

# Andru Liu

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## Education

### MS in Robotics - *Northwestern University, IL*

Sept 2021 - Dec 2022

GPA - 4.00/4.00

- Robotic Manipulation, Planning, Controls, Mobile Robotics, Perception

### BS in Biomedical Engineering - *Stony Brook University, NY*

Aug 2015 - May 2019

- Specialization in Biomechanics and Biomaterials

## Professional Experience

### Simulation Process Engineer II - *Applied Medical, Rancho Santa Margarita, CA*

Sept 2019 – Aug 2021

- Led process team in design of fixtures and manufacturing processes for 8 different simulation models.
- 3D printed fixtures, cast molds, and designed cutting rule dies for R&D and production use.
- Manufactured precise components such as surgical simulation model components and pad printing clichés.
- Prototyped on a thermoformer and built an aluminum plenum which increased performance by 4 times.
- Designed platform for use in machine vision simulation device, including optical and lighting control.

### R&D Intern - *East Coast Orthotic and Prosthetic Corp., Deer Park, NY*

June 2018 – Aug 2018

- Created joint stabilizing orthotics in SolidWorks with detailed bills of material.
- Designed an above-knee prosthetic socket utilizing a 3D scan of a residual limb and mesh modeling.
- Built an original design 3 axis CNC milling machine to produce low-cost, custom foot orthotics for children.

### Research Assistant - *Stony Brook University, Stony Brook, NY*

Oct 2018 – May 2019

#### *Rehabilitation Research and Movement Performance Laboratory (RRAMP)*

- Conducted research under Dr. Lisa Muratori and Dr. Luigi Ibarra to identify a functional concussion biomarker.
- Synced EMG, EEG, and EKG data from the Delsys EMG and Wearable Sensing EEG systems.
- Conducted human subject testing of 25 participants with EEG and EMG sensor placement and testing procedures.
- Analyzed data using EEGLAB and MATLAB statistical analysis code to study cortical-muscular coherence.

## Projects

### Pancake Maker Robot

Sept 2021 - Dec 2021

- Programmed and controlled a Franka Emika Panda robot arm to precisely cook and flip pancakes using ROS, MoveIt motion planning, and openCV.
- Calculated end effector trajectories and cartesian path plans for inverse kinematics and single joint controls for forward kinematics.
- Utilized a RealSense d435i and 3D Vision to find object pose using point clouds, transformations, and AprilTags.

### Machine Learning Algorithms from Scratch

Sept 2021 - Dec 2021

- Coded and implemented various machine learning algorithms from scratch using Python and NumPy.
- K-Nearest Neighbor (KNN), Linear and Polynomial Regression, Perceptrons, Decision Trees, Gradient Descent, Neural Networks, Naive-Bayes, Naive-Bayes with Expectation Maximization, and Reinforcement Learning.

### EMG Controlled Hand Exoskeleton

Jan 2022 - Present

- Ongoing project to design and manufacture powered exoskeleton hand controlled by EMG signals to aid in playing the piano.
- Implementing EMG and machine learning to control individual joint motors using a microcontroller.

## Skills

**Programming:** C/C++, EEGLAB, Git, Linux, MATLAB, Python

**Robotics:** Computer Vision, Gazebo, Machine Learning, Machine Vision Optical Design, MoveIt, Numerical Method Analysis, OpenCV, Robotic Operating System (ROS), Rviz, Scikit-learn

**CAD/CAM, Modeling:** Abaqus CAE, ChiliPeppr, Fusion360, PTC Creo, Rhino3d, SolidWorks

**Technical Skills:** 3D Printing, Clicker Press, CNC Milling, Machining, Molding, Soldering, Thermoforming