

HENRIQUE FERROLHO

✉ henrique.ferrolho@gmail.com · ☎ (+44) 7706 533010 · in henriqueferrolho · 🌐 ferrolho



⚙️ SKILLS

Robotics and Autonomous Systems

- Proficient in motion planning, including trajectory optimization;
- Skilled in numerical optimization, whole-body control, and rigid-body dynamics;
- Hands-on experience in working with complex and high-dimensional robots, such as: NASA Valkyrie (humanoid) · TALOS (humanoid) · ANYmal B (quadruped) · Kinova Jaco (arm) · UR10e (arm)
- Experienced in using *Robot Operating System* (ROS 1 and 2), MoveIt, SMACH, and Vicon (motion capture).

Software Development

- Strong foundation in computer science, including: algorithms and data structures · programming paradigms (object-oriented, functional, and logic) · databases operating systems · networking · compilers · computer graphics · web development (back-end and front-end)
- Programming languages: Julia, Python, C/C++, Java; Operating Systems: Linux (Ubuntu), Windows;
- Experienced in Bash scripting, CI/CD, Docker, gRPC, Protocol Buffers (protobuf);
- Familiar with agile processes (Scrum, Kanban), and Atlassian tools (Confluence, Jira, Trello).

Communication

- Very good at preparing presentations with graphics, animations, and diagrams; (example: youtu.be/pV4s7hzUgic)
- Able to communicate complex ideas in a clear and concise manner, catering to different audiences;
- Experienced in producing high-quality manuscripts, including scientific publications and reports;
- Competent in using software tools such as L^AT_EX, GIMP, Kdenlive, PowerPoint, and Audacity.

🔧 WORKING EXPERIENCE

Ocado Technology London, UK

Apr 2022 – Present

Robotics Engineer Advanced Technology

Developed robotic manipulation solutions capable of picking and placing tens of thousands of products of varying shapes, sizes, weights, and fragility. Contributed to the design and development of the *Motion Platform*, a department-wide effort to integrate motion planning and control capabilities across different teams, products, and robots. Additionally, ensured optimal performance and continuous improvement of production stations for fulfilling customer orders in real-time.

The University of Edinburgh Edinburgh, UK

Nov 2021 – Mar 2022

Research Associate Statistical Machine Learning and Motor Control (SLMC) Group

Led the research and development of the motion planning framework for *ANYmal Bull* (a quadruped robot mounted with an arm), as part of the research project for Offshore Energy Asset Integrity Management at the UK Robotics and Artificial Intelligence Hub — orcahub.org. Created a remote inspection and asset interaction solution tailored for industrial sites.

University of Porto, Porto, Portugal

Jul – Sep, 2016

Research Software Engineer DokuWeaki

Developed a collaborative real-time editor *plugin* for DokuWiki. Maintained and improved existing DokuWiki plugins. DokuWeaki is a bundle of plugins for DokuWiki especially targeted for agile teams, supporting agile documentation.

University of Porto, Porto, Portugal

Jul – Sep, 2015

Full-Stack Developer Nutriscience

Designed and implemented a responsive online platform with *Laravel*, which was used by ~1500 households. Liaised with a team of designers, nutrition specialists, and multimedia creators. Nutriscience is an award-winning European project whose goal was to improve peoples' nutrition and eating habits.

EDUCATION

The University of Edinburgh, Edinburgh, UK Sep 2017 – Mar 2022
PhD in Robotics and Autonomous Systems

The University of Edinburgh, Edinburgh, UK Sep 2016 – May 2017
Erasmus Exchange Programme
Courses: Bioinformatics, Extreme Computing, Robotics, Social and Technological Networks

University of Porto, Porto, Portugal Sep 2012 – Jul 2017
BSc+MSc in Informatics and Computing Engineering

TEACHING EXPERIENCE

The University of Edinburgh Edinburgh, UK Fall 2017
Lab Demonstrator · Marker Robotics: Science and Systems

- Supervised a class of 28 MSc students who designed, built, and programmed autonomous LEGO robots;
- Evaluated the progress of each group throughout the semester and marked their final technical reports.

University of Porto, Porto, Portugal Fall 2015 and Fall 2014
Teaching Assistant Computer Laboratory

- Taught two MSc classes (~15 students each) OOP in C, Bash scripting, VESA graphics, and state machines;
- Wrote tutorials for developing a game from scratch in Minix (difusal.blogspot.pt/2014/07/minix-posts-index.html);
- Contributed to a ~10% increase in the number of approved students. Boosted quality of the students' final projects.

University of Porto, Porto, Portugal Spring 2015
Teaching Assistant Computer Graphics

- Taught computer graphics (meshes, visibility, lighting, and shading) to two MSc classes;
- Contributed to the development of *WebCGF*, a WebGL-based library still being used in the course.

PUBLICATIONS

H. Ferrolho, V. Ivan, W. Merkt, I. Havoutis, S. Vijayakumar, “RoLoMa: Robust Loco-Manipulation for Quadruped Robots with Arms,” *Autonomous Robots (AuRo)*, 2023. (Currently under review.)

C. Mastalli, W. Merkt, J. Marti-Saumell, **H. Ferrolho**, J. Sola, N. Mansard, S. Vijayakumar, “A Direct-Indirect Hybridization Approach to Control-Limited DDP,” *Autonomous Robots (AuRo)*, 2022.

H. Ferrolho, W. Merkt, C. Tiseo and S. Vijayakumar, “Residual Force Polytope: Admissible Task-Space Forces of Dynamic Trajectories,” *Robotics and Autonomous Systems (RAS)*, 2021.

H. Ferrolho, V. Ivan, W. Merkt, I. Havoutis, S. Vijayakumar, “Inverse Dynamics vs. Forward Dynamics in Direct Transcription Formulations for Trajectory Optimization,” in *IEEE International Conference on Robotics and Automation (ICRA)*, Xi’an, China, 2021.

H. Ferrolho, W. Merkt, V. Ivan, W. Wolfslag, S. Vijayakumar, “Optimizing Dynamic Trajectories for Robustness to Disturbances Using Polytopic Projections,” in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, USA, 2020.

H. Ferrolho, W. Merkt, Y. Yang, V. Ivan and S. Vijayakumar, “Whole-Body End-Pose Planning for Legged Robots on Inclined Support Surfaces in Complex Environments,” in *IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, Beijing, China, 2018.

Y. Yang, W. Merkt, **H. Ferrolho**, V. Ivan and S. Vijayakumar, “Efficient Humanoid Motion Planning on Uneven Terrain Using Paired Forward-Inverse Dynamic Reachability Maps,” *IEEE Robotics and Automation Letters (RA-L)*, 2017.

INVITED TALKS, WORKSHOPS, AND LECTURES

Massachusetts Institute of Technology (MIT) · JuliaCon 2023 Scheduled, Jul 2023
Talk “Using Julia to Optimise Trajectories for Robots with Legs”

Ocado Technology / Kindred AI · Topics in Robotics (TiR) Feb 2023
Talk “Trajectory Optimization with Direct Transcription”

CDT RAS Annual Conference 2022 · Alumni Panel Nov 2022
Short Talk “My journey as a Robotics CDT student”

University of Porto · Intelligent Systems, Interaction and Multimedia Seminar (via Zoom) <i>Talk</i> “Trajectory Optimization with Direct Transcription”	Dec 2020
University of Edinburgh · Institute of Perception, Action and Behaviour <i>Seminar</i> “Robust Dynamic Trajectory Optimization”	May 2019
ENEI · Portuguese National Meeting of Informatics Students <i>Workshop</i> “Introduction to Robotics with Three.js”	Mar 2018
University of Porto · Computer Laboratory <i>MSc Lecture</i> “Graphics, State Machines, and OOP in C for MINIX” · bit.ly/lcom-ferrolho-2014 , bit.ly/lcom-ferrolho-2015	Dec 2014, Dec 2015

♡ VOLUNTEERING / ⓘ OTHER INFORMATION

<i>ELLIS PhD & PostDoc Program</i> , Evaluator for the pre-screening of PhD applicants (European Union)	2020
<i>Edinburgh International Science Festival</i> , Educator at the drop-in science event (Edinburgh, UK)	2018
<i>IEEE RAS International Conference on Humanoid Robots</i> , Organizing Staff (Birmingham, UK)	2017
<i>Engineering and Physical Sciences Research Council</i> , PhD scholarship (Edinburgh, UK)	2017
<i>Microsoft</i> , Microsoft Student Partner (Porto, Portugal)	2016
<i>Conservatory of Music</i> , Piano lessons (Viseu, Portugal)	2004 – 2009
<i>Fun Languages</i> , English studies (Viseu, Portugal)	2002 – 2010