# **Tommaso Projetti**

### Postdoctoral Research Fellow

**≜** 18/03/88, Rome, Italy | **♥** 60 Oxford St., Cambridge, MA 02138 | □ (+1) 857-243-5510 ☑ tommaso.proietti.88@gmail.com | □ tommasoproietti | □ tommasoproietti-robotics.github.io

# Experience \_\_\_\_\_

#### Postdoctoral Research Fellow

Jun 2019 - present

Harvard University

Cambridge, MA, USA

- ♦ Harvard John A. Paulson School of Engineering and Applied Science
  - o Development and evaluation of inflatable soft wearable robots for upper-limb assistance.
  - o Initiative within the Wyss Institute for Biologically Inspired Engineering.
  - Main responsibilities:
    - \* Lead research project and coordinate interdisciplinary team (Ph.D. students, occupational therapists, functional apparel designers, staff engineers, visiting team members, undergrads).
    - \* First-hand development of the software of the project: sensor estimation, control strategies, virtual interfaces, data logging and processing in real-time.
    - \* Managing and assisting in hardware development.
    - \* Define and run testing protocols. Process data. Redact manuscripts.
  - o PI: Prof. Conor J. Walsh

# **Control System Engineer**

Apr 2017 - Apr 2019

General Motors Turin, Italy

- **♀** GM Global Propulsion Systems
  - o Control function development and algorithm design for GM diesel engines sector.
  - Main responsibilities:
    - \* Define system requirements and software architecture by taking into account legislation, standard, and quality.
    - \* Develop system Failure Mode and Effect Analysis (FMEA).
    - \* Contribute to definition of calibration methodologies.
    - \* Communicate with hardware and advanced tech. communities to develop production-oriented technology.
    - \* Assist in troubleshooting subsystem integration, testing and validation (dyno, in-vehicle, roller bench).
  - o Certification: GM Design For Six-Sigma Green Belt

# Ph.D. in Robotics Engineering

Jan 2014 - Mar 2017

Université Pierre et Marie Curie

Paris, France

- **♀** ISIR Institut des Systèm Intelligents et de Robotique
  - Ph.D. main purpose: study the possibility to optimize relearning of motor coordination during post-stroke neurorehabilitation by using a 4-DOF upper-limb robotic exoskeleton.
  - o Main responsibilities:
    - \* Study and control the physical Human-Robot Interaction (pHRI), with a specific focus on the human upper-limb motor control (adaptation, learning, after-effects).
    - \* Model, develop, code, and test innovative control strategies for exoskeletons on a Linux-based RTOS.
    - \* Define testing protocols and experimental setup. Collect human motion data through encoders, sEMG, and MOCAP. Data processing (filtering, data fusion, statistics, visualization).
    - \* Manuscripts redaction and publication.
  - o PI: Prof. Agnes Roby-Brami

### **Visiting Pre-Doctoral Fellow**

Northwestern University

Oct 2012 - Oct 2013

Evanston, IL, USA

- NxR Neuroscience and Robotics Laboratory, McCormick School of Engineering
  - Field of research: nonprehensile manipulation and hybrid dynamic systems.
  - Main responsibilities:
    - \* Modelization of a planar robotic manipulator and dynamic contact modes.
    - \* Development of control strategies for nonprehensile manipulation.
    - \* Simulation of hybrid sample-based planning algorithms.
  - o PI: Prof. Kevin M. Lynch

Internship Jul 2010 - Oct 2010

Sapienza University of Rome

Rome, Italy

- ♥ DIAG Dipartimento di Ingegneria Informatica, Automatica e Gestionale Antonio Ruberti
  - o Main field of research: hybrid automata and embedded systems.
  - o Partnership within Artemis "pShield" FP7 European Project.
  - PI: Prof. Francesco Delli Priscoli

Scientific Tour Guide Mar 2007, 2008, 2009

Rome Mathematics Festival

Rome, Italy

- ♀ Fondazione "Musica per Roma" Auditorium Parco della Musica
  - Tour guide during three consecutive Festival della Matematica initiatives.
    - o Show and explain math-related pieces of art to festival visitors.

# Education \_\_\_\_\_

### Ph.D. in Robotics Engineering

Jan 2014 - Mar 2017

Université Pierre et Marie Curie

Paris, France

- Thesis: Characterizing the reciprocal adaptation in physical Human-Robot Interaction to address the inter-joint coordination in neurorehabilitation
- o Supervisors: A. Roby-Brami, N. Jarrassé

# **MS in Control Engineering**

Nov 2010 - Oct 2013

Sapienza University of Rome

Rome, Italy

- o Final score: 110/110 magna cum laude
- Thesis: Hybrid Dynamic Nonprehensile Manipulation: Application to a 3-DOF Robot
- Supervisors: G. Oriolo (Sapienza University of Rome), K. Lynch (Northwestern University)

#### **BS in Automated Systems Engineering**

Sep 2007 - Oct 2010

Sapienza University of Rome

Rome, Italy

- Final score: 107/110
- Thesis: Modeling and Controlling Composability Property in Embedded Systems by applying Hybrid Automata Theory
- o Supervisors: F. Delli Priscoli, A. Fiaschetti

#### **High School Diploma**

Sep 2002 - Jul 2007

G. B. Morgagni Scientific High School

Rome, Italy

- o Final score: 100/100
- o P.N.I. Piano Nazionale di Informatica (Computer Science National Diploma)

### Personal Skills\_

## **Languages**

Italian: Mother Tongue | English: Fluent - C2 | French: Proficient - B2/C1

#### </> Computer skills

Programming: Matlab/Simulink, C, C++, Python, Java, HTML, CSS, PHP, MySQL

Software: Solidworks, ROS, INCA, Git, LaTeX

OSs: Linux, Windows

# Publications .

■ Google Scholar: 8 publications (+3 under review), 293 total citations, H-index: 4.
■ Orcid: 0000-0002-8875-8646.

## **Journal Papers**

- 7. **Proietti T.\***, O'Neill C.\*, Hohimer C., Nuckols K., Clarke M., Zhou Y.M., Lin D., Walsh C. (2020) "Sensing and control of a multi-joint soft wearable robot for upper-limb assistance and rehabilitation", IEEE Robotics and Automation Letters (under Review). \*Authors equal contribution.
- 6. Zhou Y.M., Hohimer C., **Proietti T.**, O'Neill C., Walsh C. (2020) "Kinematics-based control of an inflatable soft wearable robot for assisting the shoulder of industrial workers", IEEE Robotics and Automation Letters (under Review).
- 5. Chu X., Lo C.H., **Proietti T.**, Walsh C., Fukuda T., Au S. (2020) "Opposite treatment on null space: avoiding null space towards unified and robust feedback stabilization control of underactuated robotic systems", International Journal of Robotics Research (under Review).
- 4. O'Neill C.\*, **Proietti T.**\*, Nuckols K., Clarke M., Hohimer C., Cloutier A., Lin D., Walsh C. (2020) "Inflatable soft wearable robot for reducing therapist fatigue during upper extremity rehabilitation in severe stroke", IEEE Robotics and Automation Letters (RA-L), vol. 5:3, pp. 3899 3906. \*Authors equal contribution.
- 3. **Proietti T.**, Guigon E., Roby-Brami A., and Jarrassé N. (2017) "Modifying upper-limb inter-joint coordination in healthy subjects by training with a robotic exoskeleton", Journal of NeuroEngineering and Rehabilitation (JNER), vol. 14. pp. 55.
- 2. **Proietti T.**, Crocher V., Roby-Brami A., and Jarrassé N. (2016) "Upper-limb robotic exoskeletons for neurorehabilitation: a review on control strategies", IEEE Reviews in Biomedical Engineering, vol. 9, pp. 4-14.
- 1. Jarrassé N., **Proietti T.**, Crocher V., Robertson J., Sahbani A., Morel G. and Roby-Brami A. (2014) "Robotic exoskeletons: a perspective for the rehabilitation of arm coordination in stroke patients", Frontiers in Human Neuroscience, vol. 8:947, pp. 1-10.

# **Conference Papers**

- 4. **Proietti T.**, Parry R., Lejeune F., Roby-Brami A., and Jarrassé N. (2018) "Adaptation of upper limb movement using exoskeleton-based training and transfer of cinematic patterns to unconstrained movement: A preliminary study", Annals of Physical and Rehabilitation Medicine, vol. 61, pp 488, 12th World Congress of the International Society of Physical and Rehabilitation Medicine (Paris, France).
- 3. **Proietti T.**, Roby-Brami A., and Jarrassé N. (2017) "Comparison of different error signals driving the adaptation in assist-as-needed controllers for neurorehabilitation with an upper-limb robotic exoskeleton", IEEE International Conference on Robotics and Automation (ICRA17, Singapore), pp. 6645-6650.
- 2. **Proietti T.**, Roby-Brami A., Jarrassé N. (2016) "Learning motor coordination under resistive viscous force fields at the joint level with an upper-limb robotic exoskeleton", 3rd International Conference on NeuroRehabilitation (ICNR16, Segovia, Spain), in Converging Clinical and Engineering Research on Neurorehabilitation II, pp. 1175-1179, Springer International Publishing.
- 1. **Proietti T.**, Jarrassé N., Roby-Brami A., and Morel G. (2015) "Adaptive control of a robotic exoskeleton for neurorehabilitation", 7th International IEEE/EMBS Conference on Neural Engineering (NER15, Montpellier, France), pp. 803-806.

# Teaching & Mentoring \_

# **Undergraduate Students Mentoring** Harvard University

2019/2020

Course: Robotics Projects (BS in Mechanical Engineering)

Responsibilities: Helped in developing research projects, supervised and assisted graduate students during their

summer/winter projects in the lab. *Number of mentored students:* 2.

# Teaching Assistant Université Pierre et Marie Curie

2015

Course: Mobile Robotics (MS in Robotics Engineering)

Responsibilities: Prepared, supervised, and assisted 15-ish graduate students in weekly 6-hour lab course. Assistance to final project evaluation.

Honors & Awards \_\_\_\_\_

IEEE Engineering in Medicine and Biology Prize Paper Award - 3rd place with [J2] paper.

2019