developing ROS-based architectures and machine learning algorithms for real-time applications. Now seeking to bring this experience to applied R&D or robotics product development in industry.

Contacts

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Department of Electrical, Electronic and Information Engineering (DEI) - University of Bologna

Professional Skills

- Extensive experience in simulating complex robotic/human systems, with expertise in using MuJoCo and MATLAB/Simulink.
- Proficient in developing control solutions that leverage machine learning algorithms.
- Expertise in designing and implementing modular robotic architectures using ROS.
- Basic hands-on experience with robotic platforms such as Franka Emika Panda and Flexiv Rizon.

- Team Working
- Strong Work Ethic
- Critical thinking

Languages

Italian Mothertongue

English Advanced - C1

Hobbies

Climbing, cooking, traveling.

Education

2021 - 2024 | Alma Mater Studiorum - University of Bologna

PhD in Automatic Control and Operational Research
Thesis: Advanced Robot Hand Control Strategies for Improved Human-Robot Interaction

2019 - 2021 | Alma Mater Studiorum - University of Bologna

Master Degree in Automation Engineering
Thesis: Extraction of Grasping Motions from sEMG Signals for the Control of Robotic Hands through Autoencoding.
Final grade: 110/110 with honors

2016 - 2019 | Alma Mater Studiorum - University of Bologna

Bachelor Degree in Automation Engineering
Thesis: Controllo di mani robotiche basato su elettromiografia: sviluppo di un modello del segnale semg per la simulazione di algoritmi di decodifica dell'intento.
Final grade: 110/110 with honors

2011 - 2016 | Liceo Scientifico - Fano

Scientific Diploma
Final grade: 100 with honors

Professional Experience

10/2021 - ongoing | Researcher in Robotics Engineering

(From 11/2024 | Post-Doc Researcher in Robotics)

Laboratory of Automation and Robotics (LAR)
Department of Electrical, Electronic and Information Engineering (DEI)

- Worked under the European project IntelliMan (AI-Powered Manipulation System for Advanced Robotic Service, Manufacturing and Prosthetics).
- Implemented advanced control architectures in Python and Matlab/Simulink, leveraging machine learning algorithms to improve the adaptability and effectiveness of robotic end-effectors operating in real-world environments.
- Built modular robotic architectures using ROS (Robot Operating System), integrating different hardware components —including sensors, actuators, and robotic platforms— to maximize the flexibility and extend the applicability of human-controlled manipulation systems across multiple scenarios.
- Developed advanced simulation models of the forearm's muscular system to accurately replicate the EMG (electromyographic) signal generation process, enabling the evaluation of myoelectric control schemes for improved human-robot interaction.
- Conducted extensive statistical analysis on experimental datasets to validate research hypotheses and support evidence-based conclusions.

- Used Git for efficient version control and collaborative development.
- Served as a teaching assistant from AY 2022 to 2025, for the course “Industrial Robotics” and co-supervised multiple undergraduate theses in robotics.
- Presented research findings at international conferences (IROS, ICRA, HFR), highlighting the main advancements and interacting with the academic community to exchange ideas and receive constructive feedback.

10/2023 - 03/2024 | Visiting Student Researcher

Biomimetics and Dextrous Manipulation Laboratory (BDML)
Stanford University

- Developed a simulation environment in MuJoCo to assess the performance of human operators in telemanipulation tasks with various end-effectors in constrained environments. Conducted an in-depth analysis to evaluate the impact of design choices on human operability.
- Implemented simple teleoperation applications with different robotic arms (Franka Emika Panda, Flexiv Rizon) to test end-effector manipulation performance in constrained, cluttered environments, focusing on control accuracy and human-robot interaction optimization.

Awards

- **2025** | SIDRA (Società Italiana Docenti e Ricercatotori in Automatica) Annual Award for PhD Theses in Systems and Control Engineering
- **2024** | Best Poster Award at the International Conference on Robotics and Automation - ICRA.
- **2021** | Scholarship for deserving students enrolled in the academic year 2020/2021 to study courses of the University of Bologna.
- **2019** | Scholarship for deserving students enrolled in the academic year 2018/2019 to study courses of the University of Bologna.

Publications

- A. Bernardini, R. Meattini, A. Pasquali, G. Laudante, C. Gentile, E. Gruppioni, G. Palli, C. Melchiorri. “Hidden Markov Model Based Shared Autonomy for Grasp Strength Regulation in sEMG Driven Robot Hand Control” (under review).
- R. Thomasson, A. Bernardini, H. Li, C. Xing, A. Hajj-Ahmad and M. Cutkosky, "SLIM: A Symmetric, Low-Inertia Manipulator for Constrained, Contact-Rich Spaces," in IEEE Robotics and Automation Letters, vol. 10, no. 9, pp. 8682-8689, Sept. 2025.
- R. Meattini, A. Ameri, A. Bernardini, J. Gonzalez-Huarte, A. Ibarguren, C. Melchiorri, G. Palli, "Neuromuscular Interfacing for Advancing Kinesthetic and Teleoperated Programming by Demonstration of Collaborative Robots," in IEEE Transactions on Haptics, vol. 18, no. 1, pp. 45-57, Jan.-March 2025.
- R. Meattini, A. Caporali, A. Bernardini, G. Palli, and C. Melchiorri, “Self-Supervised Regression of sEMG Signals Combining Non-Negative Matrix Factorization With Deep Neural Networks for Robot Hand Multiple Grasping Motion Control,” in IEEE Robotics and Automation Letters, vol. 8, no. 12, pp. 8533-8540, Dec. 2023.
- R. Meattini, A. Bernardini, G. Palli and C. Melchiorri, “sEMG-Based Minimally Supervised Regression Using Soft-DTW Neural Networks for Robot Hand Grasping Control,” in IEEE Robotics and Automation Letters, vol. 7, no. 4, pp. 10144-10151, Oct. 2022.