Charlotte Avra

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WORK EXPERIENCE

Robotics Engineer
Medra | June 2024 – Dec. 2025

- Designed, developed, and tested robotic manipulation behaviors in Python for custom robotic systems automating lab workflows
- Developed and executed test scripts to evaluate system performance, leveraging Linux tools for testing, debugging, and field deployment
- Analyzed test results and system logs to troubleshoot failures, identify root causes, and document findings
- Worked cross-functionally with scientists to deliver and validate end-to-end robotic workflows

Graduate Researcher, Mechanical and AI Lab
Carnegie Mellon University | Aug. 2022 - May 2024

- Researched learning-based approaches for robotic manipulation of soft materials (e.g. clay sculpting), including data processing and technical documentation
- Developed and validated a multi-camera calibration pipeline for accurate 3D object representation
- Conducted office hours and graded assignments for C++ programming course (24-780)

Robotics Engineer, Intern
Medra | May – Aug. 2023

- Wired and integrated cameras, sensors, and pneumatic hardware on robotic systems, and troubleshot hardware failures during on-site deployments
- Implemented a Transformer-based OCR model to read instrument displays, detect device state, and log data for automated cell culture workflows
- Developed and executed system-level tests to validate performance of integrated robotic system

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

- Built a neural implant imaging station with cameras, precision stages, and custom machined components to automate four manual steps
- Designed a wafer cleaning fixture to improve cleaning efficiency in chemical baths, sonication, and vapor drying, and assembled 10 units
- Designed parts for machining and injection molding, and drafted technical drawings using GD&T
- Validated tooling and fixtures in a controlled cleanroom environment supporting medical device assembly
- Authored standard operating procedures (SOPs) supporting GLP studies

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 - 2021
Achievements: Obtained a provisional patent from USPTO

PROJECTS

Nonprehensile Manipulation for Shelf Organization
Oct. – Dec. 2023

- Planned robot pushing motions in PyBullet using a sampling algorithm for a shelf organization task

CMU Array Benchtop Testing Platform
June – Aug. 2022

- Designed and built a precision test setup with custom fixturing, cameras, and translational stages to align probes on micro-electrode array with a stimulating electrode

Path Planning and Control for Autonomous Vehicles
Oct. – Dec. 2023

- Developed LQR and PID controllers in Python for a simulated autonomous vehicle, and implemented A* path planning for obstacle avoidance
- Wrote an MRAC controller for a simulated quadrotor

Learning Human-Like Tonal Inflections for Expressive Robotics
Oct. - Dec. 2022

- Classified audio signals recorded from a humanoid robot mouth into four tones using a custom CNN

SKILLS

Robotics: Industrial & collaborative robots (Denso, Franka, xArm), Python, C++, gRPC, vision (OpenCV, PyTorch, depth cameras, vision model training), motion planning, kinematics, SLAM, calibration, device drivers, Git, Linux, CI/CD, wiring, cable management

Design: CAD (Solidworks, NX, Onshape), GD&T, tolerance analysis, material selection, DFM/DFA, FEA, MATLAB & Simulink, PDM systems

Prototyping & Fabrication: 3D printing, machining, laser cutting, fixture building, motors, actuators, injection molding, thermoforming, die-cutting