

# MOHAMMED ALFARHAN

Postdoctoral Research Associate, Innovative Computing Laboratory  
University of Tennessee, Knoxville

farhan@icl.utk.edu  
(+1) (865) 801-4488  
farhanma.github.io  
github.com/farhanma  
bitbucket.org/farhanma

Education	<b>King Abdullah University of Science and Technology</b> , Saudi Arabia Ph.D., Computer Science. Advisor: David E. Keyes DISSERTATION – Unstructured Computations on Emerging Architectures	Aug 2014 – May 2019
	<b>King Abdullah University of Science and Technology</b> , Saudi Arabia M.Sc., Computer Science	Aug 2012 – Dec 2013
	<b>King Faisal University</b> , Saudi Arabia B.Sc., Computer Science	Aug 2007 – Feb 2012
Experience	<b>University of Tennessee</b> , Knoxville, US. Postdoctoral Research Associate Director: Jack Dongarra Research on developing numerical software libraries for solving linear algebra problems at scale	Jun 2019 - Present
	<b>ROBOCROP</b> , Saudi Arabia. Software Consultant [Part Time] Worked as a robotics software engineer and full stack developer for a robotics solutions startup	Sep 2017 - Mar 2019
	<b>Saudi Electricity Company</b> , Saudi Arabia. Software Engineer Developed distributed systems to monitor and detect anomalies in the reading meters	May 2012 - Aug 2012
	<b>Saudi Aramco</b> , Saudi Arabia. Software Engineer Intern Developed a distributed key-value store system to monitor IT incidents and infrastructure change requests	Summer 2011
	<b>Saudi Aramco</b> , Saudi Arabia. Software Engineer Intern Developed a database system to collect and log reports on IT problems for further processing with ease	Summer 2010
Books	<ol style="list-style-type: none"><li><i>High Performance Computing</i> <b>Mohammed A. Al Farhan</b> and David E. Keyes Under preparation, SIAM Press 2022 <a href="https://ecrc.github.io/hpc/">https://ecrc.github.io/hpc/</a></li></ol>	
Research	<ol style="list-style-type: none"><li><i>ExaBEM: Exascale Boundary Element Method Solver for Acoustic Simulation</i> <b>Mohammed A. Al Farhan</b>, Hakan Bagci, and David E. Keyes To be submitted, SC 2020 <a href="https://ecrc.github.io/ExaBEM/">https://ecrc.github.io/ExaBEM/</a></li><li><i>GPU-Optimized Unstructured Computations</i> <b>Mohammed A. Al Farhan</b> and David E. Keyes To be submitted, TPDS 2020 <a href="https://ecrc.github.io/KFUN3D/">https://ecrc.github.io/KFUN3D/</a></li><li><i>MAGMA Templates for Scalable Linear Algebra on Emerging Architectures</i> <b>Mohammed A. Al Farhan</b>, Ahmad Abdelfattah, Stanimire Tomov, Mark Gates, Dalal Sukkari, Azzam Haidar, Robert Rosenberg, and Jack Dongarra The International Journal of High Performance Computing Applications, 2019 (under review) <a href="https://icl.utk.edu/magma/">https://icl.utk.edu/magma/</a></li><li><i>Extreme Scale FMM-accelerated Boundary Integral Equation Solver for Wave Scattering</i> Mustafa Abduljabbar, <b>Mohammed A. Al Farhan</b>, Noha Al-Harthi, Rui Chen, Rio Yokota, Hakan Bagci, and David E. Keyes SIAM Journal on Scientific Computing (SISC), 2019 <a href="https://ecrc.github.io/BEMFMM/">https://ecrc.github.io/BEMFMM/</a></li></ol>	

5. *Optimizations of Unstructured Aerodynamics Computations for Many-core Architectures*  
**Mohammed A. Al Farhan** and David E. Keyes  
 IEEE Transactions on Parallel and Distributed Systems (TPDS), 2018
6. *Performance Evaluation of Computation and Communication Kernels of the Fast Multipole Method on Intel Manycore Architecture*  
 Mustafa Abduljabbar, **Mohammed A. Al Farhan**, Rio Yokota, and David E. Keyes  
 International European Conference on Parallel and Distributed Computing (Euro-Par), 2017
7. *Unstructured Computational Aerodynamics on Many Integrated Core Architecture*  
**Mohammed A. Al Farhan**, Dinesh K. Kaushik, and David E. Keyes  
 Elsevier Parallel Computing Journal (PARCO), 2016
8. *An Algorithm for Reduct Cardinality Minimization*  
 Hassan AbouEisha, **Mohammed A. Al Farhan**, Igor Chikalov, and Mikhail Moshkov  
 IEEE International Conference on Granular Computing (GrC), 2013  
<https://farhanma.github.io/reduct/>

## Services

Served as a peer reviewer for the *IEEE Cluster 2016*, *PLOS One 2018*, *International Journal of High Performance Computing Applications (IJHPCA) 2018*, *IEEE International Parallel & Distributed Processing Symposium (IPDPS) 2019*, and *ACM Transactions on Parallel Computing (TOPC) 2019*

## Teaching

**AMCS 312: High Performance Computing.** Teaching Assistant (TA) for David E. Keyes

- King Abdullah University of Science and Technology, Saudi Arabia
  - Fall 2014, Fall 2015, Fall 2016, Fall 2017, and Fall 2018
- Saudi Aramco, Saudi Arabia
  - Fall 2018
- Blue Waters Online Courses
  - Fall 2016 [Introduction to High Performance Computing]
- KAUST Visualization and Supercomputing Summer School, Saudi Arabia
  - Summer 2016 [Introduction to Portable, Extensible Toolkit for Scientific Computation (PETSc)]

## Talks

Slides available at <https://speakerdeck.com/farhanma>

1. *Unstructured Computations on Emerging Architectures*
  - (a) SIAM Conference on Computational Science and Engineering, 2019. Spokane, Washington, USA
2. *BEMFMM: An Extreme Scale FMM-Accelerated BIE Solver for Wave Scattering*
  - (a) SIAM Conference on Computational Science and Engineering, 2019. Spokane, Washington, USA
  - (b) Intel eXtreme Computing User Group (IXPUG) Meeting, 2018. KAUST, KSA
  - (c) SIAM Conference on Parallel Processing for Scientific Computing, 2018. Tokyo, Japan
3. *Optimizations of Unstructured Aerodynamics Computations for Intel Knights Landing Architecture*
  - (a) Intel eXtreme Computing User Group (IXPUG) Meeting, 2018. KAUST, KSA
  - (b) SIAM Conference on Parallel Processing for Scientific Computing, 2018. Tokyo, Japan
  - (c) Intel HPC Developer Conference, 2017. Denver, Colorado, USA
  - (d) Fully Predictive Complex Computational Fluid Dynamics Workshop, 2017. KAUST, KSA
  - (e) High Performance Computing Saudi Arabia (HPC Saudi) Conference, 2017. KAUST, KSA  
*Received best poster award*
  - (f) SIAM Conference on Computational Science and Engineering, 2017. Atlanta, Georgia, USA
  - (g) Scalable Hierarchical Algorithms for eXtreme Computing Workshop, 2017. KAUST, KSA
4. *Performance Evaluation of Fast Multipole Method on Intel Manycore Architecture*
  - (a) International European Conference on Parallel and Distributed Computing (Euro-Par), 2017

(b) HPC in Asia Poster Competition, International Supercomputing Conference (ISC), 2017

5. *Implicit Unstructured Computational Aerodynamics on Many-Integrated Core Architecture*

(a) International Conference on Parallel Computational Fluid Dynamics, 2014. Trondheim, Norway

(b) Scalable Hierarchical Algorithms for eXtreme Computing workshop, 2014. KAUST, KSA

**Programming**

LANGUAGES – C/C++, Python, Java, Shell Script, MATLAB, and L<sup>A</sup>T<sub>E</sub>X

MODELS – x86 Compiler Intrinsics, OpenMP, pThreads, TBB, CUDA, and MPI

TOOLS – Make, CMake, gmake, Autotools, perf tools, Valgrind, gnuplot, Git, and Mercurial