Divyanshu Saxena

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Education

MS/Ph.D, Computer Sciences | University of Wisconsin, Madison | GPA – 4/4 *2020–Present*

B.Tech, Computer Science and Engineering | Indian Institute of Technology Delhi | GPA – 8.14/10 *2016–2020*

Research

Memory Deduplication in Serverless Platforms October 2020 - Present

University of Wisconsin, Madison | Supervisor: Prof. Aditya Akella

- Ongoing work on studying the impact of duplication, in memory states of containers running on Serverless platforms.
- Designed an efficient mechanism for memory deduplication, leading to improved start-up times and reduced memory footprints.

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 2-100X improvement in runtimes for range search queries in JanusGraph by using the novel *Ghost Indexes*.

Network Design for a Modified Two Echelon Vehicle Routing Problem May 2018 - July 2018

National University of Singapore | Supervisor: Prof. Andrew Lim

- 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. Designed novel operators for defining neighborhood.

Selected Projects

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 interference mitigating techniques.

BatCoin: Custom Cryptocurrency from the scratch | Course Project under *Prof. Smruti R Sarangi* *Spring 2020*

- Implemented a fully-functional custom cryptocurrency by simulating processes as nodes of a Blockchain network.
- Implemented Nakamoto consensus on top of the blockchain network and demonstrated byzantine fault tolerance in the system.

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.

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.

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 at the Department of Computer Sciences, 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 scholarship on qualifying **National Talent Search Examination** (2012), conducted by NCERT.
- Qualified the **National Standard Examination** in Physics (NSEP) and Chemistry (NSEC) in 2016.

Work Experience

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

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

Cohesity | Member of Technical Staff Intern — May 2019 - July 2019
Adding Zero Copy Buffer Payloads over gRPC — *Mentor: Mayank Shekhar Narula*

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

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*

Technical Strengths

Languages and Frameworks

Python, C/C++, Java, Go, Bash, SQL, OCaml, Prolog, Javascript, HTML/CSS, VHDL, Verilog

Tools and Platforms

Git, Jupyter, PyTorch, LXC, Docker, Janusgraph, Neo4J, Elasticsearch, Android, Arduino

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**.

Guest Lectures Coordinator | Tryst, IIT Delhi — *November 2018 - March 2019*

- Worked in the Core Team of Tryst'19, the Annual Technical Fest of IIT Delhi and the largest Technical Fest of North India.
- Invited and hosted eminent Personalities, from diverse areas, to deliver guest lectures at Tryst.

Extra Curriculars

DevClub | Software Development Club of IIT Delhi — *March 2017 - February 2020*

- Developed **Study Portal** (a crowd contributed portal to cater to all types of study material requirements of the students) and **Review System** (a fully anonymous peer review system).
- Delivered several lectures on application and software development with the aim to enhance Computer Science culture in campus.

AINA | An Initiative for National Advancement — *September 2017 - January 2020*

- Regular participant in coordination of weekly teaching program, group discussions and rural trips, conducted by the club.

Indian Road Safety Campaign | Secretary, Technical Arm — *January 2017 - May 2018*

- Developed a Road Safety Accidents Data Portal, which was launched by the *Ministry of Road Transport and Highways*, India.
- Collaborated with several Corporations and NGOs to organize technical events, including a Road Safety Hackathon.