

# INNOVATEX 4.0 – Presidency University

## MakerSpace Cluster | Standard Rule Book

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### Event Overview

| Field       | Details                                 |
|-------------|---|
| Event Name: | “STEELWAVES – DRIFT. DOMINATE. DESTROY” |
| Cluster     | MakerSpace Cluster                      |
| Event Type  | RC Event                                |
| Mode        | Offline                                 |
| Team Size   | Team of 4 Members                       |
| Duration    | 8 hours (9am-5pm)                       |

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### Event Task / Objective

Not every challenge is built for speed alone — some are built for control under pressure.

STEELWAVES throws teams into a rally-style aquatic circuit where sharp turns and precision handling define the run. Boats will take the arena one at a time, attacking the buoy-marked track across two consecutive laps in a timed attempt that rewards control, consistency, and confident maneuvering. With no gimmicks or artificial obstacles, the focus stays on performance, precision, and handling under pressure. Success depends on how well your boat is tuned, how reliably it responds, and how confidently you command it through every turn of the arena.

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### Design / Technical Specifications

#### 1. Mechanical Rules

- Max dimensions: 40 cm (L) × 30 cm (B) × 15 cm (H).
- Hull: Fully self-fabricated, lightweight and waterproof (foam, plywood, fiberglass, 3D print, etc.).
- Boat type: Surface boat only, no submerged ROVs.
- Course capability: Must handle S-bends, loops, and dynamic water zones.

## Propulsion and drive

- Motor type: Brushless DC, outrunner or inrunner.
- KV rating: 1000 – 1800 KV (strict) on 3S.
- Propeller:
  - Material: Plastic / composite only.
  - Diameter:  $\leq 38$  mm (strict).
  - Pitch:  $\leq 1.4$ .
  - Blades: 2 or 3 only.
- ESC:
  - Type: Marine / waterproof ESC.
  - Current rating: 60A – 90A.
  - Voltage rating: 2–4S acceptable, but actual use limited to 3S.

## Allowed

- Stabilizers (fins, turn-fins, trim tabs).
- Propeller guards.
- Decorative elements that do not interfere with safety or other boats.

## Prohibited

- IC engines of any type.
- Nets, blades, or any entangling mechanisms.
- Flame-, gas-, or pressure-based systems.
- Exposed rotating parts that can injure (except propeller in water; guards recommended).

## 2. Electrical Rules

### Wiring & Safety:

- No exposed wires allowed
- Battery must be **properly insulated and waterproofed**
- All circuits must be secured inside the hull
- Boat must have an **easily accessible master power switch**

### Electronics:

- ESCs, sensors, microcontrollers allowed
- High-frequency LEDs allowed
- No high-voltage boost converters
- No RF emitters that exceed allowed control-band limits

### 3. Control System Rules

#### Control Type:

- **Wireless remote control only** (No wired tethers)
- Autonomous features allowed (but full autonomy not required)

#### Interference & Safety:

- Control frequency must **not interfere** with other teams
- Participants must ensure a **failsafe mechanism** (signal loss → motor stop)

#### Operator Restrictions:

- Operator must remain in the allotted control zone
  - No external guiding lasers, beacons, or trackers
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## General Guidelines

1. Participants must report **30 minutes before** their round for inspection.
  2. Only the registered team member may operate the boat.
  3. Teams must follow all **safety instructions** given by event coordinators.
  4. No team may enter the water arena without permission.
  5. Damaging the arena, obstacles, or other boats will lead to penalties.
  6. If a boat gets stuck, only the coordinators may retrieve it.
  7. Teams must start and stop their boat **only when instructed**.
  8. Unsportsmanlike behaviour or arguing with officials will result in disqualification.
  9. Judges' decisions are **final and binding**.
  10. Teams should be prepared for **multiple rounds** with minimal repair time.
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## Safety Rules


1. Do **not touch the water** or obstacles while boats are running.
2. Keep all electronic equipment and batteries **away from water** when not sealed inside the hull.
3. No team member may enter the arena unless the coordinator allows it.
4. Ensure all batteries are **properly insulated** and free from damage.

5. Avoid operating the boat at **maximum speed** near the arena edges or other participants.
  6. Immediately inform coordinators if you notice **water leakage**, short circuits, or unstable wiring.
  7. Do not run the boat if the transmitter or receiver is malfunctioning.
  8. Keep hands and tools away from **moving propellers** at all times.
  9. Only dry, clean hands should be used while handling battery connections.
  10. Follow all emergency instructions from officials without delay.
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## Event Structure

### “THE TWIN SURGE”



 Each team gets:

- One run
- Two continuous laps
- One timed attempt

Boats will take the arena one at a time and attack the circuit across two laps that demand both speed and sustained control. The transition between laps will be defined by a designated lap marker (gate). Participants must pass through this marker at the end of Lap 1 to begin Lap 2, and again after completing Lap 2 to finish their run. Missing the marker may result in penalties.

Lap 1 challenges teams to push their boat through the course with confidence and pace.

Lap 2 raises the stakes — demanding sustained stability, composure, and consistency under pressure.

There are no retries — the total time across both laps will decide the final rankings.

## Run Flow

Start Signal



Lap 1 → Speed & Control



Pass Lap Marker → Lap 2 Begins



Lap 2 → Stability & Precision



Pass Lap Marker → Finish



Time Recorded

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## Judging Criteria

Performance in *The Twin Surge* will be evaluated using a rally-style assessment model where timing remains the dominant factor, supported by control and course discipline.

| Criteria            | Weightage |
|---------------------|-----------|
| Time Performance    | 80%       |
| Control & Stability | 10%       |
| Course Accuracy     | 5%        |

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## Scoring Overview

Each team will receive one timed run consisting of two continuous laps.

### Base Time

The total time taken to complete both laps of the course.

Only successful completion of both laps through the lap marker will be considered a valid run.

### Final Result

**Final Time = Base Time + Penalty Time**

The team with the lowest final time will be declared the winner.

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## Time Penalties

| Infraction                   | Time Penalty |
|------------------------------|--------------|
| Missing the lap marker       | +10 seconds  |
| Skipping / cutting the track | +10 seconds  |
| Hitting a buoy               | +5 seconds   |
| Touching boundary walls      | +5 seconds   |
| Boat stall or complete stop  | +5 seconds   |

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## Awards & Recognition

| Category  | Prize   | Remarks         |
|-----------|---------|-----------------|
| 1st Prize | ₹15,000 | Winner          |
| 2nd Prize | ₹10,000 | Runner-up       |
| 3rd Prize | ₹7,000  | Technical Merit |

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## Event Team

| Role                | Name           |
|---------------------|----------------|
| Faculty Coordinator | Dr. Divya Rani |
| Event Lead          | Muntaz Begum   |

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# General Instructions

- Follow all university and MakerSpace cluster policies.
  - Respect judges, peers, and staff.
  - Any form of plagiarism or code reuse will lead to disqualification.
  - Decisions of the judges are final and binding.
  - Certificates will be awarded to all valid participants.
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