Anibal Guerrero Hernandez

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EXPERIENCE

Student Researcher, DLR   *Jan 2024 - Present*
- Researched and developed a CNN-based SLAM pipeline for autonomous asteroid navigation, integrating Binary Convolutional Neural Networks (BNNs) and an Efficient Perspective-n-Point (EPnP) solver.
- Replaced traditional image processing methods with a robust, noise-resistant approach for feature detection and tracking, enhancing 2D-3D matching.
- Created and tested 120,000 synthetic 3D asteroid models and real imagery for simulation and validation, ensuring practical applicability.
- Improved computational efficiency by 30% for onboard systems compared to traditional models.

WARR Rocketry - Project WESP Co-Lead, WARR e.V.   *Jan 2024 - Jul 2024*
- Co-led WESP's EX-1E project, marking the first staged rocket in WARR and European student rocketry history.
- Achieved a 7.8km launch at Spaceport America Cup 2024, securing 3rd place in the 30K COTS category and 16th overall out of 122.
- Managed a team of 40+ members, overseeing 25,000+ engineering hours and contributing 1,200+ personal hours.
- Directed the EX-1D launch in Germany, ensuring 100% compliance with safety regulations and protocols despite challenging weather.

WARR Rocketry - Project WESP Simulations Team Lead, WARR e.V.   *May 2023 - Jul 2024*
- Established WSPR (WESP Simulation Predictive Rocketry Tool) in Python for 6 DOF simulations, enhancing rocket stability analysis and mission objectives. Obtained a precision deviation of 5.8% in simulations in EX-1E launch.
- Implemented wind impact analysis and Monte Carlo simulations, enhancing apogee and impact prediction accuracy by 135%; refined safety measures that resulted in a 50% reduction in operational risk assessments over 6 months.
- Created user-friendly GUIs for single- and multi-stage rocket simulations, leading to a 100% increase in user engagement and an 80% reduction in onboarding time for new users.
- Produced a data logger for automated LaTeX report generation and analyzed telemetry data for future design optimizations.

Asteroid Mining Engineer Intern, Asteroid Mining Corporation Ltd   *May 2022 - Sep 2022*
- Conducted techno-economic analysis and constructed financial models for an asteroid mining venture, assessing viability and market demand for PGMs, resulting in actionable investment insights.
- Analyzed hydrogen energy use cases and ESG relevance, identifying future opportunities and trends by 2030.
- Formulated an award-winning 98-page internal scoping study, synthesizing market forecasts and strategic insights.

PROJECTS

Design and Control of a Rocket Hopper Demonstrator
Developed a DDPG and TD3-based reinforcement learning algorithm for 1D Attitude control, optimizing launch, descent, and navigation through 10+ physical test launches. Iteratively refined the algorithm with real-world data, achieving a 63% improvement in optimization.

Adversarial Attack on State-of-the-Art Classification Network
Achieved top grade of 1.0 in Hands-On Deep Learning by developing an adversarial attack on a classification network, improving model robustness by 40% during testing.

Spacecraft Operations: Interplanetary Mission to Mars
Designed an interplanetary mission to Mars using mission planning tools like GMAT and STK; visited DLRs GSOC to learn about mission control sequence development and deployment.

EDUCATION

M.Sc. Aerospace, Space Engineering and Computer Science   *Oct 2022 - Present*
Technical University of Munich (ASG, TUM)   GPA: 3.3
B.Eng. Aerospace Engineering, Aerospace Science and Technologies   *Sep 2017 - Sep 2022*
Technical University of Madrid (ETSIAE, UPM)   GPA: 3.1

SKILLS

Computer Science: Python, C++, MATLAB, Shell Scripts, Git, Linux, GUI Development
Rocketry: Launch Vehicles, Trajectory Analysis, Test Procedures, Launch Operations, 6DOF Dynamic Simulation
Simulation Software: Blender, ASTOS, STK, GMAT, SolidWorks, Simulink