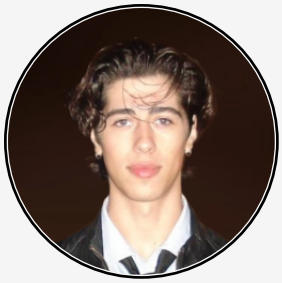

Vítor Hugo Caetano Fonseca

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About myself

Final year BSc student in Aerospace Engineering at IST Lisboa, focusing on Robotic Perception and Control. Experienced in multidisciplinary systems integration, bridging hardware prototyping (UAVs, AMRs) with advanced software implementation (VLMs, SLAM, ROS2). Eager to drive innovations that solve complex industrial challenges.

Work experience

Robotics Research Assistant | Institute for Systems and Robotics | Supervised by Prof. Pedro U. Lima | 05/09/2025 - Current | Lisboa, Portugal

- Develop the bottom layer of a Semantic Map that filters, identifies and reconstructs furniture, from Point Clouds into 3D meshes, using Open3D library and Gazebo simulation.
- Tested 3 different VLMs, optimized their prompting and created a IoU algorithm for robot's zero-shot object detection, achieving 90% accuracy on Chatrex to identify seated people and detect home objects.
- Designed a ROS2 package that allows communication from a prompting host with a VLM running on a server, allowing for real-time usage with results in less than 1 second.

Autonomous Systems Team Co-leader | Técnico Fuel Cell | 07/07/2025 - Current | Lisbon, Portugal

- Manage the members' tasks and develop the planning to test and improve autonomy, preparing for Shell Eco Marathon 2026, in Poland.
- Design a visual graph SLAM using YOLO for lane lines and obstacle detection, OpenCV for homography and mapping, fusing IMU, GPS and odometry data and implement a robust path planning algorithm.
- Created and documented a simulated environment on Gazebo, creating the URDFs, maps and controllers, and upgraded the control strategy of the vehicle by calibrating the MPC.

Summer Intern | Follow Inspiration | 15/07/2025 - 29/08/2025 | Maia, Portugal

- Conceptualized and built a budget (under 250€) differential drive AMR using Lidar sensor, Ultrasonic Sensor, Pi Camera, Raspberry Pi 5, ESP32, IMU and magnetic encoders.
- Implemented a ROS2 architecture for controlling the robot and managing sensor data, using robot_localization and Nav2 packages.
- Enhanced my C++, Python proficiency, used Solidworks to design the CAD model and 3D printed the structure.

Avionics Systems Team Member | ATLAS - Aerotéc | 20/10/2024 - 07/07/2025 | Lisbon, Portugal

- Conceptualized avionics systems (Lidar, Radar, GPS, flight controller, ESC, schematics) and built a 3D printed autonomous quadrotor for rescue applications, using CAD software and 3D printing.
- Implemented custom ESC firmware (AM32) and ArduPilot for controlling a UAV.

Education & Training

Robotics Workshop | European Space Agency - ESA | 20/05/2025 - 23/05/2025 | Noordwijk, Netherlands

- Selected among 29 students from all over the world to learn robotics programming (Python and ROS2) at ESTEC;
- Covered topics: Space Robotics; Robot Operating System; AI in robotics; Simulation and locomotion systems; Rover Project.

Third-year Bachelor's in Aerospace Engineering | Instituto Superior Técnico | 05/09/2023 - Current | Lisbon, Portugal

Focus: Robotics | GPA: 17.58 out of 20 | Relevant courses: Distributed Predictive Control and Estimation (MPC), Flight Control, Introduction to Control, Signals and Systems, Computer Architecture and Organization, Applied Mechanics I and II.

Admitted, in 2023, to the 1st most demanded engineering program in Portugal, featuring the 2nd highest entry cutoff grade nationwide, despite a large intake of 137 students.

Secondary School | Agrupamento de Escolas de São João da Pesqueira | 15/09/2020 - 15/07/2023 | São João da Pesqueira , Portugal

Final grade: 19/20 | Mathematics national exam grade: 20.0/20 - ranked top 0.36% (120 out of 33749 students) | Physics and Chemistry national exam grade: 19.4/20 - ranked top 1.7% (553 out of 32853 students, with only 31 students achieving a higher score bracket).

Skills

Programming | Python | C/C++/C# Programming | Matlab | LaTeX | RISC-V

Software/Tools | ROS2 | YOLO | PyTorch | Open 3D | OpenCV | Linux | Git | Solidworks | Docker | RViz | Gazebo | Simulink | Isaac Sim

Hardware | NVIDIA Jetson | RGB-D Cameras | 3D Printing | LiDAR | IMU | GNSS | Radar | Encoders | Raspberry Pi | ESP32

Language | Portuguese - Native | English - C1 (IELTS band 7.5) | French - A2 | German - A2

Certifications

MOOC Programming: From Abstraction to Implementation in Python | Instituto Superior Técnico | 18/08/2025

Academic Merit Board 2023/24 | Instituto Superior Técnico | 23/05/2025

Merit Scholarship 2023/24, 2024/25 | Municipality of S. João da Pesqueira | 23/12/2024 | 19/12/2025

Best high school graduate 2022/2023 | Municipality of S. João da Pesqueira | 20/12/2023

Projects

Project Leader | BSc Final Year Project: Coast Monitoring Satellite | 18/02/2026 - Current

In the scope of 1st Cycle Integrated Project in Aerospace Engineering course (over 6 months), we conceptualize a Satellite for coast monitoring and chemical substances detection using hyperspectral imaging. Lead a group of 9 students from IST in collaboration with University of Victoria Centre for Aerospace Research (CfAR), supervised by Prof. Afzal Suleman.

- Direct the systems engineering lifecycle, managing requirements, interface coordination, and integrated schedules (Gantt charts) across all subsystems.

- Engineer the satellite's Attitude Determination and Control System (ADCS) and work on hyperspectral camera AI filtering for faster and precise data transmission.

Manipulator-AMR | 31/08/2025 - Current

- Design the controller and autonomy stack for the robotic manipulator.
- Optimize the ROS2 stack for my Internship prototype.
- 3D printed and assembled a 4 DOF robotic manipulator to the AMR.

https://github.com/vitorhcf/Manipulator-AMR