

# Nicolas Crespo

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

## EDUCATION

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### University of California, Los Angeles

Sept 2024 — June 2028

*Bachelor's of Science, Computer Engineering*

- 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

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### 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](https://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](https://github.com/n-crespo/NASA-2023)).

## PUBLICATIONS

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### 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](https://doi.org/10.1007/978-3-031-60698-4_19))

## PROJECTS

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### The Open Dissent, Co-Founder and Software Engineer ([www.theopendissent.com](http://www.theopendissent.com))

Ongoing

- Built a full-stack social media site with HTML/CSS/TypeScript with Google authentication and a realtime database.

### 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 (Hacktech 2025 @ Caltech), 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

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- **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 | TypeScript
- **Technologies:** React | NodeJS | MongoDB | Oracle SQL | Vim/Neovim | Linux | Git/GitHub