

SUSHANT DINESH

CONTACT INFORMATION

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INTERESTS

My research interests are in **reverse engineering** and its applications to **security**. Through my research I would like to develop novel **binary analysis** techniques (**static and dynamic binary analysis**) and systems to: **automate** reverse engineering, aid in **software exploitation** and mitigation and improve **fuzzing**. In general, I am also interested in any project that involve hacking on low-level code.

STRENGTHS

Skills *IDA, Radare2, GDB, Immunity/OllyDBG, Z3.*

Languages *Rust, C/C++, Python, Ruby.*

EDUCATION

Purdue University

Ph.D. in Computer Science

Fall 2016 - Now

National Institute of Technology Karnataka, Surathkal

B.Tech. in Computer Engineering

August 2012 - June 2016

EXPERIENCE/PROJECTS

Radeco - Decompiler

Radare

Lead Developer

Google Summer of Code (GSoC) – 2016 and 2015

- **Skills Acquired:** System and API design; Design of an intermediate language to encompass features of several assembly languages; Compiler internals; Abstract interpretation in reverse engineering; Type systems; In depth understanding of major architectures such as x86, x86_64 and ARM; Rust.
- Built the project from ground up. I am responsible for design and implementation of this project.
- Salient features include a full type inference system, IL optimizations, C-lang output for decompiled code.
- **Links:** <http://github.com/radare/radeco-lib>; <https://github.com/radare/esil-rs>;

Rune - Symbolic Execution Engine

Developed as a part of Bachelors' Thesis

Lead Developer

2015 – 2016

- **Skills Acquired:** System and API design; In depth understanding of automated analysis and exploitation of binaries; Symbolic execution (Dynamic and Static); Use of SMT solvers in reverse engineering.
- Developed a library in Rust to interact with SMT solvers such as Z3. This library is flexible and reusable with any solver and not restricted to Z3.
- Developed an interactive symbolic execution engine to symbolically execute small pieces of code. Aimed to work with zero code or prior setup!
- Integrated with radare2 to make it a practical tool in a reverse engineer's toolkit.
- **Links:** <http://github.com/sushant94/rune>; <https://github.com/sushant94/libsmr.rs>;

Other Contributions

2012 - Now

- **Skills Acquired:** Workflow of a large professional team working on open source projects; Good coding practices and standards; Code reviews;
- *Contributed to Mozilla's JIT compiler, Ionmonkey.* My contribution improved type information available to the JIT by filtering the TypeSet at test statements. This allows the engine to perform better optimization based on improved type information. This gave a significant improvement in performance in some benchmarks. I also setup the basic infrastructure required to improve the type information at branch statements.
- *Contributed to Mozilla Investigator (MIG).* An open source, non-intrusive endpoint forensic agent. I contributed one module (ping module) which checks the connectivity of end point and a remote host.
- **Links:** <http://goo.gl/hevTiH>; <https://github.com/mozilla/mig/commits?author=sushant94>

OTHER PROJECTS

mpirs – Implementation of MPI in Rust; <https://github.com/sushant94/mpirs>.

Daedalus – Semi-automated cryptanalysis tool for RSA; <https://github.com/sushant94/daedalus>.

MILESTONES

- Presented a talk about radeco in r2con, the first radare2 congress, in September 2016.
Slides: <https://goo.gl/GT108a>; *Talk(YouTube):* <https://goo.gl/9pfnG7>
- Core member of the radare2 dev team since 2015.
- Captain of No Internet Access Capture-the-Flag (CTF) team. We placed within 100 ranks in major CTFs like Boston Key Party and Ghost in The Shellcode in 2015-2016, within a year of our inception.
Team Profile: <https://ctftime.org/team/8096>
- Organized a successful beginner level CTF, ECTF, which attracted participants from all around the world. More than a 100 teams participated in the first edition of this CTF! I was the author of several challenges in ECTF.
- Finalists for Build the Shield, a national level Capture the Flag contest organized by Microsoft.
- Placed 2nd in InCTF, A National Level CTF organized by Amrita University, India.
- Qualified for ACM ICPC Regional Rounds in the 2013-2014.