Sankha Narayan Guria

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Education

University of Maryland, College Park, MD — *Aug' 17 - Present*
Ph.D. in Computer Science.
Advisors: Prof. Jeff Foster and Prof. David Van Horn

Indian Institute of Technology Jodhpur, India — *Jul' 11 - Jul' 15*
B.Tech. in System Science.

Publications

Type-Level Computations for Ruby Libraries
M. Kazerounian, *S. N. Guria*, N. Vazou, J. Foster, D. Van Horn. PLDI 2019.

Transparent Object Proxies in JavaScript
M. Keil, *S. N. Guria*, A. Schlegel, M. Geffken, P. Thiemann. ECOOP 2015.

Awards & Achievements

- **Dean's Fellowship:** $5000, University of Maryland — *2017-2018*
- **Summer Dean's Fellowship:** $5000, University of Maryland — *Summer 2018*

Experience

Synthetic Minds
Research Intern — *May '19 - Aug '19*

We protect smart contracts on the blockchain by using formal methods to synthesize their adversaries. I am scaling program synthesis so that we can generate more expressive adversary smart contracts.

University of Maryland
Graduate Student Researcher — *Jun '18 - Present*

- Developing practical type systems and verification tools for Ruby programs, based on RDL.
- Wrote type definitions for the Ruby standard library and database query DSLs (ActiveRecord and Sequel) that helps to type check large scale Ruby on Rails web applications.

BrowserStack
Software Engineer — *Jun '15 - Jun '17*

- 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
Research Intern, Advisor: Prof. Peter Thiemann — *May '14 - Jul '14*

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

Mozilla
Open-source Contributor — *Jun '12 - Jul '14*

- 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 '17 - Dec '17*

- 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 '14 - May '14*

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, C, C++, Python, Bash, Racket
SAT/SMT Solvers: Z3
Research Tools: Coq, Rosette

Teaching Experience

CMSC430: Introduction to Compilers *Fall 2019*

CMSC433: Programming Language Technologies and Paradigms *Spring 2018*
Grading and office hours

CMSC216: Introduction to Systems *Fall 2017*
Discussion classes, grading and office hours