

David M. Zong

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Education

- 2014–present **Doctor of Philosophy**, *Rice University*, Houston, TX, .
Systems, Synthetic, and Physical Biology Program
- 2010–2014 **Bachelor of Science**, *University of Washington*, Seattle, WA, .
Major: Bioengineering, Minor: Applied Mathematics

Research Interests

- Primary Experimental Synthetic Biology using *E. coli*
- Secondary Biophysics of Gene Expression
- Deep Learning applications for Synthetic Biology

Research Experience

Graduate

- 2015–present **Graduate Researcher**, *Department of Biosciences*, Prof. Matthew R. Bennett.
Research on experimental synthetic biology using *E. coli* with a focus on gene circuits and dynamics. Develop software tools for synthetic biology research.
- Current and Past Projects:**
- Feedforward Networks in Microbial Consortia
 - Description: engineer populations *E. coli* to implement various feedforward circuits
 - Build gene circuits for each member strain of bacteria in consortia
 - Measure dynamic behavior of consortia
 - Composition and Prediction of Multi-Input Synthetic Promoters
 - Description: investigate the effects of promoter multiplexing in engineered *E. coli*
 - Develop a free energy model for promoter multiplexing
 - Run experiments to characterize multiplexed genetic circuits
 - Neural Network Machine Learning for Microscope Image Segmentation
 - Description: write software program to learn segmentation to segment microscope images
 - Build convolutional neural network model to classify pixels of bacterial cells
 - Synchronization of Synthetic Oscillators
 - Description: engineer *E. coli* to synchronize oscillations via cell coupling
 - Design gene circuit for cell-cell coupling
 - Plan and design microscope experiments to image bacteria
 - Software Tools for Hierarchical Golden Gate Assembly
 - Description: write software program to fetch and assemble DNA sequences
 - Software suite to accompany the Bacterial Toolkit assembly method

Undergraduate

- 2012–2014 **Research Assistant**, *Department of Electrical Engineering*, Prof. Eric Klavins.
Synthetic biology research on engineered multicellularity in *E. coli* for cellulose digestion
Senior capstone project on expanding the cellulose digesting system to also produce biodiesel
- 2010–2014 **iGEM Team Member**, *University of Washington iGEM Team*.
2010 Team: protein design research to create novel protein therapeutic for the treatment of anthrax. Won "Best Health and Medicine" Award.
2011 Team: metabolic engineering research to have *E. coli* produce alkanes. **Grand Prize Winner**

Teaching Experience

- 2015–present **iGEM Graduate Adviser**, *Rice University iGEM Team*.
Mentored undergraduates on the Rice iGEM Team
Designed and taught wetlab tutorials
2015 Team: International joint team with Hong Kong University of Science and Technology
2017 Team: Nominated for best Environmental Project

Awards and Affiliations

- Awards Rice Institute of Biosciences and Bioengineering Travel Award 2018
National Science Foundation Graduate Research Fellowship Program 2016
Mary Gates Endowment Research Scholarship, University of Washington, March 2013 and December 2013
- Affiliation Tau Beta Pi Engineering Honor Society, Washington Alpha

Skills

- Laboratory Molecular Cloning, Flow Cytometry, Plate Reader, Microfluidics, Nanofabrication, Fluorescence Microscopy, Next-Gen Sequencing
- Programming Python (TensorFlow, Biopython, Numpy), MATLAB, \LaTeX , HTML, CSS
- Software Adobe Illustrator, Microsoft Office, Git/Github, Benchling
- Languages English (native), Chinese (fluent), Japanese (proficient)

Publications

- [1] Robert Egbert, Leandra M Brettner, David Zong, and Eric Klavins. Self-destructive altruism in a synthetic developmental program enables complex feedstock utilization. *bioRxiv*, page 086900, 2017.
- [2] Matthew Harger, Lei Zheng, Austin Moon, Casey Ager, Ju H An, Chris Choe, Yi-Ling L Lai, Benjamin Mo, David Zong, Matthew D Smith, Robert G Egbert, Jeremy H Mills, David Baker, Ingrid S Pultz, and Justin B Siegel. Expanding the product profile of a microbial alkane biosynthetic pathway. *ACS synthetic biology*, 2(1):59–62, 2013.

- [3] Sean J Wu, Christopher B Eiben, John H Carra, Ivan Huang, David Zong, Peixian Liu, Cindy T Wu, Jeff Nivala, Josef Dunbar, Tomas Huber, Jeffrey Senft, Rowena Schokman, Matthew D Smith, Jeremy H Mills, Arthur M Friedlander, David Baker, and Justin B Siegel. Improvement of a potential anthrax therapeutic by computational protein design. *The Journal of biological chemistry*, 286(37):32586–92, 11 2011.