Nicolas Crespo

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

Education

University of California, Los Angeles Sept 2024 — June 2028
Bachelor's of Science, Computer Engineering

- Operating Systems, Logic Design of Digital Systems, Computer Architecture, Intro to Machine Learning, Object Oriented Programming, Data Structures and Algorithms, Circuit Design, Linear Algebra, Discrete Mathematics, Multivariable Calculus, Differential Equations
- Active member of UCLA IEEE and UCLA ACM Cyber (www.acmcyber.com)

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 relational Oracle SQL 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 (www.theopendissent.com) Ongoing

- Building a full-stack social media site with HTML/CSS/TypeScript with Google Authentication and a realtime database.
- Awarded funding via the University of California VOICE Initiative from the National Center for Free Speech.

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

- Optimized image convolution, grayscaling and mean pixel value algorithms with multi-threading and instruction level parallelism using OpenMP pragmas in C, resulting in a 12-15x speed up compared to sequential algorithms.

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

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

Cyber Kill Chain Implementation in a Modern Malware Toolkit, Developer and Team Member March 2025

- Integrated the Shellshock exploit, a TCP/UDP port scanner, and a self-spawning persistence service in a malware package.

Skills

- **Expertise**: Software Engineering | Formal Verification | Digital Logic Design | Circuit Design | Data Analysis
- **Programming Languages**: C/C++ | ReactJS/NodeJS/JavaScript | SQL | Java | HTML/CSS | Python | R | Bash | Lua