

PROFILE

Mechanical Engineer with a Ph.D. in BioRobotics (2025) and extensive expertise in wearable robotics. Specialized in mechanism design, miniaturized actuation systems, and their manufacturing processes, both traditional and additive. Deep knowledge of rehabilitation robotics and principles of human-device physical interaction. Proficient in process automation and general robotics with strong capabilities in transforming research concepts into functional prototypes. Experienced in mechanical modeling, optimizing systems for weight, size, and user comfort, with proven results demonstrated through pending patents and publications.

TECHNICAL SKILLS

- **Design:** Miniaturized actuation, DFM, Wearable devices, Robotics & Automation
- **CAD:** Creo, SolidWorks, Blender, FreeCAD
- **FEM:** Structural, Thermal and Dynamic Analysis
- **Dynamic Modeling:** Multi-body Dynamics, Simulink, Simscape
- **Programming:** MATLAB, Python, C/C++, LaTeX

LANGUAGES

Italian (Native), English (C1)

EXPERIENCE

POST-DOCTORAL RESEARCHER at *Scuola Superiore Sant’Anna – Institute of BioRobotics.* **2025–pres.**

◊ Senior figure in design and development of wearable robotics and rehabilitation technologies.

PHD RESEARCHER at *Scuola Superiore Sant’Anna – Institute of BioRobotics.* **2020–2025**

◊ Conducted research on wearable robotics and rehabilitation devices, focusing on exoskeleton design and human-robot physical interaction.

RESEARCH FELLOW at *Scuola Superiore Sant’Anna – Institute of BioRobotics.* **2019–2020**

◊ Part of the wearable robotics laboratory, developed and deployed devices in clinical environments.

TECHNICAL CONSULTANT at *MECOIL S.R.L.* **2018–2019**

◊ Designed automated systems for analysis of industrial processes, including custom tooling and production line optimization.

RESEARCH PROJECTS

HABILIS & HABILIS++ at *INAIL Collaboration.* **2020–pres**

◊ Active wearable devices for rehabilitation and daily living assistance following hand injury.

BIOARM & BIOARMNEXT at *INAIL Collaboration.* **2021–pres**

◊ Wearable assistive devices for brachial plexus injured people.

CONBOTS at *European Project.* **2022–2024**

◊ Physically coupling humans to boost handwriting and music learning, exploiting haptic feedback.

EDUCATION

PHD IN BIOBOTICS at *BioRobotics Institute of Scuola Superiore Sant’Anna di Pisa.* **2020–2025**

- ◊ Focus: Advanced wearable robotics and rehabilitation devices.
- ◊ Thesis: "Self-Aligning Mechanisms in Wearable Robotics"

MASTER IN MECHANICAL ENGINEERING. ROBOTIC CURRICULUM at *University of Florence.* **2015–2019**

- ◊ Final Mark: 107/110
- ◊ Thesis: "Design and dynamic synthesis of a passive lower-limb exoskeleton for industry."

KEY PUBLICATIONS & PATENTS

"H-PhIEx A: A Compact SEA-Based Hand Exoskeleton with Active Metacarpophalangeal Joints" Capitani et al. *IEEE/RAS-EMBS, BioRob* **2024**

"Self-aligning finger exoskeleton for the mobilization of the metacarpophalangeal joint" Capitani & Peperoni *Frontiers in Neurorobotics* **2023**

"Model-based mechanical design of a passive lower-limb exoskeleton" Capitani et al. *Robotics and Autonomous Systems* **2021**

"Cinematismo per la compensazione di un carico di estremità ed esoscheletro" ◊ Italian Patent Application No. 102024000013081 **2024**

"Cinematismo per la compensazione di un carico variabile ed esoscheletro" ◊ Italian Patent Application No. 102024000013099 **2024**