

EDUCATION

Georgia Institute of Technology **Georgia, USA** **Aug 2021 – Dec 2022**

- **Master of Science in Computer Science** with specialization in **Computing Systems, GPA - 4.00**
- **Key Courses:** Advanced OS & Networks, Distributed Computing, Machine Learning, Blockchain & Cryptocurrency

Indian Institute of Technology Mandi **Himachal Pradesh, India** **Aug 2015 – June 2019**

- **Bachelor of Technology in Computer Science and Engineering** with Minor in Management, **CGPA: 90.5%**
- **Key Courses:** Systems Practicum, IoT & Cloud, OS & Networks, Database Systems, Data Structures & Algorithms
- **Relevant Coursework** - Large Applications Practicum, Introduction to Communicating Distributed Processes (OS & Networks), Systems Practicum, IoT Systems & the Cloud, Computation for Engineers, Applied Databases Practicum, Information & Database Systems, Mathematical Foundations of Computer Science, Programming & Data Structure Practicum, Advanced Data Structure & Algorithms, Formal Languages & Automata Theory, Probability & Random Processes, Algorithm Design & Analysis, Computer Organization, Paradigms of Programming, Computational Modeling of Social Systems, Map Reduce & Big Data

TECHNICAL SKILLS

- **Programming Languages:** C, C++, Java, Python, TypeScript, Ruby
- **Frameworks:** EFI, ACPI, Docker, Hadoop, Django, ZooKeeper, Kafka, extended Berkeley Packet Filter (eBPF)
- **Other technologies:** MongoDB, MySQL, CC2650 Launchpad, Raspberry Pi, PintOS, Domain Name Server (DNS)

WORK EXPERIENCE

Software Engineer **Meta** **May 2024 – Present**

- Instrumental in developing and maintaining large-scale **Global Load Balancers** that efficiently manage the enormous traffic of approximately 100 Billion QPS from all Meta products - Facebook, WhatsApp, Instagram, Threads & Quest.
- Developed novel load balancing techniques to **optimize 15% reduction in end-to-end latency** for Meta RayBan sunglasses to connect with Meta AI servers.

Software Development Engineer 2 **Amazon AWS** **Jan 2023 – Apr 2024**

- Built the internal authentication services for Amazon employees in the AWS Security organization by upgrading the company's security standard to the newer authentication model of FIDO2 protocol.

Software Engineering Intern **Meta** **May 2022 – Aug 2022**

- Implemented **DNS-over-HTTPS JSON** for the Meta Edge Routing Infrastructure team. The implementation helped the company to extend their DNS service features in parity with that of Google's and Cloudflare's implementation.
- **Reduced 12% mobile app binary size** by eliminating the dependence of language-specific DNS libraries and relying on JSON.

Software Engineer **Microsoft** **Jul 2019 – Aug 2021**

- **Microsoft Surface**
 - Developed the Unified Extensible Firmware Interface (**UEFI**) firmware, and integrated Windows 11 for Holiday 2021 **Surface Pro X** release as the Systems Integration lead. **Led** the team from board bring-up to final manufacturing.
 - Programmed, in collaboration with the Watson telemetry team, an automated bootloader crash dump collection mechanism for **Surface Duo** with crash signatures which greatly improved the variety of telemetry data.
 - **Improved** Windows Firmware Update process for Surface Laptop 3 (AMD-based) and Surface Book 2.
- **Microsoft Outlook**
 - Implemented Add-In APIs for calendar-based Add-Ins and scripts for stress testing Outlook Web Add-In APIs. Designed and implemented a novel Add-In statistics feature for showing useful user statistics of installed Add-Ins.

Software Engineering Intern **Ikarus AI** **Dec 2017 – Feb 2018**

- Designed a software in Python to automatically correct skew of images of documents like PO order forms, passports, etc. by Hough Line Transform method and integrated the same to the backend of AllSpark automation platform

RESEARCH EXPERIENCE

- Invented a first-in-class fault-tolerant distributed system for Formal Concept Analysis by leveraging the resilience of frameworks like ZooKeeper and Kafka using excellent problem solving skills. Published in **Journal on Parallel and Distributed Computing Vol. 179** - <https://doi.org/10.1016/j.jpdc.2023.04.011> The system handles fail-stop failures and provides at-least-once semantics for concept discovery.
- Designed the distributed system on a master-worker algorithm with resilient messaging framework. Developed a novel snapshot mechanism to recover work of failed worker using Hadoop Distributed File System (HDFS).

SELECTED PROJECTS

- **Performance Toolkit for Microservice-based System Experiments** - Created performance monitoring toolkits using eBPF for microservice-based web servers with an aim to eliminate the issue of very long response time of requests.
- **Sharded Key-Value Store** - Developed a **sharded, fault-tolerant** and **scalable** key-value store ensuring ordered messages and garbage collection. Implementing PAXOS for achieving consensus on decisions concurrently.
- **Server Administration and Development Platform** - <https://iitmandi.co.in> - Created an automated web application hosting platform using **Docker containerization** and **automatic load balancing** mechanism in order to support heterogeneous technologies of web applications. Enabled students to seamlessly deploy web apps on the server.
- **The Raft Emulator** - Implemented the **distributed consensus** algorithm, Raft Consensus Protocol, for distributed databases in Golang. The protocol ensures consistency over data in the distributed framework and implemented leader election, and fault tolerance modules within the algorithm under the guidance of **Dr Sriram Kailasam**.
- **Home Automation Network** - Designed and implemented a **home automation network** using IoT devices (CC2650 Launchpad and Raspberry Pi) to create a over 6LowPAN network. Integrated data logging with cloud services using Kafka topic messaging system. The project was completed under the guidance of **Dr Sriram Kailasam** and **Dr Siddhartha Sarma**
- **UEFI VSCode Extension** - Created a Visual Studio Code extension to implement language grammars and keyword definitions of UEFI meta files. The extension also helps UEFI developers to have syntax highlighting for UEFI meta files.
- **Network Spinner of GNOME Polari** - Contributed to open source IRC communication client, Polari, to resolve a customer experience bug with network connection spinner. The spinner was delayed, in network re-connection scenarios, to enhance the user experience.
- **Healthcare Portal** - Designed a healthcare administration portal for hospitals to effectively manage all administrative tasks of the establishment. The web application was created using PHP and MySQL.
- **Blindle - Refreshable Braille Printer** - Designed and built a low cost e-book reader, which is capable of displaying any text document for the visually challenged in braille under the guidance of **Dr Arpan Gupta** and **Dr Tushar Jain**. Integrated the device with a smartphone for the challenged people to read notifications like message and missed call alerts.
- **Server Administration and Development Platform** **Docker Containerization**
Created a web application hosting platform using Docker containerization in order to support heterogeneous technologies of various web applications. Also introduced an automatic load balancing mechanism to handle high number of requests for a busy web application. Currently used on a college club's server.
- **Distributed Formal Concept Analysis** **Java, ZooKeeper, Kafka**
Developed a fault-tolerant distributed algorithm for mining formal concepts and generating a concept lattice for data analysis. In the process of submitting the same to an IEEE journal.
- **Raft Consensus Protocol Implementation** **Golang**
A implementation of the distributed consensus algorithm - Raft Consensus Protocol for distributed databases. The protocol ensures consistency over data in the distributed framework. It uses a centralized approach to achieve this. Implemented Leader Election, Normal Operation and fault tolerance modules within the algorithm.
- **Implementing Priority-based Scheduler in PintOS** **C, Kernel**
Changing scheduler code in PintOS to make use of the Priority based scheduling.
- **Modelling Eating Patterns of Students in the College Cafeteria** **Vensim PLE**
Modelled the eating patterns of the students in college cafeteria, and how it is affected by the canteen with the help of stock flow diagrams. Designed a new stock flow model to describe the factors that might affect peak rush hours of the college cafeteria.
- **Home Automation Network using IoT devices** **C, Python, Lua, Java**

Used IoT devices such as CC2650 Launchpad and Raspberry Pi to create a home automation network over 6LowPAN network and integrate data logging with cloud services using Kafka topic messaging system.

AWARDS, ACHIEVEMENTS AND POSITIONS OF RESPONSIBILITY

- **Microsoft E+D India “Be A Leader” Award, 2020** - Awarded to recognize the “Be Bold and Exceptional” quality in ramping up quickly in the new area of UEFI and leading important feature development in the space of 2 months.
- **Director’s Gold Medal for the year 2019, IIT Mandi** - Awarded by the Board of Governors for the all round proficiency among the graduating batch of Bachelor of Technology students in the year 2019.
- **Academic Secretary, IIT Mandi (2017-2019)** - Served as the academic secretary of the Student Gymkhana of IIT Mandi for two consecutive election terms. Helped design new courses for School of Computing and Electrical Engineering, and developed a derivative of MIT BahFest to encourage academic participation from the students of IIT Mandi.
- **IIT Mandi Representative at Student Leadership Conclave (SLC) (2018)** - Was invited to represent IIT Mandi in SLC 2018 at IIT Gandhinagar. The meeting discussed possible methods to increase collaboration between different IITs.
- **Main Coordinator, Programming Club - IIT Mandi (2017-2018)** - Created and led the application development division, which targeted educating students about best practices of software application development and open source contribution. Organised TopCoder and Media.net Hackathons at IIT Mandi. Improved college participation in Google Summer of Code.
- **Student Mentor, ACM Students Chapter IIT Mandi (2017-2018)** - Worked as a student mentor in the ACM college chapter. Helped increase college’s participation in ACM ICPC competition.
- **Foundation Day Award** - Honored for contributions to the Academic society of IIT Mandi on its 10th Foundation Day.
- **SNTC Award** - Awarded for valuable contributions to Programming Club of the Science and Technology Council, IIT Mandi.
- **AIR 1811, JEE Advanced, 2015** - Secured All India Rank 1811 in the Joint Entrance Exam conducted by the IIT council.
- **Mukhya Mantri Protsahan Yojana, Himachal Pradesh, 2016** - Recipient of the one-time incentive/award of INR 75,000 for the admission in a degree course in Indian Institute of Technology.
- **Scholarship for Higher Education under Innovation in Science Pursuit for Inspired Research (SHE-INSPIRE), 2015** - Received Scholarship for Higher Education for Basic and Natural Sciences courses at B.Sc./Integrated M.Sc. levels by the Gujarat State Education Board and Government of India valued at INR 80,000 per year for five years.
- Qualified for the **Indian National Mathematics Olympiad (INMO), 2014**.

POSITIONS OF RESPONSIBILITY

- **Academic Secretary, IIT Mandi (2017-2019)** - Served as the academic secretary of the Student Gymkhana of IIT Mandi for two consecutive election terms. Helped design new courses for School of Computing and Electrical Engineering, and developed a derivative of MIT BahFest to encourage academic participation from the students of IIT Mandi.
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- **Student Mentor, ACM Students Chapter IIT Mandi (2017-2018)** - Worked as a student mentor in the ACM college chapter. Helped increase college’s participation in ACM ICPC competition. Taught students competitive coding concepts.
- **Student Member, SAE Supra Formula, IIT Mandi (2018-2019)** - Worked as the student member of the SAE Supra Formula team from IIT Mandi. Was responsible of the business and finance presentation of the team during SAE Supra 2018.
- **Event Coordinator, Aavishkar, IIT Mandi (2016)** - Helped organize the freshman technical festival. Hosted and managed a competition with twenty three projects with newspaper and media coverage of the event.
- **Teaching Assistant, Applied Database Practicum (2017)** - Worked with **Dr. Arti Kashyap** to teach freshman undergraduates about relational databases. Also designed and evaluated lab assignments for the course.
- **Teaching Assistant, Introduction to Communicating Distributed Processes (2018)** - Taught junior undergraduates concepts of networking and helped understand multi-threaded race conditions under the guidance of **Dr. Sriram Kailasam**
- **Teaching Assistant, Paradigms of Programming (2019)** - Helped design and evaluate lab assignments for the course

taught by **Dr. Sriram Kailasam**. The lab assignments included implementing different programming paradigms.

EXTRA-CURRICULAR ACHIEVEMENTS

- Represented the IIT Mandi **Soccer** team as the central defender of the first squad. Secured 2nd position with the team in Rann-Neeti (the Inter-college sports festival at IIT Mandi). Also, represented the team in other inter-college competitions.
- Won **gold** medals in 200m sprint, 4×100m relay and 4×400m relay in the IIT Mandi Intra-College **Athletics** Meet 2016.
- Participated in the district level **Kharghar Marathon 2016**. Finished in Top 500 runners.

ACADEMIC ACHIEVEMENTS

- All India Rank - **1811** in JEE (Advanced)
- **CodersBit, Sept 2018** (Contest Held by InterviewBit) - Secured 3rd position among all the students from the college.
- ACM Student Council Member for 2017-18 and SAE SUPRA Member for 2017-19
- Open Source Contribution in GNOME Polari.
- Selected for Indian National Mathematics Olympiad (**INMO**), Indian National Astronomy Olympiad (**INAO**)