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Diptyaroop Maji

Doctoral Student, UMass Amherst

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Research Interests

Distributed Systems, Sustainable Computing, Networking

Education

University of Massachusetts, Amherst, *USA* Aug '21 – Present
PhD Student (1st year), College of Information and Computer Sciences *(GPA: 3.70/4)*
Advisor: Prof. Ramesh K. Sitaraman

Indian Institute of Technology, Bombay, *India* Jul '18 – Jun '20
Master of Technology (M.Tech), Dept. of Computer Science and Engineering *(GPA: 9.70/10)*
Thesis: Design, Development and Optimization of the User Plane Function (UPF) Dataplane in 5G
Description: Explored various design options & built a high-performance DPDK-based UPF dataplane (saturated 10 Gbps for various packet sizes while enforcing QoS rules for 16K sessions). Developed two models for the UPF dataplane (Run-to-Completion & Pipeline) as part of thesis.
Advisor: Prof. Mythili Vutukuru

Jadavpur University, Kolkata, *India* Jul '12 – May '16
Bachelor of Engineering (B.E), Dept. of Computer Science and Engineering *(GPA: 8.47/10)*

Research Experience

University of Massachusetts Amherst, *USA*
Graduate Research Assistant *Aug '21 – Present*
Project: CarbonFirst - Decarbonizing Cloud Computing (funded by NSF and VMware).
Description: Our research focuses on making edge and cloud computing carbon free by reducing scope-II carbon emissions over the long term. Currently working on forecasting day-ahead power grid carbon intensity.
Collaborators: Prof. Ramesh K. Sitaraman, Prof. Prashant Shenoy

Indian Institute of Technology Bombay, *India*
Project Engineer *Jul '20 – Jun '21*
Project: Development and optimization of high-performance User Plane Function (UPF) datatplane in 5G.
Description: Developed a high-performance DPDK-based UPF dataplane (saturated 40 Gbps for various packet sizes while enforcing QoS rules for 65K sessions). Also worked on comparing strengths and weaknesses of different hardware and software-based UPF designs based on workloads.
Collaborator: Prof. Mythili Vutukuru

Work Experience

Samsung Research Institute Bangalore, *India*
Senior Software Engineer *Mar '18 – Jun '18*
Software Engineer *Jun '16 – Feb '18*
Project: Feature development in and maintenance of Android Mobile Hotspot for flagship devices.
Description: Worked on feature development and product lifecycle management mainly in Android framework & UX layers, writing code that went into commercialization.
Manager: Farooq Hussain S

Samsung Research Institute Bangalore, *India*
Student Trainee *May '15 – Jul '15*
Project: Concurrent effective utilization of Wi-Fi frequency fands for data sharing in RSDB enabled devices.
Description: Developed a file-sharing application that uses both Hotspot & Wi-Fi of a device simultaneously to create two channels (2.4 & 5GHz) for fast file transfer between two devices.
Mentor: Farooq Hussain S

Teaching Assistantships

Semester	Institute	Course	Instructor
Spring ’20	IIT Bombay	Topics in Virtualization & Cloud Computing	Prof. Mythili Vutukuru
Fall ’19	IIT Bombay	Design and Engineering of Computing Systems	Prof. Umesh Bellur
Spring ’19	IIT Bombay	Computer Networks	Prof. Kameswari Chebrolu
Fall ’18	IIT Bombay	Computer Architecture	Prof. Bernard Menezes

Publications

CarbonCast: Forecasting Day-ahead Grid Carbon Intensity using Machine Learning **Under Review**
Diptyaroop Maji*, Ramesh K. Sitaraman, Prashant Shenoy*

Leveraging Programmable Dataplanes for a High Performance 5G User Plane Function **APNet ’21**
Abhik Bose,* ***Diptyaroop Maji****, Prateek Agarwal, Nilesh Unhale, Rinku Shah, Mythili Vutukuru*
In the 5th Asia-Pacific Workshop on Networking (APNet), June 2021
(** denotes student authors with equal contribution*)

Other projects

Benchmarking of Fast I/O Techniques Jan ’19 – May ’19
Indian Institute of Technology - Bombay

- Compared performance of different fast I/O methods with respect to that of Linux kernel stack for both long and short TCP connections.
- Compared performance of different packet delivery techniques used by fast I/O methods in virtualized (single VM) as well as non-virtualized setup.

Understanding 4G/5G Architectures and Optimizations Jan ’19 – May ’19
Indian Institute of Technology - Bombay

- Studied 4G & 5G architecture and their limitations (both from protocol design and implementation aspects).
- Did a comparative study of the solutions proposed to overcome those limitations and improve dataplane throughput/decrease control plane latency.

Awards and Honors

Awarded **Teaching Assistant of the month** for the Design and Engineering of Computing Systems course at IIT Bombay. Sept ’19
Secured **All India Rank 42** in Graduate Aptitude Test in Engineering (GATE) examination amongst 107893 candidates. Feb ’18
Graduated **First-Class with Honors** from Jadavpur University May ’16