# K Shiv Kumar

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"Engineer with research experience in programmable data plane (P4 and eBPF) and compiler framework (LLVM). Skilled in C++, Python, and systems programming, with expertise in program analysis of low-level eBPF instructions and experimentation. With experience in academic research, I'm eager to deepen my expertise in designing scalable infrastructure with a long-term focus on working with large-scale data centers."

## Education

**IIT Hyderabad - MS(CSE)** — Kandi, Telangana
*Completed 4 years of PhD research (NETX Lab); degree conferred as **MS*** - (GPA: 7.60/10) — 2021–2026
***Research:*** *eBPF, P4 and Compilers*

**IIIT Naya Raipur** — Naya Raipur, Chhattisgarh
MTech (Computer Science and Engineering) - (GPA: 8.78/10) — Jul 2019–Jul 2021

**Shri Shankaracharya Engineering College** — Bhilai, Chhattisgarh
B.E. (Information Technology and Engineering) - (Percentage: 74.48/100) — Mar 2011–Mar 2015

## Technical Skills

**Core:** XDP/eBPF, TC/eBPF, P4, C++, Python

**Libraries and Tools:** Libbpf, bpfman, Mininet, Docker, Kubernetes, Github, VirtualBox

**Frameworks:** BMv2, Tofino, Barefoot Runtime Interface (BRI), LLVM

**Networking Concepts:** Networking fundamentals, Standard network protocols, TCP/IP stack, Linux Networking stack, SDN, Programmable networks, Host networking stack

## Publications and Projects

**"In-Network Probabilistic Monitoring Primitives under the Influence of Adversarial Network Inputs"** | **APNET '23:** (🔗)

- Analyzed vulnerabilities of monitoring primitives in programmable data planes against adversarial inputs.
- Demonstrated FlowRadar pollution attacks where a few malicious flows corrupted telemetry data.
- Quantified attack impact, revealing a 99% drop in FlowRadar's accuracy under targeted adversarial conditions.
- **Tools & Frameworks:** Python, NetworkX, Wireshark.

**"DBVal: Validating P4 Data Plane Runtime Behavior"** | **SOSR '21:** (🔗)

- Developed DBVal, a runtime validation system to detect packet-processing errors in P4 data planes.
- Implemented assertion-based tracking of tables and actions, enabling line-rate validation of runtime behavior.
- **Tools & Frameworks:** Python, P4 language, BMv2, Mininet, Wireshark.

**"Understanding eBPF-based Network Function Behavior from its Bytecode"** | **Under Submission**

- Developed a system to validate the correctness and interactions of third-party eBPF network function bytecode.
- Applied program analysis to extract functional properties of eBPF network functions from the bytecode.
- **Tools & Frameworks:** C++, STL library, LLVM, eBPF/XDP, Libbpf, Linux kernel, bpftool, bpfman.

## Professional Experience

**Application Development Analyst** — Accenture, Pune, India
Mar 2016–Dec 2017

- Contributed to Salesforce development for enterprise clients.

## Certifications

- **Intel Connectivity Academy Level 1** | Issued by: Intel (🔗)
  - Covered data/control plane development with training in advanced parsing, externs in TNA (Tofino Native Architecture), Barefoot Runtime Interface, and Tofino ASIC architecture.

## Awards And Honors

- ACM SIGMETRICS Student grant: For presenting our ongoing research on *"Detecting Adversarial Attacks on Bloom Filters in P4 Data Plane Systems"* (2022). (🔗)
- COMSNETS Travel Grant: For attending the Conference (2022). (🔗)
- Apex Award - Extra Miller, in Accenture India: Recognized for consistently achieving the client objectives (2017).

## Talks And Presentations

**MS, IIT Hyderabad** 2021–2025

- Attended first eBPF Day India workshop organized by IISc and eBPF Foundation (2024). (🔗)
- Conducted a session titled *"Introduction to eBPF"* in a SERB-sponsored Workshop on "SDN: Software Defined Networking Architectures and Applications" at IIIT Kottayam (2023). (🔗)
- Delivered a seminar talk on *"Introduction to eBPF"* in CSE Department seminar series at IIT Hyderabad (2023)
- Presented the work *"Detecting Adversarial Attacks on Bloom Filters in P4 Data Plane Systems"* at the Graduate Forum, PerfNA Workshop, IIT Bombay (2022). (🔗)

## Volunteering And Assistantships

**MS, IIT Hyderabad** 2021–2025

- Teaching Assistant for courses *Computer Networks*, *Advanced Computer Networks* and *Topics in Networks*.
- Volunteered in the *International Conference on Distributed Computing and Networking.* (🔗)
- Volunteered in *ACM Workshop on Research Opportunities in Computer Science.* (🔗)

**MTech, IIIT Naya Raipur** 2020–2021

- Teaching Assistant for courses *Advanced Computer Networks* and *Software Defined Networks*.

## Additional Information

- **Extracurriculars:** Completed 5 KM Run, organized by Heartfulness and FIT India (2023). (🔗)
- **Hobbies:** Reading books, Playing chess, Doing yoga, Running.

## References

**Supervisor: Dr. Praveen Tammana (🔗)**
Assistant professor,
Dept. of CSE,
IIT Hyderabad

**Co-Supervisor: Dr. Ramakrishna Upadrasta (🔗)**
Associate Professor,
Dept. of CSE,
IIT Hyderabad