



COSGC Robotics Challenge 26-27

Part of the Colorado Space Grant Consortium Experience

A statewide design challenge to provide students with hands-on experiences to develop engineering and science skills using the excitement of NASA. Great way to share and connect with other students from affiliate and partner institutions around Colorado.



Location: Great Sand Dunes National Park

Inspired by the Viking Mars Lander missions of the 1970's. Hardware for Mars was tested on the Dunes. Rental vans carried the hardware there from near Denver.



Robotics Challenge

- Student Teams design a rover to navigate a series of increasingly difficult courses at the Dunes.
- Challenge Design Categories
- Team Recognitions

Resources

- Online workshop tutorials
 - New videos
- Practice robotics kits
 - Parts list /
Bill of Materials on
program webpage
- Live design reviews
with staff



Challenge Basic Rules

- Mass: Between 1 - 5 kg
- Inexpensive: About \$500 for final unit
- Not harmful to the environment
- No flying entries for safety
- No GPS navigation to simulate the Mars environment.
- The “is it about a cat” rule for size and mass.
- Fun Team Recognition for unique and creative **functioning** designs.

Challenge Basic Rules

Several levels of success to engage all levels of students and inform the build cycle

LEVEL 1: BASIC MOTION

- Forward movement-direct line from start to finish
- Navigation: Basic capability

LEVEL 2: GETTING SMARTER

- Obstacle avoidance: recognize obstacles and get around them (things on top of the sand, or holes in the ground).
- Navigation: Obstacle avoidance

LEVEL 3: CREATIVITY

- Navigation: Advanced Autonomy
- Choose your own challenge! See recognition categories⁷

Robotics Challenge Overview

- Several courses focusing on different levels of functionality.
- Great way to engage new students from any experience level.
- No team to team competition.



Team Design Recognition

The goals are to encourage development in these areas:

1. Motion
2. Navigation
3. Obstacle Avoidance
4. Advanced Automation/Autonomy



26-27 Challenge recognition categories

- Best Overall < 1.5kg
- Best Overall > 1.5kg
- Mars Sojourner Award
- Mars Spirit Award
- Mars Opportunity Award
- Outstanding Navigation
- Creative Locomotion
- Best Bioinspired Design
- Best Advanced Autonomy
- Attention to Detail



BONUS CHALLENGE

Space Rock Retrieval

- Meteorites will be provided...
- Multiple rocks will be placed at various points at the end of the course (3D printed)
- Autonomous navigation to end of course to collect rock and bring back to start line
- Approximate size and weight will be provided ahead of PDR



Night Before – System Checkout in Alamosa and sharing what works

Some teams use simple materials



Others have high level of complexity



The Morning of the Event

~150 people participate in addition to the spectators



Course arena



There may be soft sand, hard pack sand, 1-2 ft deep ridges and large boulders. The course designs are not published in advance so have a good mechanical and intelligent robot system that can adapt to varying challenges. Be ready to reprogram your robot and make mechanical adjustment.

The Courses – Mars like terrain

Each robot will navigate just like NASA's robots on Mars through the closest analog we have on Earth, the Dunes.



Course arena conditions

Be ready for anything!



Show off your creativity

Great new manufacturing techniques



Great mechanical and software creativity



It looks cool...but does it work???

Visitors, judges and peers will talk to your teams and learn about your designs. Be prepared to share your design approaches and what you learned.



Timeline

- September – Team Registration opens
- November – CoDR Week 11/17 -11/20
- January – New team CoDR 1/19 - 1/22
- February – PDR Week 2/9 - 2/12
- March – CDR Week/Video check-in 3/30 - 4/2
- April 9 – Team presentations on site @ASU
- April 10 – Challenge day at the Dunes
- April 17 – Final Video Submission

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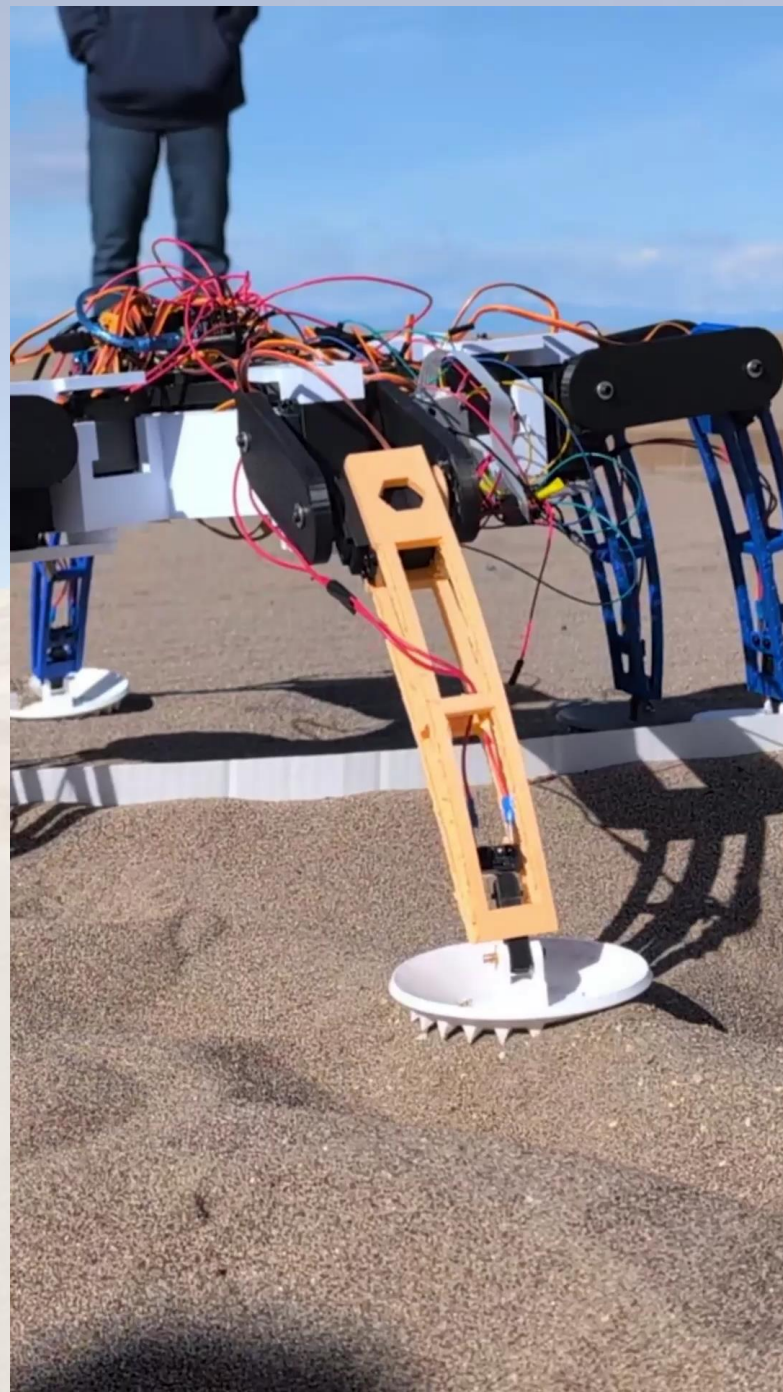
Team Registration



2025 Highlight video



2026 Highlight video



Questions

