FRANCISCO FERNANDO CAVAZOS

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EDUCATION

University of Texas at El Paso — El Paso, TX

Bachelor of Science in Computer Science, Minor in Mathematics — *Anticipated: December 2025*

- Honors & Awards: Anheuser-Busch Charitable Trust Scholarship, Hispanic Scholarship Fund Scholar, Dean's List

EXPERIENCE

Undergraduate Research Assistant — Jan. 2024 – Present

University of North Carolina at Chapel Hill — *Chapel Hill, NC*

- Performed computational data analysis of high-throughput sequencing data
- Generated data figures through excel and R studio
- Collaborated with other lab members to assist in their research projects, and performed individual research
- Developed programs for RNA analysis, including sequence discovery (motifs/IREs) and structural preference (RNA folding)

Undergraduate Researcher — June 2023 – Aug. 2023

Texas A&M University — *College Station, TX*

- Researched the use of reinforcement learning on autonomous vehicles
- Developed a method of learning in real time in a real-world environment
- Collaborated with graduate students and professor to write a paper and present a poster on my research

PROJECTS

KATSS - K-mer Analysis Tools for Sequence and Structure | *C, CMake, Unix, Bash*

- Developed a suite of tools for analyzing RNA-binding protein (RBP) interactions using RNA sequence and structure
- Analyzed over 5 proteins, including: RBFOX2, UNK, MSI1 & MSI2, discovering structural motif preference
- Created algorithms and pipeline for motif discovery, base-pair probability preference, and sequence clustering
- Implemented efficient data structures to improve performance, being able to analyze 10 million sequences in 15 seconds
- Used CMake to make program compatible with Unix/Linux, MacOS, and Windows systems

Gomoku GUI Application & AI | *Java, Swing, JUnit*

- Created GUI application for the Gomoku board game using Java Swing
- Implemented over 70 tests using JUnit, achieving 100% code coverage across 5 classes and 46 functions
- Developed an AI player using min-max algorithms, determined the best move from searching a depth of 20 moves
- Used multithreading to allow for responsive GUI program, allowing several components to run simultaneously

Autonomous Vehicle Navigation using Real-Time Reinforcement Learning | *Python, PyTorch*

- Developed real-time reinforcement learning (RL) model for autonomous vehicle navigation on a pre-mapped 2D plane
- Implemented reduced-information training to boost training efficiency and decision-making in real-world scenarios
- Continuous improvement in model performance over 85 training episodes, with the reward function increasing steadily
- Authored a paper detailing the project's methodology and results, showcasing the developed RL model

ASPIIRE | *Linux, Bash, awk, R*

- Developed a program for the detection of specific RNA sequences and structures (IREs) in a given gene
- Efficient algorithms for detection, searching through multiple 100MB files (entire human CDS and UTRs) in under 1 minute
- Program works across different genomes, and successfully identified over 300 IREs, including over 10 known IREs
- Results from this work are being prepared for publication

PUBLICATIONS

Sarah E. Harris, Maria S. Alexis, Gilbert Giri, Francisco F. Cavazos, Jernej Murn, Maria M. Aleman, Christopher B. Burge, and Daniel Dominguez. Understanding species-specific and conserved rna-protein interactions in vivo and in vitro. *bioRxiv*, 2024

TECHNICAL SKILLS

Languages: Java, Python, C/C++, JavaScript, R, Bash, awk
Developer Tools: Git, Unix, JUnit, VS Code, PyCharm, IntelliJ
Libraries: pandas, NumPy, Matplotlib