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

Anthariksh is a department magazine, bridges the gap between students and faculty. Typically, a department magazine consists of Technical articles, ideas, project outcomes, language skills, literary articles, technical updates, success stories, career tips, academic advice, the latest events and happenings related to campus. Cover-stories have to be written in an engaging format. We can also include interviews of former students who have achieved success through dedication and hard work.

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Disclaimer

Some of the contents published in this magazine are from open sources. The contents of this magazine are for information purposes only, enabling the faculty and students to have easy and quick access to information and do not have any legal sanctity. This magazine is intended for circulation among students of the department of Aerospace Engineering of LBRCE only.

FROM HOD's DESK

You are truly as important as and just as needed as everyone else in this world. Do not sit around waiting for things to happen miraculously, because they just will not. Your day is now, and it is here! Seize it and go create the world you want for yourself. We all know life is short, but it is even shorter than we think. So, if you are forever waiting for tomorrow, the window for you to do all the things you have always wanted to do will silently close, and by the time you realize it has, it will be too late.

The tears we cry can sometimes clear our eyes so we can see the possibilities that lie in front of us. Always leave room in your life to make way for the new. The truth is that the old is gone, and it is not coming back. Accepting this fundamental reality and embracing change as it comes will set you up for lasting success. During this journey, we may fail at times. Whenever we fail in life, we should take it as a blessing. This is because, failures act as indicators that we need to try something else. So, learn what you can from a failure and move on. One baby step at a time is what will get you ahead in life. Eventually, these baby steps build on top of each other and lead to our most glorious and defining moments. Remember not to settle for anything less than you deserve.

Although the greatest life challenge is the sound discovery of who you really are, the second greatest is finding happiness and peace with yourself. You should always stay true to your own goals and dreams to find happiness and peace. If people disagree with you, it is not necessarily a bad thing – it just means you are standing your own ground and finding your own way. Do not worry about whether people think you are doing something crazy. Negative people always find faults. They are best avoided as they can foist their bad attitudes on you and even get to you. When you find yourself excitedly losing track of time, you will know in your heart that you are on the right path.

A life that revolves around selfish pursuits and egotism is not a life well-lived. You will be remembered by what you have done for others and the world at large, rather than what you have done for yourself. So, be selfless, compassionate and try and give back whenever, whatever and wherever you can.

If you want to know why your life is the way it is, look at your past. If you want to know how your future is going to be, look at your actions in the present. The choice is yours – do you want to look back on what you have achieved with pride, or do you want to make a whole myriad of excuses for the things you have not?

Dr. P. Lovaraju

AIRCRAFT ACCIDENT INVESTIGATOR

M. Bhuvaneshwari,
Asst. Professor.

Who are they? An aviation accident investigator may also be called an air safety investigator. They investigate study and report on airplane crashes to figure out how and why they happened. Aviation accident investigators cover a myriad of areas and try to discover the cause of accidents. This is done through various means including interviewing survivors, reviewing and analysing flight and maintenance records, studying human performance issues and operations, examining engines, systems, instruments and other airplane parts to try and figure out what caused an accident.

What they do? A major portion of the work an accident investigator does will be at the accident scene. The average working day is eight hours, but during an accident investigation, hours may stretch up to 15 hours. Typically, NTSB (National Transportation Safety Board) accident investigators are "on call" 24 hours a day, 365 days a year and travel to all corners of the world to investigate significant accidents. Accident sites can be set in remote areas with rugged terrain, and can be in a variety of physically challenging conditions including swamps, deserts, or mountains. Travel to the accident site may require strenuous walking, hiking and climbing in adverse topographic, weather, and atmospheric conditions. Once at the accident scene, you must be able to physically manoeuvre around the accident site, which may include climbing in and out of various parts of the wreckage.

Since assignments can pose hazards to your health, you may be required to wear and operate appropriate personal protective equipment. You are required to carry all necessary equipment, tools and instruments to document all findings as you may photograph, video tape, make measurements and take notes while at the accident scene. NTSB accident investigators interview survivors and witnesses and examine aircraft parts, instruments, and engines. They also review maintenance and flight records to determine the probable cause of airplane accidents. Travel and field work typify the investigator's position.

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What are the requirements? Entry Level or trainees typically must have one year of specialized experience demonstrating knowledge of civilian aircraft design, manufacture and maintenance operations or civilian aircraft operational requirements, practices and procedures. This experience may include work as a pilot for scheduled air carrier, A&P Mechanic or certified flight instructor. Possession of a valid commercial pilot certificate with instrument rating. Requirements of higher level positions may include experience as an entry level or broad knowledge of aviation accident investigations, practices, procedures, and techniques. Specialized experience may also include that of a flight safety officer, flight operations supervisor, aircraft maintenance supervisor, designated pilot examiner, flight instruction supervisor, or flight test pilot. Typically accident investigators must have a high school diploma as well as specialized training in their area of transportation. A college degree is not always required however; most accident investigators possess a vocational or community college diploma. Military experience, degrees in engineering, and law, and military accident investigation schools are helpful.

Accident investigators need to be in good physical shape to meet the requirements of the job. Must have excellent organizational and technical writing skills, and ability to effectively speak and write English. The information taken from the accident scene must be assembled and or organized into logical factual and analytical reports. You must also be able to make effective oral presentations about your findings upon request. A valid state driver's license and have the ability to qualify for a US Government issued travel charge card. Aviation related engineering, medical and/or operational experience is required for a variety of professional positions with this safety related organization.

Who hires? If you're considering work as an accident investigator, you will be employed by a Federal agency such as the National Transportation Safety Board (NTSB) or the Federal Aviation Administration (FAA), or by insurance companies. Within the FAA, the Office of Accident Investigation (AAI) is the principal organization which investigates aviation accidents. There are many job opportunities within the FAA's accident investigative teams.

Once at the accident scene, you must be able to physically manoeuvre around the accident site, which may include climbing in and out of various parts of the wreckage.

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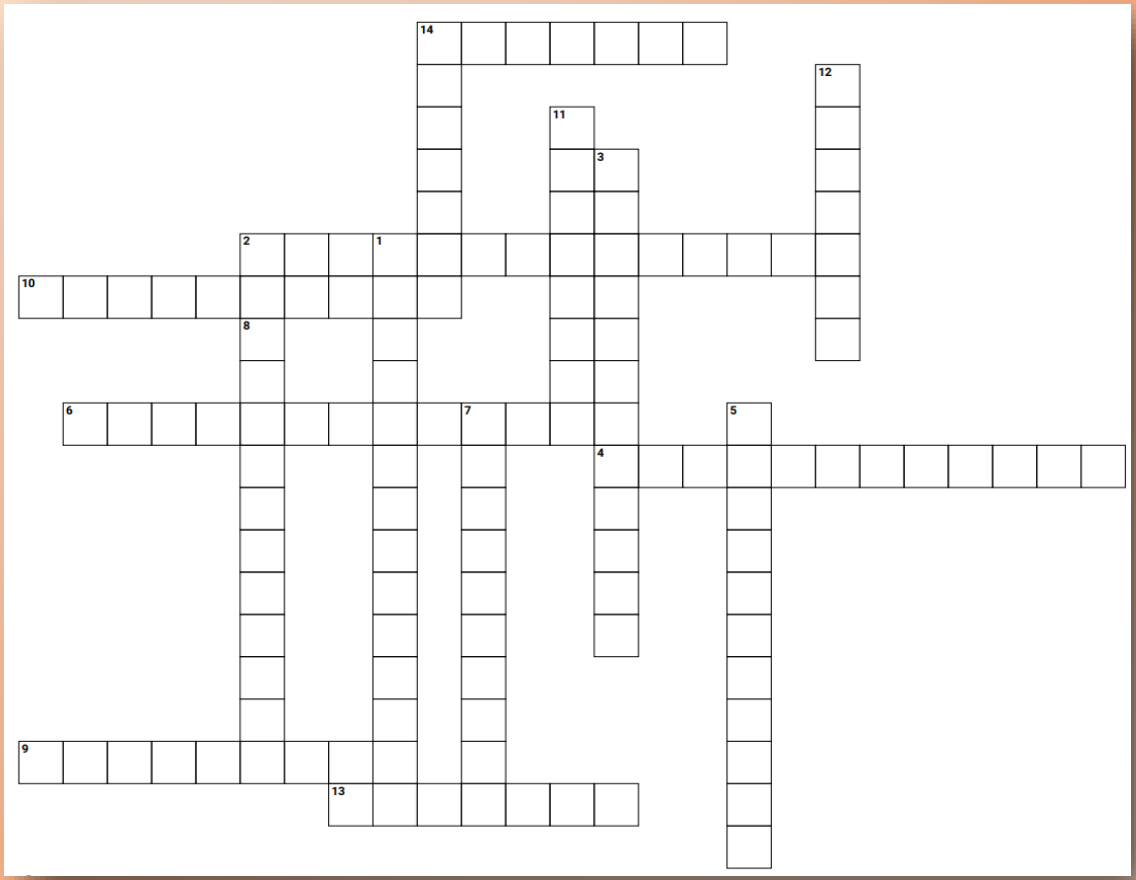
CROSS WORD PUZZLE

A. Venkata Sai Kumar
19765A2102



Across :

2. Father of Indian Space Program
4. 1st Indian to space
6. Missile woman of India
9. prints("AEROSPACE" ,%d);
10. line joining the leading edge to trailing edge
13. Missile made indigenously by India and Russia
14. India's 1st indigenously Developed Missile

Down :

1. Ratio of Inertial forces to Viscous forces
3. Rover sent to Mars recently by NASA
5. Speed of sound is completely dependent on
7. Title of our Magazine
8. 1st Satellite sent to Space by India
11. what does "U" stands in UAV
12. Flaps and Slats are secondary control surfaces used while Take-off and
14. Name of Rover sent to moon by ISRO

THE STORY OF MARS PARACHUTE DEPLOYMENT

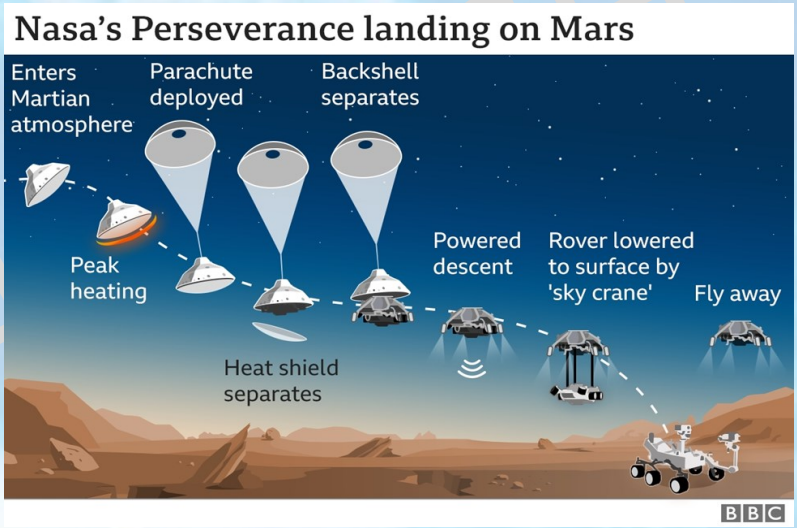
Shaik Vanhar Ali,
17761A2132 .

Testing spacecraft components prior to flight is vital for a successful mission. Rarely do we get a do-over with a spacecraft after it launches, especially those bound for another planet. We need to do everything possible to get it right the first time. Three successful sounding rocket missions from NASA's Wallops Flight Facility in Virginia in 2017 and 2018 to test a SUPERSONIC PARACHUTE proved their worth with the successful landing of the Perseverance mission on the Red Planet.

After traveling 293 million miles (472 million kilometers), the SUPERSONIC PARACHUTES, designed to slow the rover's descent to the planet's surface, successfully deployed and inflated. They made the smooth touchdown of Perseverance possible.

This mission required a design to build a 72-foot parachute that could survive inflating in a Mach 2 wind in about half a second. This is an extraordinary engineering challenge, but one that was absolutely necessary for the mission. To ensure they worked at Mars under those harsh conditions, NASA had to test the parachute designs here at Earth first. Replicating the Martian environment meant that they needed to get their payload halfway to the edge of space and go twice the speed of sound. Sounding Rockets were critical to their testing and ultimately their landing on Mars. The NASA team tested the parachute three times in Mars-relevant conditions, using BLACK BRANT IX SOUNDING ROCKETS. The final test flight exposed the chute to a 67,000-pound (300,000-Newton) load – the highest ever survived by a supersonic parachute and about 85% higher than what the mission's chute was expected to encounter during deployment in Mars' atmosphere.

In the case of the Mars 2020 parachutes, the first flight was a test to see if the right conditions can be achieved during the flight to simulate what the parachutes will encounter descending through the Mars' atmosphere. The second flight, 6 months later in March 2018, was the first full test of the parachute. The final successful test, conducted in September 2018, provided the results needed for the Perseverance parachute team to be confident that the design was ready for the Mars 2020 mission. Suborbital vehicles – either a sounding rocket or a scientific balloon – are being examined for testing the ascent vehicle. About 5% is the astral bodies are their remaining are the rest of all the absolute darkness. In this there are two major classifications are done **1.Dark energy** ,and **2.Dark matter** these two are comes from the **Dark Universe**. Dark energy is about 75% and the Dark matter about 25% of the total universe.



SPACE DEBRIS

P.R.V.V. Narahari,
17761A2128.

Since the number of satellites in Earth orbit is steadily increasing, space debris will eventually pose a serious problem to near-Earth space activities if left unchecked, and so effective measures to mitigate it are becoming urgent. Equipping new satellites with an end-of-life de-orbit or orbital lifetime reduction capability could be an effective means of reducing the amount of debris by reducing the probability of the collisions between objects. On the other hand, the active removal of space debris and the retrieval of failed satellites by spacecraft are other possible measures. In reality the situation will be worse than the "no new launches" scenario because satellite launches will continue. Post-mission disposal (such as a 25-year decay rule) will help, but will be insufficient to prevent the self-generating phenomenon from happening. To preserve the near-Earth space for future generations, remediation measures, such as Active Debris Removal (ADR), must be considered.

What is space junk? Space junk, or space debris, is any piece of machinery or debris left by humans in space. It can refer to big objects such as dead satellites that have failed or been left in orbit at the end of their mission. It can also refer to smaller things, like bits of debris or paint flecks that have fallen off a rocket.

How much space junk is there? While there are about 2,000 active satellites orbiting Earth at the moment, there are also 3,000 dead ones littering space. What's more, there are around 34,000 pieces of space junk bigger than 10 centimeters in size and millions of smaller pieces that could nonetheless prove disastrous if they hit something else.

How does space junk get into space? All space junk is the result of us launching objects from Earth, and it remains in orbit until it re-enters the atmosphere. Some objects in lower orbits of a few hundred kilometers can return quickly. They often re-enter the atmosphere after a few years and, for the most part, they'll burn up - so they don't reach the ground. But debris or satellites left at higher altitudes of 36,000 kilometers - where communications andweather satellites are often placed in geostationary orbits—can continue to circle Earth for hundreds or even thousands of years.

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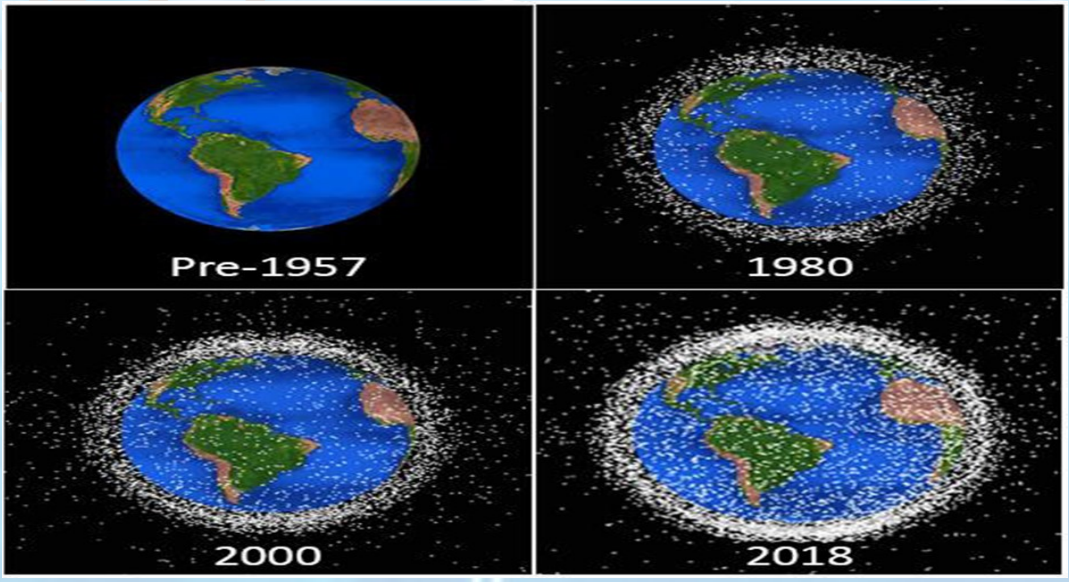
What risks does space junk pose to space exploration? Fortunately, at the moment, space junk doesn't pose a huge risk to our exploration efforts. The biggest danger it poses is to other satellites in orbit. These satellites have to move out of the way of all this incoming space junk to make sure they don't get hit and potentially damaged or destroyed. In total, across all satellites, hundreds of collision avoidance manoeuvres are performed every year, including by the International Space Station (ISS), where astronauts live.

How can we clean up space junk? This is tricky to enforce, though, because satellites can (and often do) fail. To tackle this problem, several companies around the world have come up with novel solutions. These include removing dead satellites from orbit and dragging them back into the atmosphere, where they will burn up. Ways we could do this include using a harpoon to grab a satellite, catching it in a huge net, using magnets to grab it, or even firing lasers to heat up the satellite, increasing its atmospheric drag so that it falls out of orbit.

Will space junk be a problem in the future? By making sure that satellites are removed from orbit in a reasonable amount of time once they are no longer active, we can mitigate the problem of space junk in the future. Earth's orbit allows us to study our planet, send communcations and more. It's important that we use it sustainably, allowing future generations to enjoy its benefits, too.



ANTHARIKSH

ARE THEY HEARING ?

- STORY ABOUT AREA 51 ....!

Jashuva Akumarthy,
18761A2101.

We are living on Earth since 50,000 years over 108 billion were born, investigation of the research was started from 50 years after industrial revolution, so all these aspects made us updated to 2020 in technology and we have started visiting planets soon, as we think of the future of travelling in space and development of human life. Consistently approaching the end of the Universe may occur, in the same way, a fear started in the people that we are living on earth similarly any living being ever or still living on the planets. For that fear, scientists sending signals to the species, and we call the species ALIENS. Thinking about them now arises a question that “Are They Hearing ?”. Some scientists say that they may be more advanced in the technology, they will come soon and others say they are already here. If we think about aliens are here we will get a place in our mind “AREA 51” the air base in Nevada, US, built in 1955 and still in use.

When we search in Wikipedia we get AREA 51 is the common name of highly classified United States Air force facility. The entire range covers more than 2.9 million acres of land. According to the US military, it represents "a flexible, realistic and multi-dimensional battle-space to conduct testing tactics development, and advanced training". The History says the origin of AREA 51 was unclear. It was created during the Cold War between the US and the Soviet Union as a testing and development facility for aircraft, including the U-2 and SR-71 Blackbird reconnaissance planes. Although it opened in 1955, its existence was only officially acknowledged by the CIA in August 2013. Four months after the CIA's disclosure, President Obama became the first US president to mention Area 51 publicly.

Although official information is sparse, it is believed that the US military continues to use Area 51 to develop cutting-edge aircraft. About 1,500 people are believed to work there, many commuting on charter flights from Las Vegas. Annie Jacobsen, who has written about the history of Area 51, told the BBC that some of the world's most advanced espionage programmes are at the site. "Area 51 is a test and training facility. The research began with the U-2 spy plane in the 1950s and has now moved on to drones" she says.

The secrecy surrounding Area 51 has helped fuel many conspiracy theories. Most famous is the claim that the site hosts an alien spacecraft and the bodies of its pilots, after they crashed at Roswell, New Mexico, in 1947. The US government says there were no aliens and the crashed craft was a weather balloon. Others claim to have seen UFOs above or near the site, while some say they have been abducted by aliens, and even experimented on, before being returned to Earth. And, in 1989, a man named Robert Lazar claimed he had worked on alien technology inside Area 51. He claimed to have seen medical photographs of aliens and that the government used the facility to examine UFOs. Area 51's association with aliens may have served as a useful distraction for the intelligence agencies. "As early as 1950 the CIA developed a UFO office to deal with the sightings of unidentified flying objects over Nevada. When people first saw the U-2 spy plane flying, no one knew what they were seeing," says Ms Jacobsen. "The CIA used that disinformation to their benefit by fostering an alien mythology."

If people ‘storm’ AREA 51 this happens : Matty Roberts, 20, created a Facebook event proposing that "we can run faster than their bullets". Let's see them aliens". Two million people said they were "going", although a linked festival has since been moved because of fears of a "**possible humanitarian disaster**".

Warning signs around Area 51 make it clear that no trespassers will be tolerated. The USAF warned that Area 51 "is an open training range for the US Air Force, and we would discourage anyone from trying to come into the area where we train American armed forces". It added: "The US Air Force always stands ready to protect America and its assets."

VERTICAL FARMING

D V Sunil Kumar,
19765A2103.

Farmers have grown food in roughly the same way for thousands of years: Planting seeds and watching them to grow; raising animals from birth to slaughter; hoping that nature provides them the right amounts of rain and sun. Now the Technology says that it has a better idea. Agriculture in its current form is bad for the Planet, it says- fields for crops and animal grazing occupy land where trees could be planted, and farming sucks up vast amount of increasingly precious water. Why not make food in a completely different way, may be growing lettuce in skyscrapers? One of the most trending modern technical farmings is "**Vertical Farming".**

Vertical Farming is the practice of growing crops in vertically stacked layers. It often incorporates controlled environment agriculture, which aims to optimize plant growth, and soilless farming. The modern concept of vertical farming was proposed in 1999 by "Dickson Despoiler". Some common choices of structures to house vertical farming systems include buildings, shipping containers, tunnels and abandoned mine shafts. Vertical Farming resulted in getting 10 times the crop yield than would receive through traditional farming methods. It typically uses a mix of natural light and artificial light. Artificial lighting is often LED-based and may be driven by a renewable power source such as solar power or wind turbines. There is a wide range of possible benefits when the farming is vertical. The benefits of growing indoor vary from the producers without the need of pest and disease control. Due to the closed system pests and diseases have less chance causing damage to a crop.

Another advantage is that produce can be produced year-round and can be produced close to its market, avoiding high transport costs and related CO_2 emissions. Vertical Farms can reduce land, fertilizer, water and pesticide use. In most cases, use of chemicals is not necessary.

How do Plants can be grown and get their Nutrients in Vertical Farming ?

And What are the Techniques used to grow the plants in Modern Vertical Farming?

DID YOU KNOW ?

SLOSHING...

Sloshing is the violent resonant fluid motion in a moving tank. When a fluid moves and interacts with its container, the dynamic pressures of such an interactions may cause large deformation in the container wall as well as the supporting structure.

REYNOLD'S EXPERIMENT

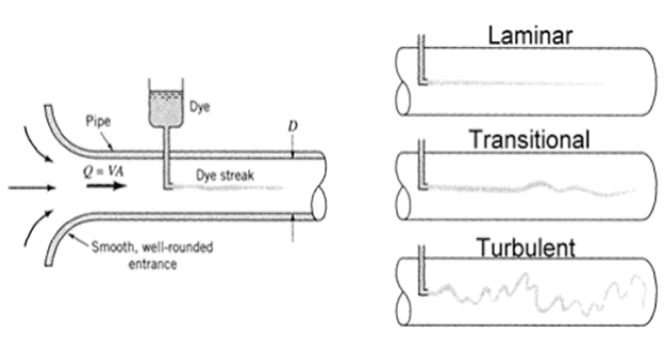
G. Roshitha Shankar, 19761A2111,
J. Sarika, 19761A2114.

It was introduced by Osborne Reynolds (1842–1912), who popularized it's use in 1883. In his 1883 paper Reynolds described the transition from laminar to turbulent flow in a classic experiment, in which he examined the behavior of water flow under different flow velocities using a small stream of dyed water introduced into the center of clear water flow in a larger pipe. The larger pipe was glass so the behavior of the layer of the dyed stream could be observed, and at the end of this pipe there was a flow control valve used to vary the water velocity inside the tube. When the velocity was low, the dyed layer remained distinct through the entire length of the large tube. When the velocity was increased, the layer broke up at a given point and diffused throughout the fluid's area cross-section. The point which this happened was the transition point from laminar to turbulent flow. The ratio of inertia forces to viscous forces, the parameter obtained is called the Reynolds number (Re), in honor of Osborne Reynolds

$$Re = \frac{inertia\ force}{viscous\ force} = \frac{\rho v D}{\mu}$$

where,

Re = Reynold's number
V = velocity of fluid
D = diameter of pipe
μ = dynamic viscosity of fluid
ρ = density



With respect to Reynolds number:
Re = 2300 transitional flow.

Laminar Flow (Re < 2300, only in pipe): Laminar flow may be described as an orderly pattern , i.e. in laminar flow the fluid moves in layer, or laminas, one layer sliding over an adjacent layer with only a molecular interchange of momentum. Such that the transverse exchange of momentum is insignificant.

Turbulent Flow (Re > 2300, only in pipe): The turbulent flow is a three-dimensional random phenomenon, exhibiting multiplicity of scales, possessing vorticity, and showing very high dissipation.

DID YOU KNOW ?

In zero gravity, a candle flame is round and blue

ULTRA-MODERN TECHNOLOGY IN INDIAN TEXTS

Meena Mahitha,
20761A5638.

VAIMANIKA SHASTRA-science of aeronautics. The Ancient Indian text Vaimanika Shastra was written by Maharishi Bhardwaj, a great Hindu sage. He is one of the finest physicians, economists and a renowned scholar.

The world got to know the airplanes in 1905 only after Wright brothers flew the first plane. Whereas, the science of aeronautics was analyzed and gifted to the world by Maharshi Bharadwaj named it, Vaimanika Shastra centuries ago. According to captain Anandbodas, a retired principal of a pilot training facility, Maharishi Bharadwaj spoke the existence of airplanes 7000 years ago. Maharshi revealed to venerable Sri. Pandit Subbarayasastri, who recorded in a Sanskrit manuscript by himself before World War-I. Vaimanika Shastra discusses about the planes that were used in ancient India by the sages. In this context, it explains that the aircrafts not only flew in the earth's environment but they travelled as inter-planetary crafts. The text also described many factors that influence the aviation like the aircraft designs, aerial routes, metals and alloys used, pilot's dressing, food, etc.,. It includes the definition of vimaana (airplane), pilot, the lessons for the pilot too. It is said that the pilot must be aware of 32 secrets and only such a person can be entrusted to fly the aeroplane. The secrets consists of many traits like expertise in mantrika, taantrika, drishya, adrishya, paroksha, know the direction of enemy approach and many more. The design of the aircraft is illustrated with the 31 parts with their locations, some of them include Vishwakriyaadarpana or mirror of outside views, Shaktyaakarshana or energy attracting mirror, Parivesha mechanism above the hood of the Vimana etc.

The scientific inventions that came latter in the 19th and 20th centuries like Electric motor and electric generator have also been elucidated in the age old Indian texts. Vaimanika shastra proved it once again that the Vedas and shastras have the most sophisticated scientific techniques and the advanced technology than which the present day world follows. These shastras were thought to be inexistent and claims made by Indians were marked as mere myths, until John Bruno Hare, founder of internet sacred text archive, had brought the sacred text into light. Though the authentic book is in Sanskrit language, GR Josyer translated it into English in 1991. Still, many of the scientists and civilized people suppose the vimana shastra to be pseudoscience. On contrary, an aerospace engineer at UC-Irvine tested a model present in vimana shastra and to the world's surprise, it worked and "It is a viable aerodynamic structure" he says. It can be firmly trusted that studying the Indian texts could lead us to create advanced space crafts.

I would like to wind this up by presenting my thought that the ancient astronaut theorists have mastered the scientific knowledge, hence walking in the footsteps of the exceptional scientists India ever had, world may create wonders in building ultra-modern engineering.

DID YOU KNOW ?

If you put a giant mirror 10 light years away from the Earth and look at it through a telescope, theoretically we'd see 20 years into the past.

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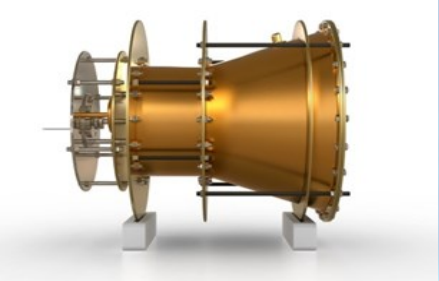
THE EM DRIVE JUST WON'T DIE

K Bharath Ganesh,
18761A2120.

The **Electromagnetic Propulsion Drive (EM Drive)** Invented by British scientist Roger Shawyer back in 1999. The EMDrive uses electromagnetic waves as 'fuel', creating thrust by bouncing microwave photons back and forth inside a cone-shaped closed metal cavity. More than 20 years after its introduction, the EmDrive is still being tested in labs around the world, including Defense Advanced Research Projects Agency (DARPA), Arington, USA. The original EmDrive, built by Roger Shawyer in 1998, is a sealed copper tube wider at one end than the other. According to Shawyer, if you bounce microwaves around inside the tube, they exert more force in one direction than the other, creating a net thrust without the need for any propellant. Theoretical model-based predictions of performance have led to new thruster designs, and these new designs may help inform future development and testing activities.



According to conventional physics, this should not happen. Put simply, closed systems like the proposed EmDrive should not generate thrust. The sticking point is the law of conservation of momentum, which says that inside a closed system momentum remains constant. Therefore, you cannot pull yourself up by your bootstraps. This result has remained solid for the past century and is accepted by many scientists. This is why most critics don't take the EmDrive seriously, and some mock it with comments about 'magic space unicorns' providing thrust, or 'EmDrive, more like BS Drive.' But several research groups, including NASA's Eagleworks and a team at Xi'an in China, tried it and got the same result, a small-but-distinct net force.

"many enthusiastic individuals want to believe it is a method that can be used to escape the constraints of known physical principles on space propulsion systems."

Brice Cassenti, an expert in advanced propulsion systems at the University of Connecticut, goes with the general view that the EmDrive does not seem plausible because it violates the law of conservation of momentum. "Only the electromagnetic waves emitted by the conical antenna can provide a momentum change, that can provide a force, and the force is several orders of magnitude too small," Cassenti told *Popular Mechanics*. ***McCulloch*** has developed a theory of Quantized Inertia (QI), which explains the effect and how it could help with human space travel. The big challenge of measuring a low level of thrust can be resolved by feeding the thrust equations into optimization software, McCulloch has designed a drive thousands of times more efficient than Shawyer's original. The current design is calculated to provide a thrust of about 0.012 N for one kW of power.

Presently, the EmDrive project is greenlit for Phase 2, DARPA told *Popular Mechanics* in February this year. Meanwhile, other teams are hoping to reach a final demonstration of the technology later this year. With two ongoing studies rigorously testing the EmDrive's "impossibility," the controversial drive that is hung around astro-engineering circles for more than two decades is only months away from its do-or-die moment.

For more details: [The EmDrive Just Won't Die | EmDrive Testing Results (popularmechanics.com)]

AEROHARVEST

REMEMBERING COLUMBIA

N. Ramanjaneyulu,
20761A5635.

Space shuttle Columbia launch: That Columbia's 28th Space mission, designated STS-107, was originally scheduled to launch on January11, 2001, but was delayed. Columbia finally launched on January 16,2003, with a crew of seven members. Eighty seconds to launch, a piece of foam insulation broke off from the shuttles propellant tank and hit edge of the shuttles left wing. Cameras focused on the launch sequence revealed the foam collision but engineer's couldn't pin point the location & extent of the damage. Their corners were not addressed in the two weeks that Columbia spent in orbit because NASA management believed that major damage had been caused.

Crew members:

- Commander: Rick D. Husband ,a U.S Air force colonel.
- Pilot: William C. Mc Cool, a U.S Navy commander.
- Payload commander: Michael P. Anderson, a U.S Air force lieutenant colonel.
- Payload specialist: Ilan Ramon , a Israeli Air force colonel.
- Mission specialist: Kalpana chawla, Aerospace engineer who was on her second space mission.
- Mission specialist: David M. Brown, a U.S Navy captain & flight surgeon .
- Mission specialist: Laurel Blair salton clark, a U.S Navy captain .

Space shuttle Columbia disaster: Columbia re-entered the earth's atmosphere on the morning February 1, 2003. It was not until 10 minutes later, at 8:53 A.M. the shuttle left wings leading edge had been damaged or were missing. Wind & heat entered the wing and blow it apart. The first debris began falling to the ground in west Texas near Lubbock at 8:58 A.M. One minute later, the last communication from the crew of 7 members at 9:01:10 A.M. The Crew members were killed no later than this point.

ISRO-WHAT'S NEXT

P. G. S. S. SUBHASH,
18765A2108.

CHANDRAYAAN-3

Chandrayaan-3 will be a mission repeat of Chandrayaan-2 but will only include a lander and rover similar to that of Chandrayaan-2. It will not have an orbiter. The Chandrayaan-2 orbiter continues to function optimally. The project is planned to be launched some time in 2022. Chandrayaan-3 is expected to retain the heritage of its predecessor while sporting a configuration that allows robust design and capacity enhancement for mission flexibility. It is estimated to be worth ₹615 crore rupees.

WHY SRIHARIKOTA...!?

Sriharikota is located away from populated areas, Coastal areas, accessible to transportation of heavy equipment to the launch site- rail, road and/or shipping. Earth rotates from west to east. Man made satellites also go round the earth in the same direction (west-east). When satellites are launched towards east the satellite gains incremental velocity of the earth velocity (460 m/s at the equator), as it leaves the earth's atmosphere. Communication satellites are put into geostationary orbit above the equator with zero inclination to the equatorial plane. To achieve this the launch site should be ideally located on the equator or close to the equator. Otherwise the satellite orbit would be inclined to the equatorial plane and it has to be manoeuvred for which extra fuel is required.

ANTHARIKSH

ADITYA-L1

Aditya-L1 is India's first solar mission. The outer layers of the Sun, extending to thousands of km above the disc (photosphere) is termed as the corona. It has a temperature of more than a million-degree Kelvin which is much higher than the solar disc temperature of around 6000K. How the corona gets heated to such high temperatures is still an unanswered question in solar physics. It was meant to observe only the solar corona. It is planned to be launched on the PSLV-C56 in late 2021 or early 2022. The Aditya-L1 mission will be inserted in a halo orbit around the L1 point (Lagrangian point 1), which is about 1.5 million km from Earth. The 1,500 kg satellite carries seven science payloads with diverse objectives, including but not limited to, the coronal heating, solar wind acceleration, coronal magnetometry, origin and monitoring of near-UV solar radiation (which drives Earth's upper atmospheric dynamics and global climate), coupling of the solar photosphere to chromosphere and corona, in-situ characterisations of the space environment around Earth by measuring energetic particle fluxes and magnetic fields of the solar wind and solar magnetic storms that have adverse effects on space and ground-based technologies. Aditya L1 will be able to provide observations of Sun's photosphere, chromosphere, and corona. In addition, an instrument will study the solar energetic particles' flux reaching the L1 orbit, while a magneto-meter payload will measure the variation in magnetic field strength at the Halo-orbit around L1. The Adithya L1 mission will enable a comprehensive understanding of dynamical process of the sun and addresses some of the outstanding problems in solar physics and heliophysics. As of July 2019, the mission has an allocated cost of ₹ 375.53 crore excluding launch costs.

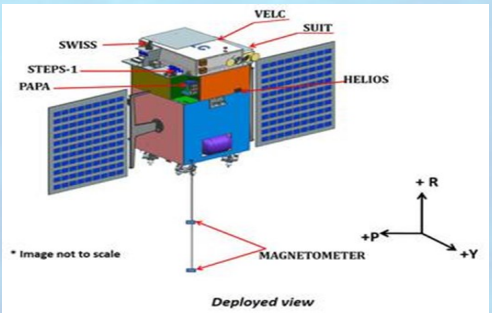
GAGANYAAN

It is an Indian crewed orbital spacecraft intended to be the formative spacecraft of the Indian Human Spaceflight Programme. The spacecraft jointly manufactured by ISRO, the Defence Research and Development Organisation (DRDO), and the Hindustan Aeronautics Limited (HAL). The objective of the mission is to carry three people in a 3.7-tonne capsule which will orbit the Earth at a 400 km altitude for up to seven days. The crewed vehicle was originally planned to be launched on ISRO's GSLV Mk III in December 2021, but this has since been delayed to no earlier than 2023. At present, the Indian astronauts are preparing for the mission in Russia, training in a simulated zero gravity environment to get accustomed to the harsh conditions of space. ISRO conducted its successful Re-entry and Pad Abort test on 18 Dec 2014 and 5 July 2018. It has also planned two uncrewed orbital test flights of the Gaganyaan capsule the first in December 2021 and the second, 2022.

DID YOU KNOW ?

Bumblebees are not designed to fly. It's body is too heavy for it's light wings, wings that should not able to keep it in the air. Bumblebees refuse to accept their limitations. It flies inspite of what its been told it cannot do. It knows their strength.

Be a bumblebee



Deployed view

IMPORTANCE OF COMPOSITE MATERIALS IN AEROSPACE/ AVIATION INDUSTRY

S. Indrasena Reddy

Asst. Professor

The composite materials are becoming the preferred material in many applications such as Aerospace, Automotive industry, Civil structures, etc. Composite materials are the combination of two or more elements with different properties. As a result, they offer desirable combination of proper-ties based on principle of combined action to meet a particular requirement which may not be possible if any one of the constituent used alone. The two materials work togeth-er to give the composite unique properties. One of the constituent is called as rein-forcement and the one which it is embed-ded is known as matrix.

Composite materials are important to the Aviation Industry because they provide structural strength comparable to metallic alloys, but at a lighter weight. Composite materials have played a major role in weight reduction, and hence they are used for both structural applications and compo-nents of all space-craft and aircraft from gliders and hot air balloon gondolas to fighter planes, space shuttle and passenger airliners. This leads to improved fuel effi-ciency and performance from an aircraft. Boeing's 787 Dreamliner will be the first commercial aircraft in which major struc-tural elements are made of compo-site mate-rials rather than aluminum alloys.

Since the birth of aviation, designers have continuously endeavored to improve the lift to weight ratios of aircrafts. the use of com-posite materials, as these enable designers to overcome the barriers created by using metals. They can be formed into various shapes to increase their strength and lay-ered with fibers running in a different di-rection, to allow designers to form struc-tures with unique properties. The develop-ment of next generation composite materi-als with light-weight and high-temperature re-sistance will help in designing high-performance, economical aircrafts.

A Brief History of Composite Materials in Aerospace: Fiberglass consisting of glass fibers embedded in a resin matrix is the most common composite material, and first came to prominence in the 1950s for designing Boeing 707 passenger jet. Com-pressor blades of the RB211 jet engine de-veloped by Rolls Royce in 1960s were made of carbon fiber, which is brittle and has unique fatigue behavior. Fibrous com-posite materials were originally used in small amounts in military aircraft in the 1960s and within civil aviation from the 1970s. Since the 1980s composites have primarily been used for secondary wing and tail components such as wing trailing edge panels and rudders. Each generation of new aircraft de-veloped by Boeing has had an increased percentage of composite material, with the highest being 50% in Boeing 787 Dreamliner. The major struc-tural elements of Boeing's 787 Dreamliner are made of more carbon 'sandwich' com-posites and advanced carbon laminate, a shift away from archaic fiberglass compo-sites.

Aramid fibers, on the other hand, are wide-ly used for constructing leading and trailing edge wing com-ponents and very stiff, very light bulkhead, fuel tanks and floors.

Advantages of Composites Usage in Aer-ospace: Some of the key benefits of using composites for aer-ospace applications in-clude the following:

• Weight reduction up to 20 to 50%.

• Single-shell molded structures provide higher strength at lower weight.

• High impact resistance. For instance, Kevlar (aramid) armor shields planes have reduced accidental damage to the engine pylons that carry fuel lines and engine controls.

• High thermal stability

ACHIEVEMENTS

LIST OF GATE-2021 QUALIFIED STUDENTS

S.No.	Reg. No	NAME	GATE Reg. No.	ALL INDIA-RANK	SCORE
1	**17761A2120**	**MALLAVARAPU CHERISHMA**	**AE21S26065096**	**83**	**640**
2	17761A2110	GIRAJALA SURYA KALAVATHI	AE21S26065308	586	373
3	17761A2114	KUCHIKA SRIHARI	AE21S26065208	545	387
4	17761A2132	SHAIK VANHAR ALI	AE21S26065320	605	369
5	19765A2106	RAGIREDDY SURESH	AE21S26065300	883	314

PLACEMENTS

S.No.	Reg. No	NAME	NAME OF THE COMPANY	PACKAGE
1	17761A2122	M.N.V.Bharadwaz	VEM Technologies Pvt. Ltd. Hyderabad	2.86 Lakh

If A equal SUCCESS then the formula is A equals x plus y plus z. With x being work , y is play and z is keeping your mouth shut...

-Albert Einstein

హృదయానికి లయతో లాలి పాడింది అమ్మ
మన ఊయలతో ఉసూలు అడింది అమ్మ
మమకారమును ముచ్చటతో అద్దింది అమ్మ
చిరకాలం చిరంజీవిల వర్ధిల్లు అనే దివేన అమ్మ
అమ్మ చేతి ముద్దకి సాటిరావు పరమాన్నాలు
తప్పు, ఒప్పులను అనురాగంతో సరిచేసే గురువు అమ్మ
తన నిద్రలో మన మెలుకువని పసిగట్టే బంధం అమ్మ
బాధలో భుజం ఇచ్చే స్నేహితురాలు, చీకటిలో వెలుగే అమ్మ
మరోజన్మ ఉన్న లేకపోయినా, జన్మజన్మలకి నువ్వే అమ్మ
ప్రపంచం నన్ను మరిచిన, ప్రాణం పోయినా తగ్గదు నీ ప్రేమ

మీ నజుముద్దీన్

ANTHARIKSH

THE SPACE...

DEPARTMENT OF AEROSPACE ENGINEERING

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