

JRCentral



Who Said Is Not Important, What Said Is Important
Vol I, Issue I

From Sonic to Cosmic:
Humanity's Next Leap

August Edition

Independence
Day
Special

The Journey is Just Beginning.....

2025



Acknowledgement

We extend a special thanks to **Dr. Ashok K. Chauhan**, Founder President, Ritnand Balved Education Foundation, and **Dr. Atul Chauhan**, Chancellor, Amity University Uttar Pradesh & President, Ritnand Balved Education Foundation, for their visionary leadership in building an institution where research and innovation can thrive. Their dedication to academic excellence creates the foundation upon which initiatives like this are made possible.





Acknowledgement

We thank **Dr. Sanjay Singh**, Professor & Director of Amity Institute of Aerospace Engineering, for steering our institution with a vision that prioritises academic rigour and a strong research ethos. The culture of curiosity and exploration fostered under his leadership provides the platform for scholarly initiatives to take shape and grow. A steadfast commitment to excellence and a broad vision for the future of the institution reflect a passion for encouraging innovation,

We also express our gratitude to **Dr. V. R. Sanal Kumar**, who has created a space that holds the highest standards of research and academia. A depth of expertise and a passion for advancing knowledge continue to leave a lasting impact on the academic community and the field at large, inspiring future generations of scholars and researchers. This enduring influence stands as a testament to a career defined by dedication, integrity, and intellectual excellence.

We are grateful to **Dr. Rajesh Kumar Saluja** for his valuable support and encouragement, which have added greatly to the spirit and vision of this magazine. His thoughtful presence and positive influence have been a source of inspiration for the entire team



It gives me immense pleasure to present this edition of our Research Club Magazine – a reflection of curiosity, collaboration, and the enduring pursuit of knowledge. Within these pages lie the efforts of our dedicated members, who have ventured beyond conventional boundaries, embraced new ideas, and turned challenges into meaningful achievements.

In a world that is advancing at an unprecedented pace, research is not simply the search for answers – it is the art of framing the right questions. Our club remains committed to fostering this spirit, encouraging each member to think with depth, create with purpose, and contribute with integrity to the broader scientific community.

This issue is not only a showcase of our technical accomplishments but also a celebration of the creativity, teamwork, and perseverance that made them possible. From drawing inspiration in nature’s designs to exploring emerging technologies, our goal has been to bridge ideas across disciplines and inspire the innovators of tomorrow.

I extend my sincere appreciation to the editorial team, contributors, and every member whose passion and commitment have shaped this publication. May this magazine stand as both a record of our journey and an inspiration to dream fearlessly, explore widely, and continue learning without end.

– **Shivansh Rana**
President, JRCentral



“Mach the Difference, Fuel the Future” — that’s the energy we want JRCentral to carry into every page. As the editor, it’s my privilege to bring you the very first edition of our department’s own research journal — a space where innovation, curiosity, and ambition meet.

In aerospace, speed alone isn’t enough; it’s about precision, vision, and the courage to tackle the unknown. From hypersonic flight to advanced propulsion systems, every project featured here represents the passion and persistence of our students, faculty, and alumni.

This issue takes you through a journey, from conceptual breakthroughs to experimental triumphs, proving that our community is not just keeping up with the future, but actively shaping it. The laser weapon on this page is more than an image; it’s a symbol of the frontier spirit that drives aerospace research: pushing limits, embracing challenge, and aiming for targets once thought impossible.

To everyone who contributed their work and ideas: thank you for making JRCentral a reality. To our readers: I hope these pages ignite the same excitement in you that editing them did for me. Let’s make waves, break barriers, and as always — Mach the Difference.

— **Daksha Tuteja**
Editor-in-Chief, JRCentral



In this inaugural edition of our Research Club Newsletter, every page is a reminder that great ideas often begin as a question, a hunch, or a simple “what if?”. Our club works in that exhilarating space between concept and creation – where ideas are tested, refined, and, when necessary, rebuilt with greater clarity and insight.

JRCentral thrives at the intersection of disciplines, bringing together engineering expertise, scientific inquiry, and creative problem-solving. Here, we measure our ideas against reality, and every outcome – whether breakthrough or setback – adds depth to our understanding. This year, our goal extends beyond building projects; we aim to build a culture that values consistency, collaboration, and curiosity.

The newsletter exists to highlight diverse interests, ideas, and achievements, serving as a catalyst for continued learning and growth. By documenting our journeys, sharing varied perspectives, and emphasizing the value of process alongside outcome, we hope to inspire students to embrace the challenges and possibilities of research. This vision ensures that we remain at the forefront of discovery, equipped to meet the evolving demands of science in our time.

– **Sameeha Khan**
Head of R&D, JRCentral



Articles

Achievements



EARTH TO SPACE: INDIA'S JOURNEY OF AEROSPACE SELF-RELIANCE

India's aerospace sector has evolved into a symbol of technological strength and national pride. At the forefront of this evolution, Indian Space Research Organisation (ISRO) and the Defence Research and Development Organisation (DRDO), the pride of our nation whose pioneering efforts have redefined the nation's global stature by contributing in the aerospace sector.

ISRO's journey from launching Aryabhata in 1975 to achieving the historic Chandrayaan-3 lunar landing, Mangalyaan (MOM) mission, Aditya-L1 solar mission which showcases the power of innovation against all odds. These missions have demonstrated India's capability to execute complex space explorations with cost-effective precision and earning worldwide respect. ISRO currently holds the position of one of the world's leading space agencies, recognized for its cost-effective, high-impact missions standing alongside NASA, ESA and other space agencies.



Meanwhile, DRDO has fortified India's defence aerospace prowess through indigenous developments such as the Light Combat Aircraft Tejas, the Agni and Prithvi missile series, and the Akash air defence system. These advancements not only enhance security but also showcases the vision of Atmanirbhar Bharat,



As we celebrate Independence Day, these achievements remind us that freedom is safeguarded by self-reliance and vision. ISRO and DRDO have shown that India can dream beyond the horizon, chart its own path, and emerge as a leader in aerospace and defence sector.

INDIA ENTERS SPACE AGE

Satellite sent into orbit from USSR

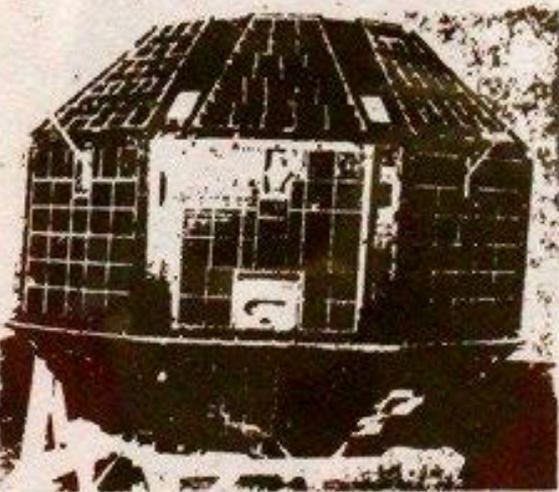
FROM OUR SPECIAL REPRESENTATIVE

NEW DELHI, April 19. — The first Indian scientific satellite Aryabhata, named after the great Indian astronomer and mathematician of the fifth century, was successfully launched from a Soviet cosmodrome with the help of a Soviet rocket carrier today at 1900 hrs. (IST) thus ushering India literally into a space age.

TO OUR READERS AND PATRONS

The price of newspaper today is about two and a half times of what it was a couple of years ago. There has been a steady increase in the price of news paper... (text continues with details about newspaper pricing and circulation)

The satellite has been launched into an orbit with the following parameters: Apogee height—492 km perigee height—356 km... (text continues with technical details of the satellite launch and mission)



First Indian satellite Aryabhata was successfully launched from the Soviet Union on April 19 — Photo: Pravda.

India insists on comprehensive deal with EEC

FROM OUR SPECIAL REPRESENTATIVE

NEW DELHI, April 19. — India has urged the European Economic Community to extend the model of Lomé convention to other developing countries in Asia by way of comprehensive trade collaboration.

The request was conveyed by Prof. D. Chatterjee, Vice-Chancellor of the Indian Institute of Space Science and Technology, to Mr. Francois Mitterrand, EEC President, when the latter visited India... (text continues with details of the diplomatic mission and the EEC's response)

UPROAR IN KARNATAKA ASSEMBLY

BANGALORE, April 19. — Uproar broke out in the Karnataka Assembly today when the Deputy Minister for Agriculture... (text continues with details of the assembly proceedings)

Khmer Rouge Radio claims Many ex-Govt. leaders beheaded

Phnom Penh, April 19. — A Khmer Rouge radio station today announced that... (text continues with details of the radio broadcast)

Indo-Bangla border confce. from tomorrow

By a Staff Reporter

NEW DELHI, April 19. — A border dispute talks between India and Bangladesh... (text continues with details of the border conference)

Bakhia, Patel released

By a Staff Reporter

NEW DELHI, April 19. — The Government today announced... (text continues with details of the release of Bakhia and Patel)



Pistol Shrimp snaps SHOCKWAVE!

At just 3-5 cm long, the pistol shrimp carries one disproportionately large claw that functions like a biological weapon. This claw is not designed for pinching but for producing extreme fluid dynamic forces. It works like a cocking mechanism: when pulled back, the claw's "hammer" creates a small chamber that fills with water, and when released, the hammer slams forward in under a millisecond, forcing a narrow jet of water out at speeds of around 25 m/s.



This rapid flow causes the local pressure in the water to drop below the vapour pressure, generating a cavitation bubble. The bubble expands outward from the claw, then collapses violently as surrounding water pressure overwhelms it. This collapse releases a shockwave loud enough to interfere with sonar and pressures near 80 kPa at close range.



The collapse is also accompanied by extreme heating. The rapid adiabatic compression of gas inside the bubble can reach temperatures exceeding 5,000 K, similar to the Sun's surface. This produces a faint burst of sonoluminescence, which is when light is generated by an imploding bubble.



FUN FACT

At 218 decibels, its snap is one of the loudest biological sounds on Earth, rivalling the sounds made by whales

For prey, the shockwave's impulse is enough to stun or kill instantly. For engineers, the pistol shrimp is a natural demonstration of extreme fluid dynamics with high-velocity jets, cavitation physics, and energy focusing, all powered by muscle. The pistol shrimp's claw is one of nature's most clever devices for focusing energy in water.

BIOMIMICRY



Biomimicry studies nature's designs to solve human challenges, drawing on ideas shaped by evolution — proof that the natural world remains our most enduring and harmonious innovator.



BEETLETECH BIOMIMICRY

NATURE'S HIGH PERFORMANCE FLYER

When a rhinoceros beetle takes flight, it is more than an insect in motion — it's a living example of nature's engineering. With only two wings, beetles execute aerial feats rivaling advanced drones: abrupt takeoffs, reverse flight, sharp lateral turns, even precise upside-down landings.



High-speed imaging shows the beetle's wings beat about 38 times per second, sweeping 165° arcs. Flapping speed has little effect on lift; timing and motion are far more critical. A split-millisecond change in rotation can dramatically shift aerodynamic forces.

By creating and testing artificial beetle-inspired wings, engineers are pinpointing optimal angles and motion patterns that maximize lift and minimize energy use. Such advances could yield Micro Air Vehicles (MAVs) with exceptional agility and endurance — ideal for search-and-rescue, environmental monitoring, or industrial inspection.

Biomimicry in this context goes beyond copying nature. Studying beetle flight starts with evolution's solutions but pushes past them, refining and adapting designs for engineering goals. From the rhinoceros beetle's powerful wingbeats, researchers are drawing blueprints for the next generation of small, efficient, and versatile flying machines.

Scientists have long studied insect flight mechanics, yet many mysteries remain. One especially complex area is near-field aerodynamics which is the turbulent airflow close to the wings. Here lie clues that could transform the design of small flying machines.

Beetles make ideal study subjects. With over 350,000 species, they display remarkable variety in size, strength, and flight style. The rhinoceros beetle (*Oryctes nasicornis*) is a standout, able to carry loads far heavier than itself while flying in diverse environments. But nature's designs prioritize survival over efficiency: its rigid forewings (elytra) add stability and protection but reduce aerodynamic performance. Engineers reimagine these features to build vehicles with fewer trade-offs

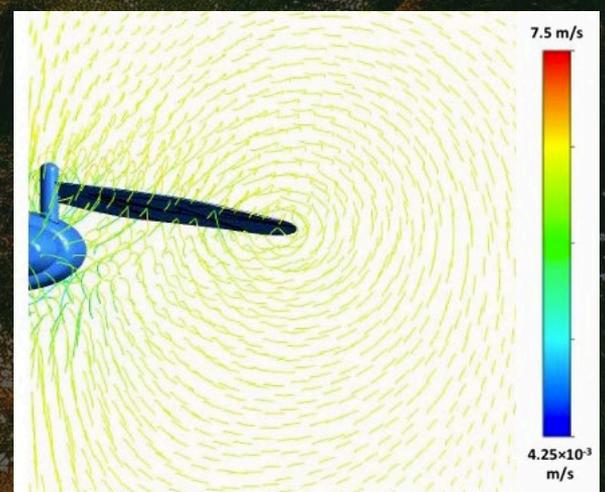


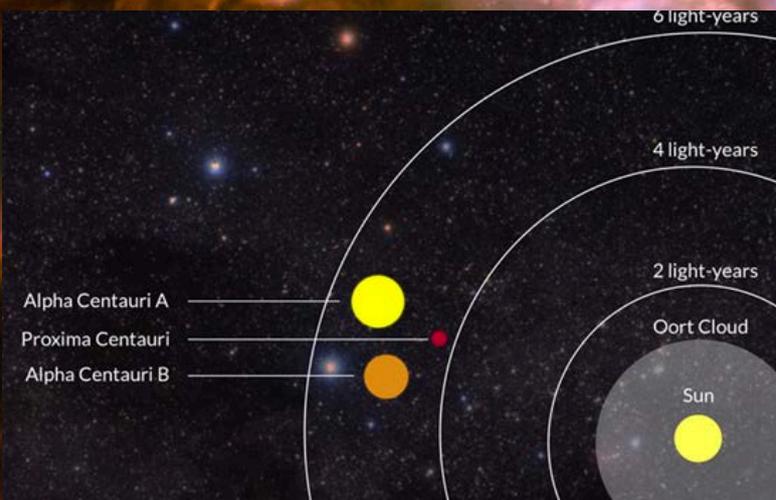
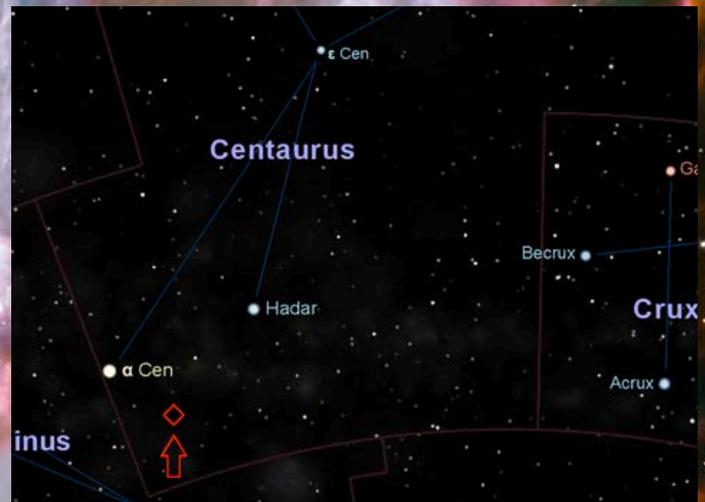
Figure shows the Demonstration of velocity vectors Around the wing in Numerical Simulations

Guru Prasath N and Sanal Kumar VR et al., "Numerical simulation of biology-inspired beetle wings," 12th IECEC, 2014.

THE STAR NEXT DOOR

Proxima Centauri

Proxima Centauri, located just 4.22 light-years away in the constellation Centaurus, holds the title of our closest stellar neighbour. Proxima Centauri is a member of the Alpha Centauri triple star system, together with Alpha Centauri A and B; however, it orbits this close pair of stars far away: almost a fifth of a light-year in distance, it takes a staggering 550,000 years, by estimation, to complete a single orbit of Alpha Centauri A and B.



In cosmic terms, it is beside us but impossible to see with the naked eye. It is an M-type red dwarf, viz., just one-eighth the solar mass, with a surface temperature of barely 3,100 K. So much of its radiation is in the infrared spectrum

that it manages to reach our eyes at just 0.0056% of the solar brightness. As a flare star, Proxima Centauri is capable of producing massive bursts of X-ray and ultraviolet radiation. A flare can make the star bright enough to be seen through telescopes by the human eye at times. In 2019, it produced one of the most enormous flares ever recorded in the Milky Way, briefly shining 14,000 times brighter in the ultraviolet. There are at least two confirmed planets to the star, Proxima b, and Proxima d, with one candidate, Proxima c. Proxima b is in the habitable zone where liquid water could be present. However; with so many intense flares, the atmosphere may have been stripped away, obviously damping the prospects for life. Proxima c would be much farther out and exceedingly cold if it exists.

Being the closest exoplanetary system, Proxima Centauri is a rare chance to study stellar physics, planetary habitability, and the challenges to life around active red dwarfs, and thus an excellent target for future interstellar exploration.

The Celestial Tapestry of Ancient India – Myths, Stars, and Cultural Continuity

Introduction: A Stellar Legacy Without Telescopes

Imagine mapping the night sky with an accuracy of 1.5° —without telescopes or modern instruments. Ancient Indian astronomers achieved this remarkable feat, blending mythology, mathematics, and meticulous observation to create a celestial system that rivaled the best of its time. This article, the first in a two-part series, explores how India's **Nakshatras** and cultural frameworks laid the foundation for a unique astronomical tradition.



Polar Stars and Vedic Precision
India's polar star, **Dhruva**, was 0.3° more accurate than its Greek counterpart—a precision achieved through Vedic altar alignments. This highlights how ritual practices doubled as scientific tools, embedding astronomy into the fabric of daily life.



The Nakshatras: Where Myth Meets the Cosmos

At the heart of Indian astronomy lies the Nakshatras, a system of 27 lunar constellations. Unlike the geometric zodiac of the Greeks, the Nakshatras were deeply intertwined with mythology and daily life. For instance:

- **Mrigashira** (the deer-head) symbolized a celestial hunt, while Greece's Orion was secularized into a mere hunter.
- **Rohini** (the red one) referred to Aldebaran, its name preserving observational knowledge.
- **Krittika** (Pleiades) was used to predict monsoons, as documented in the **Satapatha Brahmana** (2.1.2). Remarkably, 22 of these Nakshatras retained their Vedic names, showcasing an unbroken cultural and scientific continuity over millennia.

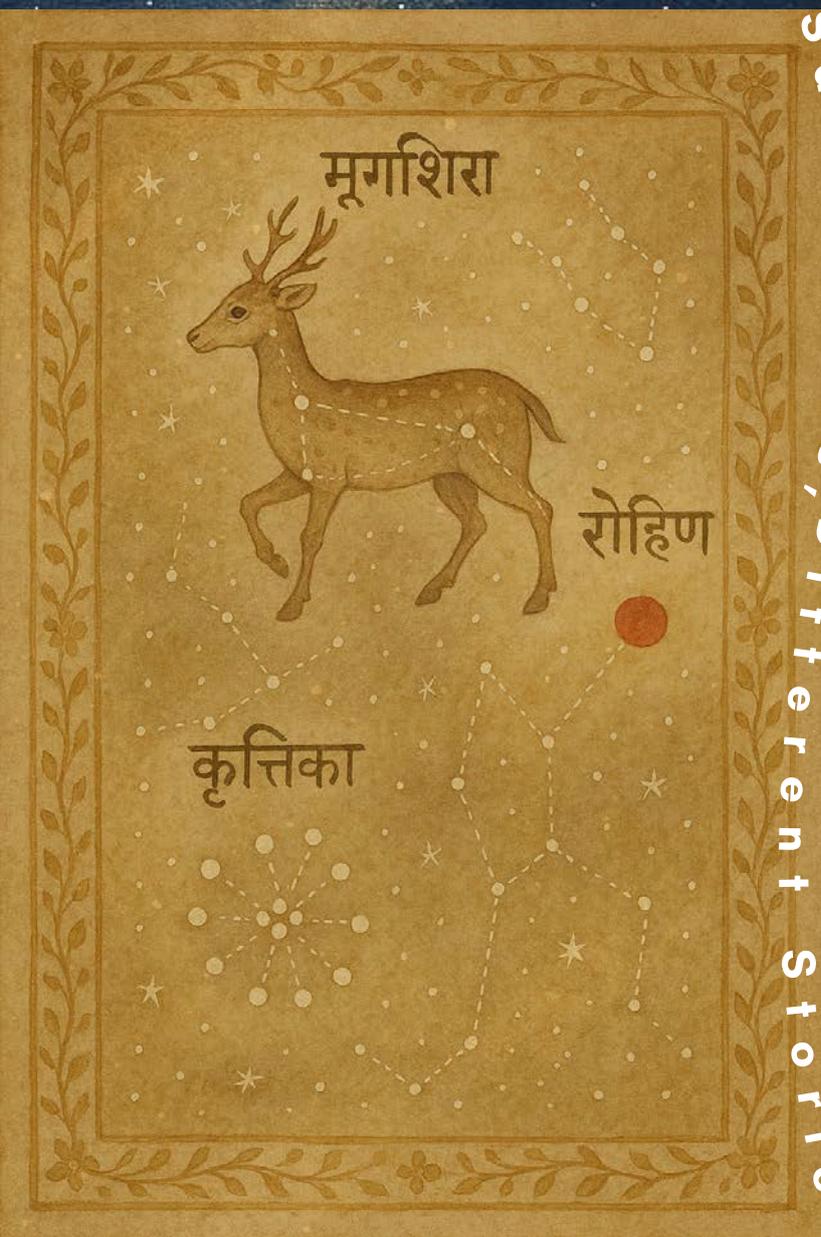
Why This Matters

The Nakshatras were more than just star maps; they were a fusion of myth and math, preserving knowledge through storytelling. This challenges the notion that ancient science was purely secular or divorced from cultural contexts.

In Part 2, we'll explore the mathematical brilliance of the **Surya Siddhanta** and **Aryabhatiya**, and how India's lunar focus contrasted with Greece's solar system. Stay tuned!

Stargazing through time

How Ancient Indian Nakshatras Compare to Modern Constellations



Same Stars, Different Stories



Where modern science sees dying stars, ancient Indians saw cosmic deer and monsoon heralds—proving observation transcends time. The same stars that guided Vedic rituals still shine over our satellites, connecting millennia of skywatchers.

- ✦ Rohini's red glow warned of storms then; now it reveals stellar evolution.
- ✦ Mrigashira's deer still runs across Orion's belt— *try spotting it!*

FUN FACT : Krittika (Pleiades) is the only star cluster mentioned in both the Mahabharata and Homer's Iliad—proving ancient cultures saw the same 'seven sisters'!



Scan me!, Learn how to navigate using the stars tonight!

PLASMA MAGNET SAILS THE FUTURE OF PROPELLANT-FREE SPACE TRAVEL

Forget canvas or mylar – tomorrow’s spacecraft might unfurl sails made of pure magnetic fields. Plasma magnet sails use onboard power to inflate a vast, invisible bubble – an artificial magnetosphere – that catches the constant stream of charged particles flowing from the Sun. Tiny coils, just 10 cm across, carry alternating currents.

These create a spinning electromagnetic field that traps the solar wind. The result? A magnetic bubble 30 km wide, big enough to scatter incoming particles and steal their momentum. That push – about 1 N of thrust with only 10 kW of power – accelerates the ship without burning a single gram of fuel.

The secret

Unlike solar sails that fade with distance, plasma magnet sails get a boost: the magnetic bubble expands in the thin plasma far from the Sun.

That keeps the thrust nearly constant over billions of kilometers – perfect for deep-space cruising.

BIG DREAMS, BIG MISSIONS

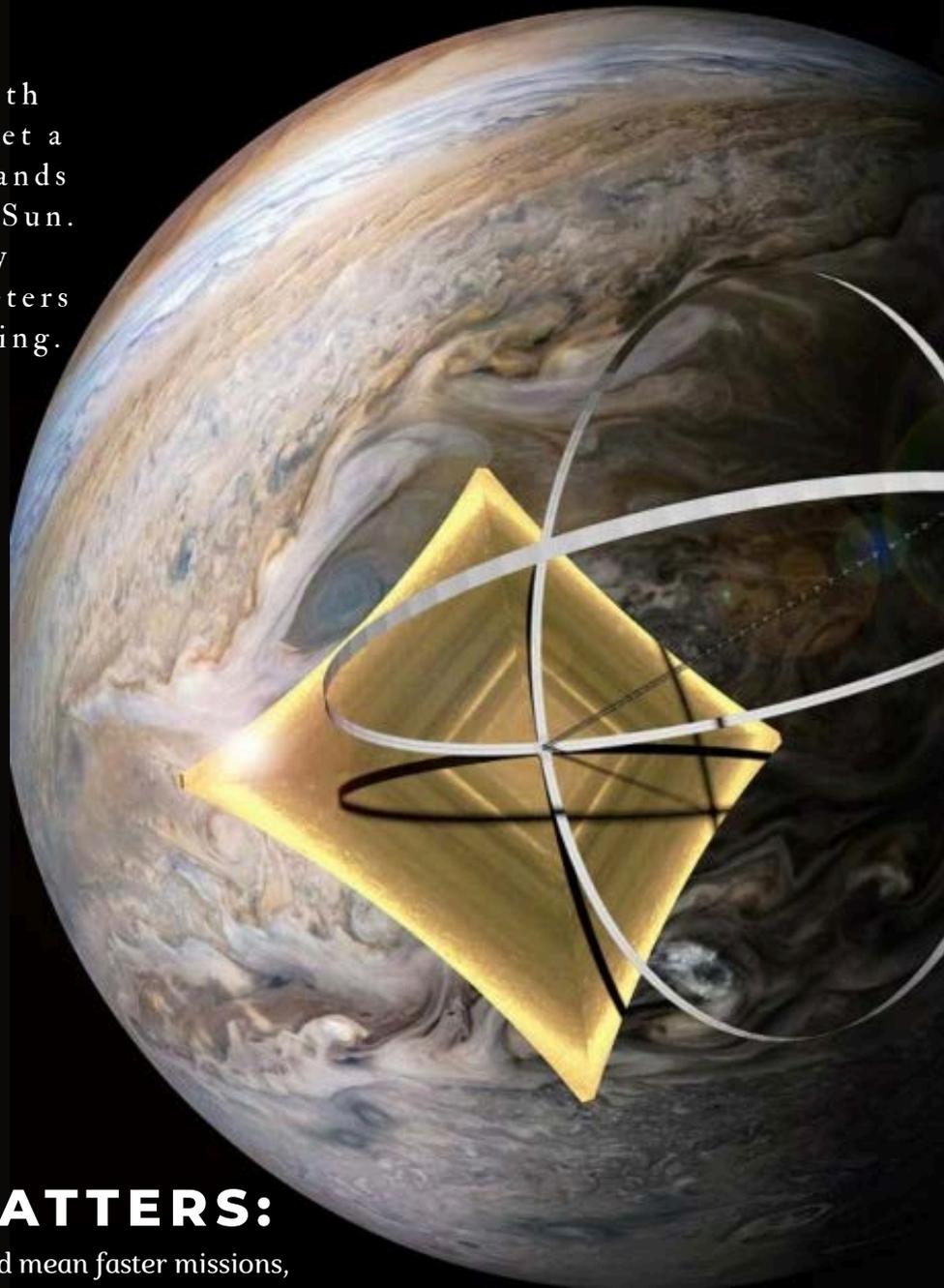
From interstellar probes that could leave the Solar System in decades, to planetary defense missions that gently nudge asteroids off dangerous paths – scientists are sketching out real spacecraft that could ride this magnetic wind.

QUICK FACTS

- No propellant – the solar wind does all the pushing
- Scalable – bigger coils, bigger bubbles, more thrust
- Long-haul capable – constant acceleration over huge distances

WHY IT MATTERS:

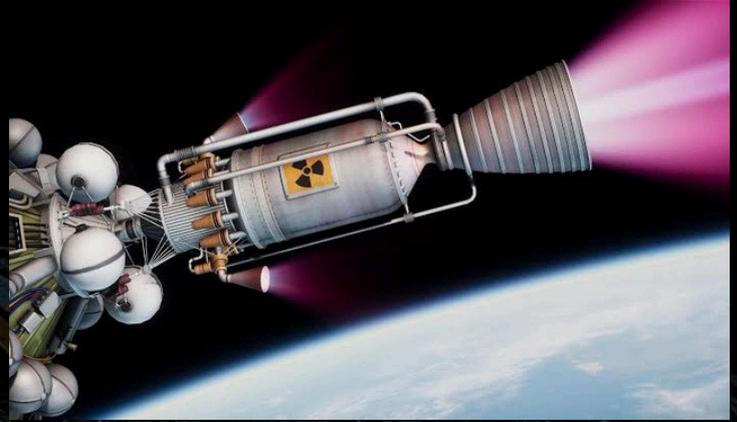
Plasma magnet sails could mean faster missions, lighter spacecraft, and a practical way to explore – or defend – our cosmic neighborhood.



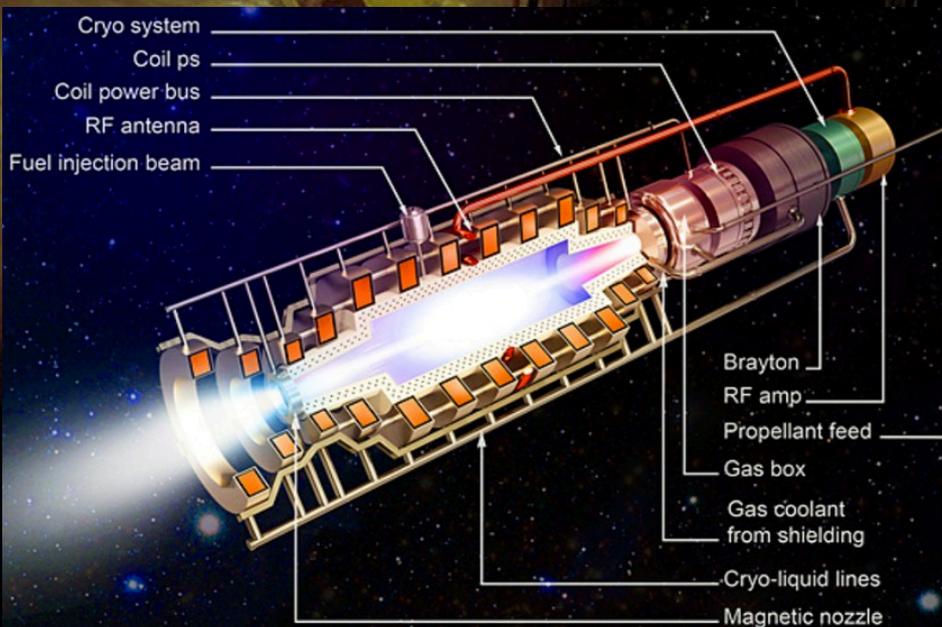
Nuclear Fission and Fusion Propulsion



Fission propulsion operates by splitting the nuclei of heavy elements such as uranium-235 or plutonium-239. This process releases large amounts of heat, which can be used in a nuclear thermal rocket (NTR) to heat a propellant—typically hydrogen—and expel it through a nozzle to produce thrust. Fission systems can deliver much higher specific impulse (Isp) than chemical propulsion, reducing travel time and propellant requirements.



Nuclear electric propulsion (NEP) is another variant, where fission energy is converted into electricity to power high-efficiency electric thrusters. Fission technology is well understood and has been tested in projects like NASA's NERVA program.



Fusion propulsion involves fusing light nuclei (such as deuterium and tritium) to form heavier nuclei, releasing immense energy. Fusion offers a much higher specific impulse and energy density than fission, potentially enabling faster interplanetary and even interstellar missions. However, achieving controlled fusion in a spacecraft remains a significant engineering challenge.

Both propulsion types offer significant benefits for human and robotic spaceflight. Fission propulsion is closer to deployment and could power missions to Mars or the outer planets within decades. Fusion, while still experimental, holds the long-term potential for near-light-speed travel and transforming humanity into a truly spacefaring civilization.



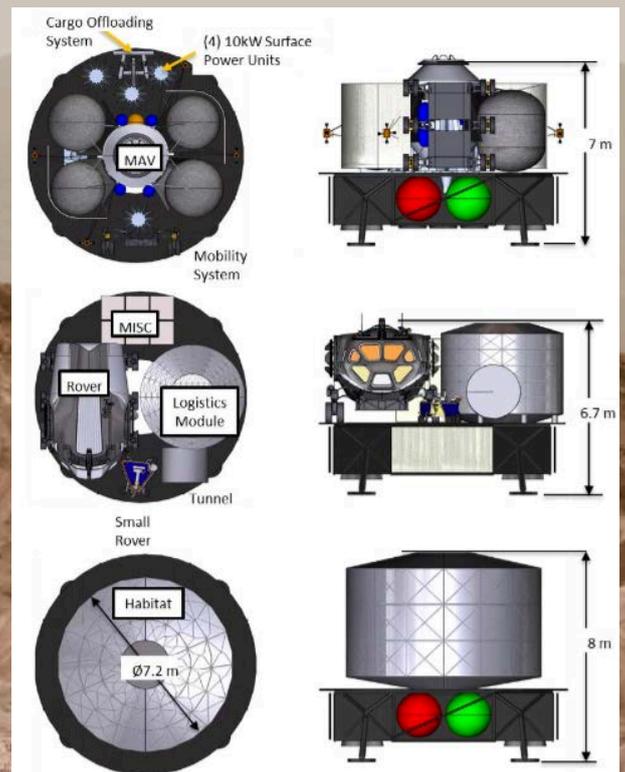
First Footprints on a **RUST-RED** world

Mars has been our target for decades — the ultimate proving ground for human space exploration. We've mapped it from orbit, drilled into its crust, and roved across its plains. But robots have their limits. The most complex geology and life-detection experiments can only be done by human hands, guided by real-time judgment.

The hurdles are powerful: long-duration radiation exposure, life support sustainability, safe landing of heavy payloads, and a reliable return trip. The key lies in making each step technically achievable before attempting the next.

We begin by launching Mars Transfer Habitats to orbit Mars years before the crew — self-sufficient modules powered by compact nuclear reactors and shielded against cosmic rays. Simultaneously, cargo landers deliver surface supplies: pressurized rovers, inflatable greenhouses, and fuel-making plants that extract methane and oxygen from the Martian atmosphere via the Sabatier process (which can be studied via in-silico methods like to show to how a Sabatier reactor makes methane + oxygen over 500 days using sunlight using Matlab or python subs like poliaastro etc.)

Only once fuel, shelter, and power are verified on-site do astronauts depart aboard aycler spacecraft, a spacecraft vessel that perpetually loops between Earth and Mars, minimizing launch mass and reusability costs. This approach means astronauts arrive to a ready, functioning base and a fueled return vehicle — no “flags and footprints,” just a sustainable human presence from day one.



From space on Earth to the Earth: Indian astronauts finish 10-day Mars simulation in Ladakh

etimes.in | Aug 12, 2025, 04:13 PM IST

Two Indian astronauts, Rahul Mogalapalli and Yaman Akot, recently completed a 10-day analog mission inside the Hope habitat located in the rugged Tso Kar region of Ladakh, about 150 km from Leh. The mission simulated the extreme conditions and routines astronauts would face during lunar and Martian exploration, providing a realistic and challenging training environment.

Speaking to IndiaToday, Rahul described the experience as “a real learning curve.” He explained, “We had to ration food, water, and even internet bandwidth. Maintaining communication and staying disciplined was tough, but if given a chance, I’d do it again.” Both Rahul and Yaman also talked about the psychological challenges posed by extended isolation, emphasising the importance of such missions for India’s future space exploration plans.

BY SUCCESSFULLY COMPLETING THIS ANALOG MISSION, INDIA TAKES A GIANT LEAP FORWARD IN PREPARING ITS ASTRONAUTS FOR THE CHALLENGES OF SPACE TRAVEL BEYOND EARTH. THE HOPE MISSION SERVES AS A VITAL REHEARSAL, BRINGING THE COUNTRY CLOSER TO REALIZING ITS DREAM OF ESTABLISHING A HUMAN PRESENCE ON THE MOON AND, EVENTUALLY, MARS.



Folded paper & Space Flight

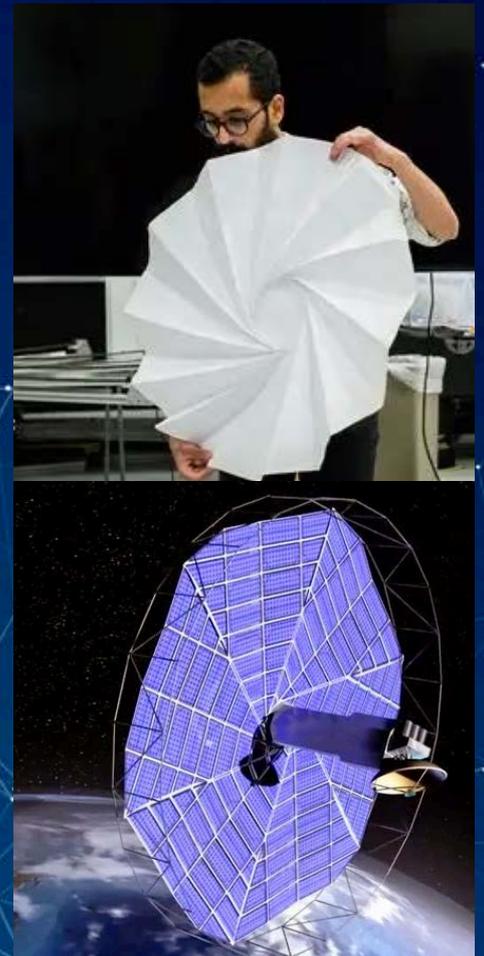
In the vacuum of space, every centimeter matters. Satellites must be compact enough to fit inside a rocket, yet large enough to gather energy, collect data, or shield sensitive instruments once deployed. Engineers have found an unlikely design partner for this challenge: the ancient art of origami.

One of the most remarkable techniques adapted for aerospace is the Miura fold, developed by Japanese astrophysicist Koryo Miura in the 1970s.

This folding pattern allows a flat sheet to collapse into a fraction of its size and then unfurl smoothly in a single motion.

Unlike conventional folding, it distributes stress evenly, reducing the risk of creases or damage to delicate materials.

NASA, JAXA, and ESA have explored origami-inspired mechanisms for solar panel arrays, deployable antennas, and space-based telescopes. Solar sails like JAXA's IKAROS have demonstrated how these folds can carry spacecraft across interplanetary distances using nothing but the pressure of sunlight. The same principles are now influencing designs for large, lightweight mirrors and next-generation starshades.

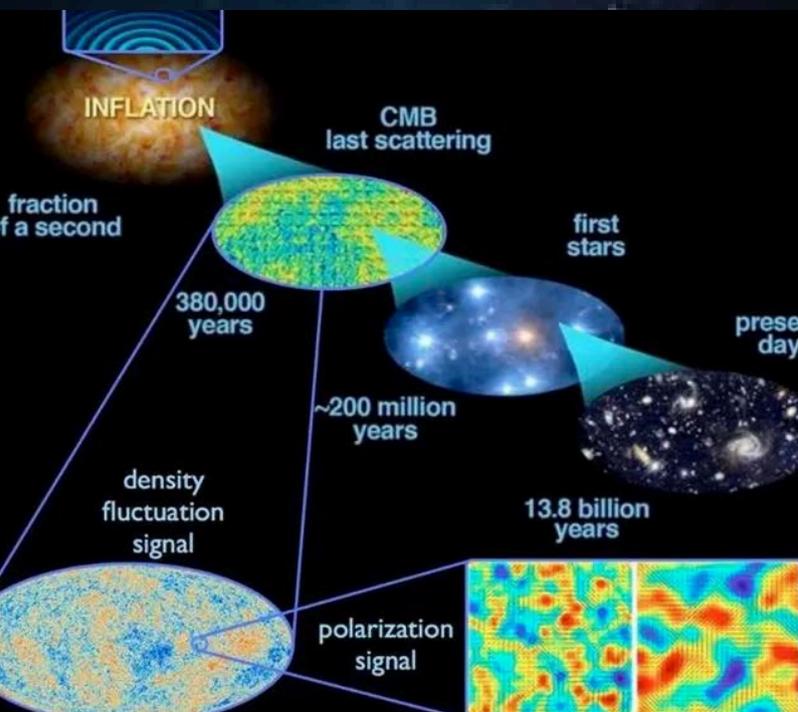


The beauty of origami in space engineering lies not just in its elegance but in its efficiency. A structure folded in a Miura pattern can expand to several times its stowed size with minimal mechanical complexity, reducing weight and potential failure points.

By merging centuries-old craftsmanship with cutting-edge engineering, origami is reshaping how we think about spacecraft design. It is a reminder that sometimes, the solutions to the most modern problems can be found in the folds of ancient ideas.

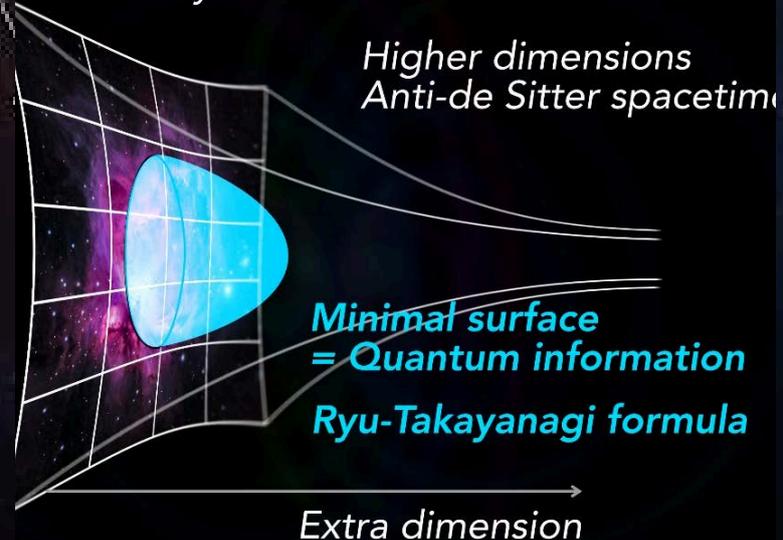
Quantum Interactions Between Universes: A Hypothetical Catalyst for the Big Bang

The Big Bang is often seen as the explosive birth of our universe from a single point. But what if it wasn't that simple? Some scientists believe our universe may have been sparked by a cosmic interaction between two other universes—like ripples colliding in a higher-dimensional space. This idea comes from theories like brane cosmology, which imagine our universe as a "brane" floating in a vast multiverse.



If two branes bumped into each other or resonated in just the right way, they could have triggered a burst of energy, creating space and time as we know it. This quantum-level event might have left behind faint clues—tiny patterns in the cosmic microwave background or strange quantum connections we don't yet understand. If true, it means our universe could be part of a much larger, interconnected reality, where other universes quietly shape our own from beyond the dimensions we can see.

Cosmology on boundary brane



Amity Aerospace Engineering Research Team Gets International Recognition



American Heart Association

Paul Dudley White International Award

"Microbubble-Induced Shock Waves in Blood: Investigating Multiphase Sanal Flow Choking During Decompression,"

reveals how tiny microbubbles, formed during rapid pressure changes, can create vapour lock effect and subsequently during it rupture shock waves strong enough to block coronary blood flow – without any clots being present leading to Cardiovascular risk. This is the first time the aerospace fluid dynamic principle of Sanal Flow Choking has been observed in biological fluids, opening a new way to explain non-thrombotic heart attacks.



Paul Dudley White International award recipients during afternoon sessions
Baltimore, MD - BCVS 2025 - Paul Dudley White International award recipients during afternoon sessions at the American Heart Association's BCVS (Basic C...

Amity Aerospace Researcher's Landmark Study Recognized in Nature (npj Microgravity)

“In vitro evidence of bubble-induced acoustic softening and Sanal flow choking in cardiovascular decompression”

Authors

Abstract



V.R.S.Kumar



Raunak Sharma



R.Pradeep Kumar



Yaman Vohra



Dhruv Panchal



Shivansh Rana



Dekkala Vinay



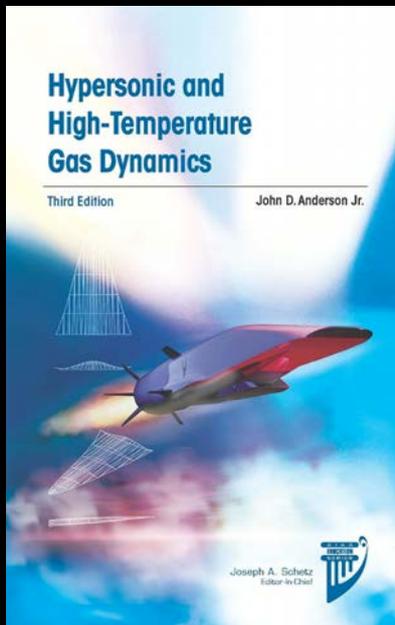
Sanjay Singh



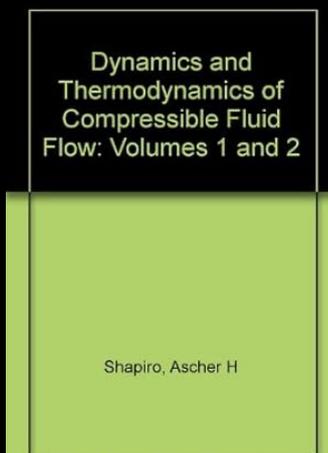
Yash Raj

When astronauts or divers experience a rapid drop in surrounding pressure, tiny gas bubbles can form in their blood—a condition that can threaten heart and vessel function. In this study, we simulated such decompression using fresh, warmed blood samples (37–40 °C) placed in a vacuum chamber. Bubbles consistently appeared near 600 mmHg. Their formation led to acoustic softening, a sharp drop in the speed of sound through blood. As flow velocity remained unchanged, the rising local Mach number brought the system closer to Sanal flow choking, triggered at a critical pressure ratio. Once choking occurs, it can lead to localized supersonic zones and abrupt pressure jumps. Additionally, bubbles may coalesce and block narrow vessels—a phenomenon akin to vapor lock—further impeding circulation. These findings reveal a novel mechanistic link between microbubble formation, acoustic softening, and flow choking, offering valuable insights for protecting cardiovascular health during spaceflight and rapid decompression events.

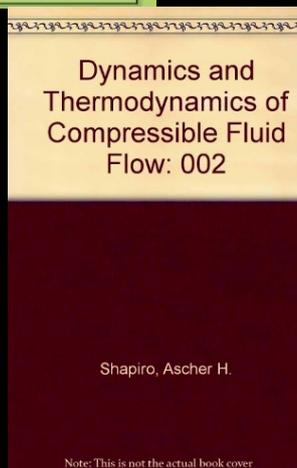




Hypersonic and High Temperature Gas Dynamics by John D. Anderson takes readers into the fascinating world of flight at extreme speeds. With clear explanations and real-world context, it unpacks shock waves, intense heating, and the unique physics that come alive in hypersonic regimes. A go-to for students, researchers, and enthusiasts alike, it's both a learning guide and a trusted companion for anyone curious about the challenges of high-speed flight.



"Dynamics and Thermodynamics of Compressible Fluid Flow" by Ascher H. Shapiro is a classic reference that blends rigorous theory with practical applications in aerodynamics and gas dynamics. Covering fundamental principles, shock waves, expansions, and high-speed flow behavior, it remains an indispensable guide for engineers, researchers, and students working in aerospace and mechanical sciences.



Note: This is not the actual book cover



Journal Research Central

We explore. We question. We reach for the stars — not because it's easy, but because wonder has no limits

We welcome fresh ideas, articles and insights to be highlighted in the next volume.

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Some limits were meant to be broken.