Srinjoy Sarkar

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RESEARCH INTERESTS

GPU Memory Systems, Unified Virtual Memory (UVM), Parallel Computing, Heterogeneous Memory Architectures, Computer Architecture, Concurrent GPU Data Structures, Scalable Data Structures, and Performance Optimization for Large-Scale Parallel Workloads.

PUBLICATIONS

Vipin Patel, Srinjoy Sarkar, Swarnendu Biswas, Mainak Chaudhuri. "Designing GPU Data Structures for Efficient Memory Oversubscription." *Proceedings of the ACM Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA), 2026.*

EDUCATION

Ph.D in Computer Science and Engineering 2025 – Present
Indian Institute of Technology (IIT) Kanpur | CPI: 7.57/10

- Specialization in GPU Memory Management

Master's in Computer Science and Engineering 2023 – 2025
Indian Institute of Technology (IIT) Kanpur | CPI: 7.57/10

- Specialization in Concurrent GPU Data Structures and Performance Optimization.
- Thesis: *Designing GPU Data Structures for Efficient Memory Oversubscription* (Supervisor: Prof. Swarnendu Biswas).

B.Tech in Chemical Engineering 2018 – 2022
Heritage Institute of Technology, Kolkata | CPI: 8.83/10

CBSE (Class XII / 10+2) 2018
Bholananda National Vidyalaya, Kolkata | 86.2%

Madhyamik – WBBSE (Class X) 2016
Ramkrishna Vivekananda Mission Vidyabhavan, Kolkata | 87.43%

RESEARCH EXPERIENCE

Master's Thesis – GPU Data Structures for Memory Oversubscription 2023 – Present

Supervisor: Prof. Swarnendu Biswas

Collaborator: Prof. Mainak Chaudhuri

- Identified performance bottlenecks in standard GPU data structures (hash maps, skip lists) when extended to Unified Virtual Memory (UVM) for datasets exceeding GPU DRAM capacity, analyzing fault-handling latency and demand-paging overhead across diverse GPU workloads.
- Designed and implemented optimized GPU data structures that exploit UVM prefetching, reduce page-fault frequency, and improve memory access locality, yielding measurable throughput improvements for large-scale, memory-oversubscribed workloads.

Memory Migration in NVIDIA Open-Source GPU Drivers Spring 2024
Course Project: CS614 Linux Kernel Programming | Mentor: Prof. Debadatta Mishra

- Investigated the fault-handling path triggered during NVIDIA GPU page faults by tracing the open-source NVIDIA kernel module, characterizing fault buffer structures and page-migration mechanisms across 5+ representative GPU workloads.
- Characterized fault-handling latency patterns under different fault types (access counter, prefetch, eviction) to quantify demand-paging overhead under memory pressure scenarios.

Stencil Computation Optimization using MPI Fall 2023
Course Project: CS633 Parallel Computing | Mentor: Prof. Preeti Malakar

- Parallelized a 3D stencil computation across distributed-memory nodes using MPI, assigning each process an independent sub-domain and exchanging halo regions via non-blocking communication primitives.

- Reduced inter-node communication overhead by approximately 35% by introducing a leader-node aggregation scheme that minimizes redundant data transfers across MPI ranks.

TECHNICAL SKILLS

Languages	C, C++, Python (basic), Verilog, HTML, Bash Scripting
GPU / Parallel	CUDA, OpenMP, PThreads, MPI, SIMD / Vector Intrinsics
Systems & Tools	Linux Kernel, NVIDIA UVM Driver, NVIDIA Nsight Compute, NVProf, NVIDIA Nsight Systems, Git, Make, LaTeX

RELEVANT COURSEWORK

- CS610: Programming for Performance
- CS614: Linux Kernel Programming
- CS633: Parallel Computing
- CS220: Computer Organization
- CS771: Introduction to Machine Learning

PROFESSIONAL SERVICE & COMMUNITY INVOLVEMENT

Artifact Evaluation Committee Member 2024 – 2025
MICRO'24 (57th IEEE/ACM International Symposium on Microarchitecture) | OSDI'25 (USENIX Symposium on Operating Systems Design and Implementation)

- Evaluated reproducibility and correctness of research artifacts for two top-tier systems conferences, developing expertise in experimental methodology and rigorous empirical evaluation.

Teaching Assistant, IIT Kanpur 2023 – Present
Department of Computer Science and Engineering

- Programming for Performance (CS610); Analysis of Concurrent Programs (CS636); Compiler Design (CS335); Introduction to Programming (ESC101).

Leadership – Student Governance & Hall Administration 2025 – 2026
IIT Kanpur

- Convenor, Post Graduate Student Advisory Council (PG-SAC 2025–2026).
- Sports and Gym Secretary, Hall of Residence 10 (HEC 2025–2026).

HONORS & ACHIEVEMENTS

- All India Rank 76 in GATE 2023 (Computer Science & Information Technology) — among the top 0.1% of approximately 110,000 candidates nationwide.
- Published at OOPSLA 2026, a SIGPLAN top-tier venue, as a co-first author during Master's.

REFERENCES

Prof. Swarnendu Biswas
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