Tommaso Proietti

Postdoctoral Research Fellow

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Experience

Postdoctoral Research Fellow
Jun 2019 - present

Harvard University
Cambridge, MA, USA

📍 *Harvard John A. Paulson SEAS and the Wyss Institute for Biologically Inspired Engineering*

- Development and evaluation of inflatable soft wearable robots for stroke individuals assistance.
- Main responsibilities:
  * Lead research project and interdisciplinary team (Ph.D. students in Mechanical Engineers, Occupational Therapists, Functional Apparel Designers, Staff Engineers).
  * Responsible for SW-side of the project: sensor estimation, control strategies, virtual interfaces.
  * Define and run testing protocols. Process data. Redact manuscripts.
- PI: Prof. Conor J. Walsh

Control System Engineer
Apr 2017 - Apr 2019

General Motors
Turin, Italy

📍 *GM Global Propulsion Systems*

- 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).
- 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.
- 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.
- PI: Prof. Agnes Roby-Brami

Visiting Pre-Doctoral Fellow
Oct 2012 - Oct 2013

Northwestern University
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.
- ○ 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*

- ○ Main field of research: hybrid automata and embedded systems.
- ○ 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.
- ○ 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*
- ○ Supervisors: A. Roby-Brami, N. Jarrassé

MS in Control Engineering
Nov 2010 - Oct 2013

Sapienza University of Rome
Rome, Italy

- ○ 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*
- ○ Supervisors: F. Delli Priscoli, A. Fiaschetti

High School Diploma
Sep 2002 - Jul 2007

G. B. Morgagni Scientific High School
Rome, Italy

- ○ Final score: 100/100
- ○ 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, Python, Java, MySQL, PHP, HTML, CSS
   Software: Solidworks, ROS, INCA, Git, LaTeX
   OSs: Linux, Windows

Publications

▤ Google Scholar: 7 publications, 275 total citations, H-index: 4.   👤 Orcid: 0000-0002-8875-8646.

Journal Papers

[J1] 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.

[J2] **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.

[J3] **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.

[J4] 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.

Conference Papers

[C1] **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.

[C2] **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.

[C3] **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.

Teaching & Mentoring

Undergraduate Students Mentoring *Harvard University*   2019/2020

Course: Robotics Projects (MS 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