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
- Collaborated with other lab members to assist in their research projects, and performed individual research
- Working on publishing results of research, and was an author from computational contributions in another paper
- 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 5 seconds
- Used CMake to make program cross 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 a min-max algorithm, determining 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, HTML/CSS, R, Bash, AWK
Developer Tools: Git, Unix, JUnit, VS Code, PyCharm, IntelliJ
Libraries: pandas, NumPy, Matplotlib