

# 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 - May 2024

- 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 4114 Systems Programming, Taught by Dr. Ken Birman

January 2024 - May 2024

- Graded students' assignments, held weekly office hours, and ran coding workshops each week with hands-on demos building and debugging C++/Linux applications.

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

August 2024 - December 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

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

## Academic Service

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

## Skills

<b>Languages</b>	OCaml, Scala, Python, Haskell, JavaScript, Java, C, Racket, Rust, English, Español, Italiano
<b>Tools</b>	LaTeX, Coq IDE, Agda-mode, Unix, Git, Shell, Neovim, Emacs, Docker, Heroku, HTML/CSS, Flask
<b>More Education</b>	Oregon Programming Languages Summer School 2024 ( <i>Boston University</i> ) Advanced Functional Programming Summer School 2023 ( <i>Utrecht University</i> )