eastern edge robotics

St. John's, Newfoundland and Labrador, Canada
Fisheries and Marine Institute of Memorial University of Newfoundland

The Edge of Innovation

Mission Statement

To be on the leading edge of the ROV industry, operating from inland lakes to the deepest depths of the ocean.

Abstract

Eastern Edge Robotics (EER) is a multidisciplinary company that designs and manufactures remotely operated vehicles (ROVs). For the 2026 Request for Proposals (RFP), EER developed a new ROV, BlueStar. The ocean is deeply important to Newfoundland, from the economy to the culture. The 2026 RFP addresses ways ROVs can support the ocean surrounding Newfoundland, including offshore maintenance, invasive species detection, and observation to understand our waters better.

To begin designing specialized tools, EER brainstormed ideas based on the 2026 RFP. For example, most of the tools developed are static to minimize disturbance in fragile environments. Then EER began rapid prototyping: a design for a tool would be created, tested, and a new design would be fabricated immediately, based on pilot feedback, allowing tool optimization to be completed in-house. This led to tools like the Newfoundland Clipper, which allows users to attach items such as recovery lines to buoy anchors.

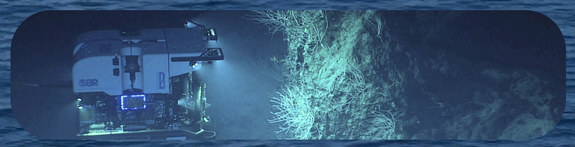
Ozzy and Claire drilling one of the tooling skids.
Photo Credits: Michaela Barnes

Theme

Ecojustice states that "the Grand Banks and the open ocean off the eastern coast of Newfoundland and Labrador are one of the most important marine environments in the world and home to a wide assortment of ocean life, from the endangered cod to humpback whales, corals and sponges" [1]. Recognizing their importance creates a sense of responsibility to protect local environments. However, continued development of the offshore oil and gas industry in Newfoundland is causing significant damage to these environments [1]. Through efforts aligned with the UN Sustainable Development Goals 7 (Affordable and Clean Energy), 13 (Climate Action), and 14 (Life Below Water) [2], the negative effects of the offshore oil and gas industry can be mitigated. This, in turn, will have environmental, social, and governance effects on how tasks are completed in industry and research settings.

Three of the UN Sustainable Development Goals
Photo Credits: [2]

Goal 14 aims to conserve and sustainably use the world's oceans [2]. In Newfoundland, this means protecting fragile marine fauna, such as the cold-water coral recently discovered in the Funk Island Deep marine refuge [3]. The OSPAR Commission states that coral gardens are often affected by "maritime human activities, such as fishing and the offshore oil industry" [4], both of which are prevalent in the province. Furthermore, "regeneration after damage can be extremely long when considering a whole garden" [4]. ROVs can aid in this conservation by entering fragile environments, such as coral gardens, to capture imagery for photogrammetry studies without disrupting the environment. Furthermore, if there are any threats to human life in these areas, ROVs can be sent in their place. This has broader implications for social and environmental factors that shape how research is conducted. If ROVs are sent to underwater coral gardens, divers are kept safe, and research can be completed more easily. This will make coral gardens more accessible to biologists and enable them to conserve these areas better, as well as other subsea environments.



ROV surveying bamboo coral
Photo Credits: [5]

Goal 7 and Goal 13 [2] can also be worked on in Newfoundland. Offshore oil and gas activity in the province is harming marine life. While work is needed to mitigate this, oil and gas are still required to meet electricity demand and support the economy in Newfoundland [6]. To offset some of the environmental impacts of this industry, wind turbines can be used to power offshore platforms, reducing carbon emissions, generating more clean energy, and mitigating the effects of climate change. Offshore wind farms require maintenance, and sending people out to perform it in harsh, coldwater environments is dangerous. ROVs can be sent instead, allowing for effective maintenance while keeping crews safe. This will also have broader implications for governance and environmental factors, especially for policy-making. If maintenance becomes safer and easier, governments can create environmental policy governing the use of offshore wind farms, potentially making them a requirement for powering offshore oil platforms.

Offshore Oil Platform with Attached Wind Turbine
Photo Credits: [7]

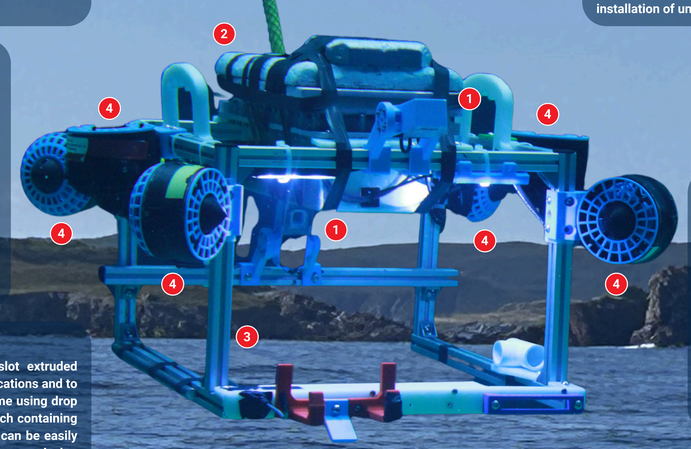
ROVs can be used in a variety of ways to help achieve the UN Sustainable Development Goals and the 2030 Agenda for Sustainable Development [2]. This, in turn, contributes to reduced environmental impact, improved off-shore safety, and more effective government policy.

Design Rationale

Eastern Edge maintains a user-centred design philosophy focused on simplicity, adaptability, and reliability in the design and manufacturing of BlueStar. Designed in-house specifically for the 2026 RFP, BlueStar delivers features that enable completion of mission tasks safely and efficiently.

BlueStar

Photo Credits: Ty Freda



1 Cameras:

The ROV is equipped with two high-resolution cameras in custom waterproof housings. They provide the operator with a wide field of view, allowing them to have greater awareness of their surroundings. Additionally the cameras are important for photogrammetry studies; they are used to capture 2D images that can be stitched to create 3D models of subsea environments such as coral gardens.

2 Electronics Enclosure:

BlueStar's electronics enclosure is a waterproof housing which contains all on-vehicle electrical systems. The enclosure is constructed from aluminum sheet metal with a clear acrylic lid and designed to withstand the specified operating depth of 5m. The vehicle's electronics are capable of driving DC motors, thrusters, and LEDs. For example, providing a control method for the DC motors used in biofouling removal. This supports modular tooling and allows the operator flexible configurations. The electronics systems are designed to be repairable and field serviceable, minimizing down time for operators.

3 Chassis:

BlueStar's chassis consists of a light-weight T-slot extruded aluminium frame for ease of transport to mission locations and to allow the operator the ability to reconfigure the frame using drop in fasteners. BlueStar includes two tooling skids each containing a pre-configured set of tools (shown below) which can be easily attached to the chassis and swapped based on mission specifications.

4 Thrusters:

BlueStar has six Blue Robotics T-200 Thrusters. Two thrusters are placed vertically allowing the operator to easily lift objects like coral samples and basket stars from the sea floor to the surface. There are four horizontal thrusters placed at 45° angles for control during RFP tasks. This allows for precise movement for flying transects and installation of underwater connectors.

5 Tether:

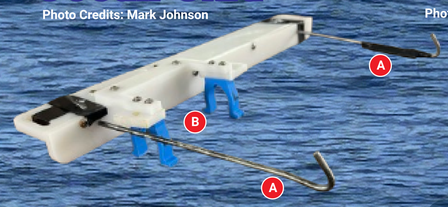
BlueStar's tether is neutrally buoyant ensuring that it trails behind the ROV without impeding movement or disrupting fragile environments by dragging on the sea floor.

Safety Features:

- The thrusters are equipped with custom guards to prevent damage to operators and fragile marine life like coral.
- There are no sharp edges on the chassis or any tools to avoid damage to any marine life during operations.
- A Kellems grip strain relief has been added to both ends of the tether
- A software kill switch has been implemented to immediately stop operations in the case of an emergency.

Ocean Skid

Photo Credits: Mark Johnson



A The Cod Jigger:

This tool is a tent peg attached to the ROV. It can be used for a variety of tasks including recovery and placement of eDNA sensors and collection of basket stars.

B The Aquafourte:

This custom 3D printed tool is designed to snap on to coral substrate for the safe collection of coral species.

Wave Skid

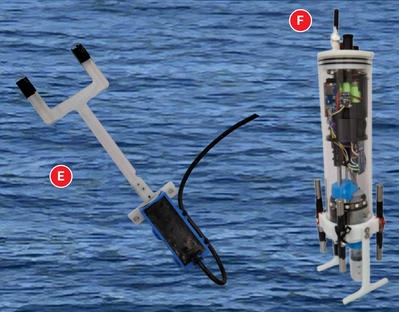
Photo Credits: Mark Johnson

C The Newfoundland Clipper:

This static tool allows BlueStar to attach recovery lines. Paracord is wrapped around a plastic spool. This provides a smooth, strong surface for the paracord to slide across as it unspools. A 3D-printed clip provides a secure attachment method to the buoy anchor for recovery.

D The Spoons:

This forked tool can be used for deploying eDNA connectors and bubble curtains at the required angles for installation. It also has a magnet attached for removing micropile release pins.



E The Nor'easter

A waterproofed DC motor with a two-prong fork is used to remove biofouling from the Holyrood subsea observatory camera.
Photo Credits: Mark Johnson

F The Vertical Profiler:

Using a buoyancy engine, the vertical profiler surveys water columns under surface ice. A depth sensor provides data used for holding its position midwater. When the profiler finishes data collection, it signals its completion by using an LED signal visible under the surface ice.
Photo Credits:
Charles Campeau

Acknowledgements

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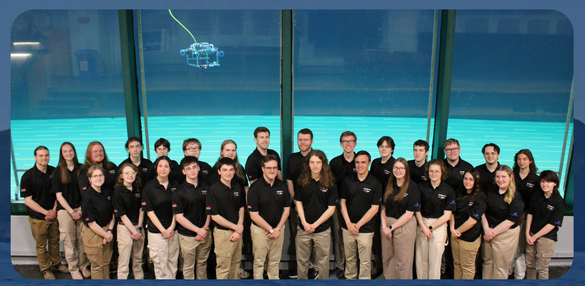
Company Information

Name	Position	Qualifications
Mark Johnson	CEO	Mechanical Engineering
Russell Corbett	COO	Computer Engineering
Jadzia Penney	CMO	Electrical Engineering
Ash Peddle	CSO	Mechatronics Engineering
Eric Goulding	Mechanical Lead	Mechanical Engineering
Kaitlin Healey	Payload Lead	Chemistry
Evan Vokey	Electrical Lead	Computer Engineering
Zaid Duraid	Software Co-Lead	Computer Engineering
Evan Whelan	Software Co-Lead	Computer Engineering
Ben Riggs	Finance	Commerce
Natalie Mitchell	Marketing	Engineering
Colin Murphy	Mechanical	Underwater Vehicles
Zach Hull	Mechanical	Ocean Naval Engineering
Abbey Bryden	Mechanical	Mechanical Engineering
Claire Harnum	Mechanical	Mechatronics Engineering
Liam Transue	Mechanical	Engineering
Ozzy Hutchings	Mechanical	Electrical Engineering
Brandon Higdon	Mechanical	Mechanical Engineering
Julia Caines	Mechanical	Mechanical Engineering
Brendan Booth	Payload	Mechatronics Engineering
James Cole	Payload	Chemistry (Biological)
Em Penney	Payload	Nautical Sciences
Julia Butt	Payload	Ocean Naval Engineering
Sadie Beaver	Payload	Mechanical Engineering
Finlay Jones	Payload	Engineering
Charles Campeau	Payload	Engineering
Polina Konstantinova	Payload	Engineering
Ty Freda	Payload	Mechatronics Engineering
Amelia Somers	Electrical	Chemistry (Biological)
Patrick O'Brien	Electrical	Engineering
Ethan Preston	Electrical	Underwater Vehicles
Keagen Slaney-Boland	Software	Engineering
Logan Janes	Software	Computer Engineering
Peyton Cashin	Software	Computer Science



Eastern Edge Robotic Team Photo

Back Row: Zach Hull, Abbey Bryden, Brandon Higdon, Ethan Preston, James Cole, Peyton Cashin, Evan Whelan, Russell Corbett, Logan Janes, Eric Goulding, Ty Freda, Colin Murphy, Liam Transue, Mark Johnson, Julia Butt
Front Row: Em Penney, Kaitlin Healey, Ozzy Hutchings, Patrick O'Brien, Charles Campeau, Ben Riggs, Brendan Booth, Evan Vokey, Jadzia Penney, Polina Konstantinova, Claire Harnum, Natalie Mitchell, Amelia Somers
Missing: Ash Peddle, Zaid Duraid, Julia Caines, Sadie Beaver, Finlay Jones, Keagan Slaney-Boland

Photo Credits: Joe Singleton

Company Evaluation

Problem Solving: For the 2026 RFP, the ROV will be required to operate in multiple environments to complete a range of tasks. This is not something EER has previously designed for, which presented a challenge for the payload team. A large number of task-specific tools are needed to work efficiently, but it became difficult to attach all of them to the ROV at once. After some brainstorming, the team decided to create swappable tooling skids that could be adjusted based on the mission tasks. This caused the payload team to learn about problem solving through creative new tooling design. In the future, EER can utilize what has been learned from the tooling skids for approaching new design challenges.

Intellectual Development: In the initial stages of testing the ROV, it proved very difficult to lift the lobster pot because of its heavy weight. The company brainstormed multiple solutions, including changing the propulsion system or the tooling. It was decided that variable buoyancy would be added to the ROV using a lift bag, which the company had little experience with and limited knowledge of implementation. The company used this learning opportunity to expand their capabilities for this year and future years in the use of variable buoyancy.

Teamwork: This year, the company encountered issues when some team leads were completing internships outside of the province. Due to time zone differences, it became harder for them to attend team meetings, and they were unable to work on the ROV physically. However, the company used this as an opportunity to learn about teamwork, as other employees stepped up to fill the gap left by the team lead's inability to work on the ROV. This allowed employees to learn a great deal about how to work with team members over distance and this will be used in future years if other employees are away from the company for a long period of time.

References

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Background Photo Credits: Em Penney