Andru Liu

andruliu2022@u.northwestern.edu · linkedin.com/in/andru-liu · github.com/WallabyLester

Education

MS in Robotics - ***Northwestern University, IL*** **Sept 2021 - Dec 2022**
- Robotic Manipulation, Planning, Controls, Mobile Robotics, Perception GPA - 4.00/4.00

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, Extrusion, Injection Molding, Machining, PDM/PLM, SAP, Soldering, Thermoforming