

ABRAR HOSSAIN

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EDUCATION

The University of Toledo

Master's, Computer Science, GPA 3.90/4.00

Toledo, Ohio

August 2023 – August 2025

Chittagong University of Engineering and Technology

Bachelors, Electrical Engineering, GPA 3.23/4.00

Chittagong, Bangladesh

March 2015 – September 2019

EXPERIENCE

Intern

June 2025 – August 2025

National Center for Supercomputing Applications

Urbana, IL

- Built parser for eBPF maps for 80+ VLANs and ports with configurable polling intervals via REST API
- Integrated with InfluxDB for efficient storage and Grafana for real-time visualization
- Added configurable logging, reducing manual reconfiguration time by 40%

Graduate Research Assistant

August 2023 – Present

The University of Toledo

Toledo, OH

- Developed TARDIS, a power-aware HPC scheduler using GNNs, cost reduction: 18% (temporal), 10-20% (spatial)
- Developed LASP, a MAB-based HPC tuner on edge devices, achieving 2.5% average performance gain over default
- Developed a SST-based scalable job scheduler, ensuring high accuracy in wait times, node usage, parallelization

Visitor

August 2024 – December 2024

NSF National Center for Atmospheric Research

Remote

- Set up CouchDB, Chords, and Streampipes on ACCESS Jetstreams for community weather data storage
- Built data orchestrator for efficient data routing, achieving 39% transmission efficiency gain
- Reduced deployment costs by 22% for communities implementing the project

Intern

May 2024 – August 2024

NSF National Center for Atmospheric Research

Boulder, CO

- Designed private LoRa network for 6+ data types with Raspberry Pi gateways and central server.
- Improved wind forecasting with edge-ML, achieving 26% accuracy gain on Raspberry Pi
- Image analysis with TensorFlow, 23% accuracy gain, 3x faster training, and 93% precision on 10,000+ images

PUBLICATIONS

[Paper] • Abrar Hossain, Abdel-Hameed Badawy, Mohammad Atiqul Islam, Tapasya Patki, Kishwar Ahmed. **HPC Application Parameter Autotuning on Edge Devices: A Bandit Learning Approach (HiPC 2024)**

[Paper] • Abrar Hossain, Abubeker Abdurahman, Mohammad Atiqul Islam, Kishwar Ahmed. **Power-Aware Scheduling for Multi-Center HPC Electricity Cost Optimization (JSSPP 2025)**

[Paper] • Abubeker Abdurahman, Abrar Hossain, Kevin A Brown, Kazutomo Yoshii, Kishwar Ahmed. **Scalable HPC Job Scheduling and Resource Management in SST (WSC 2024)**

[Paper] • Tasnimul Hasan, Abrar Hossain, Mufakir Qamar Ansari, Talha Hussain Syed **Enhanced Intrusion Detection in IIoT Networks: A Lightweight Approach with Autoencoder-Based Feature Learning (IoTBDS 2025)**

[Paper] • Abubeker Abdurahman, Arihant Singh, Abrar Hossain, Kishwar Ahmed. **A Hands-On Approach To Teaching Parallel and Heterogeneous Computing (EduHiPC 2024)**

[Poster] • Abrar Hossain, Kishwar Ahmed. **CROSS- HPC System Bayesian Optimization with Adaptive Transfer (CLUSTER 2025)**

[Poster] • Abrar Hossain, Kishwar Ahmed. **Automating HPC Model Selection on Edge Devices (SC 2023)**

[Poster] • Abrar Hossain, Keith Maull, Agbeli Ameko. **Environmental Data Sensing and Monitoring System Using Community-based Private LoRa Network (AGU 2024)**

[Paper (Under Review)] • Abrar Hossain, and Kishwar Ahmed. **Bandwidth Allocation for Heterogeneous HPC Data Ingestion using Dynamic Auctions**

[Book Chapter (Under Review)] • Abubeker Abdurahman, Abrar Hossain, and Kishwar Ahmed. **An Interactive Learning Module for Introducing Parallel Computing (Topics in Parallel and Distributed Computing)**

[Journal Paper (Under Review)] • Abrar Hossain, Xingfu Wu, Kishwar Ahmed. **Autotuning Across the High-Performance Computing Stack: Hardware, Software, and Application Optimization Techniques (The International Journal of High Performance Computing Applications (ACM TOPC))**

PROJECTS

Fantasy Premier League points prediction using LSTM

March 2020 – April 2020

- Scraped understat.com for player data to train an LSTM model.
- Developed and deployed XGBoost and Decision Trees for performance comparison.
- Optimized weekly team selections using linear programming, adhering to fantasy game rules and budget limits.
- Frameworks used: Scikit-optimize, LSTM, XGBoost, Random Forest, Pandas, Scipy, Numpy.

RAG-Based LLM Chatbot with Multimodal Capabilities

October 2024 – December 2024

- Developed a Generative AI application using Azure OpenAI for question answering and text-to-image generation.
- Designed a custom chatbot API integrated with Azure OpenAI and multimodal capabilities for conversational AI.
- Built an interactive web interface with Next.js and React, including an admin panel for embedding management.
- Frameworks used: Next.js, FastAPI, Azure OpenAI, Pinecone, TailwindCSS, LangChain, TypeScript.

Spoti-safe: Spotify Playlist Backup Platform

May 2024 – June 2024

- Developed a Flask-based web application to back up Spotify playlists by exporting track information to CSV files.
- Integrated Spotify OAuth for secure access to both public and private playlists using Authlib.
- Implemented RESTful API endpoints to retrieve playlist details and automate data extraction.
- Frameworks used: Flask, Authlib, Spotify Web API, Pandas.

HONORS AND AWARDS

- 2025 UToledo Graduate Research Assistant Recognition Award
- 2025 Midwest RCD Symposium Scholarship
- 2024 CRA-WP Grad Cohort for IDEALS Scholarship
- 2024 SIParCS Student Travel Grant
- 2024 AGU Student Travel Grant
- 2024 Friends Education Fund Scholarship
- 2024 IEEE HiPC TCPP Travel Grant
- 2024 Bangladesh Sweden Trust Fund Scholarship

PROFESSIONAL AND VOLUNTEER ACTIVITIES

Professional Engagements: Reviewer for *PEARC'25 – Tutorials and Workshops*,

PEARC'25 – Posters and Visualization

Conference Volunteer Roles: Student Volunteer at *PEARC'25 – Practice and Experience in Advanced Research Computing*, *HiPC'24 – IEEE International Conference on High Performance Computing, Data, and Analytics*, and *AGU'24 – American Geophysical Union Fall Meeting*

Community Service and Leadership: Student Volunteer for *Klar Leadership Academy's Hunger-Relief Initiative*

Professional Memberships: ACM, IEEE

TECHNICAL SKILLS

Operating Systems: Linux (Ubuntu, CentOS, Debian), Windows Server (Active Directory, Group Policy)

Networking: TCP/IP, DNS, DHCP, Firewalls (iptables, ufw), VPN (WireGuard, OpenVPN)

Automation & Scripting: Bash, Python, PowerShell, Ansible, Terraform

Cloud Platforms: Amazon Web Services (AWS), Google Cloud Platform (GCP), Microsoft Azure

Virtualization & Containers: VMware, KVM, Docker, Kubernetes, Proxmox

Monitoring & Logging: Prometheus, Grafana, ELK Stack (Elasticsearch, Logstash, Kibana), Nagios

Backup & Disaster Recovery: Rsync, Bacula, Veeam, RAID

Version Control & CI/CD: Git, GitHub, GitLab, Jenkins, ArgoCD