

## Victor Lu

### Biomedical Engineer

Phone: 1-(631)-987-2220

Website: <https://victorlu2220.github.io/homepage.html>

Email: [victor.lu2220@gmail.com](mailto:victor.lu2220@gmail.com)

Github: <https://github.com/victorlu2220>

## EDUCATION:

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### High School

- TungWah High School, Guangdong, China, 2018-2019
- Saint Anthony's High School, NY, 2019-2021

### College

- **University of Wisconsin, Madison**(2021-2023)
  - **Major:** Biomedical engineering and biology double major
  - **GPA:** 3.85
- **Bachelor of Science, University of Michigan, Ann Arbor**, May 2025(expected)
  - **Major:** Biomedical engineering
  - **Minor:** Electrical engineering
  - **GPA:** 3.96

## EXPERIENCE:

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### **Bottino Lab, University of Michigan at Ann Arbor, Sept. 2023 - present:**

- Designed a mold for a parallel-chamber chip for cell studies using SolidWorks. Synthesized cytocompatible polymers to copy its detailed structures. Gold has been sputtered onto the specific region in order to achieve real-time monitoring. Used plasma treatment in the cleanroom to seal the chip with glass slides.
- Synthesized bioadhesive for wound healing using gelatin methacryloyl(gelMA) and mussel-inspired dopamine. Implemented shear thinning test for viscosity, amplitude sweep for characterization of gel behavior, FTIR test for its chemical constituents, tensile and compression test for mechanical property and cytocompatibility test.
- Constructed an rgb-based filter in Python for cell distribution and viability study. The algorithm of the filter is published on my personal github page using a combination of html and javascript.
- Developed a neural network-based deep learning model for the binary classification of microscopy images, specifically aimed at assessing cell viability. The model's precision was significantly enhanced by incorporating DBSCAN clustering, which effectively identified and quantified compact nucleic regions and reduced noise.

### **BLUE DESIGN, University of Michigan Medical School, Jan. 2024 - present**

- Developed a modular simulator that replicates the bone-drilling process, allowing medical students to practice at a low cost. The assembly includes a bone component 3D printed with ABS material at a 20% infill density, a light module that simulates X-ray imaging to help trainees visualize internal bone structures, a display screen that provides

cues to the user, a microcontroller that controls the entire system, and a shell that integrates all components into a single, portable device.

**BME Design Team, University of Michigan, Jan. 2024 - May. 2024**

- Four two-stage amplifier circuits were constructed to capture and amplify EMG signals from different sites on the forearm. Electrode placements were strategically selected to optimize signal acquisition and differentiate EMG inputs corresponding to various wrist movements. A Python code was developed to classify the signals into different wrist movements. A user-friendly maze game was designed in Python to display the classified results in an engaging and entertaining way. This system aims to assist in the rehabilitation process for patients with hemiparesis.
- A spirometer was developed to measure key respiratory indices. The spirometer's components include a pipe to estimate air volume, a two-stage amplifier circuit with a pressure sensor that measures pressure and converts it into electrical signals, and a LabView virtual system that calculates and displays critical parameters, such as forced vital capacity (FVC) and forced expiratory volume (FEV).
- A pulse oximeter was developed to measure blood oxygen saturation and heart rate. The device uses two LED-photodetector pairs (red and infrared) to capture the necessary data. The signals from the photodetectors are amplified by a custom circuit. A LabView program then processes the signals to calculate blood oxygen saturation using the Lambert-Beer Law and determine heart rate by measuring the time interval between successive infrared signal peaks.

**BME Design Team, University of Wisconsin Madison, Jan. 2023 - May, 2023:**

- Synthesized calcium sulfate based bone graft samples that have mechanical properties similar to native human trabecular bones. Mechanical testing was done on the bone grafts. Data was collected and analyzed using MATLAB, Young's modulus was calculated and statistical tests were done to determine the existence of statistically significant differences among samples.
- A bioreactor was designed to evaluate the chemical properties of bone grafts, incorporating a differential amplifier circuit to monitor internal temperature. The circuit is powered through an outlet, with a relay module used to protect the microcontroller from high voltage source. A heating element is installed on the bioreactor wall, and its operation is carefully controlled by the microcontroller. The Arduino code includes a buffer zone to maintain temperature stability, preventing frequent on/off cycling of the heating element.

**BME Design Team, University of Wisconsin Madison, Sept. 2022 - Jan. 2022:**

- Designed a microfluidics chamber to collect cell samples for the client. A Takasago micropump was used to drive the solution into the chamber. An AC circuit was built to run the micropump. A wave function generator and an oscilloscope were connected to the circuit in order to adjust the frequency and wave pattern of input electricity such that it satisfied the working conditions of the micropump. An Arduino script was written in order to control the flow rate of fluid.

## SKILLS:

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Software: Python, Solidworks, MATLAB, Arduino, LabView, NI Multisim, Silvako

Hardware: Circuit design

Laboratory Skill: Polymer synthesis, Laser Cutting, Sputtering, Photolithography, Rheology test, Bioprinting, FTIR test

## EXTRACURRICULAR ACTIVITIES:

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- Grader for EECS 421 - Properties of Transistor, *August 2024 - present*, 4 hours per week.
  - EECS 421 is a graduate level EE course that covers in depth physics of semiconductor devices
  - Helped Dr. Guo to grade homework and exams. Provided summaries of class performance as well as feedback for individual students.
- Blue Design, *January 2024 - present*
  - Collaborating with University of Michigan Medical School to design apparatuses to meet the needs of medical professionals.
- Church Music Team, WI, *November 2021 - May 2023*
  - Performing every Sunday at Preshouse as one of the guitarists
- Biomedical Engineering Society, *October 2021 - May 2022*
  - A member of the club that focuses on sharing insights and experience about biomedical engineering and discovering opportunities inside and out of the campus
- Chinese translator, 2019-2022, *April 2020 - July 2022*
  - Translated educational videos from creative accounts such as *What If* to help the younger generation improve critical thinking skills and encourage their imagination
  - Translated motivational videos of tennis players to increase the popularity of tennis in China and demonstrate the importance of sportsmanship
- Language Tutor, *August 2021 - present*
  - Teaching Chinese online, 2 hours per week
- Varsity Tennis Team, *Spring 2021*
  - Played tournaments around Long Island and competed in the state final
- Math, Physics Tutor, *September 2020 - May 2021*
  - Tutored honor level physics classes as well as pre-calculus.

## HONORS AND AWARDS:

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- *Dean's List*, University of Michigan, all semesters
  - Maintaining a term GPA of 3.5 or higher
- *Dean's List*, University of Wisconsin Madison, all semesters
  - Maintaining a term GPA of 3.5 or higher
- *AP Scholar with Distinction*, June, 2021
  - Pass all AP Exams with an average of 3.5 or higher
- *National Honor Society*, 2020-2021

- Maintaining a term GPA of 90 or higher with volunteer-hours of at least 20 hours
- *Saint Bonaventure Award*, 2020-2021
  - Maintaining a GPA of 95 or higher for at least two consecutive terms