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**, used **Figure of Merit charts**) to identify the best thermal solution.
- Performed structural analysis on selected materials to scope out feasible geometries; made designs to identify **manufacturing risks**.
- Wrote an **11-page Statement of Work** with Gantt chart, setting **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 calcs** and **ANSYS model** to determine tensile force on thermosiphon (~**100 lbs**) after installed and cooled, due to **differential shrinkage** with other beam elements that join the semi-rigid stage plates.
- Designed **rigid copper shaft collars** and **slotted brackets**, with scratch lines and **stainless helicoils** to prevent stripped threads.
- Investigated materials with JAHM/NIST/HRL superconducting data. Sized BeO spacer (0.25" thick, <1" diameter) with **thermal resistance network** to reduce heat leak from **3.6 to 2.1uW** if placed in series.
- Measured bulk conductance and contact resistance of **BeO rods and spacers** fixed to 20mK plate. Used 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), validation, and handoff of 5 cryostats as Mechanical REA for MUX fridge architecture, with technical documentation, BOM revisions, and project management.

- Managed kitting process for ~**55 internal hardware** and ~**30 room temperature electronics** line items; delegating kitting tasks.
- **Compiled Jira project** to track procurement and provide kitting instructions over **5-month schedule**; driving weekly status updates.
- Mastered SolidWorks Composer to create **visual assembly instructions** (**100 pages**), guiding fridge builds. Showed wiring diagrams, torque specs, tools, flag notes, highlighted part callouts, transparent views, explode lines, and standard operating procedures.

Stood up a fleet of 7 He-3/He-4 dilution refrigerators (cryostats cooled by pulse tubes, pumped to vacuum with turbopumps and scrolls) under an accelerated 2-month timeline. Diagnosing fluid clogs, safely handling precious fluid, and operating system cooldowns.

- Performed acceptance testing (7mK base temp, 1000uW cooling at 100mK) with Bluefors control cart and automated scripts.
- Filled **40L of He-3** with regulator, 1L bottle, & Swagelok valves; fixing blockers (such as **air/nitrogen clogs, leaks, broken O-rings**).

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

- Delivered stiffening frames, wirebonding vacuum fixtures, amplifier brackets, variable temperature stages, cable alignment fixtures.

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

- Redesigned a relay spring mechanism which was **overstressed at solder reflow temperatures**. 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 procedure for magnet **quality validation**, with Helmholtz coil, fluxmeter, and 3D-prints.
- Conducted **root cause analysis** with Pareto, scatter, and Weibull charts to lower reject rates of magnetic latching relays **by 16%**.
- Conceptualized, 3D-designed a **high-volume relay manufacturing procedure** involving an overhead camera and rotating fixture.
- Ran component tests with **oscilloscopes**; collected electronics data such as coil resistance, set voltage, bounce time, and overtravel.
- Measured and calculated residual flux density, normal operating point, and magnetic moment of purchased magnets.
- **Performed revisions** and maintenance on engineering drawings with AutoCAD.

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

- **Won 3rd place** in DoE Ocean Observing BUILD Contest with mechanical eel that renews energy through vibrational wave harvesting.
- 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 create transfer bridge program. **Made, led 8 workshops** on CAD, FEA, circuits, 3D-printing, and MATLAB.
- Spearheaded **project development of a successful 10-team, 30-person hackathon** under a fast-paced 5-week timeline.
- Designed, built, and programmed the **proof of concept** (an Arduino-scripted car driven by Bluetooth pySerial, 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/CAM/3D-Modeling: SolidWorks (CSWA), ANSYS SpaceClaim, AutoCAD, Autodesk Inventor, Fusion360, SolidCAM, very adaptive
Engineering: Design reviews, structural beam analysis, stress calculations, thermal resistance calculations, GD&T, tolerance stackups, vendor evaluations, testing plans, parts procurement, vacuum systems, cryogenics handling, mechanical assembly, design for manufacturing (DFM), data acquisition systems, data visualization/analysis, failure analysis, engineering drawings, laboratory work
FEA/CAE: ANSYS Mechanical, ANSYS Thermal, SolidWorks Thermal, SolidWorks Simulation, Nonlinear FEA
Manufacturing Methods: Rapid prototyping (3D-printer with plastic/metal, laser cutter, Waterjet), composites fabrication (wet layup, resin infusion, prepreg), CNC G-code generation, machining (CNC, mill, lathe, drill press, bandsaw, grinding machine), hand tools (Dremel, jigsaw, files, shears, reamers, torque wrenches), sheet-metal working/bending, soldering, crimping, stripping
Software: Python, MS Windows/Excel/PowerPoint/Word, Git, Bash, CoolProp, Mathematica, Jira, MATLAB, Arduino, C++, OpenRocket

Education

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

Courses: Astronautics, Thermodynamics, Heat Transfer, Fluid Mechanics, Advanced Strength of Materials, Robotic Kinematics, Electric Circuits, Electric Circuits Laboratory, Computer Science I and II (C++), Manufacturing Processes, Materials Science, Modeling of Dynamic Systems, Feedback and Control Systems, Compliant Mechanisms, Mechanisms and Mechanical Systems, Dynamics, Statics

Projects and Clubs

UCLA E96R: Launching Two Small-Scale Rockets Jan 2023 - Mar 2023

- Made a two-piece, 3D-printed rocket (<6” long, 3oz.) with parachute and A8-3 Estes motor. Rolled **stability findings** into next design.
- Designed gas high-powered rocket (13” long) in SolidWorks and OpenRocket; built with laser-cut curved wood fins, **composite body section**, and 3D-printed detachable nose cone. Launched to an **apogee of 3000ft with altimeter data** and payload camera.

UCLA C163A: Checkers-Playing Robot Oct 2022 - Dec 2022

- Sized the links of a **4-DOF** robotic arm and designed motor mounts in SolidWorks; animated Forward/Inverse Kinematics in MATLAB.
- Designed a 3D-printed mechanism for **in-plane linear motion**, with rods, timing belt, GT2 pulley, ball bearings, and MX-28AR motor.

UCLA E96G: Building a Go-Kart Feb 2022 - Mar 2022

- **Orchestrated design** and fabrication of **drivetrain**, **chassis**, **steering**, and **power systems**. Improved robustness of braking system.
- **Guided team of 5** as project manager to build a battery-powered, winning vehicle while minimizing 3D-printed part remakes.
- Oversaw team meetings, **cross-checked all part designs**, and carried out mechanical assembly and **electrical wiring**.

Miniature Aluminum Chair Oct 2021 - Dec 2021

- Machined 4 tapped legs with **lathe**, chair seat with **mill** and **drill press**, and custom-patterned chair back with **SolidCAM** and **CNC**.

UCLA AIAA Design Build Fly • New Member Training Lead & CAD Engineer Dec 2019 - Dec 2021

- 3D-designed features for competition airplanes, such as 2020-21’s tail section (ribs, elevators) using an **imported NACA 0100 airfoil**.
- **Wrote 40-page manuals** and **produced training presentations** on aircraft manufacturing processes, CAD, and structural analysis.

1966 Volkswagen Restoration Jul 2020 - Dec 2020

- **Organized** a **project plan on Excel**; identified causes for car’s faults, conceived solutions, and **compiled parts list** from vendors.
- Fixed **transmission** and **master cylinder**; replaced windshields, brake disc pads, headlights, and steering wheel.
- Removed rust and adhesive with rotary wire brushes, **installed insulation and carpet**, revamped seating, and hammered out dents.

UCLA American Society of Mechanical Engineers • Combat Robotics Member Sept 2019 - Mar 2020

- **Launched vision** and **15-week project timeline** for 3 lb. battle bot with spinning drum weapon and curved armor, on team of 4.
- Designed **initial GD&T schematics**, researched proper battery packs, wheels, bearings, and **recorded bill of materials**.
- **Soldered electronics pack** (battery, electronic speed controller, motor, receiver, etc.).
- Machined blunt drum weapon with mill, and assembled the weapon-motor system with **pulley belt**, **shaft**, and **bearings**.