

DHYEY THUMMAR

Computer Systems • Networks • Distributed Systems • Computer Architecture

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EDUCATION

Georgia Institute of Technology

M.S. in Computer Science

GPA: 4.00/4

2024-2026

Indian Institute of Technology Gandhinagar (IITGN) [\[Transcript\]](#)

B.Tech., Computer Science & Engineering

CPI: 9.15/10

2020-2024

PUBLICATIONS

Dhyey Thummar, Iram Nawab, Sameer G Kulkarni

Distributed In-band Network Telemetry - In 2023 IEEE/ACM 23rd International Symposium on Cluster, Cloud and Internet Computing Workshops (CCGridW) [\[Publication\]](#)

EXPERIENCES

Research Intern, CalTech | Refining the Gamification Aspects of ZARTH

Mentor: [Dr. Ashish Mahabal](#) | [ZTF Group](#) | [\[Report\]](#) [\[App\]](#)

May'23 - Jul'23

- Developed ZARTH Android App, an augmented reality application for gamifying astronomy, overlaying "transient" objects on the sky covered by stars, planets, and comets.
- Implemented user accounts, leaderboards, and Firebase/Firestore integration in Android Studio with Java, drawing inspiration from successful gamification models like Pokémon GO.
- Optimized algorithms for displaying relevant transient sources using python, utilized Google Analytics, Firebase Analytics, and Google Cloud APIs for user insights.

SELECTED PROJECTS

Research Project | Power-Efficient Resource Allocation for Datacenters

Mentor: [Prof. Ahmed Saeed](#)

Aug'24 - Present

- Designed dynamic resource allocation strategies for datacenters, optimizing the utilization of running, warm, and idle servers while ensuring peak efficiency in autoscaling and load balancing.
- Focused on improving power efficiency by minimizing energy wastage in idle resources, while maintaining high performance and meeting service level objectives (SLOs) through effective workload distribution.
- Investigated innovative energy-aware server management policies to achieve sustainable and scalable datacenter operations, addressing the challenges of high-density computing environments.

Research Project | Characterisation of Different Modes of DPU Operation

Mentor: [Prof. Sameer G. Kulkarni](#) | [\[Report\]](#) [\[Poster\]](#)

Aug'23 - Dec'23

- Conducted a study on NVIDIA's BlueField DPUs, characterizing three operational modes and evaluating four logical modes for latency, throughput, and application benchmarks.
- Assessed DPU performance using kernel IP stack and kernel bypass mode, highlighting competitive latency and throughput in DPU Mode with Hardware Offload. Real-world testing with Nginx, Apache, Twemproxy, and Memtier demonstrated varied performance profiles.
- Concluded that DPU operational mode selection significantly impacts performance, with hardware offload modes exhibiting better throughput and lower latency. Provided insights into potential DPU applications in heterogeneous computing environments.

Research Project | File System Exploration for Client-Server Models

Mentor: [Prof. Abhishek Bichhawat](#) | [\[Report\]](#) [\[Github\]](#)

Jan'23 - Apr'23

- Explored file systems (AFS, WineFS, NFS) for client-server models, targeting user-friendly file management during IITGN's transition to in-house storage.
- Implemented AFS and studied WineFS, focusing on its dual-allocation policy for memory-mapped applications.
- Explored NFS in the client-server model, configured instances, set up client VMs on Ubuntu, and developed a GUI supporting NFS applications. Implemented file viewing, upload/download, and sharing between client IPs, successfully creating a user-friendly interface for distributed file system usage within the IITGN subnet.

Research Project | Comparative Analysis of Data Plane Packet Processing Modes

Mentor: [Prof. Sameer Kulkarni](#) | [\[Report\]](#) [\[Poster\]](#)

Aug'22 - Dec'22

- Conducted a comparative analysis of different modes of packet processing, specifically traditional kernel mode versus the kernel bypass mode (DPDK mode), aiming to optimize data plane packet processing.
- Utilized tools such as DPDK, pktgen, iperf3, etc., for comprehensive performance testing of the different processing modes, evaluating factors like throughput, latency, and resource utilization.
- Demonstrated the limitations associated with kernel mode processing and presented a thorough analysis indicating the significant advantages of kernel bypass mode in terms of performance and efficiency.

Course Project | On The Scalability of Temporal Graph Neural Networks

Mentor: [Prof. Anirban Dasgupta](#) | [Data Science](#) | [\[Report\]](#) [\[Presentation\]](#)

Feb'23 - Apr'23

- Investigated the scalability of Temporal Graph Neural Networks (GNNs) in the context of dynamic graph representation learning, addressing the Catastrophic Forgetting Problem.
- Created a dynamic rainfall network dataset covering daily rainfall data in the Indian subcontinent from 1900 to 2018 and conducted experiments on both static GNNs (GraphSAGE) and a dynamic GNN model (Roland framework).

Course Project | Gossip: Python based Interpreter

Mentor: [Prof. Balagopal Komarath](#) | [Compilers](#) | [\[Github\]](#) [\[Documentation\]](#)

Jan'23 - Apr'23

- Developed a Python-based interpreter/compiler for Gossip-lang, enabling concise and whimsical coding for small projects.
- Implemented features including various data types, lists, assignment, conditionals, loops, static type checking, and exception handling.

TECHNICAL SKILLS

Languages: [Python](#) [C#](#) [Java](#) [C](#) [C++](#) [Go](#) [Verilog](#) [MATLAB](#) [Lua](#) [JavaScript](#)

Utilities: [Unity](#) [DPDK](#) [Bash Scripting](#) [Git](#) [Blender](#) [Xilinx Vivado](#) [DOCA](#) [MATLAB](#) [LTSpice](#) [L^AT_EX](#)

TEACHING EXPERIENCE

- **Teaching Assistant, Computer Networks, IITGN**
 - Conducted tutorial sessions, created assignments, and mentored students on several course projects on topics such as location-restricted form, DPDK based hping, URL filtering tool, etc. *Aug'23 - Dec'23*
- **Teaching Assistant, Compilers, IITGN**
 - Led tutorial sessions and assisted students in building a compiler that compiles a custom language syntax into WebAssembly as part of a semester-long project. *Jan'24 - May'24*
- **Mentor (Academic Discussion), CS301 & ES215, IITGN**
 - Conducted weekly live sessions for solving doubts of students for the course Computer Organisation and Architecture [ES215]. *Jan'23 - May'23*
 - Addressed students' inquiries and clarified concepts related to Operating Systems course [CS301]. *Aug'23 - Dec'23*

ACHIEVEMENTS

- Achieved **All India Rank 444** in the **KVPY (Kishore Vaigyanik Protsahan Yojana)** exam, demonstrating proficiency in Mathematics, Physics, and Chemistry among 1-2 lakh students in India.
- Secured **All India Rank 1358** in the **JEE Advanced** (Joint Entrance Exam) among 1.4 lakh students in India.
- Received the **Dean's List Award for Academic Excellence** consecutively in all academic semesters to date.
- Achieved the **third position** in **IIT Gandhinagar's Annual Cybersecurity Capture The Flag (CTF)** competition.
- Won the IIT Gandhinagar annual hackathon, **Hackrush 2022**, in the **Machine Learning problem statement**.

POSITIONS OF RESPONSIBILITY & EXTRA CURRICULAR

- **Founder & Core Member, Systems Programming Group, IITGN** - Pioneered the establishment of a hobby group dedicated to fostering interest in computer networks and systems programming. *Jul'23 - Dec'23*
- **Secretary, DiGiS, Game Development Club, IITGN** - Organised workshops on Blender, Unity, and other game technologies, as well as events such as GameJams. *May'22 - Mar'23*
- **Events Executive, Blithchron, IITGN** - involved in planning and executing events in Blithchron, entirely student-run annual cultural fest of IIT Gandhinagar. *Jul'21 - Apr'22*
- **Member, Cybersecurity Challenge @ Inter-IIT Technical Meet** *Dec'22 - Feb'23*

RELEVANT COURSES

Computer Networks • Operating Systems • Compilers • Introduction to Data Science • Databases • Discrete Mathematics • Theory of Computation • Computer Organization and Architecture • Data Structures and Algorithms I & II • Digital Systems