Marc D. Riedel, Ph.D.

Academic Rank
Associate Professor, 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
Teaching: http://tinyurl.com/marc-riedel-teaching

EDUCATION

- Postdoctoral Fellow, Computation and Neural Systems, 2004–2005
  California Institute of Technology

  Funded by the NIH Human Genome Research Institute's Alpha Project through the Molecular Sciences Institute, Berkeley, CA

- 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)

POSITIONS

- Associate Professor, 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, 2009–2014.

- Paper titled "The Synthesis of Robust Polynomial Arithmetic with Stochastic Logic" nominated as a **Research Highlight** by Communications of the ACM, 2010.

- 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: National Science Foundation
  Program: BIO Computing
  Title: "Digital Signal Processing with Biomolecular Reactions"
  Investigators: Keshab Parhi (PI) and Marc Riedel (co-PI)
  Amount: $400,000
  Duration: 2011–2015

- 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, EAGER Grant
  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 [25%]
  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 [100%]
  Duration: 2007–2009

PUBLICATIONS and PRESENTATIONS

Peer-Reviewed Journal Articles and Book Chapters

1. "Logical Computation on Stochastic Bit Streams with Linear Finite Machines"
   Peng Li, David Lilja, Weikang Qian, Marc Riedel, and Kia Bazargan
   IEEE Transactions on Computers, 15 pages, under review

2. "The Analysis and Mapping of Cyclic Circuits with Boolean Satisfiability"
   John Backes, Brian Fett, and Marc Riedel
   Journal on Satisfiability, Boolean Modeling and Computation, 11 pages, under review

3. "Synthesizing Cubes to Satisfy a Given Intersection Pattern"
   Weikang Qian, Marc Riedel, and Ivo Rosenberg
   Journal of Discrete Applied Mathematics, 43 pages, under review

4. "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, 9 pages, under review

5. "Synthesis of Cyclic Functional Dependencies"
   John Backes and Marc Riedel
   ACM Transactions on Design Automation of Electronic Systems, 24 pages, to appear

6. "Logic Synthesis for Switching Lattices"
   Mustafa Altun and Marc Riedel
   IEEE Transactions on Computers, 13 pages, to appear

7. "Digital Signal Processing with Molecular Reactions"
   Hua Jiang, Marc Riedel, and Keshab Parhi
   IEEE Design & Test of Computers,
   Special Section on Bio-Design Automation in Synthetic Biology, 9 pages, to appear

8. "Cyclic Boolean Circuits"
   Marc Riedel and Jehoshua Bruck
   Journal of Discrete Applied Mathematics, 42 pages, to appear

9. "Transforming Probabilities with Combinational Logic"
   Weikang Qian, Marc Riedel, Hongchao Zhou, and Jehoshua Bruck
   IEEE Transactions on CAD of Integrated Circuits & Systems, Vol. 30, No. 9, pp. 1279–1292, 2011

10. "Synthesizing Logic with Percolation in Nanoscale Lattices"
    Mustafa Altun and Marc Riedel
    International Journal of Molecular and Nanoscale Computation, Vol. 3, No. 2, pp. 12–30, 2011

11. "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

12. "Rate-Independent Constructs for Chemical Computation"
    Philip Senum and Marc Riedel
    PLoS ONE, Vol. 6, Issue 6, pp. 1–12, 2011

13. "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

14. "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

15. "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, 2010

16. "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

17. "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

18. "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. "Robust Tunable Transcriptional Oscillators Using Dynamic Inversion Based Controllers"
Vishwesh Kulkarni, Aditya Paranjape, Marc Riedel, and Soon-Jo Chung
IEEE Conference on Decision and Control, 7 pages, 2012, under review

2. "The Synthesis of Linear Finite State Machine-Based Stochastic Computational Elements"
Peng Li, Weikang Qian, Marc Riedel, Kia Bazargan, and David Lilja
ACM/IEEE Asia and South Pacific Design Automation Conference, 8 pages, 2012

3. "Networks of Passive Oscillators"
Vishwesh Kulkarni, Marc Riedel, and Guy-Bart Stan
Allerton Conference on Communication, Control, and Computing, 7 pages, 2011

4. "Asynchronous Sequential Computation with Molecular Reactions"
Hua Jiang, Marc Riedel, and Keshab Parhi
Asilomar Conference on Signals, Systems, and Computers, 8 pages, 2011

5. "Synchronous Sequential Computation with Molecular Reactions"
Hua Jiang, Marc Riedel, and Keshab Parhi
ACM/IEEE Design Automation Conference, 6 pages, 2011

6. "Rate-Independent Constructs for Chemical Computation"
Philip Senum and Marc Riedel
Pacific Symposium on Biocomputing, 11 pages, 2011

7. "Binary Counting with Chemical Reactions"
Aleksandra Kharam, Hua Jiang, Marc Riedel, and Keshab Parhi
Pacific Symposium on Biocomputing, 12 pages, 2011

8. "Reduction of Interpolants for Logic Synthesis"
John Backes and Marc Riedel
IEEE/ACM International Conference on Computer-Aided Design, 8 pages, 2010

9. "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

10. "Lattice-Based Computation of Boolean Functions"
Mustafa Altun and Marc Riedel
ACM/IEEE Design Automation Conference, 6 pages, 2010

11. "Writing and Compiling Code into Biochemistry"
Adam Shea, Brian Fett, Marc Riedel, and Keshab Parhi
Pacific Symposium on Biocomputing, 9 pages, 2010

12. "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, 8 pages, 2009
(Nominated for **IEEE/ACM William J. McCalla Best Paper Award**)

13. "Synthesizing Sequential Register-Based Computation with Biochemistry"
Adam Shea, Brian Fett, Marc Riedel, and Keshab Parhi
IEEE/ACM International Conference on Computer-Aided Design, 8 pages, 2009

14. "Nanoscale Computation Through Percolation"
Mustafa Altun, Marc Riedel, and Claudia Neuhauser
ACM/IEEE Design Automation Conference, WACI Track, 2 pages, 2009

15. "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, 6 pages, 2009

16. "Estimation and Optimization of Reliability of Noisy Digital Circuits"
Satish Sivaswamy, Kia Bazargan, and Marc Riedel
IEEE International Symposium on Quality Electronic Design, 6 pages, 2009

17. "Stochastic Transient Analysis of Biochemical Systems"
Bin Cheng and Marc Riedel
Pacific Symposium on Biocomputing, 11 pages, 2009

18. "Module Locking in Biochemical Synthesis"
Brian Fett and Marc Riedel
IEEE/ACM International Conference on Computer-Aided Design, 7 pages, 2008

19. "The Analysis of Cyclic Circuits with Boolean Satisfiability"
John Backes and Marc Riedel
IEEE/ACM International Conference on Computer-Aided Design, 7 pages, 2008

20. "The Synthesis of Robust Polynomial Arithmetic with Stochastic Logic"
Weikang Qian and Marc Riedel
ACM/IEEE Design Automation Conference, 6 pages, 2008
(Nominated as a **Research Highlight** in Communications of the ACM, 2010)

21. "Synthesizing Stochasticity in Biochemical Systems"
Brian Fett, Jehoshua Bruck, and Marc Riedel
ACM/IEEE Design Automation Conference, 6 pages, 2007

22. "The Synthesis of Cyclic Combinational Circuits"
Marc Riedel and Jehoshua Bruck
ACM/IEEE Design Automation Conference, 6 pages, 2003
(Received the **DAC Best Paper Award**)

Peer-Reviewed Workshop Papers

1. "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

2. "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

3. "Synthesizing Cubes to Satisfy a Given Intersection Pattern"
   Weikang Qian and Marc Riedel
   IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2010

4. "Two-Level Logic Synthesis for Probabilistic Computation"
   Weikang Qian and Marc Riedel
   IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2010

5. "Reduction of Interpolants for Logic Synthesis"
   John Backes and Marc Riedel
   IEEE/ACM International Workshop on Logic and Synthesis, 6 pages, 2010

6. "Digital Signal Processing with Biomolecular Reactions"
   Hua Jiang, Aleksandra Kharam, Marc Riedel, and Keshab Parhi
   IEEE Workshop on Signal Processing Systems, 6 pages, 2010

7. "The Synthesis of Cyclic Dependencies with Craig Interpolation"
   John Backes and Marc Riedel
   IEEE/ACM International Workshop on Logic and Synthesis, 7 pages, 2009

8. "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

9. "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

10. "The Synthesis of Stochastic Logic to Perform Multivariate Polynomial Arithmetic"
    Weikang Qian and Marc Riedel
    IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2008

11. "The Synthesis of Stochastic Logic for Nanoscale Digital Circuits"
    Weikang Qian, John Backes, and Marc Riedel
    IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2007

12. "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

13. "Timing Analysis of Cyclic Combinational Circuits"
    Marc Riedel and Jehoshua Bruck
    IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2004

14. "Cyclic Combinational Circuits: Analysis for Synthesis"
Marc Riedel and Jehoshua Bruck
IEEE/ACM International Workshop on Logic and Synthesis, 8 pages, 2003

Patents

1. "Method and Means for the Synthesis of Cyclic Combinational Circuits"
Marc Riedel and Jehoshua Bruck
U.S. Patent 7,249,341

2. "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

Presentations with Published Abstracts

1. "Logic Synthesis for Nanoscale Switching Lattices"
Marc Riedel* (**invited**)
CMOS Emerging Technologies Workshop, Vancouver, BC, 2012

2. "So Simple a Caveman Could Do It – Computing On Stochastic Bit Streams"
Marc Riedel* (**invited**)
Information Theory and Applications Workshop, UC San Diego, 2012

3. "Synthesizing Logical Computation on Stochastic Bit Streams for Sensing Applications"
Marc Riedel* (**invited**)
IEEE CANDE Workshop, San Jose, CA, 2011

4. "Digital Signal Processing with DNA"
Hua Jiang,* Marc Riedel, and Keshab Parhi
International Conference on DNA Computing, Pasadena, CA, 2011

5. "Synthesizing Logical Computation on Stochastic Bit Streams"
Marc Riedel* (**invited**)
CMOS Emerging Technologies Workshop, Whistler, BC, 2011

6. "Asynchronous Sequential Computation with Molecular Reactions"
Hua Jiang,* Marc Riedel, and Keshab Parhi
International Workshop on Bio-Design Automation, San Diego, CA, 2011

7. "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

8. "Rate-Independent Constructs for DNA Computing"
Philip Senum and Marc Riedel*
Annual Institute of Biological Engineering Conference, Atlanta, GA, 2011

9. "Lattice-Based Computation with Percolation"
Mustafa Altun and Marc Riedel* (**invited**)
IEEE/ACM International Symposium on Nanoscale Architectures, Anaheim, CA, 2010

10. "Signal Processing Functions with Biomolecular Reactions"
Hua Jiang, Marc Riedel,* and Keshab Parhi
International Workshop on Bio-Design Automation, Anaheim, CA, 2010

11. Session Summary: "Engineering Biology: Fundamentals and Applications"
Marc Riedel,* Soha Hassoun, and Ron Weiss (**invited**)
ACM/IEEE Design Automation Conference, Anaheim, CA, 2010

12. "Digital Signal Processing with Biochemistry"
Marc Riedel* (**invited**)
Symposium on the Foundations of Nanoscience, Salt Lake City, UT, 2010

13. "Iterative Computation with Biomolecular Reactions"
Hua Jiang, Marc Riedel,* and Keshab Parhi
Annual Institute of Biological Engineering Conference, Boston, MA, 2010

14. "Stochastic Logic and Stochastic Biological Processes"
Marc Riedel* (**invited**)
Information Theory and Applications Workshop, UC San Diego, 2010

15. "Computing with Things Small, Wet, and Random"
Marc Riedel* (**invited**)
IEEE CANDE Workshop, Monterey, CA, 2009

16. "Stochastic Chemical Reaction Networks"
Marc Riedel* (**invited**)
International Workshop on Stochasticity, Banff, Alberta, 2009

17. "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

18. "Synthesizing Circuit Constructs with Chemical Reaction Networks"
Marc Riedel* (**invited**)
Emergence in Chemical Systems Conference, Anchorage, AK, 2009

19. "Rate-Independent Biochemical Synthesis"
Adam Shea, Brian Fett, and Marc Riedel*
Annual Institute of Biological Engineering Conference, Santa Clara, CA, 2009

20. "Modular Stochastic Biochemistry"
Brian Fett and Marc Riedel*
Synthetic Biology 4.0, Hong Kong, 2008

21. "Biochemical Pathways from Generic Designs"
Brian Fett and Marc Riedel*
Synthesis of Cells Meeting, Kobe, Japan, 2008

22. "The Computer-Aided Synthesis of Stochastic Biochemistry"
Brian Fett and Marc Riedel*
Advances in Synthetic Biology Conference, Cambridge, UK, 2008

23. "Synthesizing Stochasticity"
Brian Fett and Marc Riedel*
Synthetic Biology 3.0, Zürich, Switzerland, 2007

24. "Using The Probability Gradient to Analyze Bifurcating Biochemical Systems"
Brian Fett* and Marc Riedel
International Conference on Systems Biology, Yokohama, Japan, 2006

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

2. "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

3. 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

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

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

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

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

8. "Computing with Things Small, Wet, and Random"
Electrical and Computer Engineering Seminar

Host: Prof. Azadeh Davoodi
University of Wisconsin, Feb. 27, 2009

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

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

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

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

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

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

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

16. 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

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

18. Guest Lecture: "Molecular Computing"
IST 4, Information and Logic

Instructor: Prof. Jehoshua Bruck
California Institute of Technology, May 25, 2007

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

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

21. "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

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

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

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

25. "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

26. 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 5583, "Error Control Coding"
  Fall 2012
- EE 1301, "Introduction to Computing Systems"
  Fall 2009, Spring 2010, Fall 2010, Fall 2011, Spring 2012
- EE 2301, "Introduction to Digital System Design"
  Spring 2007, Spring 2008, and Spring 2009
- EE 5393, "Circuits, Computation, and Biology "
  Spring 2008, Fall 2008, and Spring 2011
- EE 5950, "Special Topics in Electrical and Computer Engineering"
  Fall 2006

Discussion Sections

- EE 2301, "Introduction to Digital System Design"
  Fall 2006, Fall 2007, Fall 2008, Fall 2009, Fall 2010, Spring 2012
- EE 2361, "Introduction to Microcontrollers"
  Fall 2011

Project-Based Courses

- IT 1311, "Freshman Design"
  Fall 2006
- EE 2361, "Senior Design"
  Spring 2008, Spring 2009, and Fall 2011

ADVISING and MENTORING

Visiting Scholars Hosted

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

Doctoral Students

- Weikang Qian (2006–2011)
  Dissertation title: "Synthesizing Logical Computation on Stochastic Bit Streams."
  Received a **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.

- 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.

- 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.

- John Backes (2009–2013)
  Dissertation title: "SAT-Based Techniques for Logic Synthesis."

Master's Students

- 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

- 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), and Grant Elbert (2012)

- 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), and Theerachai Chanyaswad (2011–2012)

Degree Committees

- Ph.D. Final Committee for:
  Mustafa Altun (EE), Denis Foo Kune (CS), Shuo Guo (EE), Hua Jiang (EE), Robert Knuesel (EE), Sanjay Kumar (EE), Qunzeng Liu (EE), Pongstorn Maidee (EE), Andrew Ness (EE), Weikang Qian (EE), Satish Sivaswamy (EE), and Jing Wang (EE)

- Ph.D. Preliminary Committee for:
  Mustafa Altun (EE), John Backes (EE), Baktash Boghrati (EE), Jianxin Fang (EE), Chenjie Gu (EE), Shuo Guo (EE), Sakeet Gupta (EE), Robert Knuesel (EE), Denis Foo Kune (CS), Sanjay Kumar (EE), Peng Li (EE), Qunzeng Liu (EE), Pongstorn Maidee (EE), Huang Pham (CS), Weikang Qian (EE), Jonghyeon Shin (Physics), Satish Sivaswamy (EE), Bennett Swiniarski (CEMS), Jing Wang (EE), Chi Xu (EE), and En Yuan (EE)
- M.S. Committee for:
  Amit Bose (CS), David Boutcher (EE), Bin Chen (EE), Wuyang Dai (EE), Brian Fett (EE), Andrew Ness (EE), and Bennett Swiniarski (CEMS)

PROFESSIONAL SERVICE

Paper Refereeing

- Science (2012)
- Nature Reviews Microbiology (2011)
- Proceedings of the National Academy of Sciences (2010)
- IEEE Transactions on Computers (2007, 2010, and 2011)
- IEEE Transactions on Computer-Aided Design of Circuits and Systems (2007, 2008, and 2011)
- IEEE Transactions on Information Theory (2010)
- ACM Transactions on Design Automation of Electronic Systems (2010)
- ACM Journal on Emerging Technologies (2007)
- Bioinformatics (2007)
- Journal of Chemical Physics (2007)
- SCIAM Journal on Scientific Computing (2006)

Conference and Workshop Technical Program Committees

- DAC International Workshop on Bio-Design Automation (2009–)
- ACM/IEEE Design Automation Conference (2012)
- IEEE Great Lakes Symposium on VLSI (2009–2010)
- IEEE International Workshop on Genomic Signal Processing and Statistics (2009)
- IEEE/ACM International Conference on Computer-Aided Design (2008)
- IEEE/ACM International Workshop on Logic and Synthesis (2006–)

Review Panels

- Served on review panel for the National Science Foundation's Software and Hardware Foundations Cluster CAREER Award (2009 and 2010)

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

- 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

University-Wide

- Interdisciplinary Informatics Seed Grant Program Review Panel (2009)

Electrical and Computer Engineering Department

- Member of Student Services and Advising Committee (2011–)
- Member of Graduate Committee (2006–2011)

Biomedical Informatics and Computational Biology Program

- Member of Admissions Committee (2008–2009)