

Marc D. Riedel, Ph.D.

Academic Rank

Associate Professor with Tenure, Electrical & Computer Engineering
Graduate Faculty, Biomedical Informatics & Computational Biology
University of Minnesota, Twin Cities

Contact Information

address: 200 Union St. S.E.
Minneapolis, MN 55455
email: mriedel@umn.edu
tel: 612-625-6086
cell: 612-275-9878
fax: 612-625-4583

Websites

Main website: <http://tinyurl.com/marc-riedel-group>
Research: <http://tinyurl.com/marc-riedel-research>
Papers: <http://tinyurl.com/marc-riedel-papers>

EDUCATION

- Postdoctoral Fellow, Computation and Neural Systems, 2004–2005
California Institute of Technology
Funded by the NIH Human Genome Research Institute
- Ph.D., Electrical Engineering, 2004
California Institute of Technology
Dissertation Title: “Cyclic Combinational Circuits”
Advisor: Jehoshua Bruck
Committee: Yaser Abu-Mostafa, Jehoshua Bruck, Ali Hajimiri, Alain Martin, Erik Winfree, and Andrew Viterbi (external from the Viterbi School of Engineering, University of Southern California)
- M.S., Electrical Engineering, 1998
California Institute of Technology
- B.Eng., Electrical Engineering, 1995
Minor in Mathematics, 1995
McGill University

POSITIONS

- Associate Professor with Tenure, 2012–present
Electrical and Computer Engineering
University of Minnesota, Twin Cities

- Assistant Professor, 2006–2012
Electrical and Computer Engineering
University of Minnesota, Twin Cities
- Faculty Member, 2006–present
Digital Technology Center
University of Minnesota, Twin Cities
- Graduate Faculty, 2008–present
Biomedical Informatics and Computational Biology Program
University of Minnesota, Twin Cities
- Lecturer, 2004–2005
Computation and Neural Systems
California Institute of Technology
- Research and Teaching Assistant, 2001–2004
Electrical Engineering
California Institute of Technology

HONORS AND AWARDS

- **CAREER Award** from the National Science Foundation.
- Paper titled “The Synthesis of Combinational Logic to Generate Probabilities” nominated for the **IEEE/ACM William J. McCalla Best Paper Award** at the International Conference on Computer-Aided Design (ICCAD), 2009.
- **Charles H. Wilts Prize** for the Best Doctoral Research in Electrical Engineering at Caltech, 2004.
- Paper titled “The Synthesis of Cyclic Combinational Circuits” received the **Best Paper Award** at the Design Automation Conference (DAC), 2003.

RESEARCH FUNDING

External Sponsored Funding

- Agency: **DARPA**
Program: Molecular Informatics
Title: “*Storage and Processing with Native DNA*”
Investigators: Olgica Milenkovic (PI), Marc Riedel (co-PI), David Soloveichik (co-PI), Huimin Zhao (co-PI), and Alvaro Gonzalo Hernandez (co-PI)
Amount: \$2,200,000
Duration: 2018-2021
- Agency: **National Science Foundation**
Program: Software and Hardware Foundations
Title: “Advanced Signal Processing with Molecular Reactions”
Investigators: Keshab Parhi (PI) and Marc Riedel (co-PI)
Amount: \$300,000
Duration: 2014-2017

- Agency: **National Science Foundation**
Program: Software and Hardware Foundations
Title: “Back to the Future with Printed, Flexible Electronics Design in a Post-CMOS Era when Transistor Counts Matter Again”
Investigators: K. Bazargan (PI), D. Frisbie (co-PI), R. Harjani (co-PI), and D. Lilja (co-PI), Marc Riedel (co-PI)
Amount: \$800,000
Duration: 2013–2018
- Agency: **National Science Foundation**
Program: Software and Hardware Foundations
Title: “Digital Yet Deliberately Random – Synthesizing Logical Computation on Stochastic Bit Streams”
Investigators: Marc Riedel (PI), K. Bazargan (co-PI), R. Harjani (co-PI), and D. Lilja (co-PI)
Amount: \$300,000
Duration: 2012–2015
- Agency: **National Science Foundation**
Program: Software and Hardware Foundations
Title: “Digital Signal Processing with Biomolecular Reactions”
Investigators: Keshab Parhi (PI) and Marc Riedel (co-PI)
Amount: \$400,000
Duration: 2011–2014
- Agency: **National Science Foundation**
Program: **NSF CAREER Award**
Title: “Computing with Things Small, Wet, and Random – Design Automation for Digital Computation with Nanoscale Technologies and Biological Processes”
Investigator: Marc Riedel (PI)
Amount: \$500,000
Duration: 2009–2014
- Agency: **National Science Foundation**
Program: Design Automation for Micro and Nano Systems
Title: “Synthesizing Signal Processing Functions with Biochemical Reactions”
Investigators: Keshab Parhi (PI) and Marc Riedel (co-PI)
Amount: \$200,000
Duration: 2009–2011
- Agency: **SRC Focus Center Research Program (FCRP)**
Program: Functional Engineered Nano-Architectonics (FENA)
Title: “The Concurrent Logical and Physical Design of Nanoscale Digital Circuits”
Investigator: Marc Riedel (PI)
Amount: \$325,000
Duration: 2007–2010

University Sources

- Agency: University of Minnesota, Digital Technology Center
Program: Digital Technology Initiatives (DTI) Seed Grant

Title: “Computational Method for Forward Biological Engineering”
Investigators: Y. Kaznessis (PI), C. Schmidt-Dannert (co-PI), and M. Riedel (co-PI)
Amount: \$97,800
Duration: 2011–2012

- Agency: University of Minnesota
Program: Biomedical Informatics and Computational Biology (BICB)
Funding: Student Traineeships for Brian Fett and Adrianna Fitzgerald
Investigator: Marc Riedel (PI)
Amount: \$78,000
Duration: 2007–2009

PUBLICATIONS and PRESENTATIONS

Peer-Reviewed Journal Articles and Book Chapters

1. “Performing Stochastic Computation Deterministically”
M. Hassan Najafi, Devon Jenson, David J. Lilja, and Marc D. Riedel
IEEE Transactions on Very Large Scale Integration (VLSI) Systems, Vol. 27, No. 12, 2019
2. “Synthesis of Polynomial Functions”
Weikang Qian and Marc Riedel
Stochastic Computing: Techniques and Applications, Chapter 4
W. Gross and V. Gaudet, editors, Springer, 2019
3. “Deterministic Approaches to Bitstream Computing”
Marc Riedel
Stochastic Computing: Techniques and Applications, Chapter 5
W. Gross and V. Gaudet, editors, Springer, 2019
4. “Computation of Mathematical Functions using DNA via Fractional Coding”
S. Ahmad Salehi, Xingyi Liu, Marc Riedel, and Keshab Parhi
Nature Scientific Reports, Vol. 8, No. 8312, 2018
5. “Low Cost Sorting Network Circuits using Unary Processing”
M. H. Najafi, D. Lilja, M. Riedel, and K. Bazargan
IEEE Trans. on Very Large Scale Integration Systems, Vol. 26, No. 8, pp. 1471–1480, 2018
6. “A Study on Monotone Self-Dual Boolean Functions”
Mustafa Altun and Marc. D. Riedel
Acta Mathematicae Applicatae Sinica, Vol. 33, No. 1, pp. 4352, 2018
7. “An Overview of Time-Based Computing with Stochastic Constructs”
M. Hassan Najafi, S. Jamali-Zavareh, D. Lilja, M. Riedel, K. Bazargan and R. Harjani
IEEE Micro, Vol. 37, No. 6, pp. 62–71, 2017
8. “Polysynchronous Clocking: Exploiting the Skew Tolerance of Stochastic Circuits”
M. Hassan Najafi, David Lilja, Marc Riedel, and Kia Bazargan
IEEE Transactions on Computers, Vol. 66, No. 10, pp. 1734–1746, 2017

9. “Time-Encoded Values for Highly Efficient Stochastic Circuits”
M. H. Najafi, S. Jamali-Zavareh, D. Lilja, M. Riedel, K. Bazargan, and R. Harjani
IEEE Trans. on Very Large Scale Integration Systems, Vol. 25, No. 5, pp. 1644–1657, 2017
10. “A Reconfigurable Architecture with Sequential Logic-based Stochastic Computing”
M. Hassan Najafi, Peng Li, David Lilja, Weikang Qian, Kia Bazargan, and Marc Riedel
ACM J. on Emerging Technologies in Computing Systems, Vo. 13, No. 4, pp. 1–28, 2017
11. “Chemical Reaction Networks for Computing Polynomials”
S. Ahmad Salehi, Keshab Parhi, and Marc Riedel
ACS Synthetic Biology, Vol. 6, No. 1, pp. 76–83, 2017
12. “Synchronous Sequential Computations with Biomolecular Reactions”
V. Kulkarni, H. Jiang, E. Kharisov, N. Hovakimyan, M. Riedel, and K. Parhi
in *Systems and Synthetic Biology*, Vikram Singh and Pawan K. Dhar, editors, Springer, 2015
13. “Molecular Sensing and Computing Systems”
S. Ahmad Salehi, Keshab Parhi, and Marc Riedel
IEEE Trans. on Molecular, Biological, and Multi-Scale Communications, Vol. 1, No. 3, 2015
14. “Synthesizing Cubes to Satisfy a Given Intersection Pattern”
Weikang Qian, Marc Riedel, and Ivo Rosenberg
Journal of Discrete Applied Mathematics, Vol. 193, pp. 11–38, 2015
15. “Computation on Stochastic Bit Streams: Digital Image Processing Case Studies”
Peng Li, David Lilja, Weikang Qian, Kia Bazargan, and Marc Riedel
IEEE Transactions on VLSI Systems, Vol. 22, No. 3, pp. 449–462, 2014
16. “Logical Computation on Stochastic Bit Streams with Linear Finite State Machines”
Peng Li, David Lilja, Weikang Qian, Marc Riedel, and Kia Bazargan
IEEE Transactions on Computers, Vol. 63, No. 6., pp. 1474–1486, 2014
17. “Discrete-Time Signal Processing with DNA”
Hua Jiang, S. Ahmad Salehi, Marc Riedel, and Keshab Parhi
ACS Synthetic Biology, Vol. 2, No. 5, pp. 245–254, 2013
18. “Case Studies of Logical Computation on Stochastic Bit Streams”
Peng Li, David Lilja, Weikang Qian, Kia Bazargan, and Marc Riedel
Lecture Notes in Computer Science: Power and Timing Modeling, Optimization and Simulation Workshop,
G. Goos, J. Hartmanis, and J. V. Leeuwen Editors., Springer, pp. 235–244, 2012
19. “Gene Regulatory Network Modeling Using Literature-Curated and High Throughput Data”
Vishwesh Kulkarni, Reza Arastoo, Anupama Bhat, Kalyanasundaram Subramanian, Mayuresh Kothare, and Marc Riedel
Systems and Synthetic Biology, Vol. 6, No. 3–4, pp. 69–77, 2012
20. “Synthesis of Cyclic Functional Dependencies”
John Backes and Marc Riedel
ACM Trans. on Design Automation of Electronic Systems, Vol. 17, No. 4, pp. 1–24, 2012

21. “Logic Synthesis for Switching Lattices”
Mustafa Altun and Marc Riedel
IEEE Transactions on Computers, Vol. 61, No. 11, pp. 1588–1600, 2012
22. “Digital Signal Processing with Molecular Reactions”
Hua Jiang, Marc Riedel, and Keshab Parhi
IEEE Design & Test of Computers, Vol. 29, No. 3, pp. 31–31, 2012
23. “Cyclic Boolean Circuits”
Marc Riedel and Jehoshua Bruck
Journal of Discrete Applied Mathematics, Vol. 160, No. 13–14, pp. 1877–1900, 2012
24. “Transforming Probabilities with Combinational Logic”
Weikang Qian, Marc Riedel, Hongchao Zhou, and Jehoshua Bruck
IEEE Trans. on CAD of Integrated Circuits & Systems, Vol. 30, No. 9, pp. 1279–1292, 2011
25. “Synthesizing Logic with Percolation in Nanoscale Lattices”
Mustafa Altun and Marc Riedel
Int’l Journal of Molecular and Nanoscale Computation, Vol. 3, No. 2, pp. 12–30, 2011
26. “Characterizing the Memory of the GAL Regulatory Network in *Saccharomyces cerevisiae*”
Vishwesh Kulkarni, Venkatesh Kareenhalli, Ganesh Viswanathan, and Marc Riedel
Systems and Synthetic Biology, Vol. 5, No. 3–4, pp. 97–104, 2011
27. “Rate-Independent Constructs for Chemical Computation”
Philip Senum and Marc Riedel
PLoS ONE, Vol. 6, Issue 6, 12 pages, 2011
28. “Uniform Approximation and Bernstein Polynomials with Coefficients in the Unit Interval”
Weikang Qian, Marc Riedel, and Ivo Rosenberg
European Journal of Combinatorics, Vol. 32, No. 3, pp. 448–463, 2011
29. “An Architecture for Fault-Tolerant Computation with Stochastic Logic”
Weikang Qian, Xin Li, Marc Riedel, Kia Bazargan, and David Lilja
IEEE Transactions on Computers, Vol. 60, No. 1, pp. 93–105, 2011
30. “Synthesizing Combinational Logic to Generate Probabilities: Theories and Algorithms”
Weikang Qian, Marc Riedel, Kia Bazargan, and David Lilja
Advanced Techniques in Logic Synthesis, Optimizations and Applications
Sunil Khatri and Kanupriya Gulati Editors, Springer Publishing, pp. 1–28, 2011
31. “The Synthesis of Stochastic Logic for Nanoscale Digital Circuits”
Weikang Qian, John Backes, and Marc Riedel
International Journal of Molecular and Nanoscale Computation
Vol. 1, Issue 4, pp. 39–57, 2010
32. “Computing in the RAIN: A Reliable Array of Independent Nodes”
Vasken Bohossian, Charles Fan, P. LeMahieu, Marc Riedel, Lihao Xu, and Jehoshua Bruck
IEEE Transactions on Parallel and Distributed Computing, Vol. 12, No. 2, pp. 99–114, 2001
33. “Tolerating Faults in Counting Networks”
Marc Riedel and Jehoshua Bruck

Dependable Network Computing, Dimiter Avresky, Editor
Kluwer Academic Publishing, pp. 267–278, 2000

Peer-Reviewed Conference Papers

1. “Concentration-based Polynomial Calculations on Nicked DNA”
Tonglin Chen and Marc Riedel
IEEE International Conference on Acoustics, Speech, and Signal Processing, 5 pages, 2020
2. “Performing Stochastic Computation Deterministically”
M. Hassan Najafi, D. Jenson, M. Riedel and D. J. Lilja
IEEE International Symposium of Circuits and Systems, 2020
3. “Deterministic Methods for Stochastic Computing using Low-Discrepancy Sequences”
M. Hassan Najafi, David J. Lilja, and Marc Riedel
IEEE/ACM International Conference on Computer-Aided Design, Article 51, 2018
4. “Power and Area Efficient Sorting Networks using Unary Processing”
M. Hassan Najafi, D. J. Lilja, M. Riedel, and K. Bazargan
IEEE International Conference on Computer Design, 2017
5. “Unary Positional Computing”
Mckenzie van der Hagen and Marc Riedel
IEEE Global Conference on Signal and Information Processing, 2017
6. “Molecular Computation of Complex Markov Chains with Self-Loop State Transitions”
S. Ahmad Salehi, Marc Riedel, and Keshab Parhi
Asilomar Conference on Signals, Systems and Computers, 2017
7. “Time-Encoded Values for Highly Efficient Stochastic Circuits”
M. H. Najafi, S. Jamali-Zavareh, D. Lilja, M. Riedel, K. Bazargan, and R. Harjani
IEEE International Symposium on Circuits & Systems, 2017
8. “Computing Polynomials with Positive Coefficients using Stochastic Logic by Double-NAND Expansion”
S. Ahmad Salehi, Yin Liu, Marc Riedel and Keshab Parhi
ACM Great Lakes Symposium on VLSI, 2017
9. “Synthesis of Correlated Bit Streams for Stochastic Computing”
Yin Liu, Megha Parhi, Marc Riedel, and Keshab Parhi
Asilomar Conference on Signals, Systems and Computers, 2016
10. “A Deterministic Approach to Stochastic Computing”
Devon Jenson and Marc Riedel
ACM/IEEE International Conference on Computer-Aided Design, 2016
11. “Computing Polynomials using Chemical Reaction Networks”
S. Ahmad Salehi, Keshab Parhi, and Marc Riedel
IEEE Globecom Symposium, 2016
12. “Polysynchronous Stochastic Circuits”
M. Hassan Najafi, David Lilja, Marc Riedel, and Kia Bazargan
IEEE/ACM Asia and South Pacific Design Automation Conference, 2016

13. “Markov Chain Computations using Molecular Reactions”
S. Ahmed Salehi, Marc Riedel, and Keshab Parhi
IEEE International Conference on Digital Signal Processing, pp. 689–693, 2015
14. “Effect of Bit-Level Correlation in Stochastic Computing”
Megha Parhi, Marc Riedel, and Keshab Parhi
IEEE International Conference on Digital Signal Processing, pp. 463–467, 2015
15. “Asynchronous Discrete-Time Signal Processing with Molecular Reactions”
Ahmed Salehi, Marc Riedel, and Keshab Parhi
Asilomar Conference on Signals, Systems, and Computers, pp. 493–497, 2014
16. “IIR Filters Using Stochastic Arithmetic”
Naman Saraf, Kia Bazargan, Davd Lilja, Marc Riedel
IEEE/ACM Conference on Design, Automation and Test in Europe, pp. 1–6, 2014
17. “Digital Logic with Molecular Reactions”
Hua Jiang, Marc Riedel and Keshab Parhi
IEEE/ACM International Conference on Computer-Aided Design, pp. 721–727, 2013
18. “Stochastic Functions Using Sequential Logic”
Naman Saraf, Kia Bazargan, David Lilja and Marc Riedel
IEEE International Conference on Computer Design, pp. 507–510, 2013
19. “An Efficient Implementation of Numerical Integration Using Logical Computation on Stochastic Bit Streams”
Weikang Qian, Chen Wang, Peng Li, David Lilja, Kia Bazargan, and Marc Riedel,
IEEE/ACM International Conference on Computer-Aided Design, pp. 156–162, 2012
20. “The Synthesis of Complex Arithmetic Computation on Stochastic Bit Streams Using Sequential Logic”
Peng Li, David Lilja, Weikang Qian, Kia Bazaragan and Marc Riedel
IEEE/ACM International Conference on Computer-Aided Design, pp. 480–487, 2012
21. “The Synthesis of Linear Finite State Machine-based Stochastic Computational Elements”
Peng Li, Weikang Qian, Marc Riedel, Kia Bazargan, David Lilja
IEEE/ACM Asia and South Pacific Design Automation Conference, pp. 757–762, 2012
22. “Robust Tunable in vitro Transcriptional Oscillator Networks”
Vishwesh Kulkarni, Theerachai Chanyaswad, Marc Riedel and Jongmin Kim
Asilomar Conference on Signals, Systems, and Computers, pp. 114–119, 2012
23. “Asynchronous Computation with Molecular Reactions”
Hua Jiang, Marc Riedel, and Keshab Parhi
Asilomar Conference on Signals, Systems, and Computers, pp. 493–497, 2011
24. “Synchronous Sequential Computation with Molecular Reactions”
Hua Jiang, Marc Riedel, and Keshab Parhi
ACM/IEEE Design Automation Conference, pp. 836–841, 2011
25. “Rate-Independent Constructs for Chemical Computation”
Philip Senum and Marc Riedel
Pacific Symposium on Biocomputing, pp. 326–337, 2011

26. “Binary Counting with Chemical Reactions”
Aleksandra Kharam, Hua Jiang, Marc Riedel, and Keshab Parhi
Pacific Symposium on Biocomputing, pp. 302–313, 2011
27. “Networks of Passive Oscillators”
Vishwesh Kulkarni, Marc Riedel, and Guy-Bart Stan
Allerton Conference on Communication, Control, and Computing, 559–565, 2011
28. “A Synthesis Flow for Digital Signal Processing with Biomolecular Reactions”
Hua Jiang, Aleksandra Kharam, Marc Riedel, and Keshab Parhi
IEEE/ACM International Conference on Computer-Aided Design, pp. 417–424, 2010
29. “Digital Signal Processing with Biomolecular Reactions”
Hua Jiang, Aleksandra Kharam, Marc Riedel, and Keshab Parhi
IEEE/ACM International Conference on Computer-Aided Design, 8 pages, 2010
30. “Lattice-Based Computation of Boolean Functions”
Mustafa Altun and Marc Riedel
ACM/IEEE Design Automation Conference, pp. 609–612, 2010
31. “Reduction of Interpolants for Logic Synthesis”
John Backes and Marc Riedel
IEEE/ACM International Conference on Computer-Aided Design, pp. 602–609, 2010
32. “Writing and Compiling Code into Biochemistry”
Adam Shea, Brian Fett, Marc Riedel, and Keshab Parhi
Pacific Symposium on Biocomputing, pp. 456–464, 2010
33. “The Synthesis of Combinational Logic to Generate Probabilities”
Weikang Qian, Marc Riedel, Kia Bazargan, and David Lilja
IEEE/ACM International Conference on Computer-Aided Design, pp. 367–374, 2009
(Nominated for **IEEE/ACM William J. McCalla Best Paper Award**)
34. “Synthesizing Sequential Register-Based Computation with Biochemistry”
Adam Shea, Brian Fett, Marc Riedel, and Keshab Parhi
IEEE/ACM International Conference on Computer-Aided Design, pp 136–143, 2009
35. “Nanoscale Digital Computation Through Percolation”
Mustafa Altun, Marc Riedel, and Claudia Neuhauser
ACM/IEEE Design Automation Conference, pp. 615–616, 2009
36. “A Reconfigurable Stochastic Architecture for Reliable Computing”
Xin Li, Weikang Qian, Marc Riedel, Kia Bazargan, and David Lilja
IEEE Great Lakes Symposium on VLSI Design, pp. 315–320, 2009
37. “Estimation and Optimization of Reliability of Noisy Digital Circuits”
Satish Sivaswamy, Kia Bazargan, and Marc Riedel
IEEE International Symposium on Quality Electronic Design, pp 213–219, 2009
38. “Stochastic Transient Analysis of Biochemical Systems”
Bin Cheng and Marc Riedel
Pacific Symposium on Biocomputing, pp. 4–14, 2009

39. “Module Locking in Biochemical Synthesis”
Brian Fett and Marc Riedel
IEEE/ACM International Conference on Computer-Aided Design, 758–764, 2008
40. “The Analysis of Cyclic Circuits with Boolean Satisfiability”
John Backes and Marc Riedel
IEEE/ACM International Conference on Computer-Aided Design, pp. 143–148, 2008
41. “The Synthesis of Robust Polynomial Arithmetic with Stochastic Logic”
Weikang Qian and Marc Riedel
ACM/IEEE Design Automation Conference, pp. 648–653, 2008
42. “Synthesizing Stochasticity in Biochemical Systems”
Brian Fett, Jehoshua Bruck, and Marc Riedel
ACM/IEEE Design Automation Conference, 640–645, 2007
43. “The Synthesis of Cyclic Combinational Circuits”
Marc Riedel and Jehoshua Bruck
ACM/IEEE Design Automation Conference, pp. 163–168, 2003
(Received the **DAC Best Paper Award**)

Peer-Reviewed Workshop Papers

1. “Energy-Efficient Pulse-based Convolution Engine for Near-Sensor Processing”
M. Hassan Najafi, David J. Lilja, and Marc Riedel
ISCA Workshop on Unary Computing, 8 pages, 2019
2. “Fast-Converging, Scalable, Deterministic Bit-Stream Computing using Low-Discrepancy Sequences”
M. Hassan Najafi, David J. Lilja, and Marc Riedel
IEEE/ACM International Workshop on Logic & Synthesis, 8 pages, 2018
3. “A Deterministic Approach to Stochastic Computing”
Devon Jenson and Marc. D. Riedel,
IEEE/ACM International Workshop on Logic and Synthesis, 7 pages, 2016
Nominated for Best Student Paper Award
4. “Using a Two-Dimensional Finite-State Machine for Stochastic Computation”
Peng Li, Weikang Qian, David Lilja, Marc Riedel, and Kia Bazargan
IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2012
5. “Resolution Proofs as a Data Structure for Logic Synthesis”
John Backes and Marc Riedel
IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2011
6. “Synthesizing Cubes to Satisfy a Given Intersection Pattern”
Weikang Qian and Marc Riedel
IEEE/ACM International Workshop on Logic and Synthesis, pp. 217–224, 2010
7. “Two-Level Logic Synthesis for Probabilistic Computation”
Weikang Qian and Marc Riedel
IEEE/ACM International Workshop on Logic and Synthesis, pp. 95–102, 2010

8. “Reduction of Interpolants for Logic Synthesis”
John Backes and Marc Riedel
IEEE/ACM International Workshop on Logic and Synthesis, 6 pages, 2010
9. “Digital Signal Processing with Biomolecular Reactions”
Hua Jiang, Marc Riedel, and Keshab Parhi
IEEE Workshop on Signal Processing Systems, pp. 237–242, 2010
10. “The Synthesis of Cyclic Dependencies with Craig Interpolation”
John Backes and Marc Riedel
IEEE/ACM International Workshop on Logic and Synthesis, pp. 24–30, 2009
11. “Synthesizing Sequential Register-Based Computation with Biochemistry”
Adam Shea, Brian Fett, Marc Riedel, and Keshab Parhi
IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2009
12. “The Synthesis of Combinational Logic to Generate Probabilities”
Weikang Qian, Marc Riedel, Kia Bazargan, and David Lilja
IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2009
13. “The Synthesis of Stochastic Logic to Perform Multivariate Polynomial Arithmetic”
Weikang Qian and Marc Riedel
IEEE/ACM International Workshop on Logic and Synthesis, pp. 79–86, 2008
14. “The Synthesis of Stochastic Circuits for Nanoscale Computation”
Weikang Qian, John Backes, and Marc Riedel
IEEE/ACM International Workshop on Logic and Synthesis, pp. 176–183, 2007
15. “Application of LUT Cascades to Numerical Function Generators”
Tsutomu Sasao, Jon Butler, and Marc Riedel
Workshop on Synthesis & System Integration of Mixed Information, 7 pages, 2004
16. “Timing Analysis of Cyclic Combinational Circuits”
Marc Riedel and Jehoshua Bruck
IEEE/ACM International Workshop on Logic and Synthesis, pp. 446–453, 2004
17. “Cyclic Combinational Circuits: Analysis for Synthesis”
Marc Riedel and Jehoshua Bruck
IEEE/ACM International Workshop on Logic and Synthesis, pp. 105–112, 2003

Patents

1. “Low-Discrepancy Deterministic Bit-streams”
M. Hassan Najafi, David J. Lilja, and Marc Riedel
Provisional U.S. Patent 62/864,807, June 2019
2. “Sorting Networks using Unary Processing”
M. Hassan Najafi, David J. Lilja, Marc Riedel, and Kia Bazargan
Provisional U.S. Patent App. 16/674488, Nov. 2018
3. “Stochastic Computation using Pulse-Width Modulated Signals”
M. Hassan Najafi, S Jamali-Zavareh, D. J. Lilja, M. Riedel, K. Bazargan, and R. Harjani
Provisional U.S. Patent 15/869453, Jan. 2018

4. “Polysynchronous Stochastic Circuits”
David J. Lilja, Mohammadhassan Najafi, Marcus Riedel, Kiarash Bazargan
U.S. Patent No. 10,520,975 B2, Dec. 31, 2019
5. “Stochastic Computing on Deterministic Bit Streams”
Devon Jenson and Marc Riedel
U.S. Patent, 10,063,255, Aug. 28, 2018
6. “Synthesis of Cyclic Combinational Circuits”
Marc Riedel and Jehoshua Bruck
U.S. Patent 7,249,341, July 24, 2007
7. “A Reliable Array of Distributed Computing Nodes”
Vincent Bohossian, Charles Fan, Paul LeMahieu, Marc Riedel, Lihao Xu, and Jehoshua Bruck
U.S. Patent 6,128,277, July 11, 2000

Presentations with Published Abstracts

1. “Stochastic Computation on DNA Strands through Hydroxyl Nicking”
Tonglin Chen, Arnav Solanki, and Marc Riedel
Foundations of Nanoscience: Self-Assembled Architectures and Devices, 2 pages, 2020
2. “Stochastic Computing: A New Paradigm for Ultra Low Power, Fault-Tolerant, Skew-Tolerant Computing”
Marc Riedel (**invited**)
Energy Consequences of Information Workshop
Sponsored by Air Force Office of Scientific Research, Santa Fe, NM, 2017
3. “A Deterministic Approach to Stochastic Computing”
Devon Jenson and Marc Riedel (**invited**)
Information Theory and Applications Workshop, UC San Diego, 2017
4. “Polysynchronous Clocking for Stochastic Computing”
Marc Riedel (**invited**)
CMOS Emerging Technologies Workshop, Montreal, Quebec, 2016
5. “Polysynchronous Clocking for Molecular Computing”
Marc Riedel (**invited**)
Workshop on Communications, Inference, and Computing in Molecular and Biological Systems, Los Angeles, CA, 2015
6. “Synchronous Computation and Signal Processing and DNA”
Marc Riedel (**invited**)
Workshop on Coding Techniques for Synthetic Biology, Urbana-Champaign, IL, 2015
7. “Probability as State Variable for Nanoscale Computation”
Marc Riedel (**invited**)
CMOS Emerging Technologies Workshop, Vancouver, BC, 2015
8. “Pipelining for Accuracy with Stochastic Computing”
Marc Riedel (**invited**)
Information Theory and Applications Workshop, UC San Diego, 2015

9. “Probability as State Variable for Nanoscale Computation”
Marc Riedel (**invited**)
Information Theory and Applications Workshop, UC San Diego, 2014
10. “A Biomolecular Implementation of Non-Linear Systems”
Vishwesh Kulkarni, Hua Jian, Theerachai Chanyaswad, Angelina Shudy, and Marc Riedel
International Workshop on Bio-Design Automation, San Fransisco, CA, 2012
11. “So Simple a Caveman Could Do It – Computing On Stochastic Bit Streams”
Marc Riedel (**invited**)
Information Theory and Applications Workshop, UC San Diego, 2012
12. “Synthesizing Logical Computation on Stochastic Bit Streams for Sensing Applications”
Marc Riedel (**invited**)
IEEE CANDE Workshop, San Jose, CA, 2011
13. “Digital Signal Processing with DNA”
Hua Jiang, Marc Riedel, and Keshab Parhi
International Conference on DNA Computing, Pasadena, CA, 2011
14. “Synthesizing Logical Computation on Stochastic Bit Streams”
Marc Riedel (**invited**)
CMOS Emerging Technologies Workshop, Whistler, BC, 2011
15. “Asynchronous Sequential Computation with Molecular Reactions”
Hua Jiang, Marc Riedel, and Keshab Parhi
International Workshop on Bio-Design Automation, San Diego, CA, 2011
16. “Biological Network Reconstruction Using Literature Curated and High Throughput Data”
Vishwesh Kulkarni, Kalyanasundaram Subramanian, Reza Arastoo,
Mayuresh Kothare, and Marc Riedel
International Workshop on Bio-Design Automation, San Diego, CA, 2011
17. “Rate-Independent Constructs for DNA Computing”
Philip Senum and Marc Riedel
Annual Institute of Biological Engineering Conference, Atlanta, GA, 2011
18. “Lattice-Based Computation with Percolation”
Mustafa Altun and Marc Riedel (**invited**)
IEEE/ACM International Symposium on Nanoscale Architectures, Anaheim, CA, 2010
19. “Signal Processing Functions with Biomolecular Reactions”
Hua Jiang, Marc Riedel, and Keshab Parhi
International Workshop on Bio-Design Automation, Anaheim, CA, 2010
20. Session Summary: “Engineering Biology: Fundamentals and Applications”
Marc Riedel, Soha Hassoun, and Ron Weiss (**invited**)
ACM/IEEE Design Automation Conference, Anaheim, CA, 2010
21. “Digital Signal Processing with Biochemistry”
Marc Riedel (**invited**)
Symposium on the Foundations of Nanoscience, Salt Lake City, UT, 2010

22. “Iterative Computation with Biomolecular Reactions”
Hua Jiang, Marc Riedel, and Keshab Parhi
Annual Institute of Biological Engineering Conference, Boston, MA, 2010
23. “Stochastic Logic and Stochastic Biological Processes”
Marc Riedel (**invited**)
Information Theory and Applications Workshop, UC San Diego, 2010
24. “Computing with Things Small, Wet, and Random”
Marc Riedel (**invited**)
IEEE CANDE Workshop, Monterey, CA, 2009
25. “Stochastic Chemical Reaction Networks”
Marc Riedel (**invited**)
International Workshop on Stochasticity, Banff, Alberta, 2009
26. “Synthesizing Sequential Register-Based Computation with Biochemistry”
Adam Shea, Brian Fett, Marc Riedel, and Keshab Parhi
International Workshop on Bio-Design Automation, San Francisco, CA, 2009
27. “Synthesizing Circuit Constructs with Chemical Reaction Networks”
Marc Riedel (**invited**)
Emergence in Chemical Systems Conference, Anchorage, AK, 2009
28. “Rate-Independent Biochemical Synthesis”
Adam Shea, Brian Fett, and Marc Riedel
Annual Institute of Biological Engineering Conference, Santa Clara, CA, 2009
29. “Modular Stochastic Biochemistry”
Brian Fett and Marc Riedel
Synthetic Biology 4.0, Hong Kong, 2008
30. “Biochemical Pathways from Generic Designs”
Brian Fett and Marc Riedel
Synthesis of Cells Meeting, Kobe, Japan, 2008
31. “The Computer-Aided Synthesis of Stochastic Biochemistry”
Brian Fett and Marc Riedel
Advances in Synthetic Biology Conference, Cambridge, UK, 2008
32. “Synthesizing Stochasticity”
Brian Fett and Marc Riedel
Synthetic Biology 3.0, Zürich, Switzerland, 2007
33. “Using The Probability Gradient to Analyze Bifurcating Biochemical Systems”
Brian Fett and Marc Riedel
International Conference on Systems Biology, Yokohama, Japan, 2006
34. “Exact Stochastic Simulation with Event Leaping”
Marc Riedel and Jehoshua Bruck
International Conference on Systems Biology, Boston, MA, 2005

Invited Talks, Colloquia, and Panels (without published abstracts)

1. “Stochastic Logic for DNA Computing”
IEEE International Green and Sustainable Computing Conference
Workshop on Computing with Unconventional Technologies, Alexandria, VA, 2019
2. “A Deterministic Approach to Stochastic Computing with Coding Applications”
IEEE Global Conference on Signal and Information Processing
Workshop on Stochastic and Approximate Computing for Signal Processing and Machine Learning, Montreal, 2017
3. “A Deterministic Approach to Stochastic Computing with Coding Applications”
IEEE Global Conference on Signal and Information Processing
Workshop on Stochastic and Approximate Computing for Signal Processing and Machine Learning, Montreal, 2017
4. “Polysynchronous Clocking for Molecular Computing”
Bio Physics Seminar Series
Host: Elias Puchner
University of Minnesota, Sept. 29, 2016
5. “A Deterministic Approach to Stochastic Computing”
Waterloo Workshop on Stochastic Computing
Host: Vincent Gaudet
University of Waterloo, May 25, 2016
6. “The Future of Computer Engineering”
Keynote address to IEEE General Meeting, UMN Student Branch
Host: Karel Kalthoff
University of Minnesota, Jan. 25, 2016
7. “Towards a Computer Engineering Discipline with DNA”
Biochemistry Seminar
Host: Prof. Aseem Ansari
University of Wisconsin, Sept. 30, 2013
8. “The Modest Mathematician: Anecdotes from the Personal and Professional Life of Ivo Rosenberg”
Honorary Doctorate Ceremony for Ivo Rosenberg
Host: Prof. Dietlinde Lau
University of Rostock, Germany, May 15, 2013
9. “Towards a Computer Engineering Discipline with DNA”
Computer Science Seminar
Host: Prof. Jack Lutz
Iowa State University, Nov. 30, 2012
10. “Logic Synthesis for Networks of Four-Terminal Switches”
Computer Science Seminar
Host: Prof. Alex Sprintson
Texas A&M University, April 20, 2012

11. “Random and Loopy Circuits: Complexity in Electronic and Biological Circuit Design”
Dept. of Defense Research and Engineering Complex Systems Study
Host: Robert Bond
Squam Lake, NH, July 27, 2010
12. Panelist: “CAD for Nanoelectronic Circuits and Architectures – Are We There Yet?”
IEEE/ACM International Symposium on Nanoscale Architectures
Organizer: Prof. Garrett Rose
Anaheim, CA, June 17, 2010
13. “Robust Stochastic Computation with Biomolecular Reactions”
NSF Workshop on Shared Organizing Principles in Biology
Organizer: Prof. Melanie Mitchel
Arlington, VA, May 25, 2010
14. “Computing with Things Small, Wet, and Random”
Biological and Medical Physics Seminar Series
Host: Prof. Vincent Noireaux
University of Minnesota, March 30, 2010
15. “Computing with Things Small, Wet, and Random”
Computer Science Seminar
Host: Prof. Soha Hassoun
Tufts University, March 1, 2010
16. Tutorial: “Programming Constructs for Chemical Reaction Networks”
Pacific Symposium on Biocomputing
Organizer: Dr. Gil Alterovitz
Kona, Hawaii, Jan. 7, 2010
17. “Computing with Things Small, Wet, and Random”
Electrical and Computer Engineering Seminar
Host: Prof. Azadeh Davoodi
University of Wisconsin, Feb. 27, 2009
18. “Computing with Things Small, Wet, and Random”
Electrical and Computer Engineering Seminar
Host: Prof. Lin Zhong
Rice University, Feb. 17, 2009
19. “Computing with Things Small, Wet, and Random”
Electrical and Computer Engineering Seminar
Host: Prof. Anxiao (Andrew) Jiang
Texas A&M University, Feb. 17, 2009
20. “Synthesizing Nearly Rate Independent Biochemical Computation”
NSF Expeditions in Computing – Molecular Programming Workshop
Organizer: Prof. Erik Winfree
Oxnard, CA, Jan. 10, 2009

21. “Computing with Things Small, Wet, and Random”
Electrical and Computer Engineering Seminar
Host: Prof. Rick Kiehl
UC Davis, Sep. 29, 2008
22. “Synthesizing Stochastic Logic”
SRC Center on Functional Engineered Nano-Architectonics (FENA) Annual Meeting
Organizer: Prof. Kang Wang
La Jolla, CA, June 13, 2008
23. Tutorial: “Synthesizing Stochastic Biochemical Reactions”
Tech Tune Up
Organizer: Prof. Ahmed Tewfik
University of Minnesota, May 26, 2008
24. “Synthesizing Stochasticity in Circuits and in Biology”
DARPA MTO LIBRA Workshop
Organizer: Dr. John Damoulakis
Arlington, VA, Nov. 29, 2007
25. Public Lecture: “Circuit Engineers Doing Biology –
A Discourse on the Changing Landscape of Scientific Research”
Café Scientifique Public Seminar Series, Bell Museum of Natural History
Organizer: Peggy Korsmo-Kennon
Bryant-Lake Bowl, Minneapolis, MN, Nov. 20, 2007
26. “High-Performance Computing for the Analysis and Synthesis of Biochemistry”
IBM Company Seminar
Host: Tim Mullins
Rochester, MN, Oct. 8, 2007
27. “Analysis and Synthesis of Biochemical Reactions”
Cadence Research Labs Seminar
Host: Dr. Andreas Kuelmann
Berkeley, CA, May 24, 2007
28. Tutorial: “Analysis and Synthesis of Stochastic Biochemical Reactions”
Tech Tune Up
Organizer: Prof. Kia Bazargan
University of Minnesota, May 23, 2007
29. “Analysis and Synthesis of Stochastic Logic for Nanoscale Computation”
SRC Center on Functional Engineered Nano-Architectonics (FENA) Workshop
Organizer: Prof. Kang Wang
UCLA, April 19, 2007
30. “Synthesizing Stochasticity in Biochemical Reaction Networks”
Mathematical Biology Seminar
Host: Prof. Hans Othmer
University of Minnesota, March 21, 2007

31. “Exact Stochastic Simulation with Event Leaping”
Mathematical Biology Seminar
Host: Prof. Hans Othmer
University of Minnesota, Nov. 2, 2006
32. “Cycles – The Good and the Bad in Logic Synthesis and Computational Biology”
Medtronic Technology Quarterly Seminar
Host: Sara Audet
Fridely, MN, Oct. 5, 2006
33. “Cycles – The Good and the Bad in Logic Synthesis and Computational Biology”
Electrical Engineering Seminar
Host: Prof. Mustafa Kamash
UC Santa Barbara, May 17, 2006
34. Job Talks: “Cyclic Combinational Circuits and Other Novel Constructs”
 - *Electrical and Computer Engineering Dept.*
University of Minnesota
 - *Electrical and Computer Engineering Dept.*
University of Utah
 - *Electrical Engineering and Computer Science Dept.*
Case Western Reserve University
 - *Electrical and Computer Engineering Dept.*
University of Connecticut
 - *Electrical and Computer Engineering Dept.*
University of Rochester
 - *Electrical and Computer Engineering Dept.*
University of British Columbia
 - *Electrical Engineering and Computer Science Dept.*
Washington State University
 - *Electrical and Computer Engineering Dept.*
Arizona State University
 - *Electrical and Computer Engineering Dept.*
University of Waterloo
 - *Electrical and Computer Engineering Dept.*
Purdue University
 - *Electrical Engineering Dept.*
University of Montreal École Polytechnique

February–March, 2005

(11 interviews, 11 offers)

TEACHING at the UNIVERSITY of MINNESOTA**Lecture-Based Courses**

- EE 1301, “Introduction to Computing Systems”: Fall 2009, Spring 2010, Fall 2010, Fall 2011, Fall 2012, and Fall 2013
- EE 2301, “Introduction to Digital System Design”: Spring 2007, Spring 2008, Spring 2009, Fall 2014, Fall 2016, Fall 2017, Fall 2018, and Fall 2019
- EE 2361, “Introduction to Micronrollers”: Fall 2015
- EE 5393, “Circuits, Computation, and Biology”: Spring 2008, Fall 2008, Spring 2011, Spring 2012, Spring 2013, Spring 2014, Spring 2015, Spring 2016, Spring 2017, Spring 2018, Spring 2019
- EE 5583, “Error Control Coding”: Fall 2012
- EE 5950, “Special Topics in Electrical and Computer Engineering”: Fall 2006

Project-Based Courses

- EE 4951, “Senior Design” Spring 2008, Spring 2009, Fall 2011, Fall 2012, Fall 2013, Fall 2014, Fall 2015, Spring 2017, and Spring 2018
- IT 1311, “Freshman Design” Fall 2006

ADVISING and MENTORING**Visiting Scholars Hosted**

- Vishwesh Kulkarni (2011–2013)
Funded through NSF CAREER Award.

Doctoral Students

- Arnav Solanki (2019–)
Dissertation topic: DNA Storage
- Tonglin Chen (2018–)
Dissertation topic: DNA Storage
- Julia Udell (2018–)
Dissertation topic: Computational Immunology
- Yadu Kiran (2017–)
Dissertation topic: Deterministic Approaches to Stochastic Computing
- Ahmad Salehi (2012–2017)
Jointly advised with Keshab Parhi
Received a University of Minnesota **Doctoral Dissertation Award**, 2015–2016
Dissertation title: “Advanced Digital Signal Processing with Molecular Reactions”

- John Backes (2009–2013)
Received a University of Minnesota **Doctoral Dissertation Award**, 2012–2013
Dissertation title: “SAT-Based Techniques for Logic Synthesis” Has accepted a position at Rockwell Collins Research, 2013.
- Hua Jiang (2009–2012)
(jointly advised with Keshab Parhi)
Dissertation title: “Digital Logic and Digital Signal Processing with Molecular Reactions”
Has accepted a position at Synosys, 2012.
- Mustafa Altun (2008–2012)
Dissertation title: “Logic Synthesis for Networks of Four-Terminal Switches”
Has accepted a tenure-track faculty position at the Istanbul Technical University, 2012
- Weikang Qian (2006–2011)
Dissertation title: “Synthesizing Logical Computation on Stochastic Bit Streams”
Received a University of Minnesota **Doctoral Dissertation Award**, 2010–2011.
Has accepted a tenure-track faculty position at the University of Michigan – Shanghai Jiao Tong University Joint Institute (SJTU), 2011.

Master’s Students

- Zoe Dormuth (2018–2019)
Thesis title: “DNA Storage and Computation”
- Vahbai Desai (2014–2017)
Thesis title: “Data Cycling in Networks: Thoughts and Experiments”
- Brian Fett (2006–2008)
Thesis title: “Synthesizing Stochasticity with Biochemical Reactions”
- Bin Cheng (2007–2008)
Thesis title: “Stochastic Transient Analysis of Biochemical Systems”

Undergraduate Students

- NSF Research Experiences for Undergraduates (REUs): Lawrence Hessburg (2015–2016), and Michelle Kleckler (2015–2016)
- Undergraduate Research Scholarship (URS): Jacob Miller (2018–2018)
- Directed Undergraduate Research Opportunities Program (UROP) projects for: John Backes (2008), Adam Shea (2008), Phil Greenberg (2009), Dan Hudrlik (2009), Kathleen Thurmes (2009), Aleksandra Kharam (2010), Joshua Krist (2010), Phillip Senum (2010), Jing Xiong (2010), Nick Gunderson (2011), Tor Anderson (2012), Grant Elbert (2012, 2013), Joe Connelley (2013), Caleb Sykes (2014), Blake Anderson (2014), Andrew Decker (2014), Megha Parhi (2015), Alex Keddy (2015), Ryan Mathison (2016), McKenzie van Derhagen (2016), Owen Hoffend (2017), Arnav Solanki (2017), Aceif Oubaha (2017) Benjamin Ertl (2017), Harsh Patel (2018), Serena Nicoll (2018), Jack Erhardt (2018), Jacob Miller (2018), Steven Bulfer (2018), Emma Grant (2018), Jackson Benning (2019), Aaron Moll (2019), Minh Bui (2019), Bridgette Sieffert (2019), Collin Sieffert (2019)

- Directed Senior Honors projects for: Jason Heebl (2006–2007), Tim Pankratz (2006–2007), John Kablan (2008–2009), John Backes (2008–2009), Phil Greenberg (2010–2011), Caitlin Race (2010–2011), Theerachai Chanyaswad (2011–2012), Phillip Senum (2012–2013), Thomas Daede (2013–2014), Megha Parhi (2014–2015), Andrew Erickson (2015–2016), Devon Jensen (2015–2016), Michelle Kleckler (2016–2016), Vendant Goyal (2016–2017), Michelle Kleckler (2016–2017), Ryan Mathison (2016–2017), McKenzie van Derhagen (2016–2017), Lawrence Hessburg (2017–2018), Zach Krueger (2017–2018), Tonglin Chen (2017–2018), Tait Anderson (2018–2019), Aceif Oubaha (2018–2019), Jackson Benning (2018–2019), Owen Hoffend (2019–2020)

Degree Committees

- Ph.D. Final Committee for:
Mustafa Altun (EE), Baktash Boghrati (EE), Denis Foo Kune (CS), Shuo Guo (EE), Sakeet Gupta (EE), Jianxin Fang (EE), Elaheh Ghassabani (CS), Hua Jiang (EE), Hyoung Kim (EE), Robert Knuesel (EE), Sanjay Kumar (EE), Yingjie Lao (EE), Yin Liu (EE), Qunzeng Liu (EE), Pongstorn Maidee (EE), Hassan Najafi (EE), Andrew Ness (EE), Weikang Qian (EE), Hung Pham (CS), Naman Saraf (EE), Ahmad Salehi (EE), Satish Sivaswamy (EE), Jing Wang (EE), Yao Wang (EE), Xiaofei Wang (EE), Chuan Zhang (EE), Ningyuan Wang (Psychology), Zhiheng Wang (EE), Bo Yuan (EE), Chi Xu (EE), Albert Johnathan (CS), Kwangsung Oh (CS), Hari Cherupalli (EE),
- Ph.D. Preliminary Committee for:
Mustafa Altun (EE), John Backes (EE), Baktash Boghrati (EE), Hari Cherupalli (EE), Jianxin Fang (EE), Elaheh Ghassabani (CS), Chenjie Gu (EE), Shuo Guo (EE), Sakeet Gupta (EE), Rankyung Hong Hyoung (EE), Kim (EE), Andreas Katis (CS), Robert Knuesel (EE), Denis Foo Kune (CS), Sanjay Kumar (EE), Albert Johnson (CS), Peng Li (EE), Qunzeng Liu (EE), Yin Liu (EE), Pongstorn Maidee (EE), Hassan Najafi (EE), Huang Pham (CS), Weikang Qian (EE), Ahmad Salehi (EE), Naman Saraf (EE), Jonghyeon Shin (Physics), Satish Sivaswamy (EE), Ayushi Srivastava (CS), Bennett Swiniarski (CEMS), Andrew Stephan (EE), Jing Wang (EE), Chi Xu (EE), En Yuan (EE), Bo Yuan (EE), Yingjie Lao (EE), Zhiheng Wang (EE), Xingyi Liu (EE)
- M.S. Committee for:
Amit Bose (CS), David Boutcher (EE), Bin Chen (EE), Wuyang Dai (EE), Vaibhav Desai (EE), Brian Fett (EE), Brandon Hoffman (CS), Praveen Kambam (CS), Young Sub Lee (CS), Manas Mignas (CS), Andrew Ness (EE), Kwangsung Oh (CS), Ayushi Srivastava (CS), Bennett Swiniarski (CEMS), Nimish Agashiwala (CS), Vaibhav Sharma (CS), Rohit Sindhu (CS)

PROFESSIONAL SERVICE

Journal Paper Refereeing

- Served as referee for numerous journals, including: *Public Library of Science ONE*; *Science*; *Nature*; *Proceedings of the National Academy of Sciences*; *IEEE Transactions on Computers*; *IEEE Transactions on Computer-Aided Design of Circuits and Systems*; *IEEE Transactions on Information Theory*; *IEEE Transactions on Molecular, Biological, and Multi-Scale Communications*; *ACM Transactions on Design Automation of Electronic Systems*; *ACM Journal*

on Emerging Technologies; Bioinformatics; Journal of Chemical Physics; SIAM Journal on Scientific Computing; ACS Synthetic Biology; Journal of Discrete and Applied Math

Editorships

- Guest Associate Editor, *IEEE Transactions on Emerging Topics in Computing* Special Issue on Approximate and Stochastic Computing, 2018

Chairing, Moderating, and Organizing Special Sessions, Panels, and Tutorials

- IEEE International Conference on Design, Automation and Test in Europe (2017)
 - Organized Tutorial: “Stochastic Computing: The Hype and the Hope”
- ACM/IEEE International Conference on Computer-Aided Design (2016)
 - **Chair** of Biological Systems and Electronics, Brain Inspired Computing, and New Computing Paradigms Track (2016).
 - **Moderator** of Special Session “Challenges and Opportunities of Stochastic Computing in the Dusk of Moore’s Law and the Dawn of Big Data” (2016).

Technical Program Committee Memberships

- ACM/IEEE Design Automation Conference (2012–2014, 2017–2018)
- IEEE International Conference on Communication (2017)
- International Conference on Computational Methods in Systems Biology (2017–2018)
- ACM/IEEE International Conference on Computer-Aided Design (2008, 2014–2016)
- ACM International Conference on Nanoscale Computing and Communication (2016)
- ACM/IEEE International Workshop on Bio-Design Automation (2009–2014)
- IEEE Great Lakes Symposium on VLSI (2009–2010)
- IEEE International Workshop on Genomic Signal Processing and Statistics (2009)
- IEEE/ACM International Workshop on Logic and Synthesis (2006–2014)

Review Panels

- Served on review panel for
 - National Science Foundation’s Biocomputation Cluster (2014, 2015, 2017)
 - National Science Foundation’s Software and Hardware Foundations Cluster (2009, 2010, 2017)
 - National Science Foundation’s Expeditions in Computing (2018)

Workshop Organization

- DAC International Workshop on Bio-Design Automation (IWBDA)
 - Initiated Workshop in 2009
 - Steering Committee Chair (2009–)
 - General Chair (2010)

- Technical Program Chair (2009)

Workshop attendance: **100 people** 2009, **85 people** in 2010, and **120 people** in 2011, more than 100 annually since.

- IEEE/ACM International Workshop on Logic and Synthesis (IWLS)
 - Program Chair (2009)
 - General Chair (2008)
 - Publications Chair (2007)
 - Panel Chair (2006)
- IEEE International Workshop on Genomic Signal Processing and Statistics
 - Finance Chair (2009)

Professional Interest Groups

- ACM Special Interest Group on Design Automation (SIGDA)
 - Associate Editor of SIGDA Newsletter (2006–)
 - Co-chair of Technical Committee on Logic/RTL Design (2006–2009)
 - Vice-Chair of CAD-athlon Programming Competition (2006–2007)

SERVICE to the UNIVERSITY of MINNESOTA

Electrical and Computer Engineering Department

- Member of Charles Babbage Institute (CBI) Advisory Board (2020–)
- ECE Colloquium Coordinator (2018–)
- Standards & Awards Committee, Chair (2014–)
- Student Services Committee (2011–2014)
- Student Advising Committee (2018–)
- Graduate Committee (2006–2011)
- Ph.D. Written Preliminary Exam (WPE) Committee: 2006–2007, 2007–2008, 2008–2009, 2010–2011, 2012–2013, 2014–2015, 2015–2016, and 2016–2017.

Biomedical Informatics and Computational Biology Program

- Member of Admissions Committee (2008–2009)

University-Wide

- Member of Advisory Board of the Charles Babbage Institute
- Faculty Senator (2013–2016)
- History of Science, Technology and Medicine (HSTM) Faculty Search Committee (2018–2019)
- Interdisciplinary Informatics Seed Grant Program Review Panel (2009)