Khaled Abdelaal

484-456-6967 | khaled.abdelaal@ou.edu | linkedin | github

Education

The University of Oklahoma — Norman, OK
PhD in Computer Science — *2020 – Present*

Lehigh University — Bethlehem, PA
Master of Science in Computer Engineering, GPA 3.73 /4.00 — *2018 – 2020*

Mansoura University — Mansoura, Egypt
Master of Science in Automatic Control Systems Engineering — *2014 – 2017*

- **Thesis:** A Clustering Scheme for Power Management in Asymmetric Multicore Processors

Mansoura University — Mansoura, Egypt
Bachelor of Science in Computers and Systems Engineering, GPA 90.24%, Ranked 2 / 109 — *2008 – 2013*

- **Capstone:** Design of an Educational Tablet PC based on Freescale's iMX6 Sabre Lite Board

Experience

Graduate Teaching Assistant — Aug. 2021 – Present
The University of Oklahoma — *Norman, OK*

- Responsible for conducting 2 labs of 40 students each for CS 2334: Programming Structures and Abstractions
- Responsible for grading weekly lab reports, bi-weekly projects and organizing office hours
- Used Programming Language: Java

Research Intern — June 2021 – Aug. 2021
Argonne National Laboratory — *Lemont, IL*

- Working on high-performance computing research to reduce memory traffic in matrix-based applications by up to 12x using a compression + caching technique, as compared to a baseline that does not use the proposed techniques
- Providing a unified parallel framework that transparently wraps parallel code written in CUDA, Sycl, and HIP around OpenMP to achieve code portability and enable a unified framework for optimizations
- Technologies used: C/C++, OpenMP, CUDA, DPC++/Sycl, etc.

Graduate Research Assistant — Aug. 2020 – June 2021
The University of Oklahoma — *Norman, OK*

- Devised a technique that automatically selects near-optimal tile sizes for affine programs on GPGPUs using Integer Linear Programming and the Polyhedral model which achieves around 75% of the best empirically found tile configuration performance in a baseline that uses exhaustive space search.
- Developing a Pattern-Aware Vectorization technique for Spars Matrix Computations with the goal of achieving fast, low-overhead computations on Sparse Matrices usign fast pattern exploration and vector code generation to accelerate such applications. Preliminary results show a 4.95x speedup over clang auto-vectorization when using the facebook adjacency matrix from SNAP
- Technologies used: C/C++, SIMD, Python, Bash Scripting

Graduate Teaching Assistant — Aug. 2019 – Jan 2020
Lehigh University — *Bethlehem, PA*

- Full teaching assistant for ECE033: Introduction to Computer Engineering
- Teaching a class of approximately 50 students, divided into 3 sections
- Responsible for conducting recitations (three times per week 1 hour and 40 mins each, grading weekly homework, office hours, and exam proctoring

Graduate Research Assistant — Jan. 2018 – Aug. 2019
Lehigh University — *Bethlehem, PA*

- Conducting research in computer architecture, especially emerging memory systems (NVM) and In-Memory Processing
- Design and simulation of a hybrid technique for stuck-at fault detection in Phase-Change Memories. This technique achieves an average of 9.4% performance improvement over a baseline with verify-after-write detection
- Implementing the technique in the architectural open-source simulator *gem5* memory controller module
- Involved in Intel's Computer-Assisted Programming for Heterogeneous Architectures (CAPA) program
- Benchmarking and Performance Evaluation using different benchmark suites (PARSEC, SPEC2006/2017, etc.)
- Used Programming Languages: C, C++, Python

Assistant Lecturer Dec. 2013 – Present (on leave)

Mansoura University *Mansoura, Egypt*

- Taught 5 Computer Science and Engineering Undergraduate courses, with an average number of students of approximately 95 students divided into 3 to 4 sections
- Responsibilities included: designing and assisting labs, conducting recitations, office hours, grading homework submissions, projects and exams
- Courses include: CSE3214 Programming Languages 2, CSE3223 Programming Languages 3, CSE3412 Network Design & Programming, CSE3422 Distributed Computer Systems and Web Development (Summer training).

Publications

- ***Khaled Abdelaal*** and Martin Kong. 2021. **"Tile Size Selection of Affine Programs for GPGPUs using Polyhedral Cross-Compilation"** Proceedings of the ACM International Conference on Supercomputing. Association for Computing Machinery, New York, NY, USA, 13-26. DOI: https://doi.org/10.1145/3447818.346036
- ***Khaled Abdelaal***, Richard Veras, and Martin Kong. **"Pattern-Aware Vectorization for Sparse Matrix Computation"**. Poster presented at: 2021 IEEE International Parallel and Distributed Processing Symposium (IPDPS) PhD Forum; April 2021; Portland, OR, USA.
- Chao Zhang, ***Khaled Abdelaal***, Angel Chen, Xinhui Zhao, Wujie Wen, and Xiaochen Guo, **"ECC Cache: A Lightweight Error Detection for Phase-Change Memory Stuck-At Faults,"** in Proceedings of the 39th IEEE/ACM International Conference on Computer-Aided Design (ICCAD), Virtual Conference, November 2020.
- ***Khaled M. Attia***, Mostafa A. El-Hosseini, Hesham A. Ali, **Dynamic power management techniques in multi-core architectures: A survey study**, Ain Shams Engineering Journal, Volume 8, Issue 3, 2017, Pages 445-456, ISSN 2090-4479, https://doi.org/10.1016/j.asej.2015.08.010.

Technical Skills

Programming Languages: C/C++, Java, Python, Bash Scripting
Parallel Programming Frameworks/Libraries: OpenMP, CUDA, DPC++
Compilers: clang, LLVM
Profiling and Performance Analysis: perf, nvprof, heaptrack, clang sanitizers
Benchmark suites: Polybench, Rodinia, PARSEC, SPEC
Documentation: Doxygen

Awards

- The University of Oklahoma Gallogly College of Engineering PhD Recruitment Excellence Fellowship (Academic Year 2020-2021)
- Mansoura University Best Engineering Graduation Project Award (Academic Year 2012-2013)
- Second Award in Mansoura University First Scientific Conference 2013
- Graduated with Honors in 2013 from Computers and Systems Engineering Department, Mansoura, Egypt