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 Research Intern, 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. Funded by Algorand.
- Investigated second-order logic optimization techniques for naive runtime assertions in Gradual C_0, significantly optimizing benchmark results. Funded by Amazon.
- Core contributor on the early development of a Gradual Verification framework. Implemented a Property Based Testing tool[1] for evaluating soundness of Gradual C_0 and developed formal proofs for establishing semantic correspondence between static and dynamic checks. Funded by NSF @ REUSE.

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

[1] Jan-Paul Ramos-Dávila **Evaluating Soundness of a Gradual Verifier with Property Based Testing**[1] In *Principles of Programming Languages Student Research Competition* [Link] [Presentation] [Poster] & In *Cornell Undergraduate Research Journal*, 2(1), 17–27. https://doi.org/10.37513/curj.v2i1.696 [Link]

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.

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.

Diffeq-lang

Senior High School Project

- Domain-specific language for automatically solving and graphing differential equations via a web interface.

Awards and Honors

2023	**Winner, Third Place**: ACM SIGPLAN Symposium POPL SRC[1]
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

Utrecht University *Utrecht, Netherlands*

Student, Advanced Functional Programming Summer School July 2023

- Participated in a mix of lectures, labs and a busy social program, focused in Master's level Haskell programming.

Volunteer Services

ACM SIGPLAN ICFP 2023 *Seattle, WA*

Student Volunteer 2023

Skills

Languages

OCaml, Scala, Python, LaTeX, Haskell, JavaScript, Java, C, Racket, Rust, Assembly, English, Español, Italiano

Tools

Unix, Git, VSCode, IntelliJ IDEA, Shell, Neovim, Docker, Heroku, HTML/CSS, Flask, (Microsoft/Libre) Office