

India's third lunar odyssey begins with perfect launch

Spacecraft enters elliptic parking orbit; soft landing likely on August 23; next 42 days crucial, says ISRO chief; Chandrayaan-3 is a testament to our scientists' relentless dedication: Modi

Hemanth C.S.
SRIHARIKOTA

India's third moon mission, Chandrayaan-3, was successfully launched onboard a Launch Vehicle Mark-3 (LVM-3) rocket from the Satish Dhawan Space Centre in Sriharikota at 2.35 p.m. on Friday.

This is India's second attempt at soft-landing robotic instruments on the lunar surface after the previous attempt, Chandrayaan-2, failed in 2019. Thus far, only three countries, the U.S., Russia and China, have successfully soft-landed on the moon.

Speaking to reporters after the launch, ISRO Chairman S. Somanath said the next 42 days are crucial. "The landing is currently planned on August 23 at



Ambitious mission: The rocket carrying Chandrayaan-3 lifts off from the Satish Dhawan Space Centre in Sriharikota on Friday. PTI

5.47 p.m. IST, if everything goes as per plan," he said.

Hailing the launch, Prime Minister Narendra Modi tweeted: "Chandrayaan-3 scripts a new

chapter in India's space odyssey. It soars high, elevating the dreams and ambitions of every Indian... This momentous achievement is a testament to our

scientists' relentless dedication. I salute their spirit and ingenuity!"

Minister of State Jitendra Singh, who was present at the launch, said, "It is indeed a moment of glory for India. Thank you Team ISRO for making India proud... Today is also a day of vindication: vindication of the dream Vikram Sarabhai [had] six decades ago."

Around 16 minutes after the LVM-3 lifted off, the spacecraft separated from the rocket. It was an integrated module comprising the propulsion module, the lander module, and the rover. It entered an elliptic parking orbit (EPO).

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Perfect launch to India's third lunar odyssey

The EPO's closest approach to earth was around 170 km and farthest, at 36,500 km.

The propulsion module will carry the lander (containing the rover) from the EPO around earth to a circular orbit around the moon, at an altitude of 100 km. This module also carries an instrument called 'Spectro-polarimetry of Habitable Planetary Earth' (SHAPE), to study spectral emissions coming from earth.

According to ISRO, the lander can soft-land at a specified lunar site and deploy the rover. The rover will perform in-situ chemical studies of the lunar surface as it moves around. The lander also has scientific instruments to study the lunar surface and subsurface.

The propulsion module will execute a series of manoeuvres over the next month to sling itself towards the moon and be caught there by the moon's gravity. Once it has been captured into a lunar orbit, the lander will detach itself and attempt to soft-land on the moon's surface.

The Chandrayaan-3 mission's objective is to develop and demonstrate new technologies required for inter-planetary missions.

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Success of Chandrayaan launch vehicle gives Gaganyaan a leg-up

Gaganyaan is expected to demonstrate India's manned spaceflight capability. LVM project director Mohan Kumar said the human-rated S200 (solid strap-on motors) have been used again, and the L110 Vikas engine has also become human-rated

The Hindu Bureau
SRIHARIKOTA

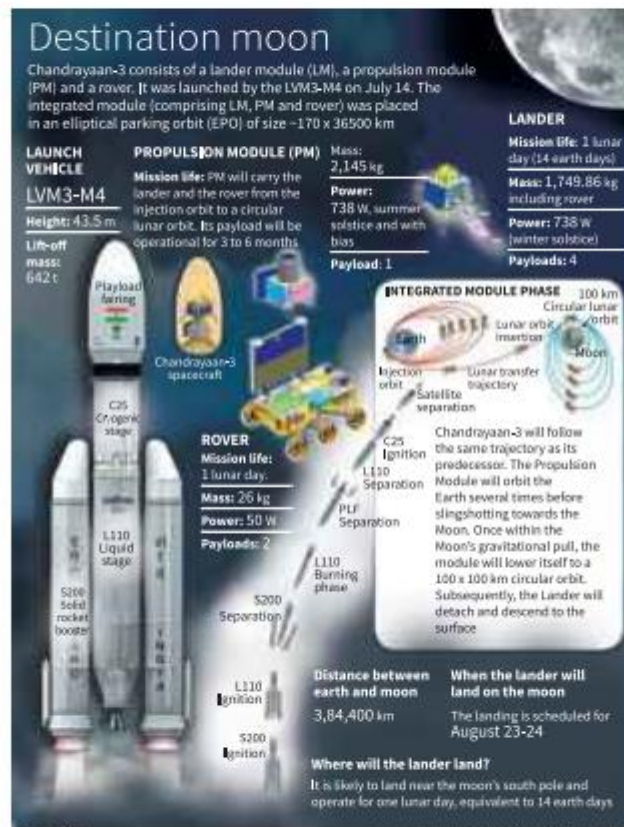
With a human-rated Launch Vehicle Mark (LVM) to be used for the upcoming Gaganyaan mission, the LVM-3's successful launch of the Chandrayaan-3 on Friday gained significance, as it has further enhanced the reliability of the launch vehicle.

Following the launch, LVM project director Mohan Kumar said that the rocket used for the Chandrayaan-3 mission used multiple systems that were rated for humans. "The human-rated S200 [solid strap-on motors] that were used earlier were again used, and the L110 Vikas engine has also completely become human-rated today," he said.

ISRO's Gaganyaan project is expected to demonstrate India's human spaceflight capability by launching three astronauts to an orbit of 400 km for a three-day mission, and then bringing them safely back to earth, landing them in Indian seas.

The success of the Chandrayaan-3 launch was celebrated by several public and private sector units all over the country that played an active role in the mission. For instance, Mishra Dhatu Nigam Limited (MIDHANI), the defence PSU, had developed and supplied various critical and strategic materials for the three-stage heavy lift launch vehicle.

It supplied cobalt base alloys, nickel base alloys, titanium alloys and special



SOURCE: ISRO

TEXT: HEMANTH C.S., GRAPHIC: SEBASTIAN FRANCIS

steels for liquid engine, nozzles for liquid stages, gas bottles, thrusters, cryogenic upper stage components, rocket motor casing, propellant tanks and investment castings of nickel alloys, stainless steel for exhaust unit, etc., said

an official release.

Kerala government undertaking Keltron in Thiruvananthapuram, Kerala Minerals and Metals (KMML) in Kollam, and long-time industry partners of the Indian Space Research Organisation (ISRO)

such as Ananth Technologies Ltd (ATL) and Kortas Industries Pvt Ltd supplied many components. Keltron supplied 41 electronics modules and various power modules. Many of the critical components on the mission used alloys

from titanium sponge produced by the KKML. KMML has a 500-tonne capacity titanium sponge plant at Chavara, Kollam, a joint venture with the Vikram Sarabhai Space Centre (VSSC) and the Defence Metallurgical Research Laboratory (DMRL). A Kerala-based rubber products firm supplied the a crucial flex seal. Vajra Rubber Products in Thrissur supplied S-200 thrust vector control flex seal for the vehicle.

The Hyderabad-headquartered Ananth Technologies Ltd (ATL), which has exclusive facilities in Thiruvananthapuram and Bengaluru for supporting ISRO's space programmes, contributed to the avionics packages for the LVM-3 mission, including on board computers on the launch vehicle, navigation system, control electronics, telemetry, power systems and various vehicle interface units.

In Bhubaneswar, technicians and students of the Central Tool Room and Training Centre are eagerly waiting to see the successful soft landing of the vehicle on the moon's surface. The CTTC has also supplied critical components. The Bhubaneswar-based central PSU has manufactured several flow control valves used in the LVM-3. It also supplied gyroscopes, propellant walls and parts, and sensors. The CTTC also manufactured some links and components of the wheel mechanism of the moon lander.

(With inputs from Kerala, Telangana and Karnataka bureaus and PTI)



A step closer: PM Narendra Modi and President Emmanuel Macron during the Bastille Day celebrations in Paris on Friday. ANI

India, France set to co-develop jet engine

Dinakar Peri
PARIS

Taking the defence cooperation between India and France to a new level, the two countries announced that they will extend their "ground-breaking" defence cooperation in advanced aeronautical technologies by supporting the joint development of a combat aircraft engine and also an engine for the Indian multi-role helicopter (IMRH) being designed and

developed by Hindustan Aeronautics Limited.

This is among the several announcements made by the two sides on the defence front. Both nations also announced cooperation on small and advanced modular reactors and finalisation of the joint Earth observation satellite, among others.

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India, France set to co-develop jet engine

"A road map on this project will be prepared between Safran and DRDO before the end of this year," the joint statement issued after bilateral talks between Prime Minister Narendra Modi and French President Emmanuel Macron said. "They also support industrial cooperation for motorization of heavy-lift helicopters under the IMRH programme with Safran Helicopter Engine, France. To enable progress on the IMRH programme, a Shareholders' Agreement between HAL, India and Safran Helicopter Engine, France has been concluded for engine development."

These ventures are in line with the spirit of trust that prevails between India and France in the sharing and joint development of critical components and technology building blocks, based on the successful Indo-French experience in technology transfer, the statement said.

Last month, HAL and General Electric General Electric signed an MoU to potentially manufacture the F-414 engine for the indigenous Light Combat Aircraft-MK2 subject to license approval from the U.S. Congress. India has been looking for a more powerful engine to power the fifth-generation Advanced Medium Combat Aircraft (AMCA) under development.

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'Strong pillar of ties'

"Defence cooperation has been a strong pillar of our ties. It is a symbol of deep mutual trust between the two countries. France is an important partner in Make in India and self-reliant India," Mr. Modi said in the joint press statement along with French President Emmanuel Macron ahead of the bilateral talks at Elysee Palace.

On Thursday, the Defence Acquisition Council accorded preliminary approval for the procurement of 26 Rafale-M fighters to operate off India's aircraft carriers and three additional Scorpene-class diesel-electric submarines from France.

The two leaders also welcomed the Memorandum of Understanding (MoU) between Mazgon Dockyard Ltd., Mumbai and Naval Group for the construction of three additional Scorpene submarines.

Further, other defence industrial partnership initiatives are a contract being concluded between Safran Helicopter Engine and HAL for the "Transfer of Technology of Forging and Castings" for the Shakti Engine which powers HAL built helicopters. "Another MoU between Garden Reach Shipbuilders and Engineers Ltd. (GRSE), and Naval Group France, a leader in European Naval Defence Industry to collaborate in the field of surface ship that caters to fulfil the requirement of India and International Naval forces," the joint statement stated. Both countries are also working towards adopting a road map on Defence Industrial Cooperation and in view of the uptick in defence industrial collaborations, India is setting up a Technical Office of the Defence Research and Development Organisation (DRDO) at its Embassy in Paris, the statement said.

Bastille Day parade

Referring to the Bastille Day parade where he was the chief guest, Mr. Modi said we all saw the fly-past of Indian Rafale jets, while an Indian Navy ship was also present in a port of France and the contingents of all three Services marched.

Mr. Macron too talked of the long history of Indian troops in both the World Wars. "I was proud to see the Punjab Regiment here in the heart of Paris." He said the two countries have identified new areas of cooperation – steel, space, energy, and civil nuclear – and also announced liberalisation of visa systems for students which was welcomed by Mr. Modi.

After taking part in the Bastille Day parade, PM Modi attended lunch hosted by the President of National Assembly Yaël Braun-Pivet at her official residence.

Later Mr. Modi met with prominent personalities both from France and of Indian origin. This included Charlotte Chopin who began practising yoga at the age of 50. Others include Thomas Pasquet, renowned French astronaut, pilot and actor and Leena Nair, global CEO of luxury brand Chanel. After the bilateral talks, PM Modi and President Macron attended the CEOs forum followed by a banquet dinner in Louvre. Mr. Modi departed for Abu Dhabi just past midnight.

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Conservationists criticise plans to allow tourism in eco-sensitive area surrounding Pakkasuran Malai

Rohan Premkumar
UDHAGAMANDALAM

Conservationists are shocked by reports that the Tamil Nadu Tourism Development Corporation Limited (TTDC) plans to allow tourism in the eco-sensitive area surrounding Pakkasuran Malai, a hill near Coonoor. They say tourism may severely impact the rare, endemic biodiversity that is found in the area.

According to officials, TTDC plans to allow tourism at Droog Fort, a historic fort on the peak of Pakkasuran Malai, spread around 40 cents of land. It also plans to construct a viewpoint, a toilet and a food court. The fort and the hill are popular hiking spots. However, conservationists and wildlife biologists working in the region have criticised the plan. A

Abinash, a wildlife biologist who has visited the area for over a decade, said the Pakkasuran Malai was one of the few places in the Nilgiris that is home to the rare species of snake known as the Günther's burrowing snake (*Plecturus guentheri*). It is also an important nesting site for the Shaheen falcon (*Falco peregrinus peregrinator*).

The area, which is composed primarily of rocks and grasslands, is also home to the rare *Valeriana leschenaultii*, an endemic species of plant that is critically endangered and is threatened by habitat loss due to road construction and expansion of agriculture and human settlements, Mr. Abinash said.

Mr. Abinash said that micro-endemic bush frogs such as the Coonoor bush frog (*Raorchestes coonoorensis*), larger mammals



Facing resistance: TTDC plans to allow tourism at the Droog Fort on the peak of Pakkasuran Malai, say officials. SPECIAL ARRANGEMENT

such as the rare Nilgiri martens, mouse deer, Indian gaurs, barking deer, leopards, sloth bears, Indian giant flying squirrels, Indian giant squirrels, brown palm civets and Indian crested porcupines, and a number of endemic orchids and grasses are found in the area.

The Droog Fort itself has historical, cultural and religious significance, and qualifies as a sacred grove, said Janardhan Nanjundan, member of the Inter-

national Union for the Conservation of Nature's World Commission on Protected Areas. He said the Fort and the surrounding Pakkasuran Malai need to be protected.

"Sacred groves are patches of primeval forest that some rural communities protect as abodes of deities. Sacred groves help in the protection of many rare, threatened and endemic species of plants and animals in the area," Mr. Janardhan said, adding

that since Pakkasuran Malai and the Droog Fort are already popular hiking spots, they do not need any additional commercial promotion and development.

Azad Kamil, of the Ongil Nature Trust in Coonoor, said that given the impact that tourism in the area could have on biodiversity, the Collector should withdraw the 'No Objection Certificate' (NOC) issued for getting the project off the ground. Mr. Azad Kamil said lack of regulation of tourists to the area meant many animals, while crossing the road, were getting killed by tourist vehicles.

'Regulate eco-tourism'
Activists are not opposed to eco-tourism in the area, but they want it to be heavily regulated. N. Moinudheen, an independent re-

searcher and wildlife biologist, said the Forest Department could consider opening up the area to limited tourism: small groups of trekkers and hikers can be allowed with the Department's permission.

The proposal to divert forestland for commercial and non-forest purposes was antithetical to the government's intention to increase the forest cover and protect the wildlife areas, said N. Sadiq Ali, founder of the Wildlife and Nature Conservation Trust (WNCT). When contacted, District Forest Officer (Nilgiris Division) S. Gowtham said the Forest Department had not received any formal proposal for such a project. But a few department staff members had accompanied the Tourism Minister for a preliminary inspection of the proposed project site.

M CHIE

Justices Bhuyan and Bhatti take oath as new SC judges

The Hindu Bureau
NEW DELHI

Chief Justice of India D.Y. Chandrachud on Friday administered the oath of office to two new Supreme Court judges, Justices Ujjal Bhuyan and S. Venkatana-rayana Bhatti.

Justice Bhuyan, appointed as a judge of the Gauhati High Court on October 17, 2011, had been serving as the Chief Justice of Telangana High Court since June 28 last year.

"Justice Ujjal Bhuyan is a judge with a good reputation for integrity and competence," the Collegium resolution read.

Justice Bhatti was appointed as a judge of the Andhra Pradesh High



Justice S.V. Bhatti takes oath as a judge of the Supreme Court. Chief Justice D.Y. Chandrachud is also seen. ANI

Court on April 12, 2013.

The Collegium explained its choice of Justice Bhatti, saying the Andhra Pradesh High Court did not have any representation on the Bench of the Supreme Court since August 2022. Justice Bhatti was transferred to the Kerala High Court in March 2019.

He had been serving as Chief Justice there since June 1.

The Collegium noted that Justice Bhatti's judgments dealt with a myriad range of issues from multiple branches of law, and "stand testimony to his legal acumen and competence".

Yamuna floods Rajghat, reaches Supreme Court

The water level in the river has started dropping, but still remains over the danger mark; flood-damaged regulator triggers political blame game; Delhi CM, L-G present united front

Jaideep Deo Bhanj
NEW DELHI

The Yamuna continued to be in spate on Friday, with its waters making its way further into the city, flooding Rajghat and reaching the gates of the Supreme Court. The Army and the Navy were called in to assist the National Disaster Response Force (NDRF) and local civic agencies to stop the flow of river water into the city.

While the water level of the Yamuna dropped gradually through the day, coming down to 208.2 metres by 7 p.m. on Friday evening from its record high of 208.66 metres 24 hours earlier, it was still well over the danger mark of 205.33 metres that was breached on Monday.

River, drains flood city

The city administration had its hands full as the Indraprastha water regulator, located near the busy Income Tax Office junction and managed by the Irrigation and Flood Control De-



Under water: The Mahatma Gandhi Samadhi caught in the flood waters of the Yamuna. R.V. MOORTHY

partment, was itself damaged due to the river's strong flow flooding areas in its vicinity. The backflow of water from drains also flooded areas that were located away from the floodplains.

Delhi's Chief Minister Arvind Kejriwal and Lieutenant-Governor V.K. Saxena – who are usually at loggerheads with each other – visited affected areas and addressed the media together, with the L-G saying that it was “not a time to

blame each other”, and that they are working as a team for the people of Delhi.

Politics at play

However, a blame game ensued away from the cameras, with Delhi Water and Flood Control Minister Saurabh Bharadwaj saying that officers were “not responding to his orders to call in an NDRF team to fix the broken regulator due to the ordinance brought in by the Central Govern-

ment”. Sources in Raj Niwas said that Mr. Bharadwaj's remarks were “uncalled for” and that the “NDRF is not responsible for carrying out regular engineering works”.

Politics also came to the fore as Delhi's Aam Aadmi Party government accused Haryana's BJP government of releasing water towards the capital from the Hathnikund Barrage, causing the flood-like situation, instead of the east and west canals that flow to Uttar Pradesh and Haryana. The BJP reacted by saying that the AAP was trying to mislead the public with such theories after failing to desilt the Yamuna.

By evening, Mr. Kejriwal announced that one of the three water treatment plants that had been shut down due to the high water levels had been restarted, bringing relief to Delhi residents who had been told to prepare themselves for a shortage of clean water. The Raj Niwas issued a statement saying that the damaged water regulator had been fixed.