PROBLEM STATEMENT

Since the mission of Apollo 11 in 1969, NASA has shifted their focus from moon exploration to creating sustainable bases on the moon. NASA wants to develop these bases with bricks comprised of melted plastic and lunar soil, requiring an immense source of heat in space. However, unlike on Earth, space has no convenient heating methods such as ovens or stoves. To heat the plastic and soil to over 250 F efficiently in such an environment, lightweight and collapsible equipment will be required to redirect and focus the sunlight.

NASA HUNCH
High school students United with NASA to Create Hardware

PROJECT LEAD THE WAY
PLTW

APACHES

CHARON'S CREW

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TEACHER: MR. CUARON
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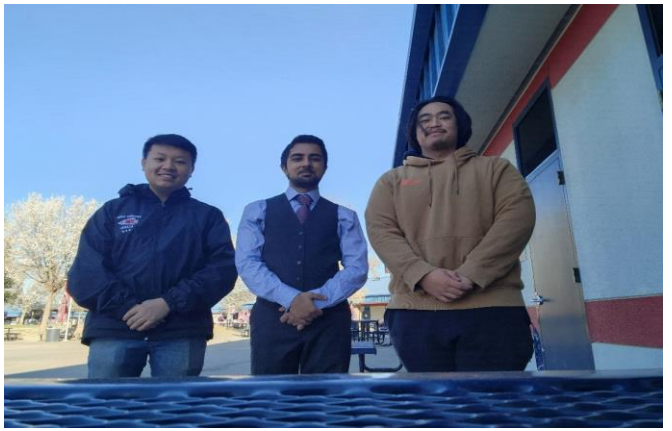
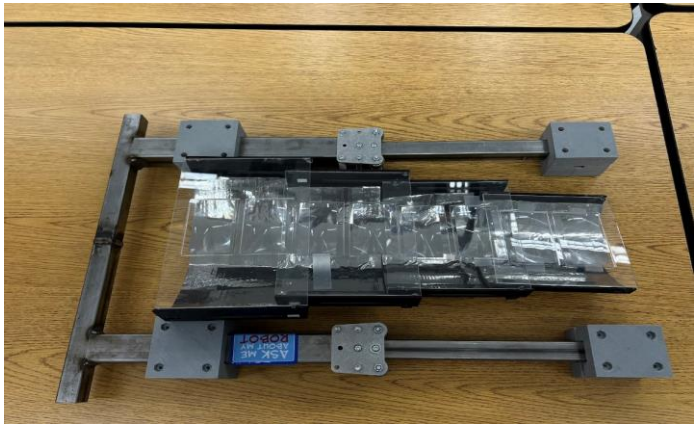


COLLAPSIBLE MIRROR

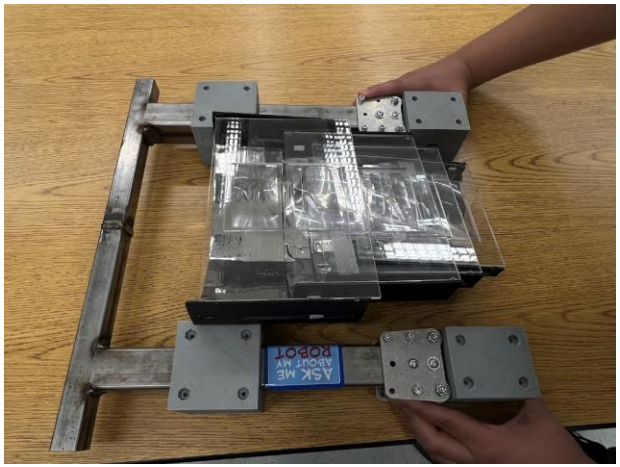
Our collapsible mirror is designed to surround the pipe with Fresnel lens on top to concentrate the sun directly on top of the pipe. The sunlight that misses the tube would be reflect back up with the parabolic mirrors that we have under the pipe. We have linear slides on both sides of the panels, allowing them to collapse or expand. Having the mirror and the lens together are important because it allows the sunlight to concentrate on the pipe from all possible directions.



HEAT TESTING

To test the heating process, we ran our design under mulitple situations, including:

- **A 65 W Plant Light over a cardstock tube (5°F increase under 2 minutes)**
- **Raytracing the focal points of our mirrow with a 5mW Laser**
- **Direct Sunlight over a Steel tube (20°F increase in 3 minutes)**
- **500 W Incandescent Stage Light over a Steel tube (31°F increase in 10 minutes).**



COLLAPSIBILITY

We saw that our design's method of collapsing would be the simplest and most efficient if the smaller panels slid back to fit inside of the larger panels in a linear motion, similar to a drawer. The motion would be controlled by an extension system and springs, naturally expanding the design when no force is applied.