

# 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, B.S. in Computer Engineering** Expected March 2028
- Operating Systems, Computer Architecture and Assembly Language, Machine Learning, Data Structures and Algorithms, Object Oriented Programming, Digital Logic Design, Systems and Signals, Discrete Mathematics, 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 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](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 ([ieeexplore.ieee.org/document/10748654](https://ieeexplore.ieee.org/document/10748654))
- A Formal Verification Framework for Runtime Assurance**, Springer May 2024  
2024 NASA Formal Methods Conference: 16th International Symposium ([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 ([github.com/n-crespo/theopendissent](https://github.com/n-crespo/theopendissent)) 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.
- VulnEx**, Team Lead and Backend Developer ([github.com/n-crespo/vulnex](https://github.com/n-crespo/vulnex)) Sept 2025 — Dec 2025
- Optimized parsing of 300k+ CVE records, reducing fetching time by 96% (1hr to 2min) and storage requirements by 97%.
  - Created an Express/MongoDB REST API, implementing secure JWT auth middleware and bulk CRUD operations.
  - Built GitHub Actions CI/CD pipeline for automated deployment with 30+ E2E and integration tests (Mocha/Playwright).
- 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.

## 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 | JavaScript/TypeScript | SQL | Bash | TypeScript
- **Technologies:** React | NodeJS | MongoDB | Playwright | ExpressJS | Vim/Neovim | Linux | Git/GitHub