Swapnil Gandhi

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RESEARCH INTERESTS

I am interested in the system-side problems associated with training, deploying, and operationalizing deep learning models at scale.

EDUCATION

Ph.D. Candidate in Computer Science, *Stanford University*, GPA: 4.0/4.0 Jul 2022 – Present
- Advisor: Prof. Christos Kozyrakis
- Current Research Focus: Efficient fault recovery support for large scale model training

M.Tech. (Research), *Indian Institute of Science (IISc)*, GPA: 9.2/10.0 Aug 2017 – Jan 2020
- Advisor: Prof. Yogesh Simmhan
- Best M.Tech. (Research) Thesis (Honorable Mention) for "Distributed Programming Abstraction for Scalable Processing of Temporal Graphs"

B.Tech. in Computer Engineering, *Bharati Vidyapeeth Pune* Jul 2010 – Jun 2014
- Department Honors and Gold Medalist
- Thesis Title: Mutation Testing Tool for C Programs

PUBLICATIONS

[Papers & Posters available here.]

PEER-REVIEWED CONFERENCES

[1] Swapnil Gandhi, Christos Kozyrakis, "MoEtion: Efficient and Reliable Checkpointing for Mixture-of-Experts Models at Scale", *Under Review*

[2] Swapnil Gandhi, Mark Zhao, Athinagoras Skiadopoulos, Christos Kozyrakis "ReCycle: Pipeline Adaptation for the Resilient Distributed Training of Large DNNs", *In proceedings of the 30th ACM SIGOPS Symposium on Operating Systems Principles (**SOSP 2024**), Nov 2024.*
Acceptance Rate: $43/248 = 17.33\%$

[3] Anand Iyer, Mingyu Guan, Yinwei Dai, Rui Pan, Swapnil Gandhi, Ravi Netravali "Improving DNN Inference Throughput Using Practical, Per-Input Compute Adaptation", *In proceedings of the 30th ACM SIGOPS Symposium on Operating Systems Principles (**SOSP 2024**), Nov 2024.*
Acceptance Rate: $43/248 = 17.33\%$

[4] Swapnil Gandhi, Anand Padmanabha Iyer, "P^3: Distributed Deep Graph Learning at Scale", *In proceedings of the 15th USENIX Symposium on Operating Systems Design and Implementation (**OSDI 2021**), Jul 2021.*
Acceptance Rate: $31/165 = 18.78\%$

[5] Swapnil Gandhi, Yogesh Simmhan, "An Interval-centric Model for Distributed Computing over Temporal Graphs", *In proceedings of the 36th IEEE International Conference on Data Engineering (**ICDE 2020**), Dallas, Texas, April 2020.*
Acceptance Rate: $129/568 = 22.71\%$

PEER-REVIEWED POSTERS

[1] Swapnil Gandhi, "Wave: A Substrate for Distributed Incremental Graph Processing on Commodity Clusters", *2nd ACM Student Research Competition (SRC) at 27th Symposium on Operating Systems Principles (**SRC- SOSP 2019**), Ontario, Canada, Oct 2019.*
Received Bronze Medal, Student Research Competition (Graduate Category)

[2] Swapnil Gandhi, Sayandip Sarkar, Abhilash Sharma, Yogesh Simmhan, "Distributed Querying over Compressed Property Graphs", *Student Research Symposium at 24th IEEE International Conference on High Performance Computing, Data and Analytics (**HiPC 2017**), Jaipur, India, Dec 2017.*
Received Best Student Research Symposium Poster

AWARDS & HONORS

Stanford Computer Science Student Service Award 2024 Jun 2024

Stanford Computer Science Student Service Award 2023 — Jun 2023

NetApp Gold Medal for Best M.Tech (Research) Thesis (Honorable Mention), IISc — Jan 2022
For "Distributed Programming Abstraction for Scalable Processing of Temporal Graphs".

Selected to participate in The Cornell, Maryland, Max Planck Pre-doctoral Research School (CMMRS) 2020, Saarbrücken, Germany — Aug 2020

Bronze Medal, 2nd ACM Student Research Competition (Graduate Category), at SOSP — Oct 2019
For "Wave: A Substrate for Distributed Incremental Graph Processing on Commodity Clusters".

Won 12th IEEE International TCSC Scalable Computing (SCALE) Challenge — May 2019
For "Dynamic Scaling of Video Analytics for Wide-area Tracking in Urban Spaces".

Best Poster Award, 10th EECS Research Students Symposium, IISc Bangalore — Apr 2019
For "Distributed Processing Model For Temporal Graphs".

Invited to attend 3rd RIKEN R-CCS HPC Youth Workshop, Kobe, Japan — Feb 2019

Best Student Research Symposium Poster, IEEE HiPC, Jaipur, India — Dec 2017
For "Distributed Querying over Compressed Property Graphs".

Department Honors, Bharati Vidyapeeth, Pune — Jun 2014
For outstanding academic performance (Batch 2010 – 2014).

TCS Popular Student Project, Bharati Vidyapeeth, Pune — May 2014
For "Mutation Testing Tool for C Programs", Bachelors dissertation.

Best Undergraduate Project Award, TRDDC Annual Students Day, Pune — Apr 2014
For "Mutation Testing Tool for C Programs", Bachelors dissertation.

INDUSTRY EXPERIENCE

NVIDIA, AI Systems Engineering Intern — Jun 2024 – Sep 2024
Internship Mentor: Niket Agrawal
Researched techniques for joint placement and scaling for SLO-aware LLM serving

Microsoft Research India, Research Fellow — Jul 2021 – Sep 2022
Internship Mentor: Anand Iyer
Researched techniques for improving system-wide inference goodput for early-exit deep neural network using heterogeneous resources; led to a paper in SOSP 2024

Microsoft Azure R&D India, Software Engineer II — Mar 2021 – Jun 2021
Worked on query optimization and distributed execution strategies in SQL Server

Microsoft Research India, Research Intern — Sep 2020 – Mar 2021
Internship Mentor: Anand Iyer
Researched how model and data parallelism can be combined with independent graph partitioning for training Graph Neural Networks (GNNs) at scale (P^3); led to paper in OSDI 2021

Microsoft Research India, Research Intern — Mar 2020 – Aug 2020
Internship Mentors: Karthik Ramachandra, Bhargav Gulavani
Investigated and implemented query optimizer modifications to overcome performance regressions in scalar UDF inlined queries; shipped in SQL Server.

PubMatic India, Data Ops Engineer — Jun 2014 – Jul 2016
Worked on reporting and ad-hoc data processing pipelines using combination of Hadoop, Hive, and Pig.

TATA Research Development and Design Centre India, Research Intern — Sep 2013 – Apr 2014
Internship Mentors: Prasad Bokil, Ulka Shrotri, R. Venkatesh
Created prototype mutation testing tool for C programs; used by internal QA teams.

SERVICE

Co-Organizer, Stanford CS Application Assistance Program (SASP) — 2023 – Present
Co-Chair, Stanford CS PhD Admit Weekend — 2023 – Present
Artifact Evaluation Committee (AEC) Member, ACM EuroSys 2023 — Aug 2022 – Oct 2022
Shadow PC Committee Member, ACM EuroSys 2022 — Oct 2021 – Dec 2021

Shadow PC Extended Review Committee Member, ACM EuroSys 2021 — Oct 2020 – Dec 2020
Artifact Evaluation Committee (AEC) Member, USENIX OSDI 2020 — Aug 2020
Artifact Evaluation Committee (AEC) Member, ACM ASPLOS 2020 — Dec 2019
Artifact Evaluation Committee (AEC) Member, ACM SOSP 2019 — Aug 2019
Treasurer and General Secretary for IISc ACM Student Chapter — Apr 2019 – Mar 2020

TEACHING ASSISTANTSHIPS

CS 349D: Cloud Computing Technology, Stanford — Apr 2024
Graduate Teaching Assistant for CS 349D. Handled class discussion, homework assignments and helped with class projects (≈ 30 students).

DS 256: Scalable Systems for Data Science, IISc — Jan 2019
Graduate Teaching Assistant for DS 256. Handled weekly discussion sections, homework assignments and helped with class projects (≈ 25 students).

E0 261: Database Management Systems, IISc — Oct 2018
Covered papers on Google's Spanner and Apache Giraph. (≈ 40 students).

[*CV compiled on 2024-12-30*]