



Hardware Redesigns of Next-gen In-air Drop Encapsulation Apparatus (IDEA) for Capsule Production

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ABOUT ME

Electrical Engineering B.S.

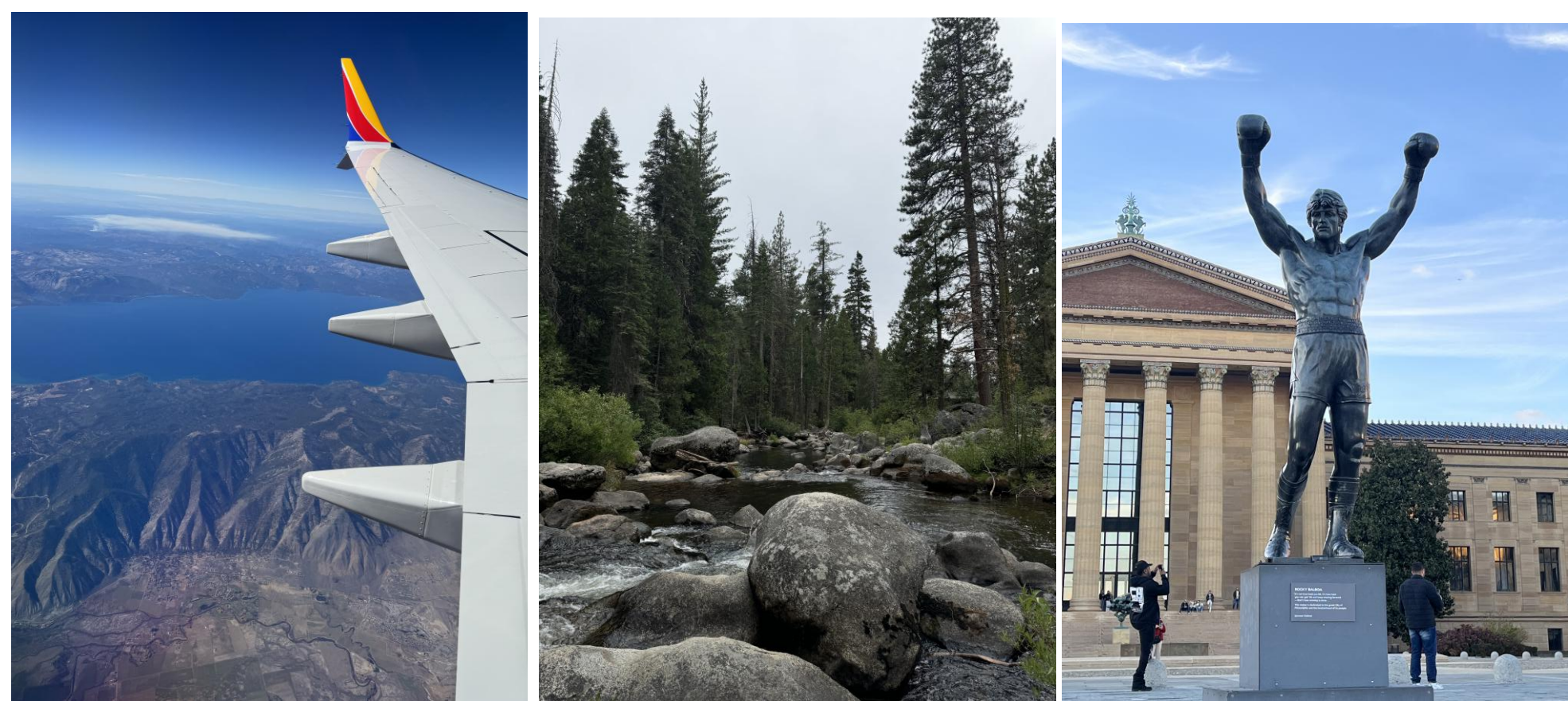
Career Goals

My career goal is to become an electrical engineer specializing in power systems, where I can help design and improve the infrastructure that delivers reliable electricity to communities. I want to contribute to developing a smarter, more resilient electrical grid capable of supporting future generations.

I chose a fellowship at LLNL because of its excellence in scientific research and the opportunity to gain hands-on engineering experience close to home.

Interest

Traveling and spending time with family



SUMMER RESEARCH

Abstract

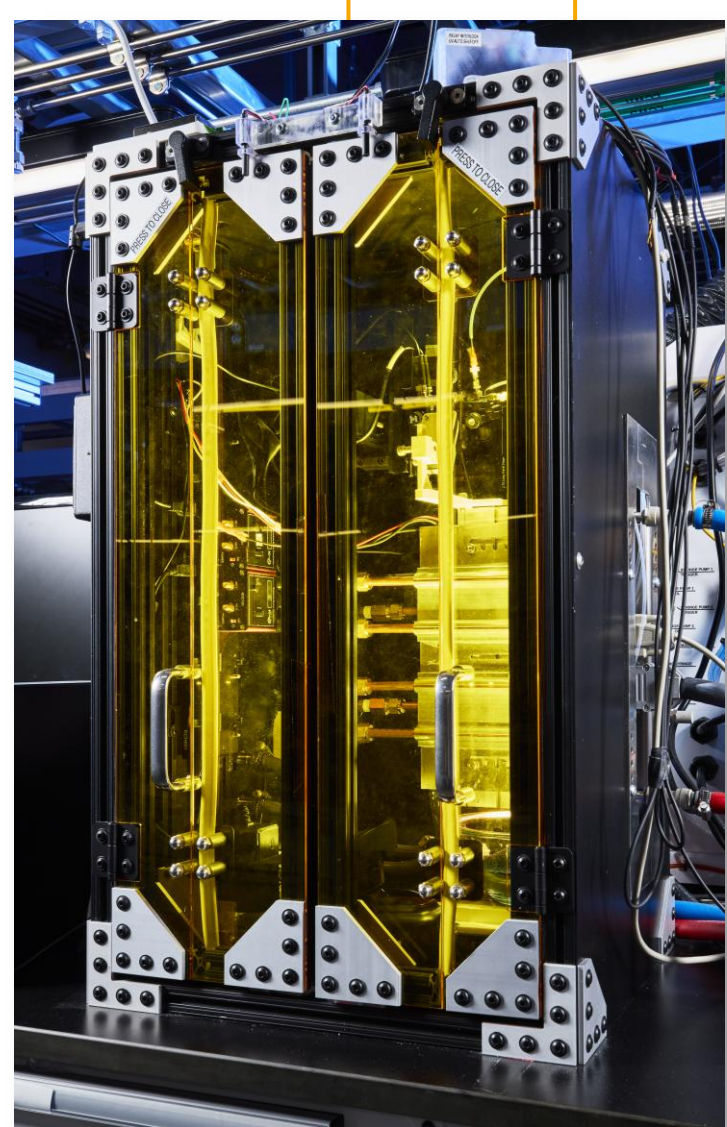
Microcapsules have applications in energy, biotechnology, and advanced manufacturing. The In-air Drop Encapsulation Apparatus (IDEA) produces uniform microcapsules but can be improved in usability and reliability. This project redesigned camera mounts and waste collection components to improve alignment, inspection, and maintenance while supporting consistent capsule production.

Methods

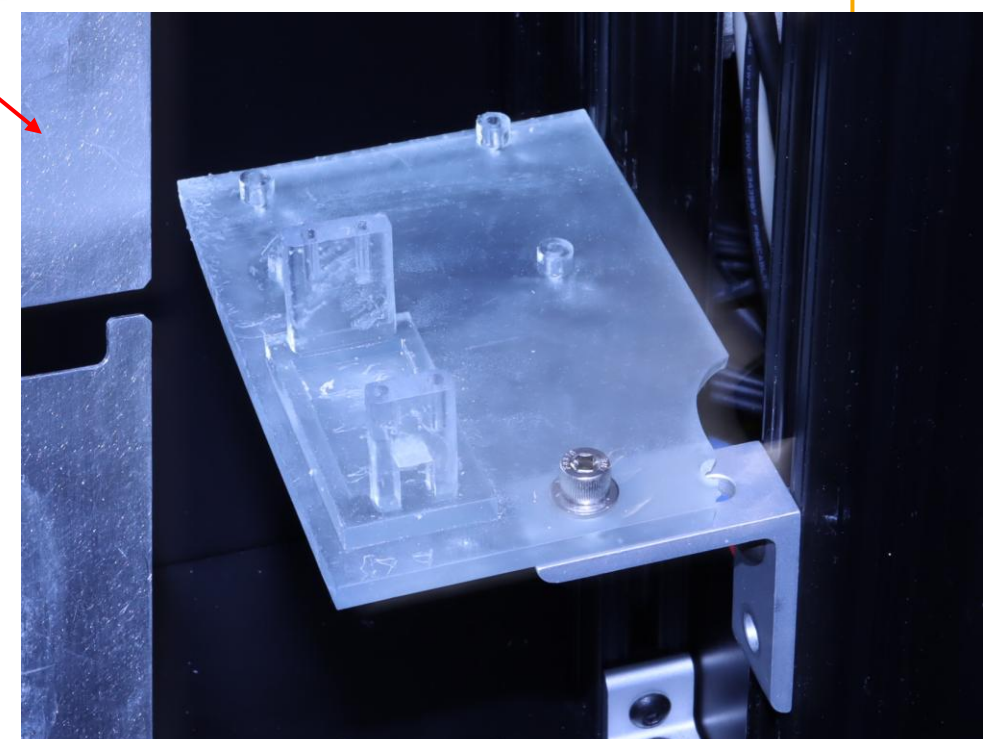
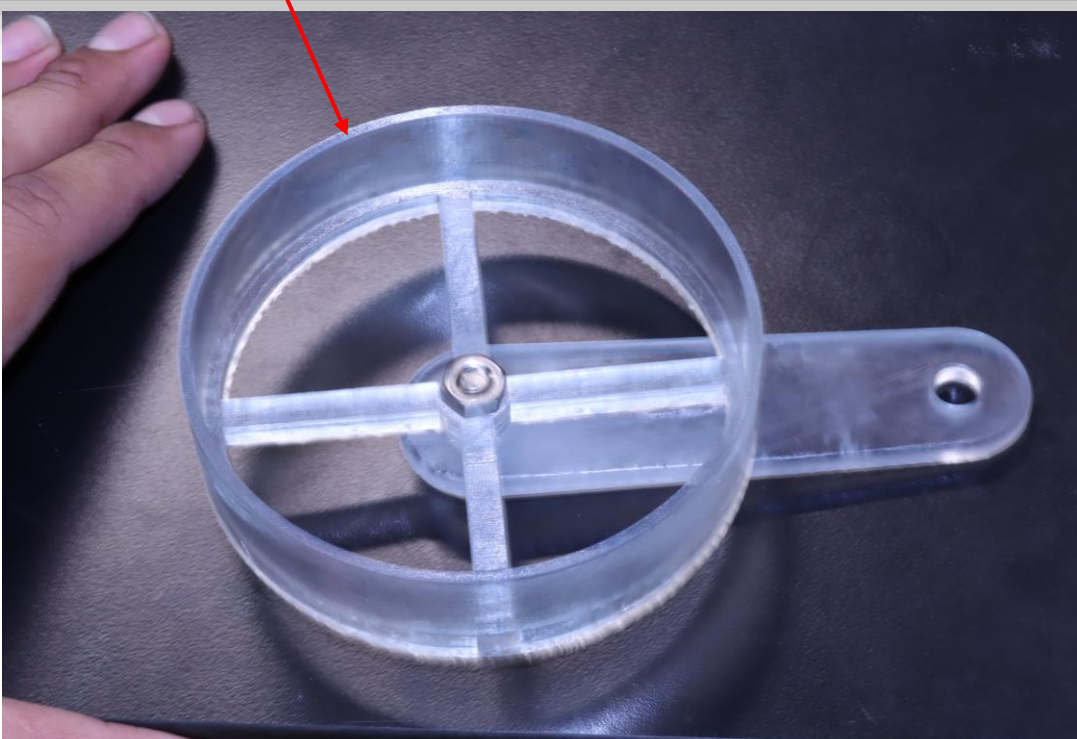
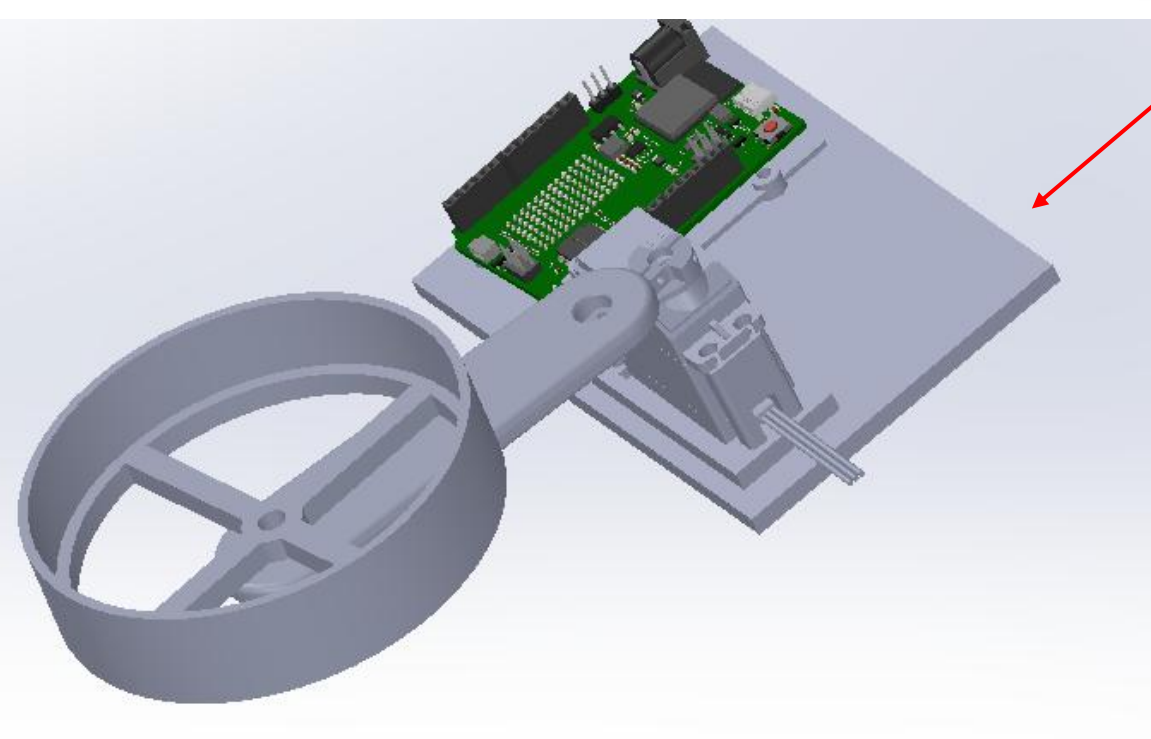
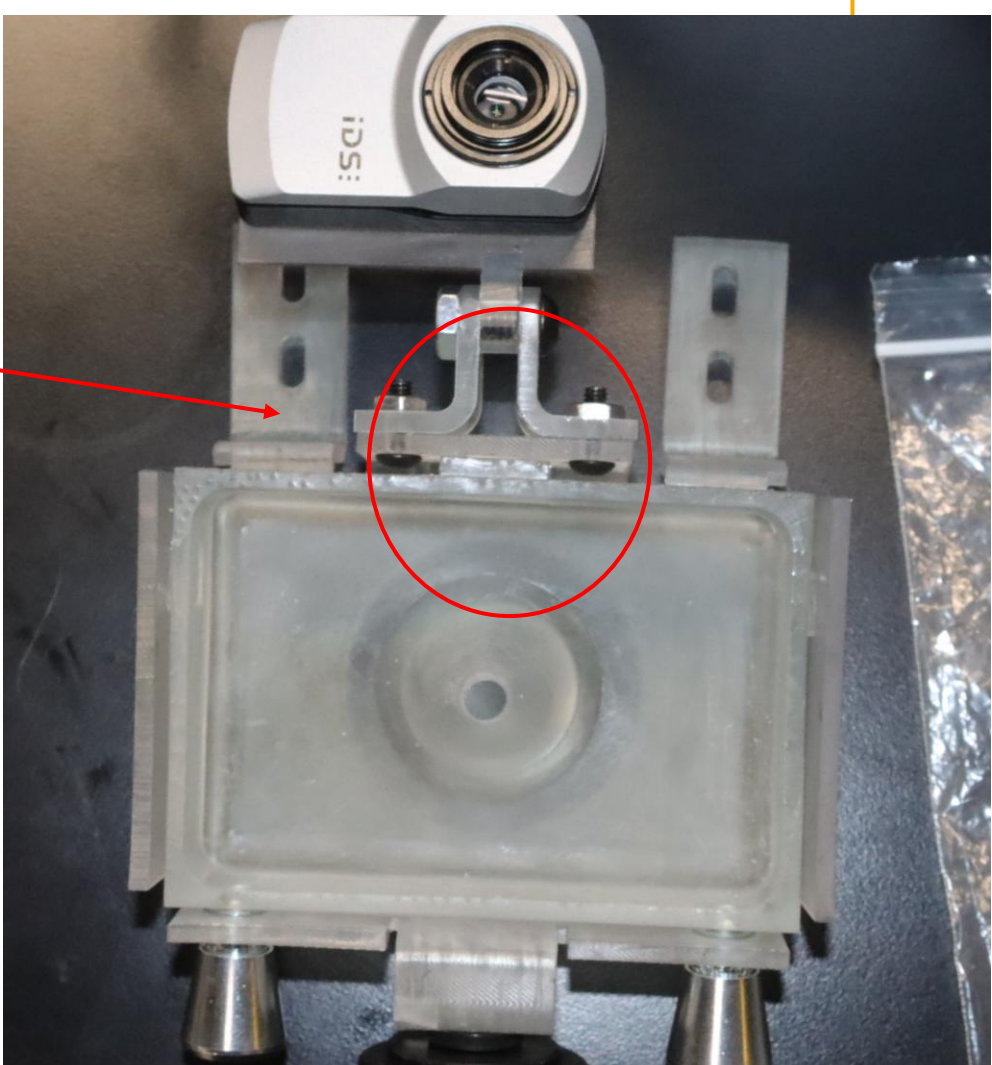
Mechanical components were designed in SOLIDWORKS and prototyped using SLA resin 3D printing to evaluate fit, alignment, and functionality. Commercial hardware was used to reduce costs and simplify assembly. New designs improved camera positioning, waste collection, and accessibility while maintaining compatibility with the existing IDEA apparatus. Upper waste tray assembly parts have been sent off for machining.

Results

The redesigned camera mount improves droplet observation using macro and wide-view imaging while providing support to stabilize the top waste tray. The new top waste tray improves droplet alignment and inspection. Together, these designs increase system modularity, usability, and readiness for future test and automation.



Part	Comments
Top Waste Tray	Redesigned to create no movement while operating
Camera Mounts	Created support for cameras and Top waste tray rail
Bottom Waste Tray and Collector	Creating a automated system to collect waste



LLF AWARD

I am incredibly grateful to the Livermore Lab Foundation for investing in my future. This fellowship has helped support my housing, transportation, and tuition as I transfer to San José State University. By easing these financial burdens, I have been able to grow as an engineer and prepare for the next chapter of my academic journey.

This fellowship has opened my eyes to the impact of research. Working alongside talented engineers and researchers has inspired me to pursue a Ph.D. in Electrical Engineering.



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