

# SAPTARSHI BHOWMIK

## HIGH PERFORMANCE COMPUTING (HPC) & AI SYSTEMS ENGINEER

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### EDUCATION

- PhD in Computer Science** | Florida State University, Tallahassee, FL | **GPA:** 3.9 **May 2025**
- Masters in Computer Science** | Jadavpur University, India | **GPA:** 4.0 **Jul 2016**
- Bachelors in Computer Science** | West Bengal University of Technology, India | **GPA:** 4.0 **Jun 2014**

### EXPERIENCE

**Graduate Research and Teaching Assistant** | Florida State University, Tallahassee, FL **Aug 2017 - Present**

- Improved HPC network performance by 15% by optimizing interconnect topologies, reducing latency and boosting bandwidth efficiency
- Achieved 95% classification accuracy by developing a neural network-based system to analyze and categorize HPC network flows
- Increased job scheduling efficiency by 20% through the implementation and fine-tuning of SLURM for large-scale HPC workloads
- Reduced cluster downtime by 25% by streamlining cluster management processes using integrated OpenHPC tools and automation scripts

**Intern** | Lawrence Livermore National Laboratory, Livermore, CA **May 2019 - Aug 2019**

- Simulated 1000+ node multi-GPU HPC systems using C/C++ with Tracer-CODES, enabling accurate performance modelling at scale
- Amplified data transfer efficiency by 25% by profiling and optimizing low-level NIC scheduling algorithms in multi-GPU supercomputers
- Improved GPU communication throughput by 30% by identifying and resolving interconnect bottlenecks through performance analysis
- Achieved 90% simulation accuracy by validating modeled results against real-system benchmarks, supporting data-driven system design

**Intern** | Lawrence Livermore National Laboratory, Livermore, CA **May 2018 - Aug 2018**

- Validated interconnection topologies in Tracer-CODES across 3+ MPI applications (Kripke, Laghos, SW4lite), ensuring robust simulation coverage
- Achieved simulation accuracy within 10% of actual system performance, significantly enhancing model reliability for HPC network analysis
- Analyzed 1,000+ simulation runs to benchmark communication efficiency and latency patterns in complex MPI-based HPC workloads
- Reduced topology validation time by 20% by automating performance comparisons, detailed data analysis, and verification processes

**Intern** | VMware, India **Jul 2015 - Jan 2016**

- Developed an automated, scalable analysis tool for efficient VM migration in DRaaS platforms, reducing manual diagnostics by 40%
- Improved failure analysis time by 12% by leveraging Python 3, VMware vSphere, and ESXi to automate data collection and analysis
- Analyzed over 500 detailed VM migration logs to identify patterns, optimize recovery workflows, and minimize downtime risks
- Heightened disaster recovery efficiency by 15% by identifying and resolving key virtualization bottlenecks across PaaS environments

### PROJECTS

**Evelyn, Lead Developer** | Web-based chatbot on LLM and Memory **2024**

- Developed an AI-powered educational chatbot using LLM APIs and prompt engineering to deliver personalized, adaptive learning experiences

**Pysim, Lead Developer** | Python HPC Modeling Library **2023**

- Implemented a synthetic MPI trace generator and designed Dragonfly and Fat-tree interconnect models within the Pysim HPC library

**TraceR, Developer** | TraceR is a tool that replays traces to predict HPC network performance on interconnection networks **2022**

- Collaborated closely with the TraceR team to troubleshoot and enable compute region recording for HPC applications within the tool

### ADDITIONAL DETAILS

- Building and Deploying Deep Learning Applications with TensorFlow - LinkedIn Learning Certification
- Infrastructure expertise: Proven ability to design, deploy, and manage HPC, networking, storage, and cloud solutions

### PUBLICATIONS

- Exploiting Software - Defined Networking Technology for Improving UGAL Routing in Dragonfly Networks | CCGRID, 2025
- Evelyn AI - A Large Language Model-powered Virtual Student Agent for Pre-service Teacher Training in Virtual Environments | ECTEL, 2024
- Multi-Path Routing in Jellyfish Networks | IPDPS 2021

### TECHNICAL SKILLS

- Visualization & Analysis:** Jupyter, Matplotlib, Seaborn, Vampir, OTF2 | **Software-Defined Networking:** SDN, BGP, OSPF, TCP/IP
- Programming & Scripting:** Python, C/C++, Bash, Shell, PowerShell | **OS & Platforms:** Ubuntu, CentOS, Red Hat, UNIX/Linux APIs
- HPC & Networking:** MPI, OpenMP, SLURM, Tracer, Vampir, InfiniBand, Ethernet, Benchmarking
- AI/ML Tools:** PyTorch, Scikit-learn, Keras, NumPy, Pandas, FAISS, Langchain, OpenAI APIs
- DevOps & Automation:** Git, CI/CD, Docker, Singularity, Ansible, Puppet, Kubernetes
- Cloud & Virtualization:** AWS, Azure, GCP, VMware vSphere & ESXi

### CORE COMPETENCIES

High Performance Computing (HPC) Architecture & Simulation | Software-Defined Networking (SDN) | Machine Learning & AI System Integration | Cloud Infrastructure & Virtualization | Network Topology Optimization & Benchmarking | Generative AI | LLM-based System Development | Performance Profiling | Metrics Analysis | HPC Interconnect Design & Analysis | Cluster Management and Workload Scheduling (OpenHPC, SLURM) | Containerized Environments for Research & Deployment | Multi-GPU System Simulation | NIC Scheduling | End-to-End Project Leadership in Research and Development | Educational Tool Development using Generative AI | Analytical and Problem - Solving Mindset | Collaboratively in Cross - Functional Teams | Excellent Communication | Time management