Nicolas Crespo

ncrespo@ucla.edu | github.com/n-crespo | linkedin.com/in/n-crespo | ncrespo.com

Aspiring computer engineer interested in building innovative, impactful solutions to complex technical problems.

Education

University of California, Los Angeles, *B.S. in Computer Engineering* Expected March 2028

- Operating System Fundamentals, Computer Architecture and Assembly Language, Intro to Machine Learning, Data Structures and Algorithms, Digital Logic Design, Object Oriented Programming, Intro to Circuit Design, Systems and Signals, Malware Defense, Linear Algebra, Discrete Mathematics, Multivariable Calculus, Differential Equations
- Active member of UCLA IEEE and UCLA ACM Cyber

Work Experience

Formal Verification of Autonomous Systems Intern, NASA Langley Research Center June 2025 — Sept 2025

- Designed a domain-specific language embedding to model and test Detect-and-Avoid systems on autonomous aircraft.
- Created and formally verified a novel technique for assuring the safety of safety-critical Unmanned Aircraft Systems (UAS) by evaluating if untrusted or AI/ML generated flight instructions would violate predefined operational boundaries.
- Developed an automated proof strategy for guaranteeing flight safety and correctness, reducing verification time by >90%.

Software Engineer Intern, Thomas Jefferson National Accelerator Facility June 2024 — Aug 2024

- Engineered and integrated lab-wide inventory location tracking with session-persistent cookies into Jefferson Lab's (JLab) data management system to fully automate manual reporting procedures for 200+ lab engineers and improve data quality.
- Developed a unified fuzzy data searching system by consolidating JLab's cross-departmental Oracle SQL relational databases, reducing data retrieval time by >70% and improving search accuracy and efficiency across all lab departments.
- Source code and documentation on GitHub (github.com/n-crespo/jlab-2024).

Computer Science Research Intern, NASA Langley Research Center Dec 2023 — Mar 2024

- Developed a productive conflict avoidance and recovery system for autonomous UAS in crowded airspaces.
- Formally verified the safety of this system as a fallback for untrusted ML/AI based controllers in safety-critical situations.
- Source code and documentation on GitHub (github.com/n-crespo/NASA-2023).

Publications

A Verification Framework for Runtime Assurance of Autonomous UAS, IEEE Nov 2024
2024 AIAA DATC/IEEE Digital Avionics Systems Conference (https://ieeexplore.ieee.org/document/10748654)

A Formal Verification Framework for Runtime Assurance, Springer May 2024
2024 NASA Formal Methods Conference: 16th International Symposium (https://doi.org/10.1007/978-3-031-60698-4_19)

Projects

The Open Dissent, Co-Founder and Software Engineer (TheOpenDissent.com) Ongoing

- Building a serverless full-stack social platform using React, TypeScript, and Firebase Cloud Functions (Node.js).
- Created an CI/CD pipeline using GitHub Actions and Vercel to automate production deployments.
- Secured funding through the VOICE Initiative from the UC National Center for Free Speech and Civic Engagement.

High-Performance Image Manipulation Algorithms in C, Developer May 2025

- Optimized Gaussian convolution and greyscaling algorithms in C to exploit cache locality and instruction-level parallelism.
- Achieved a 12-15x speedup over sequential baselines with multi-threading using OpenMP pragmas.

Nea: Machine Learning for Sleep Apnea Diagnosis (Hacktech 2025 @ Caltech), Team Member Apr 2025

- Created a data preparation pipeline in Python for cleaning and introducing deliberate noise into ML training data.

Skills

- **Expertise**: Software Engineering | Formal Verification | Digital Logic Design | Circuit Design | Data Analysis
- **Programming Languages**: C/C++ | x86 Assembly/MIPS | Python | Java | Bash | JavaScript/TypeScript | SQL | Typst
- **Technologies**: React | NodeJS | MongoDB | Oracle SQL | Vim/Neovim | Linux | Git/GitHub