

Curriculum Vitae

William Desueza
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Education

B.S. in Electrical Engineering

University of Miami

August 2020 - May 2024

Summa Cum Laude

Specialization: Medical Concentration

GPA: 4.0/4.0

Relevant Coursework: VLSI, Computer Organization, Digital Design, Linear Control Systems, DSP, Analog Electronics, Network Client-Server Programming, Electromagnetic Field Theory, Machine Learning, Data Structures, Modern Physics

Research Experience

Florida International University, Metamaterials Lab

NSF CELL-MET Program

May 2023 - August 2023

Advisor: Dr. Lihua Lou

Studied the mechanical and chemical properties of *Mimosa Pudica* for potential applications in the extracellular matrix of cardiac tissue.

- Designed a poster and presentation for an intercollegiate CELL-MET event involving several academic institutions on the biomimetic applications of vascular plants (including *M. Pudica*) at FIU's metamaterials lab for cardiac tissue engineering.
- Conducted a literature review, involving current research on the *Mimosa Pudica*, prepared weekly updates for the team, and was the first to design a unique experimental procedure.
- Prepared viscoelastic samples for nanoindentation to determine forces and elastic modulus of material.

University of Miami, Biomedical Engineering Department

Undergraduate Research Assistant

January 2022 - December 2023

Advisor: Dr. Jorge Bohorquez

Worked on the design of a multichannel galvanic skin response (GSR) system to diagnose patients with spinal cord injuries (SCI).

- Reviewed amplifier design of multiple schematics to measure the susceptance/conductance of current in skin.
- Coded simulation in MATLAB to predict behavior of lock-in amplifier design and soldered components onto PCBs.
- 3D printed a container for the circuitry using CAD software (with OnShape).

University of Miami, Biophysics and Physiology Department

Undergraduate Research Assistant

May 2022 - August 2022

Advisor: Dr. Stephen Roper

Programmed a neural network specialized in labeling the anatomical parts of mammals.

- Read through DeepLabCut documentation, a machine learning library designed for labeling, to label mice features with 95% accuracy, aiding in analyzing their behavior.
- Coded a prototype on Python that analyzed the gait of a cat with a pre-trained model, paving the way for future code that can be used to train and analyze models for mice from sample videos taken in the lab.

Publications	Dr. Lihua Lou, Kazeu Orikasa, Arya B. Nair, William Desueza , and Dr. Arvind Agarwal. Micro-Mechanosensory Insights from Nature's Mimosa Leaves to Shape Memory Adaptive Robotics. <i>Materials and Design</i> , Manuscript under review.	
Presentations	<p>William Desueza, Jungwoo Kwak, Daniel Labkovski, and Dr. Sakhrat Khizroev. <i>Muscle Memory: Wearable EMG Design for Real-Time Prediction of Contractions with CNN</i>. Presented at the Senior Project Expo in University of Miami, May 2024.</p> <p>William Desueza. <i>Electro-Mechanical-Chemical Interplay: Unravelling the Dynamic Response and a Comprehensive Study of Mimosa Pudica Mechanical Properties</i>. Poster and presentation at the CELL-MET symposium in FIU, August 2023.</p>	
Awards	<p>Norman G. Einspruch Scholar Award May 2024 UM College of Engineering Awarded to the graduating student with the highest GPA in the college of engineering.</p> <p>Best 2024 Video Presentation May 2024 Senior Design Expo at UM Awarded to the senior design team with the best pitch presentation video in the college of engineering.</p> <p>HSF Scholar June 2023 Hispanic Scholarship Fund Designated as an HSF Scholar for 2023 and was awarded \$5000. Granted to 10,000 students selected to be an HSF Scholar from a pool of 124,000+ applicants.</p> <p>Eliahu I. and Joyce Jury Award. December 2022 UM College of Engineering Awarded to one undergraduate student a year at UM in recognition of their exceptional performance in Electrical Engineering.</p>	
Teaching Experience	<p>BME 470 - Biomedical Signal Analysis Fall 2023 UM Teaching Assistant</p> <ul style="list-style-type: none"> • Lectured and guided students through various MATLAB programs and custom-designed PowerPoint presentations. • Graded and provided feedback for 10+ projects in a flipped classroom setting. • Aided the development of a final Arduino project, which detected ST segments in an EKG using signal analysis. <p>BME 480 - Biomedical Instrumentation Fall 2023 UM Teaching Assistant</p> <ul style="list-style-type: none"> • Lectured and guided students through hardware designs and custom-designed PowerPoint presentations. • Commented and graded assignments for multiple groups in a flipped classroom setting. <p>ECE 118 - Introduction to Programming Spring 2022 HKN-IEEE Tutor</p> <ul style="list-style-type: none"> • Scheduled 50+ hours of tutoring appointments at HKN-IEEE office. • Aided students in C++ projects for class. 	

- Scheduled 100+ hours of tutoring appointments on-campus.
- Prepared independent practice exam material resulting in exam and assignment score improvements and high retention rates among tutees.
- Co-hosted and presented a public review session for Calculus I during finals week involving 50+ students.

Grad Course Projects

Muscle Memory

August 2023 - May 2024

Senior Project, UM

Created a wearable device that predicts certain hand movements to use an input for general software applications.

- Researched different stages of the analog filtering of surface electromyography (sEMG) signals to ensure ideal signal-to-noise ratio is within 80% of market standard.
- Designed a convolutional neural network (CNN) and Discrete Wavelet Transform (DWT) filters with PyTorch library.
- Configured an Adafruit Feather 32u4 microcontroller in C++ with low-power Bluetooth protocol (BLE).

CMOS VLSI Design of 4-bit ALU

August 2023 - December 2023

VLSI, UM

Used Cadence Virtuoso to design pull-up networks, pull-down networks, and transmission gates in 20+ modules necessary for 4-bit arithmetic logic unit (ALU) with a 5V power supply.

- Designed and simulated complete top-level design of 4-bit ALU that can execute 16 different instructions.
- Performed DC and transient simulations to ensure ALU can drive load of a minimum of 0.1pF at 100MHz.
- Conducted power simulations on the top-level ALU to ensure its consumption was minimized to approximately 1.20mW.

16-bit RISC CPU with Pipelining

August 2023 - December 2023

Computer Architecture, UM

Designed functional CPU using Vivado as CAD software and Verilog HDL with a 16x16 register file and 16-bit ISA.

- Implemented CPU onto Nexys FPGA board using UART and PuTTY software to output operations, which are completed in 2 cycles using pipelining.
- Simulated CPU design through Vivado and achieved on-chip power consumption of less than 4.2W.

Activities

Ethics Debate Chair at UM Ethics Society

Fall 2022 - Spring 2024

Emergency Department Scribe at Miami

September 2023 - January 2024

Volunteer EMT Service at NYC

Summer 2022

Member and Tutor of HKN-IEEE Society at UM

Spring 2022 - Spring 2024

Writer for On-Campus Magazine, Scientifica

Spring 2022

Front-End Developer for On-Campus Startup Delivery Company, Unihop

Fall 2021

Co-Founder of Investment Company, Desueza-Freire Capital LLC

Fall 2020

Skills

Programming: C++, Java, C#, ARM Assembly, Python, MATLAB, HTML, CSS, JS, Typescript, Linux, L^AT_EX

HDL/CAD: VHDL, Verilog, PSpice, LTSpice, AutoCAD, Cadence Virtuoso, Quartus Prime