Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/19228
DOI URL: http://dx.doi.org/10.21474/IJAR01/19228

RESEARCH ARTICLE

CHANDRAYAAN-3 INDIA'S ACHIEVEMENT IN LUNAR EXPLORATION

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Manuscript Info

Manuscript History
Received: 05 June 2024
Final Accepted: 08 July 2024
Published: August 2024

Abstract

Astronomy, space research.

Introduction:-

On July 23, 2024, India's Chandrayaan – 3 made a historic landing on the Moon, capturing the world's attention and a wave of national pride and excitement. Through the hard work and talent of our scientists, India has made it to the South Pole of the Moon where no other country in the world has ever reached. This achievement of the Chandrayaan Mission will propel India's journey beyond the Moon's orbit. Our scientists and engineers will test the limits of our solar system and continue working to realize the infinite possibilities of the universe for humanity.

The lunar south pole, being less illuminated by the Sun, is a place of mystery and exploration. The mission was to study lunar topography, mineralogy, elemental abundance, the lunar exosphere, and signatures of hydroxyl and water ice which would be vital resources for future explorers. The mountain peaks here and illuminated by the sun for long periods of time which could be used to provide solar energy to an outpost.

The Chandrayaan-1 mission was a major boost to India's space program, as India researched and developed indigenous technology to explore the Moon. The mission was launched on 22 October 2008 and expected to operate for 2 years. The vehicle entered the lunar orbit on 8 November 2008. On 14 November 2008, the Moon Impact Probe separated from the Chandrayaan orbiter and landed on and made it to the south pole in a controlled manner. The location of impact was named Jawahar Point. With this mission, ISRO became the fifth national space agency to land on the lunar surface. However, after almost a year, the orbiter started experiencing several technical issues such as malfunction of the star tracker and poor thermal shielding. Chandrayaan-1 stopped communicating on 29th August 2009, shortly after which the ISRO officially declared that the mission was over. Chandrayaan-1 operated for 312 days; however, the mission managed to achieve most of its scientific objectives like detecting the presence of Lunar water. Chandrayaan-2 mission was a highly complex mission. Although last-minute malfunction in the landing guidance software resulted in the lander crashing, the Chandrayaan-2 orbiter is operational till date. Chandrayaan-2 detected Water, as well as Hydroxyl ions on the Moon, detected the distribution of gas in Lunar Atmosphere, presence of rare Earth elements, detection of sodium and more. The Chandrayaan-3 spacecraft consisted of 'Propulsion Module', 'Vikram Lander' (Lander Module) and the 'Pragyan Rover' (Rover Module). This time they had to engineer a lander that would effectively land safely and softly on the surface of the Moon. The team conducted experiments and tests on the materials found on the Moon's surface to better understand the composition of the Moon. ISRO chairman S. Somanath stated that this time instead of focusing on success their strategy was to focus on eliminating the errors and possible failures. Clearly, his strategy worked and proved that with unity and determination, we can achieve the hardest targets. The team of ISRO overcame all their tense moments and hardships through unity, solidarity and problem-solving skills.

Years and years of preparation and meticulous work would finally be put to the test on 14th July 2023 when the whole world would be anticipating. Witnessing the entire nation unite in prayer for the mission's success further highlighted its importance. And on August 23rd, at 6:04 PM, Vikram landed on the moon's surface without hindrance. On the big day space enthusiasts and people from everywhere gathered in schools, colleges, workplaces and electronic showrooms to watch the live telecast of the event. They cheered, clapped chanting "Vande Mataram !"and "Bharat Mata ki Jai !" and in some places like Chhatrapati Shivaji Chowk in Kolhapur, sweets were distributed. Maha Aarti's were organised to pray for the success of the Chandrayaan-3 and crowds of hundreds were gathered to celebrate after the good news came out. The success is a testament to ISROs unwavering commitment to overcoming obstacles. Learning from the experience of the Chandrayaan-2 set back paved the way for greater achievements. Ex-ISRO chief K Sivan who led the Chandrayaan-2 mission said, “The learning that we got for Chandrayaan-2; our unsuccessful attempt to soft land helped us in perfecting the technology, to run a large number of experiments to test the process of landing and it paid dividends.” He also stated that every single problem that occurred in the case of Chandrayaan-2 was addressed be it a satellite problem, stability problem or an additional requirement problem. All these tireless efforts over 3 to 4 years after Chandrayaan-2 finally paid off! A mission like this undoubtedly would not be possible without unwavering collaboration and teamwork. Being able to bounce back even stronger after the failure of Chandrayaan-2 due to a software glitch after coming so close to success demonstrates the resilience and dedication of the ISRO team.

ISRO chairman S Somanath said the success of Chandrayaan-3 mission connected with the hearts of the people and the successful soft landing on the Moon was a "Moment of glory for Indians." With India becoming the fourth nation to land on the Moon and the first to make a soft landing on the south pole of the lunar surface. As we learn more about how ISRO achieved this great success and how many obstacles they had to pass, this story becomes truly an inspiration. Chandrayaan-3 created an emotional enthusiasm in the minds of youngsters, children and people who study science and technology. We were able to showcase the whole accomplishment to the entire country and made sure the success must go to everybody. India has managed to achieve a great milestone, make the country proud and leave a print on the history of the world.

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