Deepak Sirone Jegan

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2268 Computer Sciences
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EDUCATION

University of Wisconsin-Madison, Madison, WI
Ph.D., Computer Sciences, August 2019 - March 2025 (Expected)
Advisor: Prof. Michael Swift

Indian Institute of Technology Kanpur, Kanpur, India
Master of Technology, Computer Science and Engineering, August 2017 - June 2019

National Institute of Technology Calicut, Calicut, India
Bachelor of Technology, Computer Science and Engineering, August 2012 - May 2016

RESEARCH SUMMARY

My Ph.D. research has focused on secure system design for cloud based systems drawing on techniques from programming languages, confidential computing and cryptography. I am passionate about building systems that are secure from the ground up.

COMPUTER SKILLS

Languages: C, C++, C#, Python, Scala, Rust, Golang, TypeScript, x86_64 Assembly
Operating Systems: Linux, Windows

EXPERIENCE

Graduate Research Assistant — Under Prof. Michael Swift
August 2019 - Present — UW-Madison

- Proposed a Control Flow Integrity (CFI) technique (**Kalium**) for Severless Applications, based on the network messages that are sent by functions during execution. Protects against novel control flow attacks that cannot be captured using Information Flow Control (IFC) and augments existing Control Flow and Data Flow Integrity techniques by checking the attributes of each network message sent.
- Designed and built a Trigger-Action Platform (**TAPDance**) which processes and forwards asynchronous events correctly, even when all the software on the machines running the Trigger Action Platform has been compromised. We use RISC-V Keystone enclaves for running a custom compiled variant of TypeScript with a low software TCB and a runtime protocol that maintains the invariant that a single event is processed and forwarded only once.
- Designed a Remote Attestation scheme (**Pegasus**) having a strong threat model similar to Intel SGX providing better scalability and a lower TCB for the end user by eliminating the verifier from the attestation protocol. The key idea is to use encrypted TEE binaries which can decrypt itself only inside a TEE running on a genuine CPU owned by the infrastructure provider.

Research Intern — Microsoft - Azure for Operators (OCTO)
May 2021 - August 2021 — Under Dr. Ryan Beckett

- Worked on designing a reachability analysis between nodes in the Azure vWAN network topology based on a tool built on top of the Zen constraint solving library: https://github.com/microsoft/Zen.

Graduate Teaching Assistant — IIT Kanpur
August 2017 - June 2019 — Kanpur, India
Courses TA'ed: (i) Design and Verification of Secure Systems (ii) Computer Systems Security

Software/Systems Engineer 2 — Hewlett Packard Enterprise
September 2016 - June 2017 — Bangalore, India

CONFERENCE PUBLICATIONS

Pegasus: Rethinking Remote Attestation for Cloud Environments (Name Changed)
Deepak Sirone Jegan, Michael Swift, Ethan Cecchetti
(In Submission)

Architecting Trigger-Action Platforms for Security, Performance and Functionality
Deepak Sirone Jegan, Michael Swift, Earlence Fernandes
28th ISOC Network and Distributed Security Symposium (**NDSS '24**)

Guarding Serverless Applications with Kalium
Deepak Sirone Jegan, Liang Wang, Siddhant Bhagat, Michael Swift
32nd USENIX Security Symposium (**USENIX Security '23**)

Functional Analysis Attacks on Logic Locking
Deepak Sirone, Pramod Subramanyan
Design Automation and Test in Europe 2019 (**DATE 2019**)

JOURNAL PUBLICATIONS

Functional Analysis Attacks on Logic Locking
Deepak Sirone, Pramod Subramanyan
IEEE Transactions on Information Forensics and Security (**TIFS 2020**)

INVITED TALKS

- Pegasus: Rethinking Remote Attestation for Cloud Environments, TECHCON 2024, Austin, Texas (Conducted by Semiconductor Research Corporation (SRC))

AWARDS

- **Semiconductor Research Corporation Research Fellowship** - IIT Kanpur
- **Academic Excellence Award** (2017 and 2018) - IIT Kanpur
- **Employee Excellence Award** - Hewlett Packard Enterprise
- **INSA/NASI/IAS Summer Research Fellowship** (2015)-Indian Academies of Science (Awarded to $\sim$ 120 students in Computer Science throughout India)

SERVICE

External Reviewer IEEE S&P 2024

OTHER

Mentor for Incoming Graduate Students at UW-Madison (2022, 2024)