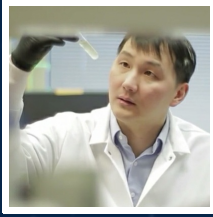


# Programming Biological Systems



Timothy Lu

Associate Professor, Biological Engineering and Electrical Engineering

## CURRENT RESEARCH

### Engineering biological circuits in living cells to detect and treat disease

Computer engineering enables researchers to program electronic systems that carry out designated, intelligent tasks. What if we could program biological circuits in living cells to perform similar computational functions inside our body? Imagine smart probiotics that, when swallowed, would swim inside a patient's gut and detect any signs of inflammatory bowel diseases -- or, customized antimicrobials that can be rapidly engineered to overcome antibiotic-resistant bacteria. Inspired by electrical engineering and computer science principles and his training in clinical medicine, Dr. Timothy Lu, Associate Professor of Biological Engineering and Electrical Engineering at the Massachusetts Institute of Technology, has established foundational design principles for constructing, probing, modulating, and modeling engineered biological circuits in living cells. The ability to program living cells can enable breakthrough technologies for diagnostics and therapeutics for a wide range of human diseases.

Dr. Lu's Synthetic Biology Group is focused on understanding how biological systems are naturally built, and using this insight to program cells by modifying their underlying "software" encoded in DNA. An electrical engineer as well as a medical doctor, Dr. Lu carries expertise in both technological and clinical settings and values interdisciplinary collaborators like physician partners to tackle challenging human diseases such as cancer, inflammatory bowel disease, neurodegenerative diseases, and heart disease. By understanding basic disease biology and crafting targeted therapies, Dr. Lu develops novel diagnostic and therapeutic technologies and has founded several companies to push these technologies towards real...

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## AFFILIATION



Massachusetts Institute of Technology

## EDUCATION

- M.D. in 2010 and Ph.D. in 2008, Harvard-MIT Health Sciences and Technology Program
- S.B./M.Eng. in Electrical Engineering and Computer Science 2003, Massachusetts Institute of Technology

## AWARDS

- ONR Young Investigator Award, 2013
- Presidential Early Career Award for Scientists and Engineers, 2012
- NIH New Innovator Award, 2011
- Army Young Investigator Award, 2011
- Named in the 2010 TR35 for "Top Young Innovators Under 35", 2010
- and 2 more...

## RESEARCH AREAS

Life Science, Cardiovascular, Immunology / Inflammatory, Oncology / Cancer

## FUNDING REQUEST

Your contributions will support Dr. Timothy Lu and his team at the Massachusetts Institute of Technology as they engineer cells to carry out artificial tasks for numerous medical applications. Donations will help fund the annual \$2M required to support 20-25 researchers in the lab, animal studies, and technology development. Partner with Dr. Lu's team to accelerate the establishment of synthetic biology as a robust and novel engineering discipline, and the translation of these diagnostic and therapeutic technologies to clinical applications!