Dennis Rivera Burgos

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EDUCATION

Texas Tech University — Dept. of Electrical & Computer Engineering May 2026
B.S. in Computer Engineering *Lubbock, TX*

EXPERIENCE

Predictive Monitoring Systems Jun 2024 – Aug 2024
Embedded Systems Intern *San Pedro Sula, Honduras*
- Designed and deployed an ESP32-based predictive-maintenance sensor unit inside live industrial machinery, delivering the condition data used to shift the plant from reactive toward predictive maintenance.
- Integrated a four-sensor node — vibration accelerometer, temperature, humidity, and ESP32-CAM — in a custom high-heat 3D-printed PETG/ABS enclosure, capturing real-time mechanical and visual health data from inside operating equipment.
- Built a web dashboard streaming live sensor data with real-time graphs, manual device controls, and CSV/Excel export, turning raw telemetry into readable maintenance reports.

Texas Tech University — Biology Greenhouse Jan 2026 – May 2026
Student Assistant *Lubbock, TX*
- Monitored plant health and environmental conditions in a controlled research greenhouse, collecting data and maintaining stable conditions that kept ongoing experiments on track.

Texas Tech University — School of Law Oct 2021 – Aug 2022
IT Support / Student Assistant *Lubbock, TX*
- Delivered front-line IT help-desk support for faculty, staff, and students, resolving hardware, software, and account issues across networked Windows workstations.
- Diagnosed and repaired desktops, printers, and peripherals, handling routine troubleshooting, setup, and maintenance to keep shared systems reliable.
- Documented recurring fixes into a reference log to speed resolution and escalated complex issues to senior IT staff.

Texas Tech University — Industrial, Manufacturing & Systems Engineering Oct 2020 – May 2021
Student Assistant *Lubbock, TX*
- Maintained and tracked department equipment and supply inventory, keeping records accurate for day-to-day operations.
- Managed front-office communications — fielding incoming calls and routing students to the correct advisors and staff.

PROJECTS

RaiderForge — CoreXY 3D Printer Firmware | *STM32G0B1 (Cortex-M0+), FreeRTOS, C* Current
- Built firmware from scratch for a fully custom CoreXY FDM 3D printer on STM32G0B1, implementing inverse kinematics and synchronized dual-stepper motion control for accurate coordinated movement.
- Implemented closed-loop PID heater control with thermistor signal conditioning, MOSFET drive, and safety interlocks to hold target temperatures without thermal runaway.
- Added a G-code parser and FATFS SD-card pipeline, enabling standalone prints directly from SD with no host PC in the loop.

Smart Hydroponics Controller | *STM32L476, Custom RTOS, ESP32, C*
- Developed a dual-MCU automated hydroponics system on a cooperative RTOS I wrote from scratch, driving soil-moisture sampling, pump actuation, and WS2812B grow lighting from an STM32L476.
- Added INA219 power monitoring with overcurrent protection and UART telemetry, and built an ESP32 JSON dashboard for live remote monitoring.

Autonomous Logistics Rover | *Verilog, Artix-7 FPGA (Basys 3)*
- Implemented a fully autonomous line-following, color-sensing robot in Verilog on an Artix-7 FPGA, using deterministic state machines for hard real-time control.
- Built hardware modules for TCS3200 color sensing, PWM motor control, inductive line following, IR inter-system communication, and servo-driven object manipulation.

Real-Time Reconnaissance Rover | *Raspberry Pi Zero 2 W, Python, Flask*
- Built a browser-controlled differential-drive rover with a Flask server mapping JSON joystick commands to GPIO through a TB6612FNG H-bridge.
- Designed a low-latency GStreamer + MediaMTX video pipeline with separated control/video paths, plus speed ramping, MPU-6050 IMU auto-balance, and background GPS tracking.

Automated Poultry Security Platform | *Raspberry Pi, Python, SQLite*
- Built an automated predator-deterrent coop on Raspberry Pi with a stepper-driven door, IR/limit-switch sensing, and H-bridge motor control.
- Added dual-sensor chicken counting, audio/water deterrents, SQLite event logging, and manual override in modular Python.

Playing Card Recognition System | *Python, OpenCV*
- Implemented real-time rank/suit detection from a live camera feed using contour detection, adaptive thresholding, perspective warping, and template matching with confidence gating.
- Raised sustained frame rate by decoupling capture from processing with a threaded video-capture pipeline.

Additional: Weather Data Networks (custom application-layer protocol over raw TCP sockets, Python) • Movie Booking System (full-stack Node.js/Express REST API with auth, catalog, bookings).

TECHNICAL SKILLS

Languages: C, C++, Python, Verilog, Java, Assembly, JavaScript/TypeScript, SQL
Embedded & Hardware: STM32 (L4 / G0), ESP32, Raspberry Pi, Artix-7 FPGA, FreeRTOS & bare-metal, ARM Cortex-M, PID control, PWM, UART/I²C/SPI, ADC, sensor integration, 3D-printed enclosure prototyping
Tools & Platforms: STM32CubeIDE, Code Composer Studio, PlatformIO, Vivado, Git/GitHub, Docker, Linux, GStreamer, OpenCV
Spoken: English (native/bilingual), Spanish (native/bilingual)