

NEDA BAGHERI

Department of Electrical & Computer Engineering, UCSB
Santa Barbara, CA 93106-9560
neda@ece.ucsb.edu

EDUCATION

University of California – Santa Barbara

Doctoral candidate, *Fall 2007*.

Department of Electrical and Computer Engineering.

Dissertation topic: ***Phase as a Performance Metric for the Modeling, Analysis, and Control of Circadian Gene Networks.***

Thesis advisor: Prof. Francis J. Doyle III

Doctoral committee: Prof. João Hespanha, Prof. Linda Petzold, Prof. Jörg Stelling, and Prof. Andrew Teel.

Master of Science in Electrical and Computer Engineering. *June 2004*.

Major in Control Theory; minor in Signal Processing.

Bachelor of Science in Electrical and Computer Engineering. *June 2002*.

Graduated with High Honors. Dean's Honors List.

RESEARCH INTERESTS

Systems Biology: The mathematical modeling, analysis, and control of robust performance in complex bio-molecular networks.

Synthetic Biology: The investigation and design of biological circuits or modules that regulate specific functionality while maintaining performance despite the presence of cellular noise and environmental perturbations.

Applications: Addressing medical and environmental challenges by applying systems theoretic tools to analyze, design, and control the performance of biological networks.

RECENT HONORS

- Research Fellow through AFRL, January 2005 - June 2007.
- NSF IGERT CSE associate, 2004-present.
- IEEE Control Systems Magazine's featured student, October 2004.
- NSF Fellow and invited participant to the 3rd International Summer School on Biocomplexity from System to Gene. Dartmouth College, NH. July 2003.
- College of Engineering's Outstanding Graduating Electrical Engineering Student Award, 2002.
- Harold Frank Scholarship; awarded to students showing exceptional motivation in technical leadership, 2002-03.
- University Award of Distinction, 2002.
- Center for Entrepreneurship and Engineering Management Scholarship, 2000-01 & 2001-02.
- National Engineer's Week Scholarship, 2000.

GRADUATE RESEARCH EXPERIENCE

Graduate student researcher. Department of Electrical and Computer Engineering, Department of Chemical Engineering, UCSB.

Santa Barbara, CA

Winter 2003 – Present

The integration of control and systems theory with biology for the purpose of better understanding (or relating) network structure to robust performance. Developed a novel set of phase-based performance metrics for the investigation of biological oscillators. Applied a nonlinear model predictive control algorithm to manipulate the phase-resetting dynamics of circadian oscillators. Developed a detailed model that relies on a positive-negative feedback switch to characterize *Drosophila melanogaster* circadian phase dynamics.

NEDA BAGHERI

Department of Electrical & Computer Engineering, UCSB

GRADUATE RESEARCH EXPERIENCE

Guest researcher. Max Planck Institute.

Magdeburg, Germany

Summer and Fall 2004

Worked at the Max Planck Institute Systems Biology Department with Prof. Ernst D. Gilles and Prof. Jörg Stelling. Investigated biological details encompassing the *Drosophila melanogaster* circadian clock including various control structures established by enzymes not fully understood by experimentalists. Initiated a numerical investigation of phase attributes in nonlinear oscillatory systems.

ACADEMIC PUBLICATIONS

Peer-Reviewed Journal Articles:

Neda Bagheri*, Stephanie R. Taylor*, Kirsten Meeker, Linda R. Petzold, and Francis J. Doyle III. Synchrony and Entrainment Properties of Robust Circadian Oscillators. *Institution of Engineering and Technology (IET) Systems Biology*, submitted.

* Equal contribution

Neda Bagheri, Jörg Stelling, and Francis J. Doyle III. Circadian phase entrainment via nonlinear model predictive control. *International Journal of Robust and Nonlinear Control*, in press. DOI: 10.1002/rnc.1209.

Neda Bagheri, Jörg Stelling, and Francis J. Doyle III. Quantitative performance metrics for robustness in circadian rhythms. *Bioinformatics* (2007) 23(3):358-364.

Francis J. Doyle III, Rudi Gunawan, Neda Bagheri, Henry Mirsky, and Tsz Leung To. Circadian rhythm: A natural, robust, multi-scale control system. *Computers & Chemical Engineering* (2006) 30:1700-1711.

Peer-Reviewed Conference Proceeding Articles and Presentations (*speakers are underlined*):

Stephanie R. Taylor*, Neda Bagheri*, Kirsten Meeker, Linda R. Petzold, Francis J. Doyle III. Robust Timekeeping in Circadian Networks: From Genes to Cells. *Foundations of Systems Biology and Engineering (FOSBE)*, Stuttgart, Germany, September 2007.

* Equal contribution

Francis J. Doyle III, Rudi Gunawan, Neda Bagheri, Henry Mirsky, and Tsz Leung To. Circadian rhythm: A natural, robust, multi-scale control system. *Chemical Process Control VII*, Alberta, Canada, January 2006.

Neda Bagheri, Stephanie Taylor, Jörg Stelling, and Francis J. Doyle III. A finite differences approach to phase-based sensitivity analysis of biological oscillators. *Foundations of Systems Biology and Engineering (FOSBE)*, Santa Barbara, CA, August 2005.

Neda Bagheri, Jörg Stelling, and Francis J. Doyle III. Optimal phase-tracking of the nonlinear circadian oscillator. *American Control Conference*, Portland, OR, June 2005.

Conference Presentations (*speakers are underlined*):

Neda Bagheri and Francis J. Doyle III. The entrainment and optimal control of circadian phase dynamics. *SIAM Conference on Computational Science and Engineering*, Costa Mesa, CA, February 2007.

Neda Bagheri, Jörg Stelling, and Francis J. Doyle III. Circadian phase entrainment via nonlinear model predictive control. *AIChE Annual Meeting*, San Francisco, CA, November 2006.

NEDA BAGHERI

Department of Electrical & Computer Engineering, UCSB

ACADEMIC PUBLICATIONS

Neda Bagheri, Jörg Stelling, and Francis J. Doyle III. Phase-based performance analysis for robustness in the mammalian circadian oscillator. *7th annual International Conference on Systems Biology*, Yokohama, Japan, October 2006.

Neda Bagheri, Jörg Stelling, and Francis J. Doyle III. Stochastic sensitivity analysis of the circadian gene network. *9th meeting for the Society for Research on Biological Rhythms*, Whistler, British Columbia, Canada, June 2004.

Neda Bagheri, Jörg Stelling, and Francis J. Doyle III. Analysis of robustness/fragility tradeoffs in a stochastic circadian rhythm gene network. *4th annual International Conference on Systems Biology*, St. Louis, MO, 2003.

Book Chapter:

Scott Hildebrandt, Neda Bagheri, Rudiyanto Gunawan, Henry Mirsky, Jason Shoemaker, Stephanie Taylor, Linda Petzold, and Francis J. Doyle III. Systems Analysis of Biological Networks in *Systems Biology* (E.T. Liu, G.P. Nolan, D.A. Lauffenburger, ed.), to be published by Academic Press.

GRADUATE TEACHING EXPERIENCE

Mentor. Biomolecular Science and Engineering Program, UCSB. **Santa Barbara, CA**
Fall 2006

Defined and managed a systems biology project for a first year Bio-Molecular Science and Engineering graduate student.

Teaching assistant. Department of Chemical Engineering, UCSB. **Santa Barbara, CA**
Spring 2006

Managed laboratory sections, directed office hours, proctored exams for both undergraduate and graduate level students enrolled in the systems biology course.

Teaching assistant. Department of Electrical Engineering, UCSB. **Santa Barbara, CA**
Spring 2001, Fall 2001

Managed laboratory sections, directed office hours, proctored exams for undergraduate students enrolled in circuit design courses.

MEMBERSHIPS

- IEEE student member, 2002-present.
- AIChE student member, 2003, 2006.
- Co-chair of the IEEE student branch, 2000-2003.
- Center for Engineering and Entrepreneurship Management (CEEM), 2000-2003.
- Student Entrepreneurial Association (SEA), 2000-2003.
- Society of Women Engineers, 1999-2002.
- Tau Beta Pi member since 1999.

PERSONAL INTERESTS

Sports: Ultimate frisbee, backpacking, cycling, climbing, dance.
Leisure: Live theatre, photography, piano.
Foreign languages and travel.

REFERENCES

Available upon request.