

**Natasa Miskov-Zivanov**, PhD (Carnegie Mellon University, Computer Engineering)  
*Special Faculty - Research Scientist*, Electrical and Computer Engineering, Carnegie Mellon University

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**RESEARCH INTERESTS** Automation of learning big mechanisms in biology. Systems and synthetic biology.  
Emerging technologies and cyber-physical systems in medicine.

**EDUCATION** **Carnegie Mellon University**, Pittsburgh, PA, USA

**Ph.D.** Computer Engineering, **January 2009**

- Thesis Title: *Probabilistic Modeling and Optimization for Circuit Reliability*
- Research Advisor: Diana Marculescu

**M.Sc.** Computer Engineering, **May 2005**

- Thesis Title: *Symbolic Analysis of Circuit Reliability*
- Research Advisor: Diana Marculescu

**University of Novi Sad**, Novi Sad, Republic of Serbia

**B.Sc.** Electrical and Computer Engineering, Faculty of Technical Sciences, **July 2003**

- Thesis Title: *The solution of a problem of minimizing the Bolca type performance index for first-order plus time delay processes via LQR approach*
- Major: Computing and Control
- Sub-major: Computer Science and Informatics
- **Summa Cum Laude**

**HONORS, AWARDS AND GRANTS**

- [H1] DARPA Award, Big Mechanism, **PI** (\$2.4M), July 2014 – January 2018.
- [H2] iGEM World Championship, *Gold Medal, Best Poster Award, Inter-lab Measurement Award*, CMU team, Boston, November, 2014.
- [H3] iGEM Regional Jamboree, *Silver Medal and Best Poster Award*, CMU team, Toronto, Canada, 2013.
- [H4] NSF Grant for organizing the workshop on Modeling of Biological Systems (MoBS), **PI**, May 2013.
- [H5] Cold Spring Harbor Laboratory, Computational Cell Biology meeting Travel Grant, 2011, 2013.
- [H6] Rising Stars in Electrical Engineering and Computer Science, MIT Workshop, Invitation and travel grant awarded to 40 female scholars from universities across US and Europe, 2012.
- [H7] iGEM World Championship, *Best Foundational Advance Award*, CMU team, Boston, MA, 2012.
- [H8] iGEM Regional Jamboree, *Gold Medal, Jamboree Finalist, Best Experimental Measurement Award*, CMU team, Pittsburgh, PA, 2012.
- [H9] q-bio Summer Conference on Cellular Information Processing Travel Grant, 2010, 2011, 2012.
- [H10] International Workshop on Bio-Design Automation Scholarship, 2010, 2011.
- [H11] q-bio Summer School on Cellular Information Processing Scholarship, Los Alamos National Laboratory, 2009.
- [H12] SIGDA PhD Forum Grant, Design Automation Conference, 2009.
- [H13] Intel Fellowship Finalist, 2006.
- [H14] NSF-SIGDA SRC Design Automation Summer School Grant, 2005.
- [H15] Computing Beyond Silicon Summer School Grant, California Institute of Technology, 2004.
- [H16] Young Student Support Program Grant, Design Automation Conference, 2004.
- [H17] Dean's Award, Electrical and Computer Engineering Department, Faculty of Technical Sciences, University of Novi Sad, Awarded each year to the top graduating student in the Department (Summa Cum Laude), 2003.

- [H18] Award for Exceptional Academic Results, The Royal House Karadjordjevic Foundation. Awarded to five outstanding final-year electrical engineering students in Republic of Serbia, 2002.
- [H19] Award for Outstanding Academic Results, Government of Norwegian Kingdom. Awarded to 1000 best students from all universities and all majors in Republic of Serbia (0.5% of the overall student body), 2001.
- [H20] Scholarship, Department of Education, Republic of Serbia. Awarded to the top 7% of undergraduate students in Serbia, 1999-2002.
- [H21] Fellowship, Foundation for Awarding Scholarships to Talented Students, University of Novi Sad, Republic of Serbia. Awarded to the top 2% of undergraduate students in Serbia, 1998-1999.
- [H22] Yearly Awards for Best Students, Department of Education, Republic of Serbia. Awarded to the top 2% of undergraduate students in Serbia, 1998.

## AFFILIATIONS

- [A1] Special Faculty (Research Scientist), Electrical and Computer Engineering, Carnegie Mellon University, 2014-present
- [A2] Senior Researcher, Computer Science, Carnegie Mellon University, 2014
- [A3] Bio-Design Automation Consortium (BDAC), Inc., Board of Directors Member and Officer, 2012-present
- [A4] Adjunct Faculty (course instructor, iGEM team mentor, undergraduate and masters student advisor), Carnegie Mellon University, Electrical and Computer Engineering, December 2011 – 2014
- [A5] Special Faculty (course instructor), Carnegie Mellon University, Electrical and Computer Engineering, 2010
- [A6] Research Associate, University of Pittsburgh, Computational and Systems Biology, 2010 – 2013
- [A7] Postdoctoral Associate, University of Pittsburgh, Computational and Systems Biology, 2009 – 2010
- [A8] Member, Society for Industrial and Applied Mathematics (SIAM), 2010-2011
- [A9] Member, Institute of Electrical and Electronics Engineers (IEEE), 2010-2011
- [A10] Student Member, Association for Computing Machinery, Special Interest Group – Design Automation (ACM SIGDA), 2007-2010
- [A11] Postdoctoral Fellow, Carnegie Mellon University, Electrical and Computer Engineering, 2009
- [A12] Student Member, Institute of Electrical and Electronics Engineers (IEEE), 2003-2009
- [A13] Student Member, Women in Institute of Electrical and Electronics Engineers (WIE), 2007-2009
- [A14] Member, Women in Electrical and Computer Engineering at CMU (WinECE), 2003-2009

## RESEARCH PROJECTS

- [RP1] **Big Mechanism in Cancer: automation of reading, model assembly and model explanation (lead PI)**  
*Collaborators:* William Cohen (ML, CMU); Peter Spirtes (Philosophy, CMU); Diana Marculescu (ECE, CMU); Michael Lotze (Cancer Institute, UPitt).
- [RP2] **Stochasticity, timing and parallelism in cell signaling**
- [RP3] **Emulation of biological models in reconfigurable hardware**
- [RP4] **Formal methods for developing and studying hybrid models of biological and cyber-physical systems**  
*Collaborators:* Edmund M. Clarke (CS, CMU); Paolo Zuliani (CS, Newcastle University).
- [RP5] **Studying immune crosstalk in malaria**  
*Collaborators:* James R. Faeder (Computational and Systems Biology, UPitt); Yoram Vodovotz (Immunology, UPitt); Shirley Luckhart (Medical Microbiology and Immunology, UC Davis).
- [RP6] **Understanding determinants of T cell fate, with application to immunotherapy**  
*Collaborators:* James R. Faeder (Computational and Systems Biology, UPitt); Penelope Morel (Immunology, UPitt); Lawrence Kane (Immunology, UPitt).
- [RP7] **Methodology to guide self-assembly of chemical structures**  
*Collaborators:* Catalina Achim (Chemistry, CMU); Danith Ly (Chemistry, CMU); Rongchao Jin (Chemistry, CMU); Diana Marculescu (ECE, CMU).
- [RP8] **Studies of perturbations in gene regulatory networks to guide drug design**  
*Collaborator:* Kartik Mohanram (ECE, UPitt).

- [RP9] **Carnegie Mellon University iGEM (International Genetically Engineered Machine) team**  
 Topic 2015: TBD  
 Topic 2014: "STREAM: Sensors That Report Endocrine Activating Molecules"  
 Topic 2013: "Light-activated Antimicrobial Phage"  
 Topic 2012: "A novel BioBrick for systematic, in vivo quantification of metabolic burden and translational efficiency"  
*Collaborators (past and present):* Catalina Achim (Chemistry, CMU); Marcel Bruchez (Chemistry and Biology, CMU); Diana Marculescu (ECE, CMU); Aaron Mitchell (Biology, CMU); Cheemeng Tan (Lane Center for Computational Biology, CMU); Cheryl Telmer (Biology, CMU); Ge Yang (BME, CMU).
- [RP10] **University of Pittsburgh iGEM (International Genetically Engineered Machine) team**  
 Topic 2014: "Living Skin Therapeutics"  
*Collaborator:* Jason Lohmueller (Immunology, UPitt).

### Older (2002-2009)

- [RP11] **Variation-aware analysis of logic circuit reliability using non-linear models**  
*Advisor:* Diana Marculescu, Electrical and Computer Engineering, Carnegie Mellon University.
- [RP12] **Modeling and analysis of transient faults in logic circuit**  
*Advisor:* Diana Marculescu, Electrical and Computer Engineering, Carnegie Mellon University.
- [RP13] **Linear quadratic regulator (LQR) control for first-order systems with time-delay**  
*Advisors:* Zoran D. Jelacic, Dusan Petrovacki, Faculty of Technical Sciences, University of Novi Sad.

### TEACHING EXPERIENCE

- [TE1] **Instructor**, Carnegie Mellon University, Electrical and Computer Engineering  
 18-669, Computing and Biology: Theory and Practice, Fall 2010, Spring 2012, Fall 2015  
 18-760, VLSI CAD: Logic to Layout, Spring 2015  
 18-202, Mathematical Foundations of Electrical Engineering, Spring 2015  
 18-240, Structure and Design of Digital Systems, Fall 2014, Fall 2015
- [TE2] **Advisor, mentor**  
 Carnegie Mellon University, Electrical and Computer Engineering, Language Technology Institute, Philosophy, Computational Biology; University of Pittsburgh, School of Medicine, Computational and Systems Biology;
- TE2.1. **Research Project Advisor (1 PhD, 13 MS, 8 BS, 2 High School students)**  
**Research Project Co-advisor (3 PhD, 5 MS, 18 BS students)**
- a. **PhD students:**
1. "Inference of models from information extracted from data or literature, learning from models with incomplete information," Spring 2015 - present  
*Student (co-advising):* Anuva Kulkarni (ECE);
  2. "Cell signaling model inference from experimental data," Fall 2014-present  
*Student (co-advising):* Elizabeth Silver (Philosophy);
  3. "Causal reasoning for stochastic models of biological signaling networks," Summer-Fall 2014  
*Student:* Adam Brodie (Philosophy).
- b. **MS students:**
4. "Framework for automated design and analysis of models of cell mechanisms," from Spring 2015  
*Students:* Chaitra Wable (ECE); Chaitra Ramarao (ECE); Rupa Jaddiva (ECE); Abhishek Gune (ECE);
  5. "Hardware-based synthesis and analysis of cell signaling models," from Spring 2015  
*Students:* Shreyas Shahane (ECE); Karna Sharma (ECE); Navya Rajput (ECE); Anushree Kasbekar (ECE);
  6. "Rewiring of cell signaling models to improve accuracy," from Spring 2015  
*Student:* Wei Wang (ECE);

7. “Automation of extraction of events from different modeling formalisms and translation into executable, stochastic models,” Fall 2014-present  
*Students:* Vrushali Fangal (CompBio); Yu-Hsin Kuo (LTI);
8. “Automation of extraction of biological entities and events from biological literature,” Summer 2014-present  
*Student (co-advising):* Rahul Goutam (LTI);
9. “Formal analysis and simulation of sensitivity in discrete models of cell signaling networks,” Fall 2014  
*Student:* Hongyun Huang (ECE);
10. “Implementation of different random number generators in an FPGA emulator of bio-networks,” Summer-Fall 2013  
*Student:* Pavan Jami (ECE);
11. “Translation of bio-model simulator from software to hardware description language,” Fall 2012-Summer 2013  
*Student (co-advising):* Aakash Chugh (ECE);
12. “GUI for hardware emulator of bio-networks,” Fall 2012  
*Student (co-advising):* Ratin Malkud (ECE);
13. “Emulation of biological networks in FPGA,” (co-mentoring), Summer 2010-Spring 2011  
*Students (co-advising):* Sreesan Venkatakrishnan (ECE); Deepa Krishnaswamy (ECE).

c. **BS students:**

14. “SystemVerilog implementation of simulation algorithms for logical models of biological networks and accuracy improvements,” Fall 2014-present  
*Students:* Niteesh Sundaram (ECE), Isaac Manjarres (ECE);
15. iGEM team, CMU: “STREAM: Sensors That Report Endocrine Activating Molecules,” Spring-Fall 2014  
*Students (co-advising):* Ali Celentano (Tepper), Dominique MacCalla (BME.MScE), Nicole Matamala (CEE), Danielle Peters (Biology), Courtney Pozzi (Industrial Design), Niteesh Sundaram (ECE), Lena Wang (Biology);
16. iGEM team, UPitt (modeling component): “Living Skin Therapeutics,” Spring-Fall 2014  
*Student:* Stephen Kita (BME);
17. “Implementing delays in discrete models of cell-signaling networks,” Fall 2013  
*Student:* Peter Wei (ECE);
18. “Implementation and parallelization of different bio-model simulations algorithms,” Fall 2013  
*Student:* Clement Krov (ECE);
19. iGEM team, CMU: “Killer Red: Light Activated Antimicrobial Phage,” Spring-Fall 2013  
*Students (co-advising):* Kathy Bates (ChemE), Benjamin Beltzer (CompBio), Andrew Nadig (Biology), Eric Pederson (Biology), Evan Starkweather (ChemE);
20. Systems Medicine REU program, “Methods to Analyze Discrete Logical Models of Cell Signaling,” June – August 2013  
*Student:* Marina Mendes (Mathematics).
21. “Probabilistic model checking of bio-models,” Fall 2011-Fall 2013  
*Students:* Alexander Moser (CS); Deepa Sathaye (CS);
22. “Design automation for cell signaling network models”, Spring 2012  
*Student (co-advising):* Solomon Sia (ECE);
23. iGEM team, CMU: “Real-time quantitative measurement of RNA and protein levels using fluorogen-activated biosensors,” Spring-Fall 2012  
*Students (co-advising):* Yang Choo (ChemE/CS), Eric Pederson (Biology), Jesse Salazar (ECE), Peter Wei (ECE);
24. “Verilog implementation of biological model simulator,” Summer 2010  
*Student (co-advising):* Andrew Bresticker (ECE).
25. “Impact of variability and technology scaling on fault propagation,” Spring 2010

*Student (co-advising): Kedar Mane (ECE).*

**d. High school students:**

26. Drug Discovery, Systems and Computational Biology (DiSCoBio) program, part of the University of Pittsburgh Cancer Institute Summer Academy for high school students, "Modeling the treatment of tumors through drug delivery by invasive bacteria," Summer 2013

*Student: Margo Corsetti;*

27. Drug Discovery, Systems and Computational Biology (DiSCoBio) program, part of the University of Pittsburgh Cancer Institute Summer Academy for high school students, "Studying the dynamics of peripheral T cell differentiation," Summer 2013

*Student: Rehima Jordan.*

**TE2.2. Mentor**

Spring 2015: 6 MS students and 2 BS students

[TE3] **Teaching Assistant**, Carnegie Mellon University, Electrical and Computer Engineering

TE3.1. 18-743, Energy Aware Computing, Spring 2006

TE3.2. 18-340, Digital Computation, Spring 2007

Nominated for the Best Teaching Assistant award in the department, school year 2006-2007

TE3.3. 18-767, VLSI CAD: Software to Logic, Fall 2007

[TE4] **Mentoring Assistant**, Carnegie Mellon University, Electrical and Computer Engineering

TE4.1. Engineering Your Future Workshop, July 2004

TE4.2. Distributed Mentor Project, June – August 2004

**TALKS**

**Invited Talks and Seminars:**

[T1] "Automation of design and analysis of cell signaling network models: application to immune system dynamics," ECE Department, University of Pittsburgh, March 2015.

[T2] "Design and Analysis Automation for Studying Cell Signaling Networks," Department of Physics, Penn State, January 2014.

[T3] "Dynamic Behavior of Cell Signaling Networks - Design and Analysis Automation," Design Automation Conference (DAC), June 2013.

[T4] "New Markets," CRA/CCC-ACM/SIGDA Extreme Scale Design Automation Workshop, March 2013.

[T5] "Dynamic behavior of cell signaling networks - design and analysis of qualitative models":  
- Department of Electrical Engineering, University of Southern California, April 2012;  
- Department of Electrical and Systems Engineering, University of Pennsylvania, April 2012.

[T6] "Development and analysis of discrete models of cell signaling networks":  
- Department of Electrical and Computer Engineering, University of Pittsburgh, September 2011;  
- Department of Electrical and Computer Engineering, Tufts University, August 2011;  
- Department of Electrical and Computer Engineering, Northeastern University, August 2011;  
- School of Engineering and Applied Sciences, Harvard University, September 2011.

[T7] "Formal Modeling and Reasoning for Reliability Analysis," Design Automation Conference (DAC), June 2010.

[T8] "Logical modeling of T cell differentiation":  
- Bio Modeling Club Seminar, Computer Science Department, Stanford University, March 2010;  
- Lawrence Berkeley National Laboratory, March 2010.

[T9] "Logical approach to modeling biological networks," CSSI Center Seminar, Department of Electrical and Computer Engineering, Carnegie Mellon University, April 2010.

[T10] "Modeling and Analysis of SER in Combinational Circuits," IEEE Workshop on Silicon Errors in Logic – System Effects (SELSE), March 2010.

- [T11] "Logical modeling of T cell differentiation," Department of Immunology, School of Medicine, University of Pittsburgh, February 2010.
- [T12] "Circuit Reliability Analysis Using Symbolic Techniques," Department of Computational Biology, School of Medicine, University of Pittsburgh, May 2009.
- [T13] "Probabilistic and Symbolic Modeling for Circuit Reliability," Department of Electrical and Computer Engineering, University of Massachusetts, Amherst, May 2009.
- [T14] "Probabilistic and Symbolic Modeling for Circuit Reliability," Department of Electrical and Computer Engineering, Polytechnic Institute of NYU, April 2009.
- [T15] "Probabilistic Modeling and Optimization for Circuit Reliability," CSSI Center Seminar, Department of Electrical and Computer Engineering, Carnegie Mellon University, March 2009.
- [T16] "Probabilistic Modeling and Optimization for Circuit Reliability," Intel Corp., May 2008.
- [T17] "MARS-S: Modeling and Reduction of Soft Errors in Sequential Circuits," CSSI Seminar, Department of Electrical and Computer Engineering, Carnegie Mellon University, May 2007.
- [T18] "Symbolic Analysis of Circuit Reliability," CSSI Seminar, Department of Electrical and Computer Engineering, Carnegie Mellon University, October 2005.

#### **Contributed Talks:**

- [T19] "THiMED: Time in Hierarchical Model Extraction and Design," Computational Methods in Systems Biology (CMSB), November 2014.
- [T20] "Computational model of immune crosstalk in malaria suggests key mechanisms of parasite killing in mosquitoes," Systems Biology of Infectious Diseases (SBID), August 2014.
- [T21] "Delay modeling in cell signaling and gene regulatory networks," International Workshop on Bio-Design Automation (IWBDA), June 2014.
- [T22] "Circuit design techniques for automated construction of mosquito immune response model in malaria infection," Workshop on Modeling of Biological Systems (MoBS), June 2013.
- [T23] "Model checking for studying timing of events in T cell differentiation," International Workshop on Bio-Design Automation (IWBDA), June 2012.
- [T24] "Biological Network Emulation in FPGA," International Workshop on Bio-Design Automation (IWBDA), June 2011.
- [T25] "T cell differentiation modeling and analysis through circuit design," Computational Cell Biology Meeting, Cold Spring Harbor Laboratory (CSHL), March 2011.
- [T26] "Modeling of Peripheral T Cell Differentiation," q-bio Conference on Cellular Information Processing, August 2010.
- [T27] "Process Variability-Aware Transient Fault Modeling and Analysis," International Conference on Computer-Aided Design (ICCAD), San Jose, November 2008.
- [T28] "Soft Error Rate Analysis for Sequential Circuits," Conference on Design, Automation and Test in Europe (DATE), Nice, France, March 2007.
- [T29] "MARS-S: Modeling and Reduction of Soft Errors in Sequential Circuits," International Symposium on Quality Electronics Design (ISQED), San Jose, March 2007.
- [T30] "Circuit Reliability Analysis Using Symbolic Techniques," International Workshop on Logic and Synthesis (IWLS), Lake Arrowhead, June 2005.

#### **Invited Lectures:**

- [T31] "Modeling Signal Transduction Pathways," Drug Discovery, Systems and Computational Biology (DiSCoBio) Academy for high school students, University of Pittsburgh Cancer Institute Summer Academy, June 2013.
- [T32] "Cellular/Systems Models & Dynamics" Training and Experimentation in Computational Biology (TECBio), May 2011, 2012, 2013.
- [T33] "Modeling of Signal Transduction Pathways," Computational and Systems Biology/Biomedical Informatics (CoSBBI) Academy for high school students, University of Pittsburgh Cancer Institute Summer Academy, June 2012.
- [T34] "Introduction to logical modeling with application to T cell differentiation," course: Systems Approach to Inflammation, School of Medicine, University of Pittsburgh, November 2011, 2012, 2013.

- [T35] "Development and analysis of discrete models of cell signaling networks," course: Cell and Systems Modeling, Computational and Systems Biology, University of Pittsburgh, January 2012.
- [T36] "Design automation tools for biological systems and biologically-inspired computing," Design Automation Summer School (DASS) at Design Automation Conference (DAC), June 2011.
- [T37] "Reliability: An Architectural Solution," course: VLSI CAD: Software to Logic, ECE Department, Carnegie Mellon University, October 2007.
- [T38] "Multiple Clock Domains," course: Digital Computation, ECE Department, Carnegie Mellon University, May 2007.
- [T39] "Molecular Electronics: Concepts, Result and Perspectives," course: The Art and Science of System Level Design, ECE Department, Carnegie Mellon University, March 2005.

### Poster Presentations:

- [T40] "Interplay of phosphorylation kinetics and methylation dynamics leads to complex behavior of Foxp3 and PTEN in computational model of T cell differentiation," Annual Meeting of the American Association of Immunologists (AAI), May 2014.
- [T41] "Studies of biological networks with statistical model checking: application to immune system cells," ACM Conference on Bioinformatics, Computational Biology and Biomedicine (ACM-BCB), September 2013.
- [T42] "Model predicts timing of T cell stimulation is critical for T cell fate," Computational Cell Biology Meeting, Cold Spring Harbor Laboratory (CSHL), March 2013.
- [T43] "Circuit design techniques for automated construction of mosquito immune response model in malaria infection," Computational Cell Biology Meeting, Cold Spring Harbor Laboratory (CSHL), March 2013.
- [T44] "Efficient Techniques for Model Design and Analysis in Biology: Application to Immune System Dynamics," Rising Stars in Electrical Engineering and Computer Science Workshop, MIT, November 2012.
- [T45] "Model checking for studying temporal behavior in cell differentiation," q-bio Conference on Cellular Information Processing, August 2012.
- [T46] "Regulatory Network Analysis Acceleration with Reconfigurable Hardware," International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), September 2011.
- [T47] "Automating the construction of discrete models of biological systems," q-bio Conference on Cellular Information Processing, August 2011.
- [T48] "Emulation of Biological Networks in Reconfigurable Hardware," ACM Conference on Bioinformatics, Computational Biology and Biomedicine (ACM-BCB), August 2011.
- [T49] "Emulation of Biological Networks in Reconfigurable Hardware," Computational Cell Biology Meeting, Cold Spring Harbor Laboratory (CSHL), March 2011.
- [T50] "Peripheral T Cell Differentiation Modeling," 14th Annual Meeting of the Translational Research Cancer Centers Consortium (TRC<sup>3</sup>), February 2011.
- [T51] "Modeling of Peripheral T Cell Differentiation," q-bio Conference on Cellular Information Processing, August 2010.
- [T52] "Probabilistic Modeling and Optimization for Circuit Reliability," Ph.D. Forum at Design Automation Conference (DAC), July 2009.

### PUBLICATIONS

#### Journal Papers:

- [P1] N. Miskov-Zivanov, S. Luckhart, Y. Vodovotz, and J. R. Faeder, "Computational model of immune response in mosquitoes suggests key mechanisms of malaria parasite killing," in preparation for submission to *Molecular Systems Biology* (impact factor: 14.099).
- [P2] W. F. Hawse, R. P. Sheehan, N. Miskov-Zivanov, L. P. Kane, J. R. Faeder, and P. A. Morel, "Differential regulation of PTEN by TCR, Akt and FoxO1 controls CD4<sup>+</sup> T cell fate decisions," in second phase of review at *The Journal of Immunology* (impact factor: 5.362).
- [P3] P. A. Morel, J. R. Faeder, W. F. Hawse, and N. Miskov-Zivanov, "Modeling the T cell immune response: a fascinating challenge," in *Journal of Pharmacokinetics and Pharmacodynamics*, Vol. 41, Issue 5, pp. 401-413, October 2014.

- [P4] N. Miskov-Zivanov, M. S. Turner, L. P. Kane, P. A. Morel, and J. R. Faeder, "The duration of T cell stimulation is a critical determinant of cell fate and plasticity," in *Science Signaling*, 6, ra97, November 2013 (**podcast featuring publication**: <http://stke.sciencemag.org/cgi/content/full/sigtrans;6/300/pc29/DC1>) (impact factor: 7.648).
- [P5] N. Miskov-Zivanov and D. Marculescu, "Multiple Transient Faults in Combinational and Sequential Circuits: A Systematic Approach," in *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, Vol. 29, No. 10, pp. 1614-1627, October 2010.
- [P6] N. Miskov-Zivanov and D. Marculescu, "Modeling and Optimization for Soft-Error Reliability of Sequential Circuits," in *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, Vol. 27, No. 5, pp. 803-816, May 2008.
- [P7] N. Miskov-Zivanov and D. Marculescu, "Circuit Reliability Analysis Using Symbolic Techniques," in *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, Vol. 25, No. 12, pp. 2638-2649, December 2006.

### Conference Proceeding Papers:

- [P8] Y.-H. Kuo, V. Fangal, C. Talcott, Natasa Miskov-Zivanov, "Automation of biological model learning, design and analysis," in preparation for submission to *Computational Methods in Systems Biology (CMSB)*.
- [P9] Natasa Miskov-Zivanov, "Automation of biological model learning, design and analysis," in *Proc. of Great Lakes Symposium on VLSI (GLSVLSI)*, to appear, 2015.
- [P10] Q. Wang, N. Miskov-Zivanov, C. Telmer, E. M. Clarke, "Formal analysis provides parameters for guiding hyperoxidation in bacteria using phototoxic proteins," in *Proc. of Great Lakes Symposium on VLSI (GLSVLSI)*, to appear, 2015.
- [P11] N. Miskov-Zivanov, P. Wei, C.S.C. Loh, "THiMED: Time in Hierarchical Model Extraction and Design," in *Proc. of Computational Methods in Systems Biology (CMSB)*, pp. 260-263, November 2014.
- [P12] N. Miskov-Zivanov, P. Zuliani, E. M. Clarke, and J. R. Faeder, "Studies of biological networks with statistical model checking: application to immune system cells," in *Proc. of ACM Conference on Bioinformatics, Computational Biology and Biomedicine (ACM-BCB)*, September 2013, pp. 728.
- [P13] N. Miskov-Zivanov, D. Marculescu, and J. R. Faeder, "Dynamic behavior of cell signaling networks: model design and analysis automation." in *Proc. of Design Automation Conference (DAC)*, Article 8, 6 p., June 2013.
- [P14] N. Miskov-Zivanov, J. R. Faeder, C. J. Myers, and H. M. Sauro. "Modeling and design automation of biological circuits and systems," in *Proc. of International Conference of Computer-Aided Design (ICCAD)*, pp. 291-293, November 2012.
- [P15] N. Miskov-Zivanov, A. Bresticker, S. Venkatakrisnan, P. Kashinkunti, D. Krishnaswamy, D. Marculescu and J. R. Faeder, "Regulatory Network Analysis Acceleration with Reconfigurable Hardware," in *Proc. of International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, pp. 149-152, September 2011.
- [P16] N. Miskov-Zivanov, A. Bresticker, D. Krishnaswamy, S. Venkatakrisnan, D. Marculescu and J. R. Faeder, "Emulation of Biological Networks in Reconfigurable Hardware," in *Proc. of ACM Conference on Bioinformatics, Computational Biology and Biomedicine (ACM-BCB)*, pp. 536-540, August 2011.
- [P17] N. Miskov-Zivanov and D. Marculescu, "Formal Modeling and Reasoning for Reliability Analysis," in *Proc. of Design Automation Conference (DAC)*, pp. 531-536, June 2010 (**invited paper**).
- [P18] N. Miskov-Zivanov and D. Marculescu, "Modeling and Analysis of SER in Combinational Circuits," in *Proc. of IEEE Workshop on Silicon Errors in Logic – System Effects (SELSE)*, March 2010 (**invited paper**).
- [P19] N. Miskov-Zivanov, K.-C. Wu and D. Marculescu, "Process Variability-Aware Transient Fault Modeling and Analysis," in *Proc. of IEEE/ACM International Conference on Computer-Aided Design (ICCAD)*, pp. 685-690, November 2008.
- [P20] N. Miskov-Zivanov and D. Marculescu, "A Systematic Approach to Modeling and Analysis of Transient Faults in Logic Circuits," in *Proc. of IEEE International Symposium on Quality Electronic Design (ISQED)*, pp. 408-413, 2009 (accepted in 2008, published in 2009, due to publisher error).
- [P21] N. Miskov-Zivanov and D. Marculescu, "Soft Error Rate Analysis for Sequential Circuits," in *Proc. of Design, Automation and Test in Europe (DATE)*, pp. 1436-1441, April 2007 (**short-listed for ten years of DATE under honors**).



- [P22] N. Miskov-Zivanov and D. Marculescu, "MARS-S: Modeling and Reduction of Soft Errors in Sequential Circuits," in *Proc. of IEEE International Symposium on Quality Electronic Design (ISQED)*, pp. 893-898, March 2007 (**Best Paper Award nomination**).
- [P23] N. Miskov-Zivanov and D. Marculescu, "MARS-C: Modeling and Reduction of Soft Errors in Combinational Circuits," in *Proc. of Design Automation Conference (DAC)*, pp. 767-772, July 2006.
- [P24] N. Miskov-Zivanov and D. Marculescu, "Circuit Reliability Analysis Using Symbolic Techniques," in *Proc. of International Workshop on Logic and Synthesis (IWLS)*, June 2005.
- [P25] Z. D. Jelacic, N. Miskov, and D. Petrovacki, "Extended LQR control for first-order plus time-delay system," in *Proc. of International Symposium on Interdisciplinary Regional Research (Hungary, Romania, Yugoslavia)*, Novi Sad, Yugoslavia, 2002.

#### Conference Proceeding Abstracts:

- [P26] N. Miskov-Zivanov, S. Lukchart, Y. Vodovotz, and J. R. Faeder, "Computational model of immune crosstalk in malaria suggests key mechanisms of parasite killing in mosquitoes," *Systems Biology of Infectious Disease*, 2014.
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- [P29] N. Miskov-Zivanov, W. Hawse, P. A. Morel, and J. R. Faeder, "Interplay of phosphorylation kinetics and methylation dynamics leads to complex behavior of Foxp3 and PTEN in computational model of T cell differentiation," *Annual Meeting of the American Association of Immunologists (AAI)*, May 2014.
- [P30] W. Hawse, N. Miskov-Zivanov, P. A. Morel, and J. R. Faeder, "PTEN Regulates CD4+ T cell differentiation," *Annual Meeting of the American Association of Immunologists (AAI)*, May 2014.
- [P31] N. Miskov-Zivanov, M. S. Turner, L. P. Kane, P. A. Morel, and J. R. Faeder, "Model predicts timing of T cell stimulation is critical for T cell fate," *Cold Spring Harbor Laboratory Computational Cell Biology Meeting*, March 2013.
- [P32] N. Miskov-Zivanov, S. Luckhart, Y. Vodovotz, D. Marculescu, J. R. Faeder, "Circuit design techniques for automated construction of mosquito immune response model in malaria infection," *Cold Spring Harbor Laboratory Computational Cell Biology Meeting*, March 2013.
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- [P35] N. Miskov-Zivanov, D. Marculescu, P. Morel and J. Faeder, "Automating the construction of discrete models of biological systems," in *Proc. of q-bio Conference on Cellular Information Processing*, August 2011.
- [P36] N. Miskov-Zivanov, A. Bresticker, D. Krishnaswamy, S. Venkatakrisnan, D. Marculescu and J. R. Faeder, "Emulation of Biological Networks in FPGA," in *Proc. of International Workshop on Bio-Design Automation (IWBD A)*, June 2011.
- [P37] N. Miskov-Zivanov, A. Bresticker, D. Krishnaswamy, S. Venkatakrisnan, D. Marculescu and J. R. Faeder, "Emulation of Biological Networks in Reconfigurable Hardware," *Cold Spring Harbor Laboratory Computational Cell Biology Meeting*, March 2011.
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- [P43] J. Sekar, N. Miskov-Zivanov, P. Morel, M. Turner and J. Faeder, “Modeling of the peripheral naïve T-cell differentiation,” in *Proc. of Annual Meeting of the American Association of Immunologists (AAI)*, May 2010.

#### **Invited articles:**

- [P44] N. Miskov-Zivanov, "Design automation tools for biological systems and biologically-inspired computing," *What is? Column in ACM SIGDA E-Newsletter*, December 2011.

#### **Book chapters:**

- [P45] Y. Vodovotz, N. Azhar, N. Miskov-Zivanov, M. Buliga, R. Zamora, B. Ermentrout, G. Constantine, J. Faeder, S. Luckhart, Modeling Host-Vector-Pathogen Immuno-inflammatory Interactions in Malaria, in *Complex Systems and Computational Biology Approaches to Acute Inflammation*, pp. 265-279, Springer New York, 2013.

#### **Editorial:**

- [P46] L. Bleris, N. Miskov-Zivanov, and Chris J Myers, “IWBD A 2012 Special Issue, “ in *ACS Synthetic Biology*, Vol.2, Issue 5, pp. 203, May 2013 (**podcast**: <http://pubs.acs.org/page/asbcd6/audio/index.html>).

#### **Seminar articles:**

- [P47] G. Fey, M. Fujita, N. Miskov-Zivanov, K. Roy, M. Sonza Reorda, "Verifying Reliability," in *Dagstuhl Seminar Reports*, Vol. 2, No. 8, pp. 57-73, 2012.

### **PROFESSIONAL SERVICE**

#### **Organizing committee member:**

- [S1] Great Lakes Symposium on VLSI (GLSVLSI), *Special Session Organizer*, April 2015
- [S2] International Genetically Engineered Machine (iGEM) competition team, Carnegie Mellon University, *Organizer and Mentor* 2013, 2014, 2015
- [S3] International Genetically Engineered Machine (iGEM) competition team, University of Pittsburgh, *Co-founder, Organizer*, 2014
- [S4] International Genetically Engineered Machine (iGEM) competition team, Carnegie Mellon University, *Founder, Organizer and Mentor*, 2012
- [S5] Workshop on Modeling of Biological Systems (MoBS), *Founder and Organizer*, June 2013
- [S6] Design Automation Summer School (DASS), *Organizer*, June 2011, June 2013
- [S7] International Conference on Computer-Aided Design, *Special Session Organizer*, November 2012
- [S8] International Workshop on Bio-Design Automation (IWBD A), *Finance Chair* June 2011, *General Chair* June 2012, *Steering Committee Member* June 2013
- [S9] Dagstuhl Seminar on Verifying Reliability, *Co-organizer* August 2012
- [S10] 1<sup>st</sup> Workshop on Diversity in Design Automation and Test: Putting D(iversity) in Design Automation and Test, *Co-organizer*, May 2011

#### **Program committee member:**

- [S11] Workshop on Modeling of Biological Systems (MoBS), 2013
- [S12] International Conference on Computer-Aided Design (ICCAD), Special sessions and tutorials subcommittee, Emerging technologies subcommittee, 2013, 2014, 2015
- [S13] European Conference on Artificial Life (ECAL), 2013
- [S14] Design Automation Conference (DAC), Emerging technologies subcommittee, 2012,2013
- [S15] International Conference on Computer-Aided Design (ICCAD), 2010

- [S16] International Workshop on Logic Synthesis (IWLS), 2013
- [S17] International Conference on Computer Design (ICCD), 2010,2011,2012,2013
- [S18] International Workshop on Bio-Design Automation (IWBDA), 2010, 2011, 2012, 2013, 2014, 2015

**Editor:**

- [S19] Special Issue, in ACS Synthetic Biology from the 2012 International Workshop on Bio-Design Automation, May 2013.

**Session chair:**

- [S20] "CMOS Sensors for Biomedical and Biological Applications," Special Session, Design Automation Conference (DAC), 2011.

**Judge:**

- [S21] ACM Student Research Competition Grande Finals, 2014, 2015.

**Reviewer:**

- [S22] PLoS Computational Biology
- [S23] Journal of Emerging Technologies in Computer Systems (JETC)
- [S24] ACM Transactions in Embedded Computing Systems (TECS)
- [S25] Journal of Electronic Testing, Theory and Application (JETTA)
- [S26] BMC Bioinformatics
- [S27] European Conference on Artificial Life (ECAL)
- [S28] Design Automation Conference (DAC)
- [S29] Journal of Theoretical Biology (JTB)
- [S30] International Conference on Computer-Aided Design (ICCAD)
- [S31] ACM Transactions on Design Automation of Electronic Systems (TODAES)
- [S32] IEEE Transactions on Computer-Aided Design of Integrated Circuits (TCAD)
- [S33] IEEE Transactions on Computers (TC)
- [S34] IEEE Transactions on Very Large Scale Integration (VLSI) Systems (TVLSI)
- [S35] Asia and South Pacific Design Automation Conference (ASPDAC)
- [S36] IEEE International Conference on Computer Design (ICCD)
- [S37] IEEE International Symposium on High-Performance Computer Architecture (HPCA)
- [S38] IEEE International Symposium on Circuits and Systems (ISCAS)
- [S39] Design, Automation and Test in Europe (DATE)
- [S40] Journal of Computer Science and Technology (JCST)
- [S41] European Conference on Circuit Theory and Design (ECCDT)
- [S42] Annals of Mathematics and Artificial Intelligence (AMAI)
- [S43] Microelectronics Reliability (MR)
- [S44] Microprocessors and Microsystems (MICPRO)

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