SEBASTIÁN A. CRUZ ROMERO

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EDUCATION

University of Puerto Rico, Mayagüez — Expected Graduation Date: May 2025
B.Sc. in Computer Science & Engineering — GPA: 3.38/4.00

Certifications

Collaborative Institutional Training Initiative (CITI) Program — Feb 2023 – Feb 2026
Data or Specimens Only Research — **Credential ID:** 54334187
Jul 2021 – Jul 2025
Biomedical Responsible Conduct of Research — **Credential ID:** 43506779
Responsible Conduct of Research for Engineers Research — **Credential ID:** 43506780

HONORS AND AWARDS

Fellowships

- Center for the Advancement of Wearable Technologies (CAWT) Undergraduate Research Fall Internship ***Aug 2024 – Present***
- Maximizing Access to Research Careers (MARC) University of Puerto Rico, Mayagüez (UPRM) Trainee **Oct 2022 – May 2023**
- Puerto Rico Louis Stokes Alliance for Minority Participation (PR-LSAMP) Research Opportunities for Undergraduates Students in STEM (ROUSS) Program **Aug 2022 – Oct 2022**
- University of Iowa, Computational Bioengineering Research Experience for Undergraduates (REU) Program **May 2021 – Jul 2022**
- Puerto Rico Louis Stokes Alliance for Minority Participation (PR-LSAMP) Research Opportunities for Undergraduates Students in STEM (ROUSS) Program **Aug 2020 – May 2022**

Scholarships

- Apple Pathways Academy Scholarship (Renewal) **Aug 2023**
- Apple Pathways Academy Travel Scholarship (Trip to SHPE National Convention 2023) **Jun 2023**
- Apple Scholars Program Scholarship **Apr 2023**
- Apple Impact Scholarship **Oct 2022**
- Nagnoi, LLC Scholarship **Oct 2022**
- Boston Scientific Scholarship **Mar 2022**
- Bristol Myers Squibb Scholarship **Mar 2022**
- Boeing Academic Excellence Scholarship **Feb 2022**
- Apple Scholars Program Scholarship **Feb 2022**
- Hispanic Scholarship Fund (HSF) Scholarship **2021 – 2024**
- University of Puerto Rico, Fondo Dotal Irrrestricto Scholarship **2020 – 2021**
- EcoEléctrica Scholarship **2019 – 2022**

Grants

- Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) Student Full Travel Award **Sep 2023**
- Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) Student Partial Travel Award – Housing **Oct 2022**
- Broader Engagement Program at Society for Industrial and Applied Mathematics Conference on Mathematics of Data Science (BE@SIAM MDS22) **Sep 2022**
- Emerging Researchers National (ERN) Conference in STEM Travel Award (Cancelled due to pandemic) **Feb 2022**

Awards

- Hispanic Scholarship Fund (HSF) Healthcare Summit (Mentor In-training) **Jan 2024**
- ABRCMS Computational and Systems Biology Poster Presentation Award 2023 **Nov 2023**
- Hispanic Scholarship Fund (HSF) Healthcare Summit (Scholar) **Feb 2023**
- Google Latinx Leadership Summit (LSLS22) 2022 **Apr 2022**
- Hispanic Scholarship Fund (HSF) Entrepreneurship Summit (Scholar) **Mar 2022**
- College of Engineering Honor Roll **2019 – 2021**

PROFESSIONAL EXPERIENCE

CAWT Undergraduate Research Fall Internship, Dr. Wilredo E. Lugo-Beauchamp
Center for the Advancement of Wearable Technologies and University of Puerto Rico at Mayagüez ***Aug 2024 – Present***

"Addressing Memory Consumption in Edge Devices through Data Quantization"

- Explore memory reduction of deep learning models used in biomedical applications for point-of-care diagnostics and accessible healthcare. We hypothesize that data quantization can optimize model parameters for a reduced representation able to compute in embedded or mobile devices while conserving accuracy and performance.

Artificial Intelligence-Machine Learning Intensive Bootcamp Trainee, Dr. Corey E. Baker
Apple, NACME Inc., and University of Southern California **Jun 2024 – Aug 2024**

"Fine-tuning Automatic Speech Recognition Models for Accented English" [Github]

- Led a four-person team in two weeks to **improve Automatic Speech Recognition (ASR) models, using PyTorch and Transformer model Whisper**, by fine-tuning on African American English and Indic Accented English. Designed **preprocessing pipeline for large-scale Audio and Text data for feature extraction, and hyperparameter tuning using Torchaudio and Pandas**. Achieved a **15% reduction in Word Error Rate (WER) and a 10% decrease in validation loss**.

Bernard & Sophie Gould MIT Summer Research Program in Biology & Neuroscience, Dr. Olivia Corradin
Massachusetts Institute of Technology and Whitehead Institute for Biomedical Research **Jun 2023 – Aug 2023**

"Identifying Epigenetic Alterations in the Orbitofrontal Cortex tied to Opioid Use Disorder "

- Conducted **ChIP-seq data analysis on post-mortem brain tissue to identify gene regulatory alterations associated with opioid use disorder (OUD)**. Utilized bioinformatics tools such as **SciPy**, **Pandas**, and **Numpy** to filter and reduce the dataset **from 3.5 million samples to 440 statistically significant ones**. Visualized chromosomal regions with Quantile-Quantile and Volcano plots to identify highly expressed regulatory elements within normally distributed results.

Computational Optics and Imaging Laboratory, Dra. Heidy Sierra-Gil
University of Puerto Rico at Mayagüez **Apr 2023 – May 2024**

"Evaluating Photoplethysmography Signals through Deep Learning for Early Sepsis Detection" [Paper]

- Wrangled data from the **Medical Information Mart for Intensive Care (MIMIC) III Clinical Database**, and **Waveform Database** and obtained patients that were diagnosed with sepsis-related afflictions and had photoplethysmography signals in their medical record. Preliminary work suggests **signal peaks give insight to sepsis severity with a 88.4% accuracy rate** of detection.

PR-INBRE Developmental Research Project Program, Dr. Juan Carlos Martínez-Cruzado
University of Puerto Rico at Mayagüez **May 2022 – Mar 2023**

"Local Ancestry Inference of Puerto Rican ancestral populations associating single nucleotide polymorphisms to diabetic nephropathy"

- Analyzed **Puerto Rican genome-wide analysis studies (GWAS) data** and identified ancestry-specific models to labeled genomes through Local Ancestry Inference (LAI).
- Performed **Python data pre-processing**, to assert correct quantity and quality of reference ancestral populations of Puerto Ricans to perform LAI. Obtained approximately **60/25/15 percent distribution of European, African, and Indigenous Native ancestral populations** in Puerto Rican genome.

Learning and Perception Research (LPR) Ignite Program, Dr. Orazio Gallo & Dr. Ekta Prashanni
NVIDIA **May 2022 – Aug 2022**

"High Dynamic Range (HDR) Image Corruption Estimation"

- Developed method for **image quality estimation and corruption correction with a denoising model for high-resolution images** using the **PyTorch** framework and **VGG-16 architecture**. Implemented custom datasets, data loaders, and transformations for the **HDR+ and CIFAR-10 datasets**. Evaluated image aesthetics by simulating various levels of corruptions (Noise, Blur, and Exposure) and visualized training progress with TensorBoard, including loss metrics and images before, during, and after denoising.

Computational Bioengineering Research Experience for Undergraduates (REU), Dr. Hans J. Johnson
University of Iowa **May 2021 – Jul 2021**

"AI Binary Classifier for Male & Female Magnetic Resonance Images"

- Created a **preprocessing pipeline** to split and sort the **PREDICT-Huntington's Disease MRI-image dataset** into training, validation, and test sets. Refactored Convolutional Neural Network to develop **Binary Classifier for male & female MRI scans** using pre-trained model **DenseNet121**, **PyTorch Lightning** framework, and **MONAI** library resulting in **91.44%** accuracy in test dataset.

Environmental and Inorganic Chemistry Laboratory, Dra. Martha L. López-Moreno
University of Puerto Rico at Mayagüez **Aug 2021 – May 2022**

"Effect of Zn-based nano material on the growth stimulation of Lactuca sativa" [Paper]

- Synthesized **ZnS and ZnS doped Mn, stable and unstable in water, quantum dots** through a **reflux system** to a ensure a green chemistry method was completed. Explored method for **stable in water CuS nanoparticles synthesis**. Characterized ZnS and ZnS doped Mn quantum dots and analyzed **High Resolution Transmission Electron Microscopy**, **Electron Diffraction**, and **Energy Dispersion X-ray** analysis to observe our quantum dots size, structure, and morphology.
- Evaluated the **toxicological effects in plants** with experimental procedures using lettuce, *Lactuca sativa.*

PUBLICATIONS AND PRESENTATIONS

Publications

- **[Conference]** Alvarez-Navarro, M.A., Huallparimachi, L., **Cruz-Romero, S.A.**, Sierra, H. (2024). *LSTM Model for Sepsis Detection and Classification Using PPG Signals*. In: Kadoch, M., Lu, K., Ye, F., Qian, Y. (eds) *Proceedings of the International Symposium on Intelligent Computing and Networking 2024*. ISICN 2024. Lecture Notes in Networks and Systems, vol 1094. Springer, Cham. https://doi.org/10.1007/978-3-031-67447-1_1

- **[Journal]** Luciano-Velázquez, J., Xin, Y., Su, Yf. Quiles-Vélez, C., **Cruz-Romero, S.A.**, Torres-Mejías, G. E., Rivera-de Jesús, J., Bailón-Ruiz, S. J. *Synthesis, characterization, and photocatalytic activity of ZnS and Mn-doped ZnS nanostructures*. MRS Advances 6, 252–258 (2021). https://doi.org/10.1557/s43580-021-00035-y

Oral Presentations

- **Cruz-Romero, Sebastián, A.**, Daire, A., Medina B., Ovalle, S., López-Tucux, R., Baker, C. E., Grant, C., *Fine-tuning Automatic Speech Recognition Models for Accented* English, Apple-NACME Artificial Intelligence-Machine Learning Intensive Bootcamp 2024 Final Presentation Showcase, University of Southern California, August 2024
- **Cruz-Romero, Sebastián, A.**, Ramcharan H., Hoang A., Corradin O., *Identifying Epigenetic Alterations within the Orbitofrontal Cortex tied to Opioid Use Disorder*, Research Symposium in Biology, University of Puerto Rico Mayagüez-Department of Biology, May 2024
- **Cruz-Romero, Sebastián A.**, Quiles-Vélez C. I., Luciano-Velázquez J., López-Moreno M. L., *TGA-covered ZnS Quantum Dots' effect on Lactuca sativa plants*, 55th ACS Junior Technical Meeting & 40th Puerto Rico Interdisciplinary Scientific Meeting, University of Puerto Rico at Humacao, April 2022
- **Cruz-Romero, Sebastián A.**, Quiles-Vélez C. I., Luciano-Velázquez J., López-Moreno M. L., *Effect of Z-based nanomaterial in the growth stimulation of Lactuca sativa*, Research Fair at University of Puerto Rico at Mayagüez (Virtual), March 2021
- **Cruz-Romero, Sebastián. A.**, Quiles-Vélez C. I., Luciano-Velázquez J., López-Moreno M. L., *Synthesis and characterization of ZnS doped Mn quantum dots by reflux system*, 54th ACS Junior Technical Meeting & 39th Puerto Rico Interdisciplinary Scientific Meeting (Virtual), April 2021

Poster Presentations

- **Cruz-Romero, Sebastián, A.**, Daire, A., Medina B., Ovalle, S., López-Tucux, R., Baker, C. E., Grant, C., *Fine-tuning Automatic Speech Recognition Models for Accented* English, USC Viterbi, School of Engineering-SURE Research Symposium, University of Southern California, August 2024
- **Cruz-Romero, Sebastián A.**, Ramcharan H., Hoang A., Corradin O., *Identifying Epigenetic Alterations within the Orbitofrontal Cortex tied to Opioid Use Disorder*, Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) Computational and Systems Biology, November 2023
- **Cruz-Romero, Sebastián A.**, Ramcharan H., Hoang A., Corradin O., *Identifying Epigenetic Alterations within the Orbitofrontal Cortex tied to Opioid Use Disorder*, MSRP Bio Research Symposium, Massachusetts Institute of Technology, July 2023
- **Cruz-Romero, Sebastián A.**, Lliguicota E., Bruzs M., Johnson H. J., *AI Binary Classifier for Male & Female Magnetic Resonance Images*, University of Iowa (UI) Undergraduate Research Symposium, University of Iowa, July 2021
- **Cruz-Romero, Sebastián A.**, Quiles-Vélez C. I., Luciano-Velázquez J., López-Moreno M. L., *Zinc sulfur-based quantum dots: synthesis and characterization by HRTEM*, XXIV Sigma XI Poster Day (Virtual), May 2021)

EXTRACURRICULAR EXPERIENCE

IEEE Engineering Medicine and Biology Society University of Puerto Rico at Mayagüez Student Branch Chapter, Dr. Pedro J. Resto Irizarry

Student Mentorship Program Coordinator ***May 2023 – Present***

- Established a 12-week mentorship program for undergraduate freshmen and sophomores, coordinating technical and professional series, with 70% of mentees securing internships in academia and industry.

Annual BioX Symposium on Engineering in Medicine and Biology Coordinator ***Aug 2021 – Present***

- Organized the BioX Symposium, fostering growth in engineering research within medical and biological sciences at UPRM, with the 2024 edition featuring 38 poster presentations and 156 attendees, making it the largest student-organized event on campus.

Secretary **May 2023 – May 2024**

- Prepared summer work plans, managed logistics, and led administrative duties in collaboration with various UPRM departments and IEEE sections, enhancing the bioengineering research community.

President **May 2022 – May 2023**

- Developed work plans, coordinated with university departments to foster bioengineering collaborations, and secured sponsorships from industry partners through detailed proposals.

Student Activities Coordinator **Aug 2021 – May 2022**

- Organized logistics for workshops and events, enhancing member experiences and fostering professional development through interactions with companies, faculty, and students.

Teaching Assistant, Introduction to Computer Programming (CIIC3015), Dr. Bienvenido Vélez ***Aug 2024 – Present***
Teaching Assistant, Introduction to Computer Programming (CIIC3015), Dr. Heidy Sierra-Gil **Aug 2023 – Dec 2023**

- Provided instructional support for a course on the fundamentals of Python programming, designed for incoming freshmen and sophomores. Facilitated laboratory sessions, offering individualized guidance and support to students, ensuring comprehension of core programming principles. Developed, evaluated, and graded assignments, including 12 practice laboratories, 3 projects, and 3 exams (including the final), for a section of 30+ students.