

ANTONIO MARZORATTI

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SUMMARY

Robotics engineer (WPI B.S., Dec 2026) and hardware startup co-founder. Five years carrying **PAWE**, a patented wheelchair power-assist drive, from a garage prototype through CAD and machining, PCB design, dual-MCU C++ firmware and physics simulation — one owner, no handoffs. **First-named inventor, U.S. Patent 12,605,293**. Winner, 2024 CEO Global Pitch Competition. Seeking robotics, embedded or hardware roles from January 2027.

EXPERIENCE

- Co-Founder & Co-CEO** — Technotonin Industries LLC, Franklin, MA May 2021 – Present
- **Invented and lead engineering on PAWE**, a 15-lb detachable friction-drive that converts a standard manual wheelchair to powered in seconds — 6 mph, ~10-mile range, hot-swap LiFePO₄ battery — and lifts into a car trunk.
 - Architected the **dual-motor differential friction-roller drivetrain** under independent per-side torque and velocity control — the mechanism claimed in the granted patent.
 - **Designed the controller and main PCBs** from schematic capture through complete fabrication and assembly packages: LiFePO₄ pack + BMS, run/charge relay, switched 12 V bus, dual H-bridge at 20 kHz, buck-boost logic rail.
 - **Wrote the dual-RP2040 C++ firmware**: USB-host link with a framed, checksummed protocol, motors-off failsafe, watchdog recovery. Built a closed-loop stack (gain-scheduled PID with anti-windup, gyro heading-hold with bias trimming), diagnosed its instability on the real chair (magnitude-only encoders → integral windup, 230° yaw) and shipped a robust open-loop drive instead.
 - **Built evidence-tagged electrical and mechanical simulations** (4,000+ lines Python) that surfaced a BMS/relay cycling fault before bench testing; electrical core verified to <0.1% against hand calculation; adversarially reviewed.
 - Drove prototypes to hardware across successive generations: SolidWorks/Onshape + FEA, in-house machining, drawing release, production parts with a machining partner in Shenzhen. Grounded requirements in **100+ interviews** with wheelchair users and clinicians.
 - Authored and filed the company's FDA Pre-Submission (written feedback received). Raised **\$125K+ non-dilutive**; lead a 7-person team.
- Embedded Systems Engineer (Contract)** — Demand-controlled ventilation systems 2025 – 2026
- Production **C firmware for PIC microcontrollers** across sensor-interface boards including CO and particulate-sensor converters; designed the PCBs and delivered manufacturing specification packages.
 - Built Windows desktop apps for sensor monitoring/configuration and an AI-assisted SQL tool for querying logged instrument data.
- Lab Monitor** — Unity Hall fabrication lab, Worcester Polytechnic Institute 2023 – 2025
- Trained students on laser-cutter operation, diagnosed and repaired machine faults, enforced shop safety.

PROJECTS

- Create OS — AI engineering workspace** — createos.tech 2026
- Architected a **17K-line Python kernel + Next.js 16 / React 19 site**: a spoken idea becomes nine linked artifacts (requirements, sourced BOM, system diagram, firmware, test plan) in ~90 s, with a provenance flag on every part price and source. Parallel job pipeline, strict JSON schemas, voice with local failover.
- Autonomous exploration & localization robot** — ROS · Python · TurtleBot3 · Gazebo 2025
- Frontier detection with multi-factor centroid scoring, **A* with recursive fallback**, and **covariance-gated AMCL** that accepts a pose only once x, y and heading converge. Mapped ~95% of an unknown maze, returned to origin, re-localized from a random pose.
- Vision-guided pick-and-place cell** — MATLAB · OpenMANIPULATOR-X 2025
- Fisheye calibration and undistortion, camera→robot homogeneous transform, HSV segmentation with swappable per-colour masks; FK/IK/differential kinematics drive the sort.

EDUCATION

Worcester Polytechnic Institute — B.S., Robotics Engineering Expected Dec 2026
Unified Robotics I–IV · Control Engineering · Embedded Systems for Robotics · Digital Circuit Design · Object-Oriented Design

PATENT, AWARDS & MEDIA

- **U.S. Patent 12,605,293** — “Electric Power-Assisting Wheelchair Control Device.” First-named inventor; filed Feb 2023, granted Apr 2026; 19 claims.
- **1st place, CEO Global Pitch Competition (2024)** · **\$25,000 Kalenian Award**, WPI i³ Lab Demo Day (2024) · VentureWell E-Team, \$20,000 (2025) · Top-25 finalist, e-Fest/Schulze Challenge (2025).
- Featured by GBH News, Boston 25, 7News (WHDH), Spectrum News 1, WPI Journal and Innovate@BU.

SKILLS

Embedded & electrical: C/C++ (RP2040, Arduino), C (PIC); PID and motor-control firmware; USB host; IMU/encoder filtering; watchdog/failsafe design; schematic capture and PCB layout through fab packages; battery/BMS; bring-up and debug.

Software: Python (numpy, simulation), C, C++, MATLAB, TypeScript/React/Next.js, Java, SQL; ROS, Gazebo, RViz; Linux; LLM pipelines.

Mechanical & product: SolidWorks, Onshape (FEA), Inventor, Mastercam; manual mill, HAAS CNC mill, lathe, laser cutting; DFM and drawing release; overseas suppliers; statics and dynamics; user research to requirements; FDA Pre-Submission authored and filed.