

Underwater Inspection Challenge



Training & ROV Competition

10th December 2025

In Association with
The Eighteenth Biennial Symposium on
Ocean Technology, (SYMPOL 2025)

organised by department of electronics, cochin university of science and technology, kochi

ABOUT THE PROGRAMME

The Underwater Inspection Challenge is a multi-stage competition designed to test your team's knowledge of underwater robotics principles, quick decision-making, and advanced remote piloting skills necessary for industrial inspection tasks. Visit <https://sympol.cusat.ac.in/news.php> for more details and rules of the event. For further queries contact the SYMPOL Secretariat at sympol@cusat.ac.in or mithuntp@cusat.ac.in

HIGHLIGHTS

- Interaction with DRDO Scientist
- Underwater Inspection Challenge
- Training Programme on ROV : 3 hour Session on ROV Systems, Basic Controls, Inspection Safety Protocols, and Mission Objectives

EVENT SCHEDULE and STRUCTURE

- Interaction with DRDO Scientist (09:30 - 10:00)
- Round 1: Training Program (10:00 - 01:00) : Mandatory 3-hour training session for all participants
- Round 2: Written Quiz (01:00 - 01:15) : 15-minute, qualifying quiz based directly on the training content from Round 1
- Round 3: ROV Inspection Challenge (Starts 14:00) : Main piloting competition of ROV Mission
- * Students can Register as a Team of Five Members
- * Top 5 teams with the highest combined quiz scores will advance to the final Round 3
- * Exciting Prizes for the winners

REGISTRATION

- Registration Fee : 1000 + 18% GST (per student)
- Registration fee includes training programme, participation in the challenge and refreshments

CONTACTS

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Register Here !!

SYMPOL 2025

Underwater Inspection Challenge

1. The Problem Statement: Mission Objectives

The **Underwater Inspection Challenge** is a multi-stage competition designed to test your team's knowledge of underwater robotics principles, quick decision-making, and advanced remote piloting skills necessary for industrial inspection tasks.

The final, high-stakes challenge (**Round 3**) requires teams to **remotely pilot a provided ROV** to locate and clearly identify **three critical points of interest (submerged images)** placed at varying depths within the competition pool. The inspection pilot will be isolated in a separate room and must rely *solely* on the **live video feedback** from the ROV's onboard camera to navigate and successfully document the inspection targets.

2. General Team and Participation Rules

- **Team Composition:** Each team must consist of **5 members**.
- **Eligibility:** Students from the **same or different institutions** can form a team.
- **Mandatory Training:** All registered team members **must attend** the Round 1 Training Program (09:30 - 12:30) to be eligible to compete in the quiz and subsequent rounds.
- **Equipment:** The organizers will provide the **standardized ROV, controller, and video feedback system**. Teams cannot use their own equipment.

3. Event Schedule and Structure

The competition is a three-round event held on a single day:

Round 1: Training Program (09:30 - 12:30)

This is a mandatory 3-hour session covering ROV systems, basic controls, inspection safety protocols, and mission objectives.

Round 2: Written Quiz (12:30 - 12:45)

A 15-minute, qualifying quiz based directly on the training content from Round 1.

- **Qualification:** The **top 5 teams** with the highest combined quiz scores will advance to the final **Round 3: ROV Mission Challenge**.

Round 3: ROV Inspection Challenge (Starts 13:30)

The main piloting competition for the top 5 qualifying teams.

4. Round 3: Detailed Mission Rules

This round simulates critical infrastructure inspection, demanding precise control under time pressure.

Team Roles

1. **Inspection Pilot (1 Member):** Controls the ROV from the **isolated room**, seeing only the video feed. **Cannot** see the pool directly or receive visual instruction from the crew.
2. **Tether/Deployment Crew (2-3 Members):** Responsible for:
 - Deploying the ROV into the tank.
 - Managing the **tether** to prevent fouling.
 - The crew **cannot** communicate navigational or target-location instructions to the pilot.

Time Limits

- **Preparation Time:** Each team receives **5 minutes** for system checks, communication testing, and positioning the ROV near the entry point.
- **Mission Time:** Each team receives a maximum of **10 minutes** to complete the inspection task.

Target Documentation

- The goal is to locate three distinct targets (images) placed at various depths.
- Documentation is successful only when the team positions the ROV directly in front of a target and the onboard camera provides a **clear, recognizable image display** through the pilot's video feed for a duration judged sufficient by the officials (3 seconds).

5. Scoring System and Penalties (Revised)

The final score for Round 3 will determine the competition winner. The maximum achievable base score is **100 points**.

Points Awarded

- **Initial Deployment & Movement: +10 points** (Awarded once the ROV enters the water and begins controlled movement).
- **Documenting Each Target: +30 points** (Maximum of 90 points for all three targets).
- **Maximum Base Score: 100 points.**

Mission Time Bonus

Teams completing the full task (documenting all three targets) in **less than the 10-minute maximum** will receive a significant time bonus.

- **Time Bonus: +15 points** will be added to the score for **every full minute remaining** on the clock at the moment the third target is successfully documented.
 - *Example:* If a team completes the mission in 6 minutes and 30 seconds, they have 3 full minutes remaining (10 min - 6 min = 4 min remaining. The full minutes are 3). The bonus would be $3 \times 15 = +45$ points.

Penalty Deductions

- **Hitting Walls or Floor: -5 points** (Deducted per confirmed incident, as judged by event officials).
- **ROV Surfacing: -5 points** (Deducted if the ROV breaks the water surface after initial deployment. The mission **ends immediately** upon surfacing, regardless of time remaining).

Tie-Breaker

In the event of a score tie, the following criteria will be used to determine the winner (in order):

1. **Fastest Completion Time:** The team that successfully documented the final target in the shortest total time (used only if scores are tied **after** the time bonus calculation).
2. **Fewest Penalties:** The team that incurred the fewest total penalty points.

6. Conclusion: The Challenge Ahead

The **Underwater Inspection Challenge** is more than just a competition; it is a rigorous test of teamwork, technical knowledge, and operational proficiency. Success requires not only mastering the ROV controls but also demonstrating impeccable coordination between the isolated pilot and the tether crew. We encourage all teams to embrace the complexity of the mission, prioritize safety, and leverage the knowledge gained in the training program. The team that exhibits the best combination of **speed, precision, and efficiency** will be declared the champion of the first annual Underwater Inspection Challenge.