# Digital Fabrication

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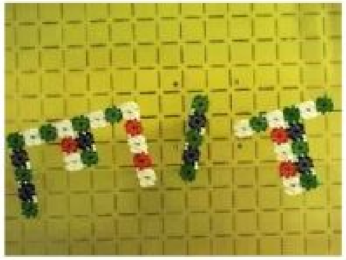
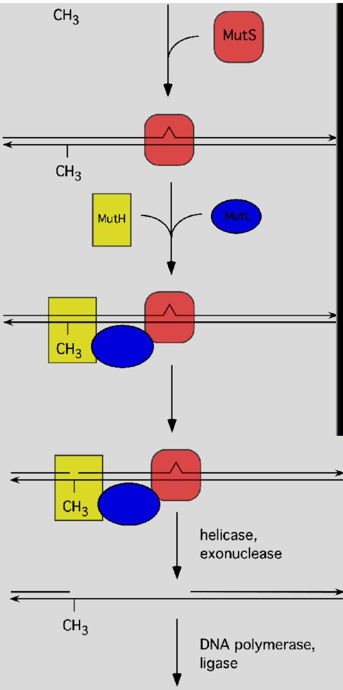
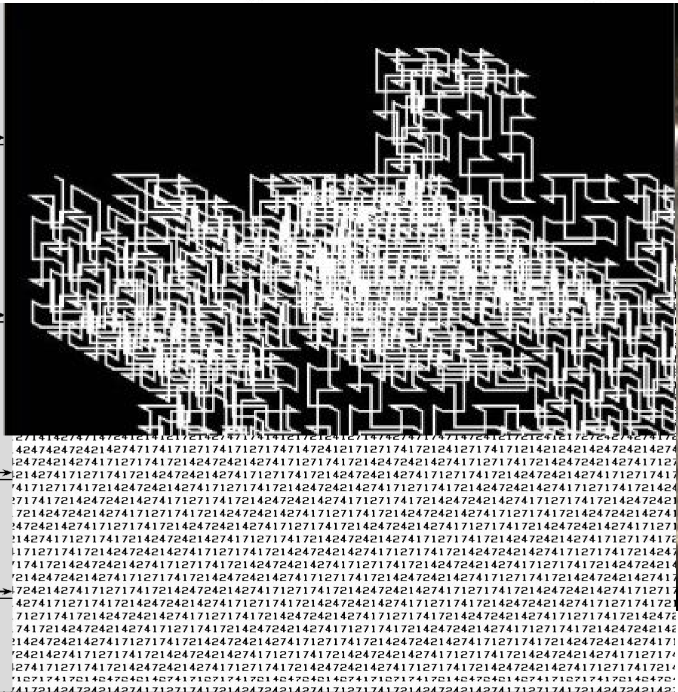
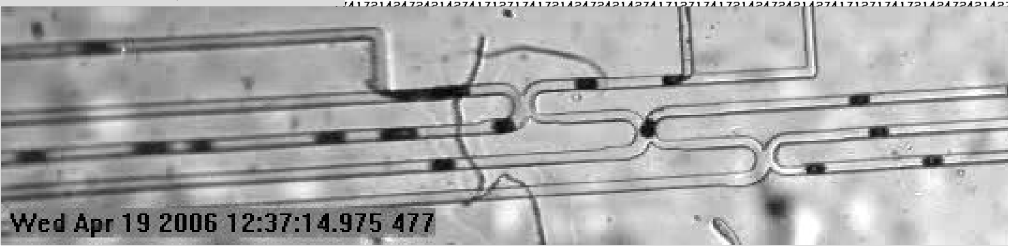
Massachusetts Institute of Technology

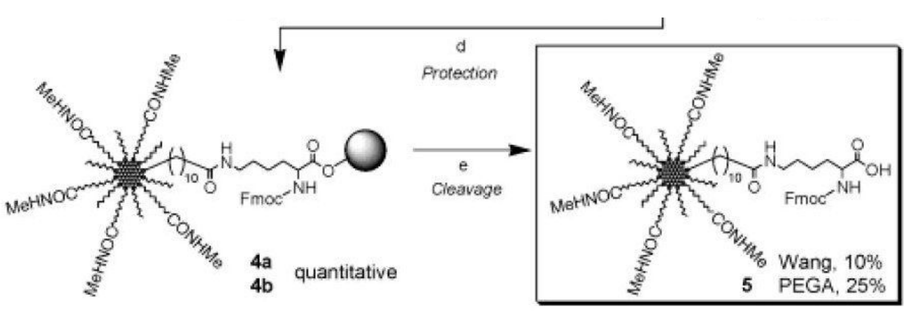











# Mathematical Programming

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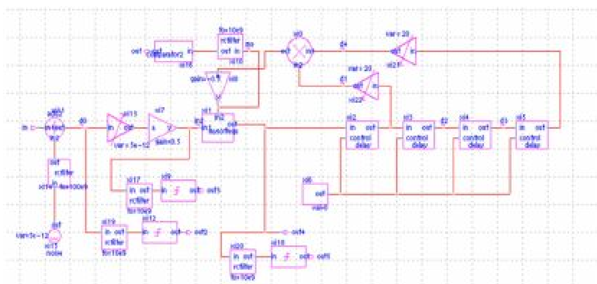
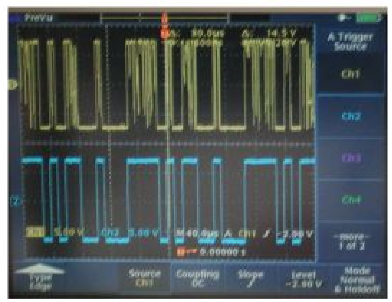
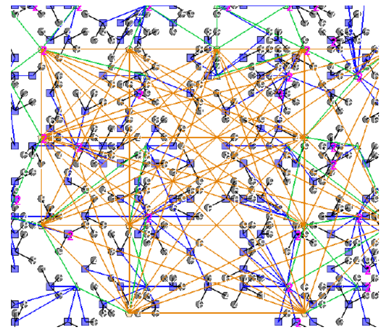
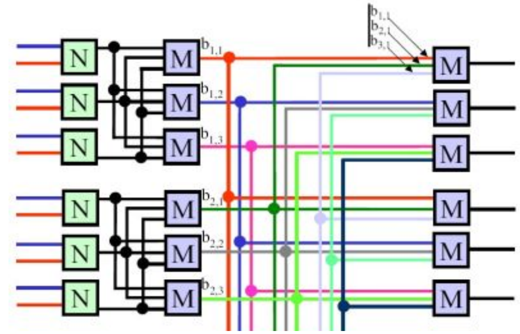
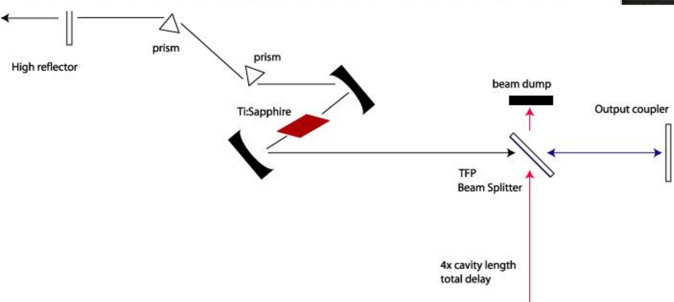
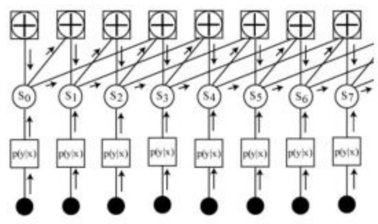


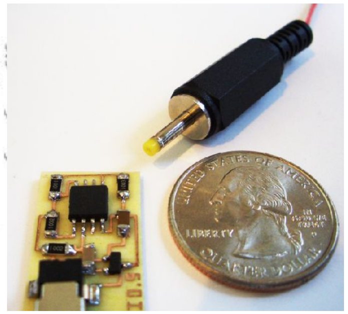


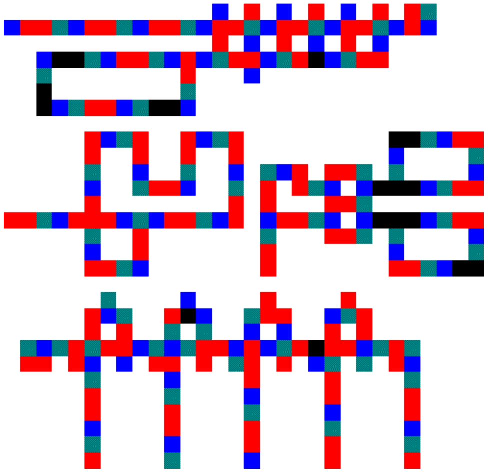






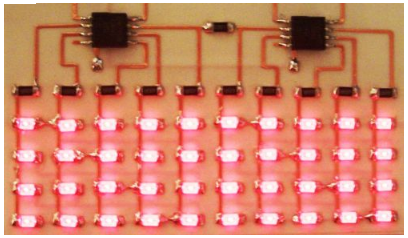


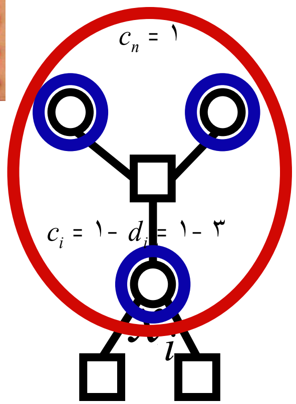


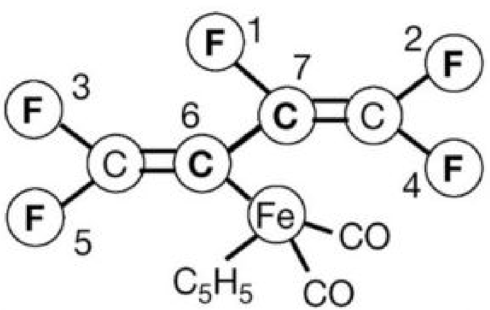
$$L = U - H + \sum_i \sum_n \lambda_{in}\left(b_i(x_i) - \sum_{\vec{x}_n \setminus x_i} b_n(\vec{x}_n)\right)$$

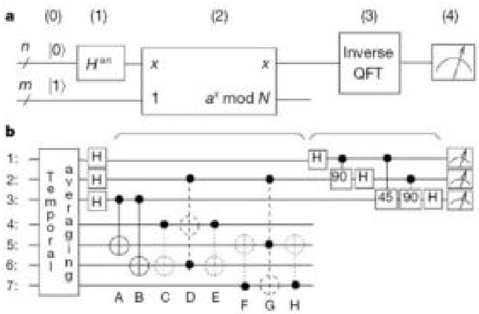
$$\frac{\partial L}{\partial b_n} = \text{٠} \Rightarrow b_n(\vec{x}_n) \propto f_n(\vec{x}_n) \prod_{x_i \in N(f_n)} e^{\lambda_{in}}$$

$$\lambda_{in} = \log m_{x_i \to f_n}(x_i)$$






## Coding and Computation in Microfluidics

9:00-10:30

*Historical Perspective*
Marvin Minksy (MIT)
Ron Stouffer, Sri Sridhara (Bowles Fluidics)

*Bubbles in Mazes*
George Whitesides (Harvard)

*Reversibility of the flow of droplets in microfluidic networks*
Piotr Garstecki (Polish Academy of Sciences)

*SPICE'd Microfluidics*
Olgierd Cybulski (Polish Academy of Sciences

*Microfluidic Bubble Logic*
Manu Prakash (MIT)

11:00-12:30

*Components for Generic and Programmable Microfluidic Devices*
Will Grover (MIT)

*Microfluidics for Gene Fabrication*
Peter Carr, Dave Kong (MIT)

*Opportunities in Microfluidics for Enabling Engineered Biological Simplicity*
Drew Endy (MIT)

*Integrating Optoelectronic, Fluidic & Biochemical Programming For Open-Source Personal Genomics & Synthetic Biology*
George Church (Harvard)

1:30-3:00

*Chaos in Droplet-Based Microfluidic Systems*
Patrick Tabeling (Ecole Supérieure de Physique et de Chimie Industrielles)

*Multiple Flow Problems In Fluid Mechanics With Emphasis On Climate Issues*
Jack Whitehead (Woods Hole Oceanographic Institution)

*The Phase Chip: Manipulating Phase Diagrams with Microfluidics*
Seth Fraden (Brandeis)

*Multiphase Microfluidics: Flows, Dispersion, and Nanomaterial Synthesis*
Axel Guenther (University of Toronto)

*Directed Fluidic Assembly*
Hod Lipson (Cornell)

3:30-4:30 **Future Work**

*implications*
*implementations*
*funding*
*facilities*
*collaborations*

4:30 **Reception**

6:00 **South End Technology Center Fab Lab Open House**