

# David M. Zong

davidzong1@gmail.com

## EDUCATION

**William Marsh Rice University**

**Ph.D., Graduate Program in Systems, Synthetic, and Physical Biology**

National Science Foundation Graduate Research Fellow (2016)

**Houston, TX**

**Aug 2014 – Present**

**University of Washington**

**B.S., Bioengineering**

Minor in Applied Mathematics

**Seattle, WA**

**Jun 2010 – Jun 2014**

## PRIMARY RESEARCH INTERESTS

- Synthetic biology
- Engineering population level gene circuits in bacterial consortia
- Developing methods to make engineering biology more predictable

## SKILLS

**Laboratory:** Molecular Cloning (PCR, DNA Assembly, Transformation), Flow Cytometry, Plate Reader, Microfluidics, Soft Lithography, Fluorescence Microscopy, Next-gen Sequencing

**Programming:** Python (Tensorflow, Biopython, Numpy), MATLAB, LaTeX, HTML/CSS

**Software:** Adobe Illustrator, Microsoft Office, Git, Benchling

**Language:** English (native), Chinese (fluent), Japanese (proficient)

## PUBLICATIONS

**D. Zong**, S. Cinar, D. Shis, K. Josic, W. Ott, and M. R. Bennett. “Predicting transcriptional output of synthetic multi-input promoters,” *ACS Synth. Biol.*, vol 7, pp. 1834-1843, 2018.

R.. Egbert, L. M. Brettner, **D. Zong**, and E. Klavins. “Self-destructive altruism in a synthetic developmental program enables complex feedstock utilization,” *bioRxiv*, page 086900, 2017.

M. Harger, L. Zheng, A. Moon, C. Ager, J. H. An, C. Choe, Y.-L. Lai, B. Mo, **D. Zong**, M. D. Smith, R. G. Egbert, J. H. Mills, D. Baker, I. S. Pultz, and J. B. Siegel, “Expanding the Product Profile of a Microbial Alkane Biosynthetic Pathway,” *ACS Synth. Biol.*, vol. 2, no. 1, pp. 59–62, Jan. 2013.

S. J. Wu, C. B. Eiben, J. H. Carra, I. Huang, **D. Zong**, P. Liu, C. T. Wu, J. Nivala, J. Dunbar, T. Huber, J. Senft, R. Schokman, M. D. Smith, J. H. Mills, A. M. Friedlander, D. Baker, and J. B. Siegel, “Improvement of a potential anthrax therapeutic by computational protein design,” *J. Biol. Chem.*, vol. 286, no. 37, pp. 32586–32592, Sep. 2011.

## RESEARCH EXPERIENCE

### Graduate Researcher

Jan 2015 – Present

Department of Biosciences, William Marsh Rice University  
Advisor: Professor Matthew Bennett

#### Projects:

Tuning of Bacterial Consortia through Relative Population Ratios Oct 2016 – Present

- Designed and engineered cooperation in 3 strains of *E. coli* to implement a pulse generator circuit
- Performed microfluidic fluorescence microscopy experiments to observe circuit dynamics
- Developed next-gen sequencing protocol to measure the population ratio of microbial consortia
- Wrote custom MATLAB and Python analysis scripts to process next-gen sequencing data and timecourse plate reader data

Composition of Multi-Input Promoters

Jan 2015 – Jul 2018

- Engineered *E. coli* to simultaneously sense up to 3 signals
- Developed a predictive model with low error in collaboration with mathematicians
- Developed a flow cytometry protocol following methods to increase data reproducibility
- Wrote custom Python analysis scripts using open source package to process flow cytometry data

### Undergraduate Research Assistant

Jun 2012 – Jun 2014

Department of Electrical Engineering, University of Washington  
Advisor: Professor Eric Klavins

#### Projects:

Multicellular Consolidated Bioprocessing Sep 2013 – Jun 2014

- Designed and constructed a gene circuit in *E. coli* for simultaneous cellulose digestion and biofuel production
- Planned and executed an individual research project for bioengineering senior capstone requirement

Aquarium Lab Protocol Software

Jun 2013 – Jun 2014

- Translated lab protocols into a standardized description language
- Inventoried and photographed lab supplies and materials into a database

Engineered Multicellularity for Cellulose Digestion

Jun 2012 – Sep 2013

- Engineered *E. coli* to digest cellulose by switching between two cooperative states
- Built plasmids and engineered host cell genome to encode designed behavior
- Performed experiments to characterize behavior and identify model parameter values

**iGEM Team Member****Jun 2010 – Jun 2014**

iGEM (International Genetically Engineered Machines Competition) Team, University of Washington

## Projects:

Microbial Alkane Production

Jun 2011 – Jan 2012

- Designed and constructed a biofuel production pathway in *E. coli*
- Synthesized and expressed genes in *E. coli* responsible for alkane production
- Identified and quantified alkane output using gas chromatograph mass spectrometry
- Project awarded grand prize at iGEM 2011 jamboree

Development of a Novel Anthrax Therapeutic

Jun 2010 – Jan 2011

- Engineered protein therapeutic to kill anthrax causing bacteria
- Used computational protein design software Foldit to generate designs
- Used mutagenesis to encode mutants, expressed mutant enzymes in *E. coli*
- Project awarded Best Health and Medicine Project at iGEM 2010 jamboree

**TEACHING EXPERIENCE****iGEM Graduate Instructor**

Mar 2015 – Nov 2018

Department of Biosciences, William Marsh Rice University

Dr. Beth Beason and Professor Joff Silberg

- Guided teams of undergraduates through 4 iGEM competitions, from project conception, implementation, and presentation at iGEM jamboree
- Designed and taught wetlab tutorials for students with little or no formal lab experience
- Coached students on scientific oral, written and visual communication for both technical and non-technical audiences

**Teaching Assistant: Computational Synthetic Biology**

Aug 2015 – Dec 2015

Department of Biosciences, Professor Matthew Bennett, William Marsh Rice University

- Scored problem sets and exams for class of 15 students
- Provided feedback for professor on draft problem sets and exam questions

**Teaching Assistant: Advanced Synthetic Biology**

Mar 2014 – Jun 2014

Department of Bioengineering, Professor James Carothers, University of Washington

- Scored and provided feedback on weekly written literature critiques for a class of 10 students
- Maintained and updated class website with assignments and announcements

**AWARDS**

Rice University Institute for Biosciences and Bioengineering Travel Award 2018

National Science Foundation Graduate Research Fellowship Program, Fellow 2016

Mary Gates Endowment Research Scholarship, University of Washington, March 2013 and December 2013