Elimination Round
RULE BOOK V3.0

ISRO ROBOTICS CHALLENGE-URSC 2026

Contents

1 Background

ISRO Robotics Challenge-URSC 2024 & 2025 (IRoC-U 2024 & 2025) provided an opportunity to the student community to showcase their engineering problem solving capabilities for space missions. The student community responded with great enthusiasm and its unprecedented success served as an inspiration for IRoC-U 2026.

The Honourable Prime Minister of India appreciated and commended ISROs initiatives such as the Indian Space Hackathon and the Robotics Challenge (IRoC-U), noting that these efforts help to kindle greater interest in space among the youth. He warmly congratulated all the students who participated in these competitions and the winners for their creativity and enthusiasm.

2 Challenge

One of ISROs future goal is the exploration of Martian surface and as a part of this surface exploration, an Autonomous Unmanned Aerial Vehicle (UAV) will carry out scientific activities. ISRO solicits from the youth of India, innovative ideas and designs in the area of navigation for future missions through the conduct of Robotics Challenge.

The IRoC-U 2026 challenges the students to develop “Towards Swarm Expedition: Autonomous Surveyor Challenge for Exploration, Navigation and Dynamics (ASCEND)” without any external navigation aids like GNSS, pseudolite or reflector arrays.

IRoC-U 2025 challenge consisted of demonstration of an autonomous, aerial capability without GPS aid. IRoC-U 2026 challenge will involve autonomous navigation, landing, power transfer and image data validation. As a result, this year’s challenge advances and refines the goals defined in the previous year.

Autonomous aerial swarms are the future of planetary exploration: they can deploy, survey, recharge and share data without direct human control. The “Towards Swarm Expedition: Autonomous Surveyor Challenge for Exploration, Navigation and Dynamics (ASCEND)” takes the first step toward this vision. In this challenge, teams will build a micro-UAV (unmanned aerial vehicle) and a base station. The UAV departs from its base station, acquires the target characteristics it needs to identify and searches a designated area for the necessary features. It then returns to base station, transfer its data, and recharges its power supply - all without GPS, telemetry or remote piloting.

Hence, the current challenge focuses on developing and demonstrating navigation & guidance and image analysis techniques rather than building aerial vehicles. Students can use/develop any available (off-the-shelf) aerial vehicle complying with the existing DGCA rules.

The student community needs to develop and demonstrate the autonomous capabilities of ASCEND:

1. for navigation and guidance without external navigation aids
2. to deploy, survey, recharge and share data without direct human control

3. to search a pre-defined arena for target features, return to base station, transfer data and recharge its power system.
4. Base station should support data transfer and charging through wired and/or wireless interfaces. If wired operation is used, the interface should have ports for i) image data transfer and ii) charging. The images (target features) captured by ASCEND during survey need to be transferred to base station and compared with the reference feature database for validation.
5. Manual human intervention or manual alignment during the task is not permitted.

3 Tasks during the challenge

ASCEND has to perform the following tasks during the various rounds of the challenge:

- **Seeding Task:** While within the yellow-boundary arena perimeter, the UAV must autonomously capture the provided seed images (3-5 sample feature images) supplied through the interface of the base station.
- **Search Task:** The UAV departs from the base station and autonomously searches the arena to locate unknown instances of the seeded feature types (for example: layered rock formations, red-oxide patches, reflective ice-like patches etc.) - each feature type could have 2 to 3 instances present in the arena.
- **Detection & Documentation Task:** On detecting a feature instance, the UAV records its local estimated coordinates (relative to the base station frame) and captures a verification image of the feature.
- **Return Task:** The UAV returns to the base station, lands and interfaces without human intervention and initiates data transfer (images and coordinate log) via wired or wireless mode. At the same time, the bay charges the UAV for the next sortie.
- **Validation Task:** The base station computer validates the transferred images against the seed images (automatic image-matching). If valid, that detection counts towards the successful sortie.
- **Repeat sorties:** The teams can attempt multiple sorties for completing the task within the stipulated time. The merit is considered based on the number of sorties and time to complete the challenge.

Refer the rule book for the details. Rule book will be updated from time to time as the challenge rounds progress. The participants are requested to follow the latest version of the rulebook available in the web portal.

4 Schedule of the events

#	Description	Date
1	Announcement of the challenge	12.12.2025
2	Registration	17.12.2025
3	Last date for submission of complete proposal for Preliminary round	12.01.2026
4	Announcement of teams selected for Preliminary round	02.02.2026
5	Commencement of Qualification round	03.02.2026
6	Last date for submission of detailed design report and videos for Qualification round	02.04.2026
7	Evaluation of Qualification round	03.04.2026 To 19.04.2026
8	Announcement of Qualification round results	20.04.2026
9	Commencement of Elimination round	21.04.2026
10	Evaluation of Elimination round	22.06.2026 To 30.06.2026
11	Announcement of Elimination round results	01.07.2026
12	Commencement of Final round	02.07.2026
13	Final field round and evaluation at the venue	20.07.2026 To 25.07.2026
14	**Announcement of results**	23.08.2026
15	Awards Ceremony on National Space Day	

Note:

1. The details of the challenge will be available after the registration.
2. Only one proposal per college will be entertained.
3. Organisers reserve the right to change the dates depending on exigency of situation /to refine the task details of the challenge.
4. All deadlines are at 8.30 PM (IST) on the respective dates.

5 Venue

The final onsite/field competition to perform the required tasks is planned to be conducted in U R Rao Satellite Centre (URSC), Bengaluru-560017 iduring the month of July 2026. For information about the IRoC-U 2026 competition venue, please follow our updates on website given in section 5.1.1.

5.1 Contact Information

5.1.1 Website address: https://www.ursc.gov.in/IRoC-U2026

5.1.2 Email address for Teams: irocu2026@ursc.gov.in

5.2 Awards and Recognitions

The first three teams will be awarded based on the evaluation by jury and fair play attitude of teams. Additionally, **two consolation prizes** will be awarded. The awards in the form of cash are planned as follows:

1st place	Rs 10 Lakh
2nd place	Rs 7 Lakh
3rd place	Rs 5 Lakh
TWO Consolation prizes	Rs 2 Lakh (each)
ONE Prize for innovative and non-intuitive thinking	Rs 1 Lakh

The teams qualifying for the Field Round and participating on the challenge day will be awarded with an appreciation certificate (for each team member and mentor).

5.3 Intellectual Property Rights

Intellectual properties (IPs) generated by the team qualifying for the Field Round during the IRoC-U 2026 challenge shall be the sole property of ISRO/DOS. These teams shall enter into non-disclosure agreement with ISRO/DOS.

The ASCEND design arrived by the teams qualifying for the Field round shall not be used by the teams in any other competition without the written consent of the ISRO/DOS.

5.4 Rules and regulations by Department of Civil Aviation:

The rules and regulations issued by Department of Civil Aviation shall be strictly followed. For more details on rules issued by Ministry of Civil Aviation please visit and follow https://www.civilaviation.gov.in/ministry-documents/rules

IRoC-U 2026 organizing team is not responsible for any violation of the rules issued by DGCA that are committed by the individual teams during any stage of the challenge.

6 PARTICIPATING TEAMS

6.1 Registration

All teams must complete the registration process on the website. The registration procedure includes:

1) Team login account creation.
2) Filling out the team details and download auto-generated registration form.
3) Get downloaded registration form duly certified by the Head of the institute.
4) Upload the softcopy of the proposal and the certified registration form in .pdf format (Proposal can be of maximum pages:30 with the file size limited to 15 MB).

NOTE: Registration shall deem to be completed only after uploading as per step 3 and 4.

6.2 Team formation

1. The competition is open to students of Indian origin studying in educational institutions located in India.
2. The team is to consist of bona-fide students pursuing (full time and non-sponsored) under-graduation/post-graduation/research. Sponsored/External students are not eligible for participating in the IRoC-U 2026.
3. The team should consist of minimum of 3 members and maximum of 10 members excluding mentors.
4. Team can have at most two mentors, one of whom must be a faculty from the parent institute and other may be from the Parent Institute/ Industry.
5. Each team should identify one member as team lead.
6. Any communication from the organisers will be sent to only team lead and any query/clarification should also be raised only using the team lead's registered email-id. No response will be provided to the email addresses other than that of the registered email id.

6.3 Selection Process

The selection process is detailed below. The number of teams selected from Preliminary round will be based on the evaluation of the entries.

The number of teams selected for all the rounds is at discretion of the committee. The decision of the organisers in this regard will be final and binding.

- Prelims Round requirement: Registration and Submission of Proposal Report and presentation.
- Qualification Round requirement: Submission of Detailed Design Report and Demonstration of laboratory Prototype (details shall be provided).
- Elimination Round requirement: Demonstration of ASCEND in the simulated arena at the respective parent institute premises (details shall be provided).
- Field Round requirement: The final onsite competition to perform the required tasks is planned to be conducted at URSC Bengaluru (details shall be provided)

7 Requirements of the various rounds

7.1 Preliminary round Report submission

Each registered team must submit proposal. The proposal should introduce the team and provide explanation for the salient features/innovations of their proposal. It should confirm that the team has read, analysed and understood the task requirements.

The team needs to download the proposal report format and follow the guidelines provided in the document. The document (maximum 15 MB) needs to be uploaded on the website.

The details and rules of the subsequent rounds will be provided a day prior to the commencement of the respective rounds.

Note: Only one team from each institute is permitted to participate in the contest. It is the responsibility of the institute to select the team based on their established criteria. Furthermore, the chosen team must secure an endorsement from the head of the institution, confirming that they are the sole representatives for their institute in the competition. If more than one entry is found from any institute, first submitted proposal shall be entertained for further rounds and the remaining proposals shall be rejected.

7.2 ASCEND Specification and Requirements

Features:

a) Hardware: Teams can develop or use readily available hardware platform (Aerial vehicle)
b) Mass of ASCEND: limited to 2 kg.
c) Compliances:
   - The teams need to specify in the proposal report the compliance of the proposed ASCEND with respect to the specifications as per Table-1.
   - To meet the challenge as proposed, the use of satellite-based navigation systems, external markers, or local positioning systems is strictly prohibited (mirroring the challenges faced by an actual planetary ASCEND on distant celestial body where traditional Earth-based navigation aids are unavailable).
   - ASCEND shall have an emergency call off mode, in case of exigencies.

Table-1: Typical Specifications of Autonomous Surveyor Challenge for Exploration, Navigation and Dynamics (ASCEND)

Sl. No.	Type	Description
1	Aerial Vehicle	Rotor Craft (Micro Drone, Mass < 2 kg) (As per Drone rules-2021, issued by Ministry of Civil Aviation as per the Gazette of India CG-DL-E-26082021-229221 or the latest version)
2	Software capabilities	Indigenously developed software/algorithms

3	Power Source	Battery operated only
4	Communication	RF radiation mode only
5	ASCEND Safety features	Safe: During emergency conditions like low battery, lost-link, etc. the ASCEND shall go to a safe mode and do a safe landing at the home position/base station. Other likely emergency conditions: • Any hint of collision, malfunction of software/ hardware, malfunction of Control system etc. • Any unforeseen deviations.

8 General Rules and Regulations

The ISRO Robotics Challenge, URSC-2026, referred to as 'IRoC-U 2026' is owned, coordinated, operated and judged by IRoC-U 2026 organizing committee constituted by URSC having experts across the ISRO Centres. By taking part in the IRoC-U 2026, teams agree to place a promotional sticker on their ASCEND (max. size of the sticker: 10 cm x 10 cm).

8.1 Organisers' Disclaimer

Teams shall take full responsibility for any damages, accidents or unsettling events caused by their hardware/software as well as for the members of the participating teams. Teams are obliged to follow all safety and good conduct rules specified by the organisers. Any breach of safety rules and requirements will result in the disqualification of the team from the entire competition.

8.2 Changes to the Competition Rules

The organisers retain the right to effect any essential / inevitable changes to the competition rules. However, any changes introduced shall not impact the overall design of ASCEND. All changes will be announced in advance and updated on the website.

8.3 Deadline Extension

The organisers retain the right to extend the deadline for any round. All deadline extensions will be announced in advance and details will be updated on the website.

8.4 FAQ

The relevant queries related to the challenge raised by the teams will be updated on FAQ section of the website. Queries to any challenge related questions that arise should be mailed to contact mail ID from team lead's email ID with subject line FAQ. Teams are requested to check FAQ section before raising the query.

8.5 Challenge Scoring Issues

All issues with scoring during the challenge will be resolved solely by the independent jury. Teams cannot appeal to any other party.

8.6 Organisational Issues

Organisational issues, including team eligibility, conduct of challenge and execution of jury decisions will be resolved by the organisers.

8.7 General Challenge Issues

In case any conflict related to the challenge is encountered, the organisers decision will be considered as final and binding.

8.8 Disqualification

The organisers may disqualify a team in the event of a serious breach of the rules, safety regulations or fair play. The organisers decision shall be considered as final and binding. Teams cannot appeal to any other party including social media platforms.

8.9 Cancellation of Event

The organisers reserve the right to cancel the IRoC-U 2026 finals in the event of unforeseen circumstances preventing its safe conduct. In case of event cancellation, the organisers will inform the participating teams directly or through web portal.

8.10 Organiser's Responsibility

The organiser's civil liability is limited solely to the responsibility for organising the event in accordance with the local law and local regulations.

8.11 Copyright of the challenge

The organisers retain all copyright to the competition rules, logo, tagline and the description of the tasks. No alterations or additions to the competition rules can be made and their sale is forbidden. The rules can only be used or copied for the IRoC-U 2026 connected activities (e.g., registration process).

8.12 Personal Data Storage

Team members agree to their personal data (registration data), the documentation delivered as well as other promotional materials and visuals being stored and processed in the organisers computer systems for the purpose of the IRoC-U 2026 programme.

The organiser shall keep all technical documentation confidential and shall not publish or disclose it to any third parties without prior approval from the respective team's representatives. The sole exception to this is the challenge's jury team – technical documentation will be disclosed to judges for scoring and mentoring purposes only.

The team members also give the organiser, parties designated by the organiser and the audience, the right to disclose and publish any photos, videos or other visuals, their names and surnames, identifiable pictures of themselves and any other persons, as well as pictures of machines, devices and equipment in any and all of the available formats, by any and every known method, in any and every known medium.

Teams grant permission to the organiser the use of promotional materials and visuals (e.g., photos and videos) as well as any additional photos, videos, portraits, documents, interviews and other materials resulting from participation in the challenge (using the name of the

participant or not) on all media, in any language, anywhere in the world, in any manner, for advertising and promotional purposes.

8.13 Miscellaneous

- Individuals or teams may be excluded from participation at the discretion of IRoC-U 2026 for unauthorized behaviour, including but not limited to (i) impersonating a ISRO/DOS official whether intentionally or in a manner that results in confusion, (ii) misuse of the logos or identifiers of ISRO/DOS, any sponsoring organisation, or any infringement of a commercial logo or trademark, (iii) failure to abide by competition rules, directives or instructions from the competition host or organisers, and (iv) asserting or implying a ISRO/DOS affiliation or sponsorship where none exists.

- ISRO/DOS does not host pre-competitions or competitions conducted by any organisation other than organizers of IRoC-U committee constituted by URSC. This IRoC-U 2026 competition is neither affiliated with nor sponsors or endorses any ASCEND Challenge competition other than the IRoC-U 2026. Outside competitions have no bearing on the IRoC-U 2026 qualification or registration process, and representation to the contrary is strictly prohibited. No competition may imply any affiliation with ISRO/DOS or use the ISRO/DOS logo without permission of ISRO/DOS. Any assertions made by organisations that represent themselves as "ISRO/DOS", "Official ISRO/DOS ASCEND Ambassador", "ISRO/DOS Judge", or any similar titles suggesting a tie to ISRO/DOS are unauthorized. Representations or suggestions that any organisation or individual can assure teams of being accepted for registration or participation in the challenge are unauthorized. All requirements for participation in the IRoC-U 2026 are outlined in this rules book.

- Participant hereby waives any claims against ISRO/DOS, its employees, its related entities, (including, but not limited to, contractors and subcontractors at any tier, grantees, investigators, volunteers, customers, users, and their contractors and subcontractors, at any tier) and employees of ISRO/DOS's related entities for any injury, death, or property damage/loss arising from or related to the IRoC-U 2026, whether such injury, death, or property damage/loss arises through negligence or otherwise, except in the case of wilful misconduct. Any team member or advisor found to be exhibiting unsportsmanlike conduct may be disqualified from the challenge individually or as a team. All scoring decisions are final.

- Teams not meeting any requirement listed above may be disqualified.

9 Qualification Round

This challenge focuses on the qualified teams to develop and demonstrate new & reliable techniques in navigation, guidance and mechanisms for docking and power-transfer with the base station (to be developed by the students). The focus is not on building aerial vehicles but on developing algorithms and architectures that enable successful completion of the challenge. Students can use/develop from any of the available (off-the-shelf) aerial vehicles complying with existing DGCA rules. The base station here refers to the charging station plus the Data Acquisition System (e.g., Laptop/Desktop, instrumentation etc.,).

- **Tasks of qualification round are detailed in Section 9.3.**

9.1 Video Evidence

- Teams shortlisted for the qualification round must demonstrate the tasks at the home institution. The tasks shall be recorded in HD resolution with time stamp.
- A video for all tasks and another video describing the configuration/features of ASCEND and base station shall be uploaded along with the Detailed Design Report*.

  * Important Note
  Teams are advised to highlight, discuss and present only the significant technical aspects and novel features of the ASCEND and Base Station in the Detailed Design Report chapters. Standard implementation procedures/specifications that are readily available in the public domain or on the internet will not be considered for evaluation and such content may be presented in a concise manner by providing appropriate publicly accessible references.

- Guidelines for uploading the videos and detailed design report will be provided shortly in the website.

The videos shall be captured in proper light conditions. The Detailed Design Report can be in the same format as the proposal report.

9.2 Definitions

9.2.1 Base station (Telemetry, Commanding, and Charging)

Base station: Base station can be a laptop / remote controller from which the initial command and emergency commands will be given. All communication between the base station and the ASCEND shall be wireless.
Home Position: It will be an **arbitrary starting position (typically in a 5ft x 5ft area) in the arena in which the base station will be positioned for the challenge.**

9.2.1.1 Telemetry information

ASCEND is expected to deliver the following telemetry information (only for diagnostics) which will be monitored during the challenge:

- Navigation parameters like Position (X, Y, Height), Vertical velocity, Horizontal velocity, identified object co-ordinates etc. as applicable in respective rounds.
- Camera, IMU output
- Battery health and State of Charge (SoC).
- Other information (if any).

9.2.2 Command modes

9.2.2.1 ASCEND Autonomous mode:

After receiving an auto-start command in manual mode, ASCEND gets into an Autonomous mode to start the task defined in the respective rounds **(default mode)**.

9.2.2.2 ASCEND Manual mode:

After turn/switch ON, ASCEND enters manual mode. In the manual mode, ASCEND is to be operated using base station **(and/or to be used during an emergency)**.

9.2.2.3 Charging Port

Base station will have charging port for power transfer to charge the ASCEND.

9.3 Tasks of Qualification Round

During the Qualification round, IRoC-U 2026 focuses on verifying the readiness, qualification and proper functioning of the required hardware.

9.3.1 Task 1: Vertical Take-Off

The ASCEND shall demonstrate a stable vertical take-off from the designated base area without abnormal vibration or loss of control.

9.3.2 Task 2: Hover Stability

After take-off, the ASCEND shall hover at a fixed height (2 m to 6 m) for a minimum specified duration of 5 minutes maintaining stable attitude and altitude.

9.3.3 Task 3: Controlled Landing

The UAV shall perform a safe and controlled landing within the take-off zone, without tipping, skidding, or structural instability.

9.3.4 Task 4: Safety System Demonstration

ASCEND shall demonstrate at least one hardware safety feature, such as low-battery failsafe landing, emergency motor cut-off, or communication loss safety response.

9.3.5 Task 5: Base Station Docking Compatibility

Teams shall demonstrate manual docking of the ASCEND onto the base station, verifying physical alignment and mechanical interface compatibility.

9.3.6 Task 6: Charging Interface Verification

After docking, the base station shall demonstrate battery charging of the ASCEND (minimum 5 % increase in battery charging), confirming electrical interface functionality.

9.3.7 Task 7: Data Transfer Verification

The team shall demonstrate data communication between ASCEND and base station, such as telemetry exchange, image transfer, or status data reception.

General Information

The design of ASCEND and Base Station can be different from what was proposed in the preliminary round due to practical reasons of realization or performance improvements.

The ASCEND shall be designed and operated in compliance with DGCA rules and safety guidelines as stated in Section 7.2.

The Base Station design qualified during this round shall be used for Elimination Round and Final Round. However, performance improvements and refinements with proper testing and validation are permitted.

Arena layout details, feature specifications, and image validation methodology are provided in Section-10.

10 Elimination Round

10.1 Objective of the Challenge

The primary goal for the **ASCEND** system is to autonomously locate specific features in the arena by matching live aerial imagery with the provided low-resolution (LR) reference data. These reference images represent small, localized sections of the larger arena. For each match, the system must report the coordinates relative to the base station and provide a corresponding high-definition (HD) image as proof.

Teams must capture HD imagery and down-sample it to 128x128 pixels to perform matching. Because down-sampling results can vary by method, teams are encouraged to apply multiple image-processing techniques to maximize matching accuracy. If the system fails to identify all three features in a single flight, the drone/ASCEND may return for autonomous charging and conduct multiple sorties until the mission is complete (within the stipulated time).

However, irrespective of the number of sorties required for the challenge, each team needs to necessarily demonstrate autonomous charging (at least once) and data transfer (at least once) to the base station.

The objectives of this round shall be achieved through the following activities:

- **Arena Setup:** Develop an arena as specified in Section 10.2.
- **Reference Creation:** Generate LR reference images of key arena features from HD images captured via a digital camera.
- **Data Input:** The ASCEND system shall ingest these LR reference images through the participant's base station.
- **Aerial Survey:** The ASCEND shall hover over the arena to capture HD imagery of terrain features and generate corresponding LR images. The ASCEND has to limit itself to within the boundary of the arena.
- **Feature Matching:** Compare the captured LR images with the supplied reference images from the base station.
- **Search Logic:** If no match is found, the system shall continue surveying the arena until a match is identified.
- **Data Logging:** Once a match is confirmed, the system shall record the coordinates (relative to the base station) and store the associated HD image.
- **Recovery & Transfer:** Perform an autonomous landing and transfer the captured data to the base station for validation.
- **Iterative Sorties:** If validation fails, the ASCEND may initiate additional sorties to locate the correct features (within the stipulated time).
- **Sustainability:** Demonstrate autonomous battery charging at the base station.

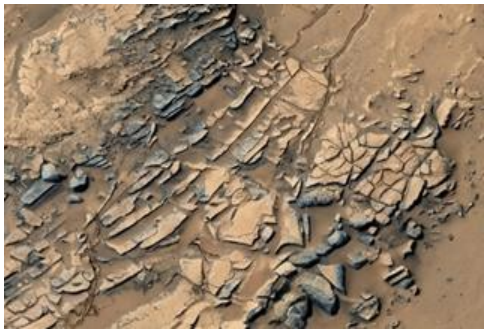
These activities simulate operational concepts of a planetary exploration mission, where orbital data guides detailed local investigation by autonomous aerial platforms.

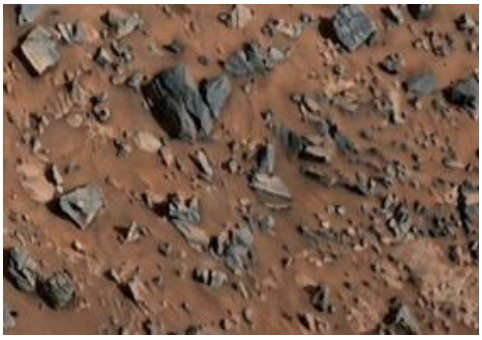
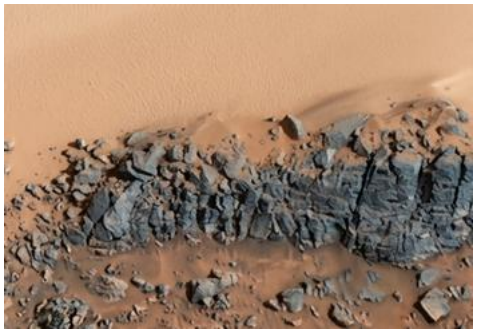
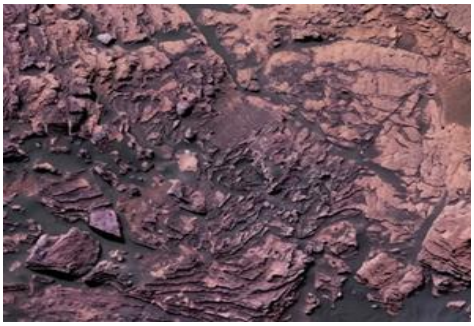
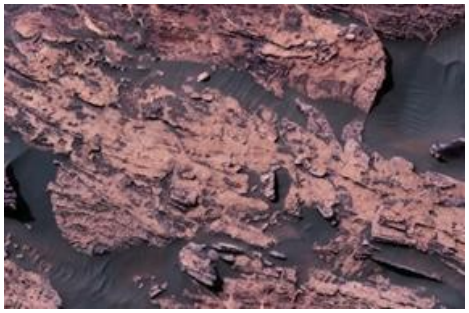
10.2 Arena Requirements

To simulate an exploration scenario, a test arena measuring approximately **35 ft × 25 ft** must be established. Multiple surface features shall be placed at random locations within this arena. Teams are responsible for creating the LR reference images from these features, which will serve as the primary input to the ASCEND system via the base station.

Figure: Typical Arena with features (This image is only a typical representation; not to scale)

10.2.1 Images of typical features (not to scale) that can be considered for constructing arena



Net around the arena (optional):
Arena to be surrounded by a net to restrict the flight/movement of the ASCEND within the Arena.
Note on Illumination conditions and wind velocity: ASCEND shall be less-sensitive to the illumination conditions. However, the challenge tasks will be conducted at moderate illumination conditions. The arena shall be prepared to have minimal wind disturbance.
In a nutshell:
1. ASCEND shall be flying or hovering or both (with minimum height of 2 m from the home position) during scanning of the arena.
2. Scanning of arena shall be in real-time.
3. Once ASCEND takes off, it should land only at the home position/base station.
4. Only one command is allowed to start/initiate the tasks of the autonomous mode.

10.3 Image Resolution and Survey Conditions

1. **HD Capture:** The ASCEND shall capture images with a resolution of at least **1280 × 720 pixels (HD)**. This resolution is mandatory; images captured at lower resolutions will not be accepted.

2. **LR Generation:** A low-resolution image of **128 × 128 pixels** shall be generated from the captured HD imagery for comparison against the reference images.

3. **Down-sampling:** Teams may utilize any suitable image down-sampling or resolution reduction method to generate the 128 × 128 images.

4. **Processing Architecture:** Image generation and comparison may be performed either on-board the ASCEND or via only the base station computing resources, depending on the team's selected architecture.

5. **Flight Altitude:** During survey operations, the ASCEND shall maintain a consistent flight altitude between **2 m and 6 m** above the arena surface.

Note: The teams are required to note that the maximum height during the final field will be typically restricted to 6 m. This constraint is to be considered by all teams.

Reference Image Generation for the Elimination Round	LR Image Generation after the sortie
Low Resolution (LR) image can be directly captured by a camera in low resolution (or) LR image can be generated by reducing the resolution of HD captured image. This LR image works as a reference/feed/input to the ASCEND before starting the challenge.	ASCEND shall capture HD image using onboard camera, and use the same HD image for generating low resolution image (LR ASCEND image). This LR ASCEND image to be compared with LR reference/feed image for validation (comparison and match)

Note: The reference image is to be created by teams during elimination round, where as these reference images are provided by the organizers during the final field round.

10.4 Image Processing and Data Validation

To successfully bridge the gap between HD aerial surveying and LR feature matching, teams must implement a robust computational pipeline. This process involves down-sampling 1280 × 720 HD imagery into 128 × 128-pixel representations. These processed images are then compared against the reference features to determine precise arena coordinates.

Teams have the flexibility to design their system architecture based on their available hardware. Tasks may be distributed according to one of the following four configurations:

1. **On-Board Real-Time Processing:** Image down-sampling and matching are performed on the aerial vehicle/ASCEND during flight, enabling immediate feature identification.

2. **On-Board Post-Processing:** The ASCEND captures and stores HD data during the sortie, executing comparison algorithms and coordinate determination locally after the flight.

3. **Ground-Based Real-Time Processing:** The ASCEND streams image data to the base station during the mission, where ground-based resources perform real-time validation.

4. **Ground-Based Post-Processing:** Following an autonomous landing, captured data is transferred to the base station for batch processing and final validation.

Regardless of the selected configuration, the process must remain **entirely autonomous**. The final output must demonstrate a clear correlation between the identified features and their measured coordinates relative to the base station.

10.5 Tasks for the Elimination round

Each team shall develop an **ASCEND** drone system and a base station capable of performing the following tasks autonomously:

10.5.1 Autonomous Take-Off

The ASCEND shall take off from the base station and initiate the mission without manual intervention following the start command (Only one command from base station is allowed to start the tasks). No further intervention from the team is allowed (i.e., ASCEND shall not be controlled using joystick or base station once the start command is given).

10.5.2 Autonomous Survey

The ASCEND shall survey the arena, capture HD imagery, and search for surface features corresponding to the three provided LR reference images.

10.5.3 Coordinate Determination

Upon identification, the system shall record the coordinates of the three target features.

10.5.4 Autonomous Landing

The ASCEND shall return and land on the base station docking platform upon mission completion or when a battery recharge is required.

10.5.5 Autonomous Charging

The ASCEND **must necessarily demonstrate autonomous charging** through the base station interface to enable repeated mission attempts.

10.5.6 Autonomous Data Validation

Following landing, data validation shall occur without human intervention as per the team's selected architecture.

10.5.7 Reporting of Result

The system shall report the identified features and their coordinates. Accuracy will be cross-validated visually via HD imagery and verified against physical measurements relative to the base station.

10.6 Evaluation methodology for Elimination round:

1. The teams shall record the video of all tasks performed by ASCEND for this round.
2. The camera shall be fixed at one corner of the arena (zero, zero coordinates of the arena, i.e., near to home position/base station) such that the camera shall cover both the base station screen and the movement of ASCEND throughout the arena during task demonstration.
3. The video comprising all the tasks performed by ASCEND shall be submitted before the deadline (for deadline of the rounds, please visit the IRoC-U 2026 website).
4. Based on the Sl. No. 3, the shortlisted teams will be evaluated in online mode and/or visit by IRoC-U 2026 evaluation committee at the college premises, for further shortlisting.

10.7 Instructions for uploading video and design report for Elimination round:

1. Video-1 shall comprise all tasks of elimination round performed by ASCEND
2. Video-2 shall comprise all the features of arena as detailed in section 10.2. The video shall also explain the methodology for generation and comparison of LR images.
3. Design report (not exceeding 5 pages) that consists of additional configuration changes of ASCEND from qualification round:
   - Changes/Additions in Hardware (mechanical elements, sensors, actuators etc.)
   - Changes/Additions in Software algorithms