Gabriel Rodriguez

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Research Interests

Control Techniques: Model-based control and optimization for real-time implementation on robots.
Embodied AI: Low-latency AI inference for robotic autonomy and thinking.
Robots in Society: Controlling robots to perform real-world tasks safely and effectively.

Education

Embry-Riddle Aeronautical University (ERAU), Daytona Beach, FL — Aug 2020 – May 2025
BS in Aerospace Engineering (Aeronautics) — GPA: 3.95/4.00
BS in Engineering Physics (Spacecraft Systems)
Minor in Applied Mathematics
Student-Athlete, Varsity Baseball (2020-2022)

Research Experience

Engineering Physics Propulsion Lab, Daytona Beach, FL — Jan 2024 – Present
Undergraduate Researcher under Dr. Sergey Drakunov

- Developed ROS2 workspace to deploy RL policies on a Unitree Go2, training them in custom Isaac Lab environments.
- Authored an anomaly search controller using time-varying probability distributions based on sensor input.
- Assisted in integration of Nav2 for autonomous 2D navigation using LiDAR and stereo cameras.
- Built and maintained lab's LinkedIn, Website, and GitHub for public outreach, recruitment, and organization.

Repositories: eppl-erau-db/go2_rl_ws, eppl-erau-db/amigo_ros2, gabearod2/IsaacLab
Tools: Python, C/C++, ROS2, Jetson AGX Orin, Raspberry Pi

Physical Sciences Department, ERAU, Daytona Beach, FL — May 2023 – Aug 2023
Undergraduate Researcher under Dr. Sergey Drakunov and Dr. John Hughes

- Constructed an autonomous, mecanum-wheeled, omnidirectional vehicle with real-time AI object detection inference.
- Authored and implemented a PID control system to capture free-falling objects based on camera data.
- Designed and 3D printed components for hardware and systems integration.

Tools: Python, Jetson Devices, Control Theory

Professional Experience

Textron Systems, Wilmington, MA — Sep 2023 – Dec 2023
Mechanical Engineering Co-Op

- Devised testing mechanisms in Siemens NX with GD&T and PMI for the Sentinel (GBSD) program.
- Conducted static linear and nonlinear structural analysis in ANSYS for various load cases on the testing mechanism.

Tools: Siemens NX, GD&T, ANSYS, PMI

Boeing Career Mentorship Program, Daytona Beach, FL — May 2022 - Nov 2022
BCP Mentee

- Fostered mentor-mentee relationships with Boeing employees through the BCP curriculum.
- Developed skills necessary to integrate into a professional environment like initiative, networking, and leadership.

Academic Projects

ToppleBot, Daytona Beach, FL — Aug 2024 - Present
Software and Communications Engineer

- Developed the software system for the ToppleBot, a reaction wheel-driven balancing and toppling cube robot.
- Implemented wireless communication with micro-ROS over WiFi for real-time data exchange and visualization.

Repositories: gabearod2/topplebot, gabearod2/topplebot_station
Tools: Python, C/C++, ROS2, micro-ROS, FreeRTOS, ESP32

VerdeCommute VC-1, Daytona Beach, FL Aug 2024 - Dec 2024
Principal Investigator

- Led the preliminary design phase of the VerdeCommute VC-1, a hybrid-electric STOL aircraft.
- Developed MATLAB scripts to optimize high-lift propeller design, positioning, and thrust modeling.
- Defined the systems integration of electric motors, batteries, and VerdeGo turbo-generator for hybrid propulsion.

REPOSITORIES: gabearod2/hlp_design
TOOLS: MATLAB, MS Excel

Adjustable Throat Area De Laval Nozzle, Daytona Beach, FL Jan 2023 - May 2023
Controls Engineer

- Created a mathematical model to control the nozzle's throat area for optimal aerodynamic performance.
- Fabricated a 3D-printed prototype using PLA and TPU, integrating a pitot-static probe to validate system performance.

TOOLS: MATLAB, Inventor

Batted Baseball Trajectory Calculator, Daytona Beach, FL Sep 2020 - Dec 2020
Software Engineer

- Authored a MATLAB script capable of predicting and graphing the trajectory of a baseball given initial conditions, based on "The Physics of Baseball" by Dr. Alan M. Nathan.
- Mastered commonly used computational and graphing capabilities of MATLAB to depict expected trajectory.

TOOLS: MATLAB

INVOLVEMENT AND LEADERSHIP

Society of Hispanic Professional Engineers (SHPE), Daytona Beach, FL May 2023 - May 2024
Academic Chair

- Led educational research meetings, introducing members to research opportunities for undergraduates.
- Planned and managed various events to provide supplementary instruction to members in MATLAB and 3D printing.

REPOSITORIES: gabearod2/omni_control_ws
TOOLS: MATLAB, Inventor, Python, C/C++, ROS2

SKILLS AND TECHNOLOGIES

Languages: English (Fluent), Spanish (Full Professional Proficiency)
Proficient In: MATLAB, Simulink, Python, C/C++, Inventor, Siemens NX, ROS2, Micro-ROS, Isaac Lab, Git, MS Excel
Familiar With: Femap with NASTRAN, CATIA v5, STK, SolidWorks, Javascript, Isaac Gym, Nav2, Docker, FreeRTOS
Robotics Hardware: Unitree Go2, Jetson AGX/NX/Nano, ESP32, Raspberry Pi

HONORS AND AWARDS

Dean's List, Embry-Riddle Aeronautical University, All Semesters
Scholar-Athlete Award, Embry-Riddle Aeronautical University, 2022
Diamond Eagle Scholarship, Embry-Riddle Aeronautical University, 2020