

Robert G. Egbert

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Research interests

synthetic biology, optimizing engineered gene networks, evolvable gene networks, control systems engineering.

Education

University of Washington, Seattle, WA, USA.
Ph.D. in Electrical Engineering. August 2012.

Thesis title: Fine-tuning engineered gene regulatory networks expressed in *Escherichia coli* using hypervariable simple sequence repeats.

Thesis advisor: Eric Klavins, Electrical Engineering, UW.

Thesis committee: Ben Kerr (Biology, UW), Jennifer Nemhauser (Biology, UW), Georg Seelig (Computer Science and Engineering, UW), and Paul Wiggins (Physics/Bioengineering, UW).

Brigham Young University, Provo, UT, USA.
B.S. in Electrical Engineering. August 2003.
B.A. in Korean Studies. August 2003.

Research Experience

Research Assistant, Klavins Lab, Electrical Engineering Department, University of Washington.

- ◆ Devise and carry out research projects to construct gene networks in *Escherichia coli* that perform to meet design specifications.
- ◆ Advise graduate students and undergraduate researchers on best practices for experimental design and efficient cloning strategies.
- ◆ Assisted in building up efficient wet lab operations through core protocol development for DNA assembly and strain engineering, as well as equipment procurement for Klavins Lab.

Publications

Egbert, RG & Klavins, E (2012). "Fine-tuning gene networks using simple sequence repeats." *Proc Natl Acad Sci USA* doi:10.1073/pnas.1205693109.

Jang SH, Oishi KT, Egbert RG, Klavins E (2012). "Specification and simulation of synthetic multicelled behaviors." *ACS Synth Biol* 1:365-374.

Harger M, Zheng L, Moon A, Ager C, An JH, Choe C, Lai E, Mo B, Zong D, Smith M, Egbert R, Mills J, Baker D, Swanson-Pultz I, Siegel J. "Expanding the Product Profile of a Microbial Alkane Biosynthetic Pathway." Submitted, *ACS Synth Biol*.

Otis B, Egbert R, Haq S, Holleman J, Hu J, Liao Y, Pandey J, Rai S, Zhang F (2009). "Design techniques for self-powered microsystems." *IEEE ISCAS 2009*.

Dong J, Egbert RG, Parviz BA (2006). "Current-block nanoelectrode array for label-free detection of proteins and short DNA strands." *IEEE NANO 2006*.

Talks & Posters

Egbert RG (08/2012). "Fine-tuning engineered gene networks using simple sequence repeats." Invited talk at the Molecular Programming Project Retreat, Oxnard, CA, USA.

Egbert RG (09/2011). "Predictable tuning of gene networks with simple sequence repeats." Invited talk at The 3rd International Workshop on Stochasticity in Biochemical Reaction Networks, Banff, Canada.

Egbert RG (08/2011). "Tuning gene networks with simple sequence repeats." Contributed speaker at The Fifth Annual q-bio Conference on Cellular Information Processing, Santa Fe, NM, USA.

Egbert RG, Klavins E (06/2011). "Tuning gene networks with simple sequence repeats in the ribosome binding site." Poster presentation at SB5.0: The Fifth International Meeting on Synthetic Biology, Stanford, CA, USA.

Egbert RG, Harvey MR, Otis BP (09/2007). "Microscale silicon thermoelectric generator with low impedance for energy harvesting." Poster presentation at the 5th European Conference on Thermoelectrics, Odessa, Ukraine.

Teaching

Instructor, Laboratory Methods in Synthetic Biology. Managed the design, assembly, and testing progress of 15 students working on five unique projects to engineer an ultrasensitive molecular detector in *E. coli*.

Co-instructor: Eric Klavins; winter 2012.

Guest lecturer for cellular and molecular biology course in Pharmaceutical Bioengineering program: "The magnetosome toolkit: porting an organelle for biofabrication of magnets to *E. coli*"

Instructor: Mark Minie; February 2012.

Course planning, Biocircuits wet lab

Instructor: Eric Klavins; spring 2010.

Teaching Assistant, Biocircuits wet lab

Instructor: Eric Klavins; spring 2009.

Link: http://soslab.ee.washington.edu/biocircuits/index.php?title=Main_Page

Advisor, UW iGEM team, 2008-2011. Specifically advised groups for Gibson

Assembly toolkit and Magnetosome toolkit (see

<http://2011.igem.org/Team:Washington>).

Honors and Awards

National Science Foundation Graduate Research Fellowship (2007-2010)

National Defense Science and Engineering Graduate Fellowship (2007, declined)

Brigham Young University Trustees Scholarship (1996-1998, 2000-2002)

Research Skills

- ♦ Engineering functional gene networks: Combinatorial plasmid (PCR, gene synthesis, Gibson assembly) and genome engineering (recombineering, MAGE) to fine-tune gene network behaviors using sequence libraries
- ♦ Cell-based experimental assays: single cell fluorescence (cytometry, time-lapse microscopy); batch culture (plate reader, solid media); and enzymatic activity (MUG for LacZ, Congo Red staining for cellulase)
- ♦ Modeling and data analysis: segmentation algorithms for time-lapse microscopy (Matlab); image processing of agar plates for colony size and fluorescence (Matlab); sequence trace analysis of evolvable sequences (Mathematica); ODE analytical models (Mathematica); and stochastic simulations (Mathematica, **gro**)

References

Professor Eric Klavins

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Professor Jeff Tabor

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Jeff Nelson, Ph.D.

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