Chrysostomos Karakasis

Ph.D. Candidate in Mechanical Engineering

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Education

Ph.D. in Mechanical Engineering — **GPA: 4.0/4.0**
University of Delaware, USA — Aug. 2019 - June 2024

- **Dissertation:** "Robust and Stable Locomotion over Compliant Terrains: Application to Lower-limb Prostheses and Bipedal Robots"
  Advisor: Dr Panagiotis Artemiadis
  Committee: Ioannis Poulakakis (UD); Thomas Buchanan (UD); Robert Gregg (UMich)

M.Sc. in Mechanical Engineering — **GPA: 4.0/4.0**
University of Delaware, USA — May 2023

B.Sc. & M.Sc. in Electrical and Computer Engineering (Top 5%) — **GPA: 9.02/10**
National Technical University of Athens, Greece (5-year Joint Degree; 300 ECTS) — Dec. 2013 - Feb. 2019

- **Thesis:** "Implementation of Quadruped Robot's Motion Control on SoC FPGA"
  Supervisors: Prof. Dimitrios Soudris & Prof. Evangelos Papadopoulos

Research Interests

Rehabilitation & Medical Robotics Legged Locomotion Dynamics and Control Embedded Systems Design

Professional Experience

Robotics and Controls Engineer Intern — **Johnson & Johnson Medtech**
Manager: Douglas Spencer Maughan - Mentor: Michael Dermksian — June - Aug. 2022

- Developing and deploying a hard-stop algorithm to prevent overloading in a cable-driven surgical instrument wrist.

Research Assistant — **University of Delaware**
Advisor: Dr. Panagiotis Artemiadis — 2019 - Present

- Robust and stable biped locomotion (3D Dual-SLIP) under one-step low-stiffness perturbations.
- Development of controller for an ankle-foot prosthesis that improves walking stability over compliant terrains.
- Development of novel kinematic data-based algorithm (F-VESPA) for real-time heel-strike detection.
- Development of user-friendly interface for performing experiments using the Variable Stiffness Treadmill (VST).

Research Assistant — **National Technical University of Athens**
Advisor: Dr. Dimitrios Soudris & Dr. Evangelos Papadopoulos (MicroLab & CSL-EP) — 2018-2019

- Implementation of highly affordable control architecture for the quadruped robot Laelaps II based on a SoC FPGA.

Technical Skills

- **Operating Systems:** Microsoft Windows, Unix (Linux)
- **Programming Languages:** C/C++, Python, Pascal, Assembly (ARM, AVR architecture)
- **Computer Hardware Design:** VHDL, Verilog, Xilinx Vivado/ISE Design Suite, High-Level Synthesis (HLS)
- **Software Tools:** Mathworks MATLAB/Simulink, CLion IDE, Bitbucket, GitHub ,Vicon Nexus/DataStream SDK, Gazebo, Jupyter Notebook, Microsoft Azure, Eclipse IDE, Matplotlib
- **Application Software:** TEX (LATEX, BIBTEX), Microsoft Office, OpenOffice

Academic Scholarships and Awards

- **IEEE/RAS Member Support Program for IROS 2023** — IEEE Robotics and Automation Society, 2023
- **Graduate Student Travel Award for IROS 2023** — University of Delaware, 2023
- **George W. Laird Merit Fellowship** (Finalist) — University of Delaware, 2020
- **Onassis Foundation Scholarship** — Alexander S. Onassis Foundation, 2020-2023
- **Gerondelis Foundation Scholarship for Academic Excellence** — Gerondelis Foundation Inc., 2020

Publications

[J3] V. Chambers, B. Hobbs, W. Gaither, Z. The, A. Zhou, **C. Karakasis**, and P. Artemiadis, "The Variable Stiffness Treadmill (VST) 2.0: Development and Validation of a Unique Tool to Investigate Locomotion on Compliant Terrains," *ASME Journal of Mechanisms and Robotics*, 2023, Under Review.

[J2] **C. Karakasis**, I. Poulakakis, and P. Artemiadis, "An Energy-Based Framework for Robust Dynamic Bipedal Walking Over Compliant Terrain," *Journal of Dynamic Systems, Measurement, and Control*, pp. 1–12, Nov. 2023, ISSN: 0022-0434. DOI: 10.1115/1.4064094.

[J1] **C. Karakasis** and P. Artemiadis, "Real-time kinematic-based detection of foot-strike during walking," *Journal of Biomechanics*, vol. 129, p. 110 849, 2021, ISSN: 0021-9290. DOI: https://doi.org/10.1016/j.jbiomech.2021.110849.

[C4] **C. Karakasis**, R. Salati, and P. Artemiadis, "Adjusting the Quasi-Stiffness of an Ankle-Foot Prosthesis Improves Walking Stability during Locomotion over Compliant Terrain," in *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023, pp. 2140–2145. DOI: 10.1109/IROS55552.2023.10342344.

[C3] **C. Karakasis**, I. Poulakakis, and P. Artemiadis, "Robust Dynamic Walking for a 3D Dual-SLIP Model under One-Step Unilateral Stiffness Perturbations: Towards Bipedal Locomotion over Compliant Terrain," in *2022 30th Mediterranean Conference on Control and Automation (MED)*, 2022, pp. 969–975. DOI: 10.1109/MED54222.2022.9837236.

[C2] **C. Karakasis** and P. Artemiadis, "F-VESPA: A Kinematic-based Algorithm for Real-time Heel-strike Detection During Walking," in *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, 2021, pp. 5098–5103. DOI: 10.1109/IROS51168.2021.9636335.

[C1] **C. Karakasis**, K. Machairas, C. Marantos, I. S. Paraskevas, E. Papadopoulos, and D. Soudris, "Exploiting the SoC FPGA Capabilities in the Control Architecture of a Quadruped Robot," in *2020 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, IEEE, 2020, pp. 501–507. DOI: 10.1109/AIM43001.2020.9159012.

Presentations

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) — Detroit, USA, Oct. 2023
In-person presentation of the accepted paper "*Adjusting the Quasi-Stiffness of an Ankle-Foot Prosthesis Improves Walking Stability during Locomotion over Compliant Terrain*" as part of the "Prosthesis Design and Control" Technical Session.

30th Mediterranean Conference on Control and Automation (MED) — Athens, Greece, July 2022
Presentation of the accepted paper "*Robust Dynamic Walking for a 3D Dual-SLIP Model under One-Step Unilateral Stiffness Perturbations: Towards Bipedal Locomotion over Compliant Terrain*" as part of the "Robotics V" Regular Session.

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) — Prague, Czech Republic, Sep. 2021
Virtual presentation of the accepted paper "*F-VESPA: A Kinematic-based Algorithm for Real-time Heel-strike Detection During Walking*" as part of the "Prosthetics and Exoskeletons I" Technical Session.

IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) — Boston, USA, July 2020
Virtual presentation of the accepted paper "*Exploiting the SoC FPGA Capabilities in the Control Architecture of a Quadruped Robot*" as part of the "Legged Robots II" Technical Session.

Mentoring

Research Advising at the University of Delaware (HORC Lab)

- Camryn Scully (M.Sc. in Robotics) — Feb. 2023 - Present
  Development of an inline bypass adapter for an ankle-foot prosthesis based on the iWALK3.0 Hands Free Crutch.
- Robert Salati (M.Sc. in Robotics) — Sep. 2022 - Aug. 2023
  Development of admittance controller for the adjustment of the quasi-stiffness of an ankle-foot prosthesis.