Luca Russo

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github.com/Aliothy aliothy.github.io/luca_russo_portfolio

Research Summary

PhD Researcher in Robotics and AI focused on modeling, simulation, and control of complex robotic systems. Experienced with dynamic modeling, trajectory optimization, and torque-level control for multi-DoF humanoid and mobile robots. Skilled in C++, Python, MuJoCo, Isaac Sim, and ROS2. Passionate about developing physics-grounded models and controllers that bridge simulation and real-world performance for humanoid robotics and multi-agent systems.

Education

University of Illinois Chicago (UIC)

- Ph.D. in Mechanical and Industrial Engineering In Progress – GPA 4.00/4.00
- M.S. in Electrical and Computer Engineering October 2024 – GPA 4.00/4.00

Politecnico di Torino | *Turin, Italy*

- M.S. in Mechatronics Engineering October 2024 – 110 cum laude/110
- B.S. in Aerospace Engineering July 2022 – 110 cum laude/110

Technical Skills

Languages: C++, Python, MATLAB/Simulink
Modeling & Control: Rigid body dynamics, inverse/forward dynamics, Jacobians, MPC, impedance/torque control
Simulation: MuJoCo, Isaac Sim/Lab, Gazebo, PyBullet
Learning & Optimization: Reinforcement Learning (model-based/model-free), trajectory optimization, system identification
Hardware & Integration: ROS2, PX4, Jetson/VOXL, sensor calibration (IMU, LiDAR, camera), SolidWorks
Tools: Git, Docker, Linux, CUDA

Research Experience

UIC Robotics Lab Jan 2024 – Present
PhD Research Assistant *C++, Python, ROS2, MuJoCo, Isaac Sim*

- Developed full-body dynamics and torque control for a 29-DoF humanoid (Unitree G1) using MuJoCo simulation.
- Implemented inverse kinematics and Jacobian-based control for balance and velocity tracking.
- Conducted RNEA-based torque computation for joint actuation and validated against simulated contact dynamics.
- Designed experiments for standing stability and trajectory optimization under model uncertainty.
- Integrated GPU-accelerated simulation with reinforcement learning control policies for adaptive motion.

Chicago EDT Student Team (NASA Lunabotics) Jan 2024 – Present
Control Systems Lead *C++, Python, Isaac ROS, Linux, PX4*

- Led hardware–software integration of an excavation rover; coordinated sensor calibration, system bring-up, and real-time testing.
- Managed lab workflows for testing under latency and power constraints using NVIDIA Jetson hardware.
- Streamlined team documentation and testing protocols to improve repeatability and reduce downtime.

UIC – Master's Thesis: Learning-based Legged Locomotion Aug 2023 – Dec 2023
Research Assistant *MuJoCo, PyTorch*

- Developed model-based reinforcement learning policies for micro-robot locomotion using dynamic stability metrics.
- Designed controlled experiments to measure performance metrics and ensure repeatable outcomes.
- Published findings at the *6th International Conference on Control and Robotics (ICCR 2024)*

Publications

[1] L. Russo, E. Chandler, K. Jayaram, and A. R. Trivedi, "Dynamic resonance frequency identification for economic insect-scale legged robot locomotion," in *2024 6th International Conference on Control and Robotics (ICCR)*, 2024, pp. 142–146. doi: 10.1109/ICCR64365.2024.10927506.

[2] L. Russo, M. S. Mondal, S. Ramasamy, J. D. Humann, J. M. Dotterweich, and P. A. Bhounsule, "Precision auto-landing of an aerial vehicle on a moving ground vehicle: A modular ros2 approach," *ASME IDETC-CIE*, 2025, Accepted for publication.

[3] M. S. Mondal et al., "Risk-aware energy-constrained uav-ugv cooperative routing using attention-guided reinforcement learning," in *2025 IEEE International Conference on Robotics and Automation (ICRA)*, IEEE, 2025, pp. 13 000–13 006.

[4] M. S. Mondal, S. Ramasamy, L. Russo, J. D. Humann, J. M. Dotterweich, and P. Bhounsule, "How to coordinate uavs and ugvs for efficient mission planning? optimizing energy-constrained cooperative routing with a drl framework," *arXiv preprint arXiv:2504.21111*, 2025.