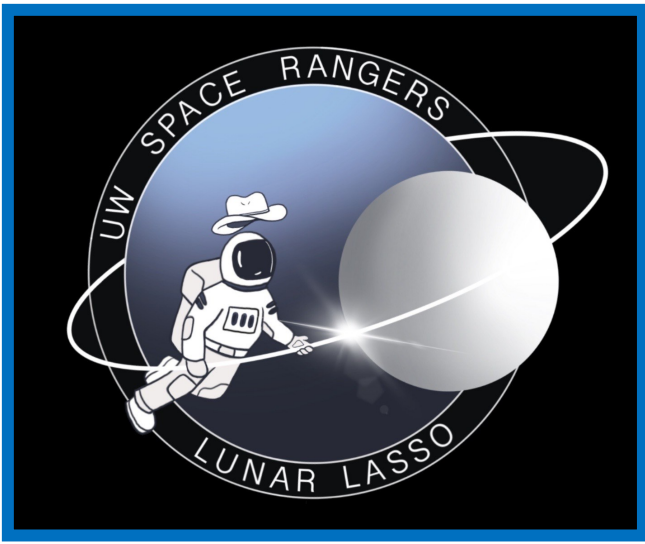


# Lunar Lasso

NASA Micro-g NExT 2022-2023 EVA Zip Tie Installer Challenge



## UW Space Ranger’s Team

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## Project Overview and Objectives



“Micro-g Neutral Buoyancy Experiment Design Teams (Micro-g NExT) challenges undergraduate students to design, build, and test a tool or device that addresses an authentic, current space exploration challenge.”

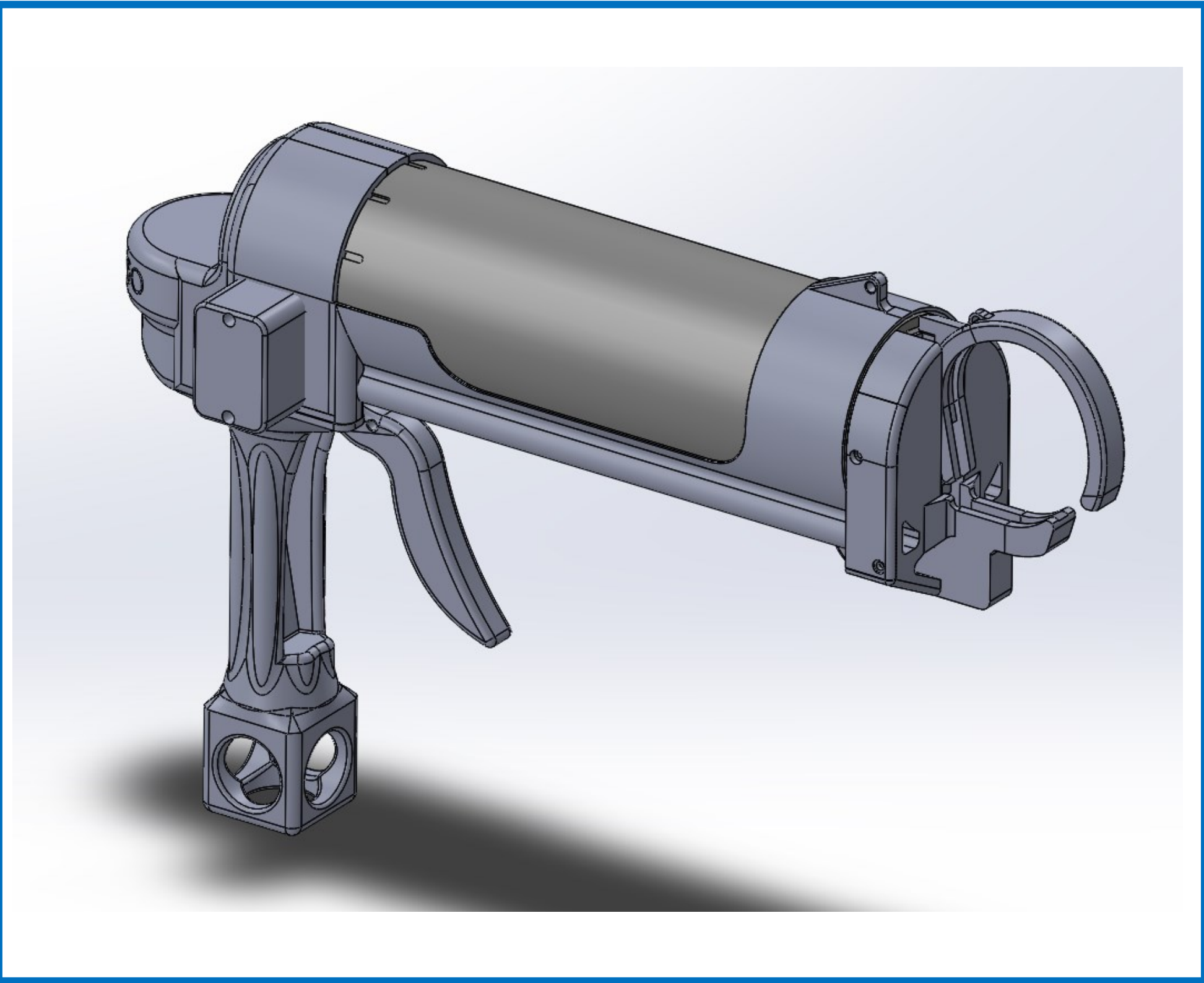
The EVA (Extra Vehicular Activity) Zip Tie Installer Challenge asks teams to design and manufacture a device that astronauts can use to install zip ties during an EVA in microgravity and the International Space Station.

## Requirements

- 1.The device shall be able to install and tighten a zip tie around an object ranging from 0.5” to 2” in diameter/width.
2. The device shall be able to hold and dispense 10 zip ties.
3. Teams must supply their own zip ties.
4. The device shall be able to pack within a 10” x 10” x 3” volume.
5. The total weight of all parts shall be less than 4 lbs.
6. The device shall use only manual power.
7. The device shall be capable of one-handed operation, but two-handed operation is acceptable.
8. The device shall be ambidextrous.
9. The device and any removable components shall have a tether point 1” in diameter.
10. The device shall be built for an underwater testing environment at the NBL and must be made from NBL Approved Materials.
11. The device shall be operable with EVA gloved hands.
12. There shall be no holes or opening which would allow or cause entrapment of fingers.
13. There shall be no sharp edges on the device. Functional sharp edges are acceptable but should be labeled and only exposed during operation.
14. Pinch point should be minimized and labeled.
15. Tools shall be designed with drain holes or geometry to allow the free flow of air and water as required to support submersion and removal to and from the NBL pool.

## Primary Features

- 1.**Drive System** consisting of a ratchet mechanism, chain, and gear and sprocket ratio
- 2.**Claw Assembly** consisting of a top and bottom claw
- 3.**Pull Cables** that act to lower the top claw and relieve tension in the tensioning teeth
- 4.**Cylindrical, Rotating Magazine** with 10 zip tie compartments
5. Zip Tie **Tensioning Teeth**



## Materials

The Lunar Lasso is primarily printed out of Tough PLA. Regular PLA was used during prototyping. The chain, sprockets, shafts, screws, and a few other components were purchased or machined from various approved metals such as stainless steel. Neodymium magnets are utilized for alignment.

## STEM Outreach

STEM Outreach activities were designed to engage the younger generation and share the challenge experience with the public. During the Spring 2023 semester, the UW Space Ranger’s team conducted:

- An egg drop design challenge with an 8th Grade Algebra class at the UW Lab School.
  - Day 1 - Wednesday, February 15th
  - Day 2 - Wednesday, March 1st
  - Day 3 - Wednesday, March 8th
- An egg drop design challenge with three 3rd/4th grade classes at the UW Lab School.
  - Day 1 - Friday, February 24th
  - Day 2 - Monday, March 6th
  - Day 3 - Friday, March 10th

Instagram: [@uwspacerangers](#)

