

# 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** 2019-2021  
• 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

- A. Abdelfattah, **M. Al Farhan**, C. Brown, M. Gates, D. Sukkari, A. YarKhan, and J. Dongarra. [SLATE port to AMD and Intel platforms](#), SWAN No. 16 (ICL-UT-21-01), *ICL, UTK*, Apr 2021
- A. YarKhan, **M. Al Farhan**, D. Sukkari, M. Gates, and J. Dongarra. [SLATE Performance Report: Updates to Cholesky and LU Factorizations](#) (ICL-UT-20-14), *ICL, UTK*, Oct 2020
- A. Charara, M. Gates, J. Kurzak, A. YarKhan, **M. Al Farhan**, D. Sukkari, and J. Dongarra. [SLATE Developers' Guide](#), SWAN No. 11 (ICL-UT-19-02), *ICL, UTK*, Aug 2020
- M. Gates, A. Charara, J. Kurzak, A. YarKhan, **M. Al Farhan**, D. Sukkari, and J. Dongarra. [SLATE Users' Guide](#), SWAN No. 10 (ICL-UT-19-01), *ICL, UTK*, Jul 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](#) (ICL-UT-19-07), *ICL, UTK*, Apr 2020
- M. Gates, A. Charara, A. YarKhan, D. Sukkari, **M. Al Farhan**, and J. Dongarra. [SLATE Working Note 14 Performance Tuning SLATE](#) (ICL-UT-20-01), *ICL, UTK*, Jan 2020

#### PROGRAMMING

- **Languages:** C/C++, Python, Java, POSIX Shell, Matlab,  $\text{\LaTeX}$
- **Models:** MPI, OpenMP, CUDA, pthreads

#### ORAL/POSTER PRESENTATIONS

- SLATE: Software for Linear Algebra Targeting Exascale
  - ECP Annual Meeting 2020, Houston, TX
- 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

#### SERVICE AND OUTREACH

- **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, ACM PASC 2020, Parallel Computing 2020, ICCS 2021, Euro-Par 2021, ACM/IEEE SC 2021, IEEE Cluster 2021
- **Artifact Evaluator:** ACM PPoPP 2016, ACM/IEEE SC 2021
- **Vice president:** KAUST IEEE Student Chapter (2012-2013), KAUST ACM Student Chapter (2012-2015), and KAUST SIAM Student Chapter (2012-2017)
- **Treasurer:** KAUST SIAM/ACM Student Chapter (2017-2019)
- **Member:** KAUST Graduate Council: Academic and Research Committee (2012-2013) and University Relation Committee (2013-2014)
- **Co-organizer:** KAUST Code Clinic (2014-2019), Python Programming Camp (Spring 2014 and 2015), and Scientific Software Engineering Lecture Series: 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)