

Divyanshu Saxena

(+1) 737 618 0797 • dsaxena@cs.utexas.edu • divyanshusaxena.github.io

Education

Ph.D., Computer Sciences | The University of Texas at Austin | GPA – 4/4 2021–Present
MS/Ph.D., Computer Sciences | University of Wisconsin-Madison | GPA – 3.875/4 2020–2021
B.Tech, Computer Science and Engineering | Indian Institute of Technology Delhi | GPA – 8.14/10 2016–2020

Publications

Divyanshu Saxena, Tao Ji, Arjun Singhvi, Junaid Khalid and Aditya Akella. *Memory Deduplication for Serverless Computing with Medes*. To appear in **EuroSys'22** (Acceptance Rate: 27.95%)

Research Experience

Interests: Serverless Platforms, Resource Disaggregation, 5G and Edge Networks, Large scale networked systems

Dynamic Auto-scaling of Streaming workloads on Serverless October 2021 - Present
UT Austin | Supervisor: Prof. Aditya Akella

- Investigating the benefits of an actor framework to provide fine-grained scaling of streaming applications on serverless platforms.
- Designing generic communication patterns, and scheduling and scaling policies to support various streaming queries.

Memory Deduplication in Serverless Platforms October 2020 - October 2021
UT Austin, UW-Madison | Supervisor: Prof. Aditya Akella

- Investigated the duplication in memory states of containers on serverless platforms, and exploited it for reducing cold starts.
- Designed an efficient deduplication mechanism over dis-aggregated memory - leading to reduced number of cold starts and reduced memory footprints.
- Demonstrated a 10-50% reduction in the number of cold starts leading to up to 3.8X improvements in end-to-end latencies.

Designing adaptive consistency models for Distributed Edge Storage July 2020 - September 2020
Indian Institute of Science, Bangalore | Supervisor: Prof. Yogesh Simmhan

- Worked on a distributed data store over unreliable Edge devices, using a super peer overlay network of Fog Devices.
- Designed an efficient algorithm to find data items within two hops across the network, making use of Bloom Filters for indexing.
- Implemented various session and causal consistency models on top of the Edge data store, to support multiple clients.

Ghost Indexing in Graph Databases April 2019 - May 2020
Indian Institute of Technology, Delhi | Supervisor: Prof. Srikanta Bedathur

- Investigated the utility of adding in-graph indexes over Graph Databases, for the Janusgraph and Neo4J frameworks.
- Implemented the novel idea of *Ghost Vertices* to implement in-graph BPlus-Tree and B-Tree indexes in Graph Databases.
- Demonstrated 2-10X improvement in execution times for range search queries in JanusGraph by using the novel *Ghost Indexes*.

Work Experience

The University of Texas at Austin | Research Assistant with Prof. Aditya Akella August 2021 - Present
Research on serverless platforms; and systems for emerging networks

University of Wisconsin-Madison | Research Assistant with Prof. Aditya Akella January 2021 - July 2021
Research on memory deduplication in serverless platforms

Joint Seat Allocation Authority (JoSAA) | Software Intern February 2020 - October 2020
Developed software for the premier National Engineering Examination of India

IISc, Bangalore | Research Intern with Prof. Yogesh Simmhan July 2020 - September 2020
Designing adaptive consistency models for Distributed Edge Storage

Cohesity | Member of Technical Staff Intern May 2019 - July 2019
Adding Zero Copy Buffer Payloads over gRPC

National University of Singapore | Research Intern with Prof. Andrew Lim May 2018 - July 2018
Designing heuristics for a Two Echelon Vehicle Routing Problem

Selected Projects

Offloading TAS on BlueField SmartNIC | Course Project under Prof. Simon Peter Fall 2021

- Designed an efficient service to offload TAS, a TCP acceleration service, by running the fast and slow paths on the SmartNIC.
- Used RDMA for communication between Host and NIC memory for writing application payload buffers and waking up threads.

RecoverKV: Highly-available strongly-consistent KV-store | Course Project under Prof. Mike Swift Spring 2021

- Designed and implemented a highly-available distributed key-value store that can tolerate upto $n/2$ failures.
- Made use of a custom quorum protocol and replicated logs to develop a performant but strongly consistent store.

Combating Multi-Camera Interference using Carrier Sensing | Supervisor: Prof. Suman Banerjee Fall 2020

- Investigated the loopholes in the current interference mitigation mechanisms for multiple 3D camera environments.
- Drawing inspiration from the CSMA-CA protocol, designed a novel carrier sensing based mitigation mechanism for cameras.
- Demonstrated a 50% reduction in the power amplification needed to capture a 3D image, compared to the existing techniques.

Identifying Shared Accounts in Streaming Services | Course Project under Prof. Srikanta Bedathur Fall 2019

- Implemented Session-based Heterogeneous Embedding (Jiang et al SIGIR'18) to identify different users using the same account.
- Improved the performance of the model by the use of a novel formulation of loss function using KMeans++ Clustering.

Containerization over xv6 Operating System | Course Project under Prof. Smruti R Sarangi Spring 2019

- Implemented a user space implementation of containers over xv6, a UNIX-like educational Operating System.
- Implemented data structures and system calls in the kernel for maintaining resource and file isolation, and fair scheduling.
- Implemented virtual page tables and associated system calls to allow container processes to declare and use variables.

Network Design for Two Echelon Vehicle Routing Problem | Intern@NUS under Prof. Andrew Lim Summer 2018

- Designed and implemented a Neighborhood Search heuristic to route available vehicles, choosing the optimal location of carparks for the Two Echelon Vehicle Routing Problem, an NP-hard combinatorial optimization problem.
- Used clustering and local search to get the solution for the problem, making use of novel operators for defining neighborhood.

Person Counter and Display Device | Supervisor: Prof. Subodh Kumar Summer 2017

- Implemented real-time processing of images to count number of people in a room, using the Beaglebone microprocessor.
- Used multiple Haar cascade classifiers, applied on the same image, to counter the problem of occlusion.
- Conferred the *Design Innovation Summer Award* by the Ministry of Human Resource Development (Government of India).

Scholastic Achievements

- Awarded a **Departmental Scholarship** of USD3000 for the academic session 2020-21 at the UW-Madison.
- Secured **All India Rank 64** in Joint Entrance Exam Advanced - 2016 among 1.5 million applicants.
- Secured **All India Rank 61** in Kishore Vaigyanik Protasahan Yojana (KVPY) - 2015 conducted by IISc Bangalore.
- Secured **All India Rank 1** in FIITJEE Talent Reward Examination (FTRE) - 2014 conducted by FIITJEE Ltd.
- Conferred a nine-year scholarship on qualifying **National Talent Search Examination** (2012), conducted by NCERT.
- Qualified the **National Standard Examination** in Physics (NSEP) and Chemistry (NSEC) in 2016.

Teaching Experience

Teaching Assistant | Programming III, Department TA Position at UW-Madison Fall 2020

Teaching Assistant | Artificial Intelligence, offered by Prof. Mausam at IIT Delhi. Fall 2019

Relevant Courses

Systems.....

Operating Systems, Computer Networks, Relaxed Memory Concurrency, Special Module in High Speed Networks, Distributed Systems, Mobile and Wireless Networking, Datacenters

ML/AI.....

Artificial Intelligence, Machine Learning, Computer Vision, Information Retrieval, Reinforcement Learning

Positions of Responsibility

Class Convener | Elected among 104 students of 2016 Entry Computer Science Batch April 2019 - July 2020

Student Mentor | IIT Delhi June 2018 - May 2019

- Selected as Student Mentor to mentor six Computer Science Freshmen students. Also appointed as **Head Mentor**.