UK Lunabotics 2026

Challenge Overview and Registration Requirements

Background

The Lunabotics Challenge is a NASA-led engineering challenge whereby student teams from across the United States build and test a prototype off-world construction robot. First run in 2010, the Lunabotics challenge is a critical asset to NASA, spurring innovation and providing risk reduction for lunar surface system development. It was established to cultivate new ideas, drive solutions, and enhance cohesive development of capabilities for productive exploration of the extreme lunar environment while developing 21st century workforce skills for the next generation of explorers. Through collaboration across public and private sectors, NASA and its partners maximize efforts and leverage resources to design and test new approaches, technologies, and systems in parallel. This strengthens NASA's ability to achieve successful long-duration missions while increasing access to space, creating pathways of discovery for future generations.

As NASA embarks on revolutionary exploration in our solar system, initiatives like Lunabotics bridge the technological capabilities needed for sustained human exploration missions on the Moon that can evolve for other challenging environments in deep space, including Mars. From a technology development perspective, the Moon serves as an ideal proving ground for complex Red Planet missions while supporting current and future lunar science missions. As we enhance our understanding of the challenging lunar environment, new knowledge from these pursuits advances technology development that informs our plans for Mars exploration and other celestial bodies, while transferring applications that can improve everyday life on Earth.

Technologies that enable affordable, advanced manufacturing and autonomous construction are critical for NASA missions. These same technologies must also support long-term system maintenance, allowing NASA and its partners to carry out a variety of missions.

Key technical challenges include excavation of hard regolith and ice materials, as well as the ability to travel long distances across uneven terrain with obstacles and other hazards. Both capabilities are essential for establishing sustainable operations in off-world environments where autonomous systems must function reliably without direct human intervention.

The Lunabotics Challenge has expanded outside of the USA to India, Australia, and beyond. UK Lunabotics is bringing this format to the UK.

UK Lunabotics Objectives

The primary objective of UK Lunabotics is for teams to apply the NASA systems engineering process to design, develop, build, and test a prototype lunar robot that supports simulated lunar construction operations. Teams must create a robot capable of traversing challenging lunar terrain while constructing regolith-based berms—gathering valuable data on lunar construction techniques in the process.

These berm structures serve critical functions for missions such as Artemis, including blast and ejecta protection during lunar landings and launches, shading for cryogenic propellant tank farms, radiation shielding around nuclear power plants, and other mission-critical applications.
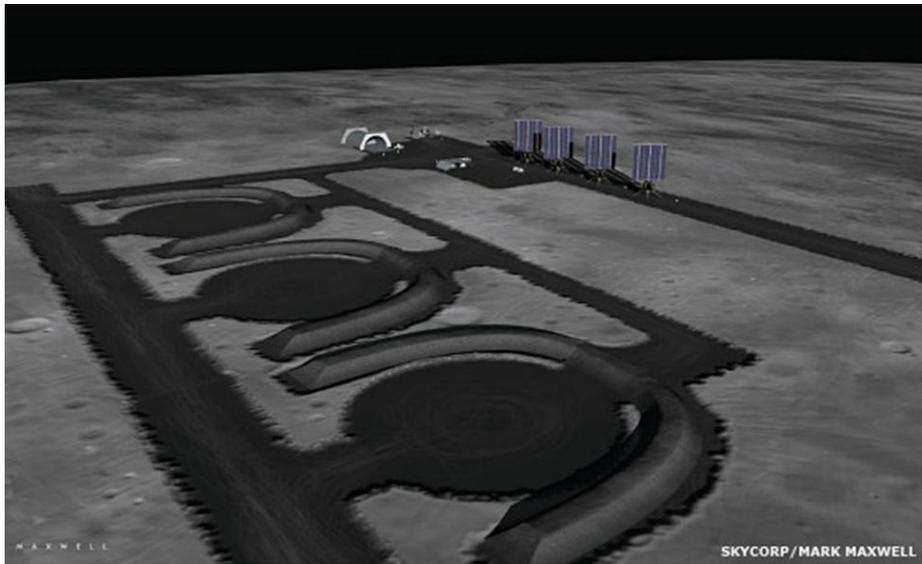
Drawing 1. - Typical concept of Lunar Landing Pads with Berms (Source: NASA/ SkyCorp)

Drawing 2. - Typical concept of Lunar Landing Pads (Source: NASA)

Aims

UK Lunabotics is a two-semester competition giving higher education students the opportunity to design, build, and test prototype lunar construction robots using the same systems engineering principles as used by NASA. The objective is to demonstrate capabilities for constructing off-world structures that serve critical functions such as:

- Blast and rocket engine plume ejecta protection during spacecraft landings and launches
- Radiation shielding for habitation modules and propellant storage
- Thermal shading for cryogenic propellant storage
- Environmental and radiation protection for power generation facilities
- Other mission-critical infrastructure in extraterrestrial environments

In doing this, student teams will gain invaluable experience in practical, real-world application of systems, mechanical, and software engineering principles such as:

- Creating computer code for autonomous construction operations.
- Engineering and designing robot frames, mobility, sensors and electronic systems.
- Using various types of manufacturing processes to create the robot systems.
- Stress-testing of mechanical components.
- Troubleshooting, prototyping and iterative design improvement.
- Remote and autonomous operation of hardware.

Through this, and other key skills such as project management, documentation, and outreach, students will develop essential career skills to prepare them for future professional opportunities.

The Challenge

The mission of this robot system is to construct a berm that protects astronauts and habitat modules from plume ejecta from vehicles lifting off and landing on the opposite side of the berm to be constructed. For this competition, plume ejecta is presumed to move perpendicular to the surface and parallel to the short axis of the berm area.   Both mass (or volume) of the berm and the projected area of the berm normal to the plume ejecta provide this protection.

A rover must be developed to navigate, either remote-controlled or autonomously, a lunar sandbox with obstacles, and transport material from a designated excavation zone to a build zone, constructing a berm in a defined orientation.

The student rover team will have access to a operations shed which has access to video feeds from the yard.

Competition Timeline

14th November 2025 – Registration deadline – send your Statement of Support and Project Management Plan to uklunabotics@open.ac.uk

Before December 2025 – Confirmation of registration

February 2026 – UK Lunabotics team checkin with registered teams

~May 2026 – "Proof of Life" Video of Rover Operations Due

~July 2026 – UK Lunabotics Competition at The Open University, Milton Keynes

Scoring

In the 2026 UK Lunabotics Challenge, the success of a rover will be measured in 5 key areas at a competition event at the Open University in Milton Keynes:

Passing of Inspections – before being allowed to compete, each rover should demonstrate a successful mechanical inspection and communications check.

Construction Berm Productivity – Normalized for Robot Mass (BP Mass) – A volumetric scan before and after the run will be performed. Only berm volumes located within the designated target area will be counted. The target area has perimeter dimensions of 1.5 M x 0.9 M. There is no restriction on the shape, height, or number of berms constructed.

Construction Berm Productivity – Normalized for Energy (BP Energy) - A volumetric scan before and after the run will be performed. Only berm volumes located within the designated target area will be counted. The electrical energy consumed must be displayed by an (commercial off the shelf or "COTS") electronic data logger and verified by a judge.

Bandwidth Use – Cameras are available to aid in remote operation of the rover. Before each attempt, teams may nominate which cameras they wish to use. Teams will be scored on arena camera usage as follows: 0 cameras = 120, 1 camera = 60, 2 cameras = 0 points.

Autonomy – A number of autonomy tasks are defined and vary in difficulty. Carry between 50 and 600 points depending on the task. Autonomy tasks require notification and verification of the beginning and completion of the task to the challenge judges. Full details can be found in the challenge rulebook.

How to register

Team Composition Requirements:

- All team members must be currently enrolled students from accredited institutions of higher learning, career/technical education programs, trade schools, community colleges, or universities located in the United Kingdom.
- Students may be registered in either autumn or spring term to qualify
- Multi-institutional teams are permitted (two schools may collaborate to form one challenge team).
- Teams from accredited institutions of higher learning (colleges/universities) must include a minimum of two (2) undergraduate students. There is no upper restriction on the number of graduate students.
- All students must be 18 years or older prior to attending on-site events.
- Each team must be accompanied by an adult advisor age 21 or older who is employed by the registered institution and will remain on-site for the duration of the challenge.

Participation Standards:

- All team members must be actively engaged in the robot's design and construction, with clearly defined roles to be communicated during Presentation and Demonstration (P&D).
- Students must complete 100% of the project work, including design, robot construction, written reports, presentations, and competition preparation. Professional assistance is permitted only for training or safety purposes under student supervision.

Disqualification Criteria:

- Unsportsmanlike conduct by any team member or advisor may result in individual or team disqualification.
  - We reserve the right to exclude individuals or teams for unauthorized behavior, including:
  - Impersonating NASA officials
  - Misusing NASA, sponsoring organization, or commercial logos/trademarks
  - Failing to follow competition rules or staff instructions
  - Falsely claiming NASA affiliation or sponsorship
- Teams not meeting all stated requirements may be disqualified.

Administrative Notes:

- All requirements for participation are outlined in this guidebook.

Applying Via E-Mail – Application Deadline 14ᵗʰ November 2025

For the 2026 challenge, we accept application via e-mail. Selected teams will receive an email notification regarding their application status to begin participation.

The number of applications accepted is not pre-determined but based on the quality of the applications received and other factors.

Application Process:

- Only faculty advisors or team leads may initiate the application process—no other team members or students can apply for the team

Submitting Team Application Deliverables.

Submit completed deliverable package via email to: uklunabotics@open.ac.uk

Required Deliverables

- Statement of Support file name: SOS-School Name
- Project Management Plan file name: PMP-School Name

Formatting Requirements:

- Submit all documents as PDF files
- Use the following naming convention (deliverables not following this format will be rejected): Deliverable Name-School Name (use official school name, not team name)
  Examples:
  o SOS-The Open University
  o PMP-The Open University

Team Application Evaluation and Selection

This completes your application process. Note: Submitting an application does not guarantee acceptance into the UK Lunabotics Challenge.

Applications will be scored and ranked, and all deliverables will be evaluated for compliance.

- REMINDER if more teams qualify for the UK Lunabotics Challenge through their PMP submission than can be accommodated at the Qualifying Event(s), then the PMP-qualified teams will be required to submit a System Requirements Review (SRR) Report.

You will be notified of your application status via email.

The following two items are required in your application package:

1. Statement of Support

A statement of support from an advisor member of institution staff indicating a willingness to supervise and work with the team during all stages of UK Lunabotics. There will be no consideration for teams working without a faculty advisor. The faculty advisor must also sign off on the cover of all deliverables as evidence they have seen the application and approves of the submission.

The following statement shall appear on an institution letterhead and include the signature of the faculty advisor:

Advisor: _____

University / College: _____

I concur with the concepts and methods by which the students plan to compete in "UK Lunabotics". I will ensure the student team members complete all project requirements and meet deadlines in a timely manner. I understand any default by this team concerning any project requirements (including submission of final report materials) could adversely affect selection opportunities of future teams from their institution.

Signature and Date: _____

	Name (Print)	Signature	Advisor/Faculty/Student
1			
2			
3			
4			
5			
6			
7			

2. Project Management Plan

The Project Management Plan is an industry standard system's engineering document, designed to begin the process of considering timeline, objectives, funding, and technical requirements of a project at the planning stage. For application to the UK Lunabotics competition, we require a PMP of **maximum 5 pages** to be submitted to ensure team readiness for competition. The PMP is not set in stone – and we expect team's plans to change as preparation for the challenge progresses. The PMP may be used to down-select teams in the event of more applications than places. It should contain the following sections:

1. Initial Project Schedule

Provide a Gantt Chart or equivalent that shows the project's major due dates and events to include at least the five items listed below. Discuss these only as needed.

a) Start Date

b) Completion Date: (after project decommissioning; this is the date when you have disposed of your robot system after the challenge; for example, you hand the system over to next year's team, dispose of it or other)

c) Dates for the Major Review milestones: as a minimum, these must include

- Systems Requirements Review

- Preliminary Design Review

- Critical Design Review

- others may be identified as you find appropriate

d) Product delivery dates to the Lunabotics Engineering Challenge, including as a minimum

- delivery of Systems Engineering Paper,

- the planned date to submit "Proof of Life"

e) Dates for important milestones related to Project Cost Budget and Technical Performance Measurement budget as identified in the Initial Project Budget and Initial Technical Performance Measurement budget sections of your Project Management Plan. (Optionally, you may also identify any major Systems Engineering activities in your Initial Project Schedule.)

f) Discuss how you will manage the evolution of the schedule during the life of the project (how often and when you plan to review the project schedule, and how you plan to adapt to schedule slips or schedule advance opportunities).

2. Initial Project Cost Budget

Provide an estimate of the total project cost, inclusive of all possible costs. Provide a Table of Major Budget Categories and Items including the following list items as a minimum. Discuss only as needed.

a) Breakdown of total project cost estimate for at least the following major items. (Total should add up to the estimate of the total project cost.)

- Cost estimates for elements in the earliest level System Hierarchy (provide this earliest level System Hierarchy, which may only be two levels at this early point in the project). Break these estimates down as follows:

  o Labor costs, if any

  o Material costs for challenge (for production and completion of Lunabotics deliverables)

- Travel costs including costs to travel to The Open University in Milton Keynes if you intend to accept a proffered invitation to participate in UK Lunabotics On-Site Challenge

b) Identify any Critical scheduling milestones (and dates) for budget or cost related items. (These critical cost budget milestones should appear in item 5 for the Initial Project Schedule; for example, dates funds will be needed, planned activities to raise funds, or others).

c) Discuss how you will manage the evolution of the budget during the life of the project (how often you plan to review your project budget and when, and how you plan to adapt to budget shortfalls or possible cost savings should they occur).

3. Project Technical Objectives

List and discuss the specific technical criteria or characteristics that your team intends to achieve (typically some technical parameter or measure you want to minimize or maximize, increase to some limit, or decrease to some limit) in your system design and operations to win the competition. These provide the technical direction and focus for the entire team in design and operations. For example: you might choose to minimize mass, or maximize automation, or minimize bandwidth, or some combination of these (or any other criteria or combination of criteria) to produce a system that will win the competition.

4. Initial Technical Performance Measures (Technical Budgets)

Provide a Table of Technical Performance Measures that you deem are important for your design to accomplish the mission.

A Technical Performance Measure is any quantifiable technical characteristic that you may consider important, difficult to achieve, or particularly risky to project success, and may derive from your Project Technical Objectives. For example, it may be that total mass (high or low) is important to you, or that a low bandwidth is difficult to achieve, or that high speed is risky for your project, or any number of other quantifiable and measurable technical quantities.

Include the following in the table as a minimum. Discuss only as needed.

a) Identification of Technical Performance Measures

b) Initial Target Value for each Technical Performance Measure to be achieved by the challenge

Provide the allocation of each Initial Target Technical Performance Measure value across the elements of the earliest System Hierarchy (should combine to the total at the highest level).

Discuss any critical schedule milestones (and dates) for achieving critical technical performance levels (for example, decision points in the design process where if you are unable to achieve the desired level you would change the design). (These should be reflected in item 5 for the Initial Project Schedule.)

Discuss how you will manage the evolution of the Technical Performance Measurement budgets during the life of the project (how often you plan to review current Technical Performance Measure values, and how you plan to adapt to performance shortfalls or exceedances should they occur).

Project Management Plan Guidance:

Resources available:

1. A video series introducing the key project management and systems engineering products and how to apply them to your project can be viewed at [Systems Engineering for University-level Engineering Projects and Competitions | NASA](#)

3. A video of the Seminar presented at the 2024 Lunabotics competition at UCF titled ["How to Develop the Perfect Lunabotics SE Paper"](#)

4. A video of the Seminar presented at the 2024 Lunabotics competition at UCF titled ["Systems 'd'esign"](#)

Each team shall submit a complete Project Management Plan (PMP) electronically in one PDF file. This is an initial plan. As you execute your project, things will change and your project will evolve, which is okay and expected. In your Systems Engineering Paper you can discuss the changes to your plan and how your project adapted.

Include your school name on the PMP.

Maximum length of the plan is 5 pages. If you include a cover page, it will not count towards the page limit. Any content over 5 pages will not be judged.

Format: The Project Management Plan shall be formatted professionally, organized clearly so that each required element is easy to find, with correct spelling and grammar, with text no smaller than size 12 point font in the main body, with text no smaller than size 9 point font in graphics and tables, and using professional margins.

Here are some Tips on the PMP previously provided:

Project Management Plan (PMP) Tip #1: Make sure your Gantt Chart (if using) and tables are readable if you are providing them to satisfy a rubric element. If we can't read it, we can't give you points. If you provide graphics with unreadable (less than 9-point text as viewed in the pdf) text, make sure the information to satisfy the rubric elements are discussed in the main body (at least 12 point font).

Project Management Plan (PMP) Tip #2: Initial Project Schedule: Major Reviews. Make sure at least 3 show up on your schedule: SRR, PDR, and CDR. If you are using an alternate review instead of SRR, PDR, and CDR, then identify the name of the review that replaces each in the discussion.

Project Management Plan (PMP) Tip #3: Developing any management plan boils down to two things: making decisions and writing them down. It's important to document those decisions at the beginning of the project and share with your team. Update your plan as you learn more and your project progresses. The Project Management Plan rubric identifies an important subset of the decisions you will have to make in your Lunabotics project planning process, and asks you to tell us what those specific decisions were.

Project Management Plan (PMP) Tip #4: Initial Project Budget: Budget evolution. As your design matures, you will learn more about how much your project is to actually going to end up costing. To be sure you don't run out of money before the end of the project, set up periodic reviews of your cost budget. If your costs are much greater (or much less) than you expect, decide at the beginning of the project how you will address budget shortfalls, and what you will do with budget excesses. Don't forget to make these decisions and discuss them in your PMP.

Project Management Plan (PMP) Tip #5: Initial Technical Performance Measures (TPM): Allocation to System Hierarchy. The system hierarchy is the backbone of your project. At the very start of a project, it may only consist of two levels. That early decomposition allows you to allocate how much time you plan to spend on each sub-element in the hierarchy, how much money you plan to spend on each sub-element, and how much of the technical performance measure's values each sub-element will have to provide so the system can accomplish the mission. As your design matures, these early allocations of TPM values across the system hierarchy levels will guide you through the design process to deeper levels in the system hierarchy, and enable sub-allocations of TPM values across these new levels. And of course, you may learn things in the design

process that might change even those earliest allocations of TPM values. There is an example of allocations down through the system hierarchy in SE Video 2: 'The Central Elements of Project Management'. That video describes budget allocation; the approach is similar for mass and other TPM allocations. Don't forget to include the TPM allocations in your PMP.