Anibal Guerrero Hernandez

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EXPERIENCE

Student Researcher, DLR *Jan 2024 – Dec 2024*

- Developed a robust computer vision pipeline for autonomous asteroid navigation, comparing classical and machine learning (ML) based feature extraction methods, implementing a 3D model reconstruction system for asteroid surface mapping.
- Enhanced DLR's OAISYS simulator to generate over 30,000 images as part of trajectory sequences, including RGB-D data and 6D poses, ensuring physically accurate and high-fidelity mission simulations for asteroid exploration and validation.
- Co-authored a paper for the IEEE Aerospace Conference 2025, focusing on landing trajectory simulations on asteroids.

WARR Rocketry - Project WESP Co-Lead, WARR e.V. *Mar 2024 – Jul 2024*

- Co-led WESP's EX-1E project, marking the first staged rocket in European and WARR's student rocketry history.
- Achieved 7.8km launch at Spaceport America Cup 2024, securing 3rd in 30 ft 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 single-stage launch in Germany, ensuring 100% safety regulation compliance despite challenging weather.

WARR Rocketry - Project WESP Simulations Team Lead, WARR e.V. *May 2023 – Jul 2024*

- Established WSPR in Python for 6 DOF simulations, enhancing rocket stability analysis and mission objectives. Obtained a precision of 94.2% in simulations in EX-1E launch.
- Implemented wind impact analysis and Monte Carlo simulations, improving apogee and impact prediction accuracy by 135%; refined safety measures that resulted in a 50% reduction in operational risk assessments.
- Created user-friendly GUIs for single- and multi-stage rocket simulations, leading to a 100% increase in user engagement and 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.

RESEARCH PUBLICATIONS

Bridging the Data Gap of Asteroid Exploration: OAISYS Extension for Synthetic Asteroids Creation
Boerdijk, W., Müller, M. G., **Guerrero Hernández, A.**, Klüpfel, L., Durner, M., Triebel, R., Bibelhauser, S., Sewtz, M.
Track 10 Best Paper Award at the IEEE Aerospace Conference 2025 (Paper No. 2696, 10.0815).

A Comparative Study of Classical and Learning-Based Methods for Vision-Aided Close-Proximity Asteroid Exploration. *Google Scholar*
Guerrero Hernandez, A. Master Thesis. Technical University of Munich, 2024.

Exploring Asteroids: A Survey. *Google Scholar*
Guerrero Hernandez, A. Diss. Technical University of Munich, 2024.

PROJECTS

Development and Control of a Rocket Hopper Demonstrator *github.com/anibal/RHD*
Developed TD3-based reinforcement learning (RL) algorithm for precise altitude control, achieving 120% performance of PID controller through 10+ physical test launches. Created comprehensive simulation validated against ESA's EcosimPro tool.

Ocean Plastic Detection Satellite
Led mission design, focusing on ADCS and power systems for an Earth observation satellite in -30°C to +60°C range. Built 18 MATLAB modules (4,000+ lines of code) in Simulink to model subsystems and size ADCS. Validated satellite trajectory using GMAT, achieving Sun-synchronous orbit with thermal control system.

Spacecraft Operations for Lunar Mining
Engineered 4-day ballistic lunar transfer trajectory attaining 0.05-degree pointing accuracy using Python and STK for precise orbital mechanics simulation.

EDUCATION

M.Sc. Aerospace, Space Engineering and Computer Science *Oct 2022 – Dec 2024*
Technical University of Munich (ASG, TUM)

B.Eng. Aerospace Engineering, Aerospace Science and Technologies *Sep 2017 – Sep 2022*
Technical University of Madrid (ETSIAE, UPM)

SKILLS

Languages: Python, C++, MATLAB, Simulink, Fortran, Rust, Shell Scripts
Technologies: Git, Linux, ASTOS, STK, GMAT, OpenCV, PyTorch, TensorFlow, EcosimPro, NASA SPICE, ROS
Hard Skills: Trajectory Optimization, Path Planning, Kalman Filtering, Flight Software, Launch Operations, 6DOF Simulation