RYAN ROSSMANGO

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Work Experience

HRL Laboratories • Cryogenics, Thermal, Mechanical Design Engineer — Jul 2023 - present

Developing two-phase, one-directional heat pipes (stainless steel-copper brazed thermosiphons filled with ethane or oxygen) with high on-state conductance and negligible heat leak (<5uW into mK plate), to reduce XLD-1000 cooldown time from ~32 hours to overnight.

- Conducted trade studies (ran over **50 FridgeSim studies** and used **Figure of Merit charts**) to identify the best thermal solution.
- Performed **structural analysis**, designs, and material selection to scope out feasible geometries and **identify manufacturing risks**.
- Wrote an **11-page Statement of Work** with Gantt chart, setting the **material**, **performance**, and **safety requirements**. Drafted an Interface Control Document, calling out the geometric envelope (9.25" long, 1.5" diameter), bolting patterns, and **GTOLs**.
- Used Pugh charts to select ITAR-certified vendor; judged cryogenics experience, brazing expertise, **design choices**, and **schedule**.
- Performed **CTE thermal stress analysis** with **Excel hand calculations** and **ANSYS model** to determine tensile force on thermosiphon (~**100 lbs**) after installed and cooled, due to **differential shrinkage** with beam elements that join semi-rigid plates.
- Sized **superconducting BeO** spacer (0.25" thick, <1" diameter) with **thermal resistance network** to reduce heat leak from 3.6 to 2.1uW. Measured **bulk conductance** and **contact resistance** of BeO parts on mK plate, with **cartridge heaters** (1-500uW, <.016mA), temperature sensors (RuOx, Cernox), Berkshire power supply, **Lakeshore Temperature Controller**, and Python.
- Drafted a **3-week thermal validation plan**: low-power test (uW heat leaks from 1K, mW heat leaks from 4K), high-power test (**>20W of heat** sent in on 50K plate to **achieve 20K temperature delta**), and full cooldown with **6 thermosiphons**.

Overseeing hardware integration (mechanical parts, PCBs, electrical signal chains, coax cables, PXIe cards, etc.), validation, and handoff of 5 cryostats as Mechanical REA for MUX fridge architecture, with technical documentation, BOM revisions, and project management.

- Mastered SolidWorks Composer to create **work instruction documentation** (**100 pages**) with wiring diagrams, guiding fridge builds.
- Stood up fleet of 7 He-3/He-4 dilution refrigerators within 2 months; diagnosing air/nitrogen clogs and operating system cooldowns.

Delivered quick-turnaround mechanical trinkets to increase production capacity, remove testing blockers, and lower failure rates.

- Designed PCB stiffening frames, wirebonding vacuum fixtures, amplifier brackets, variable temperature stages, cable alignment fixtures, **copper shaft collars**, and rigid slotted attachments with **stainless steel helicoils** to prevent stripped threads.

Teledyne Relays • Mechanical Engineering Intern — Jun 2022 - Sept 2022

- Conducted **root cause analysis** with Pareto, scatter, and Weibull charts to lower reject rates of magnetic latching relays **by 16%**.
- Redesigned an **overstressed relay spring mechanism**. Executed an iterative CAD design process involving **100 simulation studies** to lower max stress by **factor of 5.5** and **achieve contact force targets** (1-2 gram-force).
- Developed **testing equipment** and testing procedure for **magnet quality validation**, with Helmholtz coil, fluxmeter, and 3D-prints.

Pyro-E • Engineering Intern — Sept 2021 - Jan 2022

- Fabricated the waterproof exterior out of **20 fiberglass-epoxy composite pieces**, using vacuum-bagged wet layup and molds.
- Built crude **eel prototype** out of **sheet metal, stepper motors, and 3D-prints**, using press brake and machining tools (**CNC, mill**).
- Constructed a propulsion test with **strain gauge load cell** and **spring-loaded force gauge** to measure prototype's thrust.

UCLA Engineering Transfer Center • Undergraduate Mentor — Jun 2021 - Sept 2021

- **Led technical team of 6** to develop a **successful 10-team, 30-person hackathon** under a fast-paced 5-week timeline.
- Built, wired, and programmed the **proof of concept** (an Arduino-scripted car driven by Bluetooth pySerial, an IR emitter controller, and autonomously), troubleshooted code, procured **list of 50 parts**, designed 3 new parts, and 3D-printed/laser-cut 150 parts.

Technical Skills

CAD/3D-Modeling/Drafting: SolidWorks (CSWA), ANSYS SpaceClaim, AutoCAD, Autodesk Inventor, Fusion360, SolidCAM, very adaptive
Engineering: Design reviews, DFM/DFA, vacuum systems, manufacturing processes, cryogenics handling, thermal resistance models, stress-stiffness calculations, hands-on rapid prototyping, GD&T, tolerance stackups, data visualization, vendor evaluation, testing plans
FEA/CAE: ANSYS Mechanical, ANSYS Thermal (Transient and Steady-State), SolidWorks Thermal, SolidWorks Simulation, Nonlinear FEA
Manufacturing: 3D-printing, laser cutter, composites, machining, hand tools, sheet-metal working, soldering, mechanical assembly
Software: Python, Microsoft Windows/Excel/PowerPoint/Word, CoolProp/NIST, Mathematica, Jira, Arduino, C++, OpenRocket, Git, Bash

Education

University of California, Los Angeles (UCLA) • B.S. Mechanical Engineering • GPA 3.872 — Sept 2019 - Jun 2023