

Ethan Li

Pronouns: they/them

Github: github.com/ethanjli

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Education

PhD in Bioengineering

Stanford University (Stanford, CA)

Started September 2018, defended August 2025

Degree conferral January 2026

Advised by Prof. Manu Prakash

MS in Computer Science

Stanford University (Stanford, CA)

Graduated June 2018

Specialization in Artificial Intelligence

BS in Bioengineering

Stanford University (Stanford, CA)

Graduated June 2016

Graduated with Distinction, Tau Beta Pi

Research & Engineering Experience

Software Engineer (Softwareentwickler für Embedded Systeme und Webanwendungen)

openUC2 GmbH (Jena, Thuringia, Germany)

Autumn 2025 - Present

- Developing and maintaining firmware and embedded operating system for a robotic microscope ([FRAME](#)), including software update and extension system ([Forklift](#)).
- Developing online CAD platform for designing, sharing, and procuring new optical systems based on the openUC2 modular optics framework.

PhD Researcher

Summer 2019 - Present

Prakash Lab, Stanford University (Stanford, CA)

Advised by Prof. Manu Prakash

- Developing systems and infrastructure for geographically-distributed interactive robotic microscopy networks. Developed and currently operating a prototype cluster ([Ten-Earth](#)) of remotely-operable microscopes with a self-hosted software platform (Go + SQLite + Open Policy Agent + Hotwire Turbo + Hotwire Stimulus + ZeroTier + Terraform + Nomad + Caddy + GCP) for privileged administration and unprivileged public access.
- Developing GitOps-inspired software deployment & configuration system ([Forklift](#)) for composable, reprovisionable, and decentralized management of system/application software (Docker containers, static binaries, and shell scripts) and configurations on embedded Linux systems, designed to facilitate scalable system administration across networks of individually-customizable open-source scientific instruments.
- Leading software development and maintenance for an open-source microscopy project ([PlanktoScope](#)). Open-source maintainership responsibilities include release engineering over two annual software release cycles, implementation of continuous integration automation (GitHub Actions), documentation & improvement of [operating system architecture](#) and [software development processes](#), integration of third-party applications (via Docker Compose + Forklift + Caddy), improvement & maintenance of backend software (Python), improvement & maintenance of the project's documentation system and software documentation (MkDocs), change management (alpha/beta-based release train), mentorship of project contributors and interns, and issue triaging & troubleshooting support for open-source community members.
- Implemented and led 45 days of continuous research operations with a PlanktoScope for plankton biodiversity quantification aboard a research cruise ([The Tale of Three Systems: Fate of Primary Production in the Chukchi Sea](#)) on R/V Sikuliaq in the Arctic Ocean.
- Prototyped ultra-low-cost hand-powered centrifuge ([Handyfuge](#)) for clinical and scientific applications in field work and low-resource settings without electricity.
- Supported hardware development (EasyEDA+KiCAD) and clinical validation testing of low-cost automated scanning microscope platform ([Octopi/Squid](#)) for infectious disease diagnosis and advanced microscopy, including field work at the Infectious Diseases Research Collaboration in Tororo, Uganda.
- Developed embedded (STM32 HAL + C++), backend (Python), and frontend (TypeScript+React) software for an open-source ventilator ([Vent4US/Pufferfish](#))

designed for local manufacturing and for long-term clinical use globally, including in resource-limited settings. Led the software development team, including architectural decision-making and implementation of IEC 62304-related processes for tech transfer to manufacturing partners.

- Supported hardware development (OnShape) of a vertical tracking microscope ([Gravity Machine](#)) to study vertical migration behavior and physiology of marine plankton.
- Supported hardware and software development of low-cost punchcard programmable microfluidics platform for molecular diagnostics.

Research Assistant

Winter 2017 - Summer 2018

Riedel-Kruse Lab, Stanford University (Stanford, CA)

Advised by Prof. Ingmar H. Riedel-Kruse

- Designed and prototyped low-cost liquid handling robot for benchtop lab automation, with serial command protocol and Python API.
- Developed visual block-based programming interface to robot controller for students and programming novices.
- Worked with collaborators to transfer design to small-scale manufacturing and deployment in user studies.

Software Engineering Intern

Summer 2017

HELLA Ventures Silicon Valley (Sunnyvale, CA)

- Prototyped novel human-machine interface design for driver control and supervision of semi-autonomous vehicles.
- Conducted feasibility study for 3D point cloud reconstruction algorithms in the proposed interface. Designed and implemented camera rig for testing of various reconstruction algorithms.

Research Assistant

Summer 2016 - Winter 2017

Perinatal Safety Learning Lab, Lucile Packard Children's Hospital (Stanford, CA)

Advised by Prof. Henry C. Lee

- Prototyped and tested elements of an optimal visual display and user interface to improve clinical decision-making and situational awareness of time-critical health data for manual ventilation during infant resuscitation procedures.

Software Engineering Intern

Summer 2016

TeselaGen Biotechnology (San Francisco, CA)

- Implemented core product features (Node.js) of cloud platform for computer-aided design & fabrication of DNA constructs.
- Built interface for automating fabrication workflows. Shipped in a release to Dow AgroSciences in Oct. 2016.

Research Assistant

Spring 2013 - Summer 2015

KC Huang Lab, Stanford University (Stanford, CA)

Advised by Prof. KC Huang

- Developed software in MATLAB for automated statistical analysis and plotting of plate reader growth curve data to support high-throughput biological experiments.
- Developed software in C++ for computational modeling of prokaryotic cell wall mechanobiology. Conducted simulations on an HPC cluster managed by SLURM.

Manuscripts

* indicates equal contributions.

Published or Accepted for Publication

ESPressoscope: a small and powerful approach for *in situ* microscopy

Ethan Li, Vittorio Saggiomo, Wei Ouyang, Manu Prakash, Benedict Diederich

PLOS ONE, October 2024

doi.org/10.1371/journal.pone.0306654

DIY liquid handling robots for integrated STEM education and life science research

Ethan Li*, Amy T Lam*, Tamar Fuhrmann, Len Erickson, Mike Wirth, Mark L. Miller, Paulo Blikstein, Ingmar H. Riedel-Kruse

PLOS ONE, November 2022

doi.org/10.1371/journal.pone.0275688

Scientific Inquiry in Middle Schools by Combining Computational Thinking, Wet Lab Experiments, and Liquid Handling Robots

Tamar Fuhrmann, Deeana Ijaz Ahmed, Len Arikson, Mike Wirth, Mark L Miller, **Ethan Li**, Amy Lam, Paulo Blikstein, Ingmar Riedel-Kruse

IDC '21: Interaction Design and Children, June 2021

doi.org/10.1145/3459990.3465180

Scale-free Vertical Tracking Microscopy

Deepak Krishnamurthy, Hongquan Li, Francois Benoit du Rey, Pierre Cambournac, Adam Larson, **Ethan Li**, Manu Prakash

Nature Methods, August 2020

doi.org/10.1038/s41592-020-0924-7

Bacterial evolution in high osmolarity environments

Spencer Cesar*, Maya Anjur-Dietrich*, Brian Yu, **Ethan Li**, Enrique Rojas, Norma Neff, Kerwyn Casey Huang

mBio, August 2020

doi.org/10.1128/mBio.01191-20

Submitted for Publication

Octopi 2.0: Open and Scalable Microscopy Platform for AI-powered Diagnostic Applications

Hongquan Li, Huguang Lin, Pranav Shrestha, Rinni Bhansali, You Yan, Jaspreet Pannu, Kevin Marx, Wei Ouyang, Lucas Fuentes Valenzuela, **Ethan Li**, Anesta Kothari, Jerome Nowak,

Hazel Soto-Montoya, Adil Jussupov, Maxime Voisin, Kajal Maran, Oswald Byaruhanga, Joaniter Nankabirwa, Bryan Greenhouse, Prasanna Jagannathan, Manu Prakash
medRxiv, March 2025
doi.org/10.1101/2025.03.21.25324364

Sediment Trap Deployments Demonstrate Enhanced Export Driven by Frontal Dynamics in the Chukchi Sea

James A. Lauer, Gert L. van Dijken, Matthew M. Mills, Robert S. Pickart, Lexi Arlen, Stephanie M. Lim, **Ethan Li**, Courtney M. Payne, Claudette Proctor, Grace Zhong, Christine Michel, Manu Prakash, Kevin R. Arrigo

Evolution of an extensive spring under-ice phytoplankton bloom in the Chukchi Sea

Claudette Proctor, Matthew M. Mills, Gert van Dijken, James A. Lauer, Stephanie M. Lim, Ali Palm, Courtney M. Payne, Robert Pickart, Calvin W. Mordy, **Ethan Li**, Manu Prakash, Kevin R. Arrigo

Preprints

AnmO₂I: An open-source pulse-dose oxygen conserving device for the COVID-19 crisis

Hongquan Li, Deepak Krishnamurthy, Anesta Kothari, **Ethan Li**, Michael Lipnick, David Gaba, Ruth Fanning, Manu Prakash
medRxiv, May 2021
doi.org/10.1101/2021.05.19.21257477

Squid: Simplifying Quantitative Imaging Platform Development and Deployment

Hongquan Li, Deepak Krishnamurthy, **Ethan Li**, Pranav Vyas, Nibha Akireddy, Chew Chai, Manu Prakash
bioRxiv, January 2021
doi.org/10.1101/2020.12.28.424613

Handyfuge-LAMP: low-cost and electricity-free centrifugation for isothermal SARS-CoV-2 detection in saliva

Ethan Li*, Adam Larson*, Anesta Kothari, Manu Prakash
medRxiv, July 2020
doi.org/10.1101/2020.06.30.20143255

Utah-Stanford Ventilator (Vent4US): Developing a rapidly scalable ventilator for COVID-19 patients with ARDS

Hongquan Li*, **Ethan Li***, Deepak Krishnamurthy*, Patrick Kolbay*, Beca Chacin, Soeren Hoehne, Jim Cybulski, Lara Brewer, Tomasz Petelenz, Joseph Orr, Derek Sakata, Thomas Clardy, Kai Kuck, Manu Prakash
medRxiv, April 2020
doi.org/10.1101/2020.04.18.20070367

Under Preparation

Forklift: Using configurable bills-of-materials to compose, deploy, and evolve software systems

Ethan Li, Benedict Diederich, Manu Prakash

Talks

Forklift: making an open-source microscope's operating system simpler to extend, modify, and recombine over time

Ethan Li

Open Hardware Summit 2024 (Montreal, Canada)

May 3, 2024

Ten-Earth: An Online Cluster of Low-Cost Microscopes to Monitor Plankton Population Dynamics in Complex Experimental Aquatic Communities

Ethan Li, Jeonghyun An, Olivia Tomassetti, Abigail Cooper Cummings, Manu Prakash

Ocean Sciences Meeting 2024 (New Orleans, USA)

February 22, 2024

Poster Presentations

Ten-Earth: A system for cell-scale measurement of microbial population dynamics in complex aquatic communities

Ethan Li, Olivia Tomassetti, Jeonghyun An, Abigail Cooper Cummings, Manu Prakash

CZ Biohub 2nd Physics of Life Symposium (San Francisco, USA)

October 12, 2023

Optimizing oxygen saturation monitoring to aid decision-making in simulated neonatal resuscitation

Ethan Li, Janine Bergin, Henry Lee, Janene Fuerch

Pediatric Academic Societies Meeting (Toronto, Canada)

May 8, 2018

Awards & Honors

National Defense Science and Engineering Graduate (NDSEG) Fellowship 2019 - 2022

Sigma Xi Scientific Research Honor Society

Stanford Enhancing Diversity in Graduate Education (EDGE) Fellowship	Invited 2019
Tau Beta Pi Engineering Honor Society	2018 - 2020

Stanford President's Award for Academic Excellence in the Freshman Year	Inducted 2015
	2013

Teaching Experience

Course Assistant

Fall 2020

BIOE 123: Biomedical System Prototyping Lab, Stanford University (Stanford, CA)

- Assisted in planning and developing materials for the next version of the course in winter 2021, with adjusted learning goals, a streamlined lab project, and an online-only format for remote lab learning.

Course Assistant

Winter 2019

BIOE 123: Biomedical System Prototyping Lab, Stanford University (Stanford, CA)

- Assisted in teaching 40 students about principles and techniques for designing, fabricating, integrating, controlling, troubleshooting, and testing electromechanical hardware systems.
- Developed software infrastructure to enable easier integration between wireless IoT microcontroller devices and web platforms for creating online remote dashboards to hardware.
- Helped develop and deploy hands-on demonstration activities to support learning of practical electronics lab skills.

Course Assistant

Winter 2018 - Spring 2018

CS 210A/B: Software Project with Corporate Partners, Stanford University (Stanford, CA)

- Mentored four student project teams on needs finding, rapid prototyping, project management, and software engineering practices.

Course Assistant

Winter 2017

BIOE 123: Biomedical System Prototyping Lab, Stanford University (Stanford, CA)

- Assisted in teaching 30 students about principles and techniques for designing, fabricating, integrating, controlling, troubleshooting, and testing electromechanical hardware systems.
- Helped students learn to document their designs, including with functional block diagrams and specification tables.

Teaching Assistant

Spring 2015

ENGR 40M: Introduction to Electrical Engineering Lab, Stanford University (Stanford, CA)

- Taught students fundamental skills in breadboard circuit prototyping, circuit debugging, and Arduino programming.

Grader

Spring 2015

BIOE 131: Ethics in Bioengineering, Stanford University (Stanford, CA)

- Graded technical briefings describing biomedical technologies.
- Provided constructive feedback to help students improve written communication skills in technical writing.