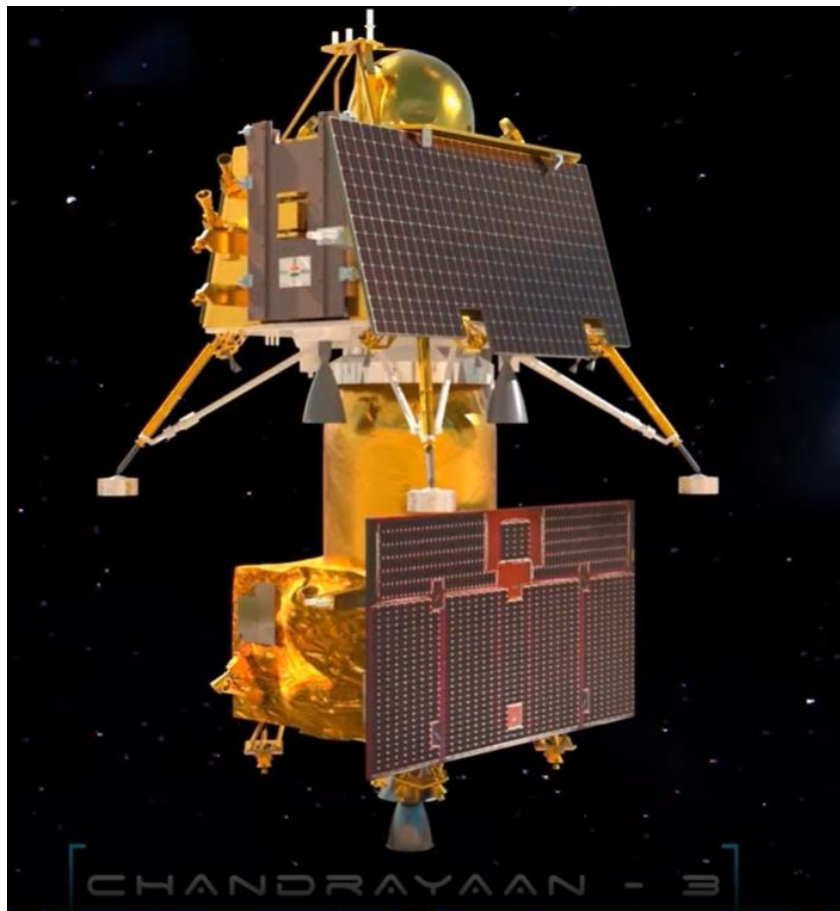


## ISRO: Launches Lunar Probe: Can India win 2023 Moon Race?

July 15, 2023

July 14, Sriharikota, Andhra Pradesh, India: **Indian Space Research Organisation (ISRO)** successfully launched Chandrayaan-3 from **Satish Dhawan Space Centre, Sriharikota**. This is the **first** of six moon missions, that could land on the moon during 2023.

In **2019**, India's **Vikram** and Israel's **Beresheet** landers crashed into the moon during their landing attempts. These were in a series of man-made devices, which have hit the moon since a **Soviet probe first** hit the moon on Sept. 13, 1959.



**S. Somnath**, Chairman ISRO said that a 3-stage **Launch Vehicle Mark III (LVM 3)** placed the integrated module of Chandrayaan-3 in an Elliptic Parking Orbit (EPO) of size  $\sim 170 \times 36500$  km. (*LVM 3 was previously called the **Geosynchronous Satellite Launch Vehicle Mark III** or **GSLV Mk III***)

Chandrayaan-3 is a follow-on mission to Chandrayaan-2 to demonstrate end-to-end capability in safe landing and roving on the lunar surface. Following the launch, after completing 40-days of journey of 380,000 Km, the **lander** and **orbiter** will **orbit** the **moon**. **On August 23-24 the Lander will separate from the**

**Orbiter and touch down on the moon**, timed to coincide with sunrise at the landing site in the moon's south polar region, where each day and each night is of 14 days. If something comes up while Chandrayaan-3 is in orbit around the moon, the landing could be delayed a month until the next sunrise, in September, so that the spacecraft can spend a full two weeks operating on the surface.

Three other countries have successfully sent landers to moon's surface - USA, former USSR and China. India may be the 4<sup>th</sup> country to do so, if Chandrayaan lands successfully on moon's surface.

A **Japanese start-up** sent an innovative small lander, along with its orbiter. It would have put a **UAE rover with AI software from a Canadian company** on the moon's surface. Its orbiter succeeded in orbiting around the moon. But its landing system failed and the Lander hit the moon's surface with high speed and was damaged. *(Please see the last page for more details about it.)*



**EARLIER MOON PROBES by ISRO:** In 2008, ISRO launched Chandrayaan-1, an orbiter. Chandrayaan-1 orbited around the moon and sent data, gathered by its sensors to earth for about an year. *(Chandrayaan in Sanskrit means a moon vehicle.)*

Chandrayaan-2 lifted off successfully on July 22, 2019. The orbiter started orbiting the moon. On September 6, 2019, the **Vikram** lander and **Pragyan** rover started to descend to the moon's surface. But when it reached about 2.1 Km above the surface, its trajectory diverged from its designed path and the landing failed. *(Please see page 3 for the issues, which led to the failure.)*

To **inculcate interest in science among the young**, ISRO permits students to come to the Space Center to witness the major events in its work. When Chandrayaan2 was attempting to land on the moon's surface, **Prime Minister Narendra Modi** was himself at the SPACE CENTER. When the attempt failed, in

his address to the scientists and engineers of ISRO, **Mr. Modi** said: “As important as ‘the final result’ is ‘the journey and the effort’. I can proudly say that the effort was worth it and so was the journey.” He was later seen *embracing and consoling K. Sivan*, then the chief of ISRO.

Issues in Chandrayaan 2: July 11: Chairman ISRO **Sreedhara Panicker Somanath** said: The problems arose because one of the lander’s five engines were used to retard the Lander, while landing on the moon’s surface. It developed thrust that was a little higher than expected. The spacecraft tried to correct the errors, but the software specified limits on how quickly it could turn. The result was that Chandrayaan 2’s Lander hit the moon’s surface with high speed and was damaged.

*Dr. Somnath was speaking to journalists at the India Space Congress at Delhi on Monday.*

**However, the Orbiter of Chandrayaan 2 continues to orbit around the moon and is communicating with ISRO. Its Overhead cameras have sent high-resolution images of the entire moon. So, ISRO has mapped all the craters and boulders at the Landing site. Secondly, the Lander of Chandrayaan 3, after reaching the moon’s surface, will communicate with earth through the Orbiter of Chandrayaan2.**



*Chairman ISRO  
Dr. S. Somnath*

**Chandrayaan-3: ISRO Scientists and engineers:**

Project Director: **P Veeramuthuvel**

LVM3-M4 Mission Director: **Mohana Kumar**

Vikarm Sarabhai Space Center Director: **S. Unnikrishnan Nair**

**Launch Authorization Board at VSSC: A. Rajarajan.**

The above are the Leaders. Hundreds of engineers and scientists have worked on the project, including **54 female scientists and engineers.**

Dr. Somnath said that only minor changes had been made in the design of the lander like stronger landing legs, more propellant, additional solar cells to gather energy from the sun and improved sensors to measure the altitude. He informed that the software had also been changed so that the spacecraft could turn faster if needed, and the allowed landing area has been expanded.

Locating the debris of Chandrayaan 2 on the moon: On November 19, 2019, an amateur internet sleuth used imagery from a NASA spacecraft to locate the crash site, where the debris of the Vikram lander and Pragyan rover sit to this

day. He informed **Dr. Mark S. Robinson** about it and he sent to Dr. Robinson an image to support his findings.

*Dr Mark Robinson is the **Principal Investigator** for the images received from the camera aboard NASA's Lunar Reconnaissance Orbiter. NASA then released the picture of the debris on the moon.*

*Most of the data from American civilian space missions is freely available to both academics and curious amateurs, who can use it whatever way they want.*

**Note:** Please read "ISRO: A Moon Probe: launching in July" at <https://diginews360.com/isro-a-moon-probe-launching-in-july/> for more technical details of Chandrayan 3.

----AI at moon through a private Japanese Spaceship company----



*UAE's Rashid Rover carries Canadian company, Mission Control's AI software*  
A private **Japanese** company **ispace's Hakuto-R** moon-lander was launched on Dec. 11, 2022 from **Cape Canaveral Space Force Station in Florida** atop a **SpaceX Falcon 9 rocket**. The briefcase-sized **Lunar Flashlight** lander then took a long, looping and highly energy-efficient path to the moon and entered lunar orbit on March 20, 2023. The Hakuto-R lander carried **UAE's small Rover**, called the '**Rashid**'. The Rover carried **AI software**, by a **Canadian** company **Mission Control**, for determining location of useful minerals from data about the moon's surface. Canadian company. **Mission Control Space Services** CEO **Ewan Reid** said," The AI software will be a critical enabling tool to making decisions on board spacecraft." Such software can be useful to **search out water** (through the **Artemis missions of NASA**), and, to make **Earth Observation** more efficient.

The Plan of Mission Control: Mission Control would have received the Rashid rover's navigation images via the Japanese lander, which would have handled communications with Earth. That output would then have been used by scientists and engineers at Mission Control's office in Ottawa, as well as at other Canadian universities, to help decide where the rover should go. The objective is that with the Canadian company's algorithm, every single pixel in the image should be classified as a certain terrain type.