Ryan-David Reyes

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About me

Robotics/controls engineer — I build and teach full-stack robotics systems: from PCB/motor drivers to distributed real-time control to web dashboards. Background in neuroprosthetics, robotics, and FPGA-based instrumentation.

Experience

Contract FPGA / Digital Systems Engineer — MAGResDIO Multifunction Card

MAGRes LLC **Remote/Tallahassee, FL**

Company specialized in building precision NMR spectrometers for superconductivity research *Feb 2024–Present*

Custom NMR spectrometer board development (Artix-7 A35T)

- **Designed and implemented full Verilog system** for deterministic 32-channel digital output controller with 10 ns timing resolution, including custom opcode architecture and execution engine.
- **Built hardware-in-the-loop simulation** flow using Verilator for cycle-accurate verification and timing closure.
- **Developed C++ DLL interface** (Windows) for control and waveform programming; supported PCIe via SPI bridge to WCH controller.
- **Reverse-engineered** Xilinx Vivado bitstream programming path to create a field-upgradeable firmware solution without Vivado dependency.
- **Integrated optional AD9915 DDS** for synchronized 0–800 MHz analog waveform generation via custom opcodes.
- **Authored complete opcode set** and instruction formats (NOP, WAIT, LOOP, JUMP, SET DDS, etc.) to support arbitrary waveform sequencing and register-based flow control.

Master's Research - Hybrid Exoskeleton Neuroprosthesis

Case Western Reserve University **Cleveland, OH**

Biomedical Engineering Department, Advanced Platform Technology Center *August 2016–May 2021*

Worked on a exoskeleton for persons with paraplegia that combines motorized assistance with neuromuscular stimulation to restore walking.

- **Architected and deployed a distributed embedded control system**: coordinated 4 Teensy MCUs and a hybrid FPGA/MCU over CAN bus with real-time scheduling.
- **Delivered full-stack telemetry and control**: implemented data logging WiFi access point with RPI0, and a responsive Node.js dashboard streaming real-time biomechanical and neural data with visualization to any device.
- **Implemented advanced control algorithms** such as cascaded PID loops with friction and gravity compensation.
- **Development of novel algorithms** to control stimulated muscles and motors in tandem using terminal iterative learning control.
- **Masters Project**: Biologically Inspired Optimal Terminal Iterative Learning Control for a Motorized Hybrid Neuroprosthesis
- **Publications:** 1, as co-author: 1, 2, 3.

Additional Experience

- Co-developed an origami-inspired folding quadcopter for the class *EMAE 488: Advanced Robotics*.
- Created an **open source linear algebra library** for the Elm programming language: elm-numeric.
- Contributed to Blender, the open source 3D modeling software.
- **Instruction and Mentorship**: One-on-one tutoring in robotics, controls, and embedded systems (high school to graduate level).

Education

Xian Tian College of Chinese Medicine **Manchester, UK**

Diploma in Chinese Medicine and Acupuncture *Fall 2022–Summer 2025*

Case Western Reserve University **Cleveland, OH**

M.S. Biomedical Engineering, with focus in Neural Engineering *Fall 2016–Spring 2021*

Florida State University **Tallahassee, FL**

B.S. Computer Engineering and B.S. Electrical Engineering with Honors, GPA: 3.83 *Fall 2011–Spring 2015*

Qualifications and Awards

Outstanding Master's Work Award in the CWRU Biomedical Engineering Department: *Spring 2021*

Recipient of NIH T32 Training Grant: *Fall 2016*

NSF Graduate Research Fellowship Program (GRFP) Honorable Mention: *Spring 2015*