Aritra Sengupta

Curriculum Vitae

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link-to-webpage
US permanent resident

INTERESTS

Program analysis, Neurosymbolic techniques for LLM based developer productivity, AI Agents, parallel and distributed systems software, compilers

I have a consistent track record of autonomously and collaboratively delivering value, by driving industry-scale software, product features with impact, and research papers and artifacts end to end. Experience in leading projects as an applied science manager working closely with product and engineering.

EDUCATION

9/2011–5/2017 **Doctor of Philosophy (Ph.D.)**, *Department of Computer Sc. and Engg.*, The Ohio State University, Columbus, Ohio.
Major: Computer Science and Engg.
Advisor: Prof. Michael D. Bond.
GPA: 3.95/4

6/2004–6/2008 **Bachelor of Technology (B.Tech)**, *School of Computer Science and Engineering, Vellore Institute of Technology University*, Vellore, India.
Major: Computer Science and Engg.
GPA: 9.29/10

SELECTED PUBLICATIONS

Subarno Banerjee, Siwei Cui, Michael Emmi, Antonio Filieri, Liana Hadarean, Peixuan Li, Linghui Luo, Goran Piskachev, Nicolás Rosner, **Sengupta, Aritra**, Omer Tripp, and Jingbo Wang. Compositional Taint Analysis for Large-Scale Policy Enforcement. In *ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering (**ESEC/FSE**)*, 2023.

Michael Emmi, Liana Hadarean, Ranjit Jhala, Lee Pike, Nicolás Rosner, Martin Schäf, **Sengupta, Aritra**, and Willem Visser. RAPID: Checking API Usage for the Cloud in the Cloud. In *ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering (**ESEC/FSE**)*, 2021.

Aritra Sengupta, Tanakorn Leesatapornwongsa, Masoud Saeida Ardekani, and Cesar Stuardo. Transactuation—Where Transaction Meets the Physical World. *Appeared at Usenix Annual Technical Conference (**USENIX ATC**, Awarded Best Paper)*, July 2019.

Aritra Sengupta, Man Cao, Michael D. Bond, and Milind Kulkarni. Legato: End-to-End Bounded Region Serializability Using Commodity Hardware Transactional Memory. In *ACM SIGPLAN International Symposium on Code Generation and Optimization (**CGO**)*, Feb 2017.

Aritra Sengupta, Swarnendu Biswas, Minjia Zhang, Michael D. Bond and Milind Kulkarni. EnfoRSer: Hybrid Static–Dynamic Analysis for Region Serializability. In *ACM Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**)*, March 2015.

TALKS AND PRESENTATIONS

- Presented paper at *FSE* 2021 (virtual)
- Presented paper at *USENIX ATC 2019*, Renton
- Talks on PhD thesis at *AWS, Intel, Samsung Research, Mathworks* in 2017.
- Presented paper at *CGO 2017*, Austin
- Presented paper at *ASPLOS 2015*, Istanbul

- Presented paper at *PPPJ 2015*, Florida
- Presented work at *ACM Student Research Competition, OOPSLA 2015.*
- Presented work at *ACM Student Research Competition, PLDI 2013.*

EXPERIENCE

7/2023–present   **Science Manager and Tech Lead**, *AWS Agentic AI*, Santa Clara, California.
- Leading a team of scientists in high quality and secure code generation for Kiro and Amazon Q leveraging machine learning and program analysis. The work includes training data curation using program analysis and ML, LLM preference tuning for code quality and security, model routing, retrievals (RAG) for code generation, inference optimizations, etc. Rigorous evaluation of LLMs through systematic benchmark creation.

4/2022–06/2023   **Senior Applied Scientist**, *AWS AI*, Santa Clara, California.
- Designed and implemented a modular and scalable version of a program analysis tool with strong abstractions for soundness.
- Implemented scalability techniques to reduce the scope of program analysis while retaining soundness and precision. Leveraged the analysis to launch a high-fidelity analysis as part of an external facing AWS service.
- Led publication of the above work. The paper appeared at FSE 2023.
- Developed techniques to analyze complex program constructs such as higher-order functions, that are typically hard to analyze precisely.

8/2019–04/2022   **Applied Scientist**, *AWS, Automated Reasoning Group then AWS AI*, Cupertino/Santa Clara, California.
- Checking/Enforcing correctness properties at scale on AWS services.
- Designed, built, and productionalized a Java program analysis tool to check properties on code at scale. The tool is currently deployed on analysis that scans every code review at Amazon and as part of multiple external facing AWS services.
- Led publication of the above work end to end. The paper appeared at FSE 2021.
- Designed, built, and productionalized a capability to provide evidence of properties checked that didn't result in detected vulnerabilities. The tool collected meaningful sequence of transitions that led the detector instance to terminate in a "good" state.

7/2017–8/2019   **Senior Research Engineer**, *Samsung Research America*, Mountain View, California.
- Built a reliable IoT application execution system that provides strong guarantees, e.g. keeping soft states/app states consistent with hard states/device states. A simple programming abstraction allows the IoT developer to express consistency requirements which is respected by our runtime. The runtime is built atop Azure serverless functions executing over Cosmos DB.
- Led publication of the above work end to end. The paper appeared at USENIX ATC, 2019. Awarded Best Paper Award!

9/2011–5/2017   **Graduate Research Associate**, *Computer Science and Engineering Department, Ohio State University*, Columbus, Ohio.
Mentor: Michael D. Bond

- Implementation of efficient dynamic and static analysis techniques in JVM compiler and runtime for enforcing strong semantics in concurrent Java programs. Experience in enforcing a strong, always-on and practical memory consistency model on commodity hardware using compiler-runtime techniques and on specialized hardware. Published in conferences [ASPLOS 2015, PPPJ 2015, CGO 2017, OOPSLA 2013, PLDI 2014].

5/2016–8/2016   **Summer Research Intern**, *Microsoft Research*, Redmond, Seattle, USA.
Mentors: Kathryn S. McKinley, Ricardo Bianchini, Sameh Elnikety, Yuxiong He.

- Research on designing dynamic and adaptive scheduling techniques for latency sensitive server systems. Design and implementation of an online technique to detect memory interference amongst coscheduled requests, using hardware performance counters, to automatically manage the server's scheduling, concurrency and intra-request paralellism in order to increase server utilization and reduce tail latency.

Service

- Program committee member for HiPC 2024, 2025
- Program committee member for ASPLOS 2024
- Program committee member for ASPLOS 2023
- Program committee member for OOPSLA 2021.
- Session chair, OOPSLA 2020.
- Program committee member for OOPSLA 2020.
- Reviewer CONCUR 2020.
- Reviewer for journal: IEEE Transactions on Software Engineering(TSE).
- Program committee member for IPDPS 2019.
- External review committee (ERC) member for ASPLOS 2019.
- Reviewer for PACT 2018.
- Reviewer for journal: ACM Transactions on Architecture and Code Optimization(TACO).
- Reviewer for journal: IEEE Transactions on Parallel and Distributed Systems (TPDS).
- Reviewer for journal: Concurrency and Computation: Practice and Experience.
- Member of EuroSys 2018 shadow program committee.
- Member of ASPLOS 2018 shadow program committee.
- Artifact evaluation committee member for PPoPP 2017/CGO 2017.
- Artifact evaluation committee member for PPoPP 2016/CGO 2016.
- Subreviewer for PLDI 2017.
- Subreviewer for PACT 2017.

Interns Managed

- summer 2025 research intern, George Ma, PhD student UC Berkley
- summer 2022 research intern at AWS CodeGuru—Siwei Cui, PhD student at Texas A&M university.
- summer 2021, 2020 research intern at AWS CodeGuru—Ali Nowraiz Khan, PhD student at U.C. Riverside.
- summer 2018 research intern at Samsung Research—Cesar S. Stuardo, PhD student at U.Chicago.

Honors and Awards

7/2019	Awarded the Best Paper Award for Transactuation at USENIX ATC 2019.
2/2017	Awarded a NSF travel grant for presenting at CGO 2017 in Austin, USA
3/2015	Awarded NSF travel grant for presenting at ASPLOS 2015 in Istanbul, Turkey.
2011-2012	Awarded the prestigious 'University Fellowship', graduate student fellowsip, Ohio State University.
2006-2008	Awarded merit certificate and scholarship in three consecutive years 2006, 2007, 2008 for academic performance at Vellore Institute of Technology University, Vellore, India.
2004	Awarded merit certificate for academic performance in Physics, Chemistry and Mathematics in Indian School Certificate Examination.

Technical skills

- Java, Python, Bash, Git
- Asynchronous programming using Node.js—Javascript.
- Tree-sitter
- LLMs for developer productivity
- AI Agents
- Program analysis, Compilers, Concurrency, and Distributed systems

Patents

Please refer webpage for granted and filed patents.