Erick Stuart Marroquin

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EDUCATION

Yale University, *New Haven, CT* August 2020 — May 2024

B.S. in Electrical Engineering (ABET Accredited), QuestBridge Scholar

Relevant Courses: Fundamentals of Robot Modeling and Control (LQR, iLQR, Model Predictive Control); Signals and Systems; Introduction to Robotic Embedded Systems; Circuits and Systems Design; Introduction to Computer Engineering; Digital Systems (I2C, SPI, USB, MIPI)

WORK EXPERIENCE

The Faboratory at Yale, Research Intern, *New Haven, CT* May 2023 — May 2024

- Programmed swimming, walking, and crawling gaits of Amphibious Robotic Turtle (A.R.T.) in **Python** using OS-level virtualization (**Docker containers**), **ROS2**, and a **Jetson Orin Nano**.
- Assembled and waterproofed A.R.T.'s electronics using **CAD**, **cable rerouting**, **rewiring**, and **crimping**.
- Enabled sinking and floating operations for A.R.T. by integrating pneumatic buoyancy control with motor control via serial communication using **pySerial** and **Arduino IDE**.
- Implemented image classification functionality for A.R.T.'s localization using a pre-trained **convolution neural network** (ResNet-18) and transfer learning in the **Isaac ROS Visual SLAM** framework.
- Recognized as a co-author on the **IEEE-published** paper *"Performance Enhancement of a Morphing Limb for an Amphibious Robotic Turtle"* (*2024 RoboSoft Conference*) for contributions to A.R.T.'s development.

Shu Hu Lab Group, Research Intern, *West Haven, CT* June 2021 — August 2021

- Designed a bipolar membrane electrodialysis cell to remove carbon from the ocean as calcium bicarbonate bricks.
- Modeled reaction kinetics using Multiphysics FEA software (**COMSOL**) based on experimental data.

PROJECTS

IoT Speech Activated Robot Navigation, *New Haven, CT* January 2024 — May 2024

- Developed a speech recognition machine learning model using **Keras** and **TensorFlow** to wirelessly control a 4-wheel robot by classifying the commands 'cease', 'go', 'left', and 'right'.
- Experimented with the Python **socket** library, Arduino Wi-Fi modules, **MQTT**, and **ROS2** to minimize command processing latency, decreasing overall system latency from 2.1 to 1.5 seconds.

Robotic Arm Pick-and-Place Motion Planning, *New Haven, CT* April 2024 — May 2024

- Developed an **inverse kinematics** solver and PD controller for the **Dynamixel OpenManipulatorX**.
- Simulated and visualized a pick-and-place task using **MuJoCo** and the **ModernRobotics** Python library.

Mechatronics TurtleBot Racing, *New Haven, CT* April 2023 — May 2023

- Designed a **PID**-controlled system for a differential drive TurtleBot using **wheel encoder odometry** to navigate a course by visiting targets, avoiding obstacles, and stopping precisely at the finish line.

FPGA MIPS Microprocessor, *New Haven, CT* April 2022 — May 2022

- Implemented a MIPS microprocessor in **SystemVerilog** with a 10 MHz runtime, capable of executing 32-bit instructions. Wrote I/O interfaces to control and display a crawling snake on a 7-segment LED.

LEADERSHIP EXPERIENCE

Yale Funbotics, *Mentor/ Treasurer* August 2021 — May 2024

- Taught New Haven middle school students fundamental engineering design and robotics principles through hands-on activities and a cone-stacking robot competition.

Circle Match, *Lead Junior Advisor* October 2020 — March 2023

- Taught personal essay writing, edited college applications, and provided guidance to low-income, high-achieving juniors and seniors in underserved, underfunded public high schools within Hudson County, NJ.

TECHNICAL SKILLS & LANGUAGES

Programming: Python; C++; MATLAB; URDF (XML-based file format); Bash (scripting); Command-Line Tools

Software & Tools: Linux; ROS2 (TF, rqt); RViz; Docker; SSH; CAD (SolidWorks/Altium); Conda; Git; Verilog; MultiSim; Gazebo

Hardware: Raspberry Pi; Oscilloscope; Function Generator; Soldering and PCB Assembly (soldered functional radio transmitter and motor controller); Cable Routing and Crimping; IMUs; FPGA Boards; Sensor Fusion (magnetometer, gyro, accelerometer); Digital Multimeter; 3D Printing; Circuit Design

Interests & Hobbies: Spanish (native); Running; Skateboarding (Heelflip, 360 Shuv); Watercolor; Reading