

HARSHIT RAJ

Senior Undergraduate · Computer Science and Engineering
Indian Institute of Technology Kanpur

✉ sayhi@harshitraj.xyz · 🌐 harshitraj.xyz
✉ harshit9304@gmail.com · 📞 1-Harshit
☎ (+91) 79922 71701 · in 1-Harshit

EDUCATION

Year	Degree	Institution	CPI/%
2020 - 2024	Computer Science and Engineering	Indian Institute of Technology Kanpur	9.3/10.0
2020	Grade XII - CBSE	Jawahar Vidya Mandir, Shyamali	96.6%
2018	Grade X - CBSE	DAV Public School, Chatra	92.2%

WORK EXPERIENCE

Systems Engineer

May'23 - Jul'23

Quadeye Securities LLP

- Assessed design and working of heaptrack, a **memory profiler**, and resolved crashes occurred while runtime attachment
- Improved **communication time** between heaptrack tracker and interpreter from 2200 ns to 85 ns using shared memory
- Examined working of Google's implementation of malloc, **tcmmalloc** explored potential tunings and compared with glibc
- Reported kernel-level operations of **IO Uring** for faster **non-blocking reads** of large static tick files using **liburing**
- Build a **visualization tool** for real-time financial data, scaled to handle 10 million data points optimally using memory
- Received pre-placement offer as a Systems Engineer based on performance during the summer internship

DevOps Engineer

Jan'23 - Mar'23

Blaze AI

- Spearheaded successful **launch** of the Discord subdivision to enhance customer engagement, especially for web3 products
- Executed the scaling of the database on **Snowflake database warehouse**, boosting its efficiency and performance
- Utilized **AWS Amplify**, **Elastic Beanstalk**, and authored pipelines to streamline **deployment** and log management, resulting in increased productivity and reduced downtime, and integrated **Google Analytics** for enhanced data insights
- Collaborated on **Airflow** and **step functions** to automate scraping and data processing pipelines for cost savings

Product Engineer

Mar'22 - Jun'22

Students' Placement Office, IIT Kanpur

🌐 spo-iitk

- Rolled out **Recruitment Automation System** for use by over **500+ companies** and **2500+ students** every year
- Delivered enhanced security, **scalability**, and achieved an **improvement** in response time by approximately **60%**
- Developed a **microservices-based** backend in **GoLang**, an async mailing system, and a **content delivery system**
- Designed and constructed feature-rich frontend in **NextJS**, including notifications, lazy loading, page-level auth, etc.
- Ideated and wrote **CI/CD** pipelines, orchestrated the system using GitHub Actions, **Nginx** reverse proxy, and **Docker**

RESEARCH EXPERIENCE

Microkernel Design

Dec'22 - Apr'22

Under Prof. Debadatta Mishra

- Conducted extensive research on microkernels, informed by comprehensive analysis of **seL4** papers and codebase, gaining in-depth knowledge of their **design principles** and real-world applications, particularly in security-critical systems
- Designed a **robust microkernel** considering security and minimality of kernel to create a teaching-oriented microkernel
- Implemented a feature-rich microkernel using the **Gem5 simulator**, incorporated crucial functionalities like inter-process communication, virtual memory, and thread management with **user mode console service** and an application
- Expanded the microkernel's capabilities by **exporting** file servers, disk IO, and console to the user space as components

ACHIEVEMENTS

- Secured **All India Rank 934** out of 150K students in JEE Advanced 2020 conducted by IIT Delhi
- Received **Academic Excellence Award** for exceptional academic performance for **three consecutive years**
- Recipient of Vidya Lakshmi Scholarship' 23 by IIT Madras, awarded in recognition of excellent undergraduate student
- Ranked **5th** in Freshers' Programming Contest, a competitive programming contest by Programming Club, IIT Kanpur

KEY PROJECTS

Compiler Design

Feb'23 - Apr'23

Course Project Under Dr. Swarnendu Biswas

🌐 studios-java

- Developed a **Java to x86** compiler from scratch using **Lex** and **Yacc** based on Oracle's SDD specifications in Python
- Implemented a **symbol table**, 3-address code generation, memory and **register allocation**, and **x86 code generation**
- Created a **robust error-handling** system for identifying and reporting **syntax, semantic, and runtime errors**
- Conducted rigorous **testing and debugging** to ensure correct output, collaborated in a team, and documented code

Simulation of Business Processes

Aug'22 - Nov'22


Course Project Under Dr. Deepu Philip

- Presented an executive summary of **performance measures** calculated through **Arena** of a supply chain management
- Analyzed the observations from results from **Monte Carlo Simulations** on a hospital administrative's planning model
- Conducted comprehensive analysis and developed case studies on the components of an efficient **supply chain system**

Digital Alpha SaaS Analyser

Mar'22 - Apr'22

Inter IIT Tech Meet 10.0


 [saas-analyzer](#)

- Developed a **scalable web app** and an **ML pipeline** to analyze SEC Filings and obtain SaaS metrics for companies
- Utilized named entity recognition, window search, and section **summarization** using legal-pegasus to extract metrics
- Built using **ReactJS**, **Flask**, and **MongoDB**, resulting in a high-performance, robust app with intuitive user interface
- Bagged **silver medal** in a **high prep** problem statement contributing to the **overall 2nd position** of IIT Kanpur

Store-it

Jan'22 - Apr'22

Course Project under Dr. Indranil Saha


 [store.it](#)

- Built a **full-stack web app** that aims to **digitize** various physical stores and service providers at the IITK campus
- Developed the web application using **ReactJS**, **JAVA** with **Spring Boot**, and cloud-based **PostgreSQL** on **Heroku**
- Using **plan-driven development**, requirements, and design documents were generated in order and then implemented

IITK Coin

May'21 - Dec'21

SnT Council Project

 [iitk-coin](#)

- Developed an app in **Go** and **React-Native** for centralized reward based **pseudo-coin** system for use by **3000+** users
- Involved database management, hashing and salting, role-based **user authentication**, and session validation (JWT)
- Built robust endpoints to handle **concurrent** transactions, provide clear error responses, and maintain ACID properties

RELEVANT COURSES

Operating Systems	Computer Organization (A)	Compiler Design
Linux Kernel Programming	Computer Networks (A)	Computer Architecture (o)
Parallel Computing (A)	Software Development and Ops (A)	Software Engineering (o)
Principles of Database Systems (A)	Logic in Computer Science	Discrete Mathematics (A*)
Data Structure & Algorithm (A*)	Design and Analysis of Algorithms	Probability in Computer Science (A)
Theory of Computation	Real Analysis (A*)	Complex Analysis (A)
Linear Algebra and ODE (A)	Signal, Systems and Networks	Simulation of Business Systems (A)

A*: Grade for exceptional performance

o: Ongoing Course

SKILLS

Programming: C, C++, Python, Golang, Java, Shell script, SQL, Verilog HDL, MIPS assembly language

Tools and Utilities: Linux shell utilities, Git, GDB, Docker, PostgreSQL, AWS, L^AT_EX, Nginx, Insomnia

POSITIONS OF RESPONSIBILITY

Web Head

Mar'22 - Mar'23


Students' Placement Office

- Spearheaded team of 8, ensuring efficient collaboration, on-time project delivery and smooth inter-team coordination
- Managed maintenance of SPO physical server and Virtual Machine, ensuring seamless operations and minimal downtime
- Designed new infrastructures includes Website, CDN, and portals, improving the overall user experience and efficiency
- Solved critical **networking challenges** while deployment, within Computer Center and SPO internal networks

Senator BT/BS Y20

Mar'21 - Apr'22

Students' Senate

- **Elected** to represent over **1100 students** and participated and contributed to the legislation of Student run bodies
- Organized the PenPal Initiative  to increase interaction among peers which saw participation of over **600 Students**

EXTRACURRICULAR

- Nominated as a **member** of the *Senate Educational Policy Committee*, which considers and reports upon fundamental matters of educational policy, as well as establishes and modifies curricula, academic and research activities, etc
- Helped **six freshmen** adjust to the institute's environment on academic and emotional fronts as a **student guide**
- Mentored over **80 Y21** students in the course *Fundamentals of Computing* and concepts related to programming
- Organized **Media and Publicity** in Techkriti'22, driving successful coverage of events in various media channels
- **Guided** a group of **20** individuals in ACA Project *Introduction to Rust Patterns*