MATTHEW GARCIA

Computer Engineer | Embedded Systems | Robotics | Digital Design

832-420-4378 | garciamatthew176@gmail.com | LinkenIn | Portfolio | Baytown, TX | https://github.com/Matthew-Garcia

SUMMARY

Senior Computer Engineering student specializing in embedded systems and robotics, with a strong background in firmware development and electromechanical diagnostics. Combines proficiency in C/C++, Python, and VHDL with hands-on experience in hardware–software integration, real-time control, and system-level debugging. Demonstrated ability to design, validate, and integrate embedded control solutions in safety-critical and research-driven environments.

EXPERIENCE

Robotics & Embedded Systems Engineer (Capstone) — NASA Lunabotics

University of Houston-Clear Lake

2025 - Present | Houston, TX

- Designed and implemented the embedded control system for a lunar excavation rover, aligned with NASA systems engineering constraints for autonomy and power management.
- Developed and tested C/C++ firmware and Python control scripts for real-time control of motors, sensors, and electromechanical subsystems on ESP32 microcontrollers.
- Developed and implemented robust fail-safe control mechanisms to support rover redundancy and operational continuity in degraded operating conditions.
- Engineered reliable embedded communication interfaces between NVIDIA Jetson (AI/Vision) and ESP32 (motion control) systems for real-time command and data exchange.
- Designed and implemented 24V-to-12V power distribution schematics, engineering a parallel battery bank with DC-DC buck conversion to deliver stable, filtered power to an NVIDIA Jetson AI computer and ESP32 microcontrollers.
- Led and supported system integration testing, validating hardware–software interfaces and producing technical documentation supporting competition compliance.

Embedded Systems & Automotive Diagnostics Technician

Pasadena Auto Service

2021 - Present | Pasadena, TX

- Diagnosed complex embedded failures in vehicle control modules (ECMs, BCMs, TCMs), utilizing schematics to isolate electrical faults in sensors, actuators, and wiring harnesses.
- Analyzed CAN bus communication using oscilloscopes and logic probes to identify signal degradation, bus errors, and node failures.
- Calibrated and flashed firmware for embedded subsystems, validating compatibility between replaced control modules and existing vehicle architecture.
- Validated sensor data integrity (O2, Hall Effect, piezoelectric) through live data monitoring, correlating voltage outputs with mechanical system performance.

Engineering Extern — Hardware, Firmware & Simulation

FlightSafety International

01/2021 - 05/2021 | Houston, TX

- Selected for a technical externship program focused on safety-critical embedded systems and avionics within the flight simulation industry.
- Analyzed high-fidelity simulation architectures, evaluating how microcontroller firmware interfaces with hardware I/O and sensor feedback loops.
- Supported reviews of industrial validation workflows and diagnostic processes, correlating academic control theory with real-world aerospace engineering standards.

IT Systems & Hardware Support Technician

Lee College

2019 - 2021 | Baytown, TX

- Managed lifecycle operations for 500+ IT assets, utilizing enterprise inventory systems to track hardware allocation and maintenance schedules across campus facilities.
- Executed large-scale workstation deployments for academic labs, applying enterprise imaging standards to ensure consistent OS and software configurations.
- Diagnosed and resolved hardware and network connectivity faults, minimizing downtime for critical academic and administrative infrastructure.

CERTIFICATIONS

Automation and Autonomy of Mobile Robots using ROS

UH Energy | University of Houston–Clear Lake | Awarded April 2025

SKILLS

Hardware & Digital Systems

Verilog, VHDL, Vivado, ModelSim, Quartus, FPGA Development, Digital Logic Design, RTL Design, Timing Analysis, Hardware Testing & Validation, Electronics, Telecommunications

Embedded Systems & Programming

C/C++, C#, Python, ARM Assembly, Arduino, STM32, Embedded Linux, Intel FPGA Boards, Oscilloscopes, Logic Analyzers, Multimeters, UART/SPI/I2C Protocols, Circuit Design, FreeRTOS, JTAG/SWD

Robotics & Automation

ROS2, Gazebo, Rviz2, URDF/Xacro, Autonomous Navigation, Mapping, SLAM, Sensor Integration (LIDAR, IMUs, GPS), Robot Simulation

Software & Tools

Linux, Git, MATLAB, LabVIEW, Windows, React, Next.js, JavaScript, HTML, CSS, Docker, Vercel, Shell Scripting, VMs, Data Structures, 3D Printing, CAD (Inventor, Fusion, SolidWorks), Bash

EDUCATION

Bachelor of Science in Computer Engineering

University of Houston-Clear Lake

2022 - 05/2026 | Houston, TX

GPA 3.3 / 4.0

Associate of Science in Pre-Engineering

Lee College

2019 - 2022 | Baytown, TX

PROJECTS

4-DOF SCARA Manipulator with ROS2 Control

2024 - 2025

- Architected a ROS2 control stack for a 4-DOF robotic arm, replacing legacy firmware with MoveIt for motion planning.
- Implemented inverse kinematics solvers and visualized real-time joint trajectories in RViz before executing on hardware.

LPC4088 Microcontroller System Design

08/2025 - 12/2025

- Designed bare-metal embedded firmware on the NXP LPC4088 (ARM Cortex-M4), configuring GPIO, timers, and UART at the register level.
- Integrated and validated hardware–firmware behavior using JTAG/SWD debugging, interrupts, and memory-mapped I/O for deterministic real-time operation.

Smart IoT Pet Feeder

01/2023 - 05/2023

- Engineered a Wi-Fi-enabled feeding system using ESP32, integrating load cells and MQTT/HTTP protocols for remote mobile control.

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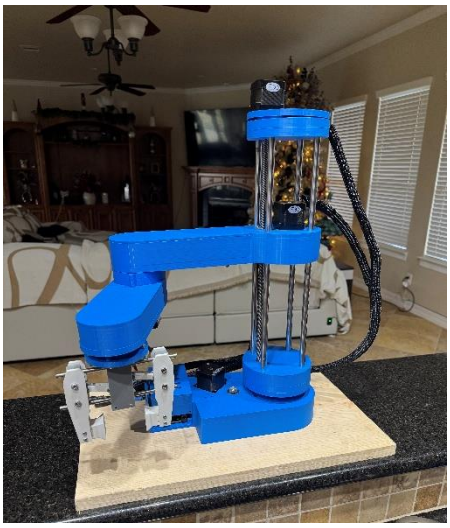
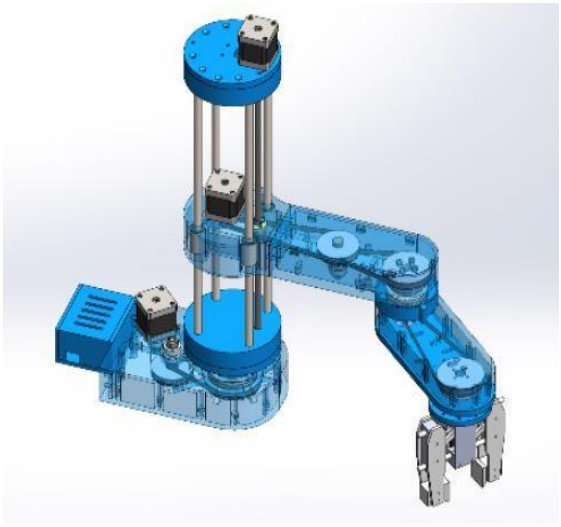
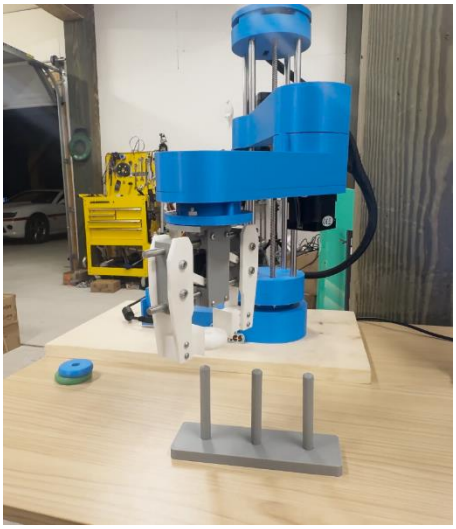
SCARA ROBOT - Research Project







What?

- Independently designed and built a functional **SCARA** robot for high-precision pick-and-place automation.
- Demonstrates key competencies in **embedded control and robot kinematics.**

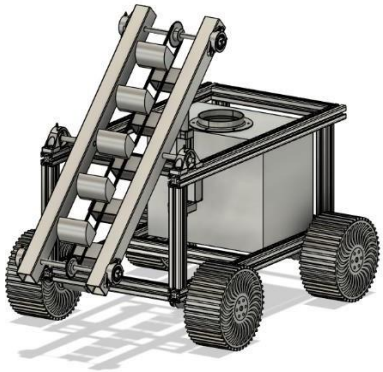
How?

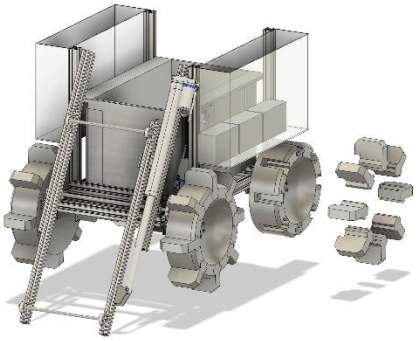
- Simulated motion and kinematics using **ROS2** and **Gazebo**. Designed using **Solidworks**.
- Developed **Python control** software with PID and **inverse kinematics.**
- Implemented **rotary encoder** feedback for closed-loop control.

Results

- Achieved accurate real-time **motion control**.
- Validated pick-and-place sequences in **simulation** and **hardware**.
- Established foundation for **robotics research**.

NASA Lunabotics Rover - UHCL





What?

- Designing a **NASA Lunabotics Rover**
- Focus on **excavation, transport, and autonomy.**
- Lead **Electrical & Software integration** (motor control, power, ROS2).

How?

- Redesigned **electrical system** (PWM, dual-battery, safety).
- Built **ROS2** stack for Jetson–ESP32 **autonomy**.

Results

- Completed **new CAD rover design in fusion 360** and drafted electrical/software architecture.
- Ongoing **ROS2 integration** toward autonomous excavation and transport.

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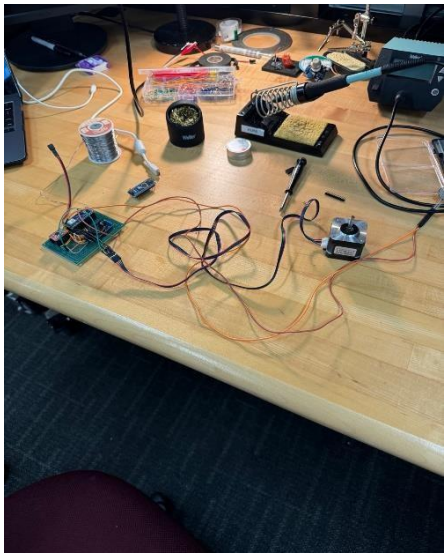
SMART BOWL SYSTEM – UHCL



What?

- Developed a **Bluetooth-controlled Smart Bowl** for automated pet feeding.
- Completed as an **Engineering Design & Project Management project** with team collaboration.

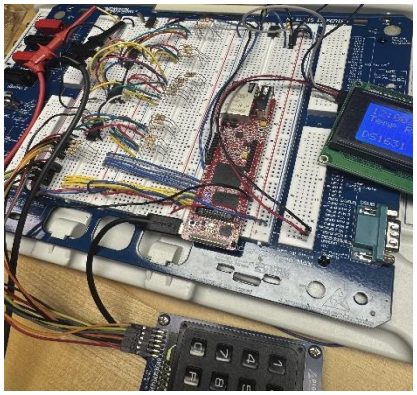
How?

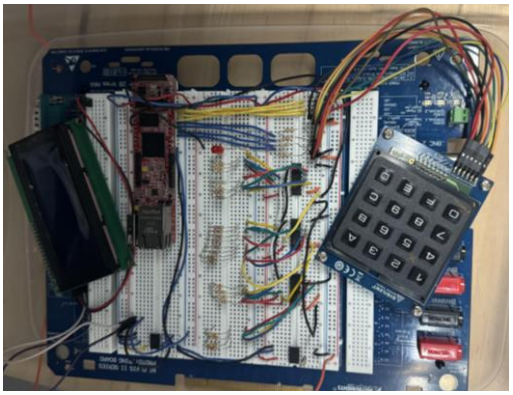
- Built **3D-printed housing** and mechanical parts in **SolidWorks.**
- Programmed **Arduino microcontroller** for motor/sensor control.
- Developed **mobile apps** (Android/iOS) to schedule feedings via BLE.

Results

- Supported up to **10 daily feedings** with customizable portions.
- Achieved **1.95% error margin**, below the 2.5% target.
- Delivered proof-of-concept with plans for **Wi-Fi control and scaling.**

LPC4088 Microcontroller – Embedded Systems Research Project





What?

- Designed a bare-metal LPC4088 embedded system for real-time control and user interaction.
- Investigated deterministic **embedded behavior** through direct hardware and firmware integration.

How?

- Programmed bare-metal LPC4088 firmware in **ARM assembly** and **C++.**
- Integrated multiple **I2C peripherals** (RTC, temperature sensor, LCD expander).
- Implemented a keypad-driven user interface with real-time **event handling.**

Results

- Demonstrated **deterministic real-time behavior** with stable multi-peripheral I2C communication.
- Delivered a **fully functional embedded system** supporting clock, alarm, temperature monitoring, and user interaction.