PhD student: Francesco Cufino

Manipulation for Service Robotics

Tutor: Prof. Fabio Ruggiero

Cycle: XXXIX

Year: 2024/2025

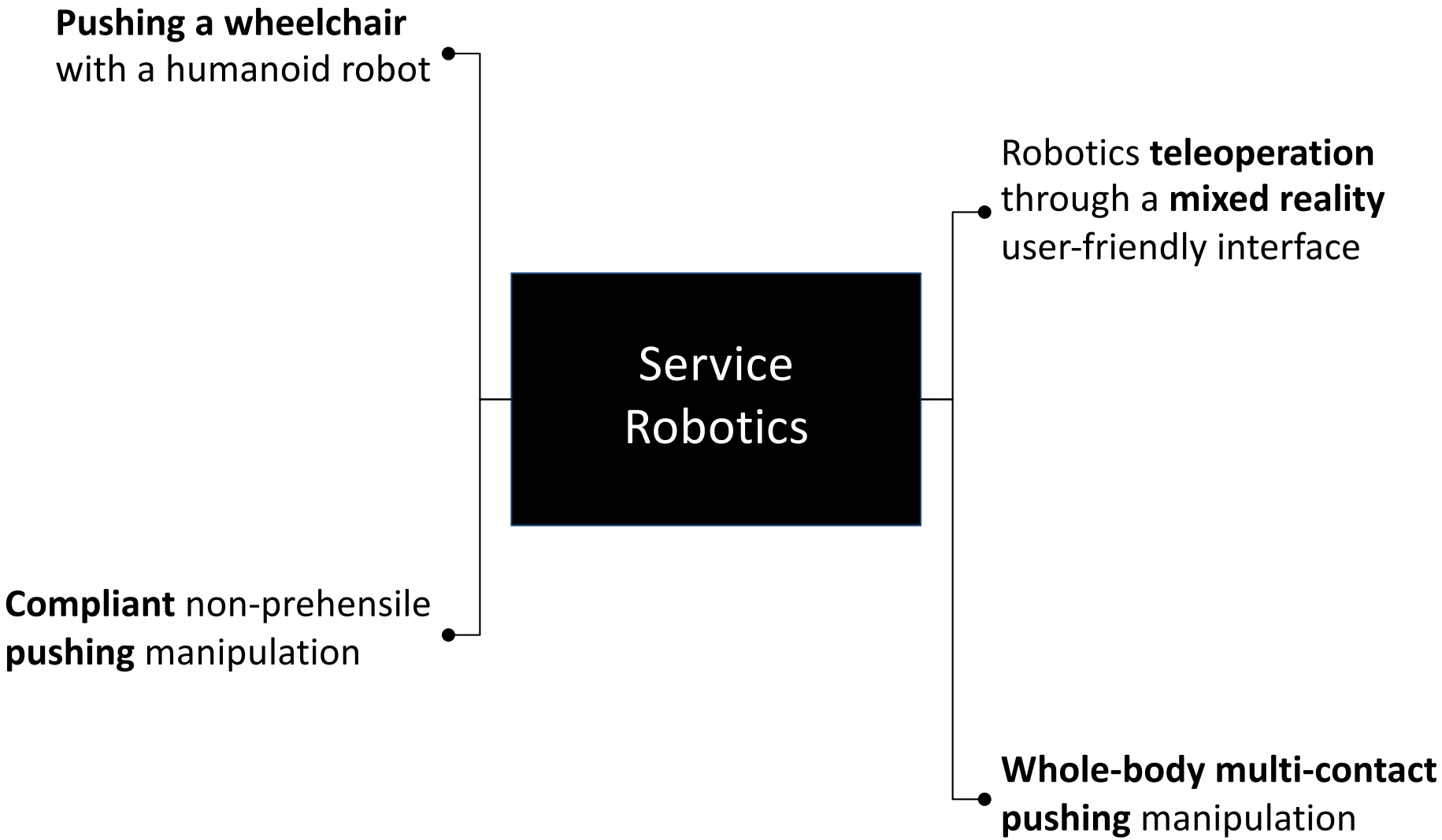
My background

- MSc in **Automation Engineering and Robotics** – "Università degli Studi di Napoli Federico II"
- Laboratory: **PRISMA Lab (UNINA) – Legged and Non-Prehensile Manipulation group**
- PhD start date: **01/11/2023**
- Scholarship: **PNRR – DM 118/2023**
- Periods abroad: **01/09/2025 – 31/10/2025** at **The University of Edinburgh, Scotland, Edinburgh**

Summary of study activities

- Ad hoc PhD Courses:
  - ***"How to boost your PhD"***, *Lecturer: Prof. Antigone Marino.* The course is focused on the soft skills required to enhance the scientific career
- Individual study
  - Pushing manipulation for humanoid robots
  - Reinforcement Learning

Research area(s)



Research activity

Pushing a wheelchair with a humanoid robot (in progress)

- **Objective:** to push patients of different body weights in a wheelchair

- **Method:** exploit the built-in robot walk and act on the upper limb.

Research activity

Robotics teleoperation through a mixed reality user-friendly interface

- **Objective:** to enable untrained users to effectively operate a robot
- **Method:** interface development through SwiftUI, RealityKit, and ARKit

Research activity

Compliant Non-Prehensile Pushing Manipulation

- **Objective:** ensure safe robotic pushing manipulation operations
- **Method:** MPC + spring interaction model + passivity filter

Compliant Non-Prehensile Pushing Manipulation

Francesco Cufino, Mario Selvaggio, Fabio Amadio, Fabio Ruggiero

PRISMA Lab
Department of Electrical Engineering and Information Technology
University of Naples Federico II
www.prisma.unina.it

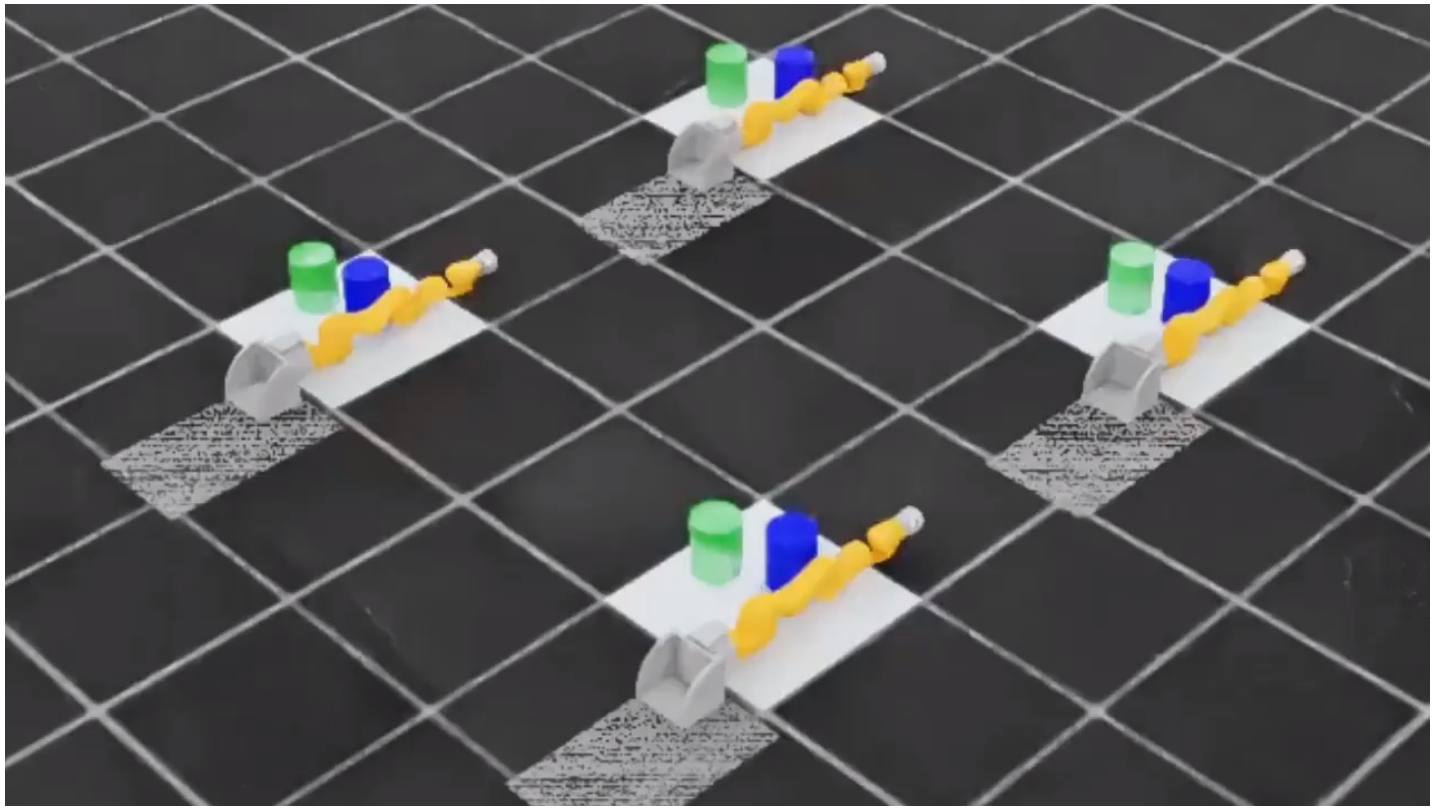
LARSEN/HUCEBOT team
Inria, Université de Lorraine, CNRS, LORIA

ABB Corporate Research Center

Research activity

Whole body multi-contact pushing manipulation (in progress)

- **Objective:** exploit the whole body to improve manipulation capabilities
- **Method:** Reinforcement Learning



Research Products

[P1]	F. Cufino, M. Selvaggio, F. Amadio, F. Ruggiero *Compliant Non-Prehensile Pushing Manipulation,* **IEEE Transactions on Robotics** Current state: **decision pending**

[P2]	M. Chemerys, M. Novoselov, S. D. M. Santos, R. Aliotta, F. Cufino, and F. Ruggiero *A Mixed Reality User-friendly Interface for Robot Teleoperation,* **International Conference of Social Robotics (ICSR) (2025)**

[P3]	F. Cufino, M. Selvaggio, F. Amadio, F. Ruggiero *Compliant Non-Prehensile Pushing Manipulation,* **Italian conference of Robotics and Intelligent Machines (I-RIM 3D) (2025)**