

Adarsh PATIL

PERSONAL DETAILS

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PROFILE SUMMARY

I bring proven research experience at both target-oriented industry labs and blue-skies academic research. My research contributions and publications aim to holistically design next generation systems, specifically memory systems for various application domains and compute paradigms - HPC, AI, serverless. My ethos of application driven hardware research is reflected in all my works, each of which span several aspects of my proficiency

I possess effective technical communication skills and have consistently proven my ability to meet deadlines and achieve project objectives. I work well in a team as well as independently. I am a constant learner, striving to expand my sphere of understanding. My education and industry experience has helped me develop technical capabilities in several adjacent areas within computer systems - operating systems, compilers, JIT libraries, network interconnect, analytical and mathematical modeling.

I am looking for research orientated industry roles in memory and systems architecture.

EDUCATION

- AUGUST 2023 DOCTOR OF PHILOSOPHY
UNIVERSITY OF EDINBURGH, United Kingdom [ARM PhD Fellowship]
Thesis: *Co-designing reliability and performance for datacenter memory*
- JULY 2017 M.TECH. (RESEARCH)
INDIAN INSTITUTE OF SCIENCE, Bangalore, India
Thesis: *Heterogeneity Aware Shared DRAM Cache for Integrated Heterogeneous Architectures*
GPA: 6.33/8.0 - *magna cum laude*
- MAY 2012 BACHELOR OF ENGINEERING
M S RAMAIAH INSTITUTE OF TECHNOLOGY, Bangalore, India
GPA: 9.40/10.0 - *summa cum laude*

WORK EXPERIENCE ~ 4 YEARS

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| Apr 2023 - Current | Postdoctoral Research Associate at UNIVERSITY OF EDINBURGH, UK
Algorithms for next generation cloud systems |
| Aug 2017 - Apr 2019
(1 year 8 months) | Research Scientist at INTEL CORPORATION, Bangalore, India
HPC Ecosystem and Applications Team |
| Jun 2012 - Jul 2014
(2 years 1 month) | Technology Analyst at GOLDMAN SACHS, Bangalore, India
Core Platform Engineering |
| Jun 2011 - Aug 2011 | Summer Analyst at GOLDMAN SACHS, Bangalore, India
Automation workflows for datacenter resource provisioning and error triage |

RESEARCH PUBLICATIONS & TALKS

DSN 2023	\bar{A} pta: Fault-tolerant object-granular CXL disaggregated memory for accelerating FaaS https://adar.sh/apta
ISCA 2021	Dvé: Improving DRAM Reliability and Performance On-Demand via Coherent Replication https://adar.sh/dve
TACO 2017 Best Poster EECS 2017, Presented HiPEAC 2018	HAShCache: Heterogeneity-Aware Shared DRAMCache for Integrated Heterogeneous CPU-GPU Systems https://adar.sh/hashcache-taco
ARM/Ued Conf 2021 (Talk)	Improving Reliability and Performance of Datacenter Systems via Coherence https://adar.sh/arm-ed-conf-2021
UK Systems 2021 (Talk)	FaaS with CXL Disaggregated Shared Memory

PROJECTS

ONGOING PROJECTS	Redesigning datacenter co-ordination services for next generation hardware <ul style="list-style-type: none">• Novel hardware primitives for disaggregated memory• Employing new algorithms for synchronization and scheduling Achieving persistence through replicated disaggregated memory
PROJECTS AT INTEL	Research into high-performance software, hardware, and systems for AI <ul style="list-style-type: none">• Optimized compute libraries for neural networks - libxsmm, MKL-DNN• Architecture specific parallel algorithms - register blocking, vectorization• Datatypes for matrix representation - low-precision, sparsity• Hardware architecture design proposals with a deep understanding of underlying algorithms
PROJECTS AT INDIAN INSTITUTE OF SCIENCE	Address translation overheads in next generation x86 processors <ul style="list-style-type: none">• TLB and Pagewalk performance in multicore architectures with large Die-Stacked DRAM Cache [Tech Report 2015, arXiv] https://adar.sh/caffe-compiler-optimize Program flow prediction in mobile devices <ul style="list-style-type: none">• Accuracy of hardware branch predictor in ARM processors running Android https://adar.sh/BranchPredAndroid Compiler optimization transforms to improve performance on CPUs <ul style="list-style-type: none">• Harris Corner Detection: https://adar.sh/compiler-optimize• Caffe Neural Networks: https://adar.sh/caffe-compiler-optimize Dynamic Scoping for C Language in Clang compiler https://adar.sh/VarMutate
	Database query optimization: Selectivity estimation of predicates in queries <ul style="list-style-type: none">• ESS Dimensions Reduction for Plan Bouquet https://adar.sh/PlanIkebana

PROJECTS AT GOLDMAN SACHS Architect, design and implement solutions of various virtualization & linux technologies spanning datacenter compute, storage, networking

Hardware and OS Performance Benchmarking & Analysis

- Authored an automated benchmarking framework to run and report performance by running test suites on VMs and Baremetals
- Performance analysis & tuning for specialized internal apps (e.g. low Latency, high I/O, memory, network intensive)
- Test Suites – SpecJBB, kmake, blacksholes, Dhystone, Whetstone, Hackbench, Disk tests, Network uperf, lat proc

Linux Containers

- Architecting and implementing Containers for Goldman Sachs Cloud
- Possess a good understanding of underlying technology Namespaces, Cgroups, SELinux, Network configuration, Libvirt API

Thin client desktop VDI solution

- Engineered a Minimized and locked down Linux based solution
- Authored several PyGTK and X11 based applications for remote management, diagnostics, troubleshooting and NEA
- Network booted, kickstart and preseed based unsupervised install
- Engineered a stateless RAM-based network booted system on ARM based hardware

Engineering Nested Virtualization (Bromium vSentry) as a security solution

Vendor Interaction and liaising – Intel, VMware, Redhat

PROJECTS AT M S RAMAIAH INST OF TECH

Spoken language identification using machine learning [Bachelor's dissertation] <https://adar.sh/spokenlang>

SNIDS: An Intelligent & Multiclass Support Vector Machines Based NIDS [ICECIT 2012] <https://adar.sh/S-NIDS>
funded by Defense Research and Development Organization (DRDO), India

Line Birds (game) using OpenGL <https://adar.sh/linebird>
A parallel algorithm for Max Flow Algorithm using Ford-Fulkerson method
Lead developer of a student focused Linux Distro "ANDROMEDA Linux"

ACHIEVEMENTS AND AWARDS

- Founding trustee of Dr. M R Gorbhal Foundation - a charitable organization which aims to promote research in Physics (2022)
- Best Poster at Electrical Science Divisional Symposium at IISc, Bangalore (2017)
- Completed with certificate of distinction several Data Science Courses from Johns Hopkins University on Coursera (2014)
- "Best outgoing achiever (2012)" - Dept. of CSE at M S Ramaiah Institute of Technology
- First Place at National Level Project Competition held at M S Ramaiah Inst. of Tech (2012)
- Second Place at "Random Hacks of Kindness #2" hackathon (2010)

VOLUNTARY POSITIONS HELD

- Informatics Science Communication Group Dec 2021 - Current
- ICSA@Informatics social media communication Sept 2021 - Current
- Teaching assistant/Tutor INF2C-CS, University of Edinburgh Aug 2019 - Dec 2019
- Student System Admin at CSA Department, IISc Aug 2014 - Dec 2016
- Teaching Associate for the CUDA Teaching Centre, sponsored by NVIDIA, at the Department of CSE, MSRIT Jan 2012 - May 2012
- Chairman of VRGLINUX (GNU/Linux users group at MSRIT) 2011-12
Secretary and member of executive committee of IEEE-MSRIT
Influential Member of several committees
(RoboMSR, CodeMSRIT, Assoc. of Computer Engineers)

MISCELLANEOUS

- STRENGTHS**
- Adaptability, Quick learner, Hardworking and Dedication
 - Effective communicator and good leadership skills
 - Always updated with latest technology and trends of market.
 - Analytical and mathematical problem solving ability
- HOBBIES**
- Avid endurance athlete: 2 full and 18 half marathons, stadium runs, 100K cycle
 - Hiking enthusiast - 5 Munros, several Corbetts, coastal and trail walks
 - Blogging and research communication
 - Organizer: HPCA 2024, TEDx, Pycon India, Random Hacks of Kindness
- OTHER LINKS**
- github.com/adarshpatil
in.linkedin.com/in/adarshpatil
- REFERENCES**
- ACADEMIC REFERENCES**
Vijay Nagarajan, PhD Advisor
Professor, University of Edinburgh
vijay.nagarajan@ed.ac.uk
- Prof. R Govindarajan, Master's Advisor
Professor, IISc
govind@serc.iisc.ernet.in
- INDUSTRY REFERENCES**
Bharat Kaul
Director, Intel Parallel Computing Lab

KEYWORDS

✓ Academic research (PhD) ✓ Industrial research experience ✓ Memory architecture ✓ System design
✓ Architectural modeling and simulation ✓ Reliability, availability and serviceability (RAS)
✓ Coherence protocols ✓ CXL, OpenCAPI ✓ Disaggregated memory ✓ Serverless computing
✓ CPU, GPU, SoC architecture ✓ DRAM, HBM, HMC, DDR memory