

SUMMARY

Full-Stack Mechanical Engineer accomplished in developing transformative technologies and products across robotics, AI/ML, automation, and energy sectors. Thrives in environments characterized by ambiguity, autonomy, and cross-functional collaboration. Deeply satisfied with providing hardware solutions that unlock the potential of others.

EXPERIENCE

Aepnus Technology - Recycling Electrolyzer Lead Mechanical Engineer

Oakland CA
4/2024–Present

First ME Hire. Responsible for research, design, and manufacturing of a three-compartment electrochemical cell, capable of converting chemical waste into useful products. Took a laboratory proof-of-concept and re-architected it to increase size by 100X. Developed manufacturing processes for exotic metals and custom composites that can scale with the Balance of Plant.

Covariant AI - Automation Robotics Staff Mechanical Engineer

Berkeley, CA
10/2021–3/2024

Engineering Lead of the Grasping system and core contributor to camera research and development. Unlocked advancements with AI/ML researchers through novel electromechanical design. Acquired by Amazon.

- **Vacuum Generation System:** Responsible engineer for a multi-channel vacuum system; integrated valves, venturi ejectors, pneumatics, sensors and custom microcontroller into a robust package, generalized for compatibility with a variety of industrial robots. Scaled design from proof-of-concept to a released product. Product was deployed to all internal research and external customers.
- **End-effectors:** Designed end-effectors for different pick-and-place applications: food items, apparel, health and beauty, pharmaceutical. Worked alongside AI/ML researchers to optimize parameters. Utilized rapid-prototyping techniques to iterate quickly, while in parallel pursuing DFM. All designs were fully compatible with the vacuum generation system.
- **Cameras:** Led development of a camera structure to support a 6-camera array, employing first-principles and designing a configurable architecture for rapid iteration of concepts. Delivered a complete solution that met desired specifications (error <0.5px over a 40C temperature range) and unlocked DFM of high-volume product. Leveraged structural learnings to refine the existing Depalletization Camera platform.
- **Custom Level-Compensator:** Explored commercially available level-compensators and recognized the need to own a critical part of the grasping hardware toolchain. Researched technologies and materials, ultimately identifying an existing technology and reimagining the tech as a solution for an entirely new application. Delivered a parametric and scalable solution, implemented across portfolio of end-effectors. Validation testing proved operational life of 5M+ cycles.
- **CAD/PDM/PLM tools:** Championed company-wide adoption of Onshape as the first user; thoroughly vetted the feature set, socialized benefits, synthesized a decision matrix, and drove consensus. Managed 40+ regular contributors across engineering teams in Asia and Europe. Worked with Supply Chain to select and implement a PLM tool and established best practices.

Abundant Robotics - Apple Harvesting Robot Senior Mechanical Engineer

Hayward, CA
2020–2021

Responsible Engineer for the *End Effector*, an electromechanical assembly that utilizes vacuum to pick apples. Created over 100 custom parts made from composites, plastic, metal, foam, fabric, and rubber.

- **Composites:** Worked with a local artisan to produce the End Effector composite housing; transferred manufacturing to one of the world's largest composite suppliers to reduce cost, and increase quality and volume.
- **Pneumatics:** Developed pneumatic actuators to route fruit through the end-effector. Designed, built and tested an air filtration system to increase cylinder life.
- **Electronics:** Selected components and designed cable harnesses to integrate optical and ultrasonic sensors, load cells, valves, cameras, and lights. Worked with the Software team to fine tune sensing and actuation.
- **Soft Goods:** Handcrafted foam and fabric structures to protect fruit inside of the End Effector. Researched and tested foam to characterize performance under varying temperatures per ASTM D3574.

Motive Mechatronics - Humanoid Robotics
Senior Mechanical Engineer

San Francisco, CA
2016–2019

Provided design, analysis, fabrication, manufacturing, and testing across a range of engineering subjects. Responsible engineer for multiple robotic designs.

- **Custom Cycloid Actuator:** Co-owned development of a cycloid actuator from the ground up. Led effort to transition Motive's cycloid technology from prototype to low-volume production, necessary to meet cost targets allowing for a full humanoid design. Sourced from overseas manufacturers, produced all manufacturing documentation and drove quality control.
- **TRI Humanoid:** Designed a 5DOF Torso and 2DOF neck as part of a humanoid robot to be delivered to the Toyota Research Institute, built around Motive's range of custom actuators. Easy to assemble and safe for human interaction.
- **Google VR:** Designed a 1DOF wearable haptic controller with force-sensing for interacting with virtual objects and 1:1 robot end-effector control. Integrated motor, load cells, encoder, microcontroller, and a novel zero-backlash belt and cable capstan transmission.
- **Surgical Robot:** Built a multibody simulation in Matlab/Simscape of Verb Surgical's 6DOF robot, used for modeling emergency braking dynamics.
- **1DOF Gripper:** Designed a cost-effective, force-sensing gripper for basic tasks. Integrated motor, load cells, encoder, and PCB.
- **Twisted String Actuator Model:** Translated twisted string mechanics into a simulator where motor and scenario variables are set and force and speed are outputs.

Primus Power - Flow Battery
Senior Mechanical Engineer

Hayward, CA
2010 - 2016

Responsible Engineer for the flow battery *Stack*, an array of electrochemical cells used for reversibly converting chemical energy into electricity. Owned dozens of unique custom components that had to stand up to harsh operating conditions. Took prototypes from laboratory scale to a fully realized energy storage product (and every size in between).

- **Bipolar Electrode:** Pioneered scalable processes for metallurgical bonding of porous and solid titanium. Validated vendors across the US to meet cost, quality and production requirements.
- **Cell Frame:** Designed HDPE frame for spacing electrode and distributing electrolyte. Iterated through three product cycles. Set up dedicated manufacturing with multiple vendors. Worked with injection molders to ensure volume production viability.
- **Ultrasonic Welding:** Developed a manufacturing process for bonding HDPE sheets to isolate electrolyte within flow channels.
- **Analysis:**
 - **CFD:** Built models to simulate electrolyte flow through the Stack, Cell, and Electrode.
 - **Structural Analysis:** Performed FEA on plastic and metal components over range of temperatures and pressures. Worked with outside laboratories to determine critical material properties.
 - **Electric Current Modeling:** Evaluated the effect of geometry and manufacturing quality on electrical current distribution.

Meka Robotics - Humanoid Robotics
Mechanical Engineer

San Francisco, CA
2009 - 2010

Fabrication and assembly of the Mekabot, a humanoid robot. Integrated strain-wave transmissions, motors, and encoders into series-elastic actuators.

PATENTS

Metal-halogen flow battery bipolar electrode assembly, system, and method - US Patent No. 10290891

EDUCATION

University of California, Santa Barbara
BS in Mechanical Engineering, 2008

Santa Barbara, CA
2004–2008