JUAN ROMERO

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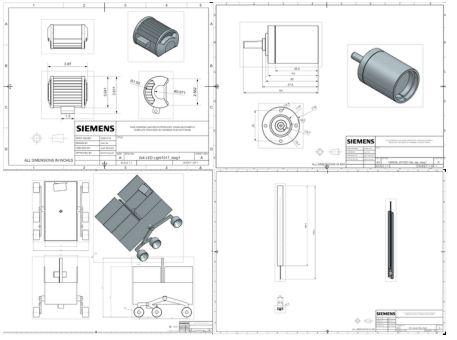
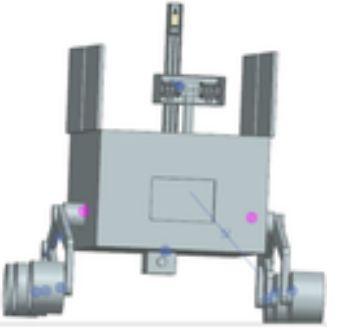
UNDERGRADUATE ENGINEERING RESEARCH - VERTICALLY INTEGRATED PROJECTS



What?

- Led the mechanical architecture for a lunar rover optimized for cryogenic exploration in Permanently Shadowed Regions (PSRs). This scope encompassed designing a high-torque percussive-rotary drill for volatile extraction and developing a passive thermal control system to safeguard the core infrastructure.



How?

- Owned the entire CAD lifecycle in Siemens NX to integrate the chassis, suspension, and drilling subsystems
- I embedded the custom drill mechanism, developed ISRU workflows to harvest oxygen and hydrogen, and strategically mapped Multi-Layer Insulation (MLI) layouts

Results

- Delivered a structurally optimized rover engineered for extreme lunar terrain. The design enables closed-loop power via regenerative fuel cells to sustain operations through the lunar night and successfully shields sensitive avionics from catastrophic freezing in 40K environments.

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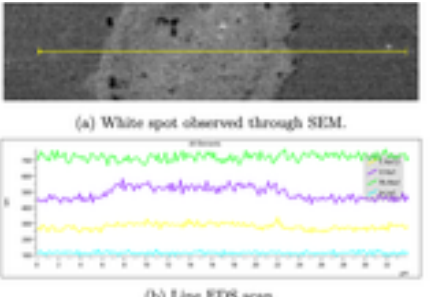
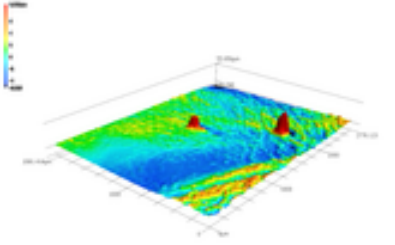
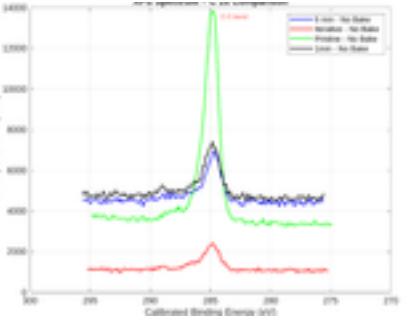
MATERIALS ENGINEERING INTERN - DEPARTMENT OF ENERGY



(a) White spot observed through SEM.



(a) Representative section showing two bumps.



What?

- Decreased surface contaminants in superconducting materials used in particle accelerators.

How?

- Tested multiple oxidation techniques
- Characterized multiple samples during the process using electron microscopy.

Results

- With the best oxidation technique, 20% of surface carbides were eliminated. This, theoretically, improves performance of the material.

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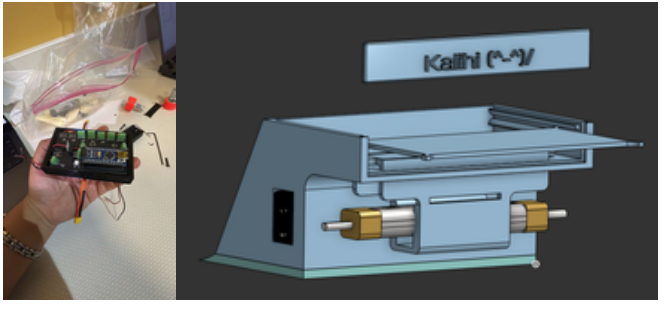
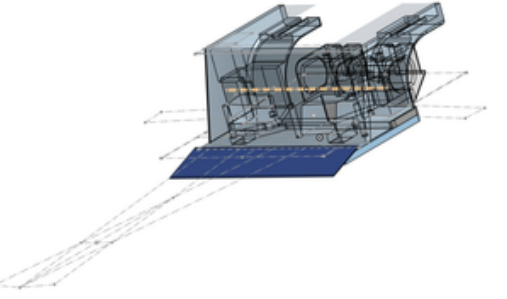
MECHANICAL ENGINEER - ROBOJACKETS





What?

- Designed and machined a 500g autonomus bot to participate in robowrestling matches.

How?

- Used SolidWorks to design and simulate the mechanics.
- Brought the robot from concept to reality — modeling and testing its mechanics in SolidWorks, then fabricating parts through 3D printing, machining, and hands-on assembly.

Results

- Will compete at regional and national levels, working on fixes and strategy

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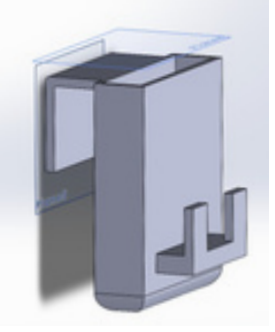
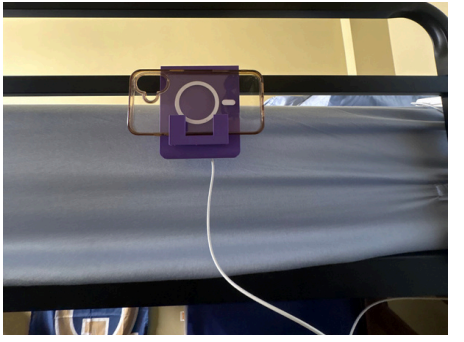
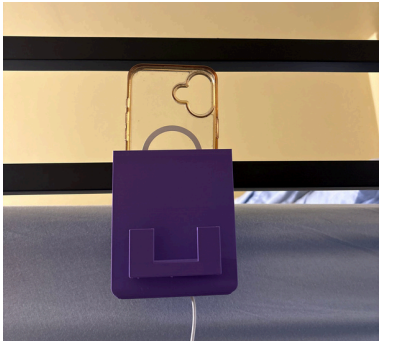
RAPID PROTOTYPING & CAD DESIGN: MAGNETIC CHARGING MOUNT







What?

- Designed a mounting solution to secure a smartphone to a standard university bed frame (lofted). The objective was to optimize alarm proximity for the user while mitigating audio disturbance for roommates, all while adhering to space constraints.

How?

- Integrated a MagSafe inductive charger slot, requiring precise caliper measurements for a snap-fit enclosure.
- Used Solid Works to design an attachment that would fit the guards from the lofted bed and 3D Printed the gadget.

Results

- Achieved a functional interference fit that supports the weight of the phone and charger without adhesives.
- Reduced device drops to zero and successfully localized alarm audio.
- Finalized design within 2 iterations