

# Zach Fredin

## Engineer

A highly motivated engineer and designer with a deep understanding of process instrumentation, digital fabrication, and electronics.

✉ zachary.fredin@gmail.com

📞 612-741-6241

📍 Cambridge, MA

## WORK EXPERIENCE

### Research Assistant

#### Massachusetts Institute of Technology

09/2019 - Present

Cambridge, MA

Group: The Center for Bits and Atoms

##### Achievements/Tasks

- Designed and fabricated several modular computational structures and corresponding robotic assembly systems
- Developed and characterized a novel modular superelastic flexure system for rapid prototyping of precision machines
- Designed and fabricated a unique micron-accurate laser lathe for machining single crystal diamonds into MAS NMR rotors
- Maintained and provided training for several key machines, including a wire-EDM and a laser micromachining system

### Co-Founder and Lead Engineer

#### NeuroTinker, LLC

04/2015 - 06/2019

Minneapolis, MN

Neuroscience Education for Everyone

##### Achievements/Tasks

- Provided key assistance writing all technical portions of successful NSF SBIR Phase I and Phase II grants
- Developed open-source NeuroBytes product line through three distinct pilot-scale production generations
- Scaled five kits to commercial production, including EMC certification, contract manufacturing, and documentation

### Outside Sales and Application Engineer

#### Jasper Engineering & Equipment Co.

09/2010 - 04/2015

Medina, MN

Instrumentation, Control Valves, and Gas Analyzers

##### Achievements/Tasks

- Hosted technical lunches focused on explaining a specific instrumentation technology
- Commissioned a vast range of process instruments, including flow meters, pressure transmitters, and gas analyzers
- Received significant factory training on many products

## EDUCATION

### M.S., Media Arts and Sciences

#### Massachusetts Institute of Technology

09/2019 - 09/2021

Cambridge, MA

##### Coursework

- How to Make (Almost) Anything: student, TA
- Thesis: Assembling Integrated Electronics

### B.S., Materials Science and Engineering

#### Case Western Reserve University

09/2003 - 06/2007

Cleveland, OH

## SKILLS

Rapid Prototyping

Digital Fabrication

SEM

Electronics Design

Embedded Development

CAD/CAM

Laser Micromachining

Machine Design

Technical Instruction

Wire-EDM

SMD Soldering

Technical Writing

Data Analysis

Instrumentation

Application Engineering

Sales

Field Service

## PROJECTS

### MicroPanto (06/2021 - 07/2021)

- Designed and fabricated a 50:1 flexural pantograph which mounts onto a commercial CNC router
- Deployed machine at Haystack Mountain School of Crafts and used it to micro-engrave messages onto jewelry, polished stone, and rice

### 3-RRR CPM (02/2021 - 05/2021)

- Designed and fabricated a 3-degree-of-freedom compliant parallel manipulator using novel modular superelastic flexures
- Used machine to rule crude but functional diffraction gratings
- Characterized system performance using instrumentation, including load cells, laser displacement sensors, and computer vision

### Cyborg Ring (08/2017 - 03/2018)

- Open-source electronic blinky ring fabricated using a highly novel SMD version of traditional cordwood electronics assembly

### TP-BMP (04/2017 - 07/2017)

- Open-source JTAG programmer and ARM-GDB debugger based on the Black Magic Probe project
- Customized and fully integrated into a Thinkpad X220 laptop

## ACHIEVEMENTS

### Co-author, NIH 1R01GM139055-01A1 (09/2020 - Present)

"Diamond Rotors", awarded Sept 2021, \$1.3 MM over 4 years

### Lead author, "Discrete Integrated Circuit Electronics (DICE)" (09/2020 - 09/2020)

2020 IEEE High Performance Extreme Computing Conference (HPEC)

### Runner-up, Hackaday Superconference Soldering Contest (11/2019 - 11/2019)

### Senior Personnel, NSF SBIR Phase II #1660086 (01/2017 - 12/2018)

"Development of a STEM Educational Platform Using Electronic Neuron Simulators", \$770,000

## INTERESTS

Birds

Fabrication

Food

Platformer Games