Autonomous Robotic Vehicle Project

Sponsorship Package
2024-2025
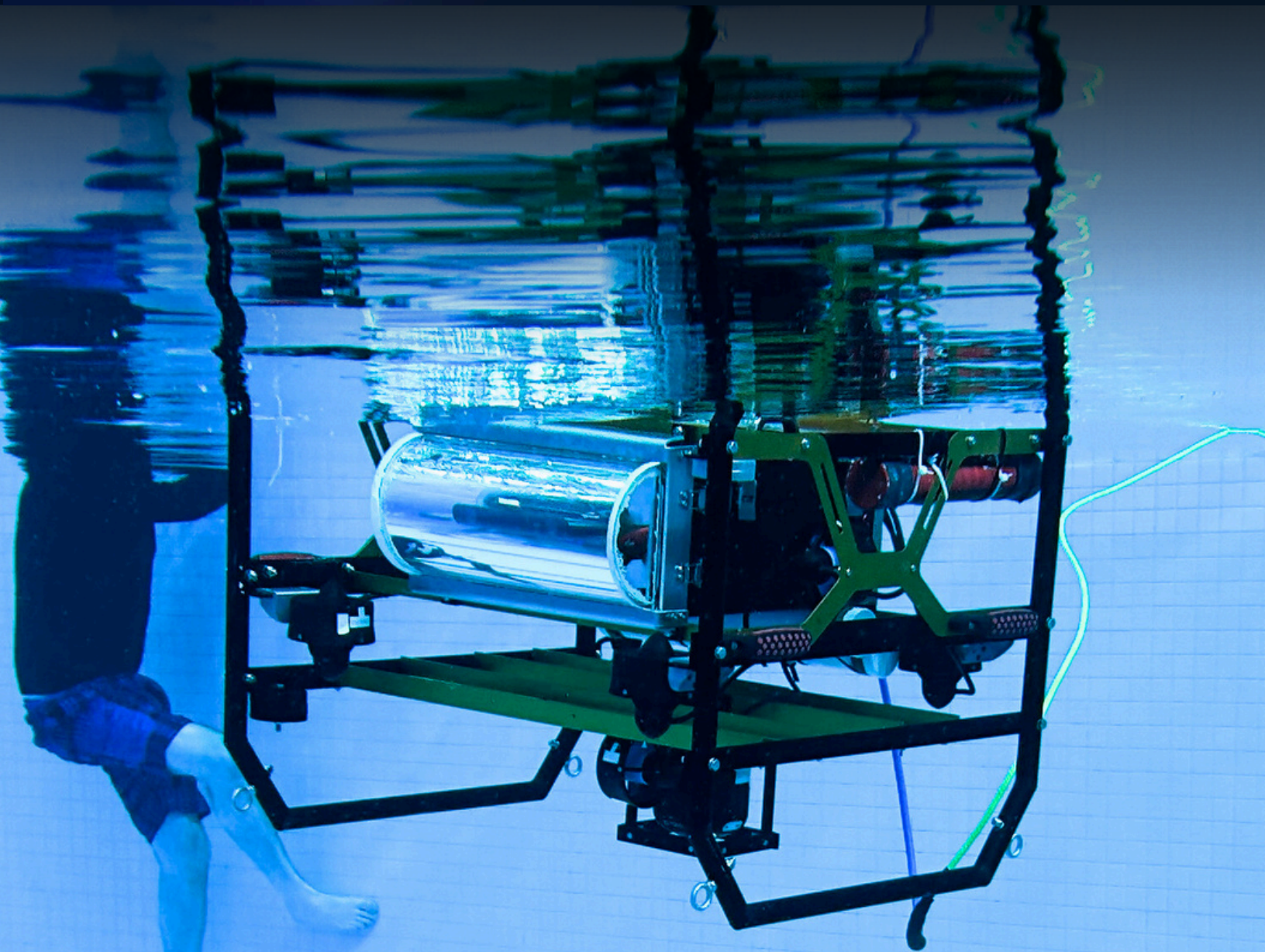
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WHO WE ARE

Founded in 1996 at the University of Alberta, The Autonomous Robotic Vehicle Project (ARVP) is the oldest interdisciplinary Project Team on campus. ARVP develops technologies and students in robotics. Currently, ARVP focuses on Autonomous Underwater Vehicles (AUVs) to compete annually in the international RoboSub Competition held by the US Navy.

We serve students from all faculties, particularly engineering and computing science, so they may solidify their understanding with real-world problems through our four sub-teams. Each member is provided with the education and experience to become a subject matter expert in one portion of ARVP's vehicle design. ARVP also engages in community outreach to promote post-secondary education and demonstrate practical uses of robotic technologies.

MISSION AND VALUES

ARVP advances, advertises, and applies autonomous robotics to large-scale systemic issues. Self-managed by students, our members from all disciplines are provided opportunities to solve complex design problems, manage projects, give back to the community, and develop worldwide professional connections within a cohesive social network.

ARVP'S TRIPLE MANDATE

SKILL DEVELOPMENT

- SubTeam Onboarding Challenges
- Ongoing Project Mentorship
- Industry-Related Project Portfolios

SOCIAL NETWORK

- Monthly & Weekly Social Events
- Philanthropic & Educational Outreach
- Cross-ESP & RoboSub Engagement

CAREER OPPORTUNITIES

- Company Visitations
- Industry Partnerships
- Vetted Resume Database

WHAT IS ROBOSUB?

RoboSub is an international competition where **50+ teams** develop an Autonomous Underwater Vehicle (AUV) to complete an obstacle course.

Tasks include seafloor mapping, sonar localization, and underwater object manipulation. The week-long competition normally takes place at the San Diego US Naval Warfare Systems Transdec Pool.

This event is held by RoboNation, a non-profit partnered with companies such as SolidWorks, Blue Origin, and Nvidia to promote STEM through 9 student competitions that **engage more than 250,000 students annually**.
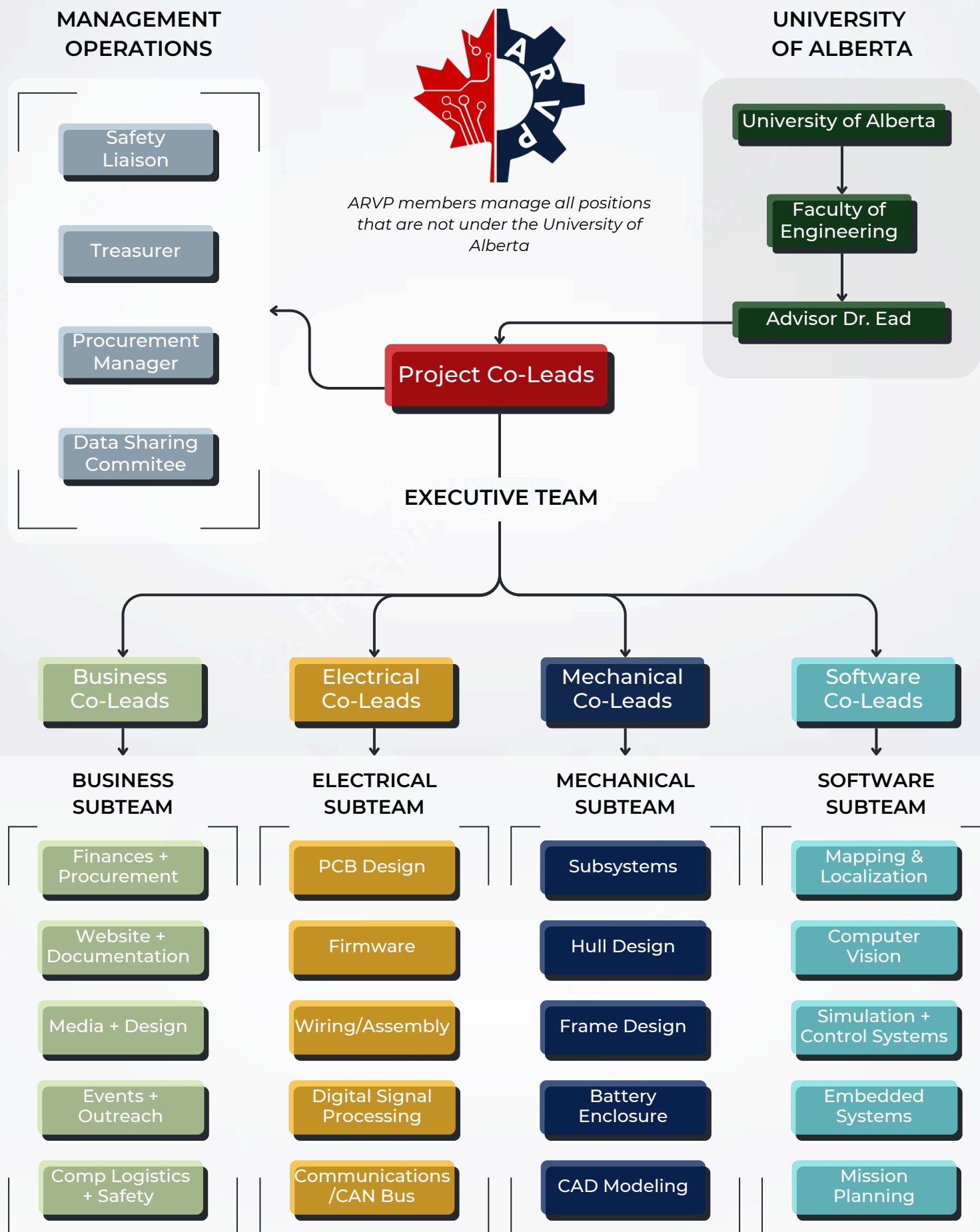
ACHIEVEMENTS

In our aim to provide members with experiential learning opportunities, ARVP's team has successfully achieved many technical milestones.

- Won **7th Place** in the international RoboSub 2024 Autonomy Challenge, making us the **highest-performing Canadian team**

- Awarded **1st Place** in **Design Documentation**, **Team Video, Design Presentation**, and a **Leader in Data Sharing** at RoboSub 2024

- Executed the **highest-scoring competition run** in the team's **28-year history** at RoboSub 2024

- Maintained a **team size** of **50+ contributing members** from 2023-2024

- Won **3rd Place** in the international RoboSub 2023 Autonomy Challenge, making us the **highest-performing North American Team**

MANAGEMENT OPERATIONS

Safety Liaison

Treasurer

Procurement Manager

Data Sharing Commitee

ARVP members manage all positions that are not under the University of Alberta

UNIVERSITY OF ALBERTA

University of Alberta

Faculty of Engineering

Advisor Dr. Ead

Project Co-Leads

EXECUTIVE TEAM

Business Co-Leads

Electrical Co-Leads

Mechanical Co-Leads

Software Co-Leads

BUSINESS SUBTEAM

Finances + Procurement

Website + Documentation

Media + Design

Events + Outreach

Comp Logistics + Safety

ELECTRICAL SUBTEAM

PCB Design

Firmware

Wiring/Assembly

Digital Signal Processing

Communications /CAN Bus

MECHANICAL SUBTEAM

Subsystems

Hull Design

Frame Design

Battery Enclosure

CAD Modeling

SOFTWARE SUBTEAM

Mapping & Localization

Computer Vision

Simulation + Control Systems

Embedded Systems

Mission Planning

1997-2000

Polar Bear
2nd in Design
Employed by
Canadian
Armed Forces

2000-2001

Bear Cub
1st in
Navigation

2001-2004

Kodiak
Top 5 in
Design

2003

Kodi-Hack
Complications
due to shipping

2005

Ursa Major
Never
Competed

2006

Ursa Minor
2nd in Navigation
Ran for SU
President

2008

In Autonomy
Challenge | **11th**

Bearacuda

SubmURSA

8th | In Autonomy
Challenge | **2011**

2013

In Autonomy
Challenge | **8th**

AquaURSA

Auri

4th | In Autonomy
Challenge
2019 & 2022 | **2017**

2020 - 2024

In Autonomy
Challenge | **3rd**

Arctos

Aluminium Hull

Electronic Trays

Key Printed Circuit Boards

Battery Monitoring

Carrier Board

Internal Environment Board

Actuator Board

Sonar Board

Frame

Torpedoes

Dropper and Markers

Battery Hulls

Doppler Velocity Log

The claw

Bottom Cameras & Hydrophones
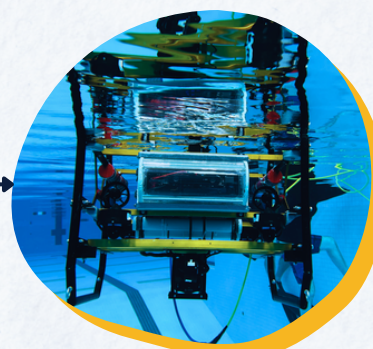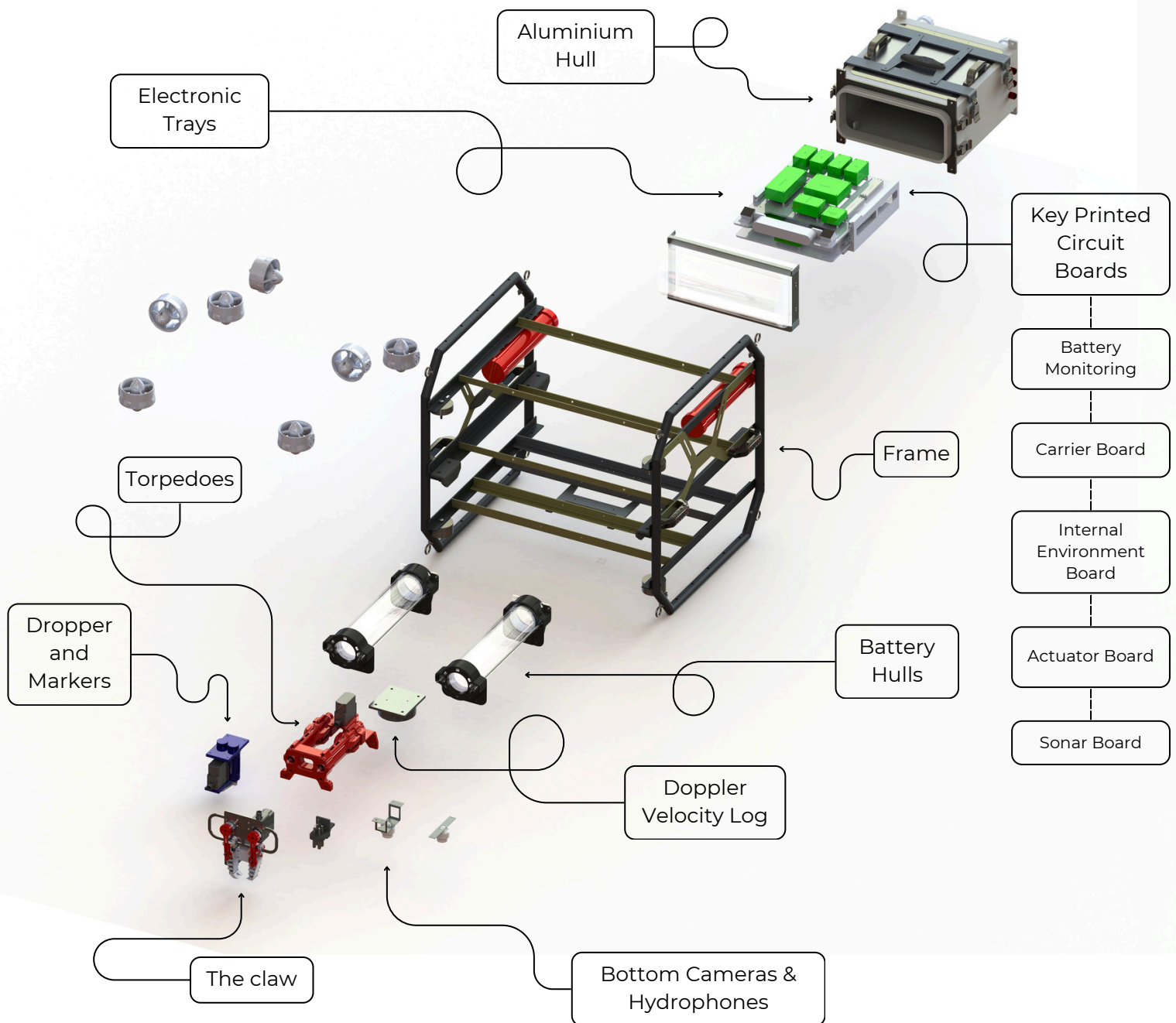
COOLING

The main heat generators, NVIDIA Jetson Orin and Li-Polymer batteries are positioned directly against the walls of Arctos. This allows the thermal properties of the aluminum hull to water-cool these components. When in water, the onboard computer only reaches a maximum temperature of 40 degrees Celsius.

COMPONENT SPECS

- On-Board Computer: NVIDIA Jetson Orin
- Main Sensor Nortek Nucleus 100 Doppler Velocity Log
- Vision Systems: ZED 2i Stereo Camera
- Thrusters: 8x Blue Robotics T200
- Batteries: 5x 100Wh Hobby Lithium Polymer Batteries

SOFTWARE STACK

Arctos' vision detection system's machine learning models communicate object positions to our mapper, and sensor fusion updates the position of the robot. From there our behavior tree compares conditions to launch specific missions including motion, object interaction, and recovery behavior.

SOFTWARE DEPENDENCIES

- RO2
- Python 3
- C++
- OpenCV
- NVIDIA CUDA
- YOLOv7
- Py Trees
- Gazebo Simulator

ARVP Formal 2023

ARVP Community Showcase 2024

Building Skills

- DiscoverE
- APEGA Science Nights and Olympics
- Lacombe High School Meet
- Mecha Mayhem

Social Support Network

- BBQs, Board Game Nights, & Seasonal Events
- Labeling Parties
- Community Showcase
- UofA Showcase

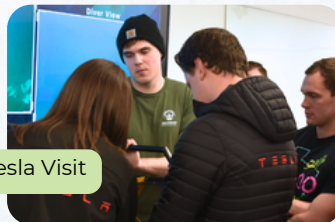2024 ARVP Mecha Mayhem Booth

UofA x NATO DIANA Partnership Announcement

Industry Networking

- Copperstone Technologies Tour
- Rail Shop Services Tour
- Tesla Tour
- BLINC Lab Tour

2024 Tesla Visit

Public Events

- Project Group Development Workshop
- University Consultations
- UofA Days & Open Houses
- K-Days

ARVP Team Photo

2023 UofA Open House

CORE OBJECTIVES

Record Performance in RoboSub 2025
- Maintain Performance in Gate, Buoy, Bins, and Torpedoes
- Completion of Pinger and Claw tasks

Complete the Design of a New AUV
- Detailed Design of Hull, Frame, and Sub-Systems
- PCB Designs and BOMs
- Manufacturing plan

Refine Internal Processes
- Sub-Team Standardized design documentation
- Standardized Testing Protocols
- 1:1 Spares for Critical Components
- Design Reviews

Uphold Triple Mandate
- Provide Onboarding & Skill Building
- Connect Members to Industry Opportunities
- Hold Consistent Social Events

Acquire Sufficient Resources
- Increase Funds & Equipment
- Maintain a Healthy Team Size

Sep-Nov Arctos Rework
- Onboarding Finalized
- Arctos Rework Shutdown
- New Robot Preliminary Design Review

Feb-Apr Arctos Showcase
- RoboSub 2025 Roster
- Community Showcase
- New Robot Critical Design Review
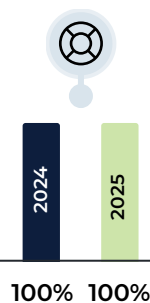
May-Aug Competition
- Competition Deliverables
- RoboSub 2025
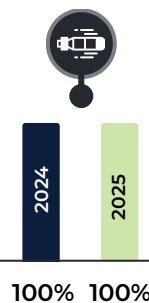- New Robot Manufacturing
- Exec Turnover
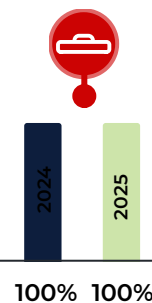
KEY PERFORMANCE INDICATORS
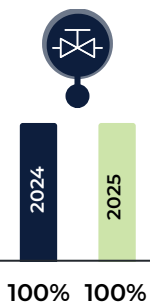
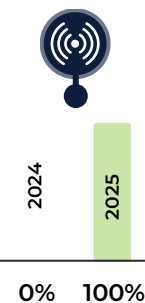| Task	2024	2025
Gate Task	100%	100%
Buoy Task	100%	100%
Torpedo Task	100%	100%
Bins Task	100%	100%
Pinger Task	0%	100%
Octagon Task	20%	80%
Website	85%	90%
Report	82%	90%
Video	95%	100%
Presentation	90%	95%
Documentation	88%	100%

BUDGET

24.6%

39.3%

22.7%

13.4%
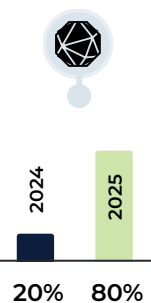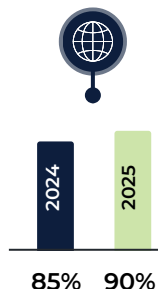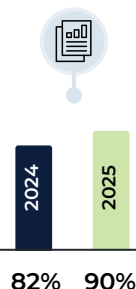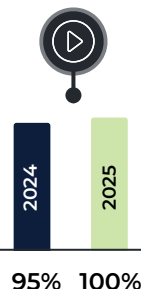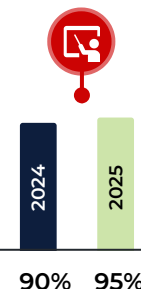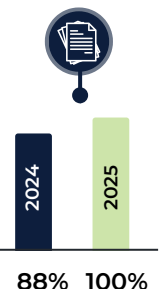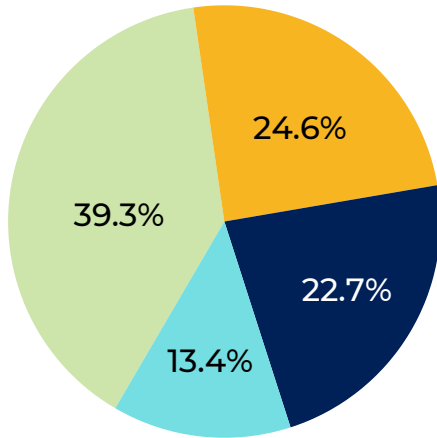
Total = $124,889

BUDGET EACH QUARTER

Business | Electrical | Mechanical | Software

$ 20,000

$ 15,000

$ 10,000

$ 5,000

$ 0

Q1 = $39,854 | Q2 = $15,107 | Q3 = $32,816 | Q4 = $37,112
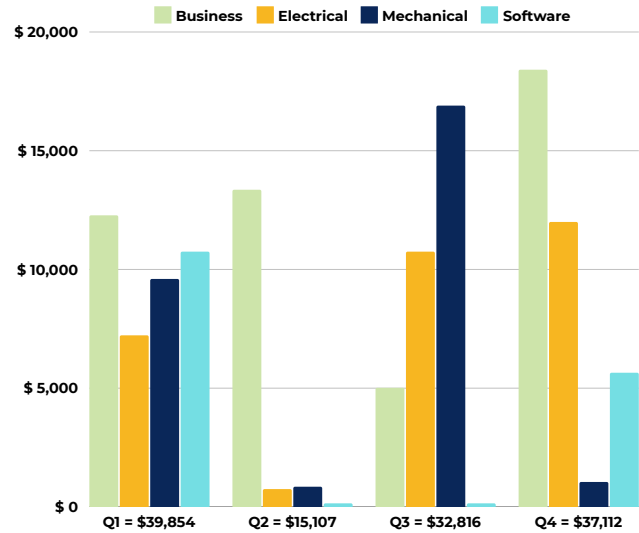
B — Business - $49,064

Competition	$31,059
Events	$7,650
Marketing	$3,950
Other	$6,405

E — Electrical- $30,725

Competition Projects	$ 14,425
New Robot Projects	$ 11,600
Equipment	$ 1,400
Consumables and Stock	$ 3,300

M — Mechanical - $28,400

Competition Projects	$ 10,150
New Robot Hull and Frame	$ 15,400
Equipment	$ 900
Consumables and Stock	$ 1,950

S — Software - $16,700

Sensors & OBC	$ 11,100
Subscriptions	$ 600

arvp.org

Alumni and Active Member Resume Database

Large Logo on current AUV

Custom Requests: Just Reach Out!

PARTNER SPONSOR
$6k+

Social Media Posts on All Platforms

Logo displayed on promotional items and ARVP events

Coordinated site visits, events, and demonstrations

SUPPORT SPONSOR
$1.5k+

Thank you cards, appreciation posts, and ARVP duckies

DONOR
<$1.5k
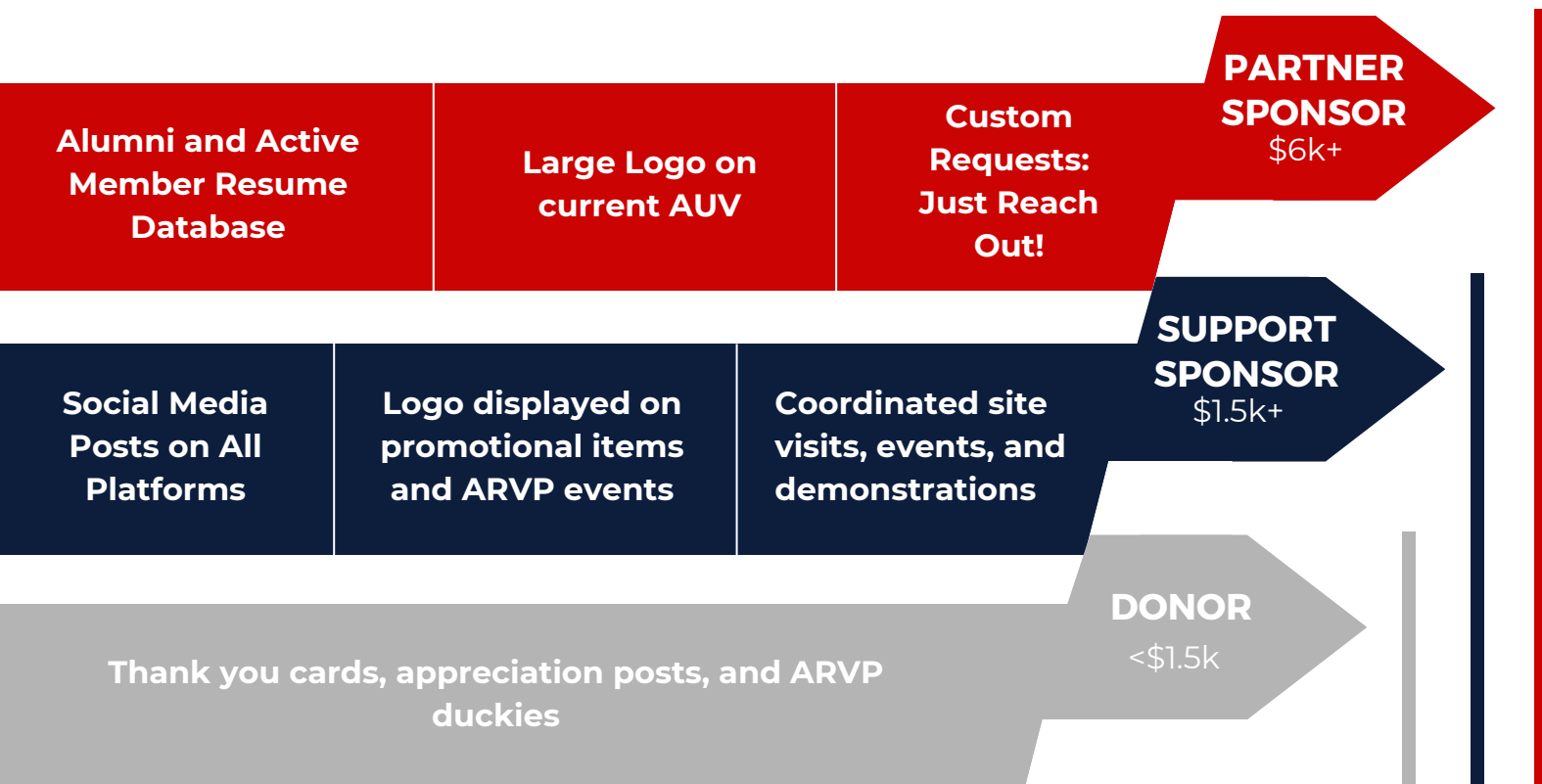
CONNECT WITH QUALITY TALENT

ARVP's core objective is to serve as a wholesale development process for young adults interested in robotics. By sponsoring ARVP, you can directly connect with undergrads and new grads with years of hands-on experience in their respective disciplines. Our vetted resume database can also help speed up your company's search for talent.

EXPAND YOUR REACH

Our team is composed of passionate students starting internships, running community outreach events, presenting our work to UofA donors, and sharing their passion with other young adults internationally. By sponsoring ARVP, you allow the team to champion your brand through our events, achievements, and testimonials to help reach your target audience.

OUR SUCCESS IS YOUR SUCCESS

Our triple mandate drives us to be a social hub for students, where community, skill-building, and shared goals come together to create a support network. Your sponsorship directly fuels this mission, enabling us to elevate the university experience for every member. By investing in ARVP, you're not just supporting our team—you're shaping a generation of community-driven leaders. Together, our success becomes your success.

Donations and sponsorships are accepted in both cash and in-kind contributions. Benefits are maintained for 1 year.

Lifetime contributions are maintained through ARVP's website and support plaque. The plaque is displayed predominately in the ARVP workspace with a banner stand-in at the international RoboSub competition.

Thank you to our generous sponsors. Our continued success is only possible through your contributions and support!

aramark

Altıum

COPPERSTONE TECHNOLOGIES

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UNIVERSITY OF ALBERTA

CAVALRY FENCE
VINYL FENCE EDMONTON

RAIL SHOP
SERVICES INC.

GitLab

ELEGOO

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