Sankha Narayan Guria

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EDUCATION

University of Maryland — College Park, MD
Ph.D. in Computer Science · Advisor: *Jeff Foster & David Van Horn* · GPA: 3.75/4.0 — *Aug 2017 – Present*

Indian Institute of Technology Jodhpur — Jodhpur, India
B.Tech. in System Science · GPA: 8.26/10.0 — *July 2011 – May 2015*

PUBLICATIONS

[1] **Guria, S. N.**, Foster, J. S., Van Horn, D., "Absynthe: Abstract Interpretation-Guided Synthesis". In: *44th ACM SIGPLAN International Conference on Programming Language Design and Implementation (PLDI 2023)*. To appear. arXiv: 2302.13145.

[2] **Guria, S. N.**, Vazou, N., Guarnieri, M., Parker, J., "Anosy: Approximated Knowledge Synthesis with Refinement Types for Declassification". In: *43rd ACM SIGPLAN International Conference on Programming Language Design and Implementation (PLDI 2022)*. DOI: 10.1145/3519939.3523725.

[3] **Guria, S. N.**, Foster, J. S., Van Horn, D., "RbSyn: Type- and Effect-Guided Program Synthesis". In: *42nd ACM SIGPLAN International Conference on Programming Language Design and Implementation (PLDI 2021)*. DOI: 10.1145/3453483.3454048.

[4] Kazerounian, M., **Guria, S. N.**, Vazou, N., Foster, J. S., Van Horn, D., "Type-Level Computations for Ruby Libraries". In: *40th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2019)*. DOI: 10.1145/3314221.3314630.

[5] Keil, M., **Guria, S. N.**, Schlegel, A., Geffken, M., Thiemann, P., "Transparent Object Proxies in JavaScript". In: *29th European Conference on Object-Oriented Programming (ECOOP 2015)*. DOI: 10.4230/LIPIcs.ECOOP.2015.149.

AWARDS & ACHIEVEMENTS

- Dean's Fellowship, University of Maryland · $5000 — *2017 – 2018*
- Summer Dean's Fellowship, University of Maryland · $5000 — *Summer 2018*
- NSF Travel Award, Summer School on Formal Techniques, SRI · $700 — *May 2018*

EXPERIENCE

University of Maryland — College Park, MD
Graduate Research Assistant — *June 2018 - Present*
- Led projects on type- and effect-guided synthesis [3], declassification [2], and abstract interpretation-guided synthesis [1].
- Contributed to RDL, a types and contracts system for Ruby [4].

Facebook — Menlo Park, CA
Software Engineering Intern — *May 2021 - Aug 2021*
- Designed & implemented an effect encapsulation for the Hack language to allow users to define & enforce custom coeffects.

Synthetic Minds — San Francisco, CA
Research Intern · Advisor: Prof. Rastislav Bodik — *May 2019 - Aug 2019*
- Designed & implemented a symbolic execution engine for Solidity, capable of running large smart contracts like Augur. It supported solver aided queries like verification, angelic execution and synthesis.

BrowserStack — Mumbai, India
Software Engineer — *June 2015 - June 2017*
- One of the two primary developers to build and release *App Live* - the interactive cloud based mobile app testing on real devices product from scratch in 5 months.
- Scaled the *Automate* product to more than 300,000 sessions/day (~4x growth), changed the engineering culture of the team to rely on automated test suites to ship faster at 99.5% stability.
- Established organization-wide instrumentation for the cloud infrastructure, built real-time message relay service, optimized real device cloud to achieve ~2x faster user perceived session start-time.

University of Freiburg — Freiburg, Germany
Research Intern · Advisor: Prof. Peter Thiemann — *May 2014 - July 2014*
- Developed JavaScript language semantics with transparent proxies against the equality operator and defined an object capability model for security related use cases in contract systems [5].

- – Propositions were implemented on SpiderMonkey VM's interpreter and baseline JIT and proved to run with real-world benchmarks without any performance regressions.

- **Mozilla**   Remote
  Open-source Contributor   *June 2012 - July 2014*
  - – Primarily contributed to SpiderMonkey - the JavaScript engine. Shipped new ECMAScript 6 features like Array, Map & Set iteration methods, String#repeat, Object.setPrototypeOf, etc.
  - – Implemented a number of JIT optimizations, async I/O in critical paths to reduce browser jank.
  - – Proposed and implemented a deterministic algorithm to analyze the browsing and form submission behavior of the user to detect search forms as a part of *Google Summer of Code 2013*.

PROJECTS

- **Automated Verification of Database Model Validations**
  Advisor: Prof. Jeff Foster   *Oct 2017 - Dec 2017*
  - – Developed a framework to compile database model schema and related methods in Ruby on Rails applications to an equivalent Rosette program, emulating basic database queries with Rosette structs.
  - – Verified database validation predicates hold statically, by discharging them as SMT queries to Z3.

- **Specializing JavaScript Programs**
  Advisor: Prof. Peter Thiemann   *Feb 2014 - May 2014*
  - – Studied program specialization techniques for JavaScript interpreters. Results were added to a JavaScript interpreter written in JS, to type specialize operations by gathering type feedback to make them faster.

TECHNICAL SKILLS

- **Languages:** Ruby, JavaScript, Rust, Python, C, C++, Bash, Racket
- **PL Research Tools:** Coq, Rosette, Z3 SMT Solver
- **Others:** PyTorch, TensorFlow, Numpy, Scikit, Redis, SQL

TALKS

- **Program Synthesis with Lightweight Abstractions:** Berkeley Programming Systems Seminar   *July 2022*
- **Absynthe: From Abstract Interpretation to Program Synthesis:** NJPLS   *May 2022*
- **Overview of Program Synthesis:** Facebook   *August 2021*
- **RBSYN: Type- and Effect-Guided Program Synthesis:** Facebook   *June 2021*

TEACHING EXPERIENCE

- **CMSC430:** Design and Implementation of Programming Languages, *Teaching Assistant*   *Spring 2020, Fall 2019*
- **CMSC433:** Programming Language Technologies and Paradigms, *Teaching Assistant*   *Spring 2018*
- **CMSC216:** Introduction to Computer Systems, *Teaching Assistant*   *Fall 2017*

SERVICE

- **External Review Committee:** OOPSLA   *2023*
- **Artifact Evaluation Committee:** OOPSLA 2023, PLDI 2021, PLDI 2020, POPL 2020
- **Organizer:** UMD's Programming Languages Reading Group   *Fa '22, Sp '20, Fa '19*
- **Application Reviewer:** Admissions Committee, Department of Computer Science, UMD   *Fall 2020*
- **Sub-reviewer:** PLDI 2022, POPL 2021, OOPSLA 2021, POPL 2020
- **Mentor:** Tech+Research track of Technica, world's largest women & non-binary hackathon   *2019, 2018*
- **Organizer:** Machine Learning India Mumbai Chapter Meetups   *2017*