

KHALAI E FALAK

Introduction

Welcome to Khalai e Falak, where we journey beyond the boundaries of Earth to explore the wonders of the cosmos. This category challenges participants to unravel the mysteries of the universe, navigate through challenges on a space settlement, and apply scientific ingenuity to solve space-based puzzles. From charting distant constellations to decoding cosmic secrets, Khalai e Falak promises an inspiring adventure that celebrates curiosity, discovery, and the limitless possibilities of space exploration. Let the voyage to the stars begin!

Round 1: Automating Systems

Delegate Cap: 4

Duration: 3 hours

The year is 2092. Welcome to Plutus, the world's third major space settlement, designed primarily to provide a centre of scientific research in the cosmos. Plutus will be capable of sustaining a population of 5,000 residents, all while conducting research on the surface of Mars. One of the main aims of Plutus' research labs is to discover more about the history of Mars. Through excavations and archaeology, who knows if they'll discover water -- or even signs of life -- on the Red Planet!



this figure depicts what Plutus looks like today.

The Pachpan Foundation Society governs Plutus. They require you to design automation facilities and robots for the settlement, some of which have been listed. You must pick **two of the below** automations to design, and come up with **one additional** robot which fulfils the specific purpose of Plutus.

Automation	Uses & Requirements
Construction robot	<ul style="list-style-type: none"> → Building internal and external infrastructure → Assembly of complex structures → Structural inspection, maintenance and repair → Transport and delivery of heavy construction materials, etc.
Personal communication device (PCD)	<ul style="list-style-type: none"> → Personal communication and social interactions → Emergency alerts and safety communication → Professional collaborations and task management → Educational purposes → Location tracking, monitoring and navigation → Entertainment, etc.
Health robot	<ul style="list-style-type: none"> → Routine health monitoring (biometric scans, vitals check, etc.) → Emergency response and robotic surgery → Environmental monitoring and evacuation assistance → Medication delivery, etc.
Security robot	<ul style="list-style-type: none"> → Surveillance and monitoring → Intrusion detection and prevention → Asset protection and anti-theft measures → Crowd control and hazard neutralization → Cybersecurity, etc.
Domestic help robot	<ul style="list-style-type: none"> → Housekeeping, including cooking, cleaning and laundry → Assistance in food preparation → Babysitting, educating and keeping children safe → Helping the elderly in everyday tasks → Entertainment and recreation, health and fitness, etc.



Some key factors to consider:

- How will the robot move around? Does it need to traverse rough terrain, fly, or operate in confined spaces?
- Is the robot operating in microgravity, vacuum, or with exposure to radiation? What about temperature extremes?
- Will it rely on solar panels, batteries, or other power systems?
- How will it transmit data back to the settlement or earth?
- Will it operate autonomously or need real-time input?
- How autonomous should the robot be? Does it need AI for decision-making? Does it need human training?
- How will the robot avoid endangering humans or damaging the settlement?
- What materials need to be used, depending on the applications of the robot?
- What tasks should the robot prioritize? Can it perform multiple functions?
- Can it work with other robots or humans seamlessly?
- How can it be repurposed, or how can it reuse other materials?
- What upgrades can be made to the robot, keeping future expansion in mind?

This is your opportunity to showcase your ingenuity, problem-solving skills, and ability to adapt to complex scenarios. Each team will have 7 minutes to present your three designs, followed by a brief Q&A session with the judges, who will evaluate your solutions based on creativity, feasibility, and adherence to the requirements. While the presentation method is up to you, the judges of The Pachpan Foundation Society require clear, dimensioned diagrams of the robots/systems.

Good luck, and remember to be creative!

Judging Criteria:

- Feasibility and practicality
 - Creativity and innovation
 - Presentation style
 - 3D modelling/graphics
 - Incorporation of different aspects of the settlement
 - Q&A session
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Round 2: Mapping Constellations

Delegate Cap: 2

Duration: 2 hours

For this round, delegates will be required to map out different constellations using excel. Constellations can be picked between 3 categories; easy, medium and hard. The more challenging the constellation, the more points you gain. Making use of the stars' right ascension, declination and magnitude as values in a table, you must plot the stars onto a graph.

- **Declination:** The distance of a celestial object from the celestial equator, measured in degrees or arcseconds, to the north or to the south of said celestial equator. Arcminutes (1/60th of a degree) and arcseconds (1/3600th of a degree) are just small sections of 1 degree.
- **Right Ascension:** The distance of a point east of the First Point of Aries, measured along the celestial equator and expressed in hours, minutes, and seconds.
- **Magnitude:** A measure of the brightness of a star.

Judging Criteria:

- Aesthetics of the diagram
- Accuracy of the plots

Round 3

Delegate Cap: 4

Duration: 2 hours

This round will connect back to our initial space settlement and requires the delegates to think on their feet. Delegates are expected to navigate crises as they are given, having 20 minutes to sort out each one. The specifics of this round will be revealed on the day of the event.