

# Mohamed S. Abdelfattah

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## Professional Experience

**Cornell University**, New York, NY, USA

Since 2022 Assistant Professor of Electrical and Computer Engineering

**Samsung AI Center**, Cambridge, UK

2022 - 2023 Visiting Professor Consultant, Automated Machine Learning  
2020 - 2022 Principal Scientist and Manager, Automated Machine Learning  
2019 - 2020 Senior Scientist, Embedded Artificial Intelligence

**Intel**, Toronto, ON, Canada

2015 - 2018 Member of Technical Staff, Machine Learning Acceleration

**Altera**, Toronto, ON, Canada

Winter 2014 Research Intern, OpenCL Compiler

**Philips Healthcare**, Böblingen, Germany

Winter 2011 Research Intern, Patient Monitoring Hardware

**Mentor Graphics**, Cairo, Egypt

Summer 2008 Research Intern, Design and Simulation

## Education

2011 - 2016 **University of Toronto**, Canada

PhD in Electrical and Computer Engineering  
Dissertation: Architecture and CAD for Embedded Networks-on-Chip on FPGAs  
Advisor: Prof. Vaughn Betz

2009 - 2011 **University of Stuttgart**, Germany

MSc in Information Technology  
Thesis: Evaluation of Advanced Techniques for Structural FPGA Self-Test  
Advisor: Prof. Hans-Joachim Wunderlich

2005 - 2009 **German University of Cairo**, Egypt

BSc in Electronics Engineering  
Thesis: Design of an RF Transmitter for RFID Tags with Ultra-thin Silicon Substrates  
Advisor: Prof. Manfred Berroth

## Honours & Awards

- 2024 NSF CAREER Award
- 2022 Meta Faculty Award in Networking for AI
- 2022 (Runner-up) Best Paper Award at the FPGA 2022 Symposium
- 2021 Samsung Best Paper Award Gold Medal (one gold medal is awarded annually in AI research across Samsung)
- 2016 (Runner-up) Michel Servit Best Paper Award at the FPL 2016 Conference
- 2016 University of Toronto TATP (University-wide) Teaching Award
- 2016 University of Toronto Faculty of Applied Science Teaching Award
- 2015 FPL 2013 paper selected as one of the most significant papers in the first 25 years of the conference
- 2015 Best Paper award at the FPGA 2015 Symposium
- 2015 University of Toronto Department of Electrical & Computer Engineering Teaching Award
- 2014 (Runner-up) Adel Sedra Distinguished Graduate Award
- 2014 University of Toronto Alumni Association Graduate Award
- 2013 - 2016 Vanier Canada Graduate Scholarship (Canada's highest doctoral award)
- 2013 Stamatis Vassiliadis Best Paper Award at the FPL 2013 Conference
- 2012, 2013 Right Track CAD Graduate Scholarship (twice)
- 2011 Connaught Doctoral Scholarship Award
- 2009 DAAD Master's Scholarship Award
- 2007 GUC Gerhard Schröder Scholarship Award

## Academic Service

### CONFERENCE ORGANIZING COMMITTEES

- 2023 International Conference on Automated Machine Learning (AutoML), Online Experience Chair
- 2022 International Symposium On Computer Architecture (ISCA), Local Arrangements Chair
- 2022 International Symposium On Field-Programmable Custom Computing Machines (FCCM), Local Arrangements Chair

### CONFERENCE TECHNICAL PROGRAM COMMITTEES

- Since 2021 International Conference on Learning Representations (ICLR)
- Since 2021 Conference on Neural Information Processing Systems (NeurIPS)
- Since 2019 International Symposium on Field-Programmable Gate-Arrays (FPGA)
- Since 2017 International Conference on Field Programmable Logic and Applications (FPL)
  - 2023 Design Automation Conference (DAC)
  - 2022 Design and Test Europe (DATE)
- 2018–2020 Artificial Intelligence Circuits and Systems (AICAS)
  - 2017 International Conference on Field-Programmable Technology (FPT)
  - 2016 International Workshop on Network on Chip Architectures (NocArc)

## JOURNAL REVIEW

- Since 2023 Transactions on Machine Learning Research (TMLR)
- Since 2021 IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- Since 2018 IEEE Transactions on Computer-Aided Design (TCAD)
- Since 2016 IEEE Transactions on Computers (TCOMP)
- Since 2015 IEEE Transactions on Very Large Scale Integrated Circuits (TVLSI)
- Since 2015 ACM Transactions on Reconfigurable Technology and Systems (TRETs)

## GRANT ADMINISTRATION

- 2017 - 2018 Grant Research Program Committee Member (Intel Representative)  
NSERC Computing Hardware for Emerging Intelligent Sensing Applications (COHESA) Network.

## Teaching

- 2022, 2023 **ECE5545 Machine Learning Hardware and Systems**, Instructor, Cornell University  
Enrollment: 24 (2022), 23 (2023)  
Course evaluation: 4.58/5 (2022), 4.38/5 (2023)  
Instructor evaluation: 4.7/5 (2022), 4.63/5 (2023)
- 2023 **ECE6950 Reconfigurable Computing and FPGA Architecture**, Instructor, Cornell University  
Enrollment: 10  
Course evaluation: 4.5/5  
Instructor evaluation: 4.5/5
- 2015, 2016 **ECE297 Communication and Design**, Head Teaching Assistant, University of Toronto  
Enrollment: 350 (both years)  
Course evaluation: 4.4/5 (2015), 4.3/5 (2016)  
My TA evaluation: 7/7 (both years)
- 2012 - 2014 **ECE241 Digital Logic Design**, Teaching Assistant, University of Toronto
- 2012 - 2014 **ECE243 Computer Organization**, Teaching Assistant, University of Toronto

## Publications

### CONFERENCE PROCEEDINGS

- 2023 **M4BRAM: Mixed-Precision Matrix-Matrix Multiplication in FPGA Block RAMs**  
Yuzong Chen, Jordan Dotzel, Mohamed S. Abdelfattah  
*International Conference on Field-Programmable Technology (FPT)*
- 2023 **DiviML: A Module-based Heuristic for Mapping Neural Networks onto Heterogeneous Platforms**  
Yassine Ghannane, Mohamed S. Abdelfattah  
*International Conference on Computer-Aided Design (ICCAD)*
- 2023 **Multi-Predict: Few Shot Predictors for Efficient Neural Architecture Search**  
Yash Akhauri, Mohamed S. Abdelfattah  
*International Conference on Automated Machine Learning (AutoML)*
- 2023 **BRAMAC: Compute-in-BRAM Architectures for Multiply-Accumulate on FPGAs**  
Yuzong Chen, Mohamed S. Abdelfattah

*International Symposium On Field-Programmable Custom Computing Machines (FCCM)*

- 2023 **Zero-Cost Operation Scoring in Differentiable Architecture Search**  
Lichuan Xiang, Łukasz Dudziak, Mohamed S. Abdelfattah, Thomas Chau, Nicholas D. Lane, Hongkai Wen  
*The AAAI Conference on Artificial Intelligence (AAAI)*
- 2022 **BLOX: Macro Neural Architecture Search Benchmark and Algorithms**  
Thomas Chau, Łukasz Dudziak, Hongkai Wen, Nicholas D. Lane, Mohamed S. Abdelfattah  
*Conference on Neural Information Processing Systems (NeurIPS)*
- 2022 **Adaptable Butterfly Accelerator for Attention-based NNs via Hardware and Algorithm Co-design**  
Hongxiang Fan, Thomas Chau, Stylianos Venieris, Royson Lee, Alexandros Kouris, Wayne Luk, Nicholas D. Lane, Mohamed S. Abdelfattah  
*IEEE/ACM International Symposium on Microarchitecture (MICRO)*
- 2022 **Logic Shrinkage: Learned FPGA Netlist Sparsity for Efficient Neural Network Inference**  
Erwei Wang, James Davis, Georgios Stavrou, Peter Cheung, George Constantinides, Mohamed S. Abdelfattah  
*International Symposium on Field-Programmable Gate Arrays (FPGA)*
- 2021 **Temporal Kernel Estimation for Blind Video Super-Resolution**  
Lichuan Chang, Royson Lee, Hongkai Wen, Mohamed S. Abdelfattah, Nicholas D. Lane  
*International Conference on Computer Vision (ICCV) Workshop*
- 2021 **Zero-Cost Proxies for Lightweight NAS**  
Mohamed S. Abdelfattah, Abhinav Mehrotra, Łukasz Dudziak, Nicholas D. Lane  
*International Conference on Learning Representations (ICLR)*
- 2021 **NAS-Bench-ASR: Reproducible Neural Architecture Search for Speech Recognition**  
Abhinav Mehrotra, Alberto Gil C. P. Ramos, Sourav Bhattacharya, Łukasz Dudziak, Ravichander Vipperla, Thomas Chau, Mohamed S. Abdelfattah, Samin Ishtiaq, Nicholas D. Lane  
*International Conference on Learning Representations (ICLR)*
- 2020 **BRP-NAS: Prediction-based NAS using GCNs**  
Łukasz Dudziak, Thomas Chau, Mohamed S. Abdelfattah, Royson Lee, Hyeji Kim, Nicholas D. Lane  
*Conference on Neural Information Processing Systems (NeurIPS)*
- 2020 **Iterative Compression of End-to-End ASR Model Using Reinforcement learning**  
Abhinav Mehrotra, Łukasz Dudziak, Jinsu Yeo, Younyoon Lee, Ravichander Vipperla, Mohamed S. Abdelfattah, Sangjeong Lee, Daehyun Kim, Nicholas D. Lane  
*Conference of the International Speech Communication Association (INTERSPEECH)*
- 2020 **Journey Towards Tiny Perceptual Super-Resolution**  
Royson Lee, Łukasz Dudziak, Mohamed S. Abdelfattah, Hyeji Kim, Stylianos Veneris, Hongkai Wen, Nicholas D. Lane  
*European Conference on Computer Vision (ECCV)*
- 2020 **Best of Both Worlds: AutoML Codesign of a CNN and its Hardware Accelerator**  
Mohamed S. Abdelfattah, Łukasz Dudziak, Thomas Chau, Royson Lee, Hyeji Kim, Nicholas D. Lane  
*Design Automation Conference (DAC)*
- 2019 **ShrinkML: End-to-End ASR Model Compression Using Reinforcement Learning**  
Łukasz Dudziak\*, Mohamed S. Abdelfattah\*, Ravichander Vipperla, Stefanos Laskaridis, Nicholas D. Lane  
*Conference of the International Speech Communication Association (INTERSPEECH)*
- 2018 **DLA: Compiler and FPGA Overlay for Neural Network Inference Acceleration**  
Mohamed S. Abdelfattah, David Han, Andrew Bitar, Roberto DiCecco, Shane O'Connell, Nitika Shanker, Joseph Chu, Ian Prins, Joshua Fender, Andrew C. Ling and Gordon R. Chiu  
*International Conference on Field-Programmable Logic and Applications (FPL)*

- 2018 **Harnessing Numerical Flexibility for Deep Learning on FPGAs**  
Andrew C. Ling, Mohamed S. Abdelfattah, Shane O’Connell, Andrew Bitar, David Han, Roberto Dicecco, Suchit Subhaschandra, Chris N Johnson, Dmitry Denisenko, Josh Fender, Gordon R. Chiu  
*International Symposium on Highly-Efficient Accelerators and Reconfigurable Technologies (HEART)*
- 2018 **Flexibility: FPGAs and CAD in Deep Learning Acceleration**  
Gordon R. Chiu, Andrew C. Ling, Davor Capalija, Andrew Bitar, Mohamed S. Abdelfattah  
*International Symposium on Physical Design (ISPD)*
- 2016 **LYNX: CAD for FPGA-based networks-on-chip**  
Mohamed S. Abdelfattah, Vaughn Betz  
*International Conference on Field-Programmable Logic and Applications (FPL)*
- 2015 **Bringing programmability to the data plane: Packet processing with a NoC-enhanced FPGA**  
Andrew Bitar, Mohamed S. Abdelfattah, Vaughn Betz  
*International Conference on Field-Programmable Technology (FPT)*
- 2015 **Design and simulation tools for Embedded NOCs on FPGAs**  
Mohamed S. Abdelfattah, Andrew Bitar, Ange Yaghi, Vaughn Betz  
*International Conference on Field-Programmable Logic and Applications (FPL)*
- 2015 **Take the highway: Design for embedded NoCs on FPGAs**  
Mohamed S. Abdelfattah, Andrew Bitar, Vaughn Betz  
*International Symposium on Field-Programmable Gate Arrays (FPGA)*
- 2014 **Gzip on a chip: High performance lossless data compression on fpgas using opencl**  
Mohamed S. Abdelfattah, Andrei Hagiescu, Deshanand Singh  
*International Workshop on OpenCL (IWOCL)*
- 2013 **Augmenting FPGAs with Embedded Networks on Chip**  
Mohamed S. Abdelfattah, Vaughn Betz  
*Workshop on the Intersection of Computer Architecture and Reconfigurable Logic (CARL)*
- 2013 **The Power of Communication: Energy-Efficient NoCs for FPGAs**  
Mohamed S. Abdelfattah, Vaughn Betz  
*International Conference on Field-Programmable Logic and Applications (FPL)*
- 2012 **Design tradeoffs for hard and soft FPGA-based Networks-on-Chip**  
Mohamed S. Abdelfattah, Vaughn Betz  
*International Conference on Field-Programmable Technology (FPT)*
- 2012 **Transparent Structural Online Test for Reconfigurable Systems**  
Mohamed S. Abdelfattah, Lars Bauer, Claus Braun, Michael E Imhof, Michael A Kochte, Hongyan Zhang, Jörg Henkel, Hans-Joachim Wunderlich  
*International Symposium on On-Line Testing and Robust System Design (IOLTS)*
- 2011 **2.2 GHz LC VCO for RFID on a 0.5- $\mu$ m digital gate-array designed for ultra-thin silicon substrates**  
Mohamed S. Abdelfattah, Damir Ferenci, Markus Grözing, Manfred Berroth, Cor Scherjon, Joachim Burghartz  
*German Microwave Conference (GeMiC)*
- 2009 **Design of a RF Transmitter for RFID Tags in a New Technology with Ultra Thin Silicon Substrates**  
Mohamed S. Abdelfattah, Damir Ferenci, Markus Grözing, Manfred Berroth, Cor Scherjon, Joachim N Burghartz  
*Workshop on Circuit Design and Digital Signal Processing (ProRISC)*

## JOURNAL ARTICLES

- 2023 **Learned Connectivity Sparsification for LUT-based Neural Networks**  
Erwei Wang, Georgios Stavrou, Peter Cheung, George Constantinides, Mohamed S. Abdelfattah, James Davis  
*ACM Transactions on Reconfigurable Technology and Systems (TRETs)*
- 2016 **Design and applications for embedded networks-on-chip on FPGAs**  
Mohamed S. Abdelfattah, Andrew Bitar, Vaughn Betz  
*IEEE Transactions on Computers (TCOMP)*
- 2015 **Power analysis of embedded NoCs on FPGAs and comparison with custom buses**  
Mohamed S. Abdelfattah, Vaughn Betz  
*IEEE Transactions on Very Large-Scale Integration Systems (TVLSI)*
- 2014 **Networks-on-Chip for FPGAs: Hard, Soft or Mixed?**  
Mohamed S. Abdelfattah, Vaughn Betz  
*ACM Transactions on Reconfigurable Technology and Systems (TRETs)*
- 2014 **The Case for Embedded Networks-on-Chip on FPGAs**  
Mohamed S. Abdelfattah, Vaughn Betz  
*IEEE Micro Magazine*

## BOOK CHAPTERS

- 2015 **Embedded Networks-on-Chip for FPGAs**  
Mohamed S. Abdelfattah, Vaughn Betz  
*Reconfigurable Logic: Architecture, Tools and Applications*

## PATENTS

- 2020 **Method and Apparatus for Neural Architecture Search**  
Mohamed S. Abdelfattah, Łukasz Dudziak, Abhinav Mehrotra  
*Application Number: UK2015231.0*
- 2020 **Method and Apparatus for Analysing Neural Network Performance**  
Thomas Chau, Łukasz Dudziak, Mohamed S. Abdelfattah, Royson Lee, Nicholas D. Lane  
*Application Number: UK20199106.4*
- 2019 **Method for Designing Accelerator Hardware**  
Mohamed S. Abdelfattah, Łukasz Dudziak, Thomas Chau, Royson Lee, Hyeji Kim, Sourav Battacharaya  
*Application Number: UK1913353.7*
- 2015 **Field Programmable Gate-Array with Embedded Network-on-Chip Hardware and Design Flow**  
Mohamed S. Abdelfattah, Vaughn Betz  
*Application Number: US14060253*

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