FAKE NEWS WATCHDOG
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Truth Matters, We Verify

WHITE PAPER 2025

India's Space Program: A historical shift from Development to Defense

Published on:
Sunday, June 29, 2025

Fake News Watchdog

Email: info@fakenewswatchdog.org | **Web:** www.fakenewswatchdog.org

About Us

Fake News Watchdog (FNW) is a global initiative dedicated to identifying, analyzing, and countering the spread of misinformation and disinformation in today's digital world. We stand at the forefront of the fight for truth, empowering individuals, media professionals, academic institutions, and civil society to navigate the increasingly complex information landscape with confidence and clarity.

Our Mission

Our mission is to detect and debunk false narratives, monitor disinformation trends, and strengthen public resilience through media literacy. Leveraging artificial intelligence, advanced fact-checking tools, and rigorous research methodologies, we work to uphold the principles of transparency, credibility, and informed public discourse.

Our Vision

We envision a world where access to accurate, verified information is a fundamental right, and where communities are equipped to question, verify, and challenge misleading content. A well-informed society is the cornerstone of democracy, and we are committed to fostering a culture where truth triumphs over manipulation.

What We Do

- **Fact-Checking Services**: Verifying claims circulating in media, politics, and public discourse.
- **Reputation Management**: Monitoring digital platforms for false or misleading content about our clients and delivering timely, evidence-based rebuttals to protect their public image and credibility.
- **Research & Trends Analysis**: Studying patterns in disinformation to inform public policy and education.
- **Educational Outreach**: Promoting media literacy through training, resources, and awareness campaigns.
- **Global Collaboration**: Partnering with international organizations, journalists, researchers, and digital rights advocates to build a united front against fake news.

A Message from Our Team

At Fake News Watchdog, our mission is rooted in the belief that truth is not just a principle but a cornerstone of a thriving society. In an age where disinformation spreads faster than ever, the responsibility to uphold integrity in information is one we share collectively.

This report serves as both a reflection of the challenges we face and a call to action. It dives deep into the anatomy of disinformation, examining its sources, impact, and the societal vulnerabilities it exploits. By bringing these incidents to light, we aim to empower individuals, institutions, and policymakers with the insights necessary to recognize, combat, and prevent the spread of falsehoods.

Our work is not possible without the contributions of vigilant fact-checkers, dedicated researchers, and the trust of those who believe in a better-informed world. Together, we can build an ecosystem where truth has the power to outpace lies, fostering trust and accountability in every corner of society.

We hope this report inspires meaningful dialogue and decisive action. Thank you for standing with us in this crucial fight against misinformation.

– The Fake News Watchdog Team

Email: info@fakenewswatchdog.org

Our Team

Prof. Rehan Hasan (Patron-in-Chief)
Rehan Hasan is an accomplished Director with extensive experience in the broadcast media industry, showcasing a proven track record of excellence. Renowned for his expertise in Immersive Reality, Journalism, Media Relations, Radio, and Film Production, he brings a dynamic and innovative approach to every project. With a strong professional background and a passion for storytelling, Rehan continues to make significant contributions to the ever-evolving media landscape.

Dr. Asad Ali Shah (Co-Founder)
Dr. Asad Ali Shah is a professor, researcher, and entrepreneur. He has earned his Ph.D. in media and sociology from Canada. He has been teaching at different universities in Pakistan and Canada. He is the author of a number of publications, including a book, journal articles, and reports. After completing his doctoral degree in Canada, Dr. Shah returned to Pakistan to serve his country.

Muhammad Nasir Butt (Co-Founder)
Muhammad Nasir Butt is a seasoned journalist and academic, currently serving at Public TV. With extensive experience in media, he has previously worked with Capital TV and GNN. In addition to his journalistic endeavors, Nasir is also teaching media & communication courses at prestigious institutions including IIU and RWU. He holds an MPhil in Media & Communication and is pursuing a PhD in Media.

Sophia Siddiqui (Media Strategist & Researcher)
Sophia Siddiqui is a seasoned journalist, academic, and media strategist with extensive experience in both national and international platforms. With a decade-long career at Radio Pakistan, currently, she serves as the Manager of International Media at NDMA and She leads various media initiatives such as Taware Pakistan and Glory Media, focusing on youth, women, engagement, and environmental journalism.

Rubab Jaffery (Senior Researcher)
Rubab Jaffery holds a Master’s degree in Media & Communication from the UK and brings a wealth of experience in journalism, working with several prominent media organizations, including Daily Jang.

Rashid Khan (AI Expert)
A leading expert in Artificial Intelligence (AI) and Deepfake Technology, specializing in the development, analysis, and ethical implications of AI-driven content creation.

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Executive Summary

India’s space program has evolved from humble beginnings to an ambitious and strategically driven enterprise. A deeper analysis reveals that India's space ambitions are increasingly aligned with military objectives and regional power politics rather than developmental needs.

Historical Context and Civilian Achievements

India began its space journey in the 1960s with the establishment of INCOSPAR and later ISRO. Initially centered on peaceful and developmental goals such as communication, weather forecasting, and agricultural monitoring, India's early missions focused on nation-building and technological self-reliance.

Strategic Shift Toward Militarization

A key theme of this analysis is India’s gradual pivot from civilian space exploration to the strategic militarization of space. Since the early 2000s, India's security doctrine has increasingly emphasized the use of space for defense. The creation of institutions such as the Defence Space Agency (DSA) and Defence Space Research Organisation (DSRO), along with the 2019 ASAT test ("Mission Shakti"), mark a deliberate shift toward militarized space capability.

India has invested heavily in dual-use satellite constellations, anti-satellite weapons, and ballistic missile defense systems. These developments are framed under national security, but they have direct implications for regional stability, especially in the context of tensions with Pakistan and strategic rivalry with China.

Socioeconomic Gaps vs. Prestige Missions

The research critiques the disconnect between India's space ambitions and its pressing socio-economic needs. India remains home to over 300 million people without access to clean water, sanitation, or electricity. More than 25% of the population lacks proper toilet facilities, and millions live in urban slums without basic amenities. Yet, significant public funds are channeled into expensive lunar missions and military space programs.

This disparity suggests that space missions serve more to project national prestige and geopolitical clout than to deliver immediate benefits to the poor. The government's “Make in India” and “Space Vision 2047” campaigns are ambitious, but they risk becoming symbols of elite-driven technological nationalism, rather than inclusive development.

Military Applications and Technological Synergy

The report provides a detailed account of India's advanced missile systems and how they increasingly integrate with space-based assets. India's missile arsenal includes the Agni series (ranging up to ICBM capabilities), BrahMos cruise missiles, and various air-defense and anti-ballistic systems.

India has also significantly enhanced its remote sensing and satellite surveillance infrastructure, some of which was reportedly used during military standoffs with Pakistan. The synergy between real-time satellite data and precision-guided missiles shortens the military "kill chain" and indicates a broader shift toward space-enabled warfare.

Regional Rivalries and Strategic Messaging

India's space strategy is shaped by its geopolitical competition with both Pakistan and China. The analysis highlights how India's dual-use technologies serve as a deterrent in South Asia but also exacerbate regional insecurities. Pakistan, though possessing more limited resources, maintains strategic parity through its own missile capabilities and Chinese partnerships. China, meanwhile, is portrayed as India's primary long-term rival in space.

The study explores how Indian political discourse subtly frames space achievements as tools of soft power and strategic deterrence, often underplaying their military implications. However, the development of India's 52-satellite military constellation and joint civil-military command structure suggest otherwise.

Global Reactions and Diplomatic Balancing

Countries such as the U.S., Japan, and the European Union welcomed India into the elite club of lunar nations. However, voices from within the scientific community especially in Pakistan and China—expressed concern about the growing militarization of India's space program and the implications for regional arms races.

The Indian government has simultaneously cultivated diplomatic ties through participation in treaties like the Outer Space Treaty and frameworks such as the Artemis Accords. Yet, behind these peaceful overtures, the strategic buildup of offensive and defensive space capabilities continues.

Chandrayaan-3 Hype Versus Transparency

The mission generated massive global and domestic media attention. A deeper analysis reveals significant concerns regarding transparency in scientific data sharing, delayed publication of crucial mission results, and the apparent over-politicization of the mission's achievements. Critics suggest that the Indian Space Research Organisation (ISRO) may have prioritized orchestrating a public spectacle over ensuring open and verifiable scientific dissemination. Important research outputs have been slow to materialize, and aspects of the televised "live feed" of the landing have raised questions about their authenticity, with some suggesting the use of computer-generated graphics rather than real-time footage.

Beneath the surface of international praise and nationalistic celebration lies a more complex narrative, one of media orchestration, limited scientific transparency, political symbolism, and questionable mission clarity. While these goals appeared to be met on paper, inconsistencies in public data release and operational transparency have raised doubts among scientific observers. Most notably, ISRO took nearly a year to release partial scientific data, limiting opportunities for international validation and collaboration.

Despite Indian media and officials referring to the site as the south pole, the actual landing point was over 600 kilometers away from the true pole. Chinese experts and international observers have challenged this characterization, suggesting the claim was more symbolic than scientific.

India’s Prime Minister Narendra Modi declared August 23 as “National Space Day” and named the landing site “Shiva Shakti Point,” invoking both nationalism and cultural pride. While such gestures resonate domestically, they risk conflating scientific achievement with political messaging.Media Coverage and Narrative Control

ISRO's broadcast from the command center during the Chandrayaan-3 landing was widely perceived as a meticulously curated media event. Observations from the control room during the telecast revealed elements indicative of theatrical staging. Commentators, for instance, claimed to be broadcasting real-time video coverage of the lander’s descent, despite the known absence of an external recording satellite or dedicated camera on the spacecraft itself capable of capturing such footage. This tightly controlled media narrative significantly influenced global perception, effectively presenting a dramatized version of events that lacked immediate, verifiable scientific validation from independent sources.

Post-landing, significant concerns have arisen regarding the limited scientific data shared publicly. Key performance metrics for the Pragyan rover, including its operational duration, range of movement, and specific experimental outcomes, remain ambiguous. Reports indicate that the rover's communication ceased shortly after its initial deployment, yet ISRO has not provided clear confirmation or detailed explanations on whether any meaningful scientific data was successfully collected or transmitted before its apparent dormancy.

Pronouncements regarding scientific findings, such as the detection of sulfur on the Moon, were made without accompanying peer-reviewed data or detailed spectral evidence. While such discoveries would be scientifically momentous, the lack of transparent methodological disclosure or supporting empirical data undermines their immediate credibility within the scientific community.

Fact-Checking Mission Claims

A review of several official and media-reported claims surrounding Chandrayaan-3 reveals instances of exaggeration or potentially misleading information. For example, key televised visuals—including dust displacement during landing and the rover's detachment sequence—appear to have been pre-rendered or studio-produced simulations, rather than real-time video recordings. The claim of semi-autonomous navigation for the Pragyan rover was reportedly hindered by power limitations and camera faults, severely restricting the rover’s actual mobility and its ability to transmit images. Visual anomalies within the broadcasted footage, such as inconsistencies in shadows, horizon sharpness, and camera angles, further point toward digital fabrication. These discrepancies inevitably undermine ISRO’s credibility and raise ethical questions concerning media manipulation in the context of scientific communication, highlighting a significant gap between public messaging and actual scientific performance.

Recommendations and Conclusion

The study concludes with a strong critique of India’s current trajectory, arguing that national development must be prioritized over militarized space ambitions. Redirection of space spending toward public welfare, including sanitation, electricity, and digital infrastructure. Greater transparency in space missions, scientific data, and defense budgets. Focus on peaceful applications of space technology in agriculture, health, and climate change mitigation. De-escalation of regional space arms race, through dialogue with China and Pakistan under international space norms.

India's focus should remain steadfastly on service to its people, prioritizing their well-being and development, rather than solely on rocketry and orbital achievements.

Research Methodology

This study employs a qualitative content analysis framework to examine India’s evolving space program, with particular emphasis on its strategic orientation, symbolic narratives, and geopolitical implications. The methodological approach is both thematic and discursive, enabling a nuanced interpretation of the technical, political, and cultural dimensions of India’s space endeavors, particularly the Chandrayaan-3 mission.

Data Collection

The research relies on a diverse range of publicly accessible primary and secondary sources. Primary data include official documents and mission briefings from the Indian Space Research Organisation (ISRO), speeches by Indian political leaders (e.g., Prime Minister Narendra Modi), and statements by ISRO officials. Secondary sources comprise academic publications (e.g., *Strategic Perspectives*, *Astropolitics*), policy reports from think tanks (e.g., Carnegie Endowment, Council on Foreign Relations), and international and domestic media coverage (e.g., *Reuters*, *BBC*, *The Hindu*, *NDTV*).

Purposive sampling was used to ensure representation from a broad array of perspectives—including scientific, political, and journalistic—particularly those addressing India's positioning as a rising space power and its regional strategic narrative vis-à-vis China and Pakistan.

Analytical Procedures

Thematic analysis was applied to identify recurring concepts such as “national prestige,” “dual-use technologies,” “strategic deterrence,” and “soft power.” Texts were coded for semantic patterns that revealed how India's space program is constructed as both a developmental and strategic initiative.

In parallel, discourse analysis was conducted to interpret rhetorical strategies employed in televised broadcasts, political speeches, and media commentaries. This included attention to the performative language and symbolism surrounding the Chandrayaan-3 landing, such as nationalistic slogans and metaphors used to amplify the mission’s significance.

Case Study: Chandrayaan-3

Chandrayaan-3 serves as a central case study for evaluating the interplay between scientific output, media representation, and political messaging. The study explores how the mission’s outcomes were framed in public discourse, including the global reception of India’s data release (ISRO, 2024) and reactions from neighboring countries and international media outlets.

Limitations

This research is limited to publicly available data. Classified material from ISRO or the Indian defense establishment was not accessible. Additionally, while secondary data were triangulated for accuracy, independent validation of technical mission outcomes was beyond the scope of this qualitative study.

Ethical Considerations

This study adheres to the ethical standards of document-based research. All data used were publicly accessible and have been cited appropriately. No human subjects were involved, and therefore institutional review board (IRB) approval was not required.

Indian Space program 1

"By 2040, an Indian's footprints will be on the Moon. Mars and Venus are also on our radar."
(Prime Minister of Republic of India Narendra Damodardas Modi)

Background

Scientific research and knowledge expansion remains the core driver for the space programs, governments fund missions to study earth's climate, the solar system, and the universe, leading to fundamental discoveries about our planet, the origin of the cosmos, and the potential for life beyond earth, these programs drive innovation across various industries, leading to "spin-off" technologies with applications in everyday life (e.g., GPS, satellite communications, weather forecasting). Governments increasingly see space as a sector for economic growth, fostering commercial space industries. Even with increased commercialization, governments continue to invest in space capabilities to maintain strategic autonomy, protect national assets in orbit, and enhance their geopolitical standing on the world stage as seen in “Space Race” during the cold war between the United States and the Soviet Union as a tool of “National Prestige and Ideological Superiority”.

With the development of powerful rockets for space launch that had direct parallels to intercontinental ballistic missile (ICBM) technology, space was quickly recognized as the "ultimate high ground. Governments sought to develop reconnaissance satellites for intelligence gathering, improved communications, navigation, and early warning systems, as a must have capabilities for national security.

Space exploration is incredibly complex. Imagine building a giant puzzle with thousands of tiny, moving pieces. Each piece, from the smallest bolt to the largest rocket section, must work perfectly and on time, exactly where it's supposed to be. If even one part is a little bit off, or if something unexpected happens, the entire mission could be in danger. It's like a perfectly timed dance where every step matters. Space missions, whether controlled by governments or private companies, and whether they have astronauts or not, are incredibly difficult. No country in the world has a perfect record; failures are a natural part of space exploration. It's like trying to achieve something truly groundbreaking and 're bound to encounter setbacks. These failures, while disappointing, teach valuable lessons, helping engineers and scientists improve future missions and push the boundaries of what's possible in space.

Developing a spacecraft from its initial concept to a successful flight is an incredibly complex and time-consuming process. Typically, this journey takes anywhere from seven to twelve years, depending on the mission's objectives, technological challenges, and available resources. Due to this lengthy development cycle, space agencies around the world often work on multiple programs simultaneously. These programs are not isolated; instead, they benefit from shared knowledge, technical expertise, and test data gathered during various phases of spacecraft design, production, and trial missions.

After each launch or test flight, the insights gained are not only used to improve the mission at hand but also critically reviewed by other ongoing and future programs. These programs often go back to the drawing board to reassess and refine their designs, strategies, and safety protocols based on the latest findings. This continuous loop of learning and adaptation ensures that future space missions become safer, more efficient, and more scientifically valuable.

Given the enormous costs, risks, and technical challenges involved in space exploration, international community comes up with different of treaties, agreements, and frameworks to ensure the peaceful, responsible, and collaborative use of outer space like The Outer Space Treaty (1967) formally known as the ″Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies″, this treaty prohibits the militarization of space and promotes peaceful exploration. “The Convention on Registration of Objects Launched into Outer Space” (1976) requires countries to provide detailed information about their space objects, including satellites and probes, to the United Nations. UN Resolution 1721 (1961) encourages countries to share scientific data, particularly regarding space weather, orbital mechanics, and exploration results, to foster transparency and global collaboration. “International Agreements on Space Debris and Satellite Tracking”, countries cooperate in monitoring space debris to prevent collisions and ensure the safety of both crewed and uncrewed missions. “Agreements Against the Militarization of Space”, many nations, through formal and informal frameworks, have pledged not to use outer space for hostile or military purposes. “The Artemis Accords” (2020) a series of bilateral agreements initiated by NASA and its international partners to promote openness, the sharing of scientific data, and transparency in space operations, particularly for lunar exploration.

Countries such as the United States, Russia, China, India, the United Kingdom, European Union member states, and Pakistan are signatories to various forms of these treaties and collaborative arrangements some of them are binding and some of them are only cooperative in nature.

About India

India, now the world's most populous nation, stands as the largest democracy when judged by voter numbers. Under the leadership of Prime Minister Narendra Damodardas Modi of the Bharatiya Janata Party (BJP), and with support from its National Democratic Alliance (NDA), the coalition secured 293 seats in the 543-member Lok Sabha. Of the more than 968 million registered voters, approximately 234.7 million (24.2%) cast ballots in favor of the BJP–NDA (Election Commission of India, 2024).

Despite the democratic mandate, a considerable portion of elected representatives has faced scrutiny over criminal allegations. According to watchdog analyses, out of 543 newly elected Lok Sabha members, 251 (46%) have pending criminal cases, including charges of rape, murder, kidnapping, and violence against women. Similarly, in the Rajya Sabha, 306 of the 763 sitting members (40%) have disclosed involvement in serious criminal proceedings (Association for Democratic Reforms, 2024).

Concurrently, India grapples with immense and interconnected socio-economic challenges, presenting a complex landscape for a nation often celebrated for its technological advancements. With a vast population exceeding 1.46 billion, the scale of these issues is staggering. A significant portion of its citizens, nearly 26.4%, live below the poverty line, struggling daily to meet basic needs. This widespread poverty acts as a root cause for many other deprivations.

One of the most pressing concerns is sanitation. Over 25% of India's population, translating to hundreds of millions of people, lacks access to proper toilet facilities. This forces a quarter of the country's inhabitants, particularly in rural areas and densely packed urban slums, to engage in open defecation—relieving themselves outdoors in fields, along railway tracks, or in narrow city alleys. This practice not only compromises dignity and privacy but also exacerbates severe public health risks, directly contributing to the spread of diseases and polluting the environment. The Ministry of Health & Family Welfare (2023) highlights the critical impact on public well-being. Access to clean, safe drinking water is another major hurdle. Less than half the Indian population, specifically fewer than 50%, has access to treated drinking water. This means their water supply is often unsafe for consumption, leading to waterborne illnesses and further burdening the healthcare system.

Housing conditions are also a significant concern, with approximately 65 million people residing in squalid slum areas that fall far below any international acceptable standards. While not all are technically "homeless," their living conditions are extremely poor, lacking basic amenities and security. A more visible crisis affects 3.7 million people in major cities who are truly homeless, literally living on the streets, sleeping under bridges, on railway platforms, or in other open spaces without any roof over their heads. Electricity access remains incomplete. Around 31 million homes in rural areas still have no electricity at all, severely impacting education, health services, and economic opportunities. An additional 81 million households, even if power lines are nearby, are not connected to the main power grid. This persistent lack of connection is primarily due to poverty, making it unaffordable for families to secure a connection, or because the existing electricity supply is unreliable with frequent outages. The Central Electricity Authority (2024) reports underscore the magnitude of this infrastructure gap. These intertwined challenges paint a stark picture of the daily realities faced by a substantial portion of India's population.

Historical Evolution of India’s Space Program

The global Space Age commenced in 1957 with the Soviet Union’s Sputnik launch, heralding a period of intense competition. Pakistan’s SUPARCO formed in 1961, launching Rehbar-I in 1962 (SUPARCO, 2022). India responded by establishing INCOSPAR in 1962. Its first launch pad emerged at Thumba, Kerala—achieving its inaugural rocket launch (Nike-Apache) on November 21, 1963 (Indian Space Research Organisation ISRO, 2023). Subsequent launches included French Centaure and Russian M-100 rockets. In 1967, ISRO launched the indigenous Rohini RH-75, followed by India’s first operational satellite, Aryabhata, in 1975.

In 1969, INCOSPAR was restructured into ISRO, and by 1972, ISRO came under the Department of Space (DoS), reporting directly to the Prime Minister. This reorganization established ISRO as the nation’s Research & Development agency, while the DoS managed strategic oversight and covertly redirected funding toward defense-related objectives.

Strategic Shift Toward Militarization

The Kargil Review Committee Report of May 12, 2012, recommended creating a dedicated defense space entity. Consequently, India established the Defence Space Agency (DSA), acknowledging space as a vital domain for military operations such as surveillance, communications, and navigation (Kargil Review Committee, 2012).

Although India presents its space program as a symbol of national pride and cost-effective innovation, political rhetoric and media narratives often overshadow its developmental impacts. The proclaimed cost-efficiency of missions belies concerns over reliability, import dependency (e.g., cryogenic engines, precision sensors), and continued foreign collaboration despite the “Make in India” initiative. Ambitious projections, such as rapid parity with established spacefaring nations, obscure significant challenges. India’s Gaganyaan crewed spaceflight signals ambition but represents merely the initial phase in a long maturation process.

Prioritizing Defense Over Development

Contrary to public perception, the Indian Department of Space operates under budgetary constraints. The growing allure of commercial space ventures and global opportunities has triggered significant brain drain among scientists and engineers.

India’s social indicators remain troubling, poverty, unemployment, and lack of infrastructure persist, exacerbated by democratic erosion and strained foreign relations with Pakistan and China—further diverting resources toward defense expenditure (World Bank, 2023). The space program, it appears, increasingly serves political narratives rather than societal needs. While space exploration milestones—such as missions to the Moon and Mars—garner public attention, their tangible benefits for the agrarian population remain limited (Hindustan Times, 2023).

Agriculture employs nearly half of India’s workforce. Although satellite data can aid weather forecasting, drought and flood management, soil analysis, and crop health monitoring, limited infrastructure and digital literacy prevent rural farmers from utilizing these services. Consequently, agricultural failures and farmer suicides persist tragically.

Militarization and Regional Power Projection

The broader picture reveals a compelling tension within India's aspirations, its space ambitions are increasingly aligned with defense and strategic goals rather than directly addressing pressing social welfare needs. This strategic alignment is underscored by the nation's robust military spending. India ranks among the top five military spenders globally, with an annual defense budget exceeding USD 86 billion – a figure nearly nine times higher than that of its regional rival, Pakistan. A considerable portion of this significant expenditure is specifically allocated to dual-use satellite technologies, extensive surveillance infrastructure, and advanced missile systems, as detailed by the Stockholm International Peace Research Institute (SIPRI) in their "Trends in World Military Expenditure 2024" report.

Simultaneously, commentators have noted that the Indian Space Research Organisation (ISRO) receives over USD 1.6 billion in government funding. While ISRO is lauded for its civilian achievements, a substantial portion of this funding, as highlighted by PwC's "Space for Defence in India" report (October 2022), is directed toward remote sensing and projects with clear defense applications. While these investments undeniably enhance India’s strategic capabilities and contribute to its image as a rising global power, they do not directly address the country’s most urgent human development needs – the very socio-economic challenges detailed previously, such as poverty, sanitation, clean water, and access to electricity.

This disparity underscores a critical debate about national priorities. To truly transform its space program from merely a symbol of national prestige into a genuine force for public good, India must fundamentally redefine its strategic priorities. This necessitates a shift in focus towards developing and utilizing technologies that offer direct and tangible benefits to its population. Specific areas for reorientation include leveraging space technology for improved public health initiatives, enhancing disaster management and early warning systems, strengthening environmental protection efforts, supporting sustainable urban planning, and bolstering food security through advanced agricultural monitoring.

Furthermore, policy reforms are essential to ensure the benefits of space technology reach the most vulnerable segments of society. This includes promoting open data access from satellites, significantly expanding rural digital infrastructure to bridge the digital divide, and ensuring that space-derived services are designed and delivered to directly benefit marginalized communities, as advocated by Dhruva Jaishankar and Zehra Kazmi in their "India 2024: Policy Priorities for the New Government" (The Centre for Social and Economic Progress).

India possesses the potential to become a serious player in cutting-edge space exploration, true leadership lies not just in reaching distant celestial bodies like the Moon or Mars. Instead, it resides in the ethical and practical application of space technology to uplift the lives of its own people. The illusion of greatness, often driven by high-profile missions and military prowess, must be replaced with a clear vision rooted in inclusivity, sustainability, and a practical impact on the daily lives of its vast population. This re-evaluation is crucial for India to achieve holistic national development and global leadership that is truly meaningful and equitable.

Indian Space Program 2

"We have reached a place where no one has reached before! We have achieved a feat which no one has achieved before! This is today's India. Bold and Brave."

(Prime Minister of Republic of India Narendra Damodardas Modi)

India's Perception as a Space Power

At the inaugural ceremony of new infrastructure at the Vikram Sarabhai Space Centre (VSSC) in Thiruvananthapuram, Kerala, Indian Prime Minister Narendra Modi proclaimed that “India has become a global space power” (Prime Minister's Office, 2024, February 12). Highlighting India’s record-breaking achievement of launching 104 satellites simultaneously and the landmark success of being the first nation to land on the lunar south pole, he underscored the cost-effectiveness of the Indian Space Research Organisation (ISRO) and its burgeoning international demand. Projecting that India's space economy would quintuple to USD 44 billion within the next decade, Modi celebrated ISRO’s achievements as an exemplar of India’s soft power and a catalyst for youth and female scientific engagement. Notable milestones cited included the Chandrayaan-3 lunar mission and the Aditya-L1 solar mission, which he framed as foundational to what he declared "the century of Bharat." “By 2035, the Bharatiya Antariksha Station will open new frontiers in research and global cooperation. By 2040 an India’s footprints will be on the Moon. Mars and Venus are also on our radar,” “Our first human space-flight mission, ‘Gaganyaan’, highlights our nation’s rising aspirations, Modi said referring to the mission planned for early 2027. He said in the coming weeks, an Indian astronaut will travel to space as part of a joint ISRO-NASA mission to the International Space Station. The Axiom-4 mission is slated for launch in the first week of June and Indian astronaut Shubhanshu Shukla and three others will undertake a 14-day tour to the orbital laboratory.

Expanding on this vision, ISRO Chairman S. Somanath clarified that “self-reliance doesn’t mean doing everything alone,” but rather embracing transparency and calculated risk as pillars of growth (Times of India, 2023, June 23). He noted the significant strides made in indigenizing rocket technology—transforming from a position of near-total dependency to producing over 90% of the Polar Satellite Launch Vehicle (PSLV) domestically. According to Somanath, India achieves technological milestones at a fraction of the global cost, positioning itself uniquely within the international space community.

In a speech delivered on May 21, 2025, ISRO Chairman V. Narayanan emphasized the organization's role in national security, noting that “out of the 56 operational satellites, ten operate round-the-clock to support India's armed forces in surveillance, communication, and navigation” during critical missions such as Operation Sindoor. He also announced a series of ambitious future missions—including Chandrayaan-4, Chandrayaan-5 (in collaboration with JAXA), the Gaganyaan human spaceflight program, and a planned Indian space station by 2035, with a lunar landing set for 2040 (ISRO, 2025, May 21). In another address, Narayanan stressed the importance of developing capabilities in launch vehicles, satellite technology, human spaceflight, earth observation, space sciences, and policy frameworks to realize "Space Vision 2047" (ISRO, 2025, May 4).

ISRO's Scientific Secretary, M. Ganesh Pillai, reaffirmed the organization's ongoing commitment to innovation in space science and applications. He identified key strategic programs—such as the Gaganyaan mission, Chandrayaan-4 and -5, the Next Generation Launch Vehicle (NGLV), the Venus Orbiter Mission, and the Bharatiya Antariksh Station—as critical to India's pursuit of scientific and geopolitical leadership in space (ISRO, 2025).

On the military front, the Department of Military Affairs presented a roadmap detailing the integration of space into India's national defense strategy. This presentation, which involved senior representatives from the Defence Space Agency (DSA), ISRO, DRDO, and the Office of the Chief of Defence Staff, outlined a dual mandate: to rapidly expand India's orbital assets and to secure them against emerging threats. Central to this vision is the deployment of a 52-satellite constellation focused on surveillance, secure communication, and navigation, particularly in contested zones along the Line of Actual Control (LAC) and borders with Pakistan and China. The initiative situates India within what the report describes as a "congested, contested, competitive, and commercial" orbital domain, effectively reimagining outer space as a new strategic frontier (Defense News, 2024, December 18).

Officials from the Defence Space Agency (DSA) have articulated a strategic doctrine that embeds military assets in orbit, fosters civil-military integration, and advances India's status as an assertive space power. India's first large-scale military space exercise, *Antariksha Abhyas 2024*, simulated threats to satellite infrastructure and tested tri-service integration, effectively laying the foundation for a space force-style command structure (Indian Defence Research Wing, 2024).

Air Marshal V. R. Chaudhari, Chief of the Indian Air Force, described this evolution as India "slowly but surely militarising its space sector," suggesting the transition of the Indian Air Force toward an "Indian Air and Space Force" paradigm. Complementing this vision, Chief of Defence Staff General Anil Chauhan emphasized the significance of dual-use technologies, including the expansion of the NavIC satellite constellation for intelligence, surveillance, reconnaissance (ISR), and navigation—components integral to space deterrence (Indian Defence News, 2024).

Geospatial World, a prominent think tank, reported that the Ministry of Defence has called for the establishment of a coherent space security doctrine. This doctrine would delineate India's policy on space-based threats, define strategic "red lines," and establish operational protocols for both defensive and offensive capabilities. It also proposes a unified command-and-control structure to enhance coordination between civilian and military stakeholders (Geospatial World, 2024).

Indian Strategic Narratives and Evolving Capabilities

Nations such as the United States, Russia, China, and India are progressively advancing their space warfare capabilities. These developments encompass a range of technologies including anti-satellite (ASAT) missile systems and satellite engagement mechanisms, exemplifying a transition toward the militarization of outer space.

According to *The Economic Times*, India's strategic emphasis on space-based defense systems, including the conceptual "Golden Dome," reflects its broader vision of integrating space assets within its military doctrine. This initiative aligns with India's utilization of unmanned aerial vehicles (UAVs) and signals the nation's ambition to position space as a pivotal domain in next-generation warfare (The Economic Times).

Reuters similarly reports that persistent geopolitical tensions, particularly in the Kashmir region, have stimulated Chinese interest in India's advanced military technologies such as the BrahMos supersonic missile and ISR-enabled satellite constellations. These systems have emerged as critical tools in modern battlefield intelligence gathering (Reuters).

In a detailed exposé in *India Today*, Manjeet Negi highlights India's strategic initiative to expand its space-based infrastructure. Senior defense officials confirmed the approval of a 52-satellite constellation intended for surveillance, secure communications, and other tactical operations. This constellation underscores India's preparedness to exert strategic dominance in the space domain (India Today).

Complementing this, *Business Standard* quotes Air Vice-Marshal Pawan Kumar of the Defence Space Agency, who outlined India's vision for an integrated satellite communication grid spanning Low Earth Orbit (LEO), Medium Earth Orbit (MEO), and Geosynchronous Earth Orbit (GEO). Such a system aims to enhance military resilience and streamline the decision-making process through a shortened Observe-Orient-Decide-Act (OODA) loop (Business Standard).

Indian Defence News frames India's space endeavors within a broader transformation of the armed forces into an "Indian Air and Space Force." The report celebrates the growth of dual-use systems and the institutionalization of civil-military fusion strategies. Exercises such as IndSpaceEx are indicative of India's intention to formalize space as a dedicated theater of warfare (Indian Defence News).

Social media reports, including one from @alpha_defense on platform X, indicate an active prioritization by the Indian Defence Forces to develop space capabilities in surveillance, navigation, and intelligence. Collaborations with ISRO and DRDO, led by the Chief of Defence Staff, aim to foster a technologically skilled workforce capable of operating in a space-dominated warfare environment.

A *NDTV* feature elaborates on India's military synergy during Operation Sindoor, highlighting its tactical coordination and advanced air defense systems—comparable to Israel's "Iron Dome." The article accentuates India's push toward indigenous systems such as the BrahMos and Akash missiles, reinforced by artificial intelligence to improve operational precision.

Reports from *The Hindu* and *The Hindustan Times* underscore India's focus on developing integrated air defense systems including the Russian S-400 and India's indigenous Akash missile system. These efforts are framed within a broader doctrine of "theaterisation"—a military concept designed to unify command structures across the Army, Navy, and Air Force for cohesive operations.

Academically, India's evolving space posture has been documented by Dimitrios Stroikos in the *Council on Foreign Relations*. He asserts that India is shifting from a development-focused space agenda to one that serves national security imperatives. This recalibration is also influenced by China's growing presence in space and India's strategic alignment with the United States (Stroikos, CFR).

The *Carnegie Endowment* provides a detailed analysis of India's 2019 ASAT test—Mission Shakti—which integrated ballistic missile and missile defense technologies, signifying a robust counter-space capability (Carnegie Endowment). Scholars like Abu Hurrairah Abbasi and Saher Liaqat discuss the regional security implications of India's dual-use space assets, ISR deployments, and missile defense architectures. Their findings suggest a significant shift in deterrence dynamics within South Asia. Ajey Lele, writing for the *Institute for Defence Studies and Analyses*, tracks ISRO's gradual integration into military applications. Satellite systems now fulfill critical roles in communication, navigation, and reconnaissance—demonstrating the strategic utility of dual-use technologies (Lele, IDSA).

Daniel Deudney (2020), in his book *Dark Skies: Space Expansionism, Planetary Geopolitics, and the Ends of Humanity*, argues that future space conflicts will likely center around the exploitation of space resources for geo-economic gain. He contextualizes the evolution of space security within a planetary framework (Deudney, 2020). Sharmin Most Farjana (2023), writing in the *Journal of Indo-Pacific Affairs*, explores how India's strategic recalibration in response to China’s assertiveness in the Indian Ocean region and outer space has driven its emphasis on militarized space capabilities. Farjana concludes that India views space as integrally connected to global power structures and international relations. Sobia Paracha (2013) in *Astropolitics* reveals that despite India's public emphasis on civilian space endeavors, there exists evidence of technology transfers from civil to military domains. These covert pathways facilitate military modernization while enabling India to secure international cooperation under the guise of peaceful space exploration.

Ajey Lele further elaborates in *India in Space: A Strategic Overview* that space technologies now act as force multipliers in India’s national security architecture. As a nuclear-armed state, India continues to invest in capabilities that integrate space as a critical element of its strategic deterrent (Lele, 2020, in Handbook of Space Security, Springer).

Strategic Militarization of India's Space Program, Regional Supremacy & Geopolitics

India has historically presented its space program as a peaceful, development-oriented initiative. However, in recent years, there has been a discernible shift in rhetoric and strategic focus. Indian defense analysts, strategic commentators, and government officials now increasingly articulate the nation's ambition to utilize space as the next strategic frontier, emphasizing its military and strategic benefits, particularly in the context of regional dynamics with Pakistan and China.

The dual-use nature of space technologies forms the crux of this transformation. Many satellite systems, though ostensibly civilian, are easily adaptable for military functions. Space-based sensors and early warning mechanisms for missile defense, for instance, represent a direct military utility. These systems are now increasingly integrated into India's broader military architecture, enhancing its command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities.

Academic and media discourses frequently employ terminology such as "military implications," "strategic significance," "dual-use technologies," "regional security," "deterrence," "space weaponization," and "geopolitical competition" to describe this evolution. This lexicon underscores the strategic recalibration of India's space agenda in pursuit of regional hegemony.

A growing body of academic literature critically assesses India's trajectory toward space militarization. In their 2025 article in *Strategic Perspectives*, Abbasi and Liaqat argue that India is transitioning its space assets from purely civilian applications to explicitly military functions. They specifically highlight India's anti-satellite (ASAT) capabilities developed under "Mission

Shakti" as a destabilizing factor in South Asia, stating that it increases the risk of a regional arms race, strategic instability, and intensifies Pakistan's security vulnerabilities. India's space-based ISR and communication infrastructure, they argue, significantly enhance its situational awareness and targeting precision, thereby strengthening its deterrence posture and strategic supremacy in South Asia.

Similarly, Areeba Imran (2025) in her analysis titled *Pakistan's Space Policy: Navigating Strategic Realities* posits that India's aggressive militarization of space undermines Pakistan's nuclear deterrence and antagonizes China's regional space ambitions, heralding a new phase of the space race.

Zeeshan (2024) further elaborates on the technological dimensions of this strategic shift. He contends that India's expansion of its military space program, in conjunction with the development of supersonic cruise missiles and ballistic missile defense systems, reflects a deliberate attempt to fortify its first-strike capability against Pakistan's critical strategic infrastructure. Zeeshan underscores India's indigenous advancements in space technologies—including ASAT weapons, ballistic missiles, and satellite surveillance systems—as integral components of its evolving space doctrine. This doctrine reportedly prioritizes cross-border signal interception and intelligence-gathering through specialized electromagnetic surveillance satellites.

Media and policy analyses in reputable outlets such as *The Hindu*, *Indian Express*, *Times of India*, *Economic Times*, and international agencies like Reuters and Associated Press, routinely reinforce these narratives. These platforms often mirror the official Indian stance or reflect the perspectives of prominent defense analysts and strategic experts.

For instance, an article published in *Bharat Shakti* (May 2025) asserts India's military and technological superiority over Pakistan, despite Islamabad's reliance on Chinese defense equipment. The piece highlights a recent episode in which the Indian Air Force successfully neutralized Chinese-supplied air defense systems during a conflict escalation, showcasing India's military efficacy.

In another notable example, *The Economic Times* (June 2025) described India's preparation for space-based combat by referencing Prime Minister Modi's declaration of "Mission Shakti" as a milestone achievement. The article reported that India had "practiced a sort of dogfight in space," signifying its admission into an elite group of space powers with warfare capabilities.

Taken together, these developments demonstrate a profound transformation in India's space policy—from peaceful exploration to strategic militarization. The pursuit of space dominance is no longer covert but openly acknowledged, with strong implications for regional security dynamics, particularly vis-à-vis Pakistan and China. The militarization of space, while bolstering India's strategic posture, simultaneously raises the specter of an arms race in the upper atmosphere, potentially destabilizing an already fragile geopolitical balance in South Asia.

Indian Space Program 3

“We in India take pride in using remote sensing and space technology for multiple applications, India would be happy to help other friendly countries in satellite and space technology. Successful test firing of Agni makes every Indian very proud. It will add tremendous strength to our strategic defense.”

(Prime Minister of Republic of India Narendra Damodardas Modi)

Striving for Regional Superiority and Strategic Competition

India with armed forces of over five million personnel including 1.47 million active, 1.15 million reserve and over 2.53 million paramilitary forces think that the modern warfare that has undergone a significant transformation from the traditional battles fought with boots on the ground to highly sophisticated operations driven by intelligence, precision, and technology compel them to militarize his space program. Among the many factors contributing to this transformation, two capabilities stand out as critical force multipliers, advanced remote sensing and missile systems. These technologies have become indispensable tools aiming to secure strategic dominance, deter adversaries, and execute precise operations with minimal collateral damage.

Indian Remote Sensing capabilities

Remote sensing involves gathering information about objects or areas from a distance using satellites, drones, or aircraft equipped with sensors. These tools provide real-time data across various spectra (e.g., visual, infrared, radar), helping to detect movement, monitor environmental changes, and track military activity (Kumar, 2020). These sensors can capture data across multiple spectra, visible, infrared, radar, etc, allowing analysts to detect movement, measure heat signatures, monitor environmental changes, and identify military and non military installations or troop movements. During the Gulf War (1990–1991), U.S. and coalition forces relied heavily on satellite imagery to track Iraqi troop deployments and infrastructure. During the brief Afghanistan occupation (Dec 2001- August 2021) the United States and International Security Assistance Force used remote sensing data to track the Taliban fighters.

ISRO launched its first remote sensing capable satellite IRS-1A (1980) and IRS-1B(1990) followed by IRS 1C and IRS 1D capable of acquiring high resolution data for in depth mapping. ISRO launched RISAT-1 with synthetic aperture radar capable of providing all observations including cloud cover. India use this satellite for gathering information on LOC between Pakistan and India (ISRO, 2019). Similarly, Resourcesat-2 and Cartosat-2B provide high-resolution panchromatic and multi-spectral imagery, enabling detailed mapping and monitoring for Indian National Reconnaissance Office at Indian Defence Agency. Satellites with the same type of sensors were used in the ongoing Russia-Ukraine conflict, commercial and military satellites have been instrumental in revealing Russian troop movements, artillery placements, and supply lines.

India with the help of its military sponsored private firm Tata Advanced Systems in collaboration with a company from Uruguay, Satellogic launch TSAT-1A using SpaceX rocket (Ramesh & Joshi, 2023). TSAT-1A is equipped with some more advanced capabilities, including a high-resolution camera capable of capturing images with a spatial resolution of 0.5 meters, the satellite has the ability to discern objects as small as 30 centimeters (Ground sampling distance) from space, distinguishing even trees and people. Indian substantiate its claim of attacking Pakistan Airbase by showing media the data from TSAT-1A, which we are not able to verify as if this is TSAT-1A data or any other satellite data or a creation of designers in production studio (Ramesh & Joshi, 2023).

Indian Missile Capabilities as Strategic Tools

Modern missile systems—ranging from short-range ballistic missiles (SRBMs) to intercontinental ballistic missiles (ICBMs), cruise missiles, and hypersonic glide vehicles have redefined the calculus of conflict. Equipped with precision guidance systems such as GPS, inertial navigation, and even AI-enhanced targeting, these missiles can hit targets with pinpoint accuracy from hundreds or thousands of kilometers away.

During a recent brief conflict (May 7-10, 2025) between India and Pakistan, India deployed a significant portion of its missile arsenal, excluding those equipped with nuclear warheads (Verma, 2025). The deployment was intended not only to project an image of offensive preparedness but also to deter Pakistan from escalating the responding hostilities. India uses its situational awareness and early warning capability to monitor Pakistan’s airfields, military positions, movements, and logistics in real time which help their decision making. This is not news for Pakistan and China or any of its neighbors, both Pakistan and China also possessed these capabilities long before Indians. In parallel, China’s DF-21D “carrier killer” missile exemplifies the strategic use of missile technology; it is specifically designed to pose a credible threat to U.S. naval assets in the Pacific region, thereby altering American naval deployment strategies. Missiles, unlike traditional artillery systems, possess precision strike capabilities, enabling them to engage high-value targets with exceptional accuracy. For instance, during the 2003 Iraq War, the United States initiated a "Shock and Awe" campaign, launching hundreds of cruise missiles to incapacitate Iraqi command-and-control structures in the opening hours of the conflict. The effectiveness of such operations underscored the value of precision-guided munitions in modern warfare.

Pakistan, possessing relatively limited conventional forces in comparison to India, relies heavily on its missile arsenal to maintain strategic parity. Its ballistic missile program—augmented by the potential for nuclear warheads—provides a powerful asymmetric deterrent. This capability enables Pakistan to counterbalance India's conventional superiority and negotiate from a position of relative strength. The existence of such weapons systems by Pakistan, compels India to recalibrate its military posture, often reconsidering troop deployments and avoiding incursions into contested zones.

India's Missile Production Trajectory

Both India and Pakistan have made substantial investments in advanced missile technology. India initiated its missile development efforts in the late 1950s, but significant momentum was gained with the establishment of the Integrated Guided Missile Development Programme (IGMDP) in 1983 under the leadership of Dr. A.P.J. Abdul Kalam (Ministry of Defence, 2021). Over the decades, India has cultivated a diverse and extensive missile arsenal encompassing various ranges and launch platforms.

India's long-range ballistic missile inventory is spearheaded by the Agni series, particularly:

Agni-V, India's only Intercontinental Ballistic Missile (ICBM), with an officially declared range of 8,000 km. Some Indian defense analysts assert that it can reach targets globally, although these claims remain unverified through independent channels.

Agni-IV, an Intermediate-Range Ballistic Missile (IRBM) with a range of approximately 4,000 km.

Agni-III, another IRBM, capable of ranges between 3,500 to 5,000 km depending on the payload configuration.

Agni-II, a medium-range ballistic missile (MRBM) with a reach of 2,000 to 3,000 km.

Agni-I, designed for short to medium-range engagement, with a range between 700 to 1,200 km.

Shaurya, a hybrid missile system with a range of up to 1,900 km, characterized by its high-speed and survivable design.

Dhanush, a naval variant with a relatively short range of 600 km (Bhatnagar, 2022).

India's cruise missile inventory is equally diversified and technologically sophisticated. These systems are engineered to fly at high speeds and low altitudes, thereby evading radar and missile defense systems. This was the first time India used cruise missiles on Pakistan, both the BrahMos cruise missile (co-developed with Russia) European SCALP-EG as well as the as well as solid-propellant rockets like the Israeli-origin Crystal Maze and Rampage missiles, Pakistan also used conventionally armed short-range ballistic missiles on India, like Fatah-I and Fatah-II.

Notable among Indian cruise missiles inventory is:

BrahMos II (Hypersonic), claimed by India to have been employed in targeting Pakistani airfields on May 10, 2025 though this assertion remains unverified.

BrahMos (Original Version), a nuclear-capable supersonic cruise missile that was once mistakenly fired into Pakistani territory near Mian Channu on March 9, 2022. India officially acknowledged the incident 48 hours later, attributing it to a "technical malfunction." According to Indian Defense Research Wing 15 BrahMos missiles fired during Operation Sindoor were from older stocks (BrahMos Block I & II), but we don't have a complete assessment of the number of BrahMos that was used during the conflict.

BrahMos ER (Extended Range), multi-platform, multi-role cruise missile with an operational range of up to 600 km.

BrahMos NG (Next Generation), a lighter, air-launched version with a range of 290 km.

BrahMos Block II and III, enhanced surface-to-surface and anti-ship variants with ranges up to 290 km.

BrahMos-A, an air-launched, anti-ship missile with a strike range of 400 km.

Submarine-launched BrahMos, capable of targeting at distances up to 290 km.

Nirbhay, a subsonic, terrain-hugging cruise missile with a range of approximately 1,500 km.

Vikrant Cruise Missile, naval missiles designed for land and sea strikes were launched from fighter jets.

India has advanced its strategic capabilities by developing a suite of submarine-launched ballistic missiles (SLBMs), which constitute the crucial sea-based leg of its nuclear triad. As per the official version, this is meant for Indian second-strike capability ensuring that India can deliver a retaliatory nuclear strike even if its land-based or air-based nuclear assets are neutralized in a first strike.

The core of India's SLBM program is the "K" family of missiles, named after the former President A.P.J. Abdul Kalam. These missiles are designed to be compact and stealthy, optimized for launch from India's indigenous Arihant-class nuclear-powered ballistic missile submarines (SSBNs). Operational and under development SLBMs includes.

K4, K-5 and K-6, these are longer-range SLBMs reportedly under development. The K-5 is projected to have a range of 5,000-6,000 km, while the K-6 could extend to 8,000-12,000 km, providing India with intercontinental ballistic missile capabilities from its submarine fleet. These future missiles are expected to arm more advanced variants of the Arihant-class and the upcoming S5-class submarines.

K-15 (Sagarika), this short-range SLBM has a range of approximately 750-1,500 km and is currently operational on the INS Arihant.Sagarika.

Ashwin, a ballistic missile interceptor with a limited range of around 200 km, designed to intercept incoming threats.

In terms of air and missile defense, India employs a layered approach, integrating multiple systems categorized by their respective interception ranges. This strategy is designed to provide comprehensive protection against a diverse spectrum of aerial threats, from high-altitude ballistic missiles to low-flying aircraft and drones.

Prithvi-II, a battlefield support missile with a range of 350 km.

LR-SAM (Long-Range Surface-to-Air Missile), developed in collaboration with Israel, with a range of up to 200 km.

MR-SAM (Medium-Range SAM), with an effective engagement envelope of around 100 km.

ER-SAM (Extended Range SAM), developed for interception up to 200 km.

XR-SAM (Extra-Long Range SAM), currently under development, with a projected range of 250 km.

Pralay, tactical ballistic missile with a kill range of 500 km.

India also maintains a wide variety of short-range and tactical missile systems designed for quick battlefield deployment.

Prahaar, a short-range, quick-reaction missile with a strike range of 150 km.

Prithvi-I, a tactical missile system with a range of 150 km, originally designed for battlefield use.

Pinaka, a multi-barrel rocket launcher system that has been used effectively in recent border skirmishes.

Akash, a surface-to-air missile system with a range of 30 km, designed for aerial defense.

Akash-NG, an upgraded version with extended range (up to 45 km) and improved reaction time.

QRSAM (Quick Reaction SAM), a mobile air-defense missile with a strike range of up to 30 km.

VL-SRSAM (Vertical Launch Short-Range Surface-to-Air Missile), designed for naval platforms with an engagement range of approximately 20 km.

VSHORAD (Very Short Range Air Defense), system with an operational range of up to 15 km, primarily used for last-mile defense against low-flying aerial threats.

Barak-8 (LRSAM/MRSAM), develop by India in collaboration with Israeli, surface-to-air missile system designed to counter airborne threats including aircraft, UAVs, and missiles. It is deployed by all three Indian military services with range of 100 km.

SPYDER, a quick-reaction surface-to-air missile system developed by Israel for India, capable of engaging multiple aerial targets with high accuracy using radar.

Air-to-air missiles (AAMs) are guided munitions strategically launched from airborne platforms to effectively engage and neutralize adversarial aircraft, including fighters, bombers, and surveillance assets. These missiles form a critical component of modern aerial combat, enabling engagements from close-range dogfights to beyond-visual-range (BVR) encounters.

The Indian Air Force (IAF) and Indian Navy (IN) extensively utilize a diverse arsenal of AAMs to bolster their air superiority and defensive capabilities. This includes indigenous systems like the Astra series (Mk-1, Mk-2, Mk-3, providing short to extended BVR capabilities up to 350 km), Novator K-100, range 400 km, and imported armaments such as the MICA (France), Derby (Israel), and various Russian-origin missiles (e.g., R-77, R-73). The integration of these advanced AAMs across various fighter platforms, including Rafales, Su-30MKIs, and Tejas (Ministry of Defence, 2021).

India has developed and deployed a comprehensive series of missile defense systems designed to intercept and neutralize incoming aerial threats, including ballistic missiles, aircraft, and unmanned aerial vehicles (UAVs). This defensive architecture incorporates surface-to-air missiles (SAMs), surface-to-surface missiles, and sophisticated Ballistic Missile Defence (BMD) systems. These systems leverage advanced satellite-based tracking, guidance, and propulsion technologies to precisely engage potential threats. Key components and capability include:

AD-1, an anti-ballistic missile system with a target interception range of up to 5,000 km.

Advanced Air Defence (AAD), an endo-atmospheric anti-ballistic missile, designed to intercept targets within the Earth's atmosphere, boasting a range of 2,000 km.

Prithvi Defence Vehicle (PDV), an exo-atmospheric anti-ballistic missile, capable of intercepting targets outside the Earth's atmosphere, with a range of 2,000 km.

Prithvi Air Defence (PAD), another exo-atmospheric anti-ballistic missile, with an interception range of 150 km.

India's Missiles and Remote Sensing Synergy

India is actively integrating its remote sensing capabilities with its missile systems, creating a powerful synergy designed to decisively influence conflicts. This isn't just about individual technologies; it's about connecting them to achieve "one world under the sky" for strategic dominance.

Advanced remote sensing allows for real-time or near-real-time tracking of crucial mobile targets like missile launchers, armored units, or convoys. When this surveillance data is fed directly into precision-guided missile systems, it enables rapid, decisive action. We saw a stark example of this during the 2020 Nagorno-Karabakh War, where Azerbaijani forces effectively used Turkish drones and Israeli loitering munitions, guided by remote sensing and real-time video, to devastate Armenian air defenses and artillery.

This integration drastically shortens the military "kill chain" *find, fix, track, target, engage, and assess* (F2T2EA) (Mehta, 2024). In a digitized battle environment, satellites can spot an enemy radar, an AI algorithm can quickly prioritize it, and a cruise missile can be launched within minutes. India, with assistance from the United States, is developing its own version of a command and control mechanism, inspired by the U.S. military's Joint All-Domain Command and Control (JADC2) exercises. This system aims to integrate all sensor and shooter platforms, creating a highly responsive military network, similar to what Pakistan demonstrated during Operation Swift Retort on February 27, 2019, and the May 7-10, 2025 conflict.

By leveraging remote sensing, India significantly enhances its ability to execute counter-force strategies, primarily targeting Pakistan's military assets. In a high-stakes scenario, like the recent India-Pakistan conflict (May 7-10, 2025), the capacity to detect missile silos, submarine deployments, or mobile nuclear launchers in real-time could enable preemptive neutralization. Such advanced capabilities fundamentally alter strategic postures and regional security dynamics.

Indian Space Program 4

India’s national defense doctrine is undergoing a paradigm shift, from Atmanirbharta (self-reliance), to Atmaraksha (self-defense), and now toward Rananeetik Aakramak (strategic aggression).

India's Space Program as a Geopolitical Instrument

Strategic Ambitions

India’s space policy exhibits a deliberate strategic ambiguity, cloaking military ambitions under a civilian veneer. This approach involves compartmentalizing defense-related space activities outside the purview of the Indian Space Research Organisation (ISRO) and conducting them through multi-layered, covert operations. Official rhetoric often emphasizes terms like “space technology for national priorities” and “dual-use technologies” as a means of obfuscating military objectives, thereby facilitating the expansion of India’s military-space footprint while projecting an image of a peaceful, civilian-oriented space program (Chandrashekar, 2022; ORF, 2024).

The Indian Space Policy 2023, and its subsequent addendums in 2024 and 2025, publicly underscore socio-economic development and peaceful exploration. In contrast, military initiatives are strategically siloed within defense institutions, avoiding explicit public acknowledgment. High-profile events such as the 2019 anti-satellite (ASAT) test (Mission Shakti) are publicly framed as defensive measures, though they carry clear offensive potential (Narayanan, 2025).

India has cultivated covert collaborations with countries such as France and Israel, enhancing its space capabilities without triggering diplomatic scrutiny (Carnegie Endowment for International Peace, 2019). Simultaneously, global powers including the United States, Russia, and China have poured billions into militarizing space, prompting India to develop its own counter-space capabilities—ranging from kinetic missiles to non-kinetic tools like cyber warfare and signal jamming.

To manage its expanding military-space ambitions, India has established specialized bodies such as the Integrated Space Cell (2010), Defence Space Agency (DSA, 2018), the Indian National Space Promotion and Authorization Center (IN-SPACe), and the Defence Space Research Organisation (DSRO). India’s satellite constellation, including Cartosat, RISAT, GSAT-7, GSAT-7A, and EMISAT, exemplifies this dual-use strategy. While ISRO promotes its launch vehicles for economic and scientific purposes, the same technology is interchangeable with ballistic missile systems (Air University, 2023).

India's space posture is strategically oriented toward countering China's expanding influence in the extraterrestrial domain while positioning itself as a pivotal power in the Indo-Pacific region and broader global context. This involves forging strategic alliances with spacefaring nations aligned against Chinese and Russian interests, while concurrently presenting itself as a champion of international norms that oppose the weaponization of space (Chatham House, 2025).

This dual approach, balancing diplomatic outreach with hard power is reflected in Indian's investment in next-generation technologies such as hypersonic glide vehicles and directed-energy weapons—reflects a broader strategy to establish space-enabled deterrence. These initiatives signal India's readiness to integrate space assets into joint military operations, thereby deterring adversaries from threatening its space infrastructure.

India is also advancing the development of reusable launch vehicles and small satellite launch platforms, while enhancing its capabilities through initiatives such as Project NETRA, which is designed to monitor and track space debris, adversarial satellites, and other orbital threats. These systems are essential for safeguarding India's space-based infrastructure against a spectrum of threats including jamming, spoofing, cyber intrusions, and kinetic attacks via its domestically developed satellite constellation, which includes Cartosat, RISAT, and EMISAT.

Regional Strategic Concerns

India perceives the strategic partnership between China and Pakistan as a significant regional security threat, particularly given their shared interest in contesting India's position in Jammu and Kashmir. New Delhi views Islamabad's access to Chinese space expertise and advanced military technologies as a direct challenge to its strategic autonomy (Strategic Perspectives, 2025).

According to numerous Indian strategic and diplomatic analysts, this intensifying collaboration is primarily aimed at enabling Pakistan to emerge as a persistent counterweight to Indian influence not only in South Asia but also in the broader Middle East. These experts assert that China has long supported Pakistan across both the civilian and military dimensions of its nuclear program. This includes the transfer of nuclear bomb designs, highly enriched uranium, and early assistance in developing Pakistan's missile capabilities. Analysts contend that Pakistan continues to serve as a credible strategic counterweight, effectively tying India down—not only along its western border but across the regional security landscape through both conventional military means and asymmetric engagement via proxy networks.

India's anxieties are further validated by recent demonstrated capabilities by Pakistan during the 2019 India–Pakistan standoff and the May 2025 conflict highlight this transformation. In both instances, Pakistan employed a sophisticated blend of domestically produced and Chinese-supplied military systems. These included jointly developed fighter aircraft and non-export versions of advanced Chinese air-to-air and air-to-ground missile systems. Moreover, Pakistan showcased an integrated, multi-layered command-and-control system, combining Ground-Based Intelligence, Airborne Targeting Systems, Airborne Early Warning and Control (AEW&C) platforms, and Satellite-Enabled Surveillance. This cohesive and real-time operational framework reflects a substantial leap in Pakistan's capacity to conduct coordinated and high-tempo military operations (Narang, 2025).

Growing Space Rivalry

India's national defense doctrine is undergoing a paradigm shift, from Atmanirbharta (self-reliance), to Atmaraksha (self-defense), and now toward Rananeetik Aakramak (strategic aggression). This recalibration is driven by India's need to adapt to the changing geostrategic landscape, particularly in light of China's assertive posture and Pakistan's growing capabilities.

India has actively intensified its military modernization efforts, effectively initiating an arms race in the region. This includes a sustained and focused campaign against Pakistan, marked by the accumulation of a significant missile stockpile and the extension of missile ranges. In contrast, Pakistan's missile development has historically been framed within the context of regional security and strategic deterrence, with its capabilities calibrated primarily to address threats from India—without posing a danger to other nations (Air University, 2023; CFR, 2025).

India's objectives appear broader and more ambitious. When assessing the wider strategic competition between India and China, particularly in the space domain it becomes evident that India's space program seeks not only to counterbalance China's expanding influence and technological edge but also to assert India's position as a rising global power. The pursuit of advanced space capabilities thus aligns with India's vision of establishing itself as a major actor in the evolving multipolar international order.

While the likelihood of China launching a full-scale war against India as a second front during an India–Pakistan military engagement remains extremely low, this in no way diminishes India's commitment to maintaining the highest levels of operational preparedness. From eastern Ladakh to the northeastern frontier, India continues to enhance its readiness posture across all potential theaters of conflict.

As part of its comprehensive national response strategy to counter the China–Pakistan nexus, India is focused on strengthening infrastructure and fortifying defences along its eastern, northern, and western borders. This multi-pronged approach aims not only to deter aggression but also to ensure rapid force mobilization and sustained combat operations if required. India is accelerating the procurement of essential high-technology systems to close operational gaps. These include satellite-based tracking and guidance systems, Airborne Warning and Control Systems (AWACS), Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) platforms, Operational Data Links (ODL), and Flight Refuelling Aircraft (FRA). The objective is to integrate these components into a cohesive, networked warfare capability, enabling seamless command, control, communication, and combat effectiveness across domains (CFR, 2025).

Immediately after clashes broke out between Pakistan and India, China issued a very bold and unexpected statement in Islamabad's support. The statement's wording, focus, and intent suggest that Beijing may no longer be content with playing a balancing role when it comes to the India-Pakistan crisis and is now willing to take sides more openly in regional conflicts, reinforcing India's security apprehensions. "China fully understands Pakistan's legitimate security concerns and supports Pakistan in safeguarding its sovereignty and security interests." Chinese Foreign Minister Wang Yi

Diplomatic Narratives and Strategic Messaging

Indian political leaders frequently present the space program as a symbol of peaceful development and national pride, direct public statements explicitly linking *militarization* of space to *regional superiority* over China and Pakistan are rare. They tend to use diplomatic sensitivities in their language, focusing on "national security," "self-reliance," "deterrence," and "protection of space assets" rather than overtly stating "superiority" over specific rivals.

However, deviations from this cautious rhetoric occur. Following the Mission Shakti ASAT test in March 2019, Prime Minister Narendra Modi publicly declared India a "space power," indirectly signaling deterrence aimed at adversaries like China (Modi, 2019). Prior to the test, Dr. V.K. Saraswat, former head of the Defence Research and Development Organisation (DRDO), had already indicated India's intent to develop ASAT capabilities in response to China's 2007 ASAT demonstration (Carnegie Endowment, 2019).

India's 2025 space policy explicitly describes the expansion of space capabilities as a "strategic recalibration in response to China's growing space power" (CFR, 2025). ISRO officials, while highlighting the civilian utility of remote sensing and navigation systems (NavIC), tacitly acknowledge their dual-use roles. ISRO Chairman V. Narayanan recently noted, "out of the 56 operational satellites, at least 10 satellites are continuously working round-the-clock for the strategic purpose to ensure the safety and security of the citizens of the country" (Narayanan, 2025).

Analytical institutions such as the Observer Research Foundation (ORF), Air University, Chatham House, and the Carnegie Endowment affirm that India's space militarization is a direct response to China's advancements. They interpret India's ASAT test and other capabilities as signaling "deterrent capability" or "assured access" in space vis-à-vis China (Air University, 2023; Chatham House, 2025).

"Since the successful 2007 Chinese intercept of its FY-1C satellite... India quietly began to contemplate developing its own ASAT demonstrator program principally with the intention of signaling to Beijing that it too possessed the capability to hold Chinese space assets at risk—should Indian satellites ever be threatened."(Carnegie Endowment, April 2019) directly connects India's ASAT capability to China and a tit-for-tat deterrence. "India, although lacking a dedicated space force like China, has established itself regionally. Both nations possess antisatellite capabilities... New Delhi recognized the importance of countering Chinese capabilities in space, aligning with India's evolving regional and global environment."(Air University, Nov 2023)

Many analyses like those from CFR, Chatham House, E-IR.info explicitly discuss the "space race" and "astropolitical dimension" of the India-China relationship. They argue that India's space program, while having civilian aspects, is increasingly driven by national security considerations and a desire to balance China's growing influence. "For all their issues with each other, India or China have at the back of their mind a feeling that they are also contesting an established western order."(Chatham House, June 2025) hinting at a shared desire for global influence that extends to space. "The expansion and diversification of India's space activities not only mirror global trends but also underscore its ambition for great power status and a strategic recalibration in response to China's growing space power." (CFR, June 2025) directly links India's space program to China's rise and India's response.

A notable interpretation from Strategic Perspectives (2025) posits that "Pakistan views India's progress in space technology as a strategic move to reinforce its supremacy in South Asia" and sees it as a threat to its nuclear deterrence posture. While India continues to advance a narrative of peaceful, civilian-led space development, its strategic objectives are increasingly aligned with military utility and regional dominance. The dual-track policy of diplomatic engagement and capability buildup underscores India's desire to assert its sovereignty, maintain regional superiority, and challenge the existing power hierarchies in the emerging astropolitical landscape.

Indian Space Program 5

The Case Study of Chandrayaan-3

Mission Targets

Chairman Indian Space Research Organization S. Somanath (January 2022 to January 2025) lists the mission objectives; we have consolidated these and were drawn from ISRO press releases, scientific publications, and public statements of ISRO officials. The primary mission objective was to demonstrate India's capability to land safely and precisely on the south pole of the moon. This included the Autonomous hazard detection and avoidance, Controlled descent and braking, Vertical descent maneuver using the lander's Vikram engine cluster and navigation system.

“The most critical part of the mission is the soft landing. All systems were designed to autonomously detect landing hazards and ensure a safe touchdown”(S. Somanath 2023). Demonstration of rover (Pragyan) mobility and surface navigation on the uneven terrain using onboard cameras and path-planning software and using NASA provided payload for laser ranging studies, helping track the lander’s exact location. “To demonstrate the ability to operate a robotic rover on the lunar surface and execute semi-autonomous tasks” (ISRO Lunar Mission Profile 2023). Conduct different on-site scientific experiments using payloads on both the lander and the rover this includes, measured temperature gradients on and below the surface (~10 cm depth) to understand the thermal behavior, monitor moonquakes and seismic activity around the landing site, study of the plasma environment on the lunar surface, analyzed the elemental composition of the lunar soil and rocks (e.g., presence of aluminum, iron, magnesium, silicon, sulfur) using Alpha Particle X-Ray Spectrometer and Laser Induced Breakdown Spectroscope, “To carry out in-situ scientific experiments to better understand the lunar surface on the south pole.” (ISRO Mission Objectives Document, July 2023). As quoted by Dr. M. Annadurai (Former Director, Chandrayaan Program) target a site near 69°S latitude to gather data “Landing on the south pole is scientifically significant. It may hold water, volatiles, and clues to the early solar system,” and to test the thermal shielding, and communications architecture, “Chandrayaan-3 is a stepping stone to more complex missions. It helps validate critical technologies for future lunar and deep space exploration.” (ISRO Annual Report, 2023).

The international space community has expressed concern regarding the transparency and data sharing practice associated with India’s Chandrayaan 3 lunar mission particularly in the light of increasing increases on collaborative space exploration and open science principles. The apprehension stems from the perception that India has been somewhat reticent in openly disseminating the data and finding drive from the mission which has implications for global scientific progress in the collective understanding of the moon. Data transparency and open access are crucial for fostering International collaboration and enable researchers worldwide to validate findings, conduct another analysis and build upon existing knowledge (Sundararajan, 2025) After a lag of one year ISRO shares some data on its website.

The Lunar South Pole Landing Claim

India staked new claim as a superpower in space, landing its Chandrayaan-3 mission safely on the moon's unexplored south pole becomes fourth country to land on the moon, first on the south pole, with Chandrayaan-3 spacecraft The lunar south pole has emerged as a place of exploration interest thanks to recent discoveries of traces of water ice on the moon. India previously attempted a lunar south pole landing in September 2019, but a software failure caused the Chandrayaan-2 mission to crash into the surface. Chandrayaan-3 spacecraft lifts off from the Satish Dhawan Space Centre in Andhra Pradesh on July 14, 2023 and touchdown on the moon after 40 days roaming in orbit on the south pole.

"India is on the moon!", "We have achieved a soft landing on the moon!" declaration by ISRO Chairman S. Somanath. "This moment is unforgettable. It is phenomenal. It is the call of a developed India. It is the victory call for a new India." These are the words Prime Minister Narendra Modi highlighted the mission's significance for India's global standing and its aspirations as a developed nation. He declared August 23rd as "National Space Day" to commemorate this historic achievement and inspire future generations and named the landing site of Chandrayaan-3 as "Shiva Shakti Point".

Anil Bhardwaj, Director of the Physical Research Laboratory (PRL), emphasized the mission's importance for India's "strategic and geopolitical purposes" and its ability to inspire youth. Most of the Indian statements reflect a deep sense of national pride in achieving this complex technological feat.

International Response

International media outlets enthusiastically participated in the global celebration of India's lunar mission success, widely amplifying the carefully curated narratives circulated through India's strategic information dissemination apparatus. These "success stories" were not only shared via official press releases and public relations efforts but also subtly advanced through behind-the-scenes briefings and selective media engagement, ensuring widespread international visibility. The Indian government and ISRO skillfully managed the global media narrative to project Chandrayaan-3 as a landmark achievement. This calculated media orchestration contributed significantly to shaping global perception, framing the mission as a symbol of India's scientific prowess and rising geopolitical stature.

Prestigious publications, such as *The New York Times*, headlined the event with “In Latest Moon Race, India Lands First in Southern Polar Region,” while *The Washington Post* emphasized the accomplishment with “India Lands a Spacecraft Softly on the Moon’s Surface.” *The Guardian* declared, “India Lands Spacecraft Near the South Pole of the Moon in Historic First,” and *BBC News* noted, “India Makes History as Chandrayaan-3 Lands Near Moon’s South Pole.” Similarly, *CNN* remarked on the mission’s heightened significance in light of Russia’s failed Luna-25 attempt, stating, “India’s Moon Mission Takes on Even Greater Significance.” *Al Jazeera* broadcasted live coverage under the headline “India Moon Landing Live News: Chandrayaan-3 Makes Space History,” while *Deutsche Welle* reported, “India Spacecraft First to Land on Moon’s South Pole.” The Japanese newspaper *Nikkei* described the mission as a “historic leap,” acknowledging India’s increasing stature in global space affairs. India should be proud of its achievements, Chinese state media said on Thursday, pointing out gaps such as lack of a manned mission, while Global Times wrote, India should remember it had the largest number of poor people in the world and a weak foundation for all-round national development, it said.

The news also resonated strongly within the South Asian region, particularly in Pakistan—a country whose relationship with India is often defined by diplomatic tensions. Major Pakistani newspapers such as *Dawn*, *The News International*, and *The Business Recorder* provided extensive front-page coverage of India’s lunar landing. Headlines underscored India's entry into an elite group of nations capable of soft-landing on the Moon, while editorial columns in publications like *Dawn* and *The Express Tribune* acknowledged the significance of India’s achievement, especially considering its relatively modest budget compared to the major spacefaring powers. These editorial voices not only lauded the Indian Space Research Organisation (ISRO) for its scientific and technological prowess but also invoked introspection regarding Pakistan’s own space program. Pakistan’s Space and Upper Atmosphere Research Commission (SUPARCO), despite being established earlier than ISRO, has seen comparatively limited progress. Commentators urged the Pakistani government and scientific community to adopt a more strategic and sustained approach, citing India’s space program as a model of consistent investment, institutional focus, and technical skill.

Social media platforms across Pakistan reflected a nuanced public response. While nationalist sentiment was predictably present, a substantial number of Pakistani citizens extended genuine congratulations to India. Some users engaged in self-deprecating humor to reflect their country’s internal challenges, with viral analogies such as “We’re already on the Moon—no gas, no electricity,” or “Comparing Pakistan’s Roads to the Lunar Surface.” Other satirical comments played on symbolic irony, like “Moon on Flag vs. Flag on Moon.”

On an official level, the Pakistan Foreign Office, through spokesperson Mumtaz Zahra Baloch, acknowledged the accomplishment and stated that Indian scientists deserved appreciation for their success. Notably, former Federal Minister Fawad Chaudhry extended public congratulations to ISRO via social media, describing the event as a “great moment” for Indian science and even urging Pakistani television networks to broadcast the landing live.

Scientific Community Reservations

The successful landing of India's Chandrayaan-3 mission on the moon in August 2023 was hailed globally as a historic moment in space exploration. Media houses, scientific institutions, and political leaders from around the world congratulated the Indian Space Research Organisation (ISRO) for achieving what only a handful of nations had done before, executing a soft landing on the Moon. However, beneath the surface of jubilant headlines and nationalist pride, critical voices emerged, raising questions about transparency, scientific rigor, and the broader implications of how space successes and failures are portrayed, particularly in politically sensitive environments.

Many independent observers, including scholars, space policy analysts, and scientific commentators, lauded the technological achievement but were also cautious in their appraisal of the mission’s outcomes. While the landing itself was a critical milestone, several aspects of the mission’s post-landing scientific objectives remained underexplored or ambiguously reported. Notably, concerns were raised about how quickly the narrative shifted from scientific analysis to political celebration, potentially obscuring technical shortcomings and incomplete results.

One of the principal concerns voiced by independent experts was the lack of comprehensive data dissemination following the landing. The Chandrayaan-3 mission carried several scientific instruments, including the ChaSTE (Chandrayaan Surface Thermophysical Experiment), ILSA (Instrument for Lunar Seismic Activity), and a laser retroreflector. The rover Pragyan was expected to analyze the elemental composition of the lunar soil. However, the data released to the public was sparse and largely anecdotal in nature. Preliminary results were announced with considerable fanfare, but peer-reviewed publications or open-access datasets were delayed or missing altogether. For a mission that was presented as a scientific triumph, the lack of detailed follow-up reporting was seen by some in the scientific community as a red flag.

International researchers, particularly those involved in lunar science and planetary exploration, observed that critical metrics such as the duration of rover functionality, actual traversal distance, and instrument calibration were either vaguely described or selectively reported. For example, while ISRO announced that the Pragyan rover had “confirmed the presence of sulfur,” it did not provide comprehensive spectroscopy data or methodological details that would typically accompany such a claim in a scientific setting. These omissions led some scientists to speculate whether all mission objectives had been fulfilled as claimed, or whether shortcomings were being strategically downplayed.

The perception of selective disclosure was further amplified by the Indian media and political establishment's treatment of the mission. News coverage quickly shifted from discussing scientific data to celebrating India's symbolic rise in the global space race. Public narratives emphasized national pride, technological sovereignty, and India's competition with space powers like China, Russia and the United States. Any critical questioning, whether related to data transparency, technical performance, or budgetary accountability was often dismissed as "anti-national" or "unpatriotic." Within India, several scientists and policy thinkers who attempted to introduce a nuanced debate about the mission's limitations found themselves sidelined or ignored in favor of triumphant headlines.

This approach, many argue, risks turning scientific milestones into political instruments. The conflation of scientific achievement with nationalistic rhetoric can erode public trust and hinder objective evaluation. A mission's true success should be measured not only by symbolic victories but by its contribution to scientific knowledge, its openness to scrutiny, and its ability to advance future explorations. While celebrations are certainly warranted for reaching a significant lunar milestone, the narrative becomes problematic when critical reflection is actively discouraged or suppressed.

The international scientific community generally operates on the principles of openness, peer review, and rigorous validation. When missions are celebrated without corresponding evidence or when data is withheld, it raises concerns about the credibility of the findings and the long-term integrity of the program. Many international missions, such as those by NASA or ESA, release raw data to the global community for collaborative analysis. Critics argue that ISRO should adopt similar transparency standards, especially if it aspires to become a leading player in deep space exploration.

India is not alone in grappling with the tension between scientific progress and political messaging. Space programs across the world have often been used to project national power and prestige. As emerging spacefaring nations gain prominence, the need for accountability, transparency, and global scientific collaboration becomes even more critical, embracing a culture of open science could solidify its reputation as not just a spacefaring nation, but a scientific leader.

According to space science experts, The Chandrayaan-3 mission was successful in deploying the Vikram lander and Pragyan rover on the lunar surface, but due to the initial phase failure, the Pragyan rover did not communicate with the lander. The rover was designed to move independently after deploying from the lander and perform scientific experiments on the lunar surface. The communication failure is attributed to the rover's internal systems. The rover's internal clock and other software may have malfunctioned, preventing it from establishing a connection with the lander. So whither rover preform any experiment or not no one know for sure, if it was able to perform and unable to communicate it will be of no use no second attempt can be made in next decade to retrieve its data.

ISRO, used a series of elliptical Earth orbits and a Trans-Lunar Injection (TLI) to send Chandrayaan-3 toward the Moon. Instead of a direct trajectory, the spacecraft gradually increased its orbit around Earth through multiple perigee burns (five maneuvers between July 15 and July 25, 2023). This approach takes 40 days to reach the moon.

Fact Checking On The Chandrayaan 3 Claims

Claim: *The launch timing was chosen to align with the Moon's position relative to Earth, optimizing the energy needed for the journey. The trajectory was designed to take advantage of gravitational forces, further extending the travel time but reducing fuel costs.*

Fact: Chandrayaan-3 was launched on July 14, 2023, as scheduled, and successfully landed 40 days later. The extended duration was due to adjustments made to better manage the rocket's trajectory toward its designated lunar position. This took longer than initially anticipated, resulting in higher fuel consumption and a delayed landing sequence. Some space science experts argue that this extended travel time was not a delay, but a strategically chosen approach. However, the longer journey also reduced the operational window available during the lunar day, limiting the mission's duration on the Moon's surface.

Claim: *Chandrayaan-3 landed on the lunar surface at the designated South Pole and at the designated time.*

Fact: The designated landing time for Chandrayaan-3 was not publicly announced prior to the launch. This decision was part of the mission's security protocol, as ISRO scientists deemed such information potentially vulnerable to hacking. Furthermore, the Chandrayaan-3 mission experienced a slight delay in reaching its final orbital position before descent to the Moon's surface. This amended plan led to the spacecraft consuming more fuel than initially projected.

The landing point which was later declared Shiv Shakti Point is not on the South Pole, it is important to clarify its precise location. While ISRO refers to it as being on the South Pole, its coordinates place it approximately 630 kilometers away from the true lunar South Pole. This distinction has led to some international discussion. Notably, Chinese lunar scientists have disputed ISRO's claim of a polar landing. Dr. Pang Zhihao, a Beijing-based senior space expert, was quoted by the Communist Party's *Global Times* after the landing, stating that while the site was within the Moon's southern hemisphere, it was not within the polar region itself, implying that China possessed superior technology for such endeavors.

Claim: *ISRO telecast a video showing the rover detaching from the lander and moving a few feet away, which was then cut short.*

Fact: Technical specifications released by ISRO before the Chandrayaan-3 launch confirm that four Lander Imager (LI) cameras (LI1, LI2, LI3, and LI4) were onboard the Lander, designed for imaging during and post-landing. These cameras were capable of various operating modes, including auto and manual/auto exposure settings, and could output images in JPEG compressed and uncompressed formats. The intention was for LI cameras to operate during initial flight and orbital journeys.

However, when reporters questioned why no further video clips were released after the initial detachment footage, an ISRO scientist provided a candid response. He emphasized that the lander's design adheres to strict weight and performance limits, and the primary objective of these missions is scientific data collection, not entertainment. The scientist did not elaborate then how the initial detachment clip was obtained given these constraints and the apparent lack of continuous video transmission. No data from camera L1, I2, L3 and L4 were shared till now.

Claim: *The mobility of the Rover was planned to be semi-autonomous, utilizing a pair of Navigation Sensors (Navigational cameras) to provide terrain imagery. This data would then be used by a ground-based image analysis and path planning system to construct a three-dimensional digital elevation model of the surface features. Additionally, the Rover was equipped with one RI camera. The NAV Sensor was designed to detect 20mm objects from a 5-meter distance with a power requirement of less than 2 watts.*

Fact: Due to unspecified power limitations and glitches within the software, the photogrammetric depth measurement data crucial for the field of views of both Navigation Sensors was not consistently available. This critical deficiency in terrain mapping and obstacle detection capabilities is cited as one of the primary reasons why the rover was unable to move further or transmit images back to the lander as extensively as anticipated. This limited its ability to conduct extensive, semi-autonomous exploration and data collection on the lunar surface.

Lack of Follow-up Information on Chandrayaan-3

The information released by ISRO regarding Chandrayaan-3, particularly the visual evidence and satellite data, has unfortunately been characterized by inconsistent descriptions. While the Indian media provided extensive coverage during the launch and landing phases, there has been a noticeable absence of follow-up information regarding the current status of the lander and rover. Specifically, there's no clear reporting on how many attempts ISRO has made to re-establish communication with the Vikram lander and Pragyan rover since they entered sleep mode.

It's understood that once a spacecraft departs Earth's orbit and visual contact is lost, ISRO's updates primarily rely on numerical telemetry data – tracking the satellite's trajectory, its entry into lunar orbit, and eventually its descent and landing on the surface. This is because no other satellite was positioned to capture external imagery of Chandrayaan-3 during these critical phases, nor did Chandrayaan-3 itself carry an external flying camera capable of "selfie" shots to document its journey or landing from an external perspective. Given the initial excitement, the current lack of detailed operational updates leaves a void for the public and media, raising questions about the mission's post-landing activities and communication efforts.

Televised Drama, And The ISRO Command Center Broadcast

The televised broadcast of the Chandrayaan-3 landing, originating from the ISRO command and control center, presented a highly theatrical scene. The hall depicted a significant gathering of individuals, creating the impression that all attendees were directly involved scientists or mission personnel.

The sheer number of chairs in the hall appeared to exceed the number of active display screens or workstations, suggesting a capacity beyond immediate operational necessity. Throughout the critical landing sequence, many individuals were observed primarily taking notes with pens and pencils on paper, rather than engaging with the keyboards and digital interfaces present at their stations. This contrasts with the expectation of high-level digital interaction typical of modern space mission control. At a such pivotal and critical juncture of a complex space mission, a notable level of movement and verbal communication among attendees was visible, which deviates from the focused and quiet intensity usually associated with real-time command and control environments during high-stakes maneuvers. These observations suggest that the televised event might have been staged, at least in part, to create a specific public impression, rather than purely reflecting the genuine, focused operational activities of the mission control team at that precise moment.

Media Discourse Shaped The Chandrayaan 3 Mission’s Victory Narrative

The live telecast of Chandrayaan-3's lunar landing marked a historic milestone for the Indian populace. The broadcast was aired across all major Indian television networks and was subsequently picked up by several international media outlets, set the tone of the global narrative around India's space triumph. India used this event to celibate this moment as it was not merely a technological feat but a powerful symbol of national pride and aspiration.

Throughout the live coverage, Indian television commentary was infused with celebratory and evocative language, underscoring the mission's scientific significance and the country's rising status as a formidable spacefaring nation. Anchors, scientists, and dignitaries alike employed terms such as “momentous achievement,” “historic,” and “unprecedented” to articulate the magnitude of the event. The phrase “a victory cry of a New India” (Reuters.com) resonated across platforms, aligning the success of Chandrayaan-3 with the broader narrative of a resurgent and self-reliant nation.

ISRO Chairman S. Somanath's emphatic proclamation, “India is on the Moon,” was broadcast and echoed widely (TheQuint.com), symbolizing the culmination of decades of scientific pursuit. The mission was framed as a testament to national unity, with phrases such as “strength of 1.4 billion heartbeats” capturing the emotional solidarity of the Indian people (TheQuint.com). The achievement was further lauded with the recurring assertion that India had become the “first nation to land near the Moon's south pole” (ABC.net.au), highlighting the pioneering nature of the mission.

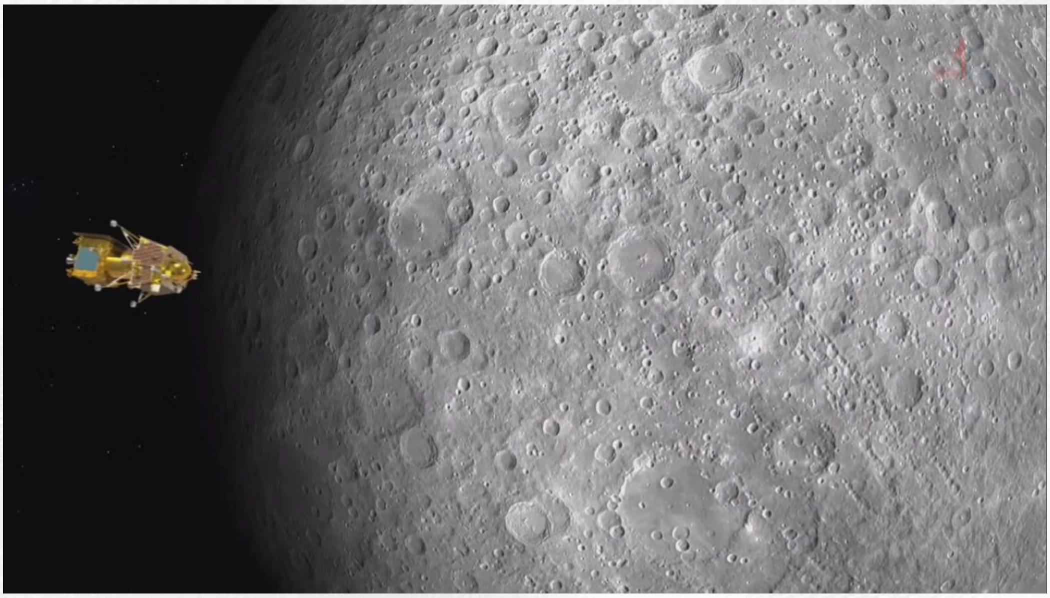
Expressions like “the sky is not the limit” captured the ambition of the Indian space program, while slogans such as “reaching the Moon, world dreams” poetically contrasted aspiration with realization. Commentary frequently acknowledged the “collective success of every Indian,” reinforcing a narrative of inclusive national achievement.

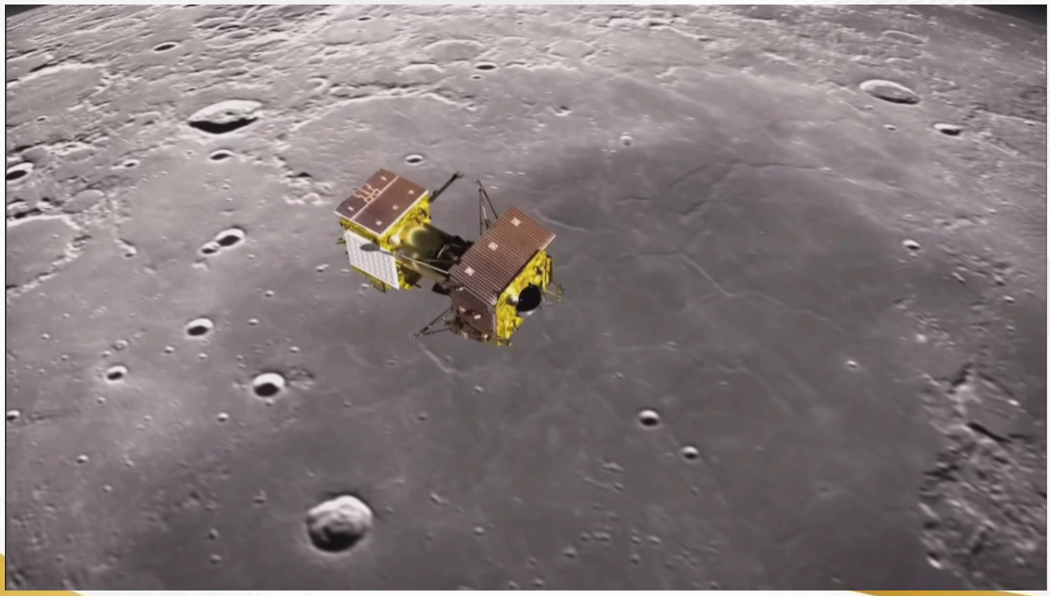
These phrases, laden with emotion and patriotism, served not only to amplify the grandeur of the moment but also to etch Chandrayaan-3's success into the national consciousness. They transformed a scientific event into a unifying cultural and geopolitical symbol of India's emergence as a global space power.

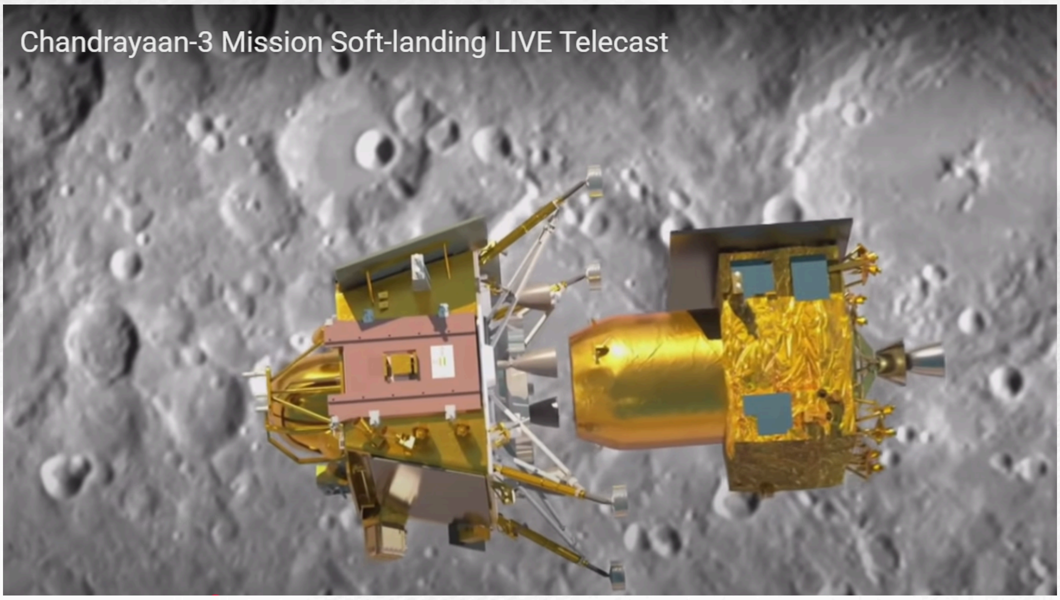
The Visual Evidence Broadcast by ISRO

ISRO broadcast live video feed of over one hour from its command center and is also available on their website, at the end portion just before the landing Indian Prime Minister also join the telecast from abroad by splitting the screen into two portions.

Visual: *During flight on the lunar orbit the Vikram lander and Pragyan rover detach from the rocket.*

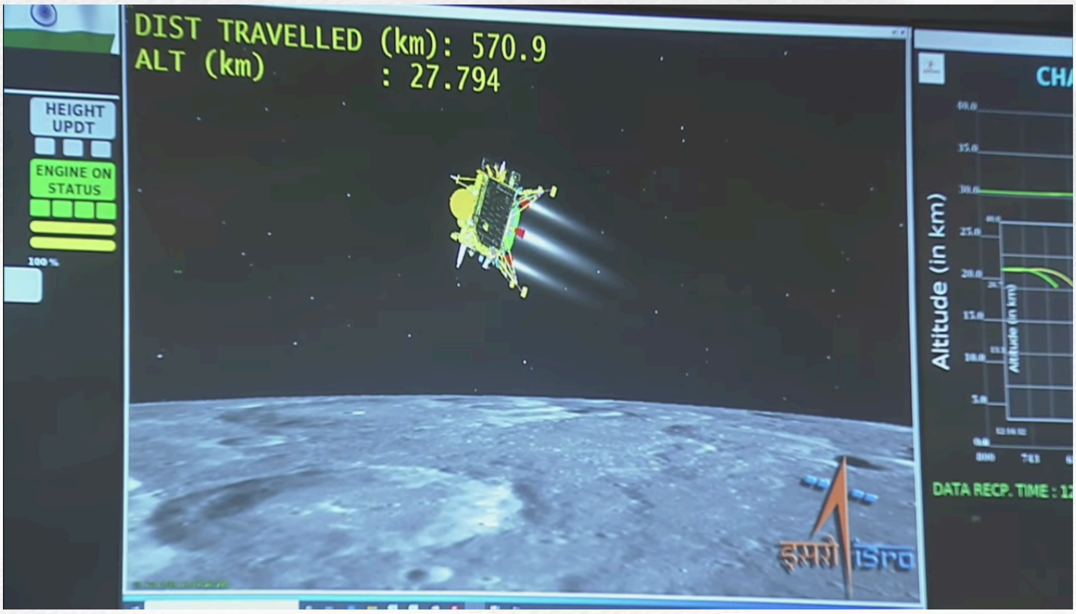






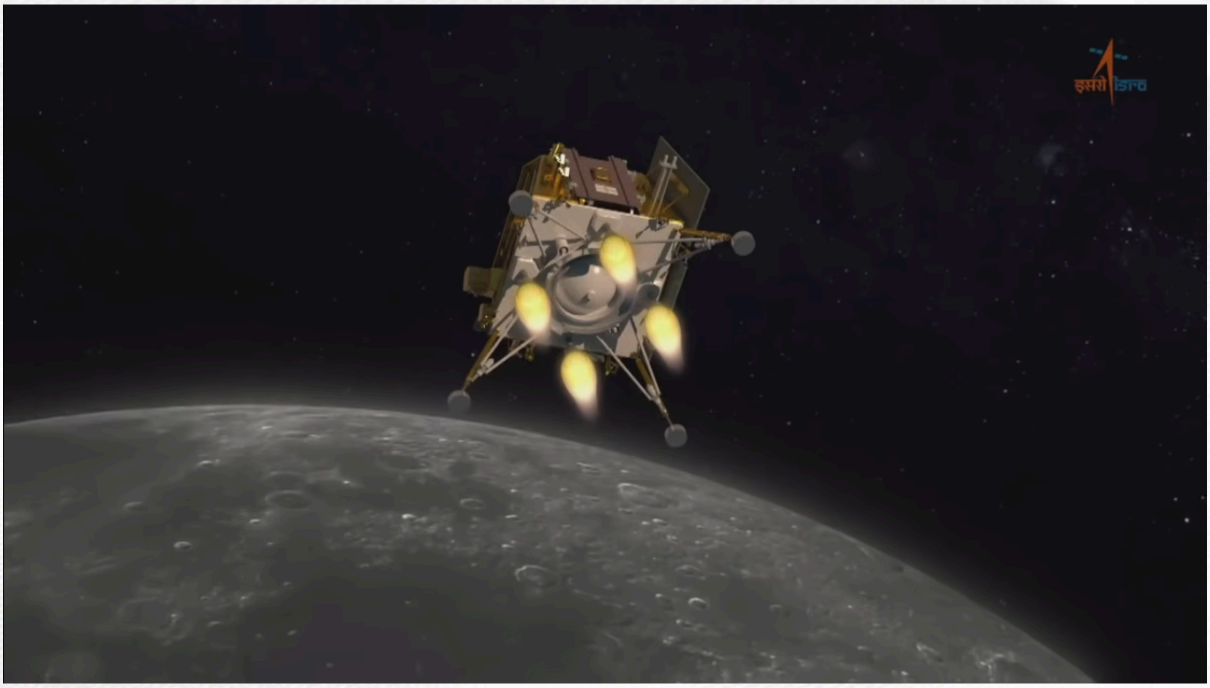
Fact: The anchor explained on live transmission that the detachment process starts and showed clips of it, he did not mention who took these videos as no satellite was available to record the picture, no clip from the rocket was shown the detachment process.

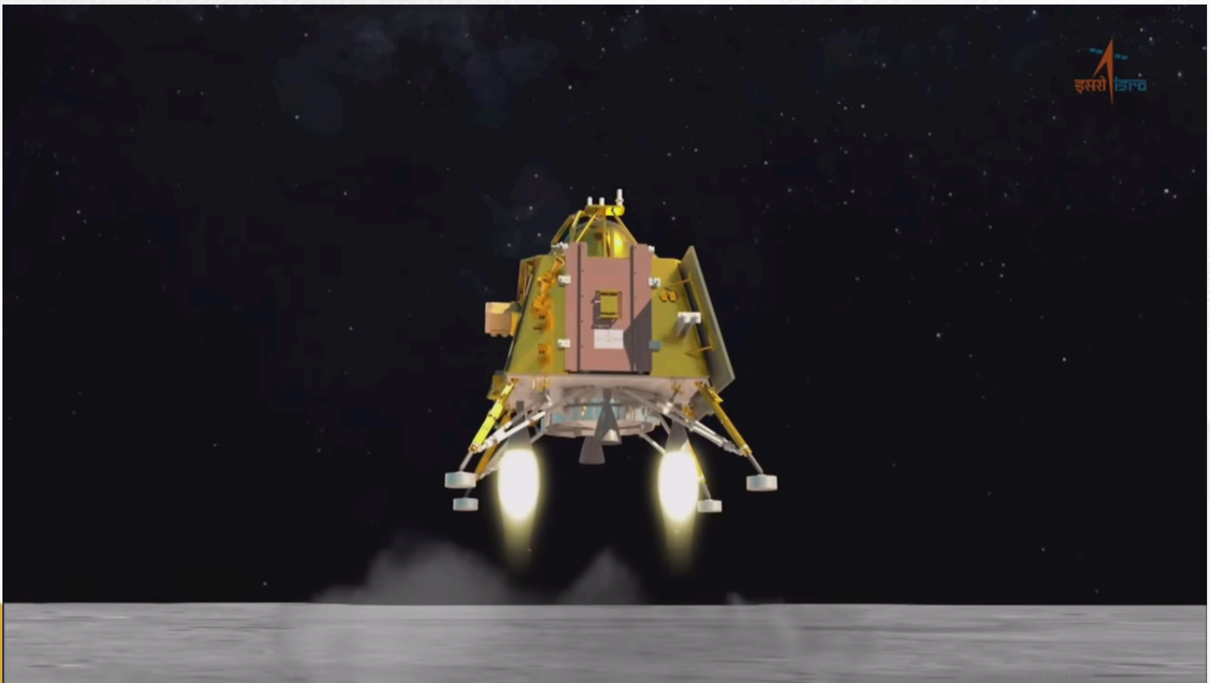
Visual: *The control room screen showing live movement of landers at different levels of altitudes was relayed on the television feed.*



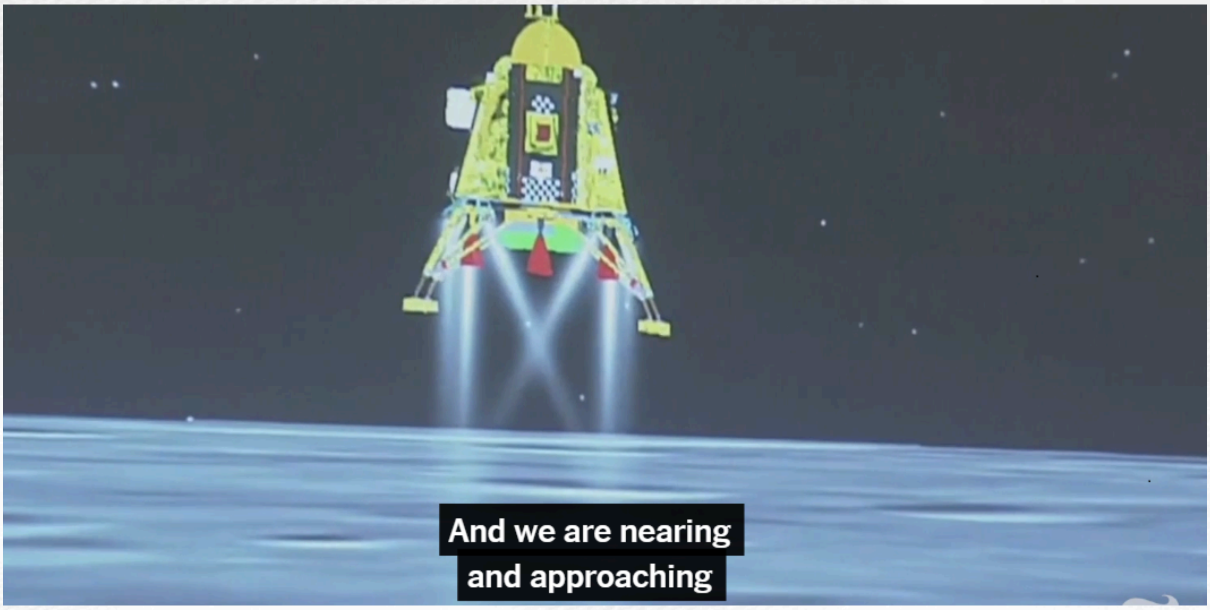
Fact: It is a deliberate attempt to mislead audience that as they are witnessing footage live from the control room (like we saw umpire decision pending from the display board from the stadium during a cricket match)

Visuals: *Different stages of landing sequence showing live images with countdown in background.*

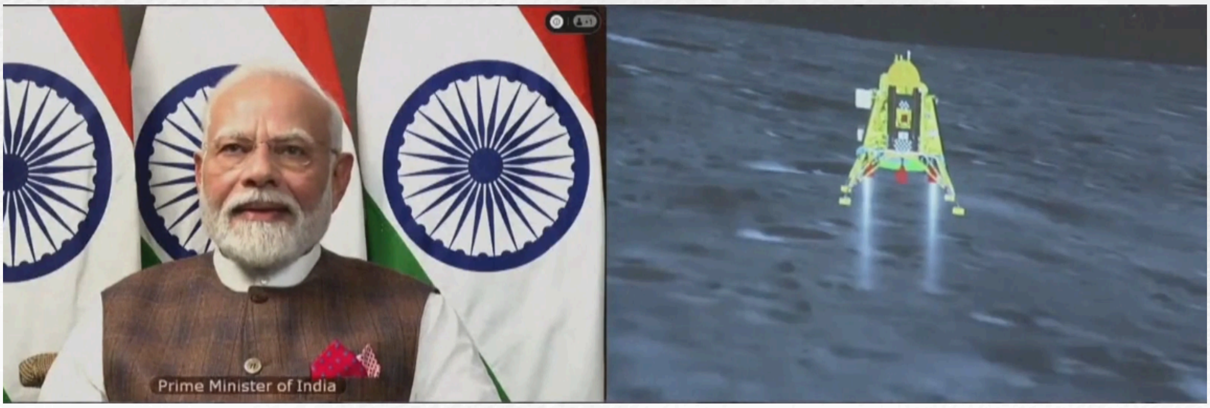


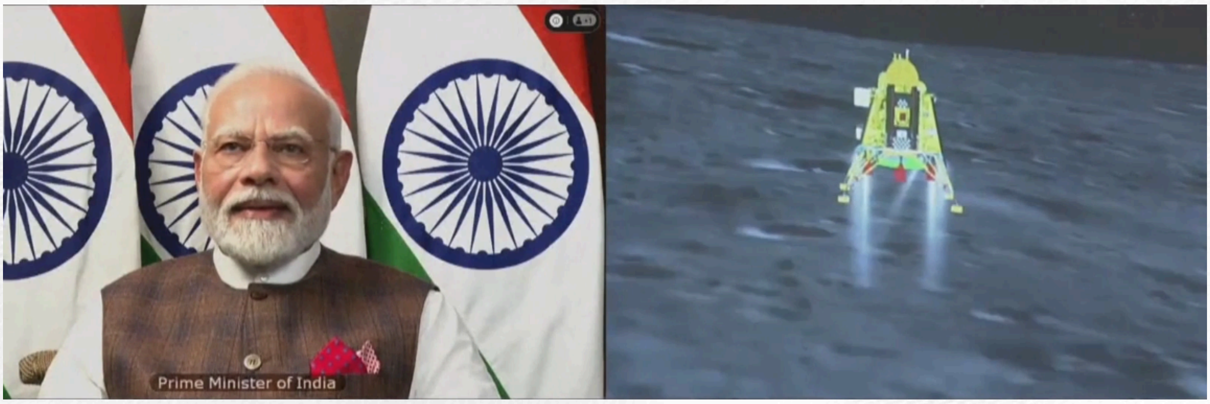


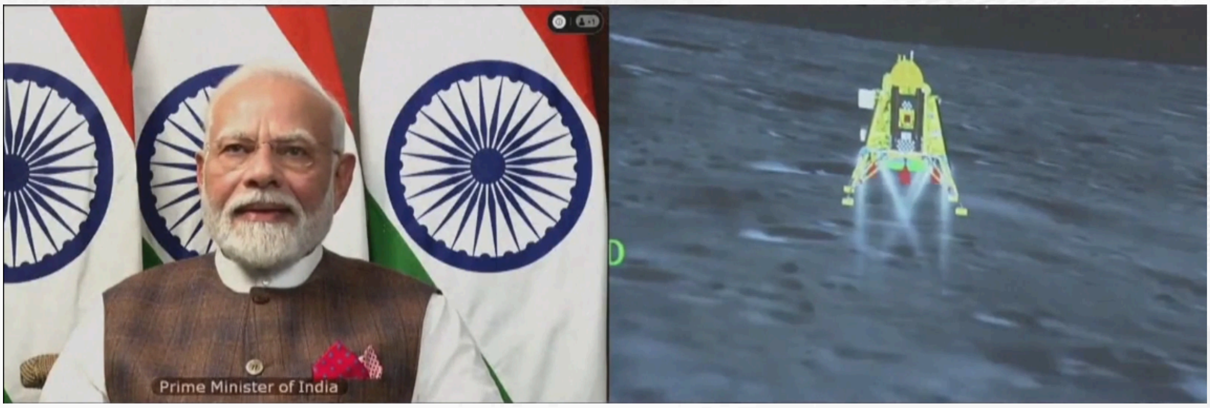
From different angle

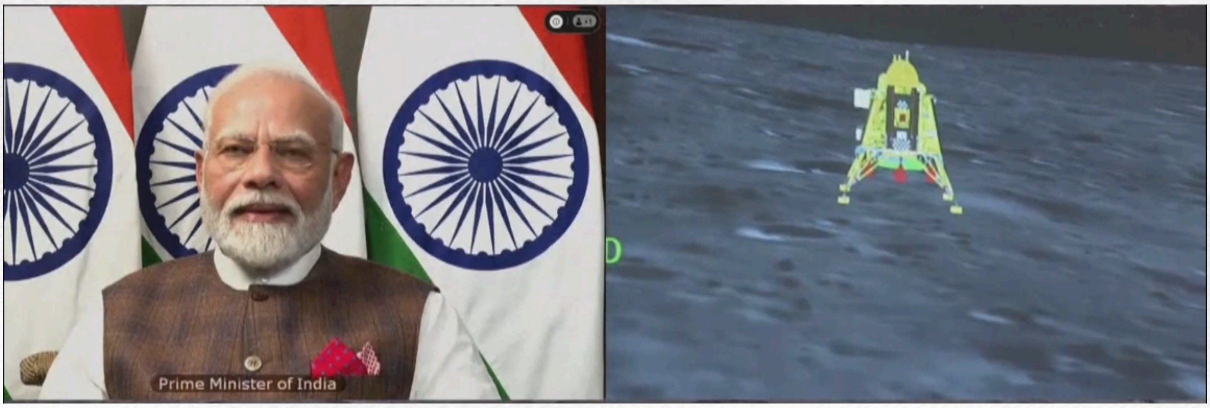


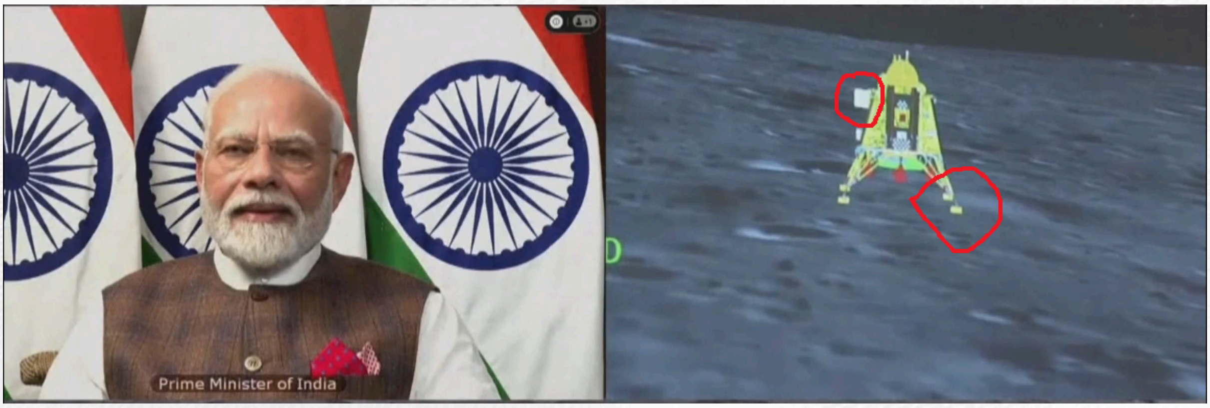
From other angle


Prime Minister of India


Prime Minister of India

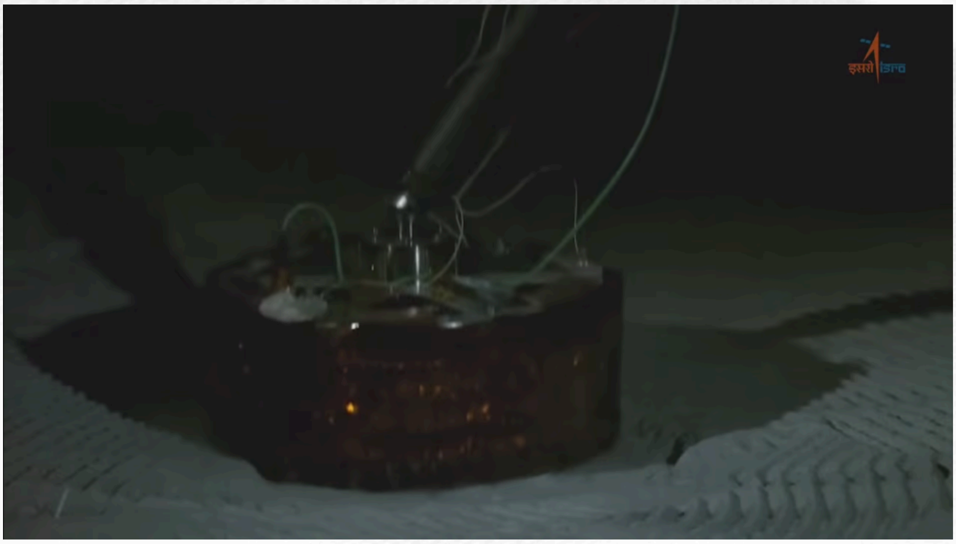

Prime Minister of India

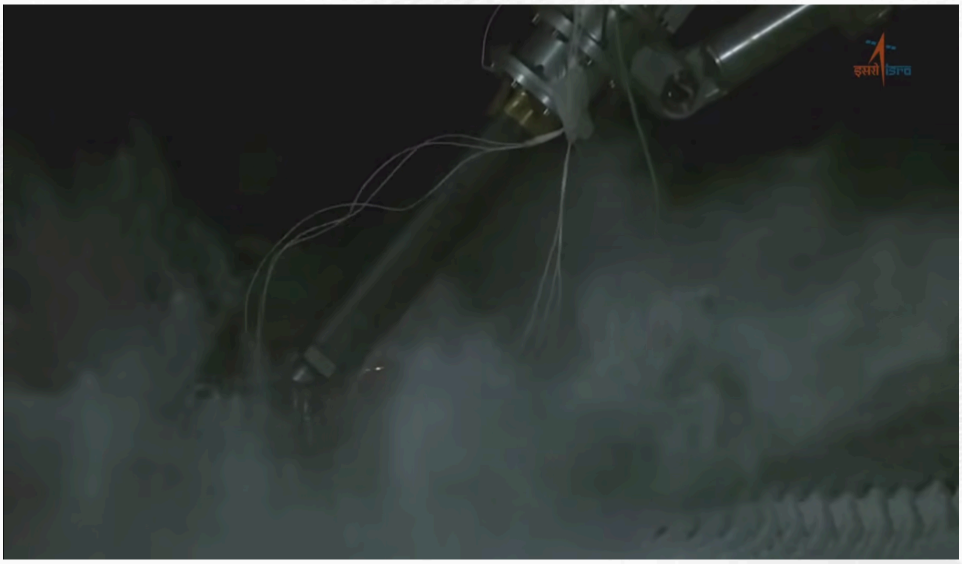




Fact: At different altitude the lander with reference to its background remains the same, only showing streams of unknown gases were stopped once the lander land on the surface. If you see the reference image of earlier images it was also not in line with the narrative when there is a difference in altitude camera angle records a different background.

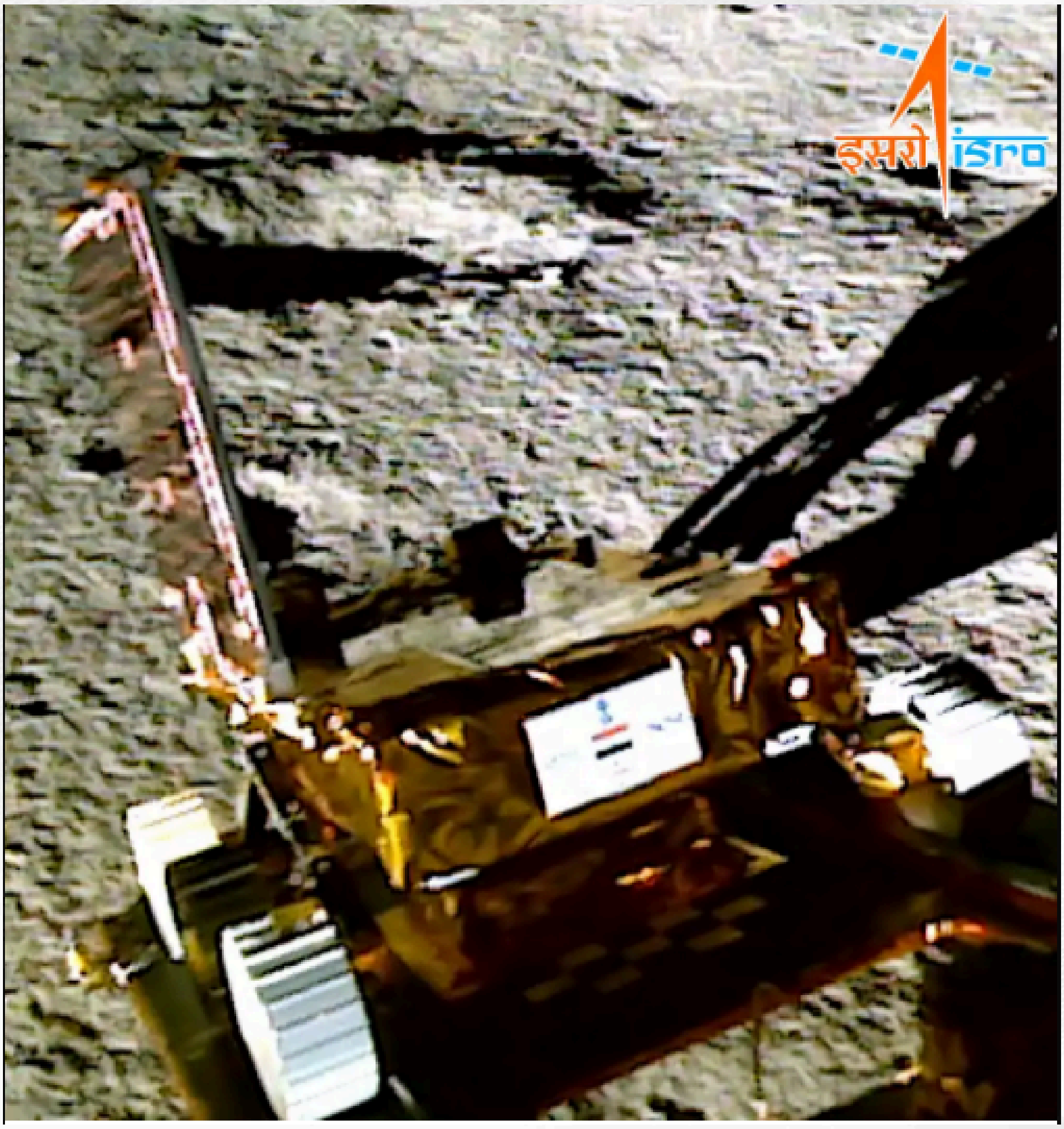
Visual: *Closeup of landing video clip was also telecast showing displacement of dust due to the touching of the lander foot on surface.*



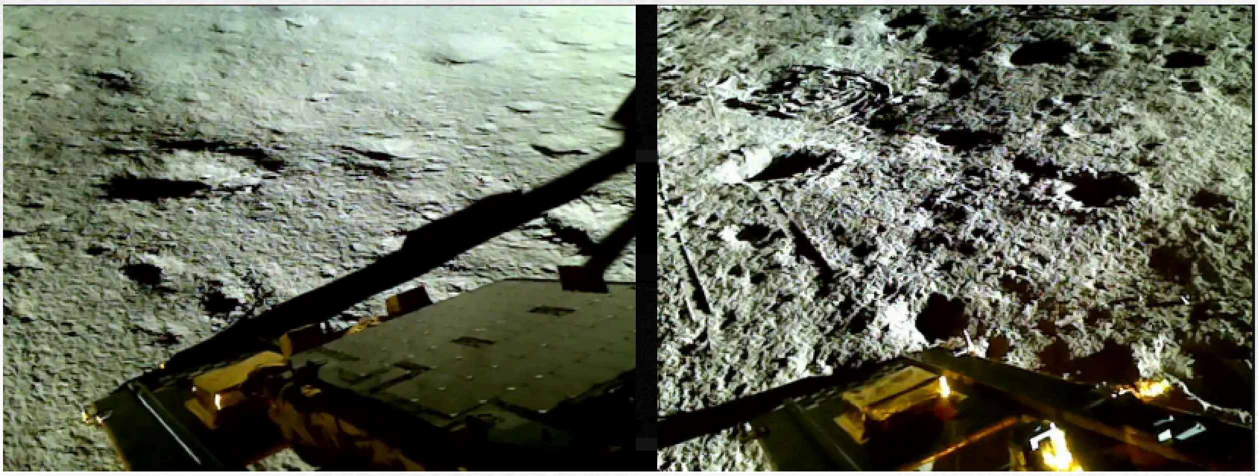


Fact: It is a fabricated clip back in studio as no flying camera was available on the lander if it was available than why ISRO fails to present it to the international community. The angle of the camera is also not from the stationary cameras supposed to be available onboard the lander. The angle is nearly 70% from where the Vikram lander steps which is also not possible for DD human cameraman to record this if he reaches before the lander lands on the historic Shakti site more than 600 kilometer away from south pole. Dust doesn't behave like it does here in the atmosphere. Dust down here blooms in turbulent air, forming these cauliflower-like clouds. If there is no atmosphere, dust just flies away and lands when you kick it up.

Visual: *Images captured by the lander camera, ISRO released for publication through its website.*

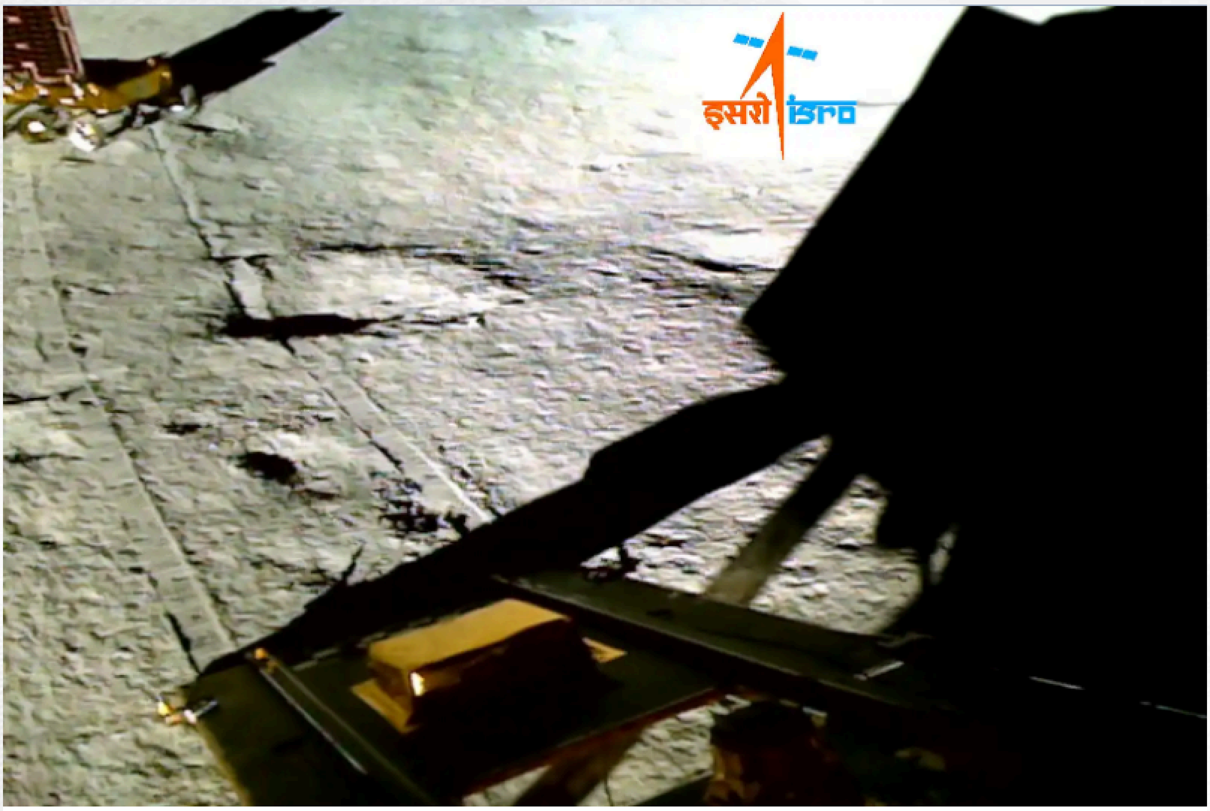


Rover sliding out of lander image taken by lander camera



Pre and post hop images of ramp

Rver track



Rover track from the edge of the ramp, also a portion of Rover is visible, track are different from the above image.

Image of rover rotating on the moon surface to find best possible route, its track

were not visible in other images recorded and present later

Fact: These images shown on Indian television channels were supplied by ISRO, there were several cameras on board on both the lander and rover. These videos were inconsistent and incomplete. No image from the rover was shared, creating room for speculation.

Other Issues

What was shown as a live video from the satellite was not a real video of the lander. It was actually a computer-generated animation of the lander. There was no camera outside the lander to record the landing.

On the Moon, there is only one source of light, the Sun.
There is no atmosphere, so the sky does not reflect light like it does on Earth. This means shadows on the Moon are very dark and very sharp. The little extra light comes from the ground, not from the sky like when you shine a flashlight under your face to look spooky.

There is no haze on the Moon.
Because there is no air, things don't look faded or blurry in the distance like they do on Earth. Objects far away still look very clear, which gives the horizon a sharp, cut-out appearance.

The way things move on the Moon is also strange.
For example, on Earth, if something weighs 120 kg, it feels heavy and moves slowly because of its weight. On the Moon, the same object only weighs about 20 kg, so it is easy to lift, but it still has the mass of 120 kg, which means it resists movement more than it seems. This is easy to see with the lunar rover. It weighed 210 kg on Earth but only 34 kg on the Moon.
So it bounced around like a light toy car, not like a real car.

The sky on the Moon looks strange too.
It is black like night, because there is no atmosphere to scatter sunlight, but the Sun is shining brightly, so bright that you cannot see any stars if the camera or your eyes are adjusted for daylight.

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