

# Carlos Manuel Torre Sada

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## EDUCATION

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### Master of Science in Aerospace Engineering

2025

Arizona State University, USA | GPA: 3.33 **Relevant Coursework:** Propulsion Systems, Combustion, Advanced Aerodynamics, Advanced Manufacturing

### Bachelor of Science in Mechanical Engineering

2023

Tecnológico de Monterrey, Mexico | GPA: 88.6/100

**Certifications:** MIT Mechanical Behavior of Materials; ASME Y14.5-2018 GD&T; Georgia Tech Machine Design

## TECHNICAL SKILLS

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**Robotics & Simulation:** ROS2, PX4, Gazebo, SITL, UAV mission planning, autonomous systems, sensor integration

**Programming & Analytics:** Python, MATLAB, Linux, GitHub, automation scripts, data analysis, AI-based tooling

**Perception & Reconstruction:** Computer vision, COLMAP, Metashape, 3D Gaussian Splatting, CloudCompare

**CAD & Manufacturing:** SolidWorks, Fusion 360, ANSYS, CNC machining, lathe, mill, composite layup, prototyping

**Languages:** English (C1), Spanish (Native)

## RESEARCH EXPERIENCE

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### Volunteer Research Assistant — DREAMS Lab

Aug 2025 – Present

Arizona State University

- Developed autonomous robotics simulation pipelines using ROS2, PX4, Gazebo, onboard sensing, and custom environments for UAV research
- Designed and integrated terrain assets, collision meshes, and simulation worlds in Blender for rapid system validation
- Built Python tools for mission automation, next-best-view planning, perception benchmarking, and reconstruction analytics
- Led first-author digital twin reconstruction study achieving 465.1 mm Hausdorff distance, 59.8 mm mean C2C error, 80% completeness, and 89% F-score on autonomous lunar inspection benchmark
- Supported robotic field experiments, system setup, troubleshooting, battery checks, waterproofing, and sensor/camera deployment

### Research Assistant

Feb 2025 – May 2025

Arizona State University

- Developed Python predictive models for cooling tower performance and water consumption using satellite imagery datasets
- Conducted engineering analysis, validation, and quantitative modeling for infrastructure systems

## DESIGN & MANUFACTURING EXPERIENCE

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### SAE Aero Design — Propulsion Team Lead

2020 – 2023

Tecnológico de Monterrey

- Led propulsion subsystem for competition aircraft; performed thrust testing, motor selection, and performance validation
- Completed aerodynamic and propulsion trade studies predicting maximum flight speed of 20.7 m/s
- Coordinated with aerodynamics, avionics, and structures teams during aircraft development cycle

### Scale Aircraft Project — HorizonTec Collaboration

2021 – 2023

Tecnológico de Monterrey

- Led wing CAD, manufacturing, and structural verification for industry-sponsored aircraft prototype
- Fabricated components using CNC machining, conventional machining, fiberglass, and composite methods
- Delivered prototype to partner specifications through iterative testing and validation

## PUBLICATIONS & CONFERENCE CONTRIBUTIONS

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- *Hybrid Sparse-Model Next-Best-View Planning for Active 3D Reconstruction for Digital Twins* — First Author; submitted to ICRA 2026 Workshop: *Advances and Challenges in AI-Driven Automation and Robotic System Integration with Digital Twins* **Accepted**
  - *Adaptive Gaussian Process-Based Sampling for Energy-Efficient Aquatic Sensing with Autonomous Surface Vessels* — Co-Author; submitted to ICRA 2026 Workshop: *Long-term Deployments in the Wild* **Accepted**
  - *Active Gaussian Splatting for Autonomous Reconstruction Using D-Optimal Next Best View Planning* — Co-Author; submitted to IROS/CASE 2026 **Accepted**
  - *Depth-Variance Guided Next-Best-View Planning for Active 3D Gaussian Splatting Reconstruction* — Co-Author; submitted to IROS/CASE 2026 **Accepted**
  - *Robust, Cost-Effective Autonomous Surface Vessel for Integrated 2D/3D Hydrographic and Biochemical Mapping* — Listed contributor; South West Robotics Symposium, Tempe AZ, 2025 **Accepted**