Saswat Padhi

Experienced Systems & Performance Engineer

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Systems engineer and researcher interested in low-level architecture and performance optimization

Employment

Google — Senior Software Engineer — Sep '22 — Present
San Jose, CA — Performance & Virtualization • ChromeOS & Android

- Collaborated on Linux on Android project: guest kernel compilation and boot optimization
- Developed *user-space guest agents* towards launching *virtual machines* for Linux on ChromeOS, replacing the legacy LXD-based *containers*
- Led the *performance analysis & tiering* project in ChromeOS: designed a technique to predict UX metrics from Chromebook hardware specifications, and deployed it as an internal tool
- Presented the prediction technology (patent pending) at NeurIPS (ML4Sys) 2023

Amazon — Applied Scientist II — Aug '20 — Sep '22
Boston, MA — Automated Reasoning Group (ARG) • Amazon Web Services (AWS)

- Led the compiler tooling project for *automated formal verification* of `C` code with loops, integrating CBMC/SMT-based inference with my prior work on invariant learning
- Delivered *memory-safety proofs* for AWS projects including FreeRTOS, s2n, and C Commons
- Collaborated with AWS IoT team on (patented) *static analysis* of events monitoring systems
- Mentored 5 PhD interns; conducted 30+ interviews for full-time candidates

Microsoft — Research SDE (Part-Time Contract via Populus Group) — Oct '17 — Aug '18
Remote, US — Research in Software Engineering (RiSE) • Microsoft Research (MSR)

- Designed a *neural network* to identify data frames in spreadsheets with near-human accuracy
- Deployed the data frame identification (patented) technology internally within Excel
- Prototyped *code synthesis* for Excel: replacing data cells with formulas automatically

Education

Ph. D. — Computer Science — Fall '14 — Spring '20
University of California, Los Angeles (UCLA) • CA, USA

- Specialization: Program analysis · Advisor: Prof. Todd Millstein
- Dissertation: *Data-Driven Learning of Invariants and Specifications*

B. Tech. — Computer Science and Engineering — Fall '10 — Spring '14
Indian Institute of Technology, Bombay (IIT-B) • India

- Graduated with Honors · CPI: 8.9 / 10.0
- UG Thesis: *Static Slicing of First-Order Programs using Demand Transformation*

Publications

Patent Grants & Applications

Amazon — **IoT Event detector correctness verification.**
V B Sharma, A J Gacek, M W Whalen, S Padhi, A Apicelli, R Yadav, S Bayless, R Pruzhanskiy, R Gupta, H Shah, F D Pauer, A Das, D Jaganathan.
⟨ 2024 US 12093160 B1 ⟩

Microsoft — **Systems, Methods, and Computer-Readable Media for Improved Table Identification Using a Neural Network.**
B G Zorn, M M J Brockschmidt, P Choudhury, O Polozov, R Singh, S Padhi.
⟨ 2024 US 12039257 B2 · 2025 US 0068837 A1 ⟩

Microsoft **Syntactic Profiling of Alphanumeric Strings.**
S Gulwani, P Jain, D A Perelman, S Padhi, O Polozov.
⟨ 2019 US 10394874 B2 · 2021 US 11210327 B2 ⟩

Microsoft **Record Profiling for Dataset Sampling.**
D G Simmons, K D J Grealish, S Gulwani, R Kumar, K M Ellis, S Padhi.
⟨ 2020 US 10846298 B2 ⟩

Journals & Conference Proceedings

PLDI '20 **Data-Driven Inference of Representation Invariants.**
A Miltner, S Padhi, T Millstein, D Walker.
⟪ ACM SIGPLAN Distinguished Paper Award ⟫

CAV '19 **Overfitting in Synthesis: Theory and Practice.**
S Padhi, T Millstein, A Nori, R Sharma.

CC '19 **A Static Slicing Method for Functional Programs and Its Incremental Version.**
P Kumar, A Sanyal, A Karkare, S Padhi.

OOPSLA '18 **FlashProfile: A Framework for Synthesizing Data Profiles.**
S Padhi, P Jain, D Perelman, O Polozov, S Gulwani, T Millstein.

PLDI '16 **Data-Driven Precondition Inference with Learned Features.**
S Padhi, R Sharma, T Millstein.

Workshops & Industrial Case Studies

NeurIPS '23 (ML4Sys) **Predicting User Experience on Laptops from Hardware Specifications.**
S Padhi, S Bhasin, U K Ammu, A Bergman, A Knies.
⟪ Invited for Oral Spotlight Presentation ⟫

CAV '23 **Automated Analyses of IoT Event Monitoring Systems.**
A Apicellii, S Bayless, A Das, A Gacek, D Jaganathan, S Padhi, V Sharma, M Whalen, R Yadav.

NeurIPS '20 (CAP) **OASIS: ILP-Guided Synthesis of Loop Invariants.**
S Bhatia, S Padhi, N Natarajan, R Sharma, P Jain.

Preprints & Technical Reports

arXiv **The SyGuS Language Standard Version 2.1.**
S Padhi, E Polgreen, M Raghothaman, A Reynolds, A Udupa.

arXiv **SyGuS-Comp 2018: Results and Analysis.**
R Alur, D Fisman, S Padhi, R Singh, A Udupa.

Selected Awards

UCLA	Outstanding Research in CS Award	2020
PLDI	ACM SIGPLAN Distinguished Paper Award	2020
UCLA	Dissertation-Year Fellowship	2019 — 2020
SyGuS, FLoC	Gold medal; Invariant Synthesis (`Inv`) Competition Winner	2017, 2018
Microsoft	PhD Fellowship	2017 — 2019

Selected Talks

NeurIPS '23 (ML4Sys)	Predicting User Experience on Laptops from Hardware Specifications.	Dec '23
CAV '19	Overfitting in Synthesis: Theory and Practice.	Jul '19
OOPSLA '18	FlashProfile: A Framework for Synthesizing Data Profiles.	Nov '18
PLDI '16	Data-Driven Precondition Inference with Learned Features.	Jun '16

Visiting Positions

Princeton University	Visiting Research Collaborator	Princeton, NJ · Apr '19 — Jun '19
Microsoft Research	Ph.D. Research Intern	Bengaluru, India · Sep '18 — Mar '19
Microsoft Research	Ph.D. Research Intern	Redmond, WA · Jun '17 — Oct '17
Microsoft Corp.	Software Engineering Intern	Redmond, WA · Jun '16 — Dec '16
Google	Summer Intern	Mountain View, CA · May '13 — Jul '13
TU-Braunschweig	Summer Research Intern	Braunschweig, Germany · May '12 — Jul '12

Academic Service

Program / Review Committee	HCVS (at ETAPS) ⟨2022, 2024⟩, PLDI ⟨2020, 2021⟩, SYNT (at CAV) ⟨2021⟩, DebugML (at ICLR) ⟨2019⟩, SyGuS-Comp ⟨2019 – 2021⟩
External Reviewer	JAIR ⟨2024⟩, FoSSaCS ⟨2022⟩, TSE ⟨2021⟩, CAV ⟨2019⟩, ISEC ⟨2019⟩
Artifact Committee	OOPSLA ⟨2018, 2019⟩, POPL ⟨2020⟩, SAS ⟨2019⟩