

# Jan-Paul Vincent Ramos-Dávila

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## Education

### Cornell University

Ithaca, NY

B.A. in Computer Science, Conc. in Programming Languages & B.A. in Philosophy, Conc. in Logic

August 2021 - May 2025

## Experience

### NASA, Langley Formal Methods

Hampton, VA (R)

Research Assistant, Program Verification, Advised by Dr. Alwyn Goodloe

June 2024 - Present

- Developing Coq proofs for statically proving properties of a DTN protocol to ensure end-to-end data delivery.

### Carnegie Mellon University, S3D

Pittsburgh, PA

Research Assistant, PL/Program Verification, Advised by Dr. Jonathan Aldrich & Dr. Jenna DiVincenzo

May 2022 - Present

- Core contributor on the early development of the Gradual Verification framework.
  - *Verification*: Implemented a Property Based Testing tool for evaluating soundness of Gradual  $C_0$  and developed formal proofs for establishing semantic correspondence between static and dynamic verification.
  - *Performance*: Significantly optimized benchmark results by using second-order logic equivalences for runtime assertions.
- Exploring the application of Gradual Verification to smart contracts on the *Algorand* and *Ethereum* blockchain platforms. Developed a prototype for Gradually Verified Teal and Gradually Verified Ethereum.

### Cornell University, CIS

Ithaca, NY

Teaching Assistant, CS 4/5110 Programming Languages and Logics, Taught by Dr. Adrian Sampson

January 2024 - May 2024

- Examination czar in charge of the infrastructure of midterms, graded students' assignments, and held weekly office hours.

Research Assistant, Programming Languages, Advised by Dr. Adrian Sampson

October 2021 - December 2022

- Implemented *Graphicionado Graph Analytics* algorithm in Calyx as a case study of the language. Found/solved soundness bugs in the front-end in the Computer Architecture & Programming Abstractions group.
- Worked on a symbolic execution tool for verifying parallelism in Calyx.

## Publications & Presentations

- [1] DiVincenzo, J., McCormack, I., Gouni, H., Gorenburg, J., Ramos-Dávila, J., Zhang, M., Zimmerman, C., Sunshine, J., Tanter, É., Aldrich, J., *Gradual C0: Symbolic Execution for Gradual Verification*, In ACM Transactions on Programming Languages and Systems (*In Submission*)
- [2] Singh, K., Sun, H., Ramos-Dávila, J., Aldrich, J., DiVincenzo, J. *Gradual Verification of Smart Contracts*, In Workshop on Principles of Secure Compilation (PRiSC, co-located with POPL '24)
- [3] Ramos-Dávila, J., *Optimization of a Gradual Verifier: Lazy evaluation of Iso-recursive Predicates as Equi-recursive at Runtime*, In 51st ACM SIGPLAN Symposium on Principles of Programming Languages Student Research Competition (POPL '24 SRC), Midwest Programming Languages Summit 2023 (MWPLS '23)
- [4] Ramos-Dávila, J., *Evaluating Soundness of a Gradual Verifier with Property Based Testing*, In 50th ACM SIGPLAN Symposium on Principles of Programming Languages Student Research Competition (POPL '23 SRC), Cornell Undergraduate Research Journal, 2(1), 17–27. <https://doi.org/10.37513/curj.v2i1.696> [Pub] [Presentation] [Poster]

## Projects

- **Kleene Algebra with Tests for Calyx.** (*Cornell CS 6861 Kleene Algebra*) Development of a KATs front-end for the Calyx hardware synthesis framework.
- **Optimization of a Concurrent PL Model Checker.** (*Cornell CS 6120 Advanced Compilers*) Reduction of state explosion for the Harmony Concurrent Programming Language's model checker.
- **Incremental Specification Mining** (*Cornell CS 6156 Runtime Verification*) Instrumentation for Maven-based projects that *incrementally* mines specifications for runtime verification. Significantly decreases overhead for evolutionary-aware specification miners. Supports integration with Javert and BDDMiner. [Repo]
- **RNAFoldml** (*Cornell CS 3110 Functional Programming*) OCaml package that enables users to input both RNA sequences in FASTA format and a set of constraints to predict RNA secondary structure. [Repo]

## Awards and Honors

**Fellow:** Amazon Summer Undergraduate Research Experience (CMU) '23  
**Winner, Third Place:** ACM SIGPLAN POPL SRC '23  
**Travel Scholarship:** ACM SIGPLAN PLDI '22  
**Sponsor Prize:** Cornell BRH Hackathon [Course2Career] '21  
**Finalist, Mathematics:** Regeneron International Science and Engineering Fair '20 & '21

## Academic Service

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Copenhagen, DK **Virtualization Chair:** ACM SIGPLAN PLDI 2024 Jun. '24  
London, UK **AV Team:** ACM SIGPLAN POPL 2024 Jan. '24  
Cascais, PT **Video Co-Chair:** ACM SIGPLAN SPLASH 2023 Oct. '23  
Seattle, WA **Student Volunteer:** ACM SIGPLAN ICFP 2023 Sept. '23

## Skills

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**Languages** OCaml, Scala, Python, Haskell, JavaScript, Java, C, Racket, Rust, English, Español, Italiano  
**Tools**  $\LaTeX$ , Coq IDE, Agda-mode, Unix, Git, Shell, Neovim, Emacs, Docker, Heroku, HTML/CSS, Flask  
**More Education** Advanced Functional Programming Summer School 2023 (*Utrecht University*)  
Advanced Compilers, Advanced Programming Languages, Runtime Verification,  
Functional Programming, Operating Systems (*Cornell University*)