EDITION 6.0

IETE-SF MPSTME

RESONATE 6.0

PRESIDENT'S NOTE:

I am glad to present to you the sixth edition of Resonate. At IETE, we are committed to a better and more promising future and think that everyone should have the opportunity to possibilities.

Education and co-curricular activity are part of student life, to inculcate the responsibility of self-being and teamwork for a better future. IETE has always helped students to push their limits and be creative in their own ways to make each and every event held in our prestigious college a success.

IETE-SF's state-of-art newsletter facilitates the dissemination of knowledge on the avant-garde of the tech world. Resonate 6.0 accentuates the space technology domain alongside India's contribution to the same.

I give the entire crew high marks for their sincere contributions to creativity and innovation. I send the IETE team my best wishes for their next endeavors.

OBJECTIVES

IETE's Resonate 6.0 is a platform for all organisation members to come together and create a consistent medium to impart knowledge and understanding of various industries to the readers. One of the industries that we are particularly highlighting in this edition is the field of space technology and exploration, with a focus on the Indian Space Research Organisation (ISRO). ISRO is considered a major player on the global level in this field, having achieved significant milestones and accomplishments that have placed it among the top space-faring nations in the world.

We believe that it is important to acknowledge and spread awareness about these achievements, not only to recognise the work of the organization and its members but also to inspire and educate the general public, particularly students, about the possibilities and advancements in the field of space technology.

By highlighting the successes of ISRO, we hope to generate interest and curiosity among students and encourage them to pursue careers in this field. This newsletter is therefore a tribute to ISRO and its accomplishments, aiming to educate and inspire the masses about the capabilities and potential of the Indian space program. Apart from this, we also strive to recognize the actions of IETE members of MPSTME and give them a platform to showcase their contribution to society.

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HISTORY OF AEROSPACE AND ISRO

From the earliest types of aviation, such as kites and attempts at tower jumping, through powered, heavier-than-air jets performing supersonic and hypersonic flight, the history of aviation spans more than two thousand years. In terms of the number of people employed and the amount of output, the aerospace industry is one of the major manufacturing sectors in the world.

Oliver and Wilbur Wright received broad-claims patents for their wing-warping invention in Europe in 1904 and the US in 1906. The Wright brothers' patents were first offered for sale by the French government for one million francs, with a 25,000 franc option deposit that was eventually lost. The forfeited deposit was given to the Wright brothers by J.P. Morgan and Company in New York City in May 1906, marking the beginning of the aerospace industry's first official business transaction.

On April 4, 1984, for the first time, an Indian was present in space, miles above the earth, and describing that experience to another Indian on the Earth. This was a tremendously successful venture for India because no other Indian had ever been there before. India's national space agency is the Indian Space Research Organization, with its headquarters in Bangalore. For tasks relating to space-based applications, space exploration, and technology development, ISRO is India's principal agency.

The agency was established in 1963, and since then, its initiatives have had a significant impact on the industrial and socio-economic growth of India as well as on navigation and reconnaissance missions. It is managed by the Department of Space (DOS), which reports directly to India's Prime Minister.

THE BEGINNING

When the Indian National Committee for Space Research (INCOPAR), under the direction of Dr. Vikram Sarabhai was established by the Indian government in 1962, India was determined to enter space. INCOSPAR established the first project at Thumba, a rural area in Thiruvananthapuram. The Thumba Equatorial Rocket Launching Station (TERLS) mission was designed to study the upper atmosphere. The Tata Institute of Fundamental Research was acknowledged by Dr. Homi J. Bhabha (TIFR).

Dr. Vikram Sarabhai opened a research laboratory in Ahmedabad two years later. To supervise the funding for atomic and space research in India, the Department of Atomic Energy (DoAE) was founded in 1954. The Indian Prime Minister requested DoAE to take precedence over Space Research in 1957. INCOSPAR was created in 1962 with the aid of Dr. Bhabha. Dr, APJ Abdul Kalam was a founding member of INCOSPAR. From Thumba, a small rural area in Kerala, INCOSPAR started making preparations to launch India's first rocket. The scientists had to turn a church into their workshop and the Bishop's House into their office due to the lack of facilities and infrastructure available at the time.

Some Rocket Parts had to be transported to the launchpad by the scientists riding bicycles. India successfully deployed its first rocket on November 21, 1963. ISRO was created on India's 22nd Independence Day from INCOSPAR. ISRO joined the newly created Department of Space in 1972.

APJ ABDUL KALAM: PROJECT LEADER FOR SLV-III

The need to develop an indigenous satellite launch capability for communication, remote sensing and meteorology gave rise to the Satellite Launch Vehicle (SLV) project. SLV-III was both designed and produced in India under APJ Abdul Kalam who was the project director for the SLV-III project at ISRO.

The first experimental launch vehicle used by India, SLV3, was capable of placing payloads 40-kilogram class into Low Earth Orbit (LEO). It was a four-stage, all solid, 22 m tall, and 17-tonne vehicle. In August 1979, SLV3 made its first experimental flight, which was only partially successful.

As the project director for the project, APJ Abdul Kalam had to make some tough decisions during this time. In a video, he recounts the incident by saying “The year was 1979. I was the project director. My mission was to put the satellite in orbit. Thousands of people worked for nearly 10 years. I have reached Sriharikota and it is on the launch pad. The countdown was going on...T minus 4 minutes, T minus 3 minutes, T minus 2 minutes, T minus 1 minute, T minus 40 seconds. And the computer put it on hold... don’t launch it. I am the mission director, I have to take a decision,”

ISRO'S VISION

ISRO's vision is stated to "Harness space technology for national development while pursuing space science research and planetary exploration."

Functions of ISRO
Sounding rocket and space launch vehicle system design, development, realisation, and launch. Design, development, and deployment of communication satellites (carrying transponders) to meet the demands of telecommunications, television broadcasting, security, and societal applications on a national scale. the development of satellites or other space-based navigational systems.

Earth observation satellite development, design, and deployment for meteorological services, resource mapping, and resource monitoring. Planetary exploration and space science research need the design, development, and use of space systems. implementation of state-of-the-art space applications for aiding emergency management and other uses. developing cutting-edge launch vehicles, spacecraft, and base systems for journeys into space, maintenance and upkeep of important infrastructure assets and space equipment.

Encouraging worldwide collaboration, including respect to international charters and conventions, in the use of space for peaceful purposes. enhancing capability and creating the necessary human resources to conduct space research operations.

WORKING OF ISRO

Broadcast, communication, weather forecasts, disaster management tools, geographic information systems, cartography, navigation, telemedicine, and dedicated distance education satellites are just a few of the application-specific satellite products and tools that ISRO develops and provides to the nation.

A nationwide network of centres allows the Indian Space Research Organisation (ISRO) to function. At the Space Applications Centre in Ahmedabad, sensors and payloads are created. The U R Rao Satellite Centre in Bangalore, formerly known as the ISRO Satellite Centre, is where satellites are designed, produced, built, and tested.

The Vikram Sarabhai Space Centre in Thiruvananthapuram creates launch vehicles. On Sriharikota Island, close to Chennai, the Satish Dhawan Space Centre conducts launches. Bhopal and Hassan each have a Master Control Facility for maintaining a geostationary satellite station. At Hyderabad's National Remote Sensing Centre, there are capabilities for receiving and processing data from remote sensing. Antrix Corporation is the commercial branch of ISRO, and it is based in Bangalore.

PREVIOUS SUCCESSES

Chandrayaan-1:
It was the first Indian lunar probe launched on October 22, 2008, aboard the PSLV which successfully entered into lunar orbit on November 8, 2008. It was a big boost for ISRO as it researched and developed the technology on its own for the mission. The probe remained operational until August 2009.

The primary payloads included the Terrain Mapping Camera, Hyperspectral Imager, Lunar Laser Ranging Instrument, High Energy aj/gamma x-ray spectrometer, and Moon Impact Probe along with some instruments from other countries.

Chandrayaan-2:
A follow-up mission to Chandrayaan-1. Chandrayaan-2 was aboard the gigantic GSLV Mark III-M1, consisting of an orbiter, lander (Vikram), and rover (Pragyaan), and was launched on August 20, 2019. On September 6, 2019, the lander and rover were supposed to touch down on the near side of the Moon in the south polar area. But the lander crashed after it veered off course while attempting to land.

As the orbiter is working fine, the mission was a partial success. With an upcoming mission known as Chandrayaan-3, ISRO will try a soft landing once more in 2023. This time, the payload would only be a lander and a rover.

Mangalyaan (MOM):
India's first interplanetary mission. Launched on 5th November 2013, aboard PSLV and successfully entered Mars orbit on 24th September 2014, making India the first nation to successfully place an orbiter around Mars on its first attempt. Although the orbiter was planned to work only for 6 months, it's still operational.

ISRO was praised for the mission's cost-effectiveness. Five major payloads for the mission included the Lyman-Alpha Photometer, Methane Sensor for Mars, Mars Exospheric Neutral Composition Analyser, Thermal Infrared Imaging Spectrometer, and Mars Colour Camera.

MISSIONS - ASTROSAT

The first dedicated Indian astronomy mission, AstroSat, will simultaneously explore celestial sources in the X-ray, optical, and UV spectral bands. The payloads are limited to the optical and X-ray regimes and cover the ultraviolet (near and far) energy bands (0.3 keV to 100 keV). The ability to simultaneously observe multiple celestial objects at multiple wavelengths with a single satellite is one of the special aspects of the AstroSat project.

On September 28, 2015, PSLV-C30 launched AstroSat from Satish Dhawan Space Centre in Sriharikota into a 650 km orbit inclined at 6 degrees to the equator. AstroSat had a lift-off mass of 1515 kg! The two AstroSat solar panels were autonomously deployed in quick succession after injection into orbit. The satellite is controlled by the spacecraft control centre at the ISRO Telemetry, Tracking and Command Network (ISTRAC), Mission Operations Complex (MOX), in Bengaluru. AstroSat's five payloads collect scientific data, which is telemetered to the ground station at MOX.

The Indian Space Science Data Centre (ISSDC), headquartered in Byalalu, close to Bengaluru, then processes, archives, and disseminates the data. The AstroSat mission's scientific goals are to:

- Understand high-energy processes in binary star systems with neutron stars and black holes.
- Estimate neutron star magnetic fields.
- Study star birth regions and high energy processes in star systems outside of our galaxy.
- Detect new, momentarily bright X-ray sources in the sky;
- Conduct a limited deep-field survey of the Universe in the ultraviolet region.

All of the payloads are working and currently observing the celestial sources. The payloads and spacecraft are in good shape.

MISSONS - NISAR

An Earth observation satellite equipped with a dual-frequency synthetic aperture radar will be launched as part of the NASA-ISRO Synthetic Aperture Radar (NISAR) mission, a collaborative venture between NASA and ISRO. The satellite will employ dual frequencies for the first time in a radar imaging satellite. It will be put to use for remote sensing to study and observe Earth's natural processes. For instance, its left-facing equipment will research the cryosphere of Antarctica.

NISAR is set to be the costliest Earth-imaging satellite in the world, with a total cost estimated at US$1.5 billion. NISAR satellite will survey the elevation of the Earth's land masses and ice masses at a resolution of 5 to 10 metres 4 to 6 times each month. It is intended to monitor and measure some of the most intricate natural processes on Earth, such as ice-sheet collapse, ecological disruption, and natural disasters such as earthquakes, tsunamis, volcanoes, and landslides.

It will use a deployable mesh antenna measuring 12 metres (39 feet) and work in both the L and S microwave bands. Within one to two days following the observation, all NISAR data would be publicly accessible, and within hours in the event of an emergency like a natural disaster. Science will be able to better comprehend our planet's natural processes and changing climate thanks to the data acquired from NISAR. It will also help with resource and hazard management in the future. NASA and ISRO are working together on the endeavour.

PLANS OF ISRO

ISRO came into being with the main vision of harnessing, sustaining and augmenting space technology for national development while pursuing space science research and planetary exploration. Some of its future aims include:

- Designing and creating launch vehicles as well as related technology to d enable access to space.
- Design and development of satellites and related technologies for meteorology, space science, communication, and earth observation.
- Telecommunications, television broadcasting, and developmental applications communication programmes.
- Employing space-based imaging, a satellite-based remote sensing programme for managing natural resources and monitoring the environment.
- Space-based navigation system.
- Space-based Applications for Societal development.
- Promote and authorise private firms to play key roles in the global Space market.

FUTURE MISSONS - ADITYA L1

The first ISRO mission specifically intended to study the sun is the Aditya-L1 mission. The Aditya-L1 coronagraph spacecraft is designed to observe the sun's atmosphere, solar wind acceleration, coronal magnetometry, chromosphere, and corona.

Additionally, the spacecraft is intended to investigate the causes and trends of near-ultraviolet solar radiation as well as continuously monitor the sun's photosphere, chromosphere, corona, energetic particles, and magnetic field. The spacecraft is scheduled to launch from Sriharikota aboard the PSLV-XL in January 2023.

Aditya-1 was the initial name of the mission, which had the sole purpose of monitoring the solar corona. The project's scope was increased and it was intended to be placed in a halo orbit around Lagrangian point 1 (L1) in 2016–17. As a result, the mission was renamed Aditya–L1. The distance between Earth and Lagrangian point 1 is approximately 1.5 million kilometres.

The Aditya-1 mission, which was built as a 400 kg class satellite and was meant to launch into an 800 km low earth orbit, carried just one payload: the Visible Emission Line Coronagraph (VELC). Aditya-L1 satellite is carrying six more payloads with expanded scientific goals.

This mission is important because it will aid in the study of and monitoring of storms that are directed at the Earth.

FUTURE MISSONS - CHANDRAYAAN 3

The Indian Space Research Organisation (ISRO) has a third lunar exploration project called Chandrayaan-3 in the works.

Chandrayaan 3 is scheduled to launch in the first quarter of 2023.
The Chandrayaan-3 mission is a follow-up of Chandrayaan-2, which was launched in July 2019 and had the objective of landing a rover on the lunar South Pole.

Chandrayaan 3 lunar mission for demonstrating a soft landing was planned following Chandrayaan-2, where a last-minute error in the soft landing guidance software failed in the lander's soft landing attempt after successful orbital insertion. This unfortunate event was one of the biggest losses for the Indian space agency. According to ISRO, the Chandrayaan-3 mission will cost approximately Rs 615 crores in total.

Chandrayaan-3 will only include a lander and rover similar to that of Chandrayaan-2. There won't be an orbiter on it. Its propulsion system will function like a satellite relay for communications. Only four of the lander's engines will be able to be throttled for Chandrayaan-3. In addition, a Laser Doppler Velocimeter (LDV) will be installed on the Chandrayaan-3 Lander. Before the launch is scheduled for 2023, ISRO has planned several tests for Chandrayaan 3.

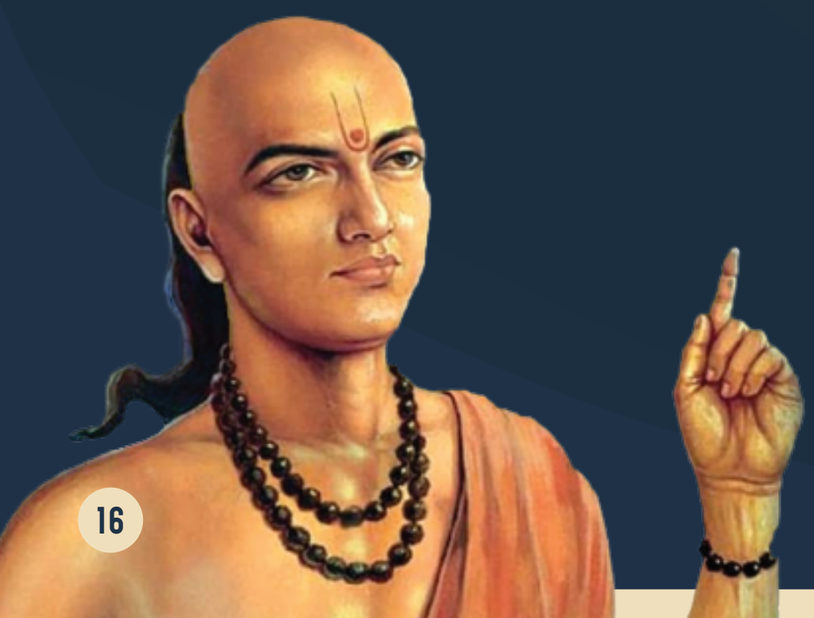
FUTURE MISSIONS - GAGANYAAN 1

India's first manned mission to outer space. This expedition will take three astronauts for about 5-7 days into the earth's low orbit around 300 - 400 km from the earth's surface.

Gaganyaan 1 will incorporate astronauts, who have been training for 15 months in Russia, and are to continue their training for Gaganyaan 1 in a facility established in Bengaluru. The primary aim of this mission is to attain self-sufficiency in access to space. In addition, the crew is planning to perform experiments which will help scientific and technological development accelerate in India.

However, as per Gaganyaan's mandate, ISRO is to carry out two unmanned missions before the manned mission to ensure the crew's safety. Furthermore, microgravity experiments to be conducted on these unmanned flights are shortlisted. These areas of research on micro-gravity include Space Medicine & Bio-Astronautics; Advanced Life Support Systems; Energy Harness and storage, Advanced Materials, Space hazards to life, etc.

To conclude, the test runs for Gaganyaan 1 will start in a couple of months, while the manned launch of Gaganyaan 1 is scheduled in 2023 and after a week-long stretch is finally set to splash down near the Indian Coast.



OTHER SATELLITE LAUNCHES

On April 12, 1975, ISRO launched Aryabhata, the first unmanned satellite. This satellite has the name of Aryabhata, a well-known astronomer, and mathematician from India. Despite being conceived and manufactured in India, it was launched from Kapustin Yar by a Soviet Kosmos-3M rocket. Experiments in X-ray astronomy, aeronomy, and solar physics were among Aryabhata's goals. The spacecraft had 26 sides, had a diameter of 1.4 metres and weighed 360 kilograms. Solar panels covering every edge of the spaceship, excluding the top and bottom, generated 46 watts of power.

At Sriharikota, the main ground station was built, and it was used to control the satellite and receive data. The scientific instruments were turned off on the fifth day after the launch due to a power outage after 4 days and 60 orbits, however up until that point, all the necessary data had already been gathered. The Aryabhata was being tracked by the ground station for almost 17 years when it re-entered Earth's atmosphere in February 1992. Aryabhata not only made it feasible to observe an X-ray source but also offered the fundamental infrastructure for creating and testing satellites, as well as training Indians in the field.

Mangalyaan, India's first interplanetary mission, had two main objectives: to study Mars' surface features, morphology, minerals, and atmosphere, and to search for signs of life. Due to a failure in 2010, PSLV was used to launch Mangalyaan on November 5, 2013, instead of the intended GSLV. Mangalyaan had to repeatedly fire its engines at exact points in Earth orbits to reach the Red Planet because PSLV could only set the spacecraft in a highly elliptical Earth orbit.

UPCOMING BIG MISSIONS IN THE FIELD:

OSIRIS-REX'S ASTEROID SAMPLE RETURN (2023)

Mission Plan-
Sep 8, 2016: Launch
Sep 22, 2017: Earth flyby
Dec 3, 2018: Asteroid Bennu tourist
Oct. 20, 2020: OSIRIS-REx favourably collects a sample from Bennu
April 7, 2021: OSIRIS-REx executes allure last flyover of Bennu
May 10, 2021: OSIRIS-REx started its allure journey back to Earth
Sep 24, 2023: Sample capsule anticipated expected brought to Earth
2029: Extended responsibility to celestial body orbiting a star Apophis starts

Mission Status-
By resolving rock fractures on a small planet that revolves around a larger one Bennu from extreme-judgement representations captured apiece OSIRIS-REx spaceship, the crew found that the Sun's heat fractures rocks on Bennu in just 10,000 to 100,000 age.

These facts will help chemists estimate in what way or manner long it takes boulders on asteroids like Bennu to decay into tinier atoms, that grant permission either dislodge into the room or persist in the celestial body orbiting a star's surface.OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer) will return a sample from Bennu to Earth on Sept. 24, 2023.

Plans of OSIRIS-REX mission- An extended mission will take the spacecraft into orbit around near-Earth asteroid Apophis in 2029 but for now, the crew is focused on the return of Osiris-rex.

ARTEMIS PLAN TO LAND FIRST WOMAN, NEXT MAN ON MOON IN 2

About The Mission:
With the effective Space Launch System (SLS) rocket and Orion spaceship approaching completely from experiment and happening, the instrumentality has the groundwork wanted to transmit persons back to the moony circuit. In preparation for the most prudent first attainable moony harbour, NASA inquires to create brimming use of early Artemis responsibilities through supplementary experiments for Orion and the Human Landing System (HLS) when likely.

The Gateway is a fault-finding component of the instrumentality's tenable moony movements. NASA will mix the first two pieces on Earth, initiating the Power and Propulsion Element (PPE) and the Habitation and Logistics Outpost (HALO) together in 2023 on a sole rocket, attended by a marketing management supply initiative. In 2024, Orion will give an alluring band to the moon circuit.

The commercially grown lander that will take the company to the moony surface will be able to hook up straightforwardly to Orion for crowd transfer for early Artemis responsibilities, but NASA is claiming adaptability for possible mooring to the Gateway. On the surface, the team will wear the new survey extravehicular flexibility part or Xemu spacesuit as they investigate the surface for about a period before answering to Orion for the trip home to Earth.

Mission Plan:
Current Mission Updates- Artemis 1 currently has a tentative go for Sept. 23 2022, but only if the rocket can meet several requirements. These include fixing a hydrogen leak, passing a fueling test and getting a safety system waiver.

NEW ENERGY RESOLUTIONS:

So far, fossil fuels have catered to our electricity wishes very efficiently, however they may be additionally non-renewable and unexpectedly depleting. These gasoline assets have additionally contributed significantly to greenhouse fuel line emissions and pollution. The time has come to locate appropriate and higher replacements for fossil fuels.

Atomic electricity, sun electricity, and electricity from wind and biofuels are only some of the promising options for a cleanser and greener future. Other fantastically new assets of electricity along with gasoline cells, geothermal electricity, and ocean electricity also are being explored.

The international community has agreed to be greener for the sake of its landscapes and the electricity we use. This consequences in vehicles walking on power or battery and homes the use of greener alternatives like sun and renewable electricity. What's even more important is that humans are aware of their carbon footprints and waste; thus, minimising it or turning the ones into renewable electricity is even extra helpful.

This opportunity electricity area is likewise boosting environment-associated and data-oriented careers. These careers pertain to the ones in Science specialisations and social technological know-how qualifications. Let's test the pinnacle jobs you may locate in New Energy:

~ Energy Specialist (Solar, Thermal, Hydro-power etc.)
~ Solar Plant Design Energy
~ Climate Strategy Specialist
~ Project Manager
~ Chemical Energy
~ Biotechnology Specialist
~ Renewable Energy Technologist

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CHANGE IS US

Change Is Us is a youth-led initiative that is focused on making a lasting commitment to creating environmental and social awareness. It promotes youth activism and sustainability, works towards keeping the environment clean and takes action to tackle climate change. Shubh Mehta and Akshat Shah are the co-founders of Change Is Us. It stands behind a transition to immediate action for climate change and sustainability, for a better future for the planet. We have a vision that unites the youth, which drives us to strive every day for the betterment of the environment.

As a team, we're exponentially growing and this is just the start; Since July 2019, we've organised weekly beach clean-ups at Girgaum Chowpatty. The change Is Us team has diverted over 225 tons of waste from the oceanfront from our 117+ weeks of clean-ups. Our cause has found support from the likes of BMC, Mumbai Police, the US Consulate, and more.

We must take action towards the deteriorating climate crisis, and collective efforts are needed to tackle the problems for the betterment of our environment. We envision making the world a better place to live in, working for a brighter future, a better society, and a cleaner planet.

OUR TEAM

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