

PERSONAL INFORMATION

Giulio Romualdi, Ph.D.



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WORKING EXPERIENCES

January 2023 – Present

Scrum Master of the *Robust, Reactive and Dynamic Locomotion* group

Istituto Italiano di Tecnologia - [Artificial and Mechanical Intelligence]

Responsibilities

I lead a team of nine researchers developing a safe, autonomous locomotion architecture for humanoid robots, enabling them to walk and interact safely with humans and the environment.

Achievement

Featured ergoCub robot walking on national Italian television <https://youtu.be/U1Onb-110sM>

August 2022 – Present

Postdoctoral researcher at Istituto Italiano di Tecnologia

Istituto Italiano di Tecnologia - [Artificial and Mechanical Intelligence]

Topic

Optimal control and Supervised learning for humanoid robot bipedal locomotion

January 2020 – November 2022

Locomotion Group Leader for the iCub Team at the ANA Avatar Xprize

Istituto Italiano di Tecnologia - [Artificial and Mechanical Intelligence]

Achievement

Design and implementation of the locomotion and robot teleoperation architecture for the ANA Avatar XPRIZE competition <https://youtu.be/r6bFwUPStOA>, <https://ami.iit.it/ana-avatar-xprize>

EDUCATION EXPERIENCES

November 2018 – August 2022

PhD in Advanced and Humanoid Robotics

Istituto Italiano di Tecnologia - [Artificial and Mechanical Intelligence] and University of Genoa

Thesis

Online Control of Humanoid Robot Locomotion github.com/GiulioRomualdi/romualdi-phd-thesis

October 2021 – December 2021

Visiting PhD student at LAAS - CNRS

Laboratoire d'Analyse et d'Architecture des Systèmes - [GEPETTO]

Topic

Modeling and control of hip flexibility in the humanoid robot TALOS

December 2017 – July 2018

Fellowship - Master thesis student at Istituto Italiano di Tecnologia

Istituto Italiano di Tecnologia - [Artificial and Mechanical Intelligence]

Topic

Development of a model predictive controller for dynamic locomotion.

2014 – 2018

Master of Science in Robotics and Automation Engineering

University of Pisa [www.unipi.it]

Final Grade

110/110 cum Laude

Thesis

Capture-Point Based Controllers for Robot Bipedal Locomotion: Analysis and Implementation on the iCub Platform

2011 – 2014

Bachelor Degree in Biomedical Engineering

University of Pisa [www.unipi.it]

Final Grade

110/110

Thesis

Design of offset-free analog front-end for TEER measurement

SELECTED PUBLICATIONS AND WORKSHOPS

- 2024 **Online DNN-driven Nonlinear MPC for Stylistic Humanoid Robot Walking with Step Adjustment**
 Authors G. Romualdi, P. M. Viceconte, L. Moretti, I. Sorrentino, S. Dafarra, S. Traversaro, D. Pucci
 Conference IEEE International Conference on Humanoid Robotics (Humanoids)
 Paper <https://doi.org/10.1109/Humanoids58906.2024.10769894>
 Website <https://sites.google.com/view/dnn-mpc-walking/home-page>
- 2024 [Workshop] **Designing Interactive Humanoids: Learning Tasks through Interaction with Humans**
 Authors D. Park, J. Park, T. Bhattacharjee, D. Pucci, G. Romualdi
 Conference IEEE International Conference on Humanoid Robotics (Humanoids)
 Website <https://humanoids-ws-2024.github.io>
- 2024 **iCub3 avatar system: Enabling remote fully immersive embodiment of humanoid robots**
 Authors S. Dafarra, U. Pattacini, G. Romualdi, et al.
 Journal Science Robotics
 Paper <https://doi.org/10.1126/scirobotics.adh3834>
- 2022 **Whole-Body Control and Estimation of Humanoid Robots with Link Flexibility**
 Authors G. Romualdi, N.A. Villa, S. Dafarra, D. Pucci, O. Stasse
 Conference IEEE International Conference on Humanoid Robotics (Humanoids)
 Paper <https://doi.org/10.1109/Humanoids53995.2022.10000157>
- 2022 **Dynamic Complementarity Conditions and Whole-Body Trajectory Optimization for Humanoid Robot Locomotion**
 Authors S. Dafarra, G. Romualdi, D. Pucci
 Journal IEEE Transactions on Robotics (T-RO)
 Paper <https://doi.org/10.1109/TRO.2022.3183785>
- 2022 **Online Non-linear Centroidal MPC for Humanoid Robot Locomotion with Step Adjustment**
 Authors G. Romualdi, S. Dafarra, G. L'Erario, I. Sorrentino, S. Traversaro, D. Pucci
 Conference IEEE International Conference on Robotics and Automation (ICRA)
 Paper <https://doi.org/10.1109/ICRA46639.2022.9811670>
 GitHub https://github.com/ami-iit/paper_romualdi_2022_icra_centroidal-mpc-walking
- 2022 **ADHERENT: Learning Human-like Trajectory Generators for Whole-body Control of Humanoid Robots**
 Authors P.M. Viceconte, R. Camoriano, G. Romualdi, D. Ferigo, S. Dafarra, S. Traversaro, G. Oriolo, L. Rosasco, D. Pucci
 Journal IEEE Robotics and Automation Letters (RA-L)
 Paper <https://doi.org/10.1109/LRA.2022.3141658>
- 2021 **Modeling of Visco-Elastic Environments for Humanoid Robot Motion Control**
 Authors G. Romualdi, S. Dafarra, D. Pucci
 Journal IEEE Robotics and Automation Letters (RA-L)

Paper <https://doi.org/10.1109/LRA.2021.3067589>
GitHub https://github.com/ami-iit/romualdi-2021-ral-soft_terrain_walking

2019 **A Benchmarking of DCM Based Architectures for Position, Velocity and Torque Controlled Humanoid Robots**

Authors G. Romualdi, S. Dafarra, Y. Hu, P. Ramadoss, F. J. Andrade Chavez, S. Traversaro, D. Pucci
Journal International Journal of Humanoid Robotics
Paper <https://doi.org/10.1142/S0219843619500348>
GitHub <https://github.com/robotology/walking-controllers>

HONORS & AWARDS

November 2024 **Best Oral Presentation Finalist at IEEE Humanoids 2024**
International Conference on Humanoid Robots [<https://2024.ieee-humanoids.org/program-glance/awards/>]
Online DNN-driven Nonlinear MPC for Stylistic Humanoid Robot Walking with Step Adjustment was selected as one of the finalists for Best Oral Presentation.

November 2021 **Runner-up Best Poster Award**
2nd NAVER LABS Europe AI for Robotics Workshop [europe.naverlabs.com/research/2nd-ai-for-robotics-international-workshop-by-naver-labs-europe/]
ADHERENT: Learning Human-like Trajectory Generators for Whole-body Control of Humanoid Robots received the Runner-up Best Poster Award.

October 2019 **I-RIM19 Finalist of the Best Interactive Section Paper**
Istituto di Robotica e Macchine Intelligenti [<https://i-rim.it/>]
The extended abstract was a finalist for the Best Interactive Section Paper award.

November 2018 **Outstanding paper of the IEEE Humanoids 2018**
International Conference on Humanoid Robots [<http://humanoids2018.csp.escience.cn>]
A Benchmarking of DCM-Based Architectures for Position and Velocity Controlled Walking of Humanoid Robots was selected as an Outstanding Paper.

SOFTWARE MAINTAINER

Project **bipedal-locomotion-framework**
A comprehensive set of libraries designed to enable bipedal locomotion on humanoid robots.
Code <https://github.com/ami-iit/bipedal-locomotion-framework>

Project **osqp-eigen**
Lightweight and user-friendly C++ wrapper for osqp library.
Code <https://github.com/robotology/osqp-eigen>

Project **walking-controllers**
Suite of modules aimed at enabling bipedal locomotion for the humanoid robot iCub.
Code <https://github.com/robotology/walking-controllers>

SKILLS AND COMPETENCIES

- Software
- **Programming Languages:** C++, Python, MATLAB, TOML.
 - **Libraries:** Eigen3, iDynTree, osqp, IPOPT, casadi, Qt, YARP, ROS2, PyTorch.
 - **Version control system & CI/CD:** Git, GitHub Actions.
- Soft skills
- **Work-related:** Problem-solving, Teamwork, Leadership, Enthusiasm.
 - **Languages:** Italian (mother tongue), English (Proficient User).