Braulio Felix Gomez, Ph.D.

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Professional Summary

Senior Robotics Software Engineer with a Ph.D. in Autonomous Systems and 4+ years of experience architecting high-fidelity **Simulation Environments** (Gazebo, Unity) and real-time navigation stacks (**ROS/ROS2**, C++). Expert in bridging the **Sim-to-Real** gap for industrial outdoor robots, achieving regulatory certification (LTA CETRAN) for the Panthera platform. Proven ability to scale digital twin infrastructure supporting 200+ concurrent users and optimize physics-based assets for reliability. Passionate about democratizing robotics through scalable, open-source software and robust validation frameworks.

Technical Skills

Simulation & Physics: Gazebo (Classic/Ionic), Unity 3D, ROS/ROS2, URDF, SDF, Physics Engines (ODE, PhysX), Digital Twins.
Languages: C++ (11/14/17), Python 3, C#, JavaScript/TypeScript, SQL, Bash.
Robotics & AI: Navigation Stack, Behavior Trees, Reinforcement Learning, SLAM, Sensor Fusion, TensorFlow, PyTorch, OpenCV.
Cloud & DevOps: Docker, Kubernetes, CI/CD (GitHub/GitLab Actions), AWS, Azure, Linux (Ubuntu/Debian).
Web & Interfacing: Node.js, WebSockets, Next.js, MongoDB, Hardware-Software Interfacing (Embedded C).

Professional Experience

Singapore University of Technology and Design (SUTD) - ROAR Lab Singapore
Ph.D. Researcher & Lead Robotics Engineer *Jan 2021 – Present*

- **Simulation Infrastructure:** Architected a scalable, multi-agent simulation platform ("Smorphi Imaginary") using **Unity 3D** and **C#**. Optimized asset rendering and physics interactions to support **200+ concurrent users** in a distributed contest environment, demonstrating ECS-like scalability.
- **Autonomous Navigation Stack:** Led the development of the navigation stack for **Panthera V2.0** (industrial outdoor sweeper) using **ROS** and **C++**. Implemented custom path planning and obstacle avoidance algorithms capable of handling dynamic urban environments.
- **Sim-to-Real Validation:** Achieved **Singapore LTA (Land Transport Authority) Certification** for public road usage by strictly validating safety behaviors in Gazebo simulations before deploying to physical hardware (T1 CETRAN test).
- **Embodied AI Framework:** Developed a Python-based AI framework for the **Dragonfly** robot, integrating LLM APIs (OpenAI) to reduce complex task deployment time by approximately **40%**, enhancing usability for non-expert operators.
- **Full-Stack Telemetry:** Engineered a remote operation interface using **Next.js**, **WebSockets**, and **MongoDB**, enabling real-time visualization of sensor data and path planning states for fleet management.

LionsBot International Singapore
AI & Robotics Engineer *2020 – 2021*

- **Gazebo Simulation Design:** Designed and implemented high-fidelity **Gazebo** simulation environments running on **ROS1/ROS2**. Created accurate URDF/SDF assets to mirror physical robot dynamics, enabling rapid iteration of control logic without hardware dependencies.
- **Computer Vision Deployment:** Co-developed and deployed computer vision modules for obstacle detection and scene understanding using **Intel OpenVINO** and **PyTorch**, contributing to the deployment of 2,500+ commercial units globally.
- **Firmware Interfacing:** Wrote low-level **C/C++** firmware to interface custom microcontroller hardware with the high-level ROS navigation stack, ensuring microsecond-level synchronization for precise motion control.

Freelance / Independent Consultant Remote
Full Stack Software Engineer *2019 – Present*

- **Cloud Pipeline Development:** Developed end-to-end data and training pipelines for AI models using **TensorFlow** on AWS and Azure, implementing **Model Risk Management** protocols and demonstrating cloud-native engineering capabilities.
- **Scalable Backend Systems:** Built high-throughput backend systems for blockchain applications (Solana) using **Node.js** and **MongoDB**, handling high-volume transaction requests with reliable uptime.

Education

Singapore University of Technology and Design (SUTD) Singapore
Ph.D. in Robotics, Automation, & AI *2021 – 2025*

- **Thesis:** Towards Effective Autonomy Strategies for Outdoor Robots.
- **Key Coursework:** Advanced Robotics, Machine Learning, Cyber-Physical Systems.

Instituto Tecnológico de Los Mochis Mexico
B.Sc. Engineering in Informatics *2014 – 2019*

Selected Publications & Achievements

Journal Article (2025): "A framework for coverage path planning of outdoor sweeping robots," *Mathematics.* Proposed novel algorithms for optimizing area coverage in unstructured environments.

Conference (2022): "Deep learning based litter identification and adaptive cleaning," *IEEE CASE.* Proposed a control methodology for robot actuators under navigation constraints.

Certifications:

- **AI Engineer MLOps Track:** Deploy Gen AI & Agentic AI at Scale from Udemy (2025)
- **Devops y cloud con azure devops**, app service pipelines y git from Udemy (2025)
- Programming Patterns in JavaScript and TypeScript from Udemy (2025)
- Javascipt Intermediate from HackerRank (2025)
- Problem Solving Intermediate from HackerRank (2025)
- Rest API Intermediate from HackerRank (2025)
- Software Engineer from HackerRank (2025)
- SQL intermediate from HackerRank (2025)