ANTHARIKSH

The Space...

DEPARTMENT OF AEROSPACE ENGINEERING

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

MYLAVARAM, ANDHRA PRADESH,INDIA.

Vision of the Department:

To achieve academic excellence and produce highly competent professionals in the field of Aerospace Engineering

Mission of the Department:

DM1: To impart high quality education in Aerospace Technology through class room teaching and laboratory practice

DM2: To develop indigenous Aerospace Technology by carrying out research in collaboration with industry and research organizations

DM3: To train and inspire the student community to possess effective communication and leadership skills with ethical values

DM4: To harness the technological development by being consistently aware of societal needs and challenges

Program Educational Objectives (PEOs)

PEOs	Statement
PEO1	To provide students with sound mathematical, engineering and multidisciplinary knowledge to solve Aerospace and Allied Engineering problems
PEO2	To prepare students to excel in higher education programs and to succeed in industry/academia profession.
PEO3	To inculcate ethical attitude, leadership qualities, problem solving abilities and life-long learning for a successful professional career

PROGRAM OUTCOMES (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct Investigation of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including predictions and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design

PSO2: To prepare the students to work effectively in Aerospace and Allied Engineering organizations

FOCUS AND SCOPE

Our departmental magazine bridges the gap between the students and the faculty. Typically, it consists of technical articles, ideas, project outcomes, language skills, literary articles, technical updates, success stories, career tips, academic advice and the latest events and happenings in the institution. Cover-stories are published in an engaging format. We also include interviews former students who have achieved success through dedication and hard work.

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send your articles to the following mail ID.

E-Mail: anthariksh.lbrce@gmail.com

FROM HOD's DESK

According to Psychologists, there are four types of Intelligence:

1) Intelligence Quotient (IQ)

2) Emotional Quotient (EQ)

3) Social Quotient (SQ)

4) Adversity Quotient (AQ)

- **Intelligence Quotient (IQ): This is the measure of your level of comprehension. You need IQ to solve maths, memorize things, and recall lessons.**
- **Emotional Quotient (EQ): This is the measure of your ability to maintain peace with others, keep to time, be responsible, be honest, respect boundaries, be humble, genuine and considerate.**
- **Social Quotient (SQ): This is the measure of your ability to build a network of friends and maintain it over a long period of time.**

People that have higher EQ and SQ tend to go further in life than those with a high IQ but low EQ and SQ. Most schools capitalize on improving IQ levels while EQ and SQ are played down. A man of high IQ can end up being employed by a man of high EQ and SQ even though he has an average IQ. Your EQ represents your Character, while your SQ represents your Charisma. Give into habits that will improve these three Qs, especially your EQ and SQ.

- **Now there is a 4th one, a new paradigm**

The Adversity Quotient (AQ): The measure of your ability to go through a rough patch in life, and come out of it without losing your mind.

Dr. P. Lovaraju

Introduction to Concept of Space, Time and Gravity

PITTA GREESHMA
20761A5643

Abstract: In this universe time will never passes equal for everyone, to understand this phenomenon, just observe the time passing between a person who is on the first floor of a building and the person who is on the 30th floor. The time passing between a person who is at home and the person who is travelling on a train with certain velocity. The changes in time for these are minute seconds. If a person is travelling at light speed, then the time stops for him. In this paper an attempt is made to understand the phenomenon of the passing time in various conditions, by understanding the concepts of space, time and gravity.

Introduction: Space time is a mathematical model that joins space and time into a single idea called the **continuum**. This four-dimensional continuum is known as Minkowski-space. Combining these two ideas helped cosmology to understand how the universe works on the big level e.g. galaxies and small level e.g. atoms. This space-time is 4D. In detail we assume this universe is empty and all the galaxies and stars are present in this empty space but that's not true. For better understanding of this statement, basing on the certain space and time we can tell that an incident is occurred, that is to tell about an incident we need both space and time we cannot separate the both.

According to Albert Einstein this universe is fully covered with a fabric called **space-time fabric.** Now let us see some common questions which are on everyone's mind upon space-time.

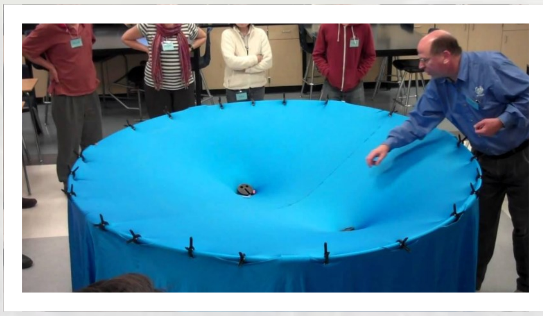
Origin of space-time: Until the 20th century, it was assumed that the three-dimensional geometry of the universe its spatial expression in terms of coordinates, distances, and directions was independent of one-dimensional time. The physicist Albert Einstein helped develop the idea of spacetime as part of his theory of relativity. The space and time both started from the big bang.

Causes of space-time: The emergence of spacetime and gravity is a mysterious phenomenon of quantum many-body physics that we would like to understand. Vigorous effort by several top-flight physicists has produced theoretical evidence that networks of entangled quantum states weave the spacetime fabric. In any case, investigations along these lines have revealed a surprising possibility: Spacetime itself may be generated by quantum physics, specifically by the baffling phenomenon known as quantum entanglement.

Effects on space-time: Large objects such as the Sun and planets aren't the only masses that warp the fabric of space-time. Anything with mass—including your body—bends this four-dimensional cosmic grid. The warp, in turn, creates the effect of gravity, redirecting the path of objects that travel into it. The strength of gravity depends on the size of the space-time warp. A large object with little mass creates a smaller distortion than a tiny object with a huge mass.

Time existence without space: When we speak of time, we need to think of space as well – they come in a package together, he says. We cannot disconnect the two, and the way that an object moves through space determines how it experiences time. In short, the time you experience depends on your velocity through space as the observer, as outlined through Einstein's special relativity, a theory on how speed impacts mass, time and space.

Space-time-gravity: Space-time fabric is 4D a standard way to illustrate this idea is to place a bowling ball representing a massive object such as the sun onto a stretched rubber sheet representing spacetime. If a marble is placed onto the rubber sheet, it will roll toward the bowling ball, and may even be put into orbit around the bowling ball as sown in the Figure.



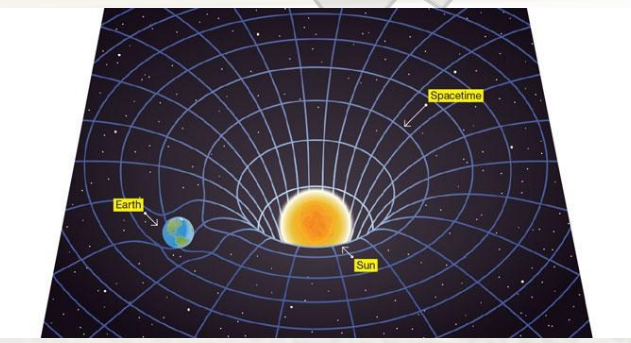
This occurs, not because the smaller mass is attracted by a force emanating from the larger one, but because it is traveling along a surface which has been deformed by the presence of the larger mass, we call this phenomenon as **Gravity**. In the same way gravitation in Einstein's theory arises not as a force but propagating through spacetime, but the feature of spacetime itself. According to Einstein, your weight on earth is due to the fact that your body is traveling through warped spacetime!

Gravity is the Curvature of Space-time:

From the above statement, it is here that Einstein connected the dots to suggest that gravity is the warping of space and time. Gravity is the curvature of the universe, caused by massive bodies, which determines the path that objects travel. That curvature is dynamical, moving as those objects move. Gravity feels strongest where spacetime is most curved, and it vanishes where spacetime is flat. This is the core of Einstein's theory of general relativity, which is often summed up in words as follows: **matter tells spacetime how to curve, and curved spacetime tells matter how to move.**

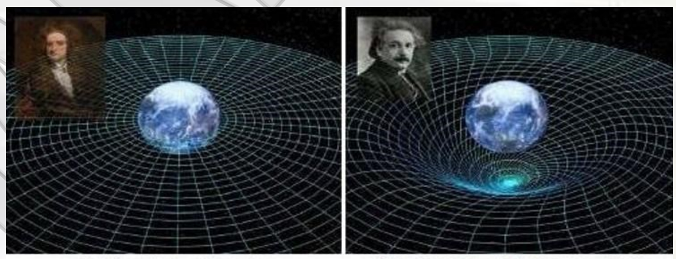
A weak gravitational field indicates nearly flat space-time, and their Newton's theories seem to apply. According to Newton, absolute time exists independently of any perceiver and progresses at a consistent pace throughout the universe. Unlike relative time, Newton believed absolute time was imperceptible and could only be understood mathematically. But according to Einstein, a strong gravitational field throws classical predictions off. Einstein postulated three ways this theory could be proved. One was by observing the stars during a total solar eclipse.

The sun is our closest strong gravitational field. Light traveling from a star through space and passing the sun's field would be bent if Einstein's



theory were true. If you could see the star during the day, he predicted, it would be in a different place than at night. The only chance to see it during the day would be during an eclipse. On March 29, 1919, that opportunity came. British Astronomer Sir Arthur Eddington travelled to Príncipe Island off the western coast of Africa. His team photographed star fields during the eclipse and compared the photos with those of the same starfield taken when the sun was not present. Eddington found the apparent location of the stars had shifted, just as Einstein predicted. Further proofs of Einstein's theory came with advancing technology through the 1960s and continue in the present. But the immediate impact in 1919 was enormous. The theory of relativity tells us that the faster you travel through space, the slower you travel through time.

Impact of velocity on space-time: The effect of velocity on space time is called Time Dilation. Light is fast. In fact, it is the fastest thing that exists, and a law of the universe is that nothing can move faster than light. Light travels at 186,000 miles per second 300,000 kilo meters per second and can go from the Earth to the Moon in just over a second. One of the coolest things that happens as an object approaches light speed is that time begins to slow down compared to time on Earth, and in fact gets slower and slower the closer it gets to achieving light speed.



Newton's fixed space | Einstein's flexible space-time

This effect is called time dilation. Which basically means that the intervals of time begin to stretch out the faster you're able to go. If you had a clock in your hand and another clock was able to zoom past you at near the speed of light, the clock sliding by you would appear to be ticking more slowly than the clock in your hand. At very high velocity, time is dilated with respect to an observer. The speed of the light remains constant but since the distance that the light must travel increases, the time that it takes for it to travel from say A to point B is appeared if it was stationary relative to the observer. This case is sometimes called special relativistic time dilation. The faster the relative velocity, the greater the time dilation between one another, with time slowing to a stop as one approaches the speed of light 299,792,458 m/s. And this is how, if you were an astronaut who was able to board a ship that could travel at the speed of light, you could spend 20 years exploring the universe and get back home to Earth to find that over 300 years had passed.

Conclusion: From the above studies, it can be concluded that, Space, time and gravity are interrelated and motion is dependent on each other's axis. Any object or celestial bodies in this universe will be identified based the reference systems of space, time and gravity. The gravity and time have a interdependent relationship so that can be influenced each other and the objects under these axis systems. The influence of the Gravity can be represented as the Curvature of Space-time. This study will help the readers who are in the basic level of Aerospace, Astrodynamics, Astrophysics and the studies in celestial bodies.

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https://en.wikipedia.org/wiki/Spacetime./https://www.amnh.org/exhibitions/einstein/gravity/you-bend-space-time/https://www.sciencephoto.com/media/762787/view/earth-and-moon-and-space-time-artwork/https://knowablemagazine.org/article/physical-world/2019/quantum-origin-spacetime/https://blackholecam.org/black-holes-distort-space-time/.

The First Indian Women Astronaut

K. ESWARI
22761A5616

A Active and Energetic girl born on 17 March 1962 in Karnal, INDIA, She born in a normal middle class family which is depended in a Tyers Manufacturing shop, This shop is running by “Mr. BANARASI LAL CHAWLA”And he is the Father of that Super women, She is a youngest of 4 children’sFrom her childhood she is very curious to fly in the sky. She was the first Indian - American astronaut and first Indian woman in space. She first flew on Space Shuttle Columbia in 1997 as a mission specialist and primary robotic arm operator. In 2003, Kalpana Chawla was one of the seven crew members killed in the Space Shuttle Columbia disaster.

Kalpana, who was lovingly called Mantu by her parents, had shown extraordinary interest in flying. She was three or four years old when she first saw an airplane on their rooftop flying above their house.Since then, her fascination with airplanes and flying became eminent. As a child, she always went with her father to a local flying club and watch planes. While in school, her teacher said that Kalpana spends her free time making paper airplanes and flying them.

Legacy: The life and career of Kalpana Chawla served as an inspiration to women who dream of being in space someday. Kalpana’s legacy continues even after her death. According to Kalpana’s father, Banaras Lal Chawla, his daughter’s only dream is for children, especially women, to not be deprived of education. While she was earning well at NASA, she never cared for material things; instead, she would spend her money helping underprivileged kids by sending them to school.The following are some of the things that will serve as a shining remembrance that a woman astronaut from India carved her name in the history of NASA once upon a time.

* The government of Karnataka in India instituted the Kalpana Chawla award to recognize young women scientists.
* The International Space University’s Alumni founded the Kalpana Chawla ISU scholarship fund to support Indian women who wish to join the international space education program.
* The Indian Students Association (ISA) of the University of Texas at El Paso (UTEL) launched the Kalpana Chawla Memorial Scholarship program for deserving graduate students in honour of Kalpana.
* The University of Chicago recently renamed its Alumni Award to The Kalpana Chawla Outstanding Recent Alumni Award.
* A planetarium in Jyotisar, Kurukshetra Haryana, was named after Kalpana Chawla.
* Kalpana’s death was not in vain because several doors of opportunities have been opened for others aspiring to follow in her footsteps. She will be remembered as the first Indian woman who did not let her racial origin hinder her from setting foot in space.

Education: Kalpana Chawla completed her earlier schooling at Tagore Baal Niketan Sr. Sec. School, Karnal. She completed Bachelor of Engineering degree in Aeronautical Engineering at Punjab Engineering College at Chandigarh in 1982. She moved to the United States in 1982 and obtained a M.S. degree in aerospace engineering from the University of Texas at Arlington in 1984. Kalpana Chawla went on to earn a second M.S. degree in 1986 and a PhD in aerospace engineering in 1988 from the University of Colorado at Boulder. Later that year she began working at the NASA Ames Research Center as vice president of Overset Methods, Inc. where she did CFD research on Vertical/Short Takeoff and Landing concepts. Kalpana Chawla held a Certificated Flight Instructor rating for airplanes, gliders and Commercial Pilot licenses for single and multi-engine airplanes, seaplanes, and gliders.

Career in NASA: Kalpana Chawla joined the NASA Astronaut Corps in March 1995 and was selected for her first flight in 1996. She spoke the following words while traveling in the weightlessness of space, “You are just your intelligence". She had traveled 10.67 million km, as many as 252 times around the Earth.

Her first space mission began on November 19, 1997 as part of the six-astronaut crew that flew the Space Shuttle Columbia flight STS-87. Kalpana Chawla was the first Indian-born woman and the second Indian person to fly in space, following cosmonaut Rakesh Sharma who flew in 1984 in a spacecraft. On her first mission, Chawla traveled over 10.4 million miles in 252 orbits of the earth, logging more than 372 hours in space. During STS-87, she was responsible for deploying the Spartan Satellite which malfunctioned, necessitating a spacewalk by Winston Scott and Takao Doi to capture the satellite. A five-month NASA investigation fully exonerated Kalpana Chawla by identifying errors in software interfaces and the defined procedures of flight crew and ground control.

After the completion of STS-87 post-flight activities, Chawla was assigned to technical positions in the astronaut office to work on the space station, her performance in which was recognized with a special award from her peers.

In 2000 she was selected for her second flight as part of the crew of STS-107. This mission was repeatedly delayed due to scheduling conflicts and technical problems such as the July 2002 discovery of cracks in the shuttle engine flow liners. On January 16, 2003, Chawla finally returned to space aboard Columbia on the ill-fated STS-107 mission. Chawla's responsibilities included the microgravity experiments, for which the crew conducted nearly 80 experiments studying earth and space science, advanced technology development, and astronaut health and safety.

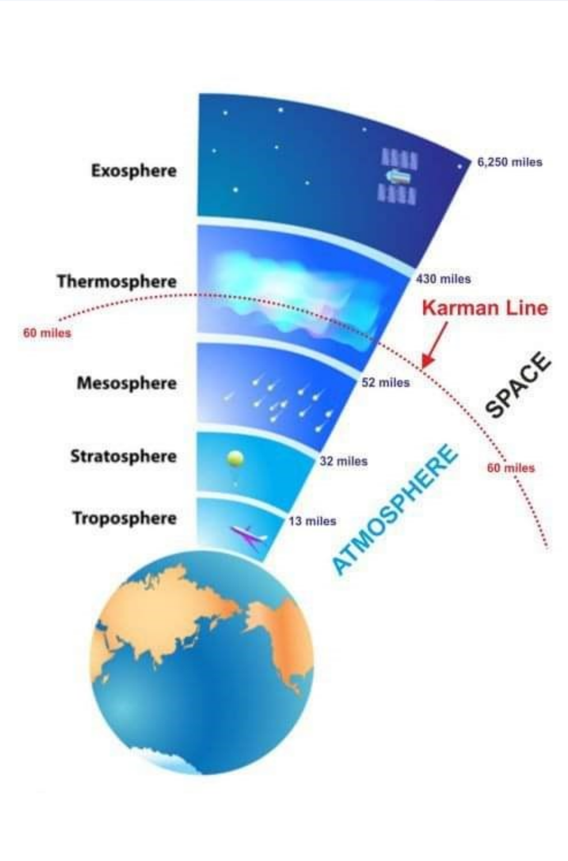
Extraordinary Journey: Chawla broke the glass ceiling with her unconventional choices from a very young age. She enrolled at Punjab Engineering College to pursue Aeronautical Engineering; a rare career path women undertook in the 1980s. According to The Quint, no girls' hostel in the wing housed young women studying the course. Nonetheless, Kalpana Chawla soldiered on and got her bachelor’s degree in 1982. In the same year, she got admission into the University of Texas, where she obtained Master of Science (MS) in Aerospace Engineering two years later, in 1984. The next few years, 1986 and 1988, proved to be monumental as Chawla went on to study the subject further and received a PhD in the same from the University of Colorado.

Awards

* Congressional Space Medal of Honor
* NASA Space Flight Medal
* NASA Distinguished Service Medal

Death: February 1, 2003, was a day the entire world was waiting for with bated breath. With everyone's eyes peeled to their television screens, everyone was excited to welcome the astronauts back to Earth. For India, it was a proud moment that they wanted to relive. Unfortunately, fate had other plans for the space shuttle. On entering the Earth's atmosphere, hot air entered into the shuttle's wing that caused all the damage, resulting in its eventual disintegration just 16 minutes before landing. The crew's untimely demise broke numerous hearts across the world. The country mourned Chawla's death as many looked up to her with hopes and dreams in their eyes. Nonetheless, she continues to live in India's hearts. Her alma mater, Punjab Engineering College, named the girls' hostel after her. Chawla was posthumously awarded the Congressional Space Medal of Honor and NASA Space Flight Medal for her contribution in this field. Kalpana Chawla's journey continues to prove that ambition knows no boundaries. Anyone can dream big and is capable enough to work hard to achieve what they want in life

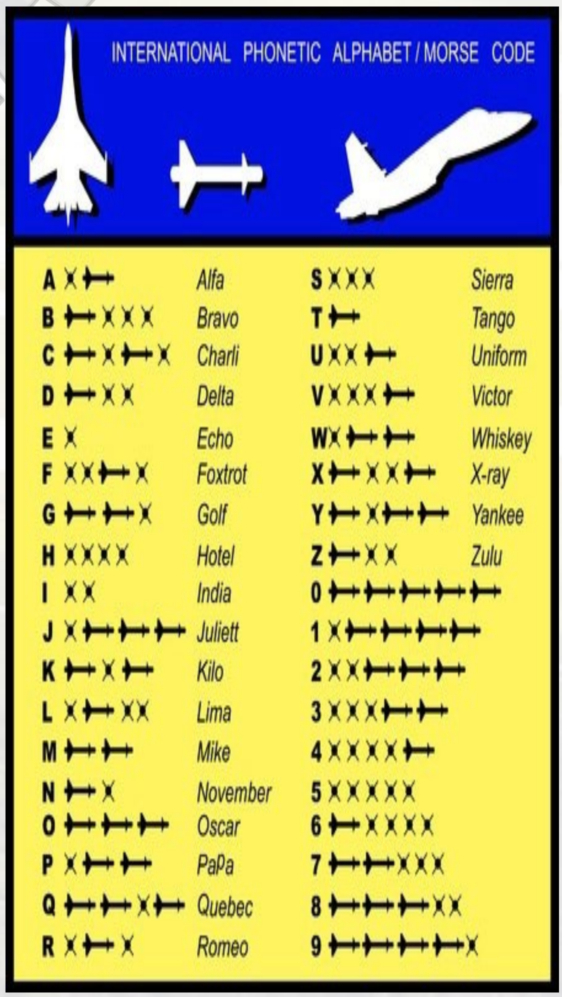
In short, we lost Kalpana Chawla in the Space Shuttle Columbia disaster which occurred on February 1, 2003, when the Space Shuttle disintegrated over Texas during re-entry into the Earth's atmosphere, with the loss of all seven crew members, shortly before it was scheduled to conclude its 28th mission, STS-107.

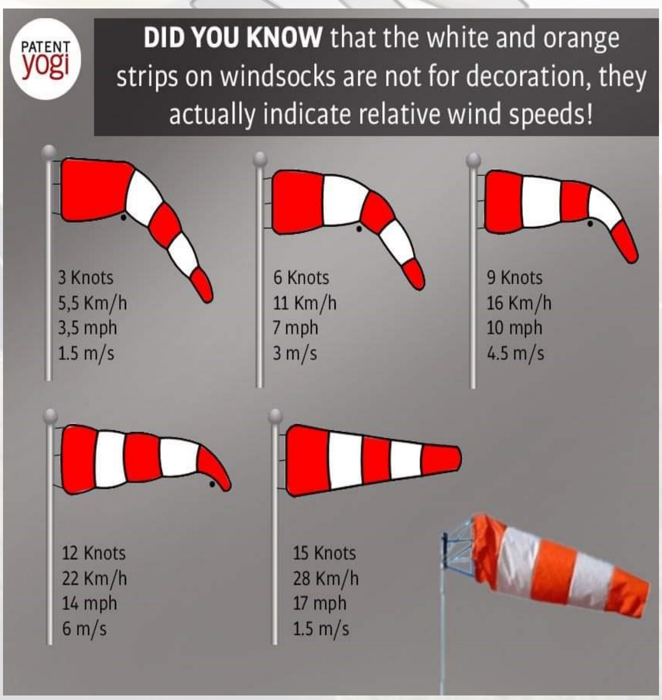


POINTS TO REMEMBER !!!!

The Aviation Alphabet and Numbers

To help avoid confusion with similar sounding consonants and numbers, in March 1956 the International Civil Aviation Organization (ICAO) adopted a standard phonetic alphabet for aviation use :





A Review on Benefits of Space Exploration

J. HITESH SRINIVASA MANIKANTA

22761A5613

Abstract: More than fifty years of human activity in space have produced societal benefits that improve the quality of life on Earth. The first satellites, designed to study the space environment and test initial capabilities in Earth orbit, contributed critical knowledge and capabilities for developing satellite telecommunications, global positioning, and advances in weather forecasting. Space exploration initiated the economic development of space that today, year after year, delivers high returns for invested funds in space1. The challenges of space exploration have sparked new scientific and technological knowledge of inherent value to humankind, leading to a better understanding of our Universe and the solar system in which we live. Knowledge, coupled with ingenuity, provides people around the globe with solutions as well as useful products and services. Knowledge acquired from space exploration has also introduced new perspectives on our individual and collective place in the Universe.

Future space exploration goals call for sending humans and robots beyond Low Earth Orbit and establishing sustained access to destinations such as the Moon, asteroids, and Mars. Space agencies participating in the International Space Exploration Coordination Group (ISECG)2 are discussing an international approach for achieving these goals, documented in ISECG's Global Exploration Roadmap3. That approach begins with the International Space Station (ISS) and leads to human missions to the surface of Mars.

1. Introduction:

For more than fifty years, humans have explored space, and this has produced a continuous flow of societal benefits. By its very nature, space exploration expands the envelope of human knowledge and presence throughout the solar system, and this process has been accelerated by a combination of human and robotic activities. Experience has demonstrated that, as long as humankind addresses the challenges of exploring mankind's common frontier of space, many tangible societal benefits are produced, and in addition to those most commonly anticipated, a great variety of valuable innovations are generated serendipitously, for this is the nature of discovery.

From the early days of space flight, it became apparent that space exploration was an efficient driver for basic science and technology. The new challenges called for new approaches. The cost of launches drove designers to make spacecraft computers lighter, smaller, and with the highest performance and dependability. Solar cells, batteries, and fuel cells were driven by space needs and benefited many sectors on Earth. The first satellites, designed to study the space environment and test initial capabilities in Earth orbit, contributed critical knowledge for developing space telecommunications, global positioning, and advances in weather forecasting.

The early missions also formed the technological basis for advanced space exploration, enabling the first robotic and human missions to the Moon, as well as highly capable planetary spacecraft and crewed space stations in orbit. Over time, governments around the world increasingly cooperated to conduct complex space missions, demonstrating the power of international partnerships to amplify accomplishments in space.

The success has been impressive and space systems continue to drive innovation, support world-class science, provide vital services, and are part of the daily life of the common citizen. Service-driven space systems are an overwhelming part of space activity today. Furthermore, the legacy of these historical efforts to develop sophisticated and useful capabilities and partnerships is evident in today's exploration programs such as the International Space Station (ISS), which continues to contribute significant benefits to humanity. The ISS supports investigations in life and physical sciences, as well as advancing research and technology to solve problems associated with long-duration human space flight that has many applications on the ground.

2. Fundamental benefits of Space exploration:

The benefits from space exploration are rooted in the generation of new knowledge, which is the first reward, and which has inherent value to humankind. Technological knowledge, generated when high-performance space systems are developed to address the extreme challenges of space missions, yields many innovations that benefit the public. Scientific knowledge acquired from space expands humankind's understanding of nature and frequently unlocks creative and useful Earth-based applications for society. In the longer term, the knowledge accumulated over many missions and the expansion of human presence into the Solar System help people gain perspective on the fragility and rarity of life in the Universe and on humankind's accomplishments, potential, and destiny. Space exploration stimulates the creation of both tangible and intangible benefits for humanity. Tangible impacts include all the innovation-related applications and benefits resulting from investments in these programs, such as new devices and services that spin off into the marketplace. Space exploration also results in various intangible impacts due to the social and philosophical dimensions that address the nature and meaning of human life. Intangible benefits include the enriching of culture, the inspiration of citizens, and the building of mutual understanding as a result of international cooperation among space-faring nations.

The fundamental benefits generated by space exploration are grouped in this document as follows:

(1) Innovation

(2) Culture and inspiration

(3) New means to address global challenges.

The delivery of these benefits to society provides the main rationale for investment in space exploration.

Innovation: The challenge of space exploration drives a continuing effort to design ever more capable, reliable, and efficient systems requiring the utmost ingenuity. Space exploration missions use the unique capabilities of humans (e.g., on the spot decision-making, cognitive adaptability, versatility) and robots (e.g., precision, sensory accuracy, reliability, and expendability) to achieve ambitious exploration goals. Maximizing the productivity of these missions by demanding an effective partnership between humans and machines drives progress in human health care, robotics, automation, and other domains. Space exploration thus supports innovation and economic prosperity by stimulating advances in science and technology, as well as motivating the global scientific and technological workforce, thus enlarging the sphere of human economic activity.

Culture and inspiration: Space exploration missions offer a unique perspective on humanity's place in the Universe, satisfying our curiosity and inspiring wonder. They provide the best opportunities for addressing questions such as "What is the nature of the Universe", "Is the destiny of humankind bound to Earth?", "Are we and our planet unique?", and "Is there life elsewhere in the Universe?".

The first five decades of human activity in space had a profound impact on the social development of humankind. Yuri Gagarin's first moments in space and Neil Armstrong's first step on the Moon truly were "giant leaps for mankind" because they expanded our views about the limits of human travel and planted seeds for new thinking about where beyond Earth human existence might be possible. Stephen Hawking has argued that "to confine our attention to terrestrial matters would be to limit the human spirit and analyzing whether sustained human activity beyond Earth orbit is actually feasible will have a profound influence on cultural and intellectual life around the world and on humanity's views and expectations of itself.

New means to address global challenge: The next ten years will be essential for building international partnerships for exploration. This will offer opportunities to developed and emerging space nations to contribute according to their needs and capabilities. The ability to operate and work with humans in the lunar vicinity will provide new means for protecting the planet and servicing space-based assets. NASA has begun planning for a robotic mission to redirect a small asteroid into lunar orbit to allow a human to visit it. Space exploration missions such as this will contribute to already ongoing efforts to understand the threat to Earth posed by asteroids, currently mostly implemented through ground and space- based telescopes, and to devise means for protecting the planet. Furthermore, stronger cooperation in space exploration will create opportunities for enhanced international coordination and cooperation on topics such as space debris management and space weather monitoring Cooperation between diverse nations on challenging space projects will showcase the ability to jointly advance common goals and help to improve diplomatic ties and understanding between nations.

3. Conclusion: Space exploration has produced an impressive record of benefits for humanity. This paper has distilled a body of evidence of such benefits into a few key observations about the capacity of future space exploration to contribute to innovation, culture and inspiration, and new means to address global challenges. Space exploration has driven scientific and technological innovation that benefits people around the globe every day. Sending humans and machines into space presents challenges that are overcome only by the utmost ingenuity; this leads to new knowledge and technical innovations that are used on Earth in ways that can be dramatic and unpredictable.

Space exploration serves a cultural and inspirational purpose by fulfilling a deep need to understand the world, address questions about the origins of life and the nature of the Universe, and to expand the notion of what it means to be human. Because space exploration stimulates significant global investment and international partnerships, and because of its extremely challenging nature, demands the development of cutting-edge technical capabilities, it provides unique opportunities to address some of the global challenges facing society today. When nations work together on challenging space missions, this promotes international cooperation beyond the realm of space. It aligns interests and forges relationships that further peace and stability on Earth. There is no activity on Earth that matches the unique challenges of space exploration. The first fifty years of space activity have generated benefits for people around the globe. This past record gives strong reason for confidence that renewed investments in space exploration will have similarly positive impacts for future generations.

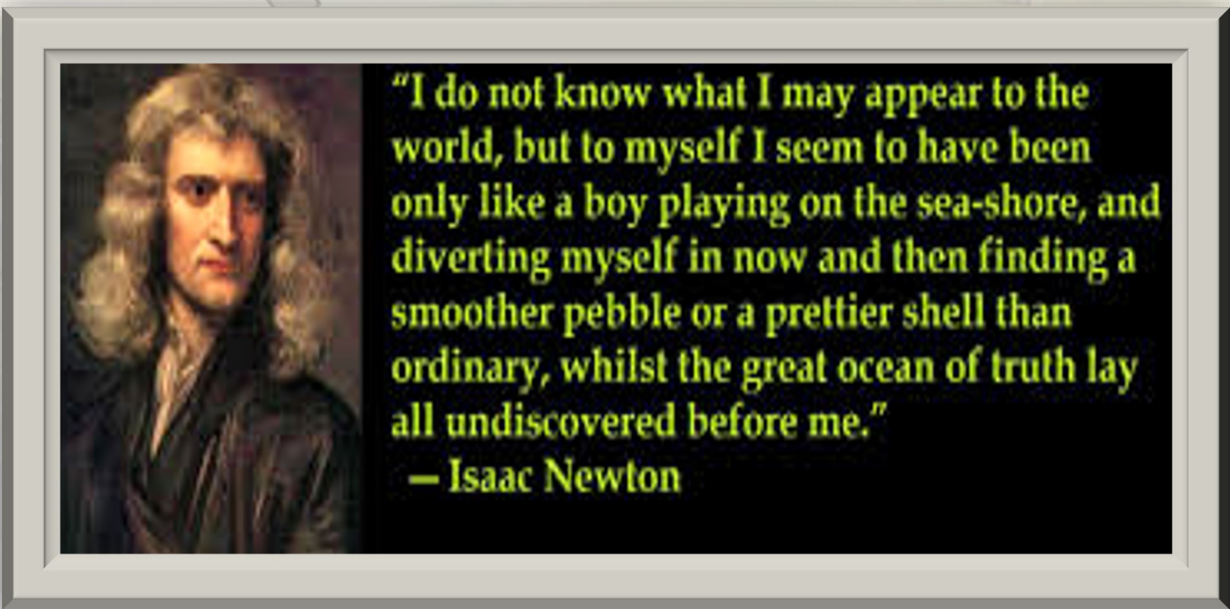
4. References:

1. All the credits go to the mentioned books, articles and websites below which helped to gather this information.
2. www.nasa.gov.in

Did you know ?

The sunset on Mars appears in Blue ....

Don't be afraid of change, because it is leading you to a new beginning.
- Joyce Meyer



Water Conservation

Are We Even Doing Anything?

P. VIJAYA
22761A5631

Abstract: We know how water, an essential resource on which the entire human race depends, is becoming scarce. There are lakhs of people in India who are already facing the brunt of irregular water supply or are living without clean drinking water. As a result, citizens are getting affected by waterborne diseases. Even though we have been taught about water conservation since the early years of our lives, the contribution from everyone is not as significant as it should be. In this paper an attempt is made to study the future problems in water supplies and ty to address the problems based on human's future needs

1. Introduction: Around 71% of the earth's surface is covered by water out of which,97% is the saline water of oceans and seas which is unfit for drinking. The remaining 3% of drinkable water comes from streams, ponds, lakes, and rivers. Rapid urbanization, irregular monsoons, expeditious use of ground water, and unchecked sewage has pushed the country into adore straight and has made it quite hard towards a water crisis and the day is not far enough for another country or a major city to become the next cape town.

Despite water being an existential need for humans, it's also one of the most underprioritized but over abused commodities. Water is central to our lives but has not been the focal point of focus in our planning while we rapidly evolve into an urban society.

Through time, early civilizations understood the importance and need for water and planned their lives around it. Civilizations were born and lost on account of water. Today, we have the advantage of this knowledge, but we still fail to value it and plan our societies around it.

Let's focus on India. The world's oldest civilization grew around the Indus and the Ganges and is still thriving. But not for long. post-independence, due importance was given to harnessing the power of water by way of controlling and storing water through large Dams. That was the need of the hour. However, our cities and towns have subsequently grown without planning for water need vs water availability. In 1951, the per capita water availability was about 5177 m^3. This has now been reduced to about 1486 m^3 in 2021.

2. Reasons behind water scarcity in India

Water scarcity is mostly man-made due to excess population growth and mismanagement of water resources. Some of the major reasons for water scarcity are:

- Inefficient use of water for agriculture. India is among the top growers of agricultural produce in the world and therefore the consumption of water for irrigation is among the highest. Traditional techniques of irrigation cause maximum water loss due to evaporation, drainage, percolation, water conveyance, and excess use of groundwater. As more areas come under traditional irrigation techniques, the stress on water available for other purposes will continue. The solution lies in the extensive use of micro-irrigation techniques such as drip and sprinkler irrigation.

- Reduction in traditional water recharging areas. Rapid construction is ignoring traditional water bodies that have also acted as groundwater recharging mechanisms. We need to urgently revive traditional aquifers while implementing new ones.

- Sewage and wastewater drainage into traditional water bodies. Government intervention at the source is urgently required if this problem is to be tackled.

- Release of chemicals and effluents into rivers, streams, and ponds. Strict monitoring and implementation of laws by the government, NGOs, and social activists are required.
- Lack of on-time de-silting operations in large water bodies that can enhance water storage capacity during monsoon. It is surprising that the governments at state levels have not taken this up on priority as an annual practice. This act alone can significantly add to the water storage levels.

- Lack of efficient water management and distribution of water between urban consumers, the agriculture sector, and industry. The government needs to enhance its investment in technology and include all stakeholders at the planning level to ensure the optimization of existing resources.

3. Urban nightmare

- The problem has been compounded with

increased concretization due to urban development that has led to the depletion of groundwater resources. Water is neither being recharged nor stored in ways that optimize its use while retaining the natural ingredients of water. In addition, the entry of sewage and industrial waste into water bodies is severely shrinking the availability of potable water. Marine life is mostly lost in these areas already. This is the genesis of a very serious emerging crisis. If we do not understand the source of the problem, we will never be able to find sustainable solutions.

- As an example, take Hyderabad. This city of Nizams had several water aquifers and water bodies through time. Osman Sagar and Himayat Sagar lakes were built and have been providing drinking water to the city for well over a hundred years. Excess migration of population to the city coupled with unplanned construction in all directions resulted in traditional aquifers, which existed in and around the city, being blocked.
- There are over 4800 bore wells operated by the state-owned HMWS&SB that have been drawing groundwater. The levels have now fallen significantly. If the groundwater cannot recharge, the supply will get only get worse. The demand for water continues to grow while the collection, storage, regeneration, and distribution have become overstressed. The story repeats itself across urban centers in India.

4. Solutions to overcome water scarcity problems.

- A simple addition of a 'water free' male urinal in our homes can save well over 25,000 liters of water, per home per year. The traditional flush dispenses around six liters of water per flush. If all male members including boys of the house use the 'water free urinal' instead of pulling the traditional flush, the collective impact on the demand for water will reduce significantly. This must be made mandatory by law and followed up by education and awareness both at home and school.

- The amount of water that is wasted during dish washing at home is significant. We need to change our dish washing methods and minimize the habit of keeping the water running. A small step here can make a significant saving in water consumption.

- Every independent home/flat and group housing colony must have rainwater harvesting facility. If efficiently designed and properly managed, this alone can reduce the water demand significantly.

- Wastewater treatment and recycling for non-drinking purposes. Several low-cost technologies are available that can be implemented in group housing areas.

- Very often, we see water leaking in our homes, in public areas and colonies. A small steady water leak can cause a loss of 226,800 liters of water per year! Unless we are aware and conscious of water wastage, we will not be able to avail the basic quantity of water that we need to carry on with our normal lives.

5. Situations tackling by the Government.

- The Government has launched many initiatives like Jal Shakti Abhiyan (JSA), Catch the Rain Campaign, National Perspective Plan for Water Resources, and Jal Jeevan Mission (JJM)-Har Ghar Jal.

- Under the JSA, it was the government's goal to improve water availability and even improve the groundwater conditions in the 256 marked water-stressed districts in India. States like Punjab and Haryana have been facing extreme stress on their groundwater level, the water has receded 9.2 meters which is the highest among all the states in the country.

- In 2021, the catch the rain campaign was introduced by Prime Minister Narendra Modi which aims to conserve Rainwater in all the districts of the country.

- The current regime has also been implementing schemes like Jal Jeevan Mission in which the Central government along with the State government wants to provide potable and adequate water to every rural household including the tribal areas in the country with a tap connection by 2024.

6. Conclusion

As a citizen, it's our fundamental responsibility to supplement the efforts of the governments and organizations with our actions. Using a limited amount of water while washing clothes and utensils, brushing teeth, bathing and farming is the steam in this. Schools and offices should start planting as many trees as possible ad possible NGOs must come up with plausible solutions and spread awareness amongst about the importance and the techniques to conserve water. To every problem, there is a solution and here, it is "we". To bring out the change, our actions need to be changed.

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Being an Engineer protecting the Earth is our responsibility

The Voice of 'SPACE'

An Anthariksh special… -

The Editorial Board, Anthariksh.

VOLUME-1

SEEDS OF SPACE EXPLORATION

An introductory thought…

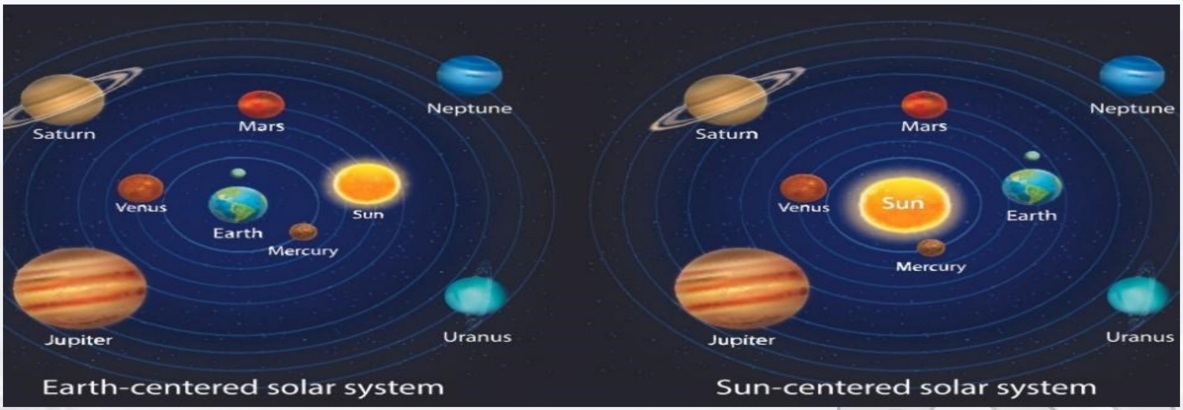
Ever since they lived, the inquisitiveness of the mankind has been continually marveling me. I've been for ages, bearing within me, my little children- the galaxies, planets, stars, black holes and every celestial body. Being captioned 'The Universe', my kids usually combat, bombard, bang and have been the cause for millions of transformations over all these years of mine. The evolution of human race over billions of years has been the supreme reason for my existence being unveiled. They once fancied me and entitled me 'The Space'. Their endeavors to hold me out were relentless. But it was not until the 20th century, I happened to notice a sparkling artifact being expelled into me from the face of the Earth. Humans called it 'a Rocket'. Now they do frequently visit me and their curiosity to dig even deeper into me doesn't seem to cease. Their motive of exploring me is now a 'Space race' in many of the Earth's countries, leading to an enormous advancement in technology and to devastation as well.

When I look back into my past, the dawn of their exploration into me has been my ever cherishing delight. It all stemmed up from their fiction and dreams. The early spaceflight pioneers persistently worked to make their dreams of exploring my family, a reality. Enthusiasts across the globe considered possibilities, toiled to build a theoretical framework and experimented with primitive Rockets for the disclosure of mankind's potential to outstretch into my womb. The outbreak of the World War II was a watershed that hastened every belligerent nation conceive some Rocket technology or the other to militarize their own country.

Of all those, the German V-2 excelled and every nation venturing into space thereafter studied the pioneering work of Wernher von Braun and his fellow Rocketeers, it's makers, to adapt it's design. On reconciling after the war, the scientists and engineers in the United States and the Soviet Union perceived that spaceflight was something that legitimately aided them during the war. The two nations were soon into a head to head race of landing humans on the Moon and to voyage in my bosom. Henceforth, the space-faring nations apparently increased every successive year with seemingly complex satellite launches, robotic missions to the planets and so on and so forth.

I remember the ancients on Earth claiming that they encountered aliens when journeying across territories, narrating all manner tales on wondrous beasts, on returning home, both real and imagined. This eventually led many people and civilizations to an-

ticipate, both in seriousness and in jest, that among the stars and planets they saw in the night sky, were worlds of great influence and importance that doubtlessly hosted a variety of strange creatures. This fear among them led them to explore me. The ancient Egyptians envisioned my son, the Milky Way to be the river Nile, that's believed to be the divine reason for the sustenance of their civilization. This analogy helped them explain some of the forces of nature that influenced their survival. Later on, around 700 BCE, astronomers in Babylon (now in Iraq) charted the paths of several planets, compiled their observations on fixed stars, assigned them religious meanings and scripted their influence over people's lives. Around 400 BCE, they devised 'the Zodiac', the first ever mechanism to divide the year into lunar periods and the astrological happenings, ascribing them to stars and the DOB of a person. They developed their own astronomical observatories. The Aztecs, upon their astronomical observations, formulated a 365-day xiuhpohualli (year count) calendar.



On studying the ancient records of lunar and solar eclipses engraved upon the tablets of clay, dating back to 750 B.C.,the scientists of today, affirmed the slowing down of the Earth's spin.

The human folk has always been of a fictitious belief that life doesn't just exist on Earth alone. In the seventeenth century, an Astronomer and Mathematician, Johannes Kepler (1571-1630) imagined the craters on the Moon to be the walls of a city, constructed by its indigenous population. He stated this in his science-fiction novel,'Somnium', first published in 1634. A couple of centuries later, a Munich-based astronomer, Franz von Paula Gethuisen (1774-1852) claimed to have truly noticed these walled lunar cities.

The early astronomers, consistently observed the starry sky in the night and devised heavenly models to showcase the mankind, how my family exactly looks like. The Greek astronomer, Aristarchus of Samos (ca. 310-ca 230 BCE) was the first to propose that, the Earth revolves around the Sun. However, this heliocentric (Sun-centered) notion failed to gain a widespread acceptance. The model of the universe, that uplifted the European ideology, until well into the sixteenth century, took its name from one of its most prominent advocates, the Roman astronomer and theorist, Claudius Ptolemy (87-150 CE) .As set out in Ptolemy's great astronomical and mathematical compilation,'The Almagest', the Ptolemaic model describes a geocentric plan of the universe that positions the Earth at its core, surrounded by nine crystalline spheres in which the Sun, stars, and planets are embedded. Ptolemy's model notably proposed the existence of my family to the mankind.

Despite the popularity and acceptance acquired by Ptolemaic models across the Roman Empire and among the followers of the emerging Christian and Islamic faiths, many astronomers found it progressively difficult to reconcile with the evidence of their astronomical observations. The movement of few planets did not seem to match the model .Over the years, people attempted to figure out ways to account for these discrepancies. One among them were Nasir al-Din Tusi (1201-74), the Persian astronomer who served as the director of the Maragheh observatory. He worked with a group of fellow star-gazers that included Chinese astronomer, Fac Munjal Din Tusi, who identified adjustments to the Ptolemaic model that helped them produce more accurate predictions of planetary movements. In the 16^{th} century, a Polish mathematician by name Nicolaus Copernicus(1473-1543) came up with his own solution to the problem in the form of a new heliocentric model. He feared contradicting the Roman Catholic Church, which was committed to a view that placed the Earth, and therefore humanity, at the centre of the universe, in agreement with the Ptolemaic model .After the death of Copernicus, the subsequent publication of his book, supporting his heliocentric model slowly began unfurling across Europe.
There arose an Italian polymath, Galileo Galilei (1564-1642), who evidentially supported the heliocentric model using his newly invented telescope. He identified four of the largest

moons orbiting Jupiter and the rings around Saturn as well. When Galileo published his first collection of telescopic observations of the solar system in Sidereal Messenger in 1610, it helped thunder a flood of speculative novels on my kids.

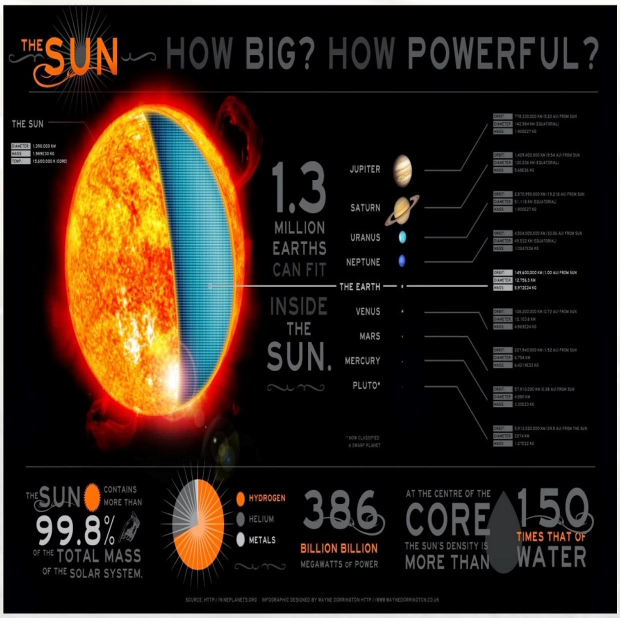
One of the sci-fi authors was the French novelist and playwright, Cyrano de Bergerac (1610-55), who penned 'The Voyage to the Moon', published in 1649. In his book, de Bergerac describes several attempts made by the hero of his story, Cyrano, to journey onto the Moon. He first girdles himself around with a string, tied to bottles filled with dew, hoping that he would be drawn upward with the bottles, when the heat of the Sun evaporates the bottled liquid, but in vain. The hapless explorer then jumps into a craft powered by firecrackers that successfully launches him onto the Moon. Consequently, he became the first fictional flyer to land on the Moon using a Rocket.

In 1869, in an edition of Atlantic Monthly, an American writer Edward Everett Hale (1822-1909) published the first ever known proposal for a space station around the Earth, in a short story, entitled 'The Brick Moon'. In his tale, Hale describes the construction and launch of a sphere, literally built of bricks, intended as a navigational aid but is accidentally launched into space with 37 people aboard. Although the author notes the absence of atmosphere in space, I helped them survive their journey.
I have been observing the growth of my daughter Earth and her kids, my grandchildren, the Earthlings, ever since their childhood. But I was busy reading out story books, that artistically narrate us, to my little kids Mercury and Mars. While it still remains unclear who exactly invented the forerunner of the rockets used today, I do know that the Chinese were using self-propelled projectile weapons in warfare by the time of Genghis Khan (ca. 1162-1227) in the twelfth century CE. Some sources have speculated that such rockets could be used to transport individuals high above the Earth. But there has been no firm evidence for such an unwarranted feet. I have always been a spectator watching humans play bombarding games with little Rockets shooting up into my sister, the Sky. I blissfully enjoy them doing it, as it made them think of advancing Rocket technology for warfare and many more. Looks like an asteroid's hitting my kid! I promise to get back with much more stuff this time.

To be continued in next edition…

Did you know ?

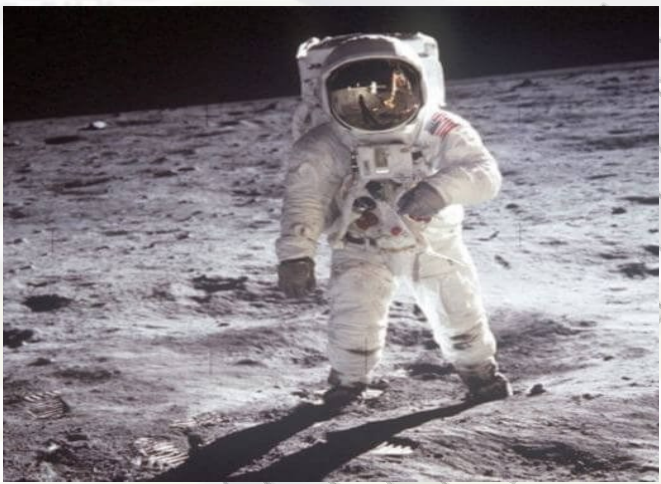
One million Earths can fit inside the sun.....



Knowledge Check about Space Suit

B.KUSUMA
20761A5606

A spacesuit is much more than a set of clothes astronauts wear on spacewalks/in space . A fully equipped spacesuit is really a one-person spacecraft. The formal name for the spacesuit used on the space shuttle and International Space Station is the Extravehicular Mobility Unit, or EMU. "Extravehicular" means outside of the vehicle or spacecraft. "Mobility" means that the astronaut can move around in the suit. The spacesuit protects the astronaut from the dangers of being outside in space.



But Why Do Astronauts Need Spacesuits?

Spacesuits help astronauts in several ways. Spacewalking astronauts face a wide variety of temperatures. In Earth orbit, conditions can be as cold as minus 250 degrees Fahrenheit. In the sunlight, they can be as hot as 250 degrees. A spacesuit protects astronauts from those extreme temperatures.

Spacesuits also supply astronauts with oxygen to breathe while they are in the vacuum of space. They contain water to drink during spacewalks. They protect astronauts from being injured from impacts of small bits of space dust. Space dust may not sound very dangerous, but when even a tiny object is moving many times faster than a bullet, it can cause injury. Spacesuits also protect astronauts from radiation in space. The suits even have visors to protect astronauts' eyes from the bright sunlight.

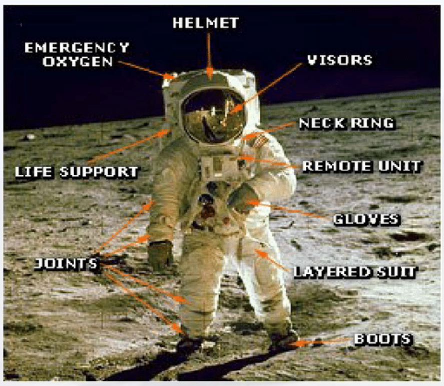
What Are the Elements of a Spacesuit?

Today's astronauts use two types of spacesuits while exploring space. The first is worn inside the spacecraft during launch, ascent, re-entry, and landing. The other is used for spacewalks — a modern take on the original EMU.

The first part of the suit is known as a cooling garment. This is made of stretchy spandex material and water tubes, and covers the body except for the head, hands, and feet. Roughly 300 water tubes are woven into this suit, through which chilled water helps to regulate body temperature and remove excess heat. Built-in vents also draw away sweat and help with circulation.

Over the cooling garment goes the EMU gear. This suit includes:

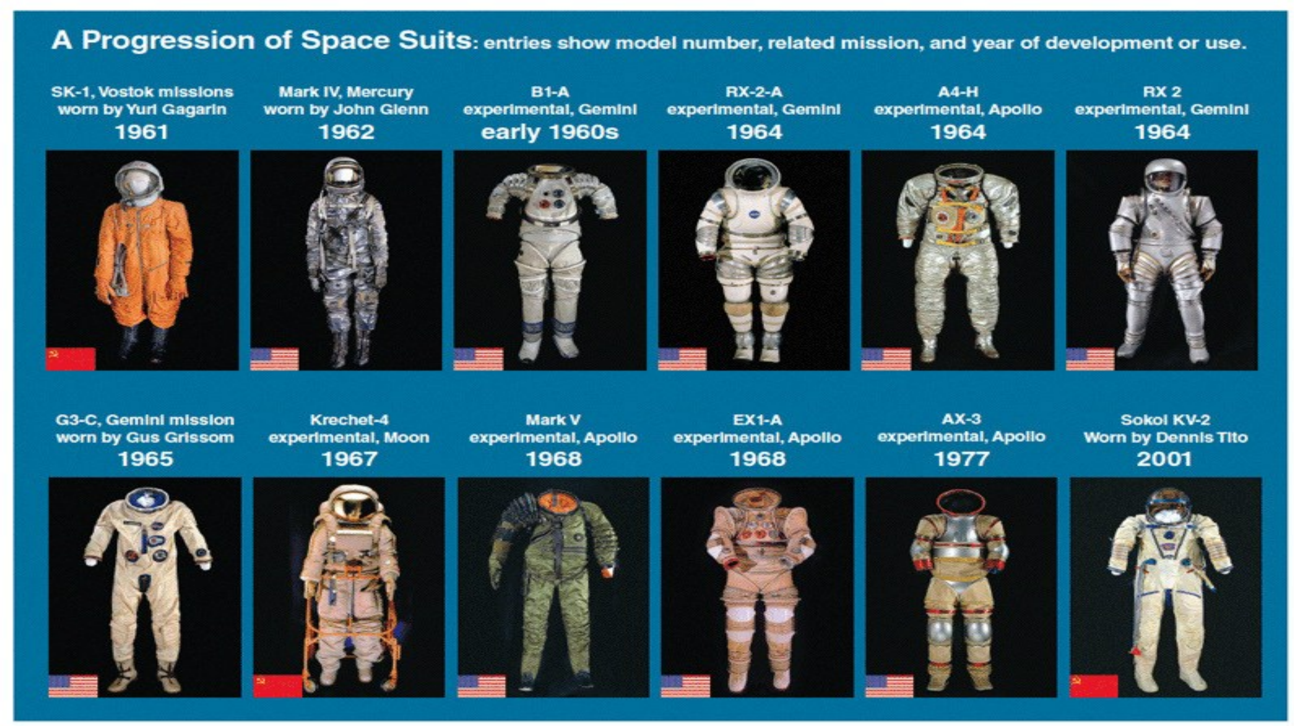
- Hard upper torso: this lightweight, strong layer connects the inside of the suit to the portable life support system. It's shaped like a sleeveless shirt with an arm assembly that connects to the gloves.
- Lower torso: the suit's pants, boots, and lower half of the waist are connected to the hard upper torso through a metal body-seal closure. A piece called the waist bearing helps the astronaut move and turn.
- Gloves: gloves offer not only protection from space dust and debris, but also heat. The fingers are the body part that gets coldest in space, so the spacesuit gloves come with a built-in heating system.
- Life support system: a backpack that circulates oxygen, pressurizes the suit, removes carbon dioxide, provides electricity and water, and holds a two-way radio for communication.
- Communication system: worn under the helmet, earphones and microphones connect to the radio on the spacesuit and enable the astronaut to talk to other crew members and mission control.
- Helmet: made of strong plastic, this pressure bubble provides astronauts with oxygen and with a protective visor to shield astronauts from the sun.



This equipment is made from a combination of metals, fiberglass, plastic, and synthetic fibres, among other raw materials. Spacesuits have a complex array of raw materials, from nylon to Mylar, Gortex, Neoprene, Kevlar, and Dacron — a type of polyester.

The History of the Spacesuit

The first spacesuits were little more than pressurized, high-altitude flight suits that offered limited mobility. These suits were not equipped to allow astronauts to leave the spacecraft. The first spacewalks took place during **the Gemini missions** in 1965; astronauts wore a seven-layer suit for extra protection. While technically safe, these early suits were difficult to use.



And also, orange one is the Advanced Crew Escape Suit (ACES) and the white suit is called the Extravehicular Activity (EVA) suit.

Advanced Crew Escape Suit (ACES)

The orange-coloured Advanced Crew Escape Suit (ACES) is the space shuttle ascent and entry suit. It is not just any shade of orange but only the International Orange that is used. This particular colour is highly visible against any kind of landscape, especially in t Astronauts wore the Advanced Crew Escape Suit (ACES) only inside the Space Shuttle during launch and return to Earth. The suit protected astronauts in case the Shuttle lost pressure and aided in rescue if they had to leave a stricken vehicle.

⇒ The high visibility orange color made astronauts easy to spot in the water in case rescue was required. The ACES suit was adapted from a US Air Force high-altitude flying suit and had a parachute and flotation device. NASA used it from 1994 through the end of the Space Shuttle program in 2011.

⇒ ACES allowed crewmembers to escape a damaged shuttle between 10,000-25,000 ft altitude, and it carried ten minutes of emergency oxygen.The suit was lighter and more comfortable than earlier ones.

⇒ It was also a full-pressure model, meaning it covered the whole body in an enclosed atmosphere. The orange suit comes with a parachute ripcord and even has a knife in case of emergencies.

⇒ ACESs (orange) come with a parachute ripcord to rip open the parachute that sits on the astronaut's back. It even has a knife to cut the parachute cords should an astronaut get stuck. There is even a life raft that sits on the rear that opens on its own once it comes in contact with water.

⇒ The fitting on the left thigh connected the suit to the Space Shuttle's life support system, and the white cord on the helmet connected to the communications system. The suit weighed about 30 lbs, and the parachute and flotation device weighed about 64 lbs together.

Extravehicular Activity suit (EVA) :

The Extravehicular Activity (EVA) suits are bulkier and white in colour. That's because white reflects the strong heat of the sun. Also, it is easily visible against the black expanse of space. NASA astronauts wear white suits, since white is the color that reflects the most sunlight in space and protects them from cancer-causing solar radiation. Other space agencies, like in Russia and China, use white for the same reason.

⇒ When they first launch though, astronauts wear orange instead, since the bright color makes it easier for them to be spotted and rescued in an emergency. Beyond NASA, space programs in countries like Russia and China also use white suits. Not the colors of the Russian flag or China's iconic yellow and red, just white. Plain old white. That basic color has saved countless astronaut lives.

⇒ The white suit has a water cooling system, necessary for survival in outer space.

⇒ The water-cooling system in EVA suits works on recycled body sweat to keep an astronaut cool in harsh conditions. It even has an in-suit drink bag filled with water that lasts even a six-hour spacewalk.

⇒ The survival kit in the white suits is more of a primary life support system.

The Future of Spacesuits

- NASA is currently developing a new suit to be used on the Artemis missions: **xEMU**s, or exploration extravehicular mobility units. These suits will include several new features that improve mobility, protection, and visibility.
- In addition, SpaceX's new suits show promising new developments in spacesuit innovation. The "**Starman**" suits are 3D-printed all in one piece and customized for the astronaut. These suits are not suitable for space walks, but functionality like gloves that can be used on touchscreens give these spacesuits high ratings.

- K.BHANU PRAKASH
(20761A5619)

Scientists Capture Radio Signal Sent From 9 billion Light-Year Away from Earth

POLIBONA DHARANI
20761A5644

For the first time, a radio signal sent from a galaxy, which is almost 9 billion light-years away from the Earth, has been captured.

What is special about this signal: It has a unique wavelength, which is known as a "21-centimeter line" or the "hydrogen line." It is reportedly emitted by neutral hydrogen atoms. The signal was captured by the Giant Metre wave Radio Telescope in

India. It means that scientists can begin probing the formation of some earliest stars and galaxies.

The astronomical distance over which such a signal has been picked up is the largest so far by a large margin. This is also the first confirmed detection of strong lensing of 21 cm emission from a galaxy. Galaxies emit light across a long range of radio wavelengths. The 21-cm-wavelength radio waves were only recorded to be emitted from nearby galaxies till now. The signal was emitted from a "star-forming galaxy", which is titled **SDSSJ0826+5630**. It was emitted when the 13.8-billion-year-old Milky Way, where Earth is located, was just 4.9 billion years old.

About Atomic hydrogen:

Atomic hydrogen is the basic fuel required for star formation in a galaxy. When hot ionised gas from the surrounding medium of a galaxy falls onto the galaxy, the gas cools and forms atomic hydrogen, which then becomes molecular hydrogen, and eventually leads to the formation of stars. Atomic hydrogen constitutes about 75% of the baryonic mass of the universe. In everyday life on Earth, isolated hydrogen atoms (called "atomic hydrogen") are extremely rare. A high concentration of atomic hydrogen close to the substrate surface is essential for the diamond deposition process.

Atomic hydrogen emits radio waves of 21 cm wavelength, which can be detected using low-frequency radio telescopes like the GMRT. Thus, 21 cm emission is a direct tracer of the atomic gas

content in both nearby and distant galaxies.

About Radio Signal:

The signal has allowed the astronomers to measure the gas content of the galaxy and find its mass. This determination has helped the scientists to come up to a conclusion that this far-off galaxy is double the mass of the stars which are visible from Earth. This radio signal is extremely weak and it is nearly impossible to detect the emission from a distant galaxy using current telescopes due to their limitedsensitivity.

Until now, the most distant galaxy detected using 21 cm emission was at redshift $z = 0.376$, which corresponds to a look-back time - the time elapsed between detecting the signal and its original emission - of 4.1 billion years.

Due to the immense distance to the galaxy, the 21 cm emission line had redshifted to 48 cm by the time the signal travelled from the source to the telescope. The signal detected by the team was emitted from this galaxy when the universe was only 4.9 billion years old; in other words, the look-back time for this source is 8.8 billion years.

This detection was made possible by a phenomenon called gravitational lensing, in which the light emitted by the source is bent due to the presence of another massive body, such as an early type of elliptical galaxy, between the target galaxy and the observer, effectively resulting in the "magnification" of the signal.

In this specific case, the magnification of the signal was about a factor of 30, allowing us to see through the high redshift universe. the atomic hydrogen mass of this galaxy is almost twice as high as its stellar mass. These results demonstrate the feasibility of observing atomic gas from galaxies at cosmological distances in similar lensed systems with a modest amount of observing time. It also opens up exciting new possibilities for probing the cosmic evolution of neutral gas with existing and upcoming low-frequency radio telescopes in the near future.

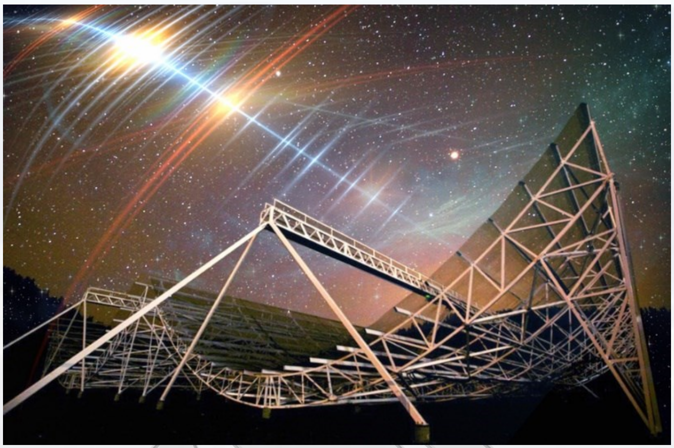
How long does it take for a radio signal from the Earth to reach an astronaut on the moon?

Radio waves propagate in vacuum at the speed of light c, exactly 299,792,458 m/s. Propagation time to the Moon and back ranges from **2.4 to 2.7 seconds, with an average of 2.56 seconds** (the average distance from Earth to the Moon is 384,400 km).

Have we ever received a radio signal from space?

Yes, Astronomers detect a radio "heartbeat" billions of light-years from Earth.Astronomers have detected a strange radio signal coming from another galaxy, nearly 3 billion light-years away from Earth. This is the second time ever that such a repeating signal was detected by scientists.

Researchers detected a new Fast Radio Bursts (FRB), known as FRB 20190520B. The researchers noted that the signal was "co-located with a compact, persistent radio source and associated with a dwarf host galaxy of high specific-star-formation."



The FRB was detected using the Five-hundred-meter Aperture Spherical radio Telescope (FAST) in Guizhou, China, in May 2019. Additional observations recorded nearly 75 more FRBs in a five-month period in 2020. The signal was then localized using the US National Science Foundation's Karl G Jansky Very Large Array (VLA).

Scientists are not sure about what causes FRBs, but they have theorised that the FRB is new-born and that it is emitting the signals as it is still surrounded by the "dense material ejected by the supernova explosion that left behind the neutron star." Under the 'new-born' theory, it is expected that the signals will gradually weaken as the FRB gets older.

Due to the Sun and Moon's gravitational pull, we have tides.

The Concept of Lagrange Points

D. SIRISHA
20761A5612

1.INTRODUCTION

Let's imagine you have been riding along in spaceship and you just need some where to put it. Where do you put it? We don't have that many options, most places leave it it's going to start drifting away. But there are a few excellent parking spots these are called the lagrange points. the lagrange points are places where the forces acting on it an object are perfectly balanced. Lagrange points are positions in space where objects sent there tend to stay put. At Lagrange points, the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them. These points in space can be used by spacecraft to reduce fuel consumption needed to remain in position.

Lagrange points are named in honour of Italian French mathematician Josephy-Louis Lagrange. There are five special points where a small mass can orbit in a constant pattern with two larger masses. The Lagrange Points are positions where the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them. This mathematical problem, known as the "General Three-Body Problem.

Of the five Lagrange points, three are unstable and two are stable. The unstable Lagrange points - labelled L1, L2 and L3 - lie along the line connecting the two large masses. The stable Lagrange points - labelled L4 and L5 - form the apex of two equilateral triangles that have the large masses at their vertices. L4 leads the orbit of earth and L5 follows..These are L1, L2, L3, L4 and L5.The L1 point of the Earth-Sun system affords an uninterrupted view of the sun and is currently home to the Solar and Heliospheric Observatory Satellite SOHO.

The L2 point of the Earth-Sun system was the home to the WMAP spacecraft, current home of Planck, and future home of the James Webb Space Telescope. L2 is ideal for astronomy because a spacecraft is close enough to readily communicate with Earth, can keep Sun, Earth and Moon behind the spacecraft for solar power and (with appropriate shielding) provides a clear view of deep space for our telescopes. The L1 and L2 points are unstable on a time scale of approximately 23 days, which requires satellites orbiting these positions to undergo regular course and attitude corrections.

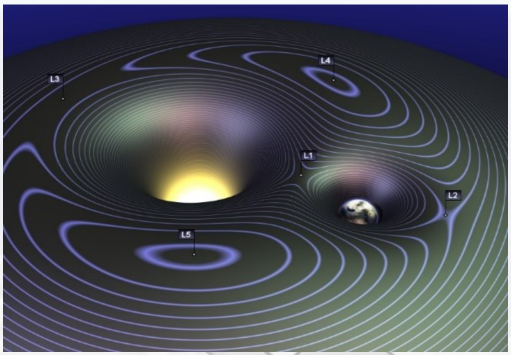


Figure 1

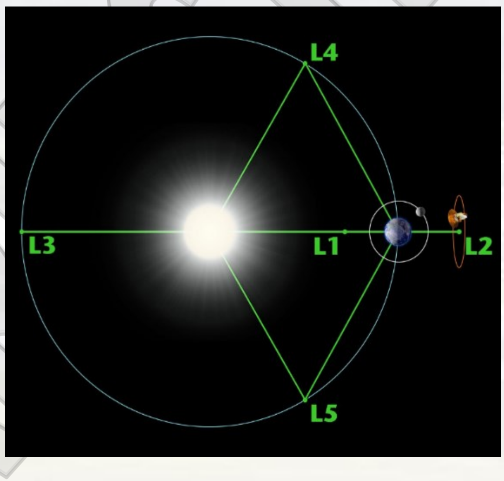


Figure 2

The L4 and L5 points are home to stable orbits so long as the mass ratio between the two large masses exceeds 24.96. This condition is satisfied for both the Earth-Sun and Earth-Moon systems, and for many other pairs of bodies in the solar system. Objects found orbiting at the L4 and L5 points are often called Trojans after the three large asteroids Agamemnon, Achilles and Hector that orbit in the L4 and L5 points of the Jupiter-Sun system. (According to Homer, Hector was the Trojan champion slain by Achilles during King Agamemnon's siege of Troy). There are hundreds of Trojan Asteroids in the solar system. Most orbit with Jupiter, but others orbit with Mars. In addition, several of Saturn's moons have Trojan companions.

2. FINDING THE LAGRANGE POINTS

From Fig 1, The easiest way to understand Lagrange points is to think of them in much the same way that wind speeds can be inferred from a weather map. The forces are strongest when the contours of the effective potential are closest together and weakest when the contours are far apart L4 and L5 correspond to hilltops and L1, L2 and L3 correspond to saddles (i.e., points where the potential is curving up in one direction and down in the other). This suggests that satellites placed at the Lagrange points will tend to wander off (try sitting a marble on top of a watermelon or on top of a real saddle and you get the idea). But when a satellite parked at L4 or L5 starts to roll off the hill it picks up speed. At this point the Coriolis force comes into play - the same force that causes hurricanes to spin up on the earth - and sends the satellite into a stable orbit around the Lagrange point.

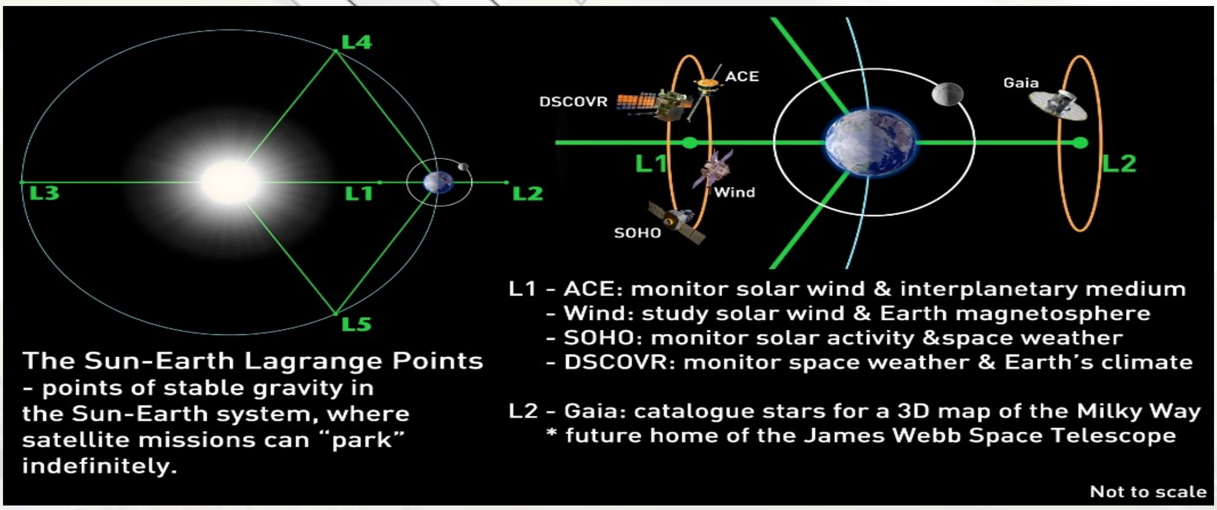
There are five equilibrium points to be found in the vicinity of two orbiting masses. They are called Lagrange Points in honour of the French-Italian mathematician Joseph Lagrange, who discovered them while studying the restricted three-body problem. The term \restricted" refers to the condition. That at two of the masses are very much heavier than the third. Today we know that the full three-body problem is chaotic, and so cannot be solved in closed form. Therefore, Lagrange had good reason to make some approximations. Moreover, there are many examples in our solar system that can be accurately described by the restricted three-body problem.

3. CONCLUSION:

An object that orbits the sun along with the earth. we are going to use a rotating coordinate system. this rotates at the speed as the earth moves, so in this coordinate system, the earth doesn't move.

To account for the fact that this coordinate system is rotating, we have to add in a centrifugal force that pushes out away from the sun. then we add in the gravitational force of the sun, and the gravitational force of the earth. An object whose orbit near the sun will slowly drift towards the sun, and an object whose orbit near the earth will slowly drift towards earth, but an object won't move, if the surface is flat. The surface is flat at five lagrange points called the Lagrange points. The first three points are discovered by Euler (L1, L2, L3). The remaining two points were discovered by Lagrange (L4, L5). The first three lagrange points (L1, L2, L3) are unstable, means that if an object is just slightly off from the point, it will just move farther and farther away.

The last two lagrange points (L4, L5) are stable. Means that if an object is slightly off from the point, it's orbit will shift slightly but not too much. Since orbits near the L4, L5 points are stable, objects naturally go there and stay there, all of the major planets have their own lagrange points.



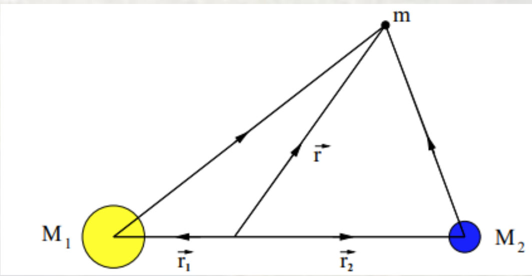


Figure 3 The restricted three-body problem

Note: The mathematical formulation can be presented in the upcoming works

4.REFERENCE

⇒ https://stargazingmumbai.in/lagrange-points-the-parking-lots-in-space/

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EDITION-I
JAN-2023

INDUSTRIAL VISIT

Details regarding Visit

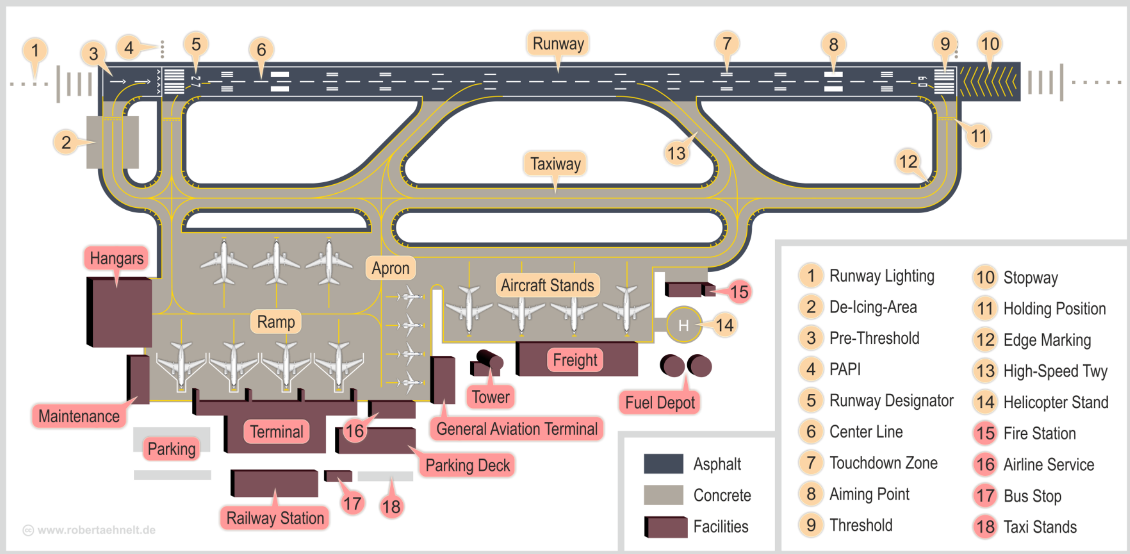
Date : 11-11-2022

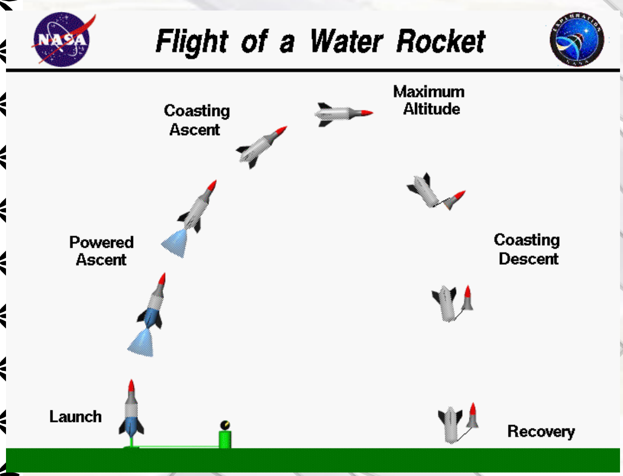
Name of the Organization:

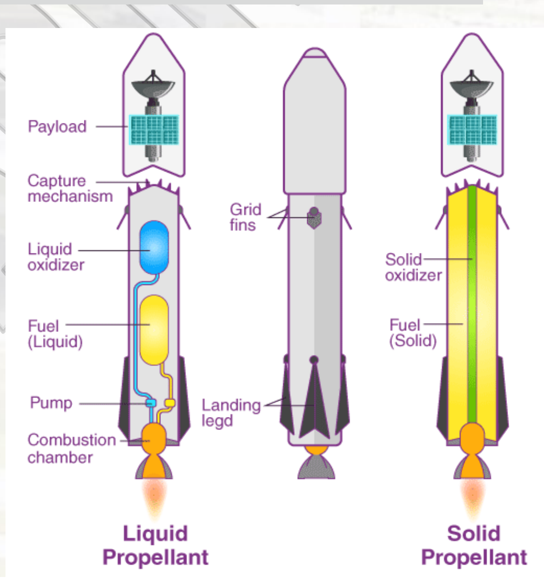
Satish Dhawan Space Centre (SDSC)-SHAR , Sriharikota

No. of students Participated : 91

PHOTO GALLERY



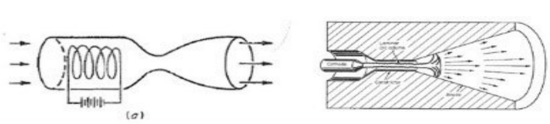




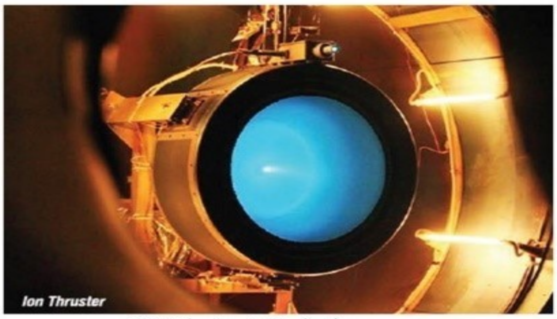
Electric Propulsion

Acceleration of gasses for propulsion is achieved by electric means

- **Electrothermal acceleration**

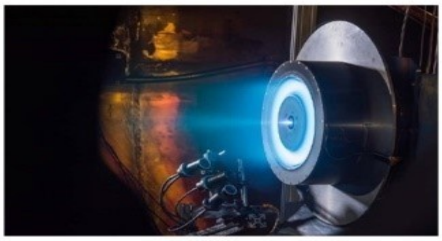


- **Electrostatic acceleration**

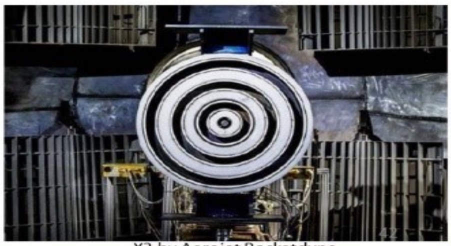


NEXT-C by Aerojet Rocketdyne

- **Electromagnetic acceleration**



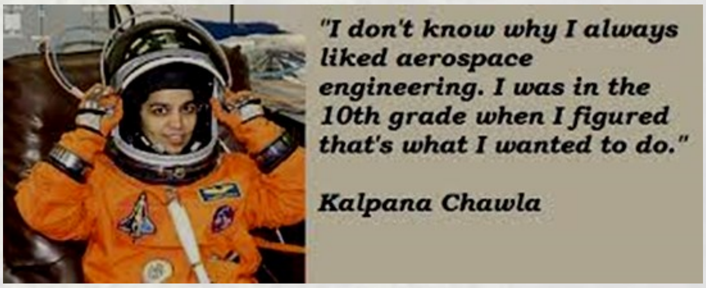
HERMeS by NASA



X3 by Aerojet Rocketdyne

Remembering First Women Astronaut of Indian Origin…..

"KALPANA CHAWLA "



STUDENT ACHIEVEMENTS

Winners of 2022-2023 INTRAMURALS(Sports and Games) which were held in the month of December 2022:

MEN BASETBALL WINNERS—ASE

S.NO	NAME	YEAR	REGD.NO
1	T.Dharma Teja	III	20761A5611
2	K.Naveen	III	20761A5622
3	U.N.V.S Krishna Raju	III	20761A5651
4	G.Giridhar	III	20761A5615
5	H.George Bablu Rathnakar	II	21761A5621
6	Y.Rohith	II	21761A5657
7	K.Sanjay	III	20761A5627
8	N.Koushik	III	20761A5637
9	V.V.N.D.Pavan Kumar	III	20761A5652
10	K.Bhanu Prakash	III	20761A5619
11	D.Naveen	III	20761A5614
12	K.Subhash	II	21761A5619

ATHLECTICS (MEN)

YEAR	NAME	EVENT	POSITION	REGD NO
III	T.Dharma Teja	100mts .Sprint	3rd	20761A5611
III	T.Dharma Teja	200mts.Sprint	1st	20761A5611
III	SK.Mohammad Arshad	1500 mts.Run	3rd	20761A5647

YEAR	NAME	EVENT	POSITION	REGD.NO
IV	Raavi Nagarjuna	Discus	2nd	19761A2137
III	T.Dharma Teja	Long Jump	2nd	20761A5611

BEST MEN ATHLETE - POWERLIFTING

YEAR	NAME	CATEGORY	POSITION	REGD.NO
III	A.Sasi Kiran	53 kg	1st	20761A5601
III	K.Sanjay	59 kg	1st	20761A5627
III	K.Bhanu Prakash	59 kg	2nd	20761A5619
IV	K.Narendra	74 kg	1st	19761A2120
IV	R.Nagarjuna	74 kg	2nd	19761A2137
IV	**Yedu Kondala Reddy**	**93 kg**	**2nd**	**19761A2146**

WOMEN TABLE TENNIS (DOUBLES)

- N.D.N.Sneha - 19761A2129
- M.Akshaya - 19761A2124

RUNNERS

MEN FOOTBALL RUNNERS—ASE

1) CH.NAVEEN KUMAR (20765A2101)
2) R.NAGARJUNA (19761A2137)
3) U.SAI SANJAY VARDHAN (21761A5645)
4) A.VIKRAM GANGADHAR (21761A5602)
5) A.CHARAN KALYAN REDDY (20761A5603)
6) D.RAJASEKHAR (20761A5613)
7) T.DHARMA TEJA (20761A5611)
8) Y.VINAY BABY (20761A5655)
9) A.SASI KIRAN (20761A5601)
10) SK.MOHAMMAD ARSHAD (20761A5647)
11) B.SIVA KOTI REDDY (20761A5607)
12) D.GOPI VENKATA KRISHNA (20761A5609)
13) SK.NOUSHAD (18761A2145)
14) T.PRAVEEN KUMAR (21765A5611)
15) N.RAMANJANEYULU (20761A5635)
16) SYED SHOUKATHA ALEEM (19761A2141)

WOMEN BASKETBALL RUNNERS—ASE

1) N.YESASHWANI (19761A2128)
2) M.AKSHAYA (19761A2124)
3) S.JYOTHI (19761A2139)
4) N.D.N.SNEHA (19761A2129)
5) P.SUPRAJA (19761A2135)
6) K.HANEESHA (19761A2115)
7) B.KUSUMA (20761A5606)

APPRECIABLE PARTICIPATION

Narayana Guna Shyam (21765A5605) of 3rd B -Tech has successfully participated in the SERB-sponsored one week High End Workshop (Karyashala) on “Artificial Intelligence Techniques for Machinery Condition Monitoring” (09-15 January 2023),organized by the Department of Mechanical Engineering, National Institute of Technology, Rourkela.

DEPARTMENT OF AEROSPACE ENGINEERING

LAKSHYA2K22-EVENT WISE WINNERS LIST

SRUJANA (Paper Presentation)

S.No	Name of the Student	College Name	Prize
1	P. BHARGAVIKRANTHI	LBRCE	I prize
2	B. PREVEEN KUMAR	LBRCE	
3	H. VAISHNAVI	LBRCE	II prize
4	V. DIVYA SUNIL	LBRCE	

PRAGNA (Poster Presentations)

S.No	Name of the Student	College Name	Prize
1	K. BHANU PRAKASH	LBRCE	I prize
2	P. BHARGAVIKRANTHI	LBRCE	II prize
3	K. ANUSHA	LBRCE	III prize
4	MOUNIKA	LBRCE	

MEDHA (Technical Quiz)

S.No	Name of the Student	College Name	Prize
1	A. RADASH	LBRCE	I prize
2	P. J. KOTI RATHNANAND	LBRCE	
3	M. MAHENDRA REDDY	LBRCE	II prize
4	R. VENKANNA	LBRCE	
5	A. SAHITHI	LBRCE	III prize
6	K. ROSHINI	LBRCE	

NIPUNA (Project Expo)

S.No	Name of the Student	College Name	Prize
1	PRAGADA. BHARGAV	LBRCE	I prize
2	MOHAMMAD ABDUL SHARON	LBRCE	
3	Y. ROHITH	LBRCE	II prize
4	SIMMA. AJAY KUMAR	LBRCE	

On the eve of "NATIONAL YOUTH DAY CELEBRATIONS" the following students won first prize in the event of Short Film making.

S.No	Name	Regd.No
1	B.SIVA KOTI REDDY	20761A5607
2	D.GOPI VENKATA KRISHNA	20761A5609
3	G.SURESH	20761A5618
4	P.JAYA KISHORE REDDY	20761A5641
5	P.AJAY PRAKASH	20761A5645
6	E.KOTI REDDY	21765A5603

- On the occasion of National Voters Day on 23-01-2023, Drawing Competition was organized by the NTR District Administration Counicl. K. Bhanu Prakash (20761A5619) won 3rd prize at the Senior Level.
- N.Meena Mahitha (20761A5638) participated in 26th National Youth Festival 2023 at Hubbli-Dharawad,Karnataka.
- On the occasion of 74rth Republic Day celebrations, Drawing Competition was conducted by the Spoorthi Club of LBRCE, K.Bhanu Prakash (20761A5619) is awarded with first prize .

PLACEMENTS

Name of the Organzation	Name of the Student	Regd.No	Package
Cognizant Technology Solutions Limited	1. SK.NOUSHAD 2. G.ROSHITHA SHANKAR 3. V.SURYA SAINADH 4. V.DINESH	18761A2145 19761A2111 19761A2147 19761A2149	4LPA
Tata Consultancy Services Limited	1. V.DINESH 2. J.SARIKA	19761A2149 19761A2114	3.36LPA

WORKSHOPS CONDUCTED

- Two Week Student Certification Program on **ADVANCED SIMULATIONS** (ANSYS, CFD, HYPERMESH AND LS-DYNA) during 2nd Jan to 13th Jan, 2023 in association with MAYINKRISH VENTURES PVT. LTD

- One day workshop on **3D-PRINTING, ROBOTICS AND AURDINO PROGRAMMING** on 10th January 2023 in association with Print 3D Technologies.

ANTHARIKSH

THE SPACE...

DEPARTMENT OF AEROSPACE ENGINEERING
LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
MYLAVARAM, ANDHRA PRADESH, INDIA.

antharikish.lbrce@gmail.com