(931) 252-9345 / +201007025748
Amherst, MA, USA

Walid A. Hanafy

whanafy@cs.umass.edu
https://people.cs.umass.edu/~whanafy

Education:

University of Massachusetts, Amherst, MA **2019 – Now**
- MS/Ph.D. Student in College of Information & Computer Sciences GPA: 4.0
- My research focuses on the energy efficiency of machine learning systems.
- The work spans deploying inference systems on edge devices and clusters and performing distributed training.
- Affiliated with Lass research group and supervised by Prof. Prashant Shenoy

Helwan University, Egypt **2015 – 2018**
- MS. in Computer Engineering GPA: 3.4
- Thesis: Container Type Virtualization Management in Cloud Computing – The work resulted in three publications

Information Technology Institute (ITI), Egypt **2012**
- Diploma in Systems Design with a Minor in Software Architecture
- Project: Saaalek, a traffic analytics software deployed in public transportations (1st place in ICT4Change)

Helwan University, Egypt **2006 – 2011**
- B.Sc. in Computer Engineering 82.5% - Top Of Class
- Graduation Project: Driver Assistance (Driver Behavior Reporting) using computer vision and ultrasonic sensors

Research Experience:

Nokia Bell Labs – Network and Distributed Systems Research Group – Intern **Summer 2021**
- Developed an End-to-End Telemetry system for Data-Intensive network traffic
- The work uses P4 programming and distributed infrastructure for analytics collection and processing
- The system design is submitted as a patent, and the conference manuscript is submitted soon.

University of Massachusetts Amherst – Research Assistant **2019 – Now**

Elastic Machine Learning:
- Develop a training time model for distributed machine learning systems workloads on multi-tenant elastic resources.
- The work aims to provide training time/cost guarantees under dynamic energy and processing resources.

Energy-Efficient Accelerator Sharing:
- Develop a resource-sharing mechanism that encourages energy fair sharing of AI inference workloads.
- The system utilizes multi-exit models, accelerator frequency scaling to save energy while providing SLO compliance.
- The work aims to increase battery longevity for battery-powered AI systems.

Energy Efficient Machine Learning:
- Develop selection techniques for matching AI models with AI accelerators.
- The work was done in collaboration with two undergraduates at UMass.
- The work resulted in two publications at WEEE'21 and MIT Undergraduate Research Technology Conference.

Machine Learning on the Edge:
- Develop ML inference framework on edge devices such as Nvidia Jetson Nano, Google Edge TPUs, and Intel VPUs.
- The system aims to provide theoretical and technical latency guarantees under static and dynamic workloads.
- The system is deployed using k8s and allows multi-objective management.

Testicide, Egypt – Research Engineer **2017 – 2019**
- Executed research in Elasticity Control, GUI testing, and Cloud Billing
- Develop an elasticity control for Selenium Grid/Docker using case-based reasoning - Publication Pending.
- Design of an alpha version of the company's novel "codeless" GUI testing framework

Public University of Navarra, Spain – Research Assistant **Feb – Aug 2018**
- Participated in MEDSOL Project Funded by ERASMUS+ Focused on renewable systems research
- Performed research in "Solar Panels anomaly detection using Machine learning."

Helwan University, Egypt – Research Assistant **2015 – 2019**
- Developed elasticity control/load balancing algorithms for containers as a service cloud.
- Construct containers live migration traces and benchmarking tool using Docker-runC and CRIU

Publications:

- Q. Liang, **W. A. Hanafy**, A. Ali-Eldin, P. Shenoy "Adaptive Energy-efficient DNN Accelerator Sharing for On-device AI" – Under Review

- Q. Liang, **W. A. Hanafy**, A. Ali-Eldin, P. Shenoy "Model-driven Resource Management of AI Inference Workloads on Shared Edge Clusters" – Under Review
- **Walid A. Hanafy**, Tergel Molom-Ochir, and Rohan Shenoy. 2021. Design Considerations for Energy-efficient Inference on Edge Devices. In Proceedings of the Second ACM International Workshop on Energy-Efficient Learning at the Edge (WEEE '21). DOI:https://doi.org/10.1145/3447555.3465326
- **W. A. Hanafy**, A. Pina and S. A. Salem, "Machine Learning Approach for Photovoltaic Panels Cleanliness Detection," 2019 15th International Computer Engineering Conference (ICENCO), Cairo, Egypt, 2019, pp. 72-77, doi: 10.1109/ICENCO48310.2019.9027402.
- **W. A. Hanafy**, A. E. Mohamed and S. A. Salem, "A New Infrastructure Elasticity Control Algorithm for Containerized Cloud," in IEEE Access. doi: 10.1109/ACCESS.2019.2907171.
- **W. A. Hanafy**, A. E. Mohamed and S. A. Salem, "Novel selection policies for container-based cloud deployment models," 2017 13th International Computer Engineering Conference (ICENCO), Cairo, 2017, pp. 237-242, doi: 10.1109/ICENCO.2017.8289794.
- **W. A. Hanafy**, A. E. Mohamed and S. A. Salem, "A load balancing with power optimization algorithm for container-based infrastructure management," 2017 12th International Conference on Computer Engineering and Systems (ICCES), Cairo, 2017, pp. 161-166, doi: 10.1109/ICCES.2017.8275296.

Teaching Experience:

University of Massachusetts Amherst – Teaching Assistant **Spring 2020**
- COMPSCI 577 (OS Design and Implementation): Plan and develop the lab materials and weekly assignments

Information Technology Institute (ITI), Egypt – Visiting Lecturer **2015 – 2019**
- Design and teach multiple hands-on courses in software design, cloud computing, and software architecture
- Technologies: Microsoft Stack, Microsoft Azure, and Docker

Helwan University, Egypt – Teaching Assistant **2015 – 2019**
- Participated in the teaching and design of several courses, including; Software Engineering, Database Systems, Operating System, Cloud Computing, and Distributed Systems.
- Deployed and Administered Cloud Computing Lab based on VMware VCenter 5.5 stack funded by DELL EMC

Development Experience:

IT-Bits, UAE – Software Engineer **2016 – 2017**
- Lead the successful development of software solutions for multiple pharmaceutical companies
- Deployed projects included: Finance Control, Expense Tracking, Personnel Performance Management
- Stack: asp.net– Entity framework - Angular JS – SQL Azure – Azure

Consukorra-PES, Egypt – Software Engineer **2012 – 2013**
- Design and Implement a GIS-based data collection platform, leading to a 200% speedup in the collection process.
- Implemented data visualization and statistics in coordination with the sales team, resulting in multiple deals.
- Stack: .net Stack – PostgreSQL– Quantum GIS

Technical Skill

- Programming Languages: Python, C#, C/C++, Java
- Database Systems: MSSQL, MySQL, COSMOSDB
- Testing: XUnit, Specflow, Selenium
- Web Development: .net Stack, Angularjs
- Cloud Computing: Azure, VMware, Docker, and K8s
- Machine Learning: Python Stack, Pytorch, and Keras

Volunteer Work:

- **Treasurer of the** "UMass Muslim Student Association – Graduate Student Branch"
- **Artifact Evaluation Committee Member at** "EuroSys 2021"
- **Mentor at "**Docker Egypt Meetup" funded by Docker, I delivered multiple training on Docker and Docker Swarm
- **Organizer and Co-Founder of** "Cairo. NET Architects Meetup"