



RESEARCH INTERESTS

Distributed Systems, Sustainable Computing, Networking

EDUCATION

University of Massachusetts, Amherst, USA Aug '21 – Present

PhD Student (3rd year), College of Information and Computer Sciences (*GPA: 3.85/4*)

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.

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*)

PUBLICATIONS

The Green Mirage: Impact of Location- and Market-based Carbon Intensity Estimation on Carbon Optimization Efficacy e-Energy '24

Diptyaroop Maji, Noman Bashir, David Irwin, Prashant Shenoy, Ramesh K. Sitaraman

In the 15th ACM International Conference on Future Energy Systems (e-Energy), June 2024 [To Appear]

Untangling Carbon-free Energy Attribution and Carbon Intensity Estimation for Carbon-aware Computing [pdf] ArXiv, Aug '23

Diptyaroop Maji, Noman Bashir, David Irwin, Prashant Shenoy, Ramesh K. Sitaraman

ArXiv preprint (not peer-reviewed), August 2023

Bringing Carbon Awareness to Multi-cloud Application Delivery [pdf] HotCarbon '23

Diptyaroop Maji, Ben Pfaff, Vipin PR, Rajagopal Sreenivasan, Victor Firoiu, Sreeram Iyer,

Colleen Josephson, Zhelong Pan, Ramesh K. Sitaraman

In the 2nd Workshop on Sustainable Computer Systems (HotCarbon), July 2023

Multi-Day Forecasting of Electric Grid Carbon Intensity Using Machine Learning [pdf] EIR '23 (June issue)

Diptyaroop Maji, Prashant Shenoy, Ramesh K. Sitaraman

In the ACM SigEnergy Energy Informatics Review (EIR) newsletter, June 2023

(*This paper is an extended version of CarbonCast.*)

CarbonCast: Multi-day Forecasting of Grid Carbon Intensity [pdf] BuildSys '22

Diptyaroop Maji, Prashant Shenoy, Ramesh K. Sitaraman

In the 9th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys), November 2022

DACF: Day-ahead Carbon Intensity Forecasting of Power Grids using Machine Learning [pdf] e-Energy '22

Diptyaroop Maji, Ramesh K. Sitaraman, Prashant Shenoy

In the 13th ACM International Conference on Future Energy Systems (e-Energy), June 2022

Leveraging Programmable Dataplanes for a High Performance 5G User Plane Function [pdf] 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)

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 carbon emissions associated with electricity consumption.

Indian Institute of Technology Bombay, India

Project Engineer

Jul '20 – Jun '21

Project: Development and optimization of high-performance User Plane Function (UPF) dataplane in 5G.

Description: Developed a high-performance DPDK-based UPF dataplane Also worked on comparing strengths and weaknesses of different hardware and software-based UPF designs based on workloads.

WORK EXPERIENCE

VMware Research, USA

Research Intern

May '22 – Aug '22

Project: Bringing carbon-awareness to the NSX Avi Global Load Balancer.

Description: Worked on extending the NSX Avi Global Load Balancer to be carbon-aware while making spatial load-balancing decisions.

Mentor: Ben Pfaff

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 bands 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

OTHER PROJECTS

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