Saksham Mishra

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Education

Indian Institute of Technology Bombay — **Bombay, India**
B.Tech. Computer Science Engineering — *Aug. 2024 – June 2028*

Achievements

Competitive Programming: Codeforces Peak Rating 1980 (Top 3% Globally, Rank 9 Div 2), Goldman Sachs India Hackathon 2026 Rank 1388 / 16280 (Top 8.5%), MLH HackTU 6.0 Winner

Quantitative Research Projects

TradeCore— High-Throughput C++20 Order Book & Execution Platform

- Engineered a zero-allocation-at-runtime Level 3 order book engine processing raw binary NASDAQ ITCH protocol feeds via MoldUDP64 transport.
- Designed custom arena allocators backed by Linux Huge Pages (2MB/1GB) and thread-safe object pools, eliminating dynamic heap allocations on the critical execution path.
- Implemented lock-free SPSC/MPSC ring buffers with explicit acquire-release memory order fences, benchmarked down to nanosecond-level execution latency using Google Benchmark and Valgrind Cachegrind.

RegimeShift: Market Regime Detection & Dynamic Asset Allocation — Python, HMM, CVXPY

- Designed a market regime detection pipeline using Gaussian Hidden Markov Models with AIC/BIC-based state selection and lookahead-free feature engineering to reduce temporal leakage.
- Implemented regime-aware portfolio allocation using Ledoit-Wolf covariance shrinkage, mean-variance optimisation (CVXPY), and transaction-cost-aware rebalancing across multiple market regimes.
- Evaluated strategy robustness through walk-forward validation, bootstrap significance testing, and automated performance diagnostics with reproducible experiment pipelines.

AQC: Event-Driven Quantitative Research Infrastructure — Python, NumPy, Pandas

- Architected an event-driven research engine integrating portfolio accounting, broker simulation, configurable strategies, and realistic transaction cost modelling.
- Integrated walk-forward optimisation, volatility forecasting (EWMA/GARCH), Hidden Markov Model regime detection, and portfolio diagnostics into a unified research workflow.
- Implemented reusable components for risk management, execution simulation, performance analytics, and validation with 100+ automated tests.

Fault-Tolerant Compute Scheduler — Go, Raft Consensus

- Implemented the Raft consensus protocol for replicated state management(across 100+ simulated nodes), supporting leader election, log replication, snapshotting(under 150ms), and automatic failover across simulated clusters.
- Designed a fault-tolerant scheduling layer with crash recovery and workload distribution for heterogeneous numerical workloads.
- Built an interactive cluster visualisation tool to monitor node health, leadership changes, and task distribution during distributed execution.

High-Performance Monte Carlo Simulation Engine — C++, CUDA

- Developed a CUDA-accelerated Monte Carlo simulation engine using vectorised numerics, cache-aware data layouts, and parallel execution.
- Validated simulation outputs using statistical goodness-of-fit tests and numerical error analysis for relativistic scattering models with residual errors below 10^{-12} GeV.
- Applied importance sampling to improve estimator efficiency and reduce variance by 35% in high-dimensional Monte Carlo integration.

Experience

Fold Inc. — **Remote**
Software Engineering Intern (Systems) — *Jan. 2026 – Present*

- Built distributed code execution infrastructure supporting 5k+ concurrent requests with fault-tolerant state management, workload orchestration, and crash recovery.
- Implemented sandboxed runtime isolation using Docker and gVisor with observability and resilient execution pipelines.

Intelligent Digital Twin (UK-India Collaboration) — **Remote**
Technical Lead — *Aug. 2025 – Present*

- Engineered a multi-agent reinforcement learning simulation platform for supply-chain optimisation using Python and Ray, increasing simulation throughput from 200 to 3.2k steps/sec.
- Led the transition from research prototype to deployable microservices; research accepted at ISDSI-Global 2025.

UbiSys Lab, IIT Jodhpur — **Jodhpur, India**
Research Intern — *May 2025 – Aug. 2025*

– Engineered a high-frequency telemetry collection pipeline sampling IMU streams at 200Hz with sub-5ms jitter for edge-device behavioural analysis.
– Built a self-supervised representation learning pipeline optimised for ARM deployment and validated it across 10k+ telemetry sessions.

Technical Skills

Languages: C++, Python, Go, SQL

Quantitative Finance: Market Regime Detection, Backtesting, Portfolio Optimization, Time Series Analysis, Statistical Modeling, Monte Carlo Methods

ML & Optimization: PyTorch, TensorFlow, Reinforcement Learning, Representation Learning, Optimization

Systems: Docker, Kubernetes, gRPC, Linux, Prometheus, CUDA

Leadership

AlgoQuant Club (AQC) — Founder & General Secretary *Sep. 2025 – Present*

- Founded and lead the university's quantitative finance community, mentoring students in systematic trading, statistical modeling, derivatives, and quantitative research.

Microsoft Student Learn Chapter — Technical Coordinator — (15k+ user events)

- Architected platforms for E-Summit '26 and Makeathon8 handling 15000+ users; mentored 150+ juniors on AI/ML, Golang and React.js workshops.