Luís F. S. Marques

Curriculum Vitae

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Education

2023 – Present **Ph.D. in Robotics**, *University of Michigan*, USA
CGPA: 4.0/4.0

2019 – 2023 **M.Eng. in Aeronautical Engineering**, *Imperial College London*, UK
CGPA: First Class Honours

2016 – 2019 **High School Diploma in Science & Technology**, *Grande Colégio Universal*, Portugal
CGPA: 20/20

Awards and Scholarships

2021, 2022 **UROP Bursary (x2)** from the Faculty of Engineering at Imperial College London
Selective bursary funding 12-week-long summer research placements (totaling over £8'000).

2022 **Student and Developing Countries Travel Award** from IROS 2022
Awarded to help cover travel costs for IROS 2022 (JP¥80'000).

2022 **General Award** from the Old Centralians' Trust at the City & Guilds College Association
Prestigious scholarship funding travel, registration and subsistence for IROS 2022 (over £1'600).

2022 **Most Innovative Project Award** by Department of Aeronautics at Imperial College London
For design of path planning and thermal detection algorithms for a search-and-rescue UAV.

Research Experience

09/2023 – Present **Probabilistically Safe Robotic Control & Planning**
Advisor: Dmitry Berenson, Autonomous Robotic Manipulation Lab, University of Michigan
- Developing learning and formal methods for safety-critical control under uncertainty.

07/2023 – 09/2023 **UAVs for Maritime Search and Rescue**
Advisors: José Escribano Macias, Imperial College London
Panagiotis Angeloudis, Transport Systems & Logistics Lab, Imperial College London
- Determined optimal search height for IR-based drone to save people at sea under uncertainty [C3].

07/2022 – 08/2023 **Robotic Assistive Feeding (UROP & M.Eng. Thesis [T1])**
Advisors: Yiannis Demiris, Personal Robotics Lab, Imperial College London
Eric Kerrigan, Imperial College London
- Designed mm-accurate URDF model of a unique 41DoF mobile bimanual manipulator.
- Derived and implemented C++ inverse-kinematics solver for closed-chain scissor lift attachment.
- Developed adaptive position-based impedance controller to compliantly grasp deformable foods.
- Developed probabilistic controller for efficient multi-material cutting with partial observability.

07/2021 – 08/2023 **Multi-Agent Reinforcement Learning for Autonomous Driving (UROP)**
Advisor: Panagiotis Angeloudis, Transport Systems & Logistics Lab, Imperial College London
- Setup and integrated a fleet of mobile robots, MoCap system, internal lab network and custom Python simulator enabling real-time control and localization to mm accuracy. Trained 15+ doctoral students to use said robotics research testbed.
- Developed policies for differential-drive robots to safely navigate tracks with static and dynamic obstacles in simulation [J1], zero-shot deployed control policies on testbed through domain-randomization [C2].

Summer 2020 **Finding New Relationships between Material Properties (UROP)**
Advisor: Vito Tagarielli, Department of Aeronautics, Imperial College London
- Developed tools for data fetching and processing to extract relationships between material properties.

Summer 2019 **Gait Analysis for the Prediction of Neurodegenerative Diseases**
Advisor: Flora Ferreira, CIICESI, Porto School of Management and Technology
- Raised accuracy of neurodegenerative disease prediction from gait patterns to above 80% [C1].

Publications

Key: * indicates equal contribution and shared authorship; pdf; video; slides; website; poster.

Refereed Journals

[J1] L. Parada*, E. Candela*, **L. Marques**, and P. Angeloudis. "Safe and Efficient Manoeuvring for Emergency Vehicles in Autonomous Traffic using Multi-Agent Proximal Policy Optimisation". *Transportmetrica A: Transport Science*, 2023.

Refereed Conferences

[C5] **L. Marques** and D. Berenson. "Quantifying Aleatoric and Epistemic Dynamics Uncertainty via Local Conformal Calibration". *16th International Workshop on the Algorithmic Foundations of Robotics (WAFR)*, 2024.

[C4] Y. Feng, Q. Ye, F. Adan, **L. Marques**, and P. Angeloudis. "Driving Style Classification using Deep Temporal Clustering with Enhanced Explainability". *26th IEEE International Conference on Intelligent Transportation Systems (ITSC)*, 2023.

[C3] **L. Marques**, J. J. E. Macias, and P. Angeloudis. "Probabilistic Planning for Maritime Search and Rescue". *6th International Conference on Dynamics of Disasters (DOD)*, 2023.

[C2] E. Candela*, L. Parada*, **L. Marques***, T. Georgescu, Y. Demiris, and P. Angeloudis. "Transferring Multi-Agent Reinforcement Learning Policies for Autonomous Driving using Sim-to-Real". *35th IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022.

[C1] **L. Marques**, F. Ferreira, A. Correia, E. Bicho, and W. Erlhagen. "Feature Extraction using Poincaré Plots for Gait Classification". *25th Portuguese Conference on Pattern Recognition (RECPAD)*, 2019. Extended abstract.

Theses

[T1] **L. Marques**. "Robotic Assistive Feeding". M.Eng. Imperial College London, 2023.

Teaching

Teaching Assistant
- Computing and Numerical Methods 1 (AERO40003), Imperial College London (Fall '22, Spring '23)

Service

Mentoring

2024 – Present Artificial Intelligence Portfolio Project, AI4ALL - Ignite (1 Undergraduate Student)

Institutional - University of Michigan

2024 – Present Professional Development and Networking Chair, Robotics Graduate Student Council

2023 – Present Graduate Student Representative, Information Technology Committee, Faculty Senate

Outreach

2024 UMich Robotics New Student Orientation, organized ARMLAB's demo & research presentation

2023 London International Youth Science Forum, presented [C3] and Imperial College's Aero facilities

2023 The Great Exhibition Road Festival, showcased Transport Systems & Logistics Lab's research

Reviewing

Conference International Workshop on the Algorithmic Foundations of Robotics (WAFR) (2024)

Conference IEEE International Conference on Intelligent Transportation Systems (ITSC) (2024)

Professional Memberships

2022 – Present Institute of Electrical and Electronics Engineers (IEEE) - Graduate Student Member

2019 – Present Royal Aeronautical Society (RAeS) - Student Affiliate

Skills

Programming Python, C++, MATLAB

Tools ROS, Git, KiCad, SolidWorks, Fusion 360, OptiTrack, Cura, Arduino, ABAQUS

Media LaTeX, DaVinci Resolve, OBS

Licenses RSGB Full Radio License

Certificates ESA Spacecraft Communications Training, UMich DEICP

Languages Portuguese (Native), English (Fluent/CEFR C2), Spanish (Intermediate), Mandarin (Beginner)