

# Mohammed Al Farhan

<https://farhanma.github.io>

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## EDUCATION

**King Abdullah University of Science and Technology (KAUST)** 2014-2019  
PhD, Computer Science  
Topic: [Unstructured Computations on Emerging Architectures](#)  
Advisor: David E. Keyes

**King Abdullah University of Science and Technology (KAUST)** 2012-2013  
MSc, Computer Science

**King Faisal University** 2007-2012  
BSc, Computer Science

## RESEARCH EXPERIENCE

**Postdoctoral Researcher, KAUST** 2020-Present  
• Research on scalable algorithms exploiting data sparsity (with David E. Keyes)

**Postdoctoral Researcher, University of Tennessee, Knoxville** 2019-Present  
• Research on distributed, GPU-accelerated dense linear algebra (with Jack Dongarra)

**Graduate Researcher, KAUST** 2012-2019  
• Research on unstructured grid PDEs and fast multipole method (with David E. Keyes)

**Directed Research, KAUST** Spring 2013  
• Research on combinatorial machine learning (with Mikhail Moshkov)

## INDUSTRIAL EXPERIENCE

**Co-founder, RoboCrop** 2017-2019  
• RoboCrop is a startup initiative that develops automated farming solutions

**Software Engineer, Saudi Electricity Company** 2012  
• Developed a smart system to detect anomalies in the reading meters

**Software Engineer Intern, Saudi Aramco** Summer 2011  
• Developed a distributed key-value store system to track IT change requests

**Software Engineer Intern, Saudi Aramco** Summer 2010  
• Developed a database management system to log IT reported incidents

## TEACHING ASSISTANTSHIPS

- AMCS 312 High Performance Computing course (with David E. Keyes)
  - Fall 2013, Fall 2014, Fall 2015, Fall 2016, Fall 2017, Fall 2018 (KAUST)
  - Fall 2016 (Blue Waters online courses, funded by US NSF at UIUC)
  - Fall 2018 (Saudi Aramco EXPEC Advanced Research Center)

## PUBLICATIONS

- Journal Articles**
- M. Al Farhan, A. Abdelfattah, S. Tomov, M. Gates, D. Sukkari, A. Haidar, R. Rosenberg, and J. Dongarra. [MAGMA Templates for Scalable Linear Algebra on Emerging Architectures](#), *IJHPCA 2020*
  - M. Abduljabbar, M. Al Farhan, N. Al-Harthi, R. Chen, R. Yokota, H. Bagci, and D. Keyes. [Extreme Scale FMM-Accelerated Boundary Integral Equation Solver for Wave Scattering](#), *SISC 2019*
  - M. Al Farhan and D. Keyes. [Optimizations of Unstructured Aerodynamics Computations for Many-core Architectures](#), *IEEE TPDS 2018*

- **M. Al Farhan**, D. Kaushik, and D. Keyes. [Unstructured Computational Aerodynamics on Many Integrated Core Architecture](#), *Parallel Computing* 2016

#### Conference Papers

- M. Abduljabbar, **M. Al Farhan**, R. Yokota, and D. Keyes. [Performance Evaluation of Computation and Communication Kernels of the Fast Multipole Method on Intel Manycore Architecture](#), *Euro-Par* 2017
- H. AbouEisha, **M. Al Farhan**, I. Chikalov, and M. Moshkov. [An Algorithm for Reduct Cardinality Minimization](#), *IEEE GrC* 2013

#### Technical Reports

- M. Gates, A. Charara, J. Kurzak, A. YarKhan, **M. Al Farhan**, D. Sukkari, and J. Dongarra. [SLATE Working Note 10 – SLATE Users’ Guide](#), *Innovative Computing Laboratory Technical Report ICL-UT-19-01*, July 2020
- A. Charara, M. Gates, J. Kurzak, A. YarKhan, **M. Al Farhan**, D. Sukkari, and J. Dongarra. [SLATE Working Note 11 – SLATE Developers’ Guide](#), *Innovative Computing Laboratory Technical Report ICL-UT-19-02*, August 2020
- M. Gates, **M. Al Farhan**, A. Charara, J. Kurzak, D. Sukkari, A. YarKhan, and J. Dongarra. [SLATE Working Note 13 – Implementing Singular Value and Symmetric/Hermitian Eigenvalue Solvers](#), *Innovative Computing Laboratory Technical Report ICL-UT-19-07*, April 2020
- M. Gates, A. Charara, A. YarKhan, D. Sukkari, **M. Al Farhan**, and J. Dongarra. [SLATE Working Note 14 – Performance Tuning SLATE](#), *Innovative Computing Laboratory Technical Report ICL-UT-20-01*, January 2020

#### PROGRAMMING

- **Languages:** C/C++, Python, Java, Unix Shell, Matlab, L<sup>A</sup>T<sub>E</sub>X
- **Models:** MPI, OpenMP, CUDA, pThreads

#### ORAL/POSTER PRESENTATIONS

- Unstructured Computations on Emerging Architectures
  - SIAM CSE 2019, Spokane, Washington
- BEMFMM: An Extreme Scale FMM-Accelerated BIE Solver for Wave Scattering
  - SIAM CSE 2019, Spokane, Washington
  - Intel IXPUG 2018, KAUST
  - SIAM PP 2018, Tokyo, Japan
- Optimizations of Unstructured Aerodynamics Computations for Intel KNL Hardware
  - Intel IXPUG 2018, KAUST
  - SIAM PP 2018, Tokyo, Japan
  - Intel HPC Developer Conference 2017, Denver, Colorado
  - PCCFD Workshop 2017, KAUST
  - HPC Saudi Conference 2017, KAUST [best poster award]
  - SIAM CSE 2017, Atlanta, Georgia
  - SHAXC-3 Workshop 2017, KAUST
- Performance Evaluation of Fast Multipole Method on Intel Manycore Architecture
  - Euro-Par 2017, Santiago de Compostela, Spain
  - ISC 2017, Frankfurt, Germany
- Implicit Unstructured Computational Aerodynamics on MIC Architecture
  - ParCFD 2014, Trondheim, Norway
  - SHAXC-2 Workshop 2014, KAUST

#### SERVICES

- **Reviewer:** ACM/IEEE SC 2015, ACM PPOPP 2016, Euro-Par 2016, IEEE Cluster 2016, PLOS One 2018, IJHPCA 2018, IEEE IPDSPS 2019, ACM TOPC 2019, Parallel Computing 2019 and 2020, ACM PASC 2020
- **Member:** KAUST IEEE Student Chapter (2012-2013), KAUST Graduate Council (2012-2014), KAUST ACM/SIAM Student Chapter (2012-2019), and KAUST Code Clinic (2014-2019)
- **Lecturer:** Gave several tutorials on: Python Programming (Spring 2014 and 2015), Fundamentals of High Performance Computing (Summer 2014 and 2015), PETSc: Portable, Extensible Toolkit for Scientific Computation (Summer 2016), and Version Control using Git (Fall 2020)