Yaoyu Yang

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Engineer, Researcher, Programmer

Summary

• Principal Software Engineer at Ginkgo Bioworks to make biology easier to engineer.
• PhD in Electrical Engineering from the University of Washington with Prof. Eric Klavins.
• A trained engineer with 10+ years of experience in software engineering and synthetic biology.

Education

2011-2016 University of Washington
Ph.D. in Electrical Engineering
M.Sc. in Electrical Engineering

2010 University of Virginia
Exchange study, Electrical and Computer Engineering

2007-2011 Shanghai Jiao Tong University
B.S. (with First Class Honors) in Automation
Minor in Business Administration

Technical skills

Programming Languages:
Ruby, Python, Java, C++, JavaScript, Swift, R, Matlab/Octave

Web Development:
Ruby on Rails, Django, React

Software tools:
Git, GitHub, Eclipse, Xcode, UNIX commands

Experience

Principal Software Engineer	**Ginkgo Bioworks,** Boston, MA	2021-Present

Senior Software Engineer	**Ginkgo Bioworks,** Boston, MA	2017-2021

• Design and implement software for keeping track of samples, laboratory workflows, and instrument.

• Design and implement software for automating laboratory protocols on liquid handlers and other instruments.

• Design and implement software for analyzing data from instruments and correlating with experimental designs.

Graduate Researcher	**Klavins Lab**, University of Washington (UW), Seattle, WA	2011-2016

• Designed, built and tested a novel inducible genetic bistable switch and an antibiotic resistance memory in yeast. Performed mathematical modeling using dynamical system, experimental design, construction of novel yeast strain through Aquarium, data gathering using scientific instruments, and automated data analysis pipeline with self developed open source Python package.

• Conducted research and continuous software development in building a software system called Aquarium, which enables researchers executing molecular biology workflows in the "cloud". Committed a net of more than 12,000 lines of code. Built 20 high-quality, reproducible workflows for constructing and testing novel plasmids and yeast strains in Aquarium. Used by more than 100 researchers and technicians at UW and MIT.

	• Designed and implemented a yeast cell microscopy image segmentation and tracking software in Matlab.

• Tested frequency response for a synthetic auxin signaling pathway in yeast. The approach was using a microfluidic device called CellASIC to grow the yeast cell, where one can control the system precisely with different frequencies of auxin inputs and observe using fluorescence microscopy over time. Generated a Bode plot describing the frequency response of signaling pathway. |
| **Teaching Assistant** | **University of Washington,** Seattle, WA   2014
• Worked as TA for Laboratory Methods in Synthetic Biology class.
• Organized to teach 16 students learn lab skills ranging from running a PCR to transforming DNA into *E.coli* and yeast via Aquarium lab operating system.
• Developed a majority of the training protocols and workflows in Aquarium lab operating system using software code. |
| **Undergrad Researcher** | **Shanghai Jiao Tong University,** Shanghai, China   2009-2011
• Worked on spectrum resources allocation in cognitive radio networks.
• Invented an optimal online auction-clearing algorithm to achieve maximized revenue for primary spectrum users in a dynamic spectrum auction setting.
• Published an original paper in a leading conference. |

Publications

2021	**Implementation of an interactive mobile application to pilot a rapid assay to detect HIV drug resistance mutations in Kenya**

J Vrana, N Panpradist, N Higa, D Ko, P Ruth, R Kanthula, JJ Lai, **Yaoyu Yang**, SR Sakr, B Chohan, MH Chung, LM Frenkel, BR Lutz, EKlavins, IA Beck, **MedRxiv & to appear in PLOS Global Public Health** |
| 2021 | **Aquarium: open-source laboratory software for design, execution and data management**

J Vrana, O de Lange, **Yaoyu Yang**, G Newman, A Saleem, A Miller, C Cordray, S Halabiya, M Parks, E Lopez, S Goldberg, B Keller, D Strickland, E Klavins, **Synthetic Biology, Oxford University Press** |
| 2019 | **Synthetic Bistability and Differentiation in Yeast**
Yaoyu Yang, J. Nemhauser, E. Klavins, *ACS synthetic biology* |
| 2016 | **Design, Construction, and Validation of Dynamic Gene Circuits in Yeast, Yaoyu Yang, University of Washington Ph.D. Thesis** |
| 2015 | **Optical Trapping on Two-Dimensional Photonic Crystal and Cell Viability Characterization**
P Jing, J Wu, GW Liu, EG Keeler, **Yaoyu Yang**, SH Pun, LY Lin, *Optical Trapping* |
| 2012 | |
| | **Engineering with Auxin: Characterization of a Synthetic Signal Processing Toolbox**
SS Jang, KA Havens, JM Guseman, EP Jerome, N Bolten, BL Moss, K Oishi, **Yaoyu Yang**, M Gander, T Gu, JL Nemhauser, E Klavins, *Abstract*, *Q-bio* |
| 2011 | |
| | **Online Market Clearing in Dynamic Spectrum Auction**
Yaoyu Yang, J Wu, C Long, B Li, *GLOBECOM* |