BENDER AUTONOMOUS ROBOTIC SYSTEMS

PREPARING STUDENTS FOR INDUSTRY THROUGH PRACTICAL APPLICATION

ABOUT THE TEAM

The Bender Autonomous Robotics Systems (ARS) Team is a cross-disciplinary VIP (Vertically Integrated Project) class & team at Boise State University competing in the annual NASA Lunabotics Challenge.

Our mission is to teach students how to design, build, and operate an autonomous robot capable of mining and transporting simulated lunar regolith.

2019

Year Class/Team Started

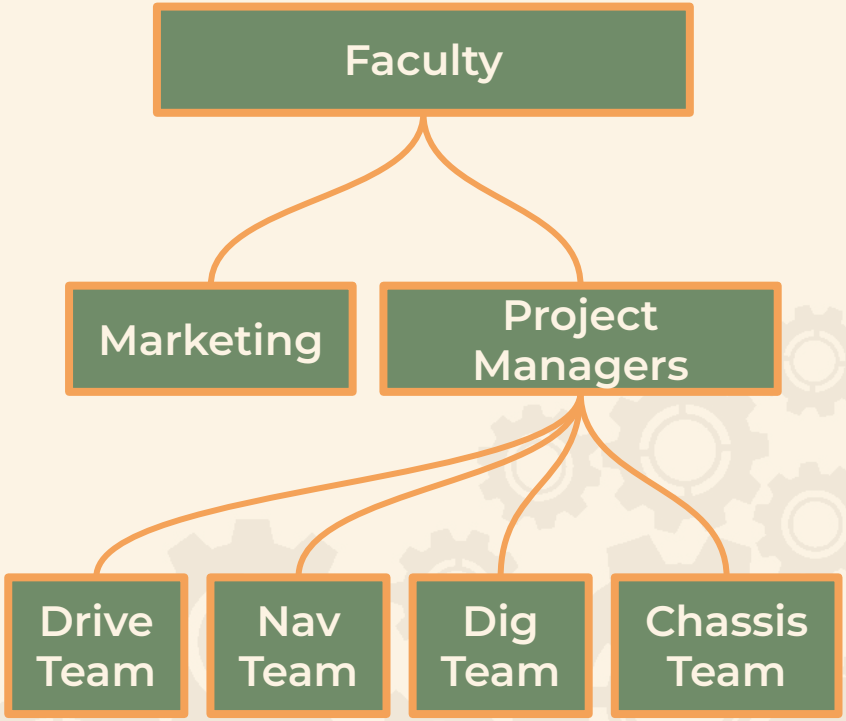
30

Number of Students (2024-2025)

15

Number of New Students (2024-2025)

TEAM STRUCTURE

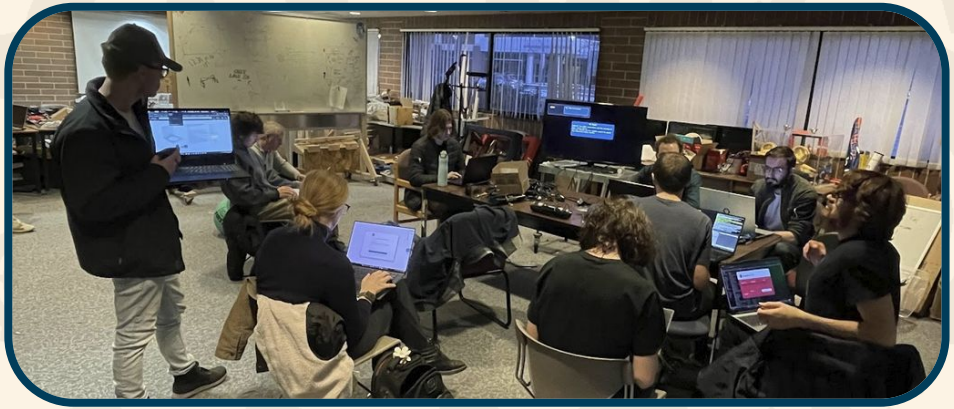


The Team is structured like a real engineering company, with:

- Students leading as project managers
- Subsystem leads
- Marketing coordinators

Faculty act as advisors, while students drive all design, testing, and coordination efforts.

This simulates real-world experience in technical development, team collaboration, and project leadership.



NASA LUNABOTICS

- Annual NASA-hosted robotics competition simulating lunar excavation. 2024-2025 was the first year that the Bender team competed.
- The goal is to design, build, and operate a robot to autonomously mine and transport regolith
- The competition is held at the Kennedy Space Center in Florida after the Spring Semester

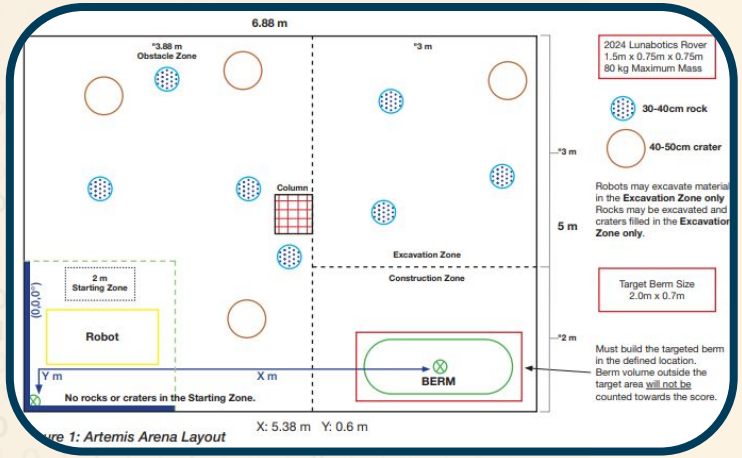
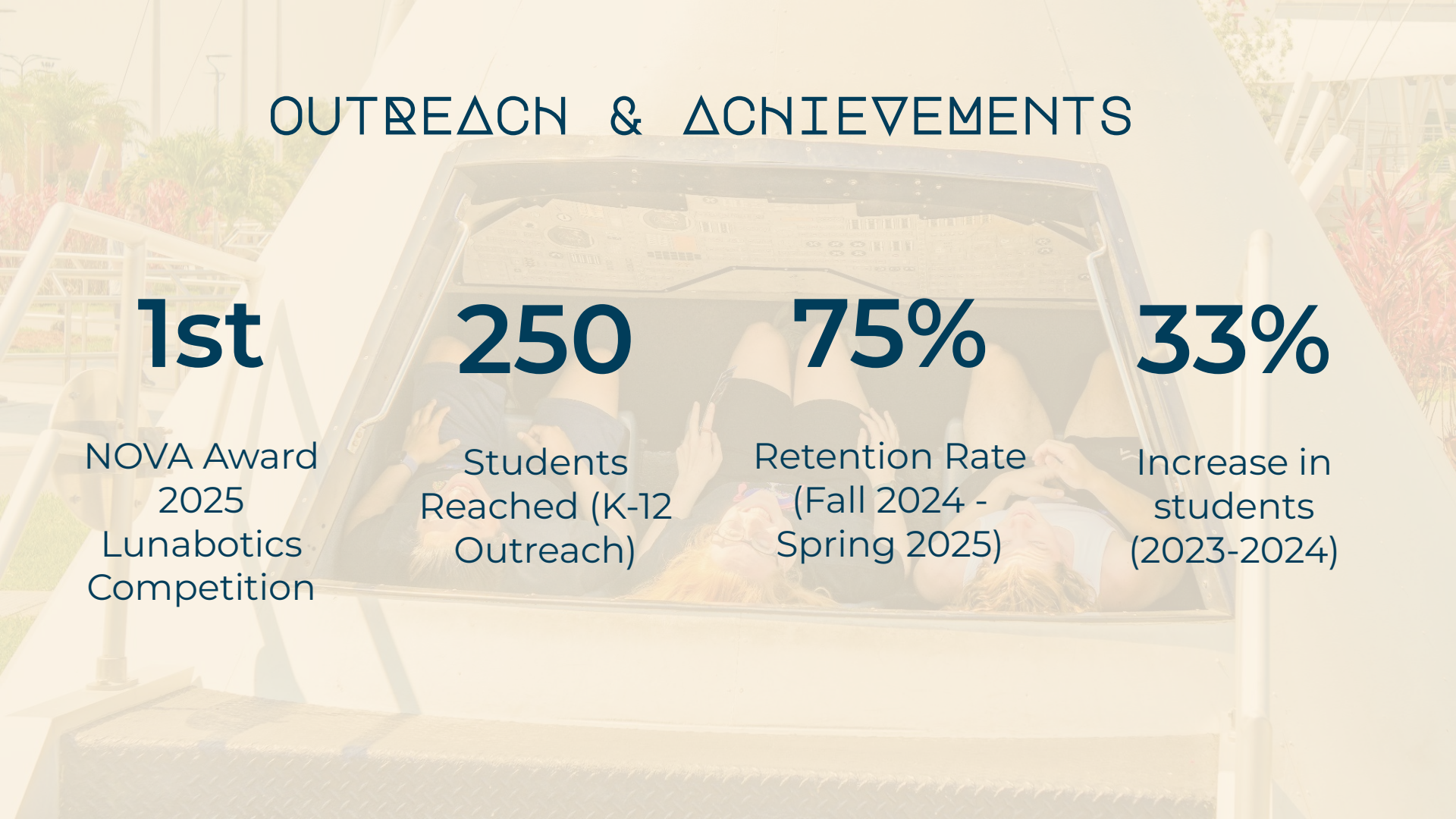


Figure 1: Artemis Arena Layout

1st	1st	16th
Idaho Team	*NOVA Award*	*Overall Place*

2024-2025 Results

OUTREACH & ACHIEVEMENTS



1st

NOVA Award 2025 Lunabotics Competition

250

Students Reached (K-12 Outreach)

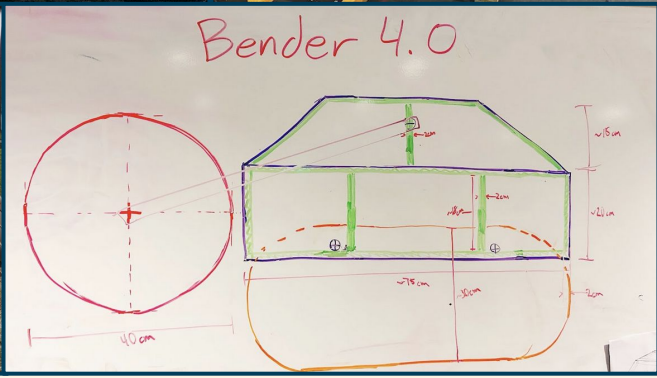
75%

Retention Rate (Fall 2024 - Spring 2025)

33%

Increase in students (2023-2024)


BENDER



The **Bender Robotics Team** exists to give students the **opportunity to experience the full lifecycle of engineering a complex system**, just **like a professional company**. From concept to prototype, testing to delivery, and outreach to impact, we empower students to take ownership of real responsibilities across design, leadership, operations, and innovation.

Our goal is to cultivate the next generation of curious, confident, and capable engineers, project managers, technical marketers, leaders, and visionaries, all while tackling one of the most ambitious challenges in student robotics.

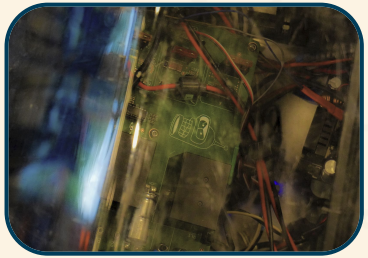
SUB-TEAM BREAKDOWN

The Bender Robotics Team is divided into four core subteams, each focused on a critical aspect of the robot's functionality. These subteams operate semi-independently under project management but collaborate frequently to ensure seamless system integration.

Nav

Ensure obstacle detection and real-time route adjustments

Integrate LiDAR, stereo cameras, IMUs, and beacon tracking



Dig

Engineer the excavation and material handling system

Ensure reliable actuation and mechanical

Drivetrain

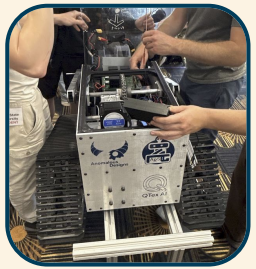
Design and build the vehicle's mobility system

Integrate motor controllers and power systems

Chassis

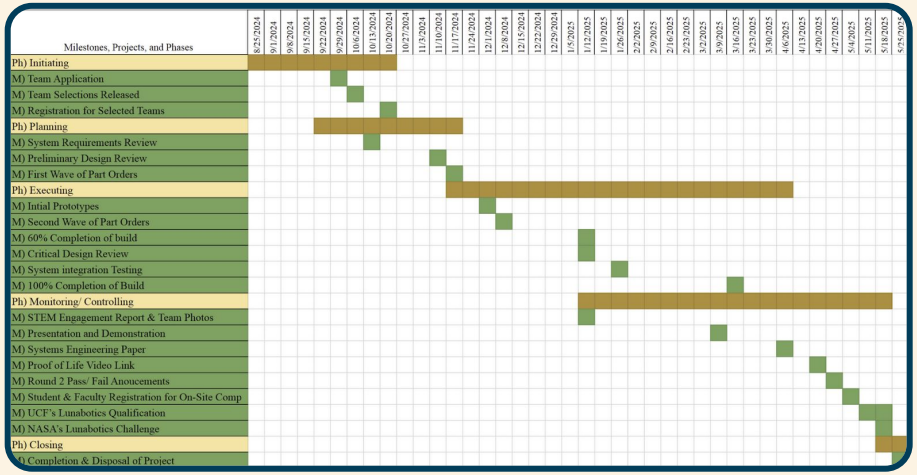
Design the structural frame to support all subsystems

Ensure ease of assembly and maintenance



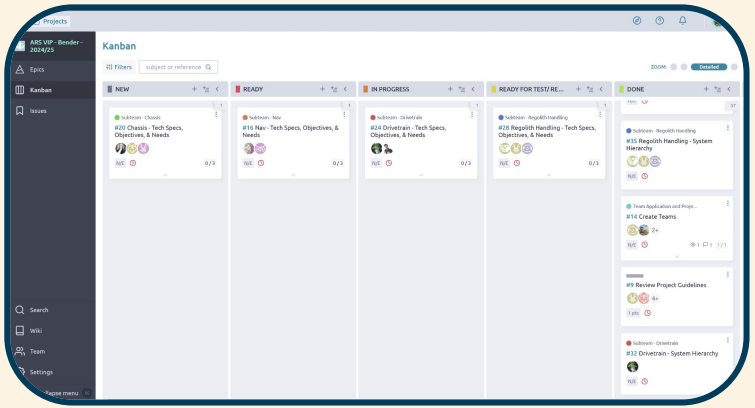
PROJECT MANAGEMENT

Our project managers coordinate all technical and non-technical aspects of the team, ensuring that deadlines are met, subsystems stay aligned, and every team member has the support they need to succeed. They bridge communication between faculty, advisors, sponsors, and student teams.



Key Responsibilities:

- Oversee timelines, goals, and deliverables across all subteams
- Run weekly milestone reviews
- Coordinate design reviews (SRR, PDR, CDR, Demo)
- Manage risks, testing schedules, and internal documentation
- Maintain communication with faculty advisors and NASA competition officials



TECHNICAL MARKETING

The Technical Marketing team ensures that the innovation happening within Bender Robotics is clearly communicated to the public, sponsors, and BSU community. This subteam blends engineering understanding with storytelling, design, and outreach, offering a unique opportunity for students interested in technical communication, media, or branding.

Key Responsibilities:

- Maintain brand identity across shirts, robot decals, and online presence
- Produce photos, videos, and graphics to showcase progress and team culture
- Manage social media, website updates, and newsletters
- Lead community outreach events

Technical Marketing bridges the gap between engineering and the outside world. It gives students a chance to develop portfolios in communication, design, and campaign strategy, while helping the team secure funding, grow visibility, and celebrate its work.

KEY STATS

66kg

Weight
(145 lbs)

30.3

Power
Consumption
(W/hr)

60/60

Dust Tolerance
Score

71W
155L
63H

Final Robot
Dimensions
(mm)

STUDENT TESTIMONIALS

Brady Ward
Computer Science

Everyone here has been very nice and supportive. Having someone's guidance on how to start learning about the robots nav was immensely helpful

Hunter Gregory
Mechanical Engr.

This team provided an opportunity like no other to work in a semi-professional setting on autonomous robotics at BSU. It encompassed all major aspects, including electrical, mechanical, and software related portions, as well as a large focus on proper team dynamics and systems engineering...

Ethan Varao
EngineeringPlus

It was fun learning experience! I enjoyed expanding my skillset and learning to work with other aspiring professionals!

ADVISE THE TEAM!

Your guidance as an advisor can have a lasting impact on the next generation of engineers. Whether you're a faculty member or industry professional, joining our design reviews helps students navigate real-world engineering challenges while giving you a front-row seat to some of the brightest minds at Boise State. Plus, you'll be part of building momentum for cutting-edge tech development right here in Boise.

- Low time investment, just a few hours per semester
- Connect with students and other industry advisors
- Recognition on our website and outreach materials
- Contribute to growing Boise's innovation ecosystem

UPCOMING OPPORTUNITIES

Join us as a reviewer to guide students and offer real-world insights. Low time commitment (2 hours), virtual or in-person attendance.

Event	Date	Target Reviewers
System Strategy Review (SSR)	Oct 6th	3-5
Preliminary Design Review (PDR)	Nov 3rd	3-5
Critical Design Review (CDR)	Dec 1st	5-10
NASA P&D Pre-Presentation	February (TBD)	5-10
End-of-Year Team Showcase	April (TBD)	3-5

Monthly In-Class Appearances:

We also welcome professionals and faculty to:

- Give a brief speech during one of the weekly meeting (10-15 mins)
- Share personal career paths or industry perspectives
- Watch the team work and give live advice on testing & designs

*1 guest per month, ongoing throughout the academic year (October & November Filled, Looking for Spring 2025)

THANK YOU

Interested in joining a review or visiting the class? Shoot us an email!

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