Youssef Elmougy

Ph.D. Student · Research Assistant

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Research Objective

Motivated and talented PhD student seeking to leverage fluency in **Python**, **C++**, and **CUDA** to projects involving **runtime systems**, **distributed systems**, **deep learning workflows**, **graph algorithm optimization**, **cloud computing**, **virtualized environments**, and **machine learning applications**.

Research Interests: distributed systems, deep learning / machine learning, parallel systems, High Performance Computing, GPU programming, cloud computing, and performance of applications in heterogeneous computing environments.

Education

Ph.D. in Computer Science — *Atlanta, GA*
Georgia Institute of Technology — *Aug 2022 - PRESENT*
- Research concentrated in HPC, Systems, and AI/DL.
- Working at the Habanero Extreme Scale Software Research Lab.
- Advisor: Vivek Sarkar.

M.S. in Computer Science — *Atlanta, GA*
Georgia Institute of Technology — *Jan 2022 - Dec 2022*
- Specialization in High Performance Computing.
- GPA: 3.6/4.0, Graduating Dec 2022, IEEE-HKN Student Member.

B.S. in Computer Science — *Atlanta, GA*
Georgia Institute of Technology — *Aug 2020 - Dec 2021*
- Specialization in Artificial Intelligence and Computer Modelling.
- GPA: 3.8/4.0, IEEE-HKN Student Member.
- Graduated with Highest Honors.

B.S. in Computer Science — *Hempstead, NY*
Hofstra University — *2017–2020*
- Concentration in Leadership and Innovation in Computing, Minor in Mathematics, GPA: 4.0/4.0, transferred to Georgia Tech.
- Presidential Scholarship Recipient, Provost Scholar, IEEE-HKN Student Member, Phi Beta Kappa's Chapter Book Award.

Research Experience

Research Assistant — *Atlanta, GA*
Habanero Extreme Scale Software Research Lab, GT — *May 2022 - PRESENT*
- Increasing resiliency of the distributed Actor/Selector system by extending implementations of automatic communication termination protocols and distributed graph generation within HClib.
- Building graph algorithms, including triangle centrality, jaccard index, page rank, and BFS, in the distributed Actor/Selector system.
- Building container images (Docker, Singularity) to create testing environments within PACE HPC Clusters.
- Mentor: Vivek Sarkar.

Research Assistant — *San Francisco, CA*
Lawrence Berkeley National Lab — *May 2023 - Aug 2023*
- Working within the Performance and Algorithms Research Lab on hybrid communication techniques and increasing fault tolerance of distributed learning for deep learning workflows.
- Built a hybrid AllReduce and Parameter Server approach to parameter distribution/update and collective communication for distributed training using PyTorch DDP and RPC.
- Provided a proof of concept for the effectiveness of elastic queues with heterogeneous resources on HPC supercomputers/clusters.
- Mentor: Khaled Ibrahim.

Research Assistant — *Atlanta, GA*
Automated Algorithm Design, GT — *Aug 2020 - Dec 2021*
- Working within Stocks subteam of AAD to alter the use of machine learning techniques in developing hybrid algorithms for stock price prediction.
- Program stock trading related primitives, objective functions, and genetic programming frameworks built on top of EMADE.
- Mentor: Jason Zutty.

Research Assistant — *Hempstead, NY*
Hofstra University — *May 2019 - May 2020*
- Working on systems and cloud infrastructure research.
- Research on diagnosing and optimizing the performance interference caused by CPU sharing in multi-tenant GPU clouds.
- Presented at ASPiRe Symposium '19, published paper in IPCCC '21.
- Mentor: Jianchen Shan.

Publications

2023 — Elmougy, Youssef, and Ling Liu. *"Demystifying Fraudulent Transactions and Illicit Nodes in the Bitcoin Network for Financial Forensics"*, ACM SIGKDD, 2023.

2023 — Elmougy, Youssef, Akihiro Hayashi, Jun Shirako, and Vivek Sarkar. *"An Asynchronous Distributed Actor-based Approach to Jaccard Similarity for Genome Comparisons"*, (under submission), 2023.

2023 — Elmougy, Youssef, Akihiro Hayashi, and Vivek Sarkar. *"Highly Scalable Large-Scale Asynchronous Graph Processing using Actors"*, IEEE/ACM CCGRID, 2023.

2023 — Paul, Sri Raj, Akihiro Hayashi, Kun Chen, Youssef Elmougy, and Vivek Sarkar. *"A Fine-grained Asynchronous Bulk Synchronous Parallelism Model for PGAS Applications"*, Journal of Computational Science, 2023.

2021 — Elmougy, Youssef, Weiwei Jia, Xiaoning Ding, and Jianchen Shan. *"Diagnosing the Interference on CPU-GPU Synchronization Caused by CPU Sharing in Multi-Tenant GPU Clouds"*, IEEE IPCCC, 2021.

2021 — Elmougy, Youssef, and Oliver Manzi. *"Anomaly Detection on Bitcoin, Ethereum Networks Using GPU-accelerated Machine Learning Methods"*, IEEE ICCTA, 2021.

Other Experience

Robotics Teaching Assistant
Atlanta, GA

GEORGIA INSTITUTE OF TECHNOLOGY
Aug 2021 - May 2022

- TA for the class CS 3630 - Introduction to Perception and Robotics.
- Engaged with students on topics of robotics planning, control and localization through weekly office hours.
- Prepared Cozmo and Vector robots for Labs.

Webmaster
Hempstead, NY

THETA TAU OMEGA BETA
Nov 2019 - May 2020

- Lead development and deployment of the chapter website.
- Front-end: Handled updating member profiles and developing user design features.
- Back-end: Handled the full website refactoring, website optimization and scaling, and documenting the code for future use.

SEAS IT Technician
Hempstead, NY

EDTECH, HOFSTRA UNIVERSITY
May 2019 - May 2020

- Provide technical support to faculty members in the DeMatteis School of Engineering and Applied Science.
- Primary support includes specialized software installation and configuration, hardware setup, and classroom technology support.

Data Analytics and Web Developer Intern
Irvine, CA

FORKAIA
Jan 2019 - May 2019

- Gathered specifications based on technical needs. Defined a data analysis process, and identified patterns and trends in datasets.
- Worked on the apps: Namebeat, Heirgraphics, Aura App.

Technology Analyst Intern
New York, NY

GOLDMAN SACHS
May 2018 - Aug 2018

- Joined the Investment Banking and Engineering Division to build and deploy innovations in banking services workflow.
- Followed an Agile SDLC using JIRA to receive performance feedback from the division.
- Enhanced an internal banking application by 20% (measured by weekly work output) through using Elastic Search and RESTful API design in Java.

Reviewer

Reviewer
2022, 2023

ACM TRANSACTIONS ON INTERNET TECHNOLOGY

Reviewer
2021

IEEE CLOUD SUMMIT 2021

Awards

- IEEE TCSC (Technical Committee on Scalable Computing) International Scalable Computing Challenge (SCALE 2023) at the CC-Grid Conference 2023.
- Phi Beta Kappa Book Award from the Phi Beta Kappa Association of New York in 2019.
- Hofstra University Presidential Scholarship recipient 2017-2020.

Relevant Graduate Coursework

- CS 6210: Advanced Operating Systems
- CS 7210: Distributed Computing
- CSE 6220: High Performance Computing
- CS 6290: High Performance Computing Architecture
- CS 7641: Machine Learning
- CS 7643: Deep Learning
- CS 7637: Knowledge-Based Artificial Intelligence
- CS 6390: Foundations of Programming Languages
- CS 6515: Graduate Algorithms
- CS 6454: Qualitative Methods in Human-Computer Interaction

Skills

Programming	Python, Java/JavaFX, C/C++/C#, CUDA, GPU, FLEXSIM, MATLAB, HTML/CSS, ROS, Coq, GIT
Libraries	MPI, OpenSHMEM, UPC, Conveyors, Slurm
ML Frameworks	PyTorch, TensorFlow, Scikit Learn
Virtualization	Docker, Singularity, KVM, Linux
Cloud	AWS, GCP, Azure
Languages	English, Arabic, French

Extra-Curricular Interests

Music	Saxophone, Clarinet, Piano
Sports	Soccer, Swimming, Tennis
Outdoor	Hiking, Museums
Clubs	Supercomputing @ GT, Data Science @GT, Arab Student Association @ GT