GUJARAT COUNCIL ON SCIENCE AND TECHNOLOGY
Dept. of Science and Technology, Govt. of Gujarat

ROBOFEST- GUJARAT 5.0

Guidelines for submission of Ideation Proposal
Senior category

All teams must be present and ready to perform their challenge. The committee may assign any team to the task at random. Any kind of absence and lack of readiness will be subject to suitable actions, including the deduction of score/disqualification.

Students are required to perform their task and answer the questions. Mentors should not be involved in the task. The committee may allow mentors during question-answer if it feels necessary, depending on the situation.

Sample images given in these guidelines are only for visual understanding.

Autonomous Underwater Vehicle

Game Description:

The DeepTech Dive – AUV Challenge aims to simulate real-world underwater navigation, detection, and manipulation tasks using an Autonomous Underwater Vehicle (AUV). The competing AUV must autonomously navigate an obstacle-free underwater arena, identify specific visual and acoustic targets, and successfully drop a payload into designated target drums—without surfacing, touching the pool walls or floor, or requiring remote control.
This challenge will test participants' skills in underwater robotics, sensor fusion, path planning, acoustic signal processing, and target acquisition using onboard computing.

Challenge Tasks:

1. Qualification Gate Run:
    - The AUV must pass through a gate forward, perform a U-turn, and return through the gate in reverse.
    - Points are awarded only when forward and reverse runs are completed without touching pool sides/bottom.
2. Visual Target Zone Navigation:
    - Navigate to the green mat zone (8m x 2m) placed on the pool floor using computer vision.
3. Target Drum Identification:
    - Identify and localize one blue drum among three red drums.
    - One red drum will emit an acoustic ping (using a pinger), randomly placed each attempt.
4. Target Acquisition:
    - Drop a payload (medium -sized ball: diameter: ~70 mm) into the designated drum:
        - Blue drum: 30 points
        - Pinger drum: 20 points
        - Other red drum: 10 points
5. Bonus Challenge:
    - Generate and display a digital 2D map of the mat and drum positions (to be reviewed post-mission).

Game Field Design:

- Arena: Rectangular water tank/pool (Minimum size: 10m x 6m, depth: 1.5m+).
- Start Zone: Marked start line near one short side of the pool.
- Qualification Gate: Placed 2 meters ahead of the start line.
- Green Target Zone: Located on the opposite half of the pool, four colored drums are placed randomly on a green mat.

- Drums: Equally spaced within the green zone. Each drum is identifiable by color from a top view.
- Obstacle-Free: No physical obstacles or barriers in the pool; emphasis is on autonomy and accuracy.

Design Specialties Expected:

- Modular watertight chassis
- Reliable battery system for 10+ minutes of operation
- Vision systems (camera-based) for drum identification
- Hydrophone/Acoustic sensor for pinger localization
- Controlled buoyancy and stabilization
- Robotic arm or drop mechanism through suitably-designed gripper for payload release

Challenge Tasks & Scoring:

Task	Description	Points
Qualification Gate Run	Forward pass → U-turn → Reverse pass through gate without touching sides	20
Visual Target Navigation	Navigate to the green mat zone using camera vision	10
Target Drum Identification	Identify the blue drum and pinger-emitting red drum among 4	10
Payload Delivery	Drop the ball into:	
	- Blue Drum (decoy)	30
	- Red Drum with Pinger (actual target)	20
	- Any other Red Drum	10
Bonus Mapping Challenge	Post-mission map of mat layout with drum positions (2D Digital Map)	10
Return to Start Zone	Return and surface within 10-minute time limit	10
Clean Run Bonus	No surface contact or boundary hits	10
TOTAL MAX SCORE		120