

## Skills: Design & Manufacturing

- CAD & CAM
- 3D Printing
  - FDM (Filament)
  - SLA / DLP (Resin)
  - SLS (Powder-based)
- Experimental Design
- User-Centered Design
- Technical Drawing
- Novel Materials R&D
- Laser Cutting
- Machining
  - Lathe
  - CNC Mill
- Thermoforming
- Molding & Casting
- Circuitry
- Profilometry
- Rapid Prototyping
- Soft Goods Development
- Sewing & Serging
- Embroidery (Machine & Hand)
- Pattern Drafting & Draping

## Skills: Software

### Project Management Tools:

- Asana
- JIRA
- Trello
- Slack

### CAD / 3D Modeling:

- Solidworks
- Fusion 360
- Onshape

### Data Processing & Simulation:

- COMSOL
- MATLAB
- ImageJ
- MS Office Suite

### Other Engineering:

- CorelDraw
- Arduino interface
- Terminal interface

### Photo, Video, & Graphics:

- Photoshop
- Lightroom
- Twitch/OBS
- Powerdirector

## Skills: Languages

- English (native/fluent)
- Spanish (proficient)
- Japanese (basic)
- Mandarin (learning!)

# Cassandra (Cassie) Lowell

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## Education



**Harvard College + School of Engineering & Applied Sciences**  
Bachelor of Science, Engineering Sciences



**Project Management Institute**  
Project Management Basics

## Project & People Management Experience



### Cosmosii – Co-Founder [Spring 2021 – Present]

- Created & launched SaaS-enabled Marketplace product for creatives with small businesses doing one-off, custom client projects. Grew platform to >1200 users with 40% quarterly growth on bootstrapped budget.
- Developed framework for user research. Conducted 100s of hours of user interviews & surveys to define 1-yr feature roadmap.
- Participated in 2 accelerators: MIT Delta V 2022 & Envision (cohort 6). Completed MIT Sloan's Executive Education intensive. Winners of MIT's Creative Arts Competition, Runner-Up in MIT's 100K Pitch Competition.



### McMaster-Carr – Text Contact Center Supervisor [June 21 – June 22]

- Managed & coached a team of 22 frontline customer service representatives on best practices for solving customer issues.
- Maintained a team wide 7 min mean time to resolution, for 1000s of emails daily.
- Designed & conducted research to propose quality & efficiency optimizations to the customer service framework. (Eg: overhauling end-of-year export processes to reduce international returns & eliminate 60+ hours of manual data entry annually).

## Engineering & Technical Work Experience



### MIT Sloan School of Business – Lecturer [Aug 2022– Present]

Course: “[Introduction to Making & Hardware Ventures](#)” (15.351/2.351)

- Hands-on introduction to mechanical & electrical engineering, with a focus on entrepreneurial frameworks for product development.
- Redesigned course curriculum to include additional design thinking modules & soft goods prototyping, and more closely reflect the Disciplined Entrepreneurship framework.



### Formlabs – R&D; Materials Engineering [Sept 2017 - May 2021]

- Developed next generation 3D printing technology (Form 3 early stage hardware prototyping) to ensure 95% print reliability, halve print time, & reduce post processing time. Over 100,000 units sold (mid-2022 data).
- Alpha formulation testing for novel materials, including: Ceramic (enabling production of un moldable geometries), Rebound resin (used in custom sneakers produced by New Balance), & high-speed Draft resin (prints 3-4x faster than standard resins).
- Stereolithography: Print settings development & validation, enabling customers to use Formlabs' full library of 40+ materials designed for Form 2 with the new Form 3 printer.
- Selective Laser Sintering: Characterization, testing, and evaluation of new powders for printing on the Fuse 1. Launched 4 novel materials that allow customers to produce solutions with a wider variety of mechanical and biocompatible properties.
- Founded the Womxn in Engineering ERG. Lead study on hiring demographics. Coordinated tech talk series.



### Additional R&D Positions– Visiting Researcher & Intern Positions

#### Hiroshima University, Biosystems Engineering Lab [Summer 2016]

- Co-developed soft robotics glove for athlete training and wrist injury rehabilitation.
- Published in *Haptic Interaction* textbook.



#### Johns Hopkins Applied Physics Lab, Bio-Aerosol Group [June 2013 - June 2016]

- Novel PCR instrument testing & evaluation. Devices used in the field to detect harmful environmental contaminants.
- JPEO Biomarkers & CBDP Capability study. Used by the US DoD to develop clinical diagnostics for toxin exposure.



#### Frederick National Labs for Cancer Research [June 2012 - June 2013]

- Exploration of *MAGT1* Genetic Variants in HIV-Infected Individuals. Quantified genotype & T-cell count relationship.

# Prior Scientific Research - Abstracts

## Formlabs

**Materials Testing & Development (SLS):** Managed sample preparation and coordination of testing for PA12 nylon technical data sheet. Quantified limits of powder recyclability and appropriate 'refresh rates' for customer use to reduce user waste and environmental contamination while maintaining print quality and advertised material properties. Planned and executed longer term studies to test process effects (print settings changes) on material properties and propose improvements. Characterized non-PA12 materials on prototype & released Fuse 1 printers.

**Materials Testing & Development (SLA):** Developed print settings for prototype formulations of new materials, and entire materials library back catalog (20+ resins) on the Form 3. Created experimental test plans for large scale print farm validation. Designed samples that tested complicated geometries akin to customer parts that were likely to fail. Troubleshooted print failures; proposed features or solutions to mitigate them in the field.

**Process Testing & Development:** Daily hands-on interaction with early Form 3 prototypes. Designed and evaluated print samples, proposed and executed extended studies on hardware degradation over expected lifetime, and root caused sources of novel failures. Developed and validated process improvements such as print time reduction, and support geometry refinement to use less material while increasing print success rate.

## Johns Hopkins Applied Physics Lab: Bio-Aerosol Group

**Instrument Testing & Evaluation:** Summer 2014 - 2016. Tested a variety of novel handheld polymerase chain reaction (PCR) instruments, such as the Biomeme and Epistem systems, for the Joint Biological Handheld Biological Identifier Program. Panels of focus included sexually transmitted infectious disease (STI) panels and Biowarfare panels. Studies included determination of the limit of detection, evaluation under a variety of environmental conditions, and long term stability studies.

**CBDP Capability Study:** Provided content expertise of present diagnostics for a variety of select agents (notably toxins) for a study under the Department of Defense's Chemical and Biological Defense Program. Knowledge of present diagnostics will be used to develop more efficient clinical diagnostic tools that can rapidly identify and quantify toxin exposure in human patients.

**JPEO Biomarker Study:** Provided content expertise (particularly in regards to patents) for a market survey of biomarkers for a variety of select agents. The summation of data will be used as preliminary basis for developing far off handheld detection systems. This study's goal was to assess the short term feasibility of developing an immunoassay platform for select agents not capable of detection by PCR, such as diseases that move intracellularly or mutate too quickly for efficient primer development.

## Hiroshima University Biosystems Engineering Lab (Professor Yuichi Kurita)

Assisting motions in the human body reduces muscular activation, and eventually, fatigue. Two students developed an assistive glove for a human wrist that was equipped with a set of pneumatic actuators. The actuators act like artificial muscles for supporting a user's various motions, which include flexion, extension, and, pronation of the wrist. A series of experiments were carried out in order to verify the effectiveness and efficiency of the glove design by measuring EMG (electromyography) signals of relevant muscles, and positive results obtained. Accepted for presentation and live demo at AsiaHaptics 2016 (November in Chiba, Japan).

## National Cancer Institute (Frederick National Labs): Winkler Lab

*MAGTI*, a magnesium transporter gene, was recently discovered to be associated with X-linked human T-cell immunodeficiency. Free  $Mg^{2+}$  acts as an intracellular second messenger that affects the activation of phospholipase  $C\gamma 1$ , and the balance of  $Ca^{2+}$  in the T-cells. A *MAGTI* deficiency prevents an influx of  $Mg^{2+}$ , and consequently hampers signaling in the T-cells, reducing their effectiveness.

Two sub-group populations were used to sequence the *MAGTI* gene via Sanger sequencing and linkage disequilibrium. Once sequenced, the polymorphisms in HIV+ patients were compared with polymorphisms in a control (non-HIV affected) group of patients. Given that reduced expression of *MAGTI* impedes T-cell processes and therefore limits the immune system's efficiency, *MAGTI* may be connected to the contraction or development of HIV in a patient.

## Senior Design Project ES100: Pressshirt, Wearable Pressure Sensors for Contact Sport Athletes (Advisor: Prof. Rob Howe)

Millions of people ranging from children to professional athletes are treated annually for sports injuries, and the most severe often come from athletes in contact sports. To better understand the forces the body experiences during contact motions and objectively analyze tackling form, a pressure sensitive wearable made from piezoresistive fabrics was developed and tested on humans. This device was able to collect data during normal practices or games, and process sensor readouts in real time.

## Coursework Research Abstracts: ES227 Medical Device Design (Professor Conor Walsh)

The student team designed a wearable sensor that can monitor a runner's tibial angle and tibial acceleration in the field via an inertial measurement unit (IMU). The device was able to segment the gait cycle in real time, and utilize an algorithm that determined overstride. The device uses the algorithm's calculations to provide real-time feedback to the user to help correct running form and prevent injury.

## Coursework Research Abstracts: BE110 Physiological Signals & Systems (Professor Kit Parker)

Shark finning is an incredibly wasteful practice that may be solved through tissue engineering. To recapitulate shark fin, the fin's biomechanical properties need to be understood. A key for recapitulating soup is the process by which the fin dehydrates and rehydrates, as this is a part of the cooking process. A deconvolution of FTIR data taken at various hydration states isolates the contribution of each of the different chemical bonds present in the sample. Analysis revealed significant variation in frequencies above  $2000\text{ cm}^{-1}$ , indicating a shift of N-H bonds in particular between fully hydrated and fully dehydrated rays.

## Coursework Research Abstracts: ES96 Junior Design (Professor David Mooney)

After Boston's record breaking 2014-15 snow season, students were tasked with facilitating the snow removal process on Harvard's campus. By collaborating with Harvard Landscaping and Harvard Facilities Maintenance Operations, students invented three snow removal solutions to increase the efficiency and safety of the process: a snow-melting mat (a salt-infused hydrogel that melts snow and ice on contact via diffusion), a robotic snowblower (oven-sized device that can be driven wirelessly using a PlayStation controller and camera to be deployed on flat rooftops), and an icicle cutter (extendable to reach two story rooftops, and cuts through a 3 inch piece of ice in <1 min).