Pratham Sahu

Fourth Year Undergraduate
Department of Computer Science and Engineering, IIT Kanpur

spratham21@iitk.ac.in | Prathamsahu52
Website| +91-7619678791| Pratham Sahu

Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2021 - Present	B.Tech	Indian Institute of Technology Kanpur	9.31/10
2021	Karnataka State Board(XII)	St Jerome's PU College, Bangalore	98.3%
2019	ICSE(X)	Vibgyor High, Bangalore	96.4%

Internships and Key Projects

- **Yonsei Vision and Learning Laboratory, Seoul, South Korea** | *Prof. Jonghyun Choi* (*May '23 - Sep '23*)
  Intern Research Assistant
  - Engaged in research on developing efficient deep neural architectures and effective **continual machine learning** algorithms
  - Performed extensive survey on **sampling, improving time and efficiency with limited accuracy loss** of ML algorithms
  - Assessed on developing efficient **coresets for streaming data** to mitigate forgetting in incremental deep learning setups
  - Worked on **incremental classification** to come up with a novel technique to evolve existing methods in **episodic-replay**
- **MSenseAI, Bengaluru** | **Platform Software Engineering Intern** (*Jul '22 - Aug '22*)
  - Implemented open source IoT Platform **ThingsBoard** to add functionalities to suit specific needs of the product
  - Successfully implemented open source JS library **Annotorious** to implement picture annotating on the platform

Competitions and Workshops

- **ISC Student Cluster Competition**
  Prof. Preeti Malakar & Prof. Swarnendu Biswas (*Aug '23 - May '24*)
  - Led a team of 6 third year students in the world's largest student High Performance Computing Competition. Became the **first Indian team**, to get selected to participate in the competition.
  - Optimized the microphysics package in the implementation of **ICON**, using **openACC** directives to make the code portable to CUDA backends, and also parallelization techniques like loop reordering to achieve 20x improvement in performance.
  - Built, ran, visualized and profiled the results and performance of the NekoCFD application, on CPU and GPU backends on the Bridges2 supercomputer. Showed weak scaling and strong scaling for the same.

Selected Projects

- **Controlled Interthread memory sharing in multi-threaded applications**
  Linux Kernel Programming| *Prof. Debadatta Mishra*| Report (*Jan '24 - May '24*)
  - Designed a **novel** memory sharing mechanism for multi-threaded applications to achieve isolation in same address space.
  - Implemented the mechanism on the linux kernel, using modules as well as core kernel code, provided user-space API's.
  - Conducted thorough testing and benchmarking, verifying correctness and assessing memory access time tradeoffs.
  - Received highest marks among all teams for complete implementation of the novel framework in the project.
- **Modelling Performance Variability in HPC Clusters**
  Ongoing Prof. Preeti Malakar|Report (*Jan '24 - current*)
  - Analyzed job interference impact on performance variability in large-scale supercomputers.
  - Characterized supercomputer jobs using profilers(IPMPI), I/O tracing, network tracing, and hardware counters(perf).
  - Designed algorithm to mitigate job interference effects on performance, integrated and simulated on Slurm Scheduler.
  - Received an **A*** for exceptional contributions to research in the field of performance and variability modelling.
- **PuppyLove2.0** | **Programming Club** (*Jan '23 - Apr '23*)
  - Built a cryptographically secure dating application for the campus community which ensured zero-server side knowledge
  - Deployed the application using Kubernetes along with security measures to ward off large scale DOS attacks on the server.
  - Achieved successful registration of 2800 campus residents and around 300 matches being made by our application
- **Scalable Parallel Feature Extraction and Tracking for Large Time-varying 3D Volume Data**
  CS677 Course Project| *Prof. Preeti Malakar & Prof. Soumya Dutta* (*Aug '23 - Nov '23*)
  - Implemented a high performance parallel feature extraction and tracking algorithm for large 3D volume data.
  - Validated the algorithm on large scale datasets and compared the performance with existing state-of-the-art methods.
  - Performed weak-scaling and strong-scaling analysis to evaluate the performance of the algorithm on large scale clusters.
- **CSE-Bubble** | **CS220 Course Project**| *Prof. Urbi Chatterjee* (*Jan '23 - Apr '23*)
  - Implemented a **Verilog hardware description** of a simple **32-bit Processor** featuring ISA, ALU and a memory unit
- **CampusPay** | **CS253 Course Project**| *Prof. Indranil Saha* (*Jan '23 - Apr '23*)
  - Developed the code-base for a website to handle finances and dues for ease of campus community and vendors.
  - Utilised **Django** framework to create the webite's backend, **ReactJS** for the website's frontend and **SQLite** for database
- **Python Compiler** | **CS335 Course Project**| *Prof. Swarnendu Biswas* (*Jan '24 - Apr '24*)
  - Developed an end to end compiler to convert Python code to x86 assembly code. Implemented support for Classes, multilevel inheritence, arrays, non primitive data types, etc.

Relevant Courses

- Online

Computer Architecture	Parallel Computing(A*)	Linux Kernel Programming
Compilers	Computer Organisation	Networks
CUDA programming	Analysis and Design of Algorithms	Data Structtures and Algorithms
Mathematical Logic	Fundamentals of Computing	Undergraduate Project(A*)
Operating Systems	Large data analysis and visualisation(A*)	Theory of Computation
Probability	Introduction to Machine Learning	Software Development and Operations

Scholastic Achievements

- Secured **All India Rank 131** in **JEE Advanced 2021**, conducted by IIT Kharagpur, among 1,50,000 shortlisted candidates
- Secured an **All India Rank of 87** in **JEE Mains 2021**, conducted by **NTA** among 1.1 million candidates
- Secured **AIR 44** in **Indian National Physics Olympiad(INPhO),** in **2021** and made it to **National Selection Camp(IPhO)**
- Secured **AIR 31 Indian National Astronomy Olympiad(IAO),** in **2021** and made it to **National Selection Camp(IOAA)**
- Secured **AIR 19 Indian National Chemistry Olympiad(INChO),** in **2021** and made it to **National Selection Camp(IChO)**
- Recipient of the **Directors Scholarship, IIT Kanpur** in the year 2022 for having an exceptional JEE Advanced rank
- Awarded **KVPY SA 2019** fellowship, securing an **All India Rank 340** conducted by Indian Institute of Science, Bangalore
- Awarded **KVPY SX 2020** fellowship, securing an **All India Rank 148** conducted by Indian Institute of Science, Bangalore
- Received the **Academic Excellence Award** for exceptional academic performance in 2021-22 and 2022-2023 academic session
- Recipient of the **National Talent Search Examination(NTSE) Scholarship** conducted by **NCERT** in 2019

Technical Skills

- **Programming Languages:** C, C++, Python, Java, Javascript, Solidity, RUST, CUDA, DPC++
- **Software and Libraries:** gdb, perf, Tau profiler, Nvidia Nsight, Numpy, Pandas, MatplotLib, MERN stack, Git, NextJS, PyTorch, Django, Kubernetes, Docker
- **Exposure:** Bash, Linux Kernel Programming, VerilogHDL, MIPS, XHR, AJAX, MQTT, GCP

Volunteering

- **Coordinator, Programming Club IITK** (*Mar '23 - Apr '24*)
  Secretary, Programming Club IITK (*Sep '22 - Mar '23*)
  - Managed one of the most active clubs of IIT Kanpur which delves into the multiple domains of programming
  - Worked on open source projects aimed at targetting the campus community such as **StudentSearch** and **PuppyLove**
  - Facilitated coding workshops, training sessions to promote programming culture and events like ICPC and GSoC
- **Student Guide, Counselling Service IIT Kanpur** (*Sep '22 - May '23*)
  - Mentored a group of 6 freshmen academically and emotionally to get acclimatized to the new college environment