

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

Research Experience

Carnegie Mellon University

Pittsburgh, PA

Software Verification REU Participant, Advised by Dr. Jonathan Aldrich & Dr. Joshua Sunshine

May 2022 - Present

- Core contributor on the early development of the Gradual Verification framework. 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.
- Investigated second-order logic optimization techniques for naive runtime assertions in Gradual C_0 , significantly optimizing benchmark results.
- 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

Ithaca, NY

Programming Languages Undergraduate Researcher, 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

* = equal contribution

- [1] *In Submission*. 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 (TOPLAS)
- [2] **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 SRC), Cornell Undergraduate Research Journal, 2(1), 17–27. <https://doi.org/10.37513/curj.v2i1.696> [Pub] [Presentation] [Poster]

Projects

- **Lightweight Verification of Compiler Optimizations** (Cornell CS 6120 Advanced Compilers) *In Progress*.
- **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]
- **EtaC** (Cornell CS 4120 Intro to Compilers) Compiler for the Eta programming language in OCaml with ~ 7,200 lines of code. Made use of Jane Street's expect testing suite for ~ 90% code coverage.
- **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]
- **Diffeq-lang** (Senior High School ISEF) Domain-specific language for automatically solving and graphing differential equations via a web interface. [Repo] [Website]

Awards and Honors

2023	Fellow: Amazon Summer Undergraduate Research Experience (CMU)
2023	Winner, Third Place: ACM SIGPLAN POPL SRC
2022	Travel Scholarship: ACM SIGPLAN PLDI
2021	Sponsor Prize: Cornell BRH Hackathon [Course2Career]
2020 & 2021	Finalist, Mathematics: Regeneron International Science and Engineering Fair

Academic Service

Cascais, PT	Video Co-Chair: ACM SIGPLAN SPLASH 2023
Seattle, WA	Student Volunteer: ACM SIGPLAN ICFP 2023 (Video & Audio Tech)

Skills

Experience

Advanced Functional Programming Summer School 2023 (Utrecht University)

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