Charlotte Avra

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WORK EXPERIENCE

Robotics Engineer
Medra | June 2024 – Dec. 2025
- Programmed, tested, and deployed robotic behaviors to automate lab workflows
- Designed and modified mechanical components to integrate labware with the robotic system
- Collaborated with partner scientists to translate scientific goals into reliable robotic behaviors and validate their performance in live lab environments

Graduate Researcher, Mechanical and AI Lab
Carnegie Mellon University | Aug. 2022 - June 2024
- Researched learning-based approaches for robotic manipulation of soft materials (e.g. clay sculpting)
- Developed a multi-camera calibration workflow for accurate 3D representations of objects for robotic manipulation
- Conducted office hours and graded assignments for C++ programming course (24-780)

Robotics Engineer, Intern
Medra | May – Aug. 2023
- Implemented a Transformer-based OCR model for reading a cell counter display, detecting instrument state and capturing data for cell culture workflows
- Programmed and integrated syringe pumps, expanding on-deck liquid handling from micropipettes to volumes up to 50mL, a 150x increase

Mechanical Design Engineer, Intern
Neuralink | May - Aug. 2021, Jan. - June 2022

Wafer Processing
- Designed wafer cleaning fixture to improve cleaning efficiency in chemical baths, sonication, and vapor drying, and assembled 10 units
- Created custom machined PEEK fasteners for the cleaning fixture, reducing particles on arrays
- Designed a carrier to hold 10 cleaning fixtures for batch processing in a megasonic cleaner

Imaging & Lab Fixtures
- Built a neural implant imaging station with cameras, precision stages, and custom machined components to automate four manual steps
- Designed and machined a PCB alignment fixture, eliminating two steps from flip-chip bonding process
- Designed parts for machining and injection molding, and drafted technical drawings using GD&T

EDUCATION

Master of Science in Mechanical Engineering
Carnegie Mellon University | 2022 - 2024
Emphasis: Robotics & Control Systems
Achievements: BRIDGE Fellowship (full tuition & stipend, 2022 – 2024); Co-author, SculptBot: Pre-Trained Models for 3D Deformable Object Manipulation, IEEE ICRA 2024

Bachelor of Science in Mechanical Engineering
Rensselaer Polytechnic Institute | 2018 - 2022
Achievements: Obtained a provisional patent from USPTO

PROJECTS

CMU Array Benchtop Testing Platform
June – Aug. 2022
- Designed and built a precision test setup with cameras, fixturing, and translational stages to align probes on micro-electrode array with a stimulating electrode

Night Light Product and Manufacturing Design
Aug. – Dec. 2021
- Developed a manufacturing and assembly process for 500 units of a small night light toy, including technical drawings, bills of materials, molds, and fixtures

Gastrostomy Medical Device (Provisional Patent)
Sep. - Dec. 2021
- Designed and prototyped a skin level device for patients requiring enteral feeding, emphasizing reliability, comfort, and cost-effectiveness

Path Planning and Control for Autonomous Vehicles
Oct. – Dec. 2023
- Developed LQR and PID controllers for a simulated autonomous vehicle, and implemented A* path planning for obstacle avoidance

SKILLS

Design: Solidworks, NX, GD&T, tolerance stack-up, material selection, DFM/DFA, PDM systems

Robotics: Python, C++, OpenCV, depth cameras, optical sensors, motion planning, kinematics

Prototyping & Fabrication: 3D printing, machining, laser cutting, fixture building, motors, actuators, injection molding, vacuum forming

Machine Learning: PyTorch, classification, model training, feature extraction, data augmentation, fine-tuning