

Youssef Elmougy

PH.D. STUDENT · GRADUATE RESEARCH ASSISTANT

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Summary

Motivated and talented PhD student seeking to leverage fluency in **C++**, **Python**, and **CUDA** to projects involving **runtime systems**, **distributed systems**, **parallel systems**, **high performance computing**, **deep learning / machine learning workflows**, **generative AI**, **graph algorithm optimization**, **cloud computing**, **GPU programming**, and **virtualized 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 Habana 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, 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

 **Graduate Research Assistant** *Atlanta, GA*
HABANERO EXTREME SCALE SOFTWARE
RESEARCH LAB, GEORGIA TECH *May 2022 - PRESENT*

- Increasing resiliency and performance of the HCLib Actor-based runtime system by extending automatic communication termination protocols, distributed graph generation, and multithread execution.
- Building large-scale distributed graph algorithms, including triangle centrality, approx. triangle counting, jaccard index, and page rank.
- Developing no-shot and few-shot classification models for tabular/numerical data using large language models (LLMs).
- Exploiting auto-regressive generative LLMs to generate realistic and accurate synthetic tabular/numerical data.
- Implemented a distributed and parallel Actor-based runtime system for cloud computing, allowing for HPC on the Cloud.
- Contributed in designing a distributed and asynchronous graph neural network (GNN) training system for large-scale graphs.
- Mentor: Vivek Sarkar.



Graduate Research Assistant

San Francisco, CA

LAWRENCE BERKELEY NATIONAL LAB

May 2023 - Aug 2023

- Worked 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

- Worked within Stocks subteam of AAD to alter the use of machine learning techniques in developing hybrid algorithms for stock price prediction.
- Programmed stock trading related primitives, objective functions, and genetic programming frameworks built on top of EMAD.
- Mentor: Jason Zutty.



Research Assistant

Hempstead, NY

HOFSTRA UNIVERSITY

May 2019 - May 2020

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

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, and Vivek Sarkar. "Highly Scalable Large-Scale Asynchronous Graph Processing using Actors", IEEE/ACM CGGRID, 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

- Inspiration Award at the 2023 Monte Jade Innovation Competition for the "Streaming Digital Innovation into Services with Blockchain" project.
- IDEaS Cloud Hub Microsoft Azure Grant for \$8,500 in 2023.
- 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, HuggingFace, 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