



IPSC IT FEST 2026

Robot Specification

Terra Incognita

The Doon School

DEHRADUN

This document is part of the Terra Incognita document pack. It sets out the limits that apply to the robot.

1. Dimensions

1.1 The robot must remain within the following maximum dimensions:

Parameter	Specification
Length	Maximum 20 cm
Width	Maximum 20 cm
Height	Maximum 20 cm
Weight	Maximum 5 kg
Scope	Applies to the complete robot in its normal operating configuration
Extension restriction	No component may intentionally extend beyond the permitted dimensions during the official run

1.2 Centre mark. The robot must carry a visible cross on its top surface at the centre of its length and width. The final distance is measured from the point directly below this mark (Judging Rubric §2.2).

2. Power

2.1 The maximum permitted battery capacity is 10,000 mAh.

2.2 Teams may select their preferred battery type and operating voltage, provided that the battery and power system are safely integrated into the robot. The battery must be securely mounted and must not create a safety hazard.

3. Sensors

3.1 All sensor types are permitted, provided that they are safely integrated into the robot. Possible sensors include:

- cameras;
- depth cameras;
- RGB-D cameras;
- ultrasonic sensors;
- infrared sensors;
- wheel encoders;
- IMUs;
- optical sensors;

- time-of-flight sensors;
- other suitable environmental or motion sensors.

3.2 No LIDAR sensor of any type is permitted. A LIDAR sensor is a sensor that scans a laser to measure distance in multiple directions. A single-point commercial time-of-flight sensor is not LIDAR for the purposes of this document.

4. Control

4.1 The robot must operate fully autonomously during the official run.

4.2 The robot must have a physical switch that starts the robot. A robot without the switch does not pass inspection (Inspection and Safety §1.3).

4.3 Preparation before the run and touches during the run are governed by Rulebook §3.2 and §4.1.

5. Communication

5.1 Wi-Fi and Bluetooth may be used only to send non-control information from the robot to the team's own laptop, for example the map, the robot's position, its trajectory and basic telemetry or status information. The link must be a direct local link with no internet connection. Sharing an internet connection (a hotspot) is not permitted (Rulebook §8).

5.2 Communication may not be used to transfer sensor data to an external computer for SLAM processing. An external computer may not make navigation or movement decisions for the robot. It may be used only as a display device and may receive and display information generated by the robot. It may not be used to:

- perform SLAM calculations;
- process the robot's sensor data for mapping;
- perform localisation calculations;
- control the robot's movement;
- send navigation instructions to the robot.

This ensures that the robot remains the primary autonomous system.

6. Recommended system architecture

6.1 A typical competition robot could consist of the following chain:

Sensors > Onboard computer (SLAM, localisation, mapping, navigation, autonomous control) > Grid map > HDMI cable > Monitor provided by the organisers

6.2 This architecture is only a recommendation. Teams remain free to design their own hardware and software systems.

7. Map generation and display

7.1 The robot must generate a grid map during the official run, as set out in Arena Specification §6.

7.2 After the run, the grid map is shown on an HDMI monitor provided by the organisers (Rulebook §3.3). Teams bring their own HDMI cables and any adapters needed. The robot may output the map directly, or a laptop may display what the robot sends. The laptop must not perform the SLAM or autonomous-control calculations.

7.3 The map shown must not be edited, regenerated or reprocessed after the run ends (Rulebook §3.3).

8. Computing system

8.1 Teams may use any onboard computing system (microcontroller, single-board computer, embedded computer, onboard PC or other platform), provided that it is physically part of the robot and complies with the dimension and weight limits.

8.2 All computation required for the robot's autonomous operation must be performed onboard the robot. This includes SLAM, sensor processing, localisation, mapping, loop-closure processing, navigation, motion planning and motor control. An external computer may not perform any of these calculations during the official run.

9. Languages and tools

9.1 All programming languages are permitted.

9.2 Each team member must be able to explain the robot's code entirely.

10. Restrictions

10.1 Any material or mechanism reasonably likely to damage the arena, harm a person, damage equipment, interfere with another team's robot, or deliberately alter the arena environment is prohibited.

10.2 A pre-existing map of the arena may not be used to generate the competition map.

10.3 Robots may be self-built or made from commercially available components.

11. Inspection

11.1 Every robot is inspected once before its official run, in one of the inspection slots in the Fest schedule, as set out in Inspection and Safety §1 and §2. A robot that does not comply must correct the issue and pass re-inspection before its run.