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

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.

PUBLICATION FREQUENCY:

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Send your articles to the following mail ID.

E-Mail: anthariksh.lbrce@gmail.com

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

Our dignity as humans is linked to our ability to make choices based on reason and free will. *"Truthfulness is the foundation of all human virtues"*. When you think about it, you can't truly practice any quality without being truthful in the first place. To be truly thankful requires you to be honest with yourself. So, truthfulness serves as the basis for all other qualities and should exist in all we do.

Life is littered with opportunities to not only speak the truth but also act in a truthful way. Whether you are an entrepreneur, author, teacher or student, your success will be based on how honest you are. We are at a point in time where companies built on corruption and exploitation are being identified and made to pay for their wrongdoings.

As an author, readers can pick up on authenticity. Your words don't have any effect if you do not mean them. You will not connect to your audience if you are not honest. And that goes for teaching too. There is a huge difference between a teacher that genuinely cares about their students and one who is there to make money. Be honest in your work. Be true to who you are, and others will trust you.

To be intelligent and understand, how the world works, you need to know the truth. Knowledge is power. So, you need to be a life long learner, taking every opportunity you get to learn. ***When you put the search for truth at the centre of your education, you become more curious.*** You question what you are told. You explore, learn, and create. In this way, the more truth you know, the better your decisions are and the easier it is to be in control of your life.

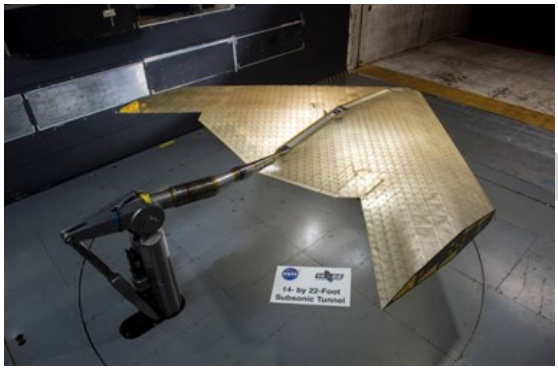
To be happy, you need to be true to yourself. Do not chase dreams of others when choosing your career, what to study, and how to live - you will not be happy unless you do what you feel is right. If you choose a career because it pays well or looks cool, you will most likely end up unfulfilled and unhappy. Trying to live a lifestyle to impress others, leaves you empty. But when you reflect on what you truly want in life and live according to that, you are happier and eventually more successful. Sincerity, integrity, and being true to oneself are attractive qualities that make you stand out in a world of self-interest, greed, and ignorance. To live a happier and more fulfilling life we need to enhance our character, and that starts with *truthfulness*.

Dr. P. LOVARAJU

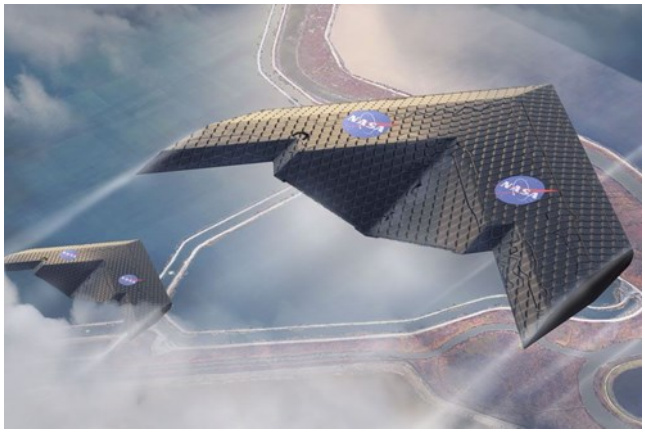
A NEW KIND OF AEROPLANE WING

Sk. Mohammad Arshad,
20761A5647

At MIT-Massachusetts Institute of Technology and NASA have developed and tested a new kind of Airplane wing which is assembled from hundreds of tiny identical pieces welded together and covered with a thin polymer layer. The wing is capable of changing its shape automatically thereby adjusting itself to the configuration optimal for the different stages of the flight like for take-off, landing, etc. Controlling the plane's flight will thus improve the efficiency. Traditional airplane wings made of metal and composite materials, so they are fairly heavy. They also involve moving parts, like flaps and ailerons which are tilted up & down. The new wing is made up of both stiff and flexible components. Each of the individual pieces is made from a polymer material. It is much lighter than regular aircraft wings thereby providing much more energy efficient aircraft design. The structure is made of 'thousands of tiny triangles of matchstick - like struts'. The Lattice-Like Wing is covered with a thin sheet of polymer and has a density of just 5.6 kilograms per



Cubic meter Which is much Lesser In Comparison With rubber having a density of about 1,500 kilograms per Cubic meter. The same system could be used to make other structures as well, like the wing blades of wind turbines, where it can avoid the issue of assembly of blades on-site and the problems of transporting long blades. A similar design can be used to develop space structures, and also be useful



for bridges and other high-performance structures. The wing was tested in the NASA wind tunnel and is described in a paper published in the journal smart materials and structures. While this version was hand -assembled by a team of graduate students, future iterations could easily be built by a swarm of small, simple autonomous assembly robots. Each individual piece is built by using injection molding and a complex 3D mold ; a single piece takes only 17 seconds to create. According to researchers, there's only a one time investment in tooling, after that the parts are cheap.

DIAMOND AIRFOIL

B. Kusuma
20761A5606

The flow over a “DIAMOND” Shaped Airfoil in terms of Lift, Drag, L/D ratio and flow velocity over it at supersonic speed, Mach 2 at different angle of attacks. Diamond airfoils can be proved to be more efficient Airfoils than other Airfoils at supersonic speeds. Diamond Airfoils experience lower drags at supersonic speeds as compared to circular Airfoils. Hence it is very important to study the Aerodynamic characteristics of the Diamond Airfoil as it can solve the problem of high drag at supersonic speeds.

Supersonic aircraft have diamond shaped airfoil...

Supersonic Aerodynamics are more complex that subsonic aerodynamics. And also aerodynamics have different behavior to subsonic flow. Without getting really into supersonic aerodynamics, this means a supersonic wing will be developing lift using shockwaves and expansion waves on the wing. A sharp point on the leading edge will cause a fairly neat shock wave, a blunt, rounded one for subsonic flight won't work so well. The middle point of the diamond results in an expansion wave.

Air passing through a shock is compressed, so pressure is higher after the shock than before. Pressure rise varies with angle of flow relative to the shock-if the airfoil has positive angle of attack, the shock above the wing produces less pressure rise than the shock below the wing, due to the shallower angle relative to the airflow. The 'break' at the diamond ridge at approximately Mid-chord generates a very thin shock wave on both sides of the wing and the recovery after the shock manifests as an area of higher pressure at the shock traveling boundary & which dissipated as it travels aft. The pressure distribution in the trailing expansion region alters with AOA. At positive AOA the under-wing pressure is higher, resulting in positive lift.

Supersonic flow over a diamond-shaped airfoil is one of the classic canonical cases for demonstrating the application of shock expansion theory. As the supersonic flow moves over the airfoil, it encounters both oblique shock waves and expansion waves. Though the flow-field is quite complicated, the shock-expansion theory is able to correctly estimate the flow variables such as pressure, Mach number, etc., in different regions of the flow.

POWER NAP

RNVK Pavan
18761A2142

Have you ever wondered how the gigantic tycoons like Jeff Bezos and Elon Musk manages their hectic work load and schedule. They fell short to sleep sometimes, but how do they manage? How do they get rid off this? How do they be so enthusiastic all day along? All do they do is technique called "Power Nap". Yes, it is also called as short sleep. Now-a-days it has been quite common and almost followed by every entrepreneur as well as doctor's and many of us.

What is Power Nap? Why is it so important?

POWER NAP: A power nap or cat nap is a short sleep that terminates before deep sleep (slow-wave sleep; SWS). A power nap is intended to quickly revitalize the sleeper. Cornell University social psychologist "James Maas" coined the term. A ten minutes of mental activity equals to three hours sleep.

- A power nap is a short nap that provides the energy boost you need to function for the rest of your day. Power napping has plenty of benefits. First, napping contributes to your overall health. Taking naps boosts the immune system and reduces stress levels.
- Research shows that taking one to two naps per week can also reduce your risk of cardiovascular diseases such as heart attack, heart failure, or stroke. As an employee, a short snooze can increase your alertness and productivity.

- A NASA study found that after a 26-minute nap, pilot performance improved by 34%.
- Naps also promote creative problem solving and help strengthen memories.
- Because naps have such a positive impact, napping in the workplace is a trend employers are picking up on. Some companies even provide their employees with designated places to sleep on the job.
- Not only in recent year's power naps has been practiced earlier also. It is mostly used by Winston Churchill, Albert Einstein, Leonardo Da Vinci, Thomas Alva Edison, and few people. Winston Churchill said that "Nature has not intended mankind to work from eight in the morning until midnight without that refreshment of blessed oblivion which, even if it only lasts twenty minutes, is sufficient to renew all the vital forces… Don't think you will be doing less work because you sleep during the day. That's a foolish notion held by people who have no imaginations. You will be able to accomplish more. You get two days in one — well, at least one and a half."
-

WHEN TO TAKE A POWER NAP:

For typical day workers, the best time for a power nap is before or during the time you'd usually experience a post-lunch slump, such as around 12:30 or 2:00 p.m. People working a traditional schedule don't want to nap too late in the day because it could cause them to struggle to fall asleep at night. However, shift workers may benefit from a nap in the middle of the night or early in the morning.

HOW TO TAKE A POWER NAP :

Find a Good Sleep Environment: It's best to keep your sleep environment dark, quiet, and cool. If you work from home, you can lie down in your bedroom. If you work in an office, you may have to improvise. Draw the blinds in your office or rest in your vehicle. If your company offers a sleep space, take advantage of it.

Keep Your Space Distraction-Free: When naptime rolls around, set your phone aside. You want to avoid scrolling and get to sleeping. Plus, the blue light emitted from a phone screen can make falling asleep more difficult.

If you're in an office, schedule yourself as busy during your naptime. Put a sign on the door to discourage any unwanted knocking.

Keep Your Eyes Closed

If you struggle to fall asleep at nap time, use it as an opportunity to rest and relax. A brief period of quiet can help you recharge and refocus. Consider trying meditation to achieve relaxation during your rest time. You may find it easier to actually fall asleep over time, as your body adjusts to your new midday rest schedule.

HOW LONG SHOULD BE A POWER NAP?

A power nap is most effective when it's short and sweet. Try keeping your power nap length between 10 and 20 minutes for best results. The trick to a power nap is getting your body through stage 1 sleep and into stage two sleep but not into stage three sleep.

During stage one sleep, your body slows down. This stage transitions you from wakefulness to sleep and is only a few minutes long. Stage two is a light sleep in which your muscles relax and your breathing and heartbeat slow down even more. If you nap for too long, you risk entering stage three sleep. You sleep deeper in stage three sleep and may struggle to wake up as a result. This stage ensures you feel refreshed in the morning after a full night of sleep. Keep in mind if you nap into stage three and then wake up, you might feel groggy or more even tired than you were before taking the nap.

FUN FACT

No number before 1,000 contains the letter A
Some of these fun facts will have you counting. But there are plenty of E's, I's, O's, U's, and Y's

DEFIANT X

Jobin Dova
18761A115

The fastest, most maneuverable, most survivable military helicopter in history is on the horizon. Thirty aircraft, carrying 360 soldiers, lift into the air and disappear into the night. They fly low and fast, grouped in six formations. The mission is to secure a sensitive infrastructure complex deep in enemy territory. To get to the landing zone, they will have to fly twice the length of New Jersey, through a web of enemy air defense. Once at the landing zone, soldiers will travel on foot. The helicopters weave through tree lines, a valley, then over a riverbed — too low to show up on radar and too fast for adversaries to even get a shot off. The last mile of flight is the most dangerous. The landing zone is surrounded by hostile forces. Pilots must maneuver the aircraft on the spot to land quickly and smoothly — and then get out the second soldiers disembark. Speed, reach and maneuverability are critical to mission success and to ensure everyone comes home. Someday, this imagined scenario could be DEFIANT X in action. DEFIANT X is an advanced utility helicopter and air assault weapon system that can fly low and fast, land quickly, deliver soldiers to the objective area (known as the "X") and get out — all while evading the enemy in complex terrain. It will revolutionize the Army's air assault capability and be the fastest, most maneuverable and most survivable military helicopter in history. Recently, Sikorsky and Boeing released details about the new aircraft, which is the team's entry for the U.S. Army's Future Long Range Assault Aircraft competition, a top modernization priority for the service. The Army is expected to issue a request for proposals later this year, with contract award anticipated in 2022.Nate Morgan is one of the Boeing engineers working on the DEFIANT X program. His team is involved with system integration, analysis and safety.

"Our role is to ensure all the parts and systems of the aircraft work together, safely and efficiently," he said. Morgan has worked on vertical lift programs since 2013, but he is especially excited about DEFIANT X because it is a clean-sheet aircraft that incorporates state-of-the-art technology and innovation. According to Morgan, four aspects of DEFIANT X make it exceptional. Coaxial Rotor System. Two sets of composite rotors are stacked atop each other. The rotors' rigidity, along with the pusher prop on the rear of the helicopter, enables DEFIANT X's game-changing speed, exceptional maneuverability, and enhanced acceleration and deceleration. DEFIANT X will fly at speeds exceeding 230 knots, twice as fast as the Black Hawk helicopter it is designed to replace.

"It's an air assault weapon system with all the advantages of a traditional helicopter and the speed, range and payload of an airplane," said Morgan.

ILLUSTRATION: SIKORSKY-BOEING

Fly-By-Wire Flight Controls: Advanced flight control software and pilot interfaces coupled with redundant control surfaces reduce the workload for aircrew and provide the framework for autonomous operation.
Composite Fuselage: Advanced materials and manufacturing techniques reduce weight, vibration effects and corrosion in harsh environments.

Model-Based Engineering: The tools and processes used to develop DEFIANT X are fully model based. Model-based engineering (MBE) uses a digital system model integrated during all stages of the development in order to form a robust digital thread of program data, which increases first-time quality and safety. This approach also enables early discovery of issues during development; facilitates rapid technology insertion later in the program; and forms the basis of digital twins, which can be used to support the aircraft once fielded.

HIGH EARTH ORBIT

Dr. P Lovaraju

When a satellite reaches exactly 42,164 km from the center of the Earth (about 36,000 km from Earth's surface), it enters a sort of "sweet spot" in which its orbit matches Earth's rotation. Because the satellite orbits at the same speed that the Earth is turning, the satellite seems to stay in place over a single longitude, though it may drift north to south. This special, high Earth orbit is called geosynchronous. A satellite in a circular geosynchronous orbit directly over the equator (eccentricity and inclination at zero) will have a geostationary orbit that does not move at all relative to the ground. It is always directly over the same place on the Earth's surface. A geostationary orbit is extremely valuable for weather monitoring because satellites in this orbit provide a constant view of the same surface area. When you log into your favorite weather web site and look at the satellite view of your hometown, the image you are seeing comes from a satellite in geostationary orbit. Every few minutes, Geostationary satellites like the Geostationary Operational Environmental Satellite (GOES) satellites send information about clouds, water vapor, and wind, and this near-constant stream of information serves as the basis for most weather monitoring and forecasting. Because geostationary satellites are always over a single location, they can also be useful for communication (phones, television, radio). Built and launched by NASA and operated by the National Oceanic and Atmospheric Administration (NOAA), the GOES satellites provide a search and rescue beacon used to help locate ships and airplanes in distress. Finally, many high Earth orbiting satellites monitor solar activity. The GOES satellites carry a large contingent of "space weather" instruments that take images of the Sun and track magnetic and radiation levels in space around them. Other orbital "sweet spots," just beyond high Earth orbit, are the Lagrange points. At the Lagrange points, the pull of gravity from the Earth cancels out the pull of gravity from the Sun. Anything placed at these points will feel equally pulled toward the Earth and the Sun and will revolve with the Earth around the Sun.

Of the five Lagrange points in the Sun-Earth system, only the last two, called L4 and L5, are stable. A satellite at the other three points is like a ball balanced at the peak of a steep hill: any slight perturbation will push the satellite out of the Lagrange point like the ball rolling down the hill. Satellites at these three points need constant adjustments to stay balanced and in place. Satellites at the last two Lagrange points are more like a ball in a bowl: even if perturbed, they return to the Lagrange point.

- The first Lagrange point is located between the Earth and the Sun, giving satellites at this point a constant view of the Sun. The Solar and Heliospheric Observatory (SOHO), a NASA and European Space Agency satellite tasked to monitor the Sun, orbits the first Lagrange point, about 1.5 million kilometers away from Earth.
- The second Lagrange point is about the same distance from the Earth, but is located behind the Earth. Earth is always between the second Lagrange point and the Sun. Since the Sun and Earth are in a single line, satellites at this location only need one heat shield to block heat and light from the Sun and Earth. It is a good location for space telescopes, including the future James Webb Space Telescope (Hubble's successor, scheduled to launch in 2014) and the current Wilkinson Microwave Anisotropy Probe (WMAP), used for studying the nature of the universe by mapping background microwave radiation.
- The third Lagrange point is opposite the Earth on the other side of the Sun so that the Sun is always between it and Earth. A satellite in this position would not be able to communicate with Earth.
- The extremely stable fourth and fifth Lagrange points are in Earth's orbital path around the Sun, 60 degrees ahead of and behind Earth. The twin Solar Terrestrial Relations Observatory (STEREO)

spacecraft will orbit at the fourth and fifth Lagrange points to provide a three-dimensional view of the Sun.

POSITIVE THOUGHTS

~~A dream came true….!!!!!. And a new dream born.~~

Nuvvula Uma Maheshwar Rao
18761A2136

At the time of 2018, a young brain at a dormitory of plus two (+2) with playful thoughts and having dreams about his future had many things to do in his day-to-day activities like listening to lectures, preparing notes, completing tasks to train and do all of the best skill and knowledge to show at a competitive exam in which many young brains like this is trying to gain entrance to the country's most remarkable colleges and make his parents and teachers and institution proud among all 1,259,000 brains. At that time there enters the problem with the fellow students, every day and evening all the 60 students in the class without listening to the care takers they used to scream all the time even in presence of the trainer in front them delivering the lecture. This brain was totally confused and additional to that malpractice so, this brain didn't get to know what to do to fulfill the short-term goal at that time the young aspirant is possessing. This brain stopped working on the goal and started working on problem faced by it. This brain is having a problem of overthinking on every problem it faces, as the days passed there is a certain matured brain (Father) said that "Stop complaining on everything, Start working in your own way" to avoid all the problems and to reach your goal to make everyone proud around you and a communication skills trainer said that "Always don't forget your parents hard-work". Problems and failures are also the lessons to learn. Listening to the trainer this brain started working days and nights with a little amount of sleep thinking it's the smart work it is doing at that time, what happens to the body if the brain is continuously working? It will get illness to do the work what brain wanted to do. The same result affected to this brains body, At the time its suffering that brain dreamt of something that may be this can stop the students from screaming, yelling and all the funny and sweet memories they are creating with their friends and start working on their goals without any malpractice and believing in their own skills.

That is, if all the young minds see how their parents are working hard to give these people the education and knowledge to survive in this world one day without their support, 'Standing on their own legs as their foot as the base to support them'. Why can't my institute give this as an assignment to them? One day 25/03/2020, came without saying that this is the dream you had long before is now in front of you. The country is in complete lockdown up to a year, it is good everyone having their time with the families. As the days going on the head of the family and the young mind which is now maturing by facing and witnessing all the issues and around it having a conversation about the future of this young mind and how he is running the family.

Now, both father and the young brain they are dreaming their own dream together how this young brain is going to see the future.

From the initial days of the schooling of the no one has spent these many days at your home Once a wise man said "learn everything you can from your experience, getting negative is good these days, but think positive keeps your cool always with you.

what have we learnt from your best dream and worst nightmare?

Have you seen it.? Is your dream come true.? What have you learnt from those days.?

https://docs.google.com/forms/d/e/1FAIpQLScdlQHsMbQFneBhgnU2Rju9LYZKYTfds6XxAWBZ39BwS7Zi1w/viewform?usp=sf_link

A BRIEF HISTORY OF MOON EXPLORATION

K. ISHMAEL
18761A2127

In the 1950s, the Cold War triggered a race to visit the Earth's moon with flyovers, robots, and manned missions. Since humans look towards the sky, the moon is a centre of fascination. You could always see the mottled, crimson face of your cosmic partner. Later, telescopes sharpened our views of its bumps, ridges, and relict lava seas. Finally, in the middle of the 20th century, people visited the Earth's moon and saw its surface up close. Since then, a volley of spacecraft has studied our nearest celestial neighbour, swooping low over its dusty plains, and surveying its curious far side.

Early forays into space
The Cold war:

The earliest forays into lunar exploration were a product of the ongoing Cold War, when the U.S. and Soviet Union sent uncrewed spacecraft to orbit and land on the moon.

Soviet Union

The Soviets scored an early victory in January 1959, when Luna 1, a small Soviet sphere bristling with antennas, became the first spacecraft to escape Earth's gravity and ultimately fly within about 4,000 miles of the moon's surface.

Later in 1959, Luna 2 became the first spacecraft to make contact with the moon's surface when it crashed in the Mare Imbrium basin near the Aristides, Archimedes, and Autolycus craters. That same year, a third Luna mission captured the first, blurry images of the far side of the moon—where the rugged highland terrain is markedly different from the smoother basins on the side closest to Earth.

In 1966, the Soviet spacecraft Luna 9 became the first vehicle to land safely on the lunar surface. Stocked with scientific and communications equipment, the small spacecraft photographed a ground-level lunar panorama. Later that year, Luna 10 launched, becoming the first spacecraft to successfully orbit the moon.

United States

Then, the U.S. got in the game with nine NASA Ranger spacecraft that launched between 1961 and 1965 and gave scientists the first close-up views of the moon's surface. The Ranger missions were daring one-offs, with spacecraft engineered to streak toward the moon and capture as many images as possible before crashing onto its surface. By 1965, images from all the Ranger missions, particularly Ranger 9, had revealed greater detail about the moon's rough terrain and the potential challenges of finding a smooth landing site for humans. NASA also landed a spacecraft on the moon's surface that year with the first of its surveyor space probes, which carried cameras to explore the moon's surface and soil samplers to analyse lunar rock and dirt. Over the two years that followed, NASA launched five Lunar Orbiter missions that were designed to circle the moon and chart its surface in preparation for the ultimate goal: landing astronauts on the surface. These orbiters photographed about 99 percent of the moon's surface, revealing potential landing sites, and paving the way for a giant leap forward in space exploration.

DID YOU KNOW?

Scholars think Hernán Cortés brought the seeds in 1519 with the intent of the fruits being used ornamentally in gardens. By the 1700s, aristocrats started eating tomatoes, but they were convinced the fruits were poison because people would die after eating them. In reality, the acidity from the tomatoes brought out lead in their pewter plates, so they'd died of lead poisoning.

Humans on the moon

At the time, NASA was racing to fulfil a presidential promise: In 1961, President John F. Kennedy committed the United States to landing a person on the moon before the decade was complete. The Apollo program, by far the most expensive spaceflight endeavour in history, kicked off that year, and by the time it ended in 1972, nine missions and 24 astronauts had orbited or landed on the moon. Perhaps the most famous of those, Apollo 11, marked "the first-time humans had stepped on another world".

On July 20, 1969, Neil Armstrong and Edwin "Buzz" Aldrin touched down in the Sea of Tranquillity in the lunar lander Eagle, while astronaut Michael Collins orbited the moon in the command module Columbia. Armstrong, who pressed the first boot prints into the moon's surface, famously said, "That's one small step for a man, one giant leap for mankind." The pair stayed on the moon's surface for 21 hours and 36 minutes before rendezvousing with Collins and heading back to Earth.

Each mission after Apollo 11 set new milestones in space travel and lunar exploration. Four months after the first humans reached the moon, Apollo 12 touched down, achieving a much more precise landing on the moon. Apollo 13 narrowly avoided a near-disaster when on-board oxygen tanks exploded in April 1970, forcing the crew to abort a planned moon landing. All three survived. During the third lunar landing, in January 1971, Apollo 14, commander Alan Shepard set a new record for the "farthest distance travelled on the moon: 9,000 feet". He even lobbed a few golf balls into a nearby crater with a makeshift 6-iron. Apollo 15, launched in July 1971, was the first of three missions capable of a longer stay on the moon. In the course of three days spent on the lunar surface, achievements included collecting hundreds of pounds of lunar samples and traveling more than 17 miles in the first piloted moon buggy.

Apollo 16 and Apollo 17 in 1972 were the two most recent crewed missions to the moon, and Russia's Luna-24 crewless spacecraft in 1976 was the last to land until the following century. Samples collected during these lunar explorations produced huge amounts of knowledge about the geology and formation of the Earth's moon. After the dramatic accomplishments of the 1960s and 1970s, the major space agencies turned their attention elsewhere for several decades. So far, only 12 humans all Americans and all men have set foot on the moon.

Moon curiosity builds again

It wasn't until 1994 that the moon came back into focus for the United States, with a joint mission between NASA and the Strategic Defense Initiative Organization. The Clementine spacecraft mapped the moon's surface in wavelengths other than visible light, from ultraviolet to infrared. Hiding in the more than 1.8 million digital photos it captured were hints of ice in some of the moon's craters.

In 1999, the Lunar Prospector orbited the moon, confirming Clementine's discovery of ice at the lunar poles, a resource that could be crucial for any long-term lunar settlement. The mission's end was spectacular: Prospector slammed into the moon, intending to create a plume that could be studied for evidence of water ice, but none was observed. Since 2009, the Lunar Reconnaissance Orbiter has taken high-resolution maps of the lunar surface. Between 2011 and 2012, it was joined in orbit by NASA's twin GRAIL probes named Ebb and Flow which mapped the moon's gravitational field before intentionally crashing into a region near the lunar north pole.

The recent and future status of moon exploration

NASA isn't the only space agency with a surging interest in the moon. Within the last two decades, lunar exploration has gone truly international and even commercial.

In 2007, Japan launched its first lunar orbiter, SELENE. China launched its first lunar spacecraft the same year, and India followed suit in 2008. By 2013, China became the third country to successfully land on the lunar surface, when its Chang'e-3 spacecraft deployed the Yutu rover. More milestones—both for better and worse—were achieved in 2019. In January, another Chinese lander, Yutu-2, made history by becoming "the first rover to touch down on the lunar farside". Meanwhile, India's second lunar orbiter, Chandrayaan-2, unsuccessfully deployed a small lander, Vikram, on the lunar surface that year.

And in April 2019 Israel aimed for the moon with the launch of its Beresheet spacecraft. Unfortunately, even though the spacecraft achieved lunar orbit, it crashed during its attempt to land. Unlike other spacecraft that came before it, Beresheet was built largely with private funding, heralding a new era of lunar exploration in which private companies are hoping to take the reins from governments.
NASA, for one, is partnering with commercial spaceflight companies to develop both robotic and crewed landers for lunar exploration; among those companies are SpaceX, Blue Origin, and Astrobotic. Amazon CEO Jeff Bezos and Blue Origin have announced the goal of establishing "a lunar base near the south pole" where people could work and live. SpaceX is developing "a spacecraft capable of ferrying astronauts to the moon and Mars" and is also developing a plan to bring tourists to lunar orbit.

And not to be overshadowed by the commercial sector, NASA is planning its own ambitious return to the moon. The agency's Artemis program, a sister to the venerable Apollo project, aims to put the first woman and the next man on the moon by 2024. The backbone of Artemis is NASA's Orion space capsule, currently in development, although the agency is also partnering with private companies to achieve its goal.

If Artemis goes well, then the near future might also see NASA and partners developing a space station in lunar orbit that could serve as a gateway to destinations on the moon's surface—and beyond.

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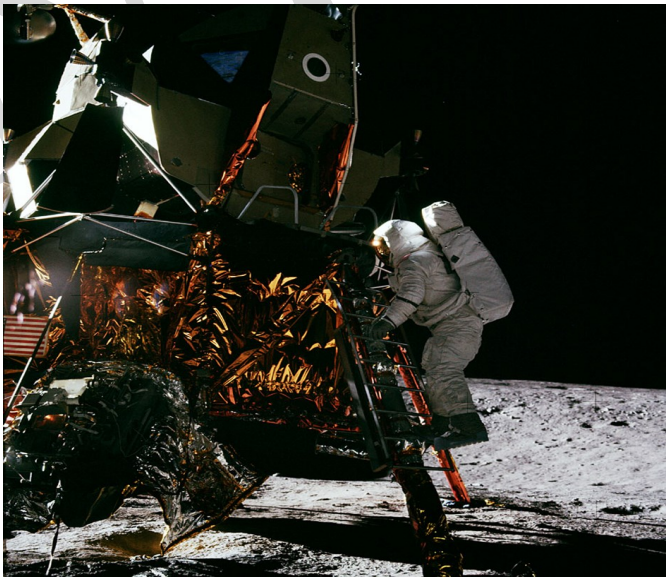

APOLLO 12

Apollo 12 astronaut Alan Bean descends from the lunar module Intrepid. When it reached the Ocean of Storms on November 19, 1969, Apollo 12 became the second manned mission to land on the moon. As he walked on the moon for the first time, Commander Pete Conrad famously said, "Whoopie! Man, that may have been a small one for Neil, but that's a long one for me."

MOON BUGGY

Apollo 17 mission Commander Eugene Cernan checks out the lunar roving vehicle (LRV) at the Taurus-Littrow landing site in December 1972. LRVs, also called moon buggies, are electric vehicles designed to expand astronauts' range of exploration on the low-gravity surface of the moon. The east end of the moon's South Massif rises in the background at right.

A GIANT MAGNETIC TUNNEL

From the collections of Chief Editor and Editors…

Our planet, along with the rest of the solar system and some nearby stars, may be trapped inside a giant magnetic tunnel — and astronomers don't know why.

A tube of vast magnetized tendrils, 1,000 light-years long and invisible to the naked eye, may encircle the solar system, astronomers propose in a new paper. Jennifer West, an astronomer at the Dunlap Institute for Astronomy and Astrophysics at the University of Toronto, made the proposal after an investigation into the North Polar Spur and the Fan Region — two of the brightest radio-emitting gas structures in our galactic neighborhood — revealed that the two structures might be linked even though they are located on different sides of the sky. "If we were to look up in the sky, we would see this tunnel-like structure in just about every direction we looked — that is, if we had eyes that could see radio light," .

The curving tendrils — which are made of both charged particles and a magnetic field, and resemble long, thin ropes — project outward from the North Polar Spur and the Fan Region. Not only could the strange cosmic ropes link the two regions, but they could form something akin to "a curving tunnel" where the tendrils are like "the lines formed by the tunnel lights and road lane marker," the researchers said.

This would place our solar system along with a small chunk of the Milky Way, inside the giant magnetic tunnel.

The North Polar Spur, which appears as an enormous yellow cloud stretching above the plane of our galaxy, is a gigantic crest of gas emitting X-rays and radio waves. The Fan Region is less well understood but produces a lot of polarized radio waves. Though these unusual regions in space were discovered in the 1960s, scientific understanding of them remains patchy, and most previous studies described each structure separately. But by plugging data from radio wave observations into a new computer model, West and her colleagues mapped out the probable length and position of the gigantic ropes. The model estimated that the ropes were roughly 1,000 light-years long and that the structures were most likely about 350 light-years from the solar system. West says that the inspiration for her model came when she was a student, seeing the tendrils upon her first inspection of a map of the radio sky. Years later, she was told of a 1965 paper which speculated on the strange radio signals. "Based on the crude data available at this time, the authors (Mathewson & Milne) speculated that these polarized radio

West said in the statement. "That paper inspired me to develop this idea and tie my model to the vastly better data that our telescopes give us today."

It's not just in our part of the universe that these cosmic filaments have been spotted. In fact, they're ubiquitous throughout the galaxy and can radiate many different types of light. The researchers note in their study that filamentary structures have been seen emitting optical light near remnants of gigantic stellar explosions, or supernovas; in molecular clouds; and in the walls of "galactic chimneys" — enormous cavities created by multiple supernova explosions, through which hot gas from the galactic disk flows to the galactic halo. In fact, some studies have even gone as far to suggest that spiraling filaments of molecular gas could be the "bones" that form the "skeleton" of the Milky Way. The scientists' next steps are to confirm their findings by taking detailed observations of the regions they simulated, and to then use those observations to refine their model. West hopes that, by deepening the model, she can improve astronomers' ability to understand other magnetic filaments spotted around our galaxy. Another intriguing possibility is that the invisible magnetic ropes could be a small part of a much larger galactic structure. "Magnetic fields don't exist in isolation. They all must connect to each other," West said. "So a next step is to better understand how this local magnetic field connects both to the larger-scale galactic magnetic field and also to the smaller-scale magnetic fields of our sun and Earth. "I think it's just awesome to imagine that these structures are everywhere, whenever we look up into the night sky," West added.

DID YOU KNOW?

There was a real John Chapman who planted thousands of apple trees on U.S. soil. But the apples on those trees were much more bitter than the ones you'd find in the supermarket today. "Johnny Appleseed" didn't expect his fruits to be eaten whole, but rather made into hard apple cider.

FAQ IN INTERVIEWS

1. Self introduction or Introduce yourself.
2. What is your favorite subject?
3. What is so special about Aerospace Engineering?
4. Why did you choose Aerospace Engineering?
5. How does an aeroplane fly?
6. Why should we hire you?
7. What are the biggest challenges you have faced?
8. What are your strengths?
9. What are your weaknesses?
10. Why do you want to shift to IT sector?
11. Are you a team player or an Ideal person?
12. What are the qualities a leader should have?
13. What is your aim/goal?
14. Where do you see yourself in next 5 years?
15. Where do you see yourself in next 10 years?
16. How do you rate yourself about your performance in this interview on a scale of 10?
17. What are your biggest achievements so far?
18. How do you describe about your personality?
19. What made you to choose our company?
20. What about the Latest trends in your area?
21. Are you a good person?
22. What is your motivation?

Student Placements

In COGNIZANT

NAME	REGD. No
K. PREETHAM RAJ	18761A2123
D. SRI SIVA SAI KRISHNA	18761A2111
M. NEERAJ VAMSI	18761A2130
CH. MADHAV CHAITANYA	18761A2131
VENKAT SAI	19765A2102
SURESH	19765A2106
M. VEERA SWAMY	18761A2129

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Placed as
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