

Marco Soprani Tayar

Physical AI · Aerial Robotics

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PROFILE

Physical AI and robotics researcher building models and autonomy systems that run onboard real robots, mainly aerial vehicles. Experience deploying vision-language models and reinforcement-learning policies on embedded hardware, with GPS-denied state estimation, planning and runtime safety layers. Most work developed with industry (Petrobras, Volkswagen) and validated on real hardware.

EDUCATION

University of São Paulo (EESC/USP), São Carlos — B.Eng. Mechatronics Engineering · 2023–2027 (expected)

RESEARCH & PROFESSIONAL EXPERIENCE

Researcher — USP Center for Robotics (CROB), Mobile Robotics Group · São Carlos · Mar 2024–present

- Robot learning, odometry and path planning for autonomous UAVs and mobile robots in high-risk industrial environments; supervised by Prof. Marcelo Becker.
- Petrobras (with Embrapii): navigation for UAVs and quadrupeds for oil-facility inspection; RL pipe-inspection agents trained in Genesis on a facility digital twin.
- Volkswagen: perception stack and path planning for drone-based warehouse inventory control, registering stock items in flight.
- First author of *VLN on the Fly*, an onboard vision-language navigation stack (IMAV 2026).

Spring Research Intern — Texas A&M University, Advanced Vertical Flight Laboratory · College Station, USA · Jan–Mar 2026

- Autonomous flight stack with seamless in-flight transitions between GPS and GPS-denied (vision-based) state estimation, available across multiple drone platforms. Advisor: Dr. Moble Benedict.

Summer Intern — Embraer, Avionics · Jan–Mar 2025

- Avionics systems for navigation, data recording and flight-subsystem control; sensor integration for military aircraft systems.

SEMEAR Robotics Group, EESC/USP · São Carlos · May 2023–Dec 2025

- Aerial Robotics Director (Nov 2024–Dec 2025): led the aerial robotics division and its IMAV competition team.
- Embedded Software Developer for Aerial Systems (May 2023–Dec 2025): autonomous drone software in Python and ROS, computer vision and AI for international competitions.
- External Relations Manager (Jul 2023–Jul 2024): industry partnerships for the aerial robotics division.

PUBLICATIONS

- M. S. Tayar**, F. Tommaselli, G. Capezzuto, P. A. Saraiva, P. H. V. de Freitas, L. Kido de Oliveira, G. Sonogo, R. V. de Godoy, M. Becker. *VLN on the Fly: An Onboard Vision-Language Navigation Stack for Aerial Robots*. International Micro Air Vehicle Conference (IMAV), Strasbourg, 2026. [Project page](#)
- M. S. Tayar**, L. K. de Oliveira, F. A. G. Tommaselli, J. D. Negri, T. H. Segreto, R. V. Godoy, M. Becker. *Autonomous UAV Flight Navigation in Confined Spaces: A Reinforcement Learning Approach*. 2025 Latin American Robotics Symposium (LARS), IEEE, 2025, pp. 1–6. [IEEE Xplore](#)

SELECTED PROJECTS

VLN on the Fly — onboard vision-language navigation (2026) — quantized VLM (Qwen3-VL) on a Jetson Orin NX grounds language goals; depth lifts them to 3D; EGO-Planner plans; a pretrained RL policy tracks to motor commands; a safety supervisor gates each stage.

RL for confined-space UAV flight — compared on-policy (PPO) and off-policy (SAC) deep RL for collision-free UAV navigation in procedurally generated industrial ducts, in high-fidelity simulation (LARS 2025).

Drift-free localization — VIO plus relocalization against an offline learned-feature map (SuperPoint, DINOv2, LightGlue, COLMAP), fused in a GTSAM pose graph.

AWARDS & SERVICE

- Most Promising Team** — IMAV 2026, Strasbourg, France (4th place indoor)
- Best Indoor Design Award** — IMAV 2025, Puebla, Mexico (team co-lead; 4th-highest indoor score)
- Autonomy Prize (Most Autonomous Drone)** — IMAV 2024, Bristol, UK (3rd place indoor)
- National finalist — AWS DeepRacer (reinforcement learning), CSBC 2024, Brasília
- Reviewer — IMAV 2026

SKILLS & LANGUAGES

- Physical AI**: VLM deployment and quantization, RL policy training and fine-tuning, sim-to-real
- Robotics**: PX4, ArduPilot, ROS / ROS 2, Gazebo, Isaac Sim, Genesis
- Perception & estimation**: visual-inertial odometry (VIO), lidar-inertial odometry (LIO), visual SLAM, feature extraction and matching, visual relocalization, structure-from-motion, pose-graph optimization, sensor fusion
- Hardware**: Jetson Orin NX, Pixhawk, ESP32, Intel RealSense, lidar and thermal cameras
- Programming & tools**: Python, C++, Assembly (RISC-V, 8051), Docker, Linux, Git
- Languages**: Portuguese (native), English (C2 — EF SET 89/100), Spanish (professional), Mandarin (beginner)