Robert G. Egbert

Postdoctoral Research Associate
Electrical Engineering Department
University of Washington, Seattle, WA, USA
Phone: (206) 965-9915
Email: robere@uw.edu
Website: http://depts.washington.edu/soslab

Research interests

synthetic biology, optimizing engineered gene networks, evolvable gene networks, dynamical systems, 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.

Thesis committee: Ben Kerr, Biology; Jennifer Nemhauser, Biology; Georg Seelig, Computer Science and Engineering; and Paul Wiggins, Bioengineering.

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

Research

Graduate Research Assistant, Klavins Lab, Electrical Engineering Department, University of Washington (2007-2012).

- Devised and carried out research project constructing highly tunable gene networks in *Escherichia coli*
- Mentored 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

Graduate Research Assistant, Otis Lab, Electrical Engineering Department, University of Washington (2006-2007).

- Developed miniature thermoelectric energy harvester to power ultra-low-power neural recording devices.

Publications

Egbert, RG & Klavins, E (2012). "Fine-tuning gene networks using simple sequence repeats." *Proceedings of the National Academy of Sciences of the United States of America* 109:16817-22. Link (Associated commentary by Prindle and Hasty - link).

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

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." *ACS Synthetic Biology* doi:10.1021/sb300061x. Link

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." *2009 IEEE International Symposium on Circuits and Systems,* 1429-1432. Link

Dong J, Egbert RG, Parviz BA (2006). "Current-block nanoelectrode array for label-free detection of proteins and short DNA strands." *Sixth IEEE Conference on Nanotechnology, 2006.* 2:814-817. Link

Talks & Posters

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

Egbert, RG (09/2011). "Predictable tuning of gene networks with simple sequence repeats." Invited talk at *The Third 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. Supervised the design, assembly, troubleshooting, and testing progress of 15 students working on five related projects to engineer an ultrasensitive molecular detector in *E. coli*. Co-instructor: Eric Klavins; winter 2012.

Guest lecturer, cellular and molecular biology course in Pharmaceutical Bioengineering program: "The magnetosome toolkit: porting an organelle for biofabrication of magnets in *E. coli*"
Instructor: Mark Minie; February 2012.

Course planner, Biocircuits wet lab
Instructor: Eric Klavins; spring 2010.

Teaching Assistant, Biocircuits wet lab
Instructor: Eric Klavins; spring 2009. Link

Advisor, UW iGEM team, 2008-2011. Specifically advised 2011 subgroup of three students who developed the Gibson Assembly Toolkit and Magnetosome Toolkit for next-generation gene networks. Link

Professional Activities

Co-organizer, Fourth International Workshop on Stochasticity in Biochemical Networks, 13-15 September, 2013. Banff, Canada.
Committee: Alistair Boettiger (chair), Andrew Mugler, Mary Dunlop

Honors and Awards

iGEM World Champion (2011 - advisor)
National Science Foundation Graduate Research Fellowship (2007-2010)
National Defense Science and Engineering Graduate Fellowship (2007 - declined)
2nd Place, Korean Speech Contest for Foreigners (1999 - Pohang, South Korea)
Brigham Young University Trustees Scholarship (1996-1997, 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, limiting carbon media); 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 simple sequence repeats (Mathematica); ODE analytical models (Mathematica); and stochastic simulations (Mathematica, `gro`)

References

Professor **Eric Klavins**
Department of Electrical Engineering
University of Washington
Paul Allen Center Room AE100R
Campus Box 352500
Seattle, WA, 98195-2500
Office: (206) 616-1743
Email: klavins@uw.edu

Professor **Ben Kerr**
Department of Biology
University of Washington
Campus Box 351800
Seattle, WA 98195-2500
Office: (206) 221-3996
Email: kerrb@u.washington.edu

Professor **Georg Seelig**
Department of Computer Science & Engineering
University of Washington
Paul Allen Center Room AE100R
Campus Box 352500
Seattle, WA 98195-2500
Office: (206) 616-3885
Email: gseelig@u.washington.edu

Professor **Jeff Tabor**
Department of Bioengineering
Rice University
Rice University Bioengineering, MS-142
6100 Main Street
Houston, TX 77005
Office: (713) 348-8316
Email: jeff.tabor@rice.edu

Jeff Nelson, Ph.D.
Vice President for Process Technologies
OligoCo, Inc.
19805 North Creek Parkway
Bothell, WA 98011
Office: (425) 488-9915
Email: nelson@oligoco.com