

K. Ashwin Kumar

☎ +91 9886271312 | ✉ ashkumar@cse.iitb.ac.in | 🌐 Website | 📍 Circular Hall, Kresit Building, IIT Bombay, Mumbai

PROFILE

I work with my advisor, **Prof. Mythili Vutukuru** at IIT Bombay on problems in the broad field of networked systems. I am a recipient of the **Microsoft Research India PhD award**. My thesis targets every stage of the virtual network function development pipeline, from specifying and building network functions using a DSL, to accelerating them with application aware request steering. My most recent work involves efficiently extracting application level metrics from these well defined and accelerated NFs. I have also explored buffer placement strategies in the RX path of kernel bypass network stacks with the goal of mitigating the leaky DMA problem.

EDUCATION

R.V College of Engineering

B.Tech in Computer science and engineering; GPA: 8.12

Bangalore, India

Aug 2013 – May 2017

Indian Institute of Technology Bombay

Ph.D in computer science and engineering; GPA: 8.48

Advisor: Mythili Vutukuru

Mumbai, India

Jul 2019 – Present

EXPERIENCE

Perpule

Android Developer

Bangalore, India

May 2017 – Feb 2018

Pitstop

Full Stack Developer

Bangalore, India

Mar 2018 – Dec 2018

IBM Research

Research Intern; Mentors: Palanivel Kodeswaran and Sayandeep Sen

Bangalore, India

Apr 2020 – Aug 2020

- Worked with the Telco cloud group at IBM research India on understanding the effect of novel userspace network stacks on telco workloads.

IBM Research

Research Intern; Mentor: Priyanka Naik

Bangalore, India

May 2021 – Aug 2021

- Worked with the telco cloud group at IBM research India on tuning linux kernel parameters.
- Made an extensive list of parameters present in the linux kernel network stack.
- Studied the effect of tuning these parameters in the linux kernel network stack on various workloads.

PUBLICATIONS

Evaluating Network Stacks for the Virtualized Mobile Packet Core

Ashwin Kumar, Priyanka Naik, Sahil Patki, Pranav Chaudhary, Mythili Vutukuru
5th Asia-Pacific Workshop on Networking (APNet), Virtual, June 2021.

AppSteer: Framework for Improving Multicore Scalability of Network Functions via Application-aware Packet Steering

Ashwin Kumar, Rajneesh Katkam, Pranav Chaudhary, Priyanka Naik, Mythili Vutukuru
IEEE/ACM international Symposium on Cluster, Cloud and Internet Computing (CCGrid), Philadelphia, USA, May 2024.

Feasibility of Application Layer Header Parsing in eBPF and P4

Ashwin Kumar, Abhik Bose, Khushboo Tiwari, Arnav Mishra, Abhishek Dixit, Abuhujair Khan, Mythili Vutukuru
IFIP/IEEE Networking, Thessaloniki, Greece, June 2024.

Pyramis: A Domain Specific Language for Developing Multi-tier Systems

Ashwin Kumar, Ajinkya Tanksale, Armaan Chowfin, Mohan Ajjampudi, Arnav Mishra, Abuhujair Khan, Vishal Saha, Priyanka Naik, Mythili Vutukuru
8th Asia-Pacific Workshop on Networking (APNet), Sydney, Australia, August 2024.

Application layer telemetry in eBPF and P4 (Ongoing work)

Ashwin Kumar, Abhik Bose, Khusboo Tiwari, Arnav Mishra, Abhishek Dixit, Bhunik Sanchaniya, Het Patel, Ratnesh, Patel, Abuhujair Khan, Mythili Vutukuru
Manuscript under review

TALKS & COMMUNITY WORK

Hands-on eBPF session at ACM SIGMETRICS 2022. Conducted a hands-on session on eBPF as part of the PerfNA workshop in ACM SIGMETRICS 2022, held at IIT Bombay. (Jun 2022)

Linux kernel network stack and modern packet processing frameworks. Gave a talk on packet processing frameworks as part of the 'Virtualization and Cloud Computing (CS695)' course taught by Prof. Puru Kulkarni at IIT Bombay. (Apr 2023)

External Review Committee (ERC) member, USENIX ATC 24. Served on the review committee for USENIX ATC 24. (Apr 2024)

Application-aware packet steering Gave a talk on recently accepted work relating to packet steering at University of Pennsylvania, hosted by Prof. Vincent Liu, and at University of Illinois Urbana-Champaign, hosted by Prof. Radhika Mittal. (May 2024)

SKILLS

Languages: C, C++, Java, Python

Frameworks: eBPF, AF-XDP, DPDK, Linux network stack

AWARDS

Microsoft Research India PhD Award, 2024

APNet Travel Grant, 2024