# Sebastián A. Cruz Romero

Mayagüez, Puerto Rico
(787) 601-1026 • sebastian.cruz6@upr.edu • https://romerocruzsa.github.io/
romerocruzsa • romerocruzsa • 0000-0003-3892-2273

## Education

**University of Puerto Rico at Mayagüez** — **Mayagüez, PR**
*B.Sc. in Computer Science and Engineering* — *May 2025 (Expected)*
GPA: 3.47/4.00

**Relevant Courses**: Database Systems, Introduction to Artificial Intelligence, AI-methods in Enabling Smart Cities, High Performance Computing, General Biology I & II, Molecular and Cellular Biology for Engineers, Probability & Statistics for Engineers

**Certifications**:

- Collaborative Institutional Training Initiative (CITI) Program
  1. Data or Specimens Only Research — **Credential ID:** 54334187
  2. Biomedical Responsible Conduct of Research — **Credential ID:** 43506779
  3. Responsible Conduct of Research for Engineers Research — **Credential ID:** 43506780

### Skills

**Programming**: Python (Advanced), C/C++ (Intermediate), MATLAB, R/RStudio, HTML/CSS/JavaScript, Swift (Beginner)

**Frameworks & Tools**:

- Scripting — Git, Bash/Shell, Nano/VIM
- Data Science & Analytics — NumPy, Pandas, Matplotlib, Seaborn, SciPy, Scikit-learn
- Deep Learning & Computer Vision — PyTorch, PyTorch Lightning, MONAI, OpenCV, Pillow, TensorBoard
- Edge Computing — PyTorch Quantization, TensorRT, CoreML
- Full-stack Development — React, Flask, MongoDB, MySQL, PostgreSQL, Vector Databases

**Languages**: English, Spanish (Fluent), Portuguese (Beginner)

## Publications and Presentations

### Publications

- **Conference Proceedings**

  1. **S. A. Cruz-Romero** and W. Lugo-Beauchamp, "Performance Analysis of Post-training Quantization on CNN-based Conjunctival Pallor Anemia Detection" in *Proceedings of the International Symposium on Intelligent Computing and Networking (ISICN)*, 2025. Accepted. *Manuscript*
  2. M. A. Alvarez-Navarro, L. Huallparimachi, **S. A. Cruz-Romero**, and H. Sierra, "LSTM Model for Sepsis Detection and Classification Using PPG Signals" in *Proceedings of the International Symposium on Intelligent Computing and Networking (ISICN)*, 2024, Lecture Notes in Networks and Systems, vol. 1094, Springer, Cham, pp. 1–10. doi: https://doi.org/10.1007/978-3-031-67447-1_1.

- **Peer-revied Journal Articles**

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

- **Manuscripts & Pre-prints**

  1. R. B. Lopez-Tucux, **S. A. Cruz-Romero**, B. Medina, A. Daire, S. Ovalle, J. Millan, C. E. Baker, C. E. Grant, "Fine-tuning Automatic Speech Recognition Models for Accented Speech", 2024. *Manuscript*
  2. **S. A. Cruz-Romero**, I. Rivera-De Jesús, D. J. Troche-Quiñones, W. Rivera-Gallego, "Optimized Learning for X-Ray Image Classification for Multi-Class Disease Diagnoses with Accelerated Computing Strategies", 2024. arxiv-issued doi: https://doi.org/10.48550/arXiv.2407.01705.

### Oral Presentations

1. **S. A. Cruz-Romero** et al., "Performance Analysis of Post-training Quantization on Conjunctival Pallor Anemia Detection" International Symposium on Intelligent Computing and Networking, March 2025.
2. **S. A. Cruz-Romero** et al., "Fine-tuning Automatic Speech Recognition Models for Accented English," Apple-NACME AI-ML Intensive Bootcamp 2024 Final Presentation Showcase, University of Southern California, August 2024.
3. **S. A. Cruz-Romero** et al., "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.
4. **S. A. Cruz-Romero** et al., "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.
5. **S. A. Cruz-Romero** et al., "Effect of Zn-based nanomaterial in the growth stimulation of *Lactuca sativa*," Research Fair at University of Puerto Rico at Mayagüez (Virtual), March 2021.
6. **S. A. Cruz-Romero** et al., "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

1. **S. A. Cruz-Romero** et al., "Evaluating Performance of Neural Network Quantization for Conjunctival Pallor Anemia Detection," SIAM Conference on Computational Science and Engineering 2025, March 2025.
2. **S. A. Cruz-Romero** et al., "Fine-tuning Automatic Speech Recognition Models for Accented English," USC Viterbi, School of Engineering-SURE Research Symposium, University of Southern California, August 2024.
3. **S. A. Cruz-Romero** et al., "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.
4. **S. A. Cruz-Romero** et al., "Identifying Epigenetic Alterations within the Orbitofrontal Cortex tied to Opioid Use Disorder," MSRP Bio Research Symposium, Massachusetts Institute of Technology, August 2023.
5. **S. A. Cruz-Romero** et al., "AI Binary Classifier for Male & Female Magnetic Resonance Images," University of Iowa (UI) Undergraduate Research Symposium, University of Iowa, July 2021.
6. **S. A. Cruz-Romero** et al., "Zinc sulfur-based quantum dots: synthesis and characterization by HRTEM," XXIV Sigma XI Poster Day (Virtual), May 2021.

## Research Experience

**Research Fellow, Edge Computing** **2024–Present**

*University of Puerto Rico at Mayagüez, Mayagüez, PR* *Advisor: Dr. Wilfredo Lugo Beauchamp*

- Fine-tuned SOTA-architectures for anemia severity (no anemia, mild, moderate, severe) and hemoglobin level estimation through the inner-eyelid membrane and achieved an average of 85% accuracy and 88% precision across models.
- Explored model compression methods through quantization of FP32, FP16, INT8, and INT4 bit-width precision achieving comparable performance to larger SOTA algorithms.
- Implemented a multi-task loss algorithm for effective knowledge distillation that improved accuracy and precision on previously underperforming models with a 7% increase across metrics.
- Proposed capstone project to design and deploy an edge device Point-of-Care diagnostic tool without internet connectivity, reduced power consumption, and low-cost compute.

**Visiting Researcher, Bioinformatics** **Summer 2023**

*Massachussetts Institute of Technology, Cambridge, MA* *Advisor: Dr. Olivia Corradin*

- 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 statistically significant chromosomic regions through Quantile-Quantile and Volcano plots to identify highly expressed regulatory elements within normally distributed results. Identified highly enriched patterns of associated GWAS traits and putative gene targets within case opioid overdose subjects, specifically loci tied to insomnia and schizophrenia.

**Researcher, Biomedical Signal Processing** **2023-2024**
*University of Puerto Rico at Mayagüez, Mayagüez, PR* *Advisor: Dr. Heidy Sierra*

- Wrangled data from the Medical Information Mart for Intensive Care (MIMIC) III Clinical Database, and Waveform Database to obtain 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.

**Ignite Intern, Learning and Perception Research** **Summer 2022**
*NVIDIA, Santa Clara, CA* *Advisor: Dr. Orazio Gallo, Co-Advisor: Dr. Ekta Prashani*

- Developed method for image quality estimation and corruption correction with a denoising model for high-resolution images (the HDR+ and CIFAR-10 datasets) using the PyTorch framework and VGG-16 architecture.
- 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.

**Visiting Researcher, Biomedical Imaging** **Summer 2021**
*University of Iowa, Iowa City, IA* *Advisor: Dr. Hans Johnson*

- 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.

**Research Assistant, Environmental and Inorganic Chemistry** **2020-2022**
*University of Puerto Rico at Mayagüez, Mayagüez, PR* *Advisor: Dr. Martha L. López Moreno*

- 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*.

## Other Research/Professional Experience

**Artificial Intelligence-Machine Learning Intensive Bootcamp** **Summer 2024**
*Apple, NACME Inc. & University of Southern California, Los Angeles, CA*

- 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 accented english speech and achieved a 15% reduction in Word Error Rate (WER) and a 10% decrease in validation loss.
- Designed preprocessing pipeline for large-scale Audio and Text data for feature extraction, and hyperparameter tuning using Torchaudio and Pandas.

**Quantitative Methods Workshop in Biology & Neuroscience** **Winter 2023**
*Massachusetts Institute of Technology, Cambridge, MA*

- Analyzed and processed Cryo-EM data to filter out noise and high-frequency signals, obtaining clear morphological structures of a proteasome in different orientations. Utilized particle and microscopy images to simulate a 3D model of a proteasome using CryoSparc.
- Identified, segmented, and measured sizes of objects/cells in *Drosophila melanogaster* embryo membranes using computer vision methods with Python and OpenCV.
- Analyzed bulk RNA-seq data from M1 and M2 macrophages to visualize their anti- and pro-inflammatory effects. Evaluated the impact of different factors that might inhibit M2 development.
- Analyzed single-cell gene expression data to identify cell-type clusters (peripheral blood mononuclear cells) using KNN clustering and Principal Component Analysis (PCA).

**Accelerate Program** **Summer 2022**
*IBM, Armonk, NY (Remote)*

- Participated in an eight-week immersive training program with IBM software developers and career managers through the Software Development Track.
- Enhanced programming skills and core competencies through coding assessment platforms, applying web development practices with JavaScript, HTML, CSS, React, and Material-UI.
- Gained a solid understanding of the software development lifecycle (SDLC), coding logic, and application security.

**Department of Energy Winter Mini Semester** **Winter 2022**
*Brookhaven National Laboratory, Upton, NY (Remote)*

- Received training from Dr. David Biersach in scientific computing and quantum programming, writing software using Python and IBM Qiskit.
- Attended lectures on current research projects and participated in virtual tours of the facilities at Brookhaven National Laboratory.
- Engaged in discussions on the applications of mathematical modeling, monte carlo methods, and quantum computing in scientific research.

## Teaching Experience

**Research Mentor** **Spring 2025**
*University of Puerto Rico at Mayagüez, Mayagüez, PR* *Supervisor: Dr. Wilfredo Lugo Beauchamp*
- Edge Computing
- AI & Machine Learning

**Teaching Assistant** **Fall 2024**
*University of Puerto Rico at Mayagüez, Mayagüez, PRSupervisor: Dr. Bienvenido Vélez, GIR Instructor: Jean C. Méndez*
- Introduction to Computer Programming I

**Teaching Assistant** **Fall 2023**
*University of Puerto Rico at Mayagüez, Mayagüez, PR Supervisor: Dr. Heidy Sierra, GIR Instructor: Cambell Christensen*
- Introduction to Computer Programming I

**GIR: Google-in-Residence Instructor*

## Honors & Awards

- **Fellowships**
  1. CAWT Undergraduate Research Fall & Spring Internship [NSF OIA-1849243] **2024–Present**
  2. MARC UPRM Trainee [NIGMS T34GM008419] **2022–2023**
  3. Computational Bioengineering REU Program [NSF EEC-2049044] **2021**
  4. PR-LSAMP Research Opportunities for Undergraduates Students in STEM (ROUSS) **2020–2022**
- **Scholarships**
  1. Apple Pathways Academy Scholarship **2022–2025**
  2. Nagnoi, LLC Scholarship **2022**
  3. Boston Scientific Scholarship **2022**
  4. Bristol Myers Squibb Scholarship **2022**
  5. Boeing Academic Excellence Scholarship **2022**
  6. Hispanic Scholarship Fund (HSF) Scholarship **2021–2024**
  7. EcoEléctrica Scholarship **2019–2022**
- **Travel Grants**
  1. Broader Engagement Program @ SIAM Conference on Computational Science & Engineering **2025**
  2. NSF I-Corps Site UPRM Travel Award for Octane Medical Innovation Forum **2024**
  3. Annual Biomedical Research Conference for Minoritized Scientists Student Full Travel Award **2023**
  4. Annual Biomedical Research Conference for Minoritized Scientists Student Partial Travel Award – Housing **2022**
  5. Broader Engagement Program @ SIAM Conference on Mathematics of Data Science **2022**
- **Awards**
  1. NACME Gala Featured Scholar **2024**
  2. HSF Healthcare Summit (Mentor In-training) **2024**
  3. ABRCMS Poster Presentation Award **2023**
  4. Google Latinx Leadership Summit **2022**
  5. HSF Entrepreneurship Summit **2022**
  6. College of Engineering Honor Roll **2019–2021**

## Leadership Experience

**IEEE Computational Intelligence Society UPRM Student Branch Chapter** **2024–Present**
*Founder & President* *Supervisor: Dr. Wilson Rivera Gallego*

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

**IEEE Engineering in Medicine and Biology Society UPRM Student Branch Chapter** **2021–Present**

*Annual BioX Symposium on Engineering in Medicine and Biology Coordinator* *Supervisor: Dr. Pedro J. Resto*

- The IEEE EMBS UPRM founded the Annual BioX Symposium (BXS) on Engineering in Medicine and Biology to foster a growth of both undergraduate and graduate students by providing a space where researchers at UPRM can present their research projects with our student body further developing an interest in engineering research within applications in the medical and/or biological sciences. Our most recent edition in 2024 included the participation of 38 poster presentations which were revised by collaborating faculty at UPRM within the fields of interest of their research absracts. Moreover, 156 attendees were present making it the largest activity organized by a student organization in-campus and the only forum for scientific communication focused on Bioengineering, Biomedical Engineering, and Life Sciences in Puerto Rico

**2023-2024**

*Student Mentorship Program Coordinator*

- Established a 12-week mentorship program for undergraduate freshmen and sophomores, coordinating technical and professional series in diverse areas of bioengineering and biomedical engineering within academia and/or industry with 82% of mentees securing internships in academia and industry.

**2023-2024**

*Secretary*

- Prepared summer workplan for directive transition, activities logistics, and research team recruitment for Fall 2023 academic term. Led administrative duties within collaboration groups such as: UPRM Bioengineering Graduate Program, UPRM Mechanical Engineering Department IEEE UPRM Student Branch, IEEE Western Puerto Rico Section, and many student organizations.

**2022-2023**

*President*

- Elaborated summer workplan for directive transition, activities logistics, and research team recruitment for Fall 2022 academic term. Interacted with Cultural and Social Engagement Department, Mechanical Engineering Department, and Bioengineering Graduate Program to foster collaborations in the student body on the area of Bioengineering/Biomedical Engineering. Redacted research and student organization sponsorship proposal and gained support from industry partners.

**2021-2022**

*Student Activities Coordinator*

- Organized logistics for recreational and professional workshops and events for members of IEEE EMBS UPRM and the public. Interacted with companies, faculty, and students, enhancing their experience, and gaining interpersonal skills. Coordinated event for student professional development such as Resume, LinkedIn, and Python Workshops with student speakers.

**Society for Hispanic Professional Engineers UPRM Chapter** **2021–2022**

*Student Mentor* *Supervisor: Paola S. Vázquez & Diego A. Medina*

- Serve as guidance, both professionally and personally, to freshmen, sophomores, and juniors under the MentorSHPE program. Attend seminars, workshops, and recreational events to contribute to personal and professional growth.

**2020–2021**

*Logistics Coordinator*

- Coordinated and hosted a virtual event, as part of the FellowSHPE Program, where students interacted with Southern Company representatives to solve real or hypothetical problems called "case studies". Interacted with students and company recruiters, enhancing their experience, and gaining interpersonal skills. Volunteered for the Recycled Boat Competition 2021 Logistics Team to organize an on-site event at the University of Puerto Rico, Mayagüez Natatorium.