

Pranjal Singh

Dual Degree Student
Computer Science and Engineering, IIT Kanpur

cse.iitk.ac.in/users/prsingh
prsingh@cse.iitk.ac.in

Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2021 - Present	Bachelor of Technology	Indian Institute of Technology Kanpur, Kanpur	9.1/10
2021	AISSCE - CBSE (XII)	K V NAL Campus, Bengaluru	96.6%
2019	AISSE - CBSE (X)	K V NAL Campus, Bengaluru	98.2%#

#Two centums

Scholastic Achievements

- Awarded the Academic Excellence Award for 2021-22 and 2022-23 by the institute
- JEE Advanced 2021 – Secured **All India Rank 216**
- JEE Main 2021 – Secured **All India Rank 413** and scored the highest marks in mathematics in two sessions
- KVPY (SX) 2021 – Secured **All India Rank 131**
- KVPY (SA) 2020 - Secured **All India Rank 434**
- Cleared the **Regional Mathematics Olympiad** in 2019




Work Experience

- R&D Intern at Samsung R&D Institute, Noida (May '24 - Jul'24)
 - Built an on-device NLP model to simplify complicated sentences for better readability
 - Used TikToken for input text tokenization and trained model from scratch using PyTorch
 - Filtered paraphrasing dataset ParaBank by readability to overcome shortage of text simplification datasets
 - Obtained a BLEU score of 72.4 and model size of 80 MB

Coursework

Institute:	Linux Kernel Programming	Parallel Computing	Topics in Operating Systems
	Advanced Compiler Optimizations	Databases	Operating Systems
MOOCs:	Introduction to Psychology (Coursera) [verify]		(Jun '23 - Jul '23)
	Computational Complexity (NPTEL) [verify]		(Jul '23 - Oct '23)
	Multicore Computer Architecture (NPTEL) [verify]		(Jul '23 - Oct '23)

Course Projects

- Analysis of Unified Memory in NVIDIA GPU Drivers (Linux Kernel Programming) [report] (Jan '24 - Ongoing)
 - Analyzed **NVIDIA GPU drivers** to study Unified CPU-GPU Virtual Memory internals and prefetching policy
 - Built two profilers to obtain the cost breakdown of **UVM page fault servicing**
 - Found fault path for page faults and binary tree prefetching policy implementation, which have not been documented
- See-through Base VM Images for QEMU and EXT4 (Topics in Operating Systems) [report] (Aug '24 - Nov '24)
 - Modified **QEMU's block layer** to permit simultaneous writes to VM images and Copy-on-Write disk snapshots
 - Designated block groups to be writable either in the base image or snapshot to prevent overwrites and filesystem corruption
 - **Modified EXT4** filesystem to not use designated block groups for consistency with restrictions at QEMU's block layer
- Survey on Ethereum Smart Contract Optimization Tools (Advanced Compiler Optimizations) [report] (Mar '24 - Apr '24)
 - Studied the **Solidity language compiler** for Ethereum smart contracts and output bytecode for potential optimizations
 - Performed a literature review of open-source optimization and analysis tools
 - Created a test suite of sub-optimal programs to check for specific **data-flow and control-flow analyses/optimizations**
- The Manhathton Project - Python Compiler  (Compiler Design) (Jan '24 - Apr'24)
 - Built a **compiler toolchain** to generate amd64 assembly from Python programs
 - Used GNU **flex**, **bison**, **gcc** and **gdb** for parsing and testing output
 - Implemented function stack, static classes, inheritance, constructors, nested loops and calls to library functions
- Unified Portal for Hall Automation  (Software Development & Operations) (Jan '23 - Apr '23)
 - Built a portal for automating mess and canteen billing, booking guest rooms, housekeeping requests, issuance of sports equipment, booking gym slots and sports courts
 - Documented the software requirement, software design, implementation, testing and user manual
 - Used the Django framework and CSS and did unit, intergration and system testing
- Bubblesort in Verilog  (Computer Organisation) (Mar '23 - Apr '23)
 - Designed a minimal processor in **Verilog HDL** and executed bubblesort on an integer array
 - Created a **Turing-complete instruction set** with logical, arithmetic and branch instructions

Technical Skills

- Certificate course on RISC-V assembly programming from IIT-Roorkee [certificate]
- Programming/Scripting: C, Python, Bash
- Software: Message Passing Interface (MPI), QEMU
- Utilities: **gdb**, **pdb**
- Exposure: C++, SQL, MIPS assembly, amd64 assembly, PyTorch, Verilog HDL, CUDA