Giulio Romualdi, Ph.D.

Robotics Technical Lead & Product Owner

Humanoid Robotics | Physical AI | Locomotion, Whole-Body Control & Reinforcement Learning

Genoa, Italy | giulio.romualdi@gmail.com | giulioromualdi.github.io | LinkedIn | GitHub | Google Scholar

Summary

Robotics technical leader with 8+ years in humanoid robotics, currently Technical Lead for locomotion control and Product Owner of the locomotion team at Generative Bionics. I own the technical roadmap, backlog, priorities and delivery criteria for humanoid locomotion, lead a multidisciplinary team of engineers and researchers, and stay hands-on across reinforcement learning, whole-body control, simulation and on-robot deployment. Led the locomotion delivery for the GENE.01 humanoid, shown in a public live demonstration at AMD Advancing AI 2026. Previously at the Istituto Italiano di Tecnologia, where I coordinated a locomotion research group and contributed to the iCub, iCub3 and ergoCub platforms. Ph.D. in robotics, 20+ peer-reviewed publications (700+ citations, h-index 14), and maintainer of widely used open-source robotics software.

Skills

Leadership and product: Technical leadership; product ownership; technical roadmaps; backlog and prioritisation; milestones, Definition of Done and acceptance criteria; technical decision-making; mentoring; technical hiring; cross-functional coordination; stakeholder and executive reporting; Agile/Scrum.

Robotics and Physical AI: Humanoid locomotion; whole-body control; reinforcement learning for locomotion; motion imitation and adversarial motion priors; model predictive, nonlinear and optimal control; trajectory optimisation; state estimation; sim-to-sim and sim-to-real transfer; deployment and experimental testing on physical humanoids.

Software and tools: C++; Python; MATLAB/Simulink; PyTorch; Isaac Lab; MuJoCo; Eigen; iDynTree; OSQP; IPOPT; CasADi; ROS 2; YARP; Qt; CMake; Git; GitHub Actions; Linux.

Robot platforms: GENE.01; iCub; iCub3; ergoCub; TALOS.

Experience

Technical Lead – Locomotion Control **Jan 2026 – Present**

Generative Bionics *Genoa, Italy*

Functional responsibility: Product Owner – Locomotion Team

- Product Owner for the locomotion team: translate quarterly objectives agreed with the CTO and system architects into technical roadmaps, backlog, priorities, milestones and delivery plans, and define Definition of Done and acceptance criteria.
- Technically lead a multidisciplinary team of engineers, Ph.D.s and researchers: drive technical decision-making for the locomotion and whole-body control subsystem, evaluate alternative solutions with the team, resolve technical disagreements and set the implementation direction.
- Mentor team members, give technical feedback, and organise and run technical hiring interviews and candidate evaluations.
- Lead cross-functional coordination with the mechanical and system teams, providing simulation results and technical input for the development of future humanoid platforms; report progress, results, technical trade-offs and delivery status to leadership.
- Own the technical pipeline end to end: reinforcement-learning policy design, motion generation, simulation, sim-to-sim validation, deployment on physical humanoids, experimental testing and on-robot tuning; contribute hands-on in PyTorch, Isaac Lab, C++ and Python.
- Led the locomotion delivery for **GENE.01**, contributing to its public live demonstration at AMD Advancing AI 2026, and delivered a Motion Intelligence via RL milestone across several GENE.01 lower-body platforms.

Istituto Italiano di Tecnologia – Artificial and Mechanical Intelligence **Dec 2017 – Jan 2026**

Genoa, Italy

Postdoctoral Researcher – Humanoid Robotics Sep 2022 – Jan 2026

- Coordinated the technical activities of the Robust, Reactive and Dynamic Locomotion group (Scrum Master, 2023–2025), supporting up to nine researchers across development, experiments and scientific work.
- Mentored Ph.D. students and researchers on research ideation, experimental design, software development, code review and scientific publications.
- Designed and developed locomotion architectures for the iCub, iCub3 and ergoCub humanoid platforms, taking research prototypes through to reliable on-robot demonstrations, including the ergoCub walking demonstration broadcast on national Italian television.
- Acted as IIT technical point of contact for the ergoCub project (IIT–INAIL collaboration): ran monthly technical meetings with INAIL and presented overall development status and progress.
- First author of *Online DNN-driven Nonlinear MPC for Stylistic Humanoid Robot Walking with Step Adjustment*, a Best Oral Presentation Award finalist at IEEE-RAS Humanoids 2024.

Ph.D. Researcher – Humanoid Robotics Nov 2018 – Aug 2022

- Researched online humanoid locomotion: nonlinear model predictive control with online step adjustment, optimal control, whole-body control and optimisation, validated experimentally on physical humanoid robots.
- Contributed the locomotion architectures for iCub and iCub3 and their integration with the teleoperation system used in the iCub3 avatar and ANA Avatar XPRIZE activities, later published in *Science Robotics*.
- Published and presented at the main international robotics conferences and journals (ICRA, Humanoids, T-RO, RA-L).

Research Fellow & Guest Student – Humanoid Robotics Dec 2017 – Oct 2018

- Developed and experimentally validated capture-point and DCM-based walking controllers for the iCub humanoid, starting from M.Sc. thesis work and continuing into the Ph.D.

Education

Ph.D. in Mechatronics, Robotics and Automation Engineering – Grade: Excellent **2018 – 2022**
Università degli Studi di Genova & Istituto Italiano di Tecnologia *Genoa, Italy*
Thesis: *Online Control of Humanoid Robot Locomotion*.

Visiting Ph.D. Student – Gepetto Team **Oct – Dec 2021**
LAAS-CNRS *Toulouse, France*
Whole-body control and state estimation for the TALOS humanoid with structural link flexibility; led to a first-author IEEE-RAS Humanoids 2022 paper.

M.Sc. in Robotics and Automation Engineering – 110/110 cum laude **2015 – 2018**
Università di Pisa *Pisa, Italy*
Thesis: *Capture-Point Based Controllers for Robot Bipedal Locomotion: Analysis and Implementation on the iCub Platform*.

B.Sc. in Biomedical Engineering – 110/110 **2011 – 2014**
Università di Pisa *Pisa, Italy*

Open-Source Software

- **Bipedal Locomotion Framework** – maintainer of a C++/Python suite for planning, estimation, control, machine learning and robot interfaces, used as the foundation for both published research and locomotion shipped on real robots.
- **osqp-eigen** – author and maintainer of the Eigen/C++ wrapper for the OSQP quadratic-programming solver, adopted across the robotics and optimisation community.
- **AMP-RSL-RL**, **walking-controllers**, **lie-group-controllers**, **robot-log-visualizer** – maintainer.

Selected Publications

2026. "Towards Shared Embodied Intelligence in Humanoid Robots through Optimization, Development and Testing of the Human-Aware ergoCub Robot." *Nature Machine Intelligence*.
2024. "iCub3 Avatar System: Enabling Remote Fully Immersive Embodiment of Humanoid Robots." *Science Robotics*.
2024. "Online DNN-Driven Nonlinear MPC for Stylistic Humanoid Robot Walking with Step Adjustment." *IEEE-RAS International Conference on Humanoid Robots – first author; Best Oral Presentation finalist*.
2022. "Online Non-Linear Centroidal MPC for Humanoid Robot Locomotion with Step Adjustment." *IEEE International Conference on Robotics and Automation – first author*.
2022. "Whole-Body Control and Estimation of Humanoid Robots with Link Flexibility." *IEEE-RAS International Conference on Humanoid Robots – first author*.
2022. "Dynamic Complementarity Conditions and Whole-Body Trajectory Optimization for Humanoid Robot Locomotion." *IEEE Transactions on Robotics*.
Full list (20+ publications, 700+ citations, h-index 14): Google Scholar.

Awards and Professional Service

- **Finalist, Best Oral Presentation Award**, IEEE-RAS Humanoids 2024 – first author.
- **Organising committee**, IEEE-RAS Humanoids 2024 workshop *Designing Interactive Humanoids: Learning Tasks through Interaction with Humans*.
- **ANA Avatar XPRIZE Finalist**, iCub team (2022) – contributed the integration of humanoid locomotion with the iCub3 avatar teleoperation system.
- **Runner-up, Best Poster Award**, NAVER LABS Europe AI for Robotics Workshop 2021 – co-author, *ADHERENT*.
- **Finalist, Best Interactive Presentation**, I-RIM 2019; **Outstanding Paper**, IEEE-RAS Humanoids 2018.

Certifications and Languages

Certifications: Professional Qualification as Industrial Engineer, Italian State Examination, Università di Pisa (Feb 2021); RPAS (drone) pilot practical training certificate, ENAC (2016).

Languages: Italian – native; English – full professional proficiency; Japanese – elementary.