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

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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

1. Agency: **NSF**
   Program: Expeditions in Computing
   Title: "*Computing and Storage with Small Molecules*"
   Investigators: Sherief Reda (PI), Marc Riedel (co-PI), Chris Rose (co-PI), Jacob Rosenstein (co-PI), Derek Stein (co-PI), Peter Weber (co-PI), Brenda Rubenstein (co-PI), David Lynn (co-PI), Eunsuk Kim (co-PI), and Robert F. Shepherd (co-PI)
   Amount: $15,000,000
   My Share: $1,500,000
   Duration: 7 years
   Status: Pending – *Made it to Final Round*

2. Agency: **Seagate**
   Program: DNA Storage
   Title: "*Routing and Optimization of Digital Microfluidics for DNA Storage*"
   Investigators: Marc Riedel (PI)
   Amount: $50,000
   My Share: $50,000
   Duration: 2021–2022

3. Agency: **NSF**
   Program: Division of Computing and Communication Foundations
   Title: "*Computationally Predicting and Characterizing the Immune Response to Viral Infections*"
   Investigator: Marc Riedel (PI)
   Amount: $200,000
   My Share: $200,000
   Duration: 2020–2022

4. 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
   My Share: $550,000
   Duration: 2018–2021

5. 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: $400,000
   My Share: $200,000
   Duration: 2014–2017

6. 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
   My Share: $143,664
   Duration: 2013–2018

7. 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

My Share: $83,333
Duration: 2012–2015

8. 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
My Share: $200,000
Duration: 2011–2014

9. 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
My Share: $500,000
Duration: 2009–2014

10. 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
My Share: $100,000
Duration: 2009–2011

11. 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
My Share: $325,000
Duration: 2007–2010

University Sources

1. 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
My Share: $32,600
Duration: 2011–2012

2. 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
My Share: $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 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. 43–52, 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. "Polysynchrous 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 Viswananthan, 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, 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, Alexsandra 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. "Low-Discrepancy Deterministic Bit-streams"
   M. Hassan Najafi, David J. Lilja, and Marc Riedel
   Provisional U.S. Patent 62/864,807, June 2019

3. "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

4. "Low Discrepancy Deterministic Bit-Stream Processing Using Sobol Sequences"
   M. Hassan Najafi, David J. Lilja, Marc Riedel, Kia Bazargan, Sayed A. Faraji, and Bengzhe Li
   U.S. Patent 20,200,401,376,A1, 2021

5. "Stochastic Computation using Pulse-Width Modulated Signals"
   M. Hassan Najafi, S Jamali-Zavareh, D. J. Lilja, M. Riedel, K. Bazargan, and R. Harjani
   U.S. Patent No. 10,740,686 B2, 2018

6. "Polysynchronous Stochastic Circuits"
   David J. Lilja, M. Hassan Najafi, Marc Riedel, Kiarash Bazargan
   U.S. Patent No. 10,520,975 B2, 2019

7. "Stochastic Computing on Deterministic Bit Streams"
   Devon Jenson and Marc Riedel
   U.S. Patent, 10,063,255, 2018

8. "Synthesis of Cyclic Combinational Circuits"
   Marc Riedel and Jehoshua Bruck
   U.S. Patent 7,249,341, 2007

9. "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, 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, virtual, 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. Panelist, "Rapid and Accurate Detection and Assessment of Emerging Pathogens"
   NSF Workshop on Predictive Intelligence for Pandemic Prevention, virtual, 2021

2. "Computationally Predicting and Characterizing the Immune Response to Viral Infections"
   NSF Workshop on Predictive Intelligence for Pandemic Prevention, virtual, 2021

3. Panelist, "Unconventional Computing and What it Means for the Future of Interconnects"
   IEEE/ACM International Workshop on Network-on-Chip Architectures, virtual, 2020

4. "Stochastic Logic for DNA Computing"
   IEEE International Green and Sustainable Computing Conference
   Workshop on Computing with Unconventional Technologies, Alexandria, VA, 2019

5. "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

6. "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

7. "Polysynchronous Clocking for Molecular Computing"
   Bio Physics Seminar Series
   Host: Elias Puchner
   University of Minnesota, Sept. 29, 2016

8. "A Deterministic Approach to Stochastic Computing"
   Waterloo Workshop on Stochastic Computing
   Host: Vincent Gaudet
   University of Waterloo, May 25, 2016

9. "The Future of Computer Engineering"
   Keynote address to IEEE General Meeting, UMN Student Branch
   Host: Karel Kalthoff
   University of Minnesota, Jan. 25, 2016

10. "Towards a Computer Engineering Discipline with DNA"
    Biochemistry Seminar
    Host: Prof. Aseem Ansari
    University of Wisconsin, Sept. 30, 2013

11. "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

12. "Towards a Computer Engineering Discipline with DNA"
    Computer Science Seminar
    Host: Prof. Jack Lutz
    Iowa State University, Nov. 30, 2012

13. "Logic Synthesis for Networks of Four-Terminal Switches"
    Computer Science Seminar
    Host: Prof. Alex Sprintson
    Texas A&M University, April 20, 2012

14. "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

15. 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

16. "Robust Stochastic Computation with Biomolecular Reactions"
    NSF Workshop on Shared Organizing Principles in Biology
    Organizer: Prof. Melanie Mitchel
    Arlington, VA, May 25, 2010

17. "Computing with Things Small, Wet, and Random"
    Biological and Medical Physics Seminar Series
    Host: Prof. Vincent Noireaux
    University of Minnesota, March 30, 2010

18. "Computing with Things Small, Wet, and Random"
    Computer Science Seminar
    Host: Prof. Soha Hassoun
    Tufts University, March 1, 2010

19. Tutorial: "Programming Constructs for Chemical Reaction Networks"
    Pacific Symposium on Biocomputing
    Organizer: Dr. Gil Alterovitz
    Kona, Hawaii, Jan. 7, 2010

20. "Computing with Things Small, Wet, and Random"
    Electrical and Computer Engineering Seminar
    Host: Prof. Azadeh Davoodi
    University of Wisconsin, Feb. 27, 2009

21. "Computing with Things Small, Wet, and Random"
    Electrical and Computer Engineering Seminar
    Host: Prof. Lin Zhong
    Rice University, Feb. 17, 2009

22. "Computing with Things Small, Wet, and Random"
    Electrical and Computer Engineering Seminar
    Host: Prof. Anxiao (Andrew) Jiang
    Texas A&M University, Feb. 17, 2009

23. "Synthesizing Nearly Rate Independent Biochemical Computation"
    NSF Expeditions in Computing – Molecular Programming Workshop
    Organizer: Prof. Erik Winfree
    Oxnard, CA, Jan. 10, 2009

24. "Computing with Things Small, Wet, and Random"
    Electrical and Computer Engineering Seminar
    Host: Prof. Rick Kiehl
    UC Davis, Sep. 29, 2008

25. "Synthesizing Stochastic Logic"
    SRC Center on Functional Engineered Nano-Architectonics (FENA) Annual Meeting
    Organizer: Prof. Kang Wang
    La Jolla, CA, June 13, 2008

26. Tutorial: "Synthesizing Stochastic Biochemical Reactions"
    Tech Tune Up
    Organizer: Prof. Ahmed Tewfik
    University of Minnesota, May 26, 2008

27. "Synthesizing Stochasticity in Ciruits and in Biology"
    DARPA MTO LIBRA Workshop
    Organizer: Dr. John Damoulakis
    Arlington, VA, Nov. 29, 2007

28. 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

29. "High-Performance Computing for the Analysis and Synthesis of Biochemistry"
    IBM Company Seminar
    Host: Tim Mullins
    Rochester, MN, Oct. 8, 2007

30. "Analysis and Synthesis of Biochemical Reactions"
    Cadence Research Labs Seminar
    Host: Dr. Andreas Kuelmann
    Berkeley, CA, May 24, 2007

31. Tutorial: "Analysis and Synthesis of Stochastic Biochemical Reactions"
    Tech Tune Up
    Organizer: Prof. Kia Bazargan
    University of Minnesota, May 23, 2007

32. "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

33. "Synthesizing Stochasticity in Biochemical Reaction Networks"
    Mathematical Biology Seminar
    Host: Prof. Hans Othmer
    University of Minnesota, March 21, 2007

34. "Exact Stochastic Simulation with Event Leaping"
    Mathematical Biology Seminar
    Host: Prof. Hans Othmer
    University of Minnesota, Nov. 2, 2006

35. "Cycles – The Good and the Bad in Logic Synthesis and Computational Biology"
    Medtronic Technology Quarterly Seminar
    Host: Sara Audet
    Fridely, MN, Oct. 5, 2006

36. "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

37. 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, Fall 2019, Fall 2020, Fall 2021

- EE 2361, "Introduction to Microntrollers": 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, Spring 2020, Spring 2021

- 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

Postdoctoral Fellows Funded

1. Andrew Stephan (2021–2022)
   Research topics: DNA Storage.

2. Vishwesh Kulkarni (2011–2013)
   Research topics: Genetic Circuits.

Doctoral Students

1. Alex Shrom (2021–   )
   Dissertation topic: Computational Immunology

2. Arnav Solanki (2019–   )
   Dissertation topic: DNA Storage

3. Tonglin Chen (2018–   )
   Dissertation topic: DNA Storage

4. Julia Udell (2018–   )
   Dissertation topic: Computational Immunology

5. Yadu Kiran (2017–   )
   Dissertation topic: Deterministic Approaches to Stochastic Computing

6. 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"

7. 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.

8. 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 Synposys, 2012.

9. 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

10. 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

1. Zoe Dormuth (2018–2019)
   Thesis title: "DNA Storage and Computation"

2. Vahbai Desai (2014–2017)
   Thesis title: "Data Cycling in Networks: Thoughts and Experiments"

3. Brian Fett (2006–2008)
   Thesis title: "Synthesizing Stochasticity with Biochemical Reactions"

4. 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), Kevin Vander Heyden (2020), Matt Vogel (2021), Henry Hein (2021), and Chase Anderson (2021)

- 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), and 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), Yingie Lao (EE), Zhiheng Wang (EE), Xingyi Liu (EE), Yangyang Chang (EE), Bhaskar (Bio), Rasoul Faraji (EE), Krisna Van Dyke (Bio), Xiangzhen Kong (Bio)

- 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 International Conference on Computer-Aided Design (2008, 2014–2016, 2021)
- 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 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 Insitute (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)