Pragna Mamidipaka

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I am a systems researcher focused on building abstractions for managing and extending kernel functionality using eBPF. My research focuses on simplifying the design, deployment, and coordination of eBPF programs across distributed systems, with the broader goal of enabling more flexible and robust mechanisms for observability and network stack enhancements in modern operating systems.

Education

Carnegie Mellon University — Pittsburgh, PA, USA
PhD in Electrical and Computer Engineering — *2024-2029*
Advisor : Prof. Theophilus Benson
CGPA : **4.00**/4.00

Indian Institute of Technology, Hyderabad — Hyderabad, India
Bachelor of Technology in Electrical Engineering, with minor in Artificial Intelligence — *2020 - 2024*
CGPA : **9.75**/10.00
President of India Gold Medallist

City International School, Pune — Pune, India
High School and Senior Secondary Education (Science Discipline) — *2007-2020*
Grade 12 : **95%** Grade 10 : **97%**

Awards

Carnegie Institute of Technology Dean's Fellow — Aug 2024 - July 2025
Awarded full tuition support and stipend for one year of PhD study.

President of India Gold Medal — July 2024
For achieving the highest overall CGPA among all graduating B.Tech students at IIT Hyderabad.

Institute Silver Medal — July 2024
For achieving the highest CGPA in the Electrical Engineering Department at IIT Hyderabad.

Academic Excellence Award — Apr 2024, Apr 2022
For achieving the highest CGPA in Electrical Engineering Department at IIT Hyderabad, in the calendar years 2023 and 2021.

Excellence in Innovation Award — Jan 2022
Awarded for being one of top 5 among 1,300 participants in the Road2Shine program, a joint venture by the Indian and Japanese governments.

All India Rank of 3418 in JEE-Advanced — Nov 2020
among 1 Million Candidates taking the test.

Merit Certificate by CBSE — Apr 2018
For scoring in the top 0.1% among 1.7 Million candidates in Science in Grade 10.

Research Projects

Prism - Towards Software Defined Observability — Feb 2025 - Present
with Prof. Theophilus Benson at CMU

Prism rethinks observability through a programmable, modular framework that decouples probe specification from execution. It introduces a reactive programming model, a compiler that tailors eBPF probes based on workload and kernel context, and a runtime for dynamic orchestration of probes.

Characterizing Datacenter Bursts Jun 2025 - Present
with Prof. Theophilus Benson at CMU

This project investigates the nature of microsecond-scale traffic bursts in datacenter networks, and its impact on performance engineering techniques like congestion control and datacenter transport.

Apiary: A Runtime Framework for Distributed eBPF Program Management Aug 2024 -Present
with Prof. Theophilus Benson at CMU

Apiary introduces a new abstraction for writing and managing distributed eBPF applications. Through a classifier–enforcer model, a coordinated runtime, and system-level support for consistent updates and state sharing, Apiary addresses the challenges of programmability, isolation, and lifecycle management in large-scale eBPF deployments.

Leveraging Bytecode Understanding for Debugging eBPF NF Deployments Sep 2023 - May 2024
with Dr. Praveen Tammana and Dr. Ramakrishna Upadrasta at IIT Hyderabad

Developed a tool capable of understanding packet flows in an eBPF program, using only its bytecode. The tool is intended to be used for debugging incorrect or undesired packet behaviours, particularly when the source code is not available.

eBPF Program Registry and Code Summarization Apr 2023 - Dec 2023
with Dr. Palanivel Kodeswaran and Dr. Sayandeep Sen at IBM Research Lab

This was an open-source research effort, aimed at creating a program registry with user friendly access mechanism. We used LLMs to automate summarization of existing code, and Elastic based access mechanism for developing intelligent search capabilities.

Peer Reviewed Publications

Apiary: Distributed Programming and Lifecycle Management for eBPF **(2025)**
N2Women Workshop @ Sigcomm 2025

The Indian Pulsar Timing Array Data Release 2: I. Dataset and Timing Analysis **(2025)**
Publications of the Astronomical Society of Australia.

Low-frequency pulse-jitter measurement with the uGMRT I: PSR J0437–4715 **(2024)**
Publications of the Astronomical Society of Australia.

Application of Efron-Petrosian method to radio pulsar fluxes **(2024)**
Journal of Cosmology and Astroparticle Physics.

Do Pulsar and Fast Radio Burst dispersion measures obey Benford's law? **(2023)**
Astroparticle Physics.

Professional service and outreach activities

Shadow PC Member, ACM CoNEXT 2025
Contributed to reviewing and discussion of submissions as part of the shadow program committee.

Evaluator, Meeting of the Minds – Carnegie Mellon University 2025
Reviewed senior undergraduate research projects and provided constructive feedback as part of CMU's annual research symposium.

Yoga Instructor at CMU 2024 - Present
Teach weekly group yoga sessions as part of CMU's GroupX fitness program.

Volunteer Teacher - National Service Scheme, India 2022-2024
Volunteered as a teacher and motivational lectures lead of Aksharamaala Program in India, imparting knowledge to rural students.

Work Experience

Software Developer May 2023 – July 2023
Arcesium *Hyderabad, India*

Developed an application to analyze the CI/CD workflow in a Dev-Ops setting. This involved extensive work with APIs and dashboards like Apache Superset and Grafana.

Teaching Assistant Jan 2023 - Jun 2023
IIT Hyderabad *Hyderabad, India*

Served as a Teaching Assitant for the Data Science Analysis Course offered at IIT Hyderabad.

Undergraduate Researcher Dec 2022
University of Tokyo *Tokyo, Japan*

Visited UTokyo for a research internship under the guidance of Prof. Kunihiko Sadakane. The project was based on succinctly encoding ordinal trees using tree covering.

Student Member Jun 2022 - Jun 2024
Indian Pulsar Timing Array *Hyderabad, India*

I was a student member of the InPTA Consortium, as part of the Data Reduction team. I also worked with National Centre for Radio Astrophysics for collating legacy data of the uGMRT (Giant Metrewave Radio Telescope).

5G testbed Intern Jan 2022 – Jun 2022
Wisig Networks *Hyderabad, India*

Developed a module to transmit DCI (Downlink Control Information) from gNB Base station to User equipment. Gained knowledge about L2/L3 protocol stack development.