

# Marco Baracca

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## Research Experience

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- **PhD Student**

Information Engineering Department, University of Pisa

November 2021 – present

**Affiliations:** *Research Center “E. Piaggio”, Pisa, Italy; Department of Information Engineering, University of Pisa, Italy*

- **Scholarship (Borsa di Studio e Approfondimento)**

Research Center “E. Piaggio”

May 2021 – October 2021

**Title:** *“Studio, sviluppo e validazione di tecniche di pianificazione e controllo di manipolatori antropomorfi per l’afferraggio/manipolazione di oggetti autonomi e l’interazione uomo macchina”*

## Education

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- **Academic English Course, Level C1**

Language Department, University of Pisa

March 2022

**Final Mark:** Very Good

- **Master's Degree in Robotics and Automation Engineering**

University of Pisa

February 2021

**Final Mark:** 110/110

**Thesis Title:** *“Exploring human motion primitives for the generation of anthropomorphic movements of redundant manipulators”*

**Tutors:** *Matteo Bianchi, Antonio Bicchi, Giuseppe Averta*

**Description:** *In this thesis I analysed a dataset, containing real human arm movements recorded with a motion capture system, through functional Principal Component Analysis to extract the key features of human motion. These features then were used to develop a closed form planning algorithm that guarantee the human-likeness of the trajectory computed.*

- **Bachelor Degree in Biomedical Engineering – Industrial specialization**

University of Pisa

December 2016

**Final Mark:** 92/110

**Thesis Title:** *“Strategie di movimento della mano umana e applicazione nella progettazione di mani robotiche”*

**Tutors:** Enzo Pasquale Scilingo, Matteo Bianchi

**Description:** *In this thesis I acquired the human hand movements for grasping different objects with and without tactile impairments using a motion capture system. Then I studied the state of the art of the hand prostheses analysing how the research on human movement strategies could be applied for the improvement of artificial hands.*

## Other Educational Activities

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8<sup>th</sup> International Summer School of Neuroengineering, Genova, Italy (2022)

## Publications

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### Peer-Reviewed Journal Publications

1. Bonifati P.\*, **Baracca M.\***, Menolotto M., Averta G. and Bianchi M. (2023) *“A Multi-Modal Under-Sensorized Wearable System for Optimal Kinematic and Muscular Tracking of Human Upper Limb”*. Sensors

### Peer-Reviewed Conference Publications

1. **Baracca M.**, Averta G., Bianchi M. *“Optimal Electromyographic Sensing for Whole-Body Muscular Activity Estimation”*. In I-RIM 3D 2022 Conference, Rome (Italy)
2. **Baracca M.**, Averta G., Bianchi M. *“Estimation of Whole-Body Muscular Activation from an Optimal Set of Scarce Electromyographic Recordings”*. The 15<sup>th</sup> international Workshop on Human-Friendly Robotics (HFR2022), Delft (The Netherlands)
3. **Baracca M.**, Bonifati P., Nisticò, Y., Catrambone, V., Valenza, G., Bicchi, A., Averta, G., Bianchi, M. *“Toward human-like motion generation in the Cartesian domain with robotic manipulators”*. In I-RIM 3D 2021 Conference, Rome (Italy)
4. **Baracca M.**, Bonifati P., Nisticò, Y., Catrambone, V., Valenza, G., Bicchi, A., Averta, G., Bianchi, M. *“Functional analysis of upper-limb movements in the Cartesian domain”*. The 6<sup>th</sup> International Conference on NeuroRehabilitation (ICNR2020), Vigo (Spain)

## Reviewer Activity

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### International Journal

- IEEE Robotics and Automation Letters
- IEEE Transaction on Robotics
- IEEE Access

### International Conferences

- International Conference on Robotics and Automation (ICRA)
- International Conference on Intelligent Robots and Systems (IROS)

## Research Projects

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I have been involved in the following funded research projects:

- **DARKO: Dynamic Agile Production Robots That Learn and Optimise Knowledge and Operation**, European Commission Collaborative Project no. 101017274, Horizon 2020 Framework (2021-2025)
- **SOPHIA: Socio-Physical Interaction Skills for Cooperative Human-Robot System in Agile Production**, European Commission Collaborative Project no. 871237, Horizon 2020 Framework (2019-2023)

## Student Advising

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### Master Thesis:

- Floriana Dolce - 2023  
Master's thesis in Automation and Robotics Engineering, School of Engineering, University of Pisa  
Title: *"Exploiting Proprioceptive Information to Perform Human-like Movement with Robotic Manipulators in Cluttered Environment"*
- Mariangela Menolotto – 2022  
Master's thesis in Automation and Robotics Engineering, School of Engineering, University of Pisa  
Title: *"Combining optimal design and Kalman filtering for upper limb kinematic and EMG acquisition"*

### Master Courses Projects:

*Robot Control Course (Master's degree in Robotics and Automation Engineering – University of Pisa)*

- Lorenzo Lehmann – 2023
- Domenico Pelle – 2023

- Yuri De Santis – 2023
- Paolo Rosa Brusin – 2023
- Camilla Celli – 2023
- Tommaso Bigi – 2023
- Samuele Bordini - 2023
- Gianmarco Cei – 2023
- Federico Vitabile – 2022

## Teaching Experience

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### Teaching Assistant:

- Master's degree in Robotics and Automation Engineering – University of Pisa  
Course: Digital Control (Prof. Matteo Bianchi)  
Period: October 2022 - present

Update to July 04, 2023