Pranjali Jain

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Education

University of California, Santa Barbara (UCSB), CA — Sep 2021 – Jun 2026
Ph.D., Computer Science — GPA: **4.0/4.0**

Indian Institute of Technology (IIT), Gandhinagar, India — Jul 2016 – Aug 2020
Bachelor of Technology (Honors), Computer Science and Engineering — GPA: **8.55/10.0**

Experience

Graduate Research Assistant, *UCSB Archlab*, Goleta, CA | Prof. Timothy Sherwood — Jun 2023 – Present
- Collaborated with interdisciplinary teams to execute research on sustainability impacts of computing systems
- Built computer architectural simulation frameworks utilizing state-of-the-art deep learning techniques
- Evaluated emerging technologies to substitute printed circuit boards enhancing performance and sustainability

Software Engineering Intern, *Qualcomm*, Santa Clara, CA | Neeraj Sharma — Jun 2022 – Sep 2022
- Designed and implemented automation framework for reliability testing of Qualcomm WiFi chipset
- Designed the algorithm to enable standalone and reliability testing for 10+ scenarios, created a physical testbed setup, wrote 700+ lines of code in C# to run the algorithm using Qualcomm's internal tools

Embedded Software Engineer, *Enphase Energy*, Bangalore, India | Sesha N. — Aug 2020 – Jun 2021
- Devised new features and wrote 500+ lines of code in C++ for the Envoy platform in the micro-controller for solar energy monitoring, developed APIs to monitor the performance of Envoys
- Analyzed and remotely solved issues in the online platform or onsite installations of Enphase devices at 100+ sites

Undergraduate Research Assistant, *IIT Gandhinagar*, India | Prof. Joycee Mekie — Aug 2018 – Aug 2020
- Designed and simulated 10+ server system cache designs with SRAM cache cells of different cell latencies
- Devised 8 different last-level cache designs for mobile devices with conventional, NVM, and hybrid technologies
- Evaluated performance, density, and energy benefits of different cache designs for 25+ workloads

Research Intern, *SAFARI Group, ETH Zurich*, Switzerland | Prof. Onur Mutlu — May 2019 – Dec 2020
- Collaborated with a team of four to design C/C++-based algorithms for *Efficient Computation of GPU Primitives(5+ operations) leveraging Lightweight Compute Units in L2 cache*
- Characterized 30+ primitive General-Purpose GPU applications to identify suitability for Processing-in-memory

Summer Research Intern, *IIT Gandhinagar*, India | Prof. Manu Awasthi — May 2018 – Jul 2018
- Analyzed the impacts of changing 5+ timing parameters(e.g., read/write time) used to model DRAM-based volatile and STTRAM-based non-volatile memory systems using a C/C++-based main memory simulator *ZSim-NVMain*
- Developed comprehensive documentation and a portable *Docker version* of the simulator

Publications

*Paper titles hyperlinked, * indicates equal contribution*

Quantifying Computing System E-Waste Profiles with ArchTox. Pranjali Jain, Alex Bologna, Dingsheng Li, Timothy Sherwood. — *under submission*

Neural Cache Simulator. Pranjali Jain, Meiru Han, Zhizhou Zhang, Brandon Lee, Jonathan Balkind. — *under submission*

A Framework for Evaluating Sustainability Impacts of Computer Systems beyond Carbon. Pranjali Jain, Jonathan Balkind, Timothy Sherwood. — *under submission*

Toxicity versus Carbon Footprint of Computer Systems. Pranjali Jain, Jonathan Balkind, Timothy Sherwood. ***Workshop on Hot Topics in Ethical Computer Systems*** *at Architectural Support for Programming Languages and Operating Systems* ***(ASPLOS)****, 2024*

Electronic Waste footprint of Computer Systems. Pranjali Jain, Claire Pemberton, Ivan Hernandez, Mariana Rosillo, Samantha West, Jonathan Balkind, Timothy Sherwood. ***Young Architect Workshop*** *at Architectural Support for Programming Languages and Operating Systems* ***(ASPLOS)****, 2024*

HyGain: High Performance, Energy-Efficient Hybrid Gain Cell based Cache Hierarchy. Sarabjeet Singh, Neelam Surana, Pranjali Jain, Joycee Mekie, Manu Awasthi. ACM Transactions on Architecture and Code Optimization **(TACO)**, October 2021

PlantDoc: Dataset for Visual Plant Disease Detection. Davinder Singh*, Naman Jain*, Pranjali Jain*, Pratik Kayal*, Sudhakar Kumawat, Nipun Batra. ACM India Joint International Conference on Data Science & Management of Data **(CoDS-COMAD)**, 2020

NLPExplorer: Exploring the Universe of NLP Papers. Monarch Parmar*, Naman Jain*, Pranjali Jain*, Jayakrishna Sahit*, Soham Pachpande*, Shruti Singh, Mayank Singh. European Conference on Information Retrieval **(ECIR)**, 2020

AgriBot: Agriculture-Specific Question Answer System. Naman Jain*, Pranjali Jain*, Pratik Kayal*, Jayakrishna Sahit*, Soham Pachpande*, Jayesh Choudhary, Mayank Singh. 14th International Conference on Science, Technology, Engineering and Management **(ICSTEM)**, 2019

Research Projects

Project repositories hyperlinked

PFAS Toxicity in Computer Manufacturing | Independent Research | *Python* Jun 2024 – Present
Advisor: Prof. Timothy Sherwood | Collaboration with *Harvard University*
- Conducted a comprehensive analysis to quantify the weight and toxicity impacts of per- and poly-fluoroalkyl substances (PFAS) or Forever Chemicals of interest used in semiconductor manufacturing
- Investigated trade-offs between PFAS toxicity and carbon emissions associated with computer system manufacturing

Consumer-focused Carbon Footprint Analysis | Independent Research | *Python* May 2024 – Present
Advisor: Prof. Timothy Sherwood | Collaboration with *University of Washington*
- Examined the relationship between industry-reported Life Cycle Carbon Impact Assessments of consumer devices and their hardware specifications using Deep Learning algorithms
- Implemented a consumer-centered carbon impact reporting tool to simplify product comparisons and decision-making

Sustainability-aware Power Delivery Network | Independent Research | *C/C++* Oct 2023 – Present
Advisor: Prof. Timothy Sherwood
- Identified passive components with high toxicity impacts in server Printed Circuit Board power delivery mechanism
- Analyzed the frequency and impedance attributes of the power delivery network without specific passive components
- Developed strategies to address inconsistent power supply to the chip while preserving optimal performance

Teaching and Mentoring Experience

Early Research Scholars Program (ERSP) Mentor, *UCSB* Sep 2023 – Jul 2024
Mentored four undergraduate students to conduct computer science research and design an object detection system to identify and count various active and passive components on printed circuit boards of server machines

Graduate Teaching Assistant, *UCSB* Sep 2021 – Jul 2024
Courses: ***Research Mentorship Program*** *(Summer 2024),* ***Computer Architecture*** *(Spring 2022 & Winter 2023 & Spring 2023),* ***Computer Organization and Logic Design*** *(Fall 2022 & Winter 2022 & Spring 2024),* ***Operating Systems*** *(Fall 2021)*

Undergraduate Teaching Assistant, *IIT Gandhinagar* Jan 2019 – Aug 2020
Courses: ***Computer Organisation and Architecture*** *(Spring 2019 & Spring 2020)*

Technical Skills

Languages – Python, C/C++, SQL, Shell scripting, HTML/CSS, Ruby(Rails), Assembly Languages[MIPS]
Frameworks/Tools – Git, Latex, Python Data Science Stack, System Simulators[Gem5, SniperSim], VS Code

Awards and Honors

Received **Travel Grants** to attend **ASPLOS 2024**, **ECIR 2020**, **CoDS-COMAD 2020** Mar 2024
Dean's List for Academic Excellence, IIT Gandhinagar Jan 2017 – Dec 2019
Awarded **Durga Devi Sultania Scholarship** for internship at ETH Zurich, IIT Gandhinagar Apr 2019
Secured a position in **Top 3 Best Papers** for **Agribot** at ICSTEM 2019 among 300+ papers Jan 2019
Received **cash prize of Rs. 25000** by Gujarat state government for Social Good through CS research Jan 2019
Awarded **Bachelor of Arts** degree in **Indian Classical Music** Aug 2014