

EMILIO PEREIRA

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Education

Purdue University

M.S. in Mechanical Engineering

University of Central Florida — Burnett Honors College

B.S. in Aerospace Engineering

GPA 3.65

Fall 2025 – Fall 2026

Summa Cum Laude

Fall 2022 – Summer 2025

Research Experience

Zucrow Laboratory (ADPRL) PI: Terrence Meyer

Graduate Researcher — Large-scale Modular Jet Engine

Lafayette, IN

Aug 2025 – Present

- Leading a 5-person team in the development of a modular, optically accessible advanced jet engine
- Utilizing Method of Characteristics to model flame morphology of advanced combustion schemes
- Performing a Monte-Carlo like simulation to design an engine capable of meeting government flight requirements
- Created an axisymmetric, annular Method of Characteristics (MOC) tool package for supersonic nozzles

Propulsion Energy and Research Laboratory (PERL) PI: Kareem Ahmed

Undergraduate Researcher — Mach 10 Oblique Detonation Wave Engine

Orlando, FL

Aug 2024 – May 2025

- Led a study comparing Busemann, conical, and planar inlets for a hypersonic sounding experiment
- Utilized Pareto Optimization to reduce odds of inlet unstart and promote oblique detonation stability
- Designed fiber coupled optical diagnostics (OH TDLAS and CH₂O PLIF) to investigate the underlying physics of oblique detonation waves (ODW), in flight conditions
- Wrote a research proposal for two-color OH VLIF based tomography of ODWs in ground experiments

VASU Laboratory (HiPER STAR) PI: Subith Vasu

Undergraduate Researcher — NASA Ammonia University Led Initiative

Orlando, FL

Jan 2023 – Sep 2023

- Iterated designs for an NH₃-H₂ jet-ring to optimize the combustion of reactants
- Interpolated data using Python and MATLAB for locating ideal inlet conditions in a Well Stirred Reactor
- Executed Stress and FEA analysis on a Toroidal Jet Stirred Reactor to assess function at operating conditions
- Utilized Ansys ChemKin to reduce NoX and NH₃ emissions to projected 5ppm and 20ppm
- Designed Tunable Diode Laser Absorption Spectroscopy setup for flame and species characterization
- Volunteered for NASA Minority Undergraduate Research and Education Program

Professional Experience

Halo Engines

Aerothermal Development Engineer

Orlando, FL

Oct 2024 – Sep 2025

- Developed a cycle based model for Detonation Rocket Engines using Cantera, showing 99% accuracy with existing tools
- Created a set condition and analysis tool for a high thrust load rocket test stand
- Generated data for novel engine architectures and designs used in several awarded grants and proposals
- Developed ROMs for 1D high-enthalpy supersonic vitiators and wind tunnels

Blue Origin

Engine Component Engineering Intern

Kent, WA

May 2024 – Aug 2024

- Conducted and led 107 test shots of a pulse gun in order to characterize and improve product efficacy, resulting in up to a 20% increase in the strength of chamber disturbances
- Wrote scripts in Python for high-speed post processing and graphing, used to host three data review sessions
- Designed pulse gun components in CREO using NASA CPI 655 to reduce total number of hot fires
- Trained on manual mills and lathes to design for manufacturability and correct seals on existing hardware

Lockheed Martin Missiles & Fire Control

Systems Engineering CWEP

Orlando, FL

Dec 2023 – May 2024

- Created and Managed ICNs ICDs using Windchill PLM to ensure proper system integration

- Used lab hardware to evaluate test product performance assuring performance within desired metrics
- Conducted trade studies to reduce product costs to simplify manufacturing and test engineering processes

Space Resource Technologies (Formerly Exolith Labs)

Orlando, FL

ISRU Engineering Intern

Apr 2023 – Jul 2023

- Designed airlock and positive pressurizing system for world’s largest regolith bin
- Designed components for ventilation system for regolith processing to protect workers from particulates
- Created scripts to optimize components for ventilation systems and reduce total product cost

Extracurriculars

Hollow-body Rotating Detonation Rocket Engine (RDRE) Senior Capstone

Orlando, FL

Combustion, Injector, and Fluid Systems RE

Jan 2025 – Jul 2025

- Designed feed system and test campaign calculator for a hollow RDRE, reached an accuracy within 5%
- Created CAD for a triplet F-O-F injector and quintic contraction combustor
- Showcased a detonation rate of 100% across 4 hot-fires, showcasing detonation with aft-end imaging

Knights Experimental Rocketry (KXR)

Orlando, FL

President

Apr 2023 – Apr 2024

- Managed 8 projects and 670+ members for UCF’s largest Student Organization leading students to develop, SRAD airframes, experimental payloads, as well as electric, liquid, solid, and hybrid propulsion systems
- Reviewed project alignment with organization goals by hosting PDR and CDR sessions for project teams
- Conducted outreach to over 4000 individuals through a variety of presentations and workshops

NASA University Student Launch Initiative Payloads Manager

Aug 2022 – June 2023

- Designed a lunar lander to take panoramic imagery of horizon, live avionics to report data up to rocket apogee using LoRa, ground station to showcase live flight path, recovery measures, and safety protocols
- Wrote and presented PDR, CDR, and FRR to NASA, showcasing progress and alignment with agency goals
- Led team of 50 members and 4 sub-systems to meet NASA Experiment Requirements and club objectives

Publications

- "Development of Injector-Coupled and Simplified Zero-Dimensional Performance Models for Rotating Detonation Engines" **Emilio Pereira**, Terrence Meyer
- "Geometric Considerations of Hypersonic Inlet Integrability for Internal Flow-Path Combustion," Subhan Wade, **Emilio Pereira**, Spencer Smith, Kareem Ahmed.

Skills, Certifications, and Societies

Software: CREO, AutoCAD, SolidWorks, SolidWorks Routing, MasterCAM, Ansys ChemKin, JIRA

Programming: C, Java, MATLAB, Python, Arduino, Excel VBA

Hardware: Optical Diagnostics, P&ID, Power Tools, Manual Mill (Basic), Manual Lathes (Basic), GD&T

Certifications: L1 High Power Rocketry, Radio Technician, MasterCAM Associates, AutoCAD Associates

Languages: English (fluent), Spanish (fluent)

Honors & Awards

Purdue Ross Fellow

Purdue Academic Excellence Fellow

Frederick A Deluca Academic Excellence Award

Dream Award Semi-Finalist

UCF SURF REU

NASA Student Launch 3rd Place Rookie Team

UCF National Recognition Award

Modeling the Future Challenge Semi-finalist

Mathworks M3 Challenge Authentication Award

National Merit Commendation

Florida Bright Futures Academic Scholar

Hispanic Scholarship Fund Finalist

Varicent EDGE Scholar

AT&T HACEMOS Scholar