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

- Exploring the application of gradual verification to smart contracts on the *Algorand* blockchain platform in developing Gradually Verified Teal.
- Investigated second-order logic optimization techniques for naive runtime assertions in Gradual C_0, significantly optimizing benchmark results.
- Core contributor on the early development of a 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 checks.

Cornell University *Ithaca, NY*

Programming Languages Undergraduate Researcher, Advised by Dr. Adrian Sampson October 2021 – December 2022

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

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

- **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 $\sim$ 7,200 lines of code. Made use of Jane Street's expect testing suite for $\sim$ 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
2023	**Winner, Third Place**: ACM SIGPLAN Symposium POPL SRC
2022	**Travel Scholarship**: ACM SIGPLAN Conference PLDI
2021	**Sponsor Prize**: Cornell BRH Hackathon [Course2Career]
2020 & 2021	**Finalist, Mathematics**: Regeneron International Science and Engineering Fair

Other Experience

Seattle, WA	**Student Volunteer**: Video & Audio Tech @ ACM SIGPLAN ICFP 2023
Utrecht, NL	**Student**: Advanced Functional Programming Summer School 2023, Utrecht University

Skills

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