Luís F. S. Marques

Curriculum Vitae

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Education

2023 – Present **Ph.D. in Robotics**, *University of Michigan*, USA

2023 – Present **M.S. in Robotics**, *University of Michigan*, USA
GPA: 4.0/4.0

2019 – 2023 **M.Eng. in Aeronautical Engineering**, *Imperial College London*, UK
GPA: First Class Honours
Thesis Title: "Robotic Assistive Feeding"

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

Awards and Scholarships

2025 **Rackham Graduate Student Research Grant** from the University of Michigan
Awarded to graduate students to help cover their proposed research projects ($1'500).

2024 **Rackham International Student Fellowship** from the University of Michigan
Awarded to twenty-five international students to help cover tuition or serve as stipend ($13'770).

2024 **Robotics Outreach Ambassador** from the Robotics Department at the University of Michigan
Distinction awarded to students who performed notable service efforts in the previous academic year.

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 fifty-one researchers 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
Selective scholarship funding travel, registration and subsistence for IROS 2022 (£1'628).

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

Research Experience

09/2023 – Present **Provably Safe Robotic Autonomy under Uncertainty**
Advisor: Dmitry Berenson, Autonomous Robotic Manipulation Lab, University of Michigan
- Developed a localized conformal-based framework to calibrate the uncertainty estimates provided by approximate dynamics predictors, leading to provably safe motion plans [C5].

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

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

07/2021 – 08/2023 **Safe Multi-Agent Reinforcement Learning for Autonomous Driving (UROP)**
Advisor: Panagiotis Angeloudis, Transport Systems & Logistics Lab, Imperial College London
- Setup and integrated a fleet of 24 mobile robots, MoCap system (8 cameras), 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. Total project budget over £30'000.
- Developed reinforcement learning policies for mobile robots to safely navigate tracks with static and dynamic obstacles in simulation [J1], and then zero-shot deployed the learned control policies on the robotics testbed through domain-randomization [C2].

Summer 2020 **Learning Relationships between Material Properties (UROP)**
Advisor: Vito Tagarielli, Department of Aeronautics, Imperial College London
- Developed tools for data collection and processing, and designed models to learn new 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 the accuracy of neurodegenerative disease prediction from gait patterns to above 80% by employing SVM-based classification leveraging Poincare plots' statistics [C1].

Publications

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

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)*, IEEE. 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.-A. 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)*, IEEE. 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.

Teaching

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

Service

Key: AY = Academic Year; UG = Undergraduate Student

Mentoring

2025 – Present Mentor (Industry Session), Resume/LinkedIn/Website Review, AI4ALL - Ignite (4 UGs)
2024 Mentor (Office Hours), Artificial Intelligence Portfolio Project, AI4ALL - Ignite (10 UGs)

Institutional - University of Michigan

2024 – Present Laboratory Safety Coordinator, Autonomous Robotic Manipulation Lab

2025 – Present Graduate Student Representative, Community Engagement Committee, Robotics Department

2025 – Present Robotics Advocacy Chair, Robotics Graduate Student Council

2024 Professional Development and Networking Chair, Robotics Graduate Student Council

AY 2023-24 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)

Media

Key: webpage; X/Twitter; Blog; LinkedIn; Instagram; Facebook

2024 Michigan Robotics featured [C5] on the Robotics Newsletter and socials

2024 Duckietown featured [C2] as a research highlight on webpage and socials

Presentations

2024 **Paper Presentation**, "Quantifying Aleatoric and Epistemic Dynamics Uncertainty via Local Conformal Calibration" [C5]
WAFR 2024 (Chicago, IL, USA) & 2024 Michigan AI Symposium: Embodied AI (Ann Arbor, MI, USA)

2023 **Paper Presentation**, "Probabilistic Planning for Maritime Search and Rescue" [C3]
DOD 2023 (Athens, Greece)

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, Unix, Git, KiCad, SolidWorks, Fusion 360, OptiTrack, Cura, Arduino, ABAQUS

Media LaTeX, DaVinci Resolve, OBS

Licenses RSGB Full Radio License

Certificates ESA: Spacecraft Communications Training, American Red Cross: Adult First Aid/CPR/AED

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