Youssef Elmougy

PH.D. STUDENT @GEORGIA TECH

811 Juniper St. NE, Atlanta, GA 30308, United States

+1 (516) 506-9832 | youssefelmougy@yahoo.com | www.yelmougy.com | youssefelmougy | Egyptian Citizen

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.
- Thesis: Scalable Asynchronous Actor-based Approaches for Distributed-Memory Parallel Applications.
- Advisor: Vivek Sarkar.
- Expected Graduation: July 2025.

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 2017 - Dec 2021*

- Specialization in Artificial Intelligence and Computer Modelling.
- GPA: 3.8/4.0, IEEE-HKN Student Member.
- Graduated with Highest Honors.
- Transferred from Hofstra University (attended Aug 2017 - May 2020) with 4.0/4.0 GPA as a Presidential Scholarship Recipient.

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, jaccard index, page rank, pattern matching, genome comparisons, internet network topology analysis, DL, and GNN.
- Implementing a distributed and shared-memory parallel Actor-based runtime system for cloud computing.
- Optimizing and fine tuning the runtime system using an architecture-aware approach, such as evaluating intra-node core, socket, NUMA, and software-level buffer bindings.
- Advisor: Vivek Sarkar.

Graduate Research Intern — *Santa Clara, CA*
NVIDIA - NV RESEARCH — *May 2024 - Aug 2024*

- Worked within the Programming Systems and Applications (PSA) Research Group to analyze the performance limitations of NVIDIA's state-of-the-art libraries for graph analytics.
- Designed and implemented new scalable algorithmic approaches to improve performance and reduce code complexity of these graph libraries using the CUDASTF task-based programming system.
- Collaborated with NVIDIA product teams to guide the research and development of new algorithms and software.
- Mentor: Michael Garland.

Graduate Research Intern — *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.
- 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 EMADE.
- 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 [🎓]

C=Conference, J=Journal, P=Poster, S=Under Submission

[S.1] *Youssef Elmougy, Akihiro Hayashi, Vivek Sarkar. (2024).* ***HybridFusion: A Parameter Update Framework for Scalable and Efficient Distributed Deep Learning***, under submission at *HiPC*.

[C.1] *Aniruddha Mysore, Youssef Elmougy, Akihiro Hayashi. (2024).* ***On the Cloud We Can't Wait: Asynchronous Actors Perform Even Better on the Cloud***, VIVEKFEST Symposium at SPLASH.

[C.2] *Akihiro Hayashi, Shubhendra Singhal, Youssef Elmougy, Jiawei Yang. (2024).* ***Enabling User-level Asynchronous Tasking in the FA-BSP Model - Case Study: Distributed Triangle Counting***, VIVEKFEST Symposium at SPLASH.

[C.3|] *Youssef Elmougy, Akihiro Hayashi, Vivek Sarkar. (2024).* ***Asynchronous Distributed Actor-based Approach to Jaccard Similarity for Genome Comparisons***, ISC HPC.

[C.4|🏆] *Youssef Elmougy, Akihiro Hayashi, Vivek Sarkar. (2024).* ***A Distributed, Asynchronous Algorithm for Large-Scale Internet Network Topology Analysis***, IEEE/ACM CCGRID. **Winner of the TCSC SCALE 2024 Award**.

[C.5|] *Youssef Elmougy, Ling Liu. (2023).* ***Demystifying Fraudulent Transactions and Illicit Nodes in the Bitcoin Network for Financial Forensics***, ACM SIGKDD.

[C.6|] *Youssef Elmougy, Akihiro Hayashi, Vivek Sarkar. (2023).* ***Highly Scalable Large-Scale Asynchronous Graph Processing using Actors***, IEEE/ACM CCGRID, 2023. **Winner of the TCSC SCALE 2023 Award**.

[C.7] *Youssef Elmougy, Weiwei Jia, Xiaoning Ding, Jianchen Shan. (2021).* ***Diagnosing the Interference on CPU-GPU Synchronization Caused by CPU Sharing in Multi-Tenant GPU Clouds***, IEEE IPCCC.

[C.8] *Youssef Elmougy, Oliver Manzi. (2021).* ***Anomaly Detection on Bitcoin, Ethereum Networks Using GPU-accelerated Machine Learning Methods***, IEEE ICCTA.

[J.1|] *Sri Raj Paul, Akihiro Hayashi, Kun Chen, Youssef Elmougy, Vivek Sarkar. (2023).* ***A Fine-grained Asynchronous Bulk Synchronous Parallelism Model for PGAS Applications***, Journal of Computational Science (JOCS).

[P.1] *Aniruddha Mysore, Kaushik Ravichandran, Youssef Elmougy, Akihiro Hayashi, Vivek Sarkar. (2023).* ***Accelerating Actor-based Distributed Triangle Counting***, SC.

Professional Experience

HPC Teaching Assistant — *Atlanta, GA*
Georgia Institute of Technology — *Jan 2024 - May 2024*

- TA for CSE 6220 - Introduction to High Performance Computing.
- Engaged with students on topics of theoretical complexities, parallel and distributed computing, and communication efficient algorithms through weekly office hours.
- Prepared MPI-based HPC projects.

Robotics Teaching Assistant — *Atlanta, GA*
Georgia Institute of Technology — *Aug 2021 - May 2022*

- TA for 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.

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.

Reviewer

Reviewer — *2024*
IEEE Transactions on Knowledge and Data Engineering

Reviewer — *2022, 2023*
ACM Transactions on Internet Technology

Reviewer — *2021*
IEEE Cloud Summit 2021

Awards

[2024] **[]** *"IEEE TCSC (Technical Committee on Scalable Computing) International Scalable Computing Challenge Award (SCALE 2024)"*, at the IEEE/ACM CCGrid Conference.

[2023] **[]** *"Innovative Use of High Performance Computing Award "*, from the National Energy Research Scientific Computing Center (NERSC) and the U.S. Department of Energy (DOE) Office of Science.

[2023] *"Inspiration Award"*, at the 2023 Monte Jade Innovation Competition for the "Streaming Digital Innovation into Services with Blockchain" project.

[2023] *"Microsoft Azure Grant for $10,500"*, from IDEaS Cloud Hub at Georgia Tech.

[2023] **[]** *"IEEE TCSC (Technical Committee on Scalable Computing) International Scalable Computing Challenge Award (SCALE 2023)"*, at the IEEE/ACM CCGrid Conference.

[2019] *"Phi Beta Kappa Book Award"*, from the Phi Beta Kappa Association of New York.

[2017 - 2020] *"Presidential Scholarship recipient"*, from Hofstra University.

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