

Marcus Prieto

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Education

California Polytechnic State University, San Luis Obispo

Bachelor of Science in Mechanical Engineering with Mechatronics Concentration

December 2024

Engineering Experience

Cal Poly Department of Mechanical Engineering, Behavior, Robotics, and Sensing Group

Undergraduate Research Assistant

January 2024 - December 2024

- Applied gait analysis concepts, dynamics, and machine learning to develop predictive models for human movement disorders, integrating biomechanics with real-time data processing. Achieved 100% accuracy in impairment classification tests.
- Engineered embedded software for 2 wearable sensors, implementing algorithms for signal processing, feature extraction, and enhanced gait assessment accuracy in post-stroke rehabilitation, analyzing datasets ranging from 30 minutes to 24 hours.
- Performed machine learning model training and data analysis, designing custom metrics to evaluate performance, optimize classification accuracy, and improve real-time impairment detection, achieving a processing time of approximately 40 seconds per dataset with linear discriminant analysis.

Cal Poly Robotics Club

Project lead and co-founder, Micromouse Project

January 2024 - December 2024

- Designed and implemented a comprehensive software architecture and control system, including dynamic system analysis, sensor integration (IMUs, encoders, IR sensors), and a flood-fill algorithm, enhancing autonomous maze-solving capabilities.
- Led project growth from individual initiative to a team of 5, mentoring members in robotics fundamentals, embedded programming, and hardware integration.
- Successfully utilized developed navigation algorithms and embedded system designs to significantly improve the performance of a subsequent line-following robot, reducing its lap completion time by 67% (from 60s to 20s).

Member, Battlebots Project

January 2023 - December 2023

- Developed and implemented internal structural components and drive train systems for competitive robotics, using MATLAB and SolidWorks for system simulations, resulting in a fully operational robot with custom-manufactured brackets.

Senior Capstone project

Team Member

January 2024 - December 2024

- Designed and prototyped three modular boundary layer rakes for improved manufacturability and adaptability in aerodynamic testing, reducing costs from a budgeted \$500 per rake to approximately \$20 per rake while maintaining high measurement accuracy under Northrop Grumman (sponsor) specifications.
- Conducted wind tunnel experiments and applied statistical analysis in Python to process velocity profiles and pressure data, validating performance against industry standards.
- Reviewed technical papers and applied engineering principles to develop CAD models, manufacturing plans, and data-driven insights, ensuring feasibility for both 3D-printed prototypes and CNC-milled aluminum versions.

Academic Projects

- *Gearbox Design Project:* Led a team in designing a custom gearbox, using MATLAB for constraint optimization and SolidWorks for 3D modeling.
- *Embedded Systems Project:* Programmed a microprocessor in Assembly to achieve cooperative multitasking in a mechatronics application.
- *Heat Transfer Simulation:* Created a modular MATLAB script to model transient heat transfer with interactive parameter visualization.
- *Line Following robot:* Collaborated with a partner to design and build a line-following robot for a mechatronics class, developing the firmware architecture, integrating sensors for real-time path detection, and optimizing both hardware and software, improving lap completion time from 60 seconds to 20 seconds.

Technical Skills

Programming: C++, Python, Assembly, MATLAB, Simulink, Embedded C

Software and Tools: SolidWorks, EES, Microsoft Office, Git, ROS (Robot Operating System)

Engineering and Prototyping Equipment: Mill, Lathe, CNC, TIG welding, 3D printing, Oscilloscope, Multimeter, Soldering

Data Analysis and Machine Learning: Scikit-learn, NumPy, Pandas, TensorFlow, MATLAB toolboxes

Languages: Fluent in Spanish, Portuguese, and English