Majid Ahadi

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Education:

- **Georgia Institute of Technology**, Atlanta, GA, PhD Candidate, Electrical Engineering (minor in computer science), 2016 – 2020, GPA: 3.66, **Graduation: Sept. 2020**, Advisor: Professor Madhavan Swaminathan
- **Colorado State University**, Fort Collins, CO, Master's Degree, Electrical Engineering 2014 – 2016, GPA: 3.72
- **K.N.Toosi University of Technology**, Tehran, Iran, Bachelor's Degree, Electrical Engineering 2009- 2013, GPA: 3.6

Skills:

- **Hardware:** Signal and power integrity, Packaging, SerDes, Transmission lines, Digital and analog circuit design, PCB design, Signal processing, Electromagnetics, Microwave circuits, RF circuits, VLSI, Computer architecture.
- **Software:** C/ C++, Python, MATLAB, JavaScript, VHDL, Amazon Web Services, CUDA, OpenMP, Linux.
- **Machine Learning:** Supervised/ unsupervised learning, Reinforcement learning, Neural networks, Convolution neural networks, Recurrent neural networks, Deep learning, Online learning, Bayesian optimization.
- **Simulation:** High-speed Channels, Device and circuit modeling, Statistical analysis, ADS, Cadence, HSPICE, HFSS.
- **Other:** Visualization, Image processing, lab measurement (Oscilloscope, VNA, etc.).

Work Experiences and Projects:

- **Research Assistant** **Georgia Institute of Technology** 2017 – present
  - Inverse design of electronic systems with machine learning: Setting parameters in a complicated design using ML algorithms based on the desired output, to replace tedious tuning and sweeping strategies.
  - Quick analysis of SERDES channels using machine learning: Prediction of eye-diagram characteristics (Jitter, BER, etc.) for SERDES channels using polynomial chaos theory, Bayesian optimization and other ML methods **(In collaboration with IBM)**
  - **DARPA** Common Heterogeneous Integration and IP Reuse Strategies (CHIPS): As a member of this program, I developed interconnect and PDN models on Silicon and LCP interposers for 2.5 D packages, and performed signal and power integrity analysis.
  - Capacitor optimization for power delivery networks: Using the genetic algorithm to place decoupling capacitors in printed circuit boards.
  - Student member of the NSF Center for Advanced Electronics through Machine Learning (CAEML), 2016 - present
- **SIPI Intern** **Apple** Summer 2020
  - Developing numerical and machine learning algorithms for RF interference simulation in the signal and power integrity team.
- Opportunity Research Scholar's mentor Georgia Institute of Technology 2019 - 2020
  - Mentoring a group of undergraduate students on a research project.
- **Electrical Engineering Intern** **Cadence Design Systems** Summer 2018
  - Design space exploration: An efficient method was developed for design space exploration and sensitivity analysis of a DDR4 topology using Polynomial Chaos theory during **internship at Cadence**.
- Teacher Assistance Georgia Institute of Technology 2016
- **Research Assistant** **Colorado State University** 2014- 2016
  - Hyperbolic Polynomial Chaos (HPC) expansion for uncertainty quantification: A novel approach for alleviating curse of dimensionality in high dimensional stochastic problems based on HPC.
  - Uncertainty Quantification for High Speed Circuits: Developing numerical approaches to achieve speedup in stochastic analysis and simulation of high-speed circuits.
- **Electrical Engineering Intern** **Ansys, Inc.** Summer & Fall 2015
  - Quality Assurance of Nexxim: Writing MATLAB scripts for daily accuracy check of ANSYS circuit solver (Nexxim) by comparing daily results with a predetermined baseline during internship at ANSYS.
- Voluntary**:** Cultural mentor Colorado State University 2015
  - Holding social and cultural events and assistance to new international students.
- Electrical Engineer Kianic Company 2013

- Intelligent Audio System for smart homes: Industrial project, designing a convenient audio system to provide special functions in a smart home.

- Electrical Engineering Intern ICAS laboratory 2012
  - Spinal cord stimulation: Prototyping an implantable device, which can do electrical neural stimulation in order to do pain relief.

- Teacher Assistant K.N.Toosi University 2011- 2012
- **Review services for:**
  - IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems
  - IEEE Transactions on Electromagnetic Compatibility
  - IEEE Access: The Multidisciplinary Open Access Journal

Other Projects:

- 2012: Designing an AVR Microcontroller by VHDL: Design and simulation of ATmega32 on Spartan3 FPGA, including Memories, Registers, I/O Ports, USART and Timer.
- 2010-2013: An Application of DC-DC Converters to soccer player robots: A boost DC-DC converter which can charge a solenoid and move a shaft to kick the ball in soccer player robots.
- 2009-2013: Small Size Soccer Robotic league: One of the Robocup leagues, design and build of autonomous agents which are able to play soccer without human control using motion planning and AI.
- 2009: Snake game on analog oscilloscope: Building a snake game in three levels on XY mode of oscilloscope which could be controlled by an external hardware.
- 2008: Assistant robot for paraplegics: A mobile robot which could be controlled by visual head movements commands for paraplegic patients, using image processing and wireless communication.

Awards:

- 1st place Cadence Design Systems Hackathon (Chelmsford, MA), 2018
- Best Presentation Award in the Academic Track, CDNLIVE Cadence User Conference 2018
- Best poster paper award in EPEPS IEEE Conference, 2014
- 1st place, AVR microprocessors programming grand prize competition, 2009

List of Publications:

Journal Papers

- M. Ahadi, S. Roy, "Sparse Linear Regression (SPLINER) Approach for Efficient Multidimensional Uncertainty Quantification of High-Speed Circuits", *IEEE transactions on Computer-Aided Design of Integrated Circuits and Systems,* 2015
- A. K. Prasad, M. Ahadi, S. Roy, "Multidimensional Uncertainty Quantification of Microwave/RF Networks using Linear Regression and Optimal Design of Experiments", *IEEE Transactions on Microwave Theory and Techniques,* 2016
- M. Ahadi, J. Hejase, W. Becker, M. Swaminathan, "Methods for Jitter and Eye Diagram Estimation in High-Speed Serial Channels Using Polynomial Chaos Surrogate Models", *IEEE ACCESS,* April 2019
- M. Ahadi, J. Hejase, W. Becker, J. Kim, S. Lim, M. Swaminathan, "Worst-case Eye Analysis of High-speed Channels Based on Bayesian Optimization," *IEEE Transactions on Electromagnetic Compatibility*, Submitted in June 2020 (under review).

Conference Papers:

- M. Kabir, R. Khazaka, Md. A. H. Talukder, M. Ahadi, et al., "Non-Intrusive Pseudo Spectral Approach for Stochastic Macromodeling of EM Systems using Deterministic Full-wave Solvers", *IEEE EPEPS,* October 2014
- A. K. Prasad, M. Ahadi, S. Roy "Polynomial Chaos Based Variability Analysis of Power Distribution Networks Using a 3D Topology of Multiconductor Transmission Lines", *IEEE EPEPS,* October 2014
- M. Ahadi, M. Vempa, S. Roy "Efficient Multidimensional Statistical Modeling of High Speed Interconnects in SPICE via Stochastic Collocation using Stroud Cubature", *IEEE Symposium on Electromagnetic Compatibility and Signal Integrity*, March 2015 (Invited paper to special session)
- M. Ahadi, M.Kabir, S. Roy, R. Khazaka "Fast Multidimensional Statistical Analysis of Microwave Networks via Stroud Cubature Approach", *IEEE MTT-S International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization,* August 2015
- A. K. Prasad, M. Ahadi, B. S. Thakur, S. Roy "Accurate Polynomial Chaos Expansion for Variability Analysis using Optimal Design of Experiments", *IEEE MTT-S International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization,* August 2015

- M. Ahadi, A. K. Prasad, S. Roy "Hyperbolic Polynomial Chaos Expansion (HPCE) and its Application to Statistical Analysis of Nonlinear Circuits," *IEEE International Conference on Signal and Power Integrity*, May 2016
- M. Ahadi, J. Hejase, W. Becker, M. Swaminathan "Development of Polynomial Chaos based Surrogate Models for Channel Simulation", *IEEE Conference on Electromagnetic Compatibility, Signal & Power Integrity EMC+SIPI*, 2018
- M. Ahadi, H. Yu, J. Hejase, W. Becker, M. Swaminathan, "Polynomial Chaos modeling for jitter estimation in high-speed links", International Test Conference, October 2018
- M. Ahadi, J. Hejase, W. Becker, M. Swaminathan "Jitter and Eye Estimation in SerDes Channels using Modified Polynomial Chaos Surrogate Models", *IEEE* EPEPS, October 2018
- M.Ahadi, A. Varma, K. Keshavan, M. Swaminathan, "Design Space Exploration with Polynomial Chaos Surrogate Models for Analyzing Large System Designs", *DesignCon 2019*, Jan. 2019
- M. Ahadi, J. Hejase, W. Becker, M. Swaminathan, "Eye Diagram and Jitter Estimation in SerDes Designs using Surrogate Models Generated with the Polynomial Chaos Theory", *DesignCon 2019*, Jan. 2019
- M.Ahadi, A. Varma, K. Keshavan, M. Swaminathan, "A Modified Polynomial Chaos Modeling Approach for Uncertainty Quantification", *International Applied Computational Electromagnetics Society (ACES) Symposium*, April 2019 (Invited paper to special session)
- K. Roy, M. Ahadi, H. Torun, R. Trinchero, M. Swaminathan, "Inverse Design of Transmission Lines with Deep Learning", *IEEE Conference on Electrical Performance of Electronic Packaging and Systems*, October 2019
- R. Trinchero, M. Ahadi, K. Roy, M. Swaminathan, F. G. Canavero, "Design of High-Speed Links via a Machine Learning Surrogate Model for the Inverse Problem", *IEEE Electrical Design of Advanced Packaging and Systems (EDAPS)*, Kaohsiung, Taiwan, 2019
- M. Ahadi, M. Swaminathan, "Determining worst-case eye height in low BER channels using Bayesian optimization.", LASCAS 2020 - 11th IEEE Latin American Symposium on Circuits and Systems, San José, Costa Rica, 2020.