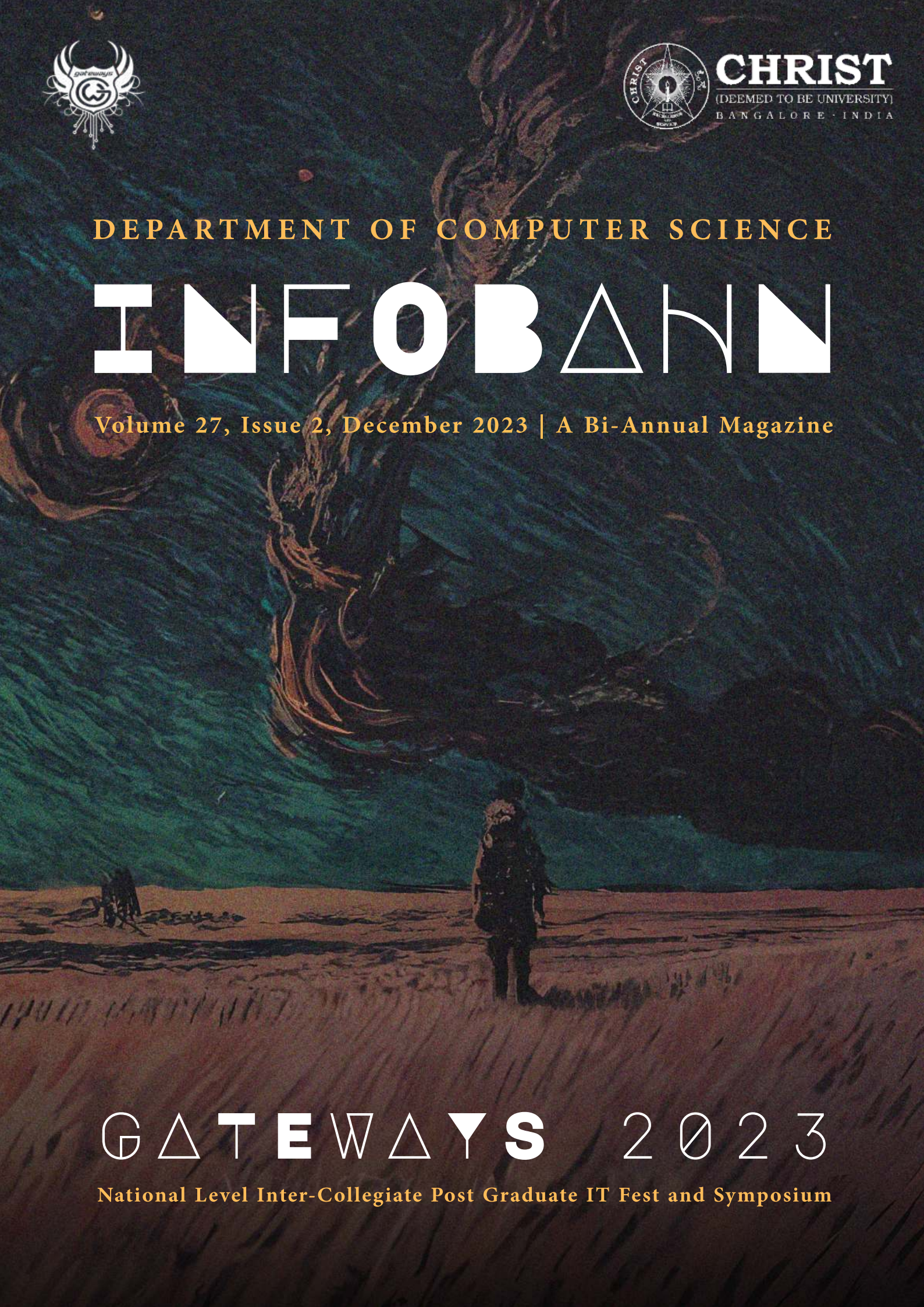

CHRIST
(DEEMED TO BE UNIVERSITY)
BANGALORE · INDIA

DEPARTMENT OF COMPUTER SCIENCE

INFOBAHN

Volume 27, Issue 2, December 2023 | A Bi-Annual Magazine

GATEWAYS 2023

National Level Inter-Collegiate Post Graduate IT Fest and Symposium

ABOUT US

Department of Computer Science

The Department of Computer Science was established in 1990 with a curriculum aligned with industry expectations and research. Over the years, the department has provided opportunities to work on collaborative projects in industry and academia. Strengthened by knowledgeable faculty and supportive alumni, the Department strives to shape outstanding professionals with ethical and human values and the skills necessary to face the challenges in the fast paced and ever changing global IT sector.

Gateways

Gateways, the annual national level post-graduate IT fest, is all about competing with and connecting the IT masters of the future. Students compete, learn, and grow through an array of technical and non-technical events. It provides a vibrant stage to put their best foot forward and grow. Gateways aims to provide students with the necessary exposure to the field of computer science and the bright minds in it. As a fest organised by students, it helps them develop their organisational, management and soft skills.

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From the Vice Chancellor's Desk

CHRIST (Deemed to be University) is dedicated to giving its students the knowledge, tools, and mindset necessary to successfully navigate the rapidly transforming and increasingly global environment of today's world. By combining instruction, practice, and exposure to real-world situations, CHRIST ensures that its students take the right approach with the sensitivity needed to succeed in demanding situations and innovate in the face of disruptions. Students are taught to assess their roles and duties and are always encouraged to take the initiative to come up with feasible and solid solutions to issues in the ever-changing landscape called "life".

The postgraduate students of the Computer Science Department have taken up Infobahn with commendable enthusiasm and zeal to showcase their talents and knowledge in various domains. Through Infobahn, they aim to share their expertise with the broader community in and outside the college, and demonstrate their ability to practically apply the theory they are familiar with.

I would like to extend a hearty congratulations to all involved in the successful release of the second issue of Infobahn Volume 27.

Dr. Fr. Joseph C C

From the Head of the Department's Desk

At CHRIST (Deemed to be University), we work hard to develop a friendly and supportive environment within the Computer Science Department. Our objective is to give students a top-notch educational experience that enhances their talents and positions them for success in a rapidly transforming global environment. To encourage adaptability and a competitive spirit that motivates our students to be their best selves, our curriculum has been meticulously developed and undergoes constant updates. We encourage students to participate in extracurricular events including inter- and intra-collegiate fests alongside their academic interests. Our department's welcoming culture enables students to demonstrate their many skills.

The department firmly believes that preparing young people for demanding careers in the IT industry requires the creation of an environment that fosters progress. Through instruction, training, and exposure to cutting-edge technologies, we give students the most up-to-date resources and information necessary for success. Our university's commitment to its vision of excellence and service inspires our students to follow their passions and achieve new levels of achievement. We are dedicated to giving our students the greatest tools and environment to support their learning and advance their objectives. To this end, we encourage both our teachers and our students to take full advantage of the opportunities available to them at our university.

Infobahn is an excellent illustration of the range of abilities our students acquire. Infobahn volume 27 - issue 2 will definitely provide its readers with a range of subjects and deliver an entertaining and enriching experience.

Dr Ashok Immanuel V

From the Editorial Team's Desk

'Gateways' is back, and along with it, 'Infobahn', the bi-annual magazine of the Department of Computer Science at CHRIST (Deemed to be University), returns as well! The magazine provides the post-graduate students of the department yet another platform to showcase their talents and knowledge in various fields.

In the vastness of the cosmos, countless stars twinkle with possibilities, and the same holds true for the ever-evolving tech landscape. The past year has seen various achievements in space exploration and astronomy, such as India's Chandrayaan-3 mission and the successful retrieval of asteroid samples by NASA's Osiris-REX mission. The observable universe is already incomprehensibly vast, and there is still so much left to be explored. However, progress is a little quicker when it comes to the technology that helps us. The James-Webb Telescope has opened our eyes further than ever, and companies like SpaceX are working towards putting our feet on other worlds. This year's theme, "CodeCosmos – An Interstellar Tech Fest!" aims to illuminate the man-made stars helping humanity uncover the universe's secrets and brighten our futures. Not to forget, a lot of technology that started with the goal of conquering space has also found its way into our everyday lives.

With that in mind, this issue of Infobahn has been prepared with a variety of content. The team has worked with great zeal and support from faculty, students and alumni. We hope you find this magazine a stellar read.


WORD-NOVA

BRIDGING THE STARS: PAVING THE WAY FOR INCLUSIVE SPACE TOURISM

DR.T.CYNTHIA
ASSISTANT PROFESSOR

Before we start, I want you all to spare a moment, close your eyes, and picture this: you, your friends, and your family — all embarking on an extraordinary vacation in outer space. It may sound like a page torn from a science fiction novel, but thanks to the relentless march of technology, the dream of space tourism is becoming an exhilarating reality for people from all walks of life. Ahead, we shall embark on an awe-inspiring odyssey through the cosmos, where we'll unveil the remarkable ways in which cutting-edge technology is unlocking the universe for ordinary individuals just like you and me. So fasten your seatbelts, or perhaps your zero-gravity harnesses, for this will be an unforgettable ride!

The Vision of Space Tourism

Let's commence with a vision of traversing the cosmos, experiencing the marvels of zero gravity, and gazing upon our beautiful blue planet from the celestial vantage point of space. Space tourism represents the democratisation of this dream, an opportunity for individuals of diverse backgrounds and ages to partake in the wonders of the cosmos. Making this dream a reality? But how, you may wonder, are we exactly planning to reach for the stars?

1. Affordable Launch Technologies: Traditional space travel has always carried a sky-high price tag. Yet, the landscape is changing, thanks to cutting-edge launch technologies like reusable rockets, exemplified by SpaceX's Falcon 9. As these technologies become more affordable, the gateway to space tourism swings open wider.

2. Private Space Enterprises: Private companies like SpaceX, Blue Origin, and Virgin Galactic have swooped into the space industry, injecting a shot of competition, innovation, and commercial potential. This fierce rivalry is driving down costs and propelling us further into the cosmos.

3. Materials Science Advancements: The foundation of spacecraft construction lies in lightweight, robust materials. Remarkable strides in materials science are making spacecraft construction more efficient and cost-effective.

4. Enhanced Safety Protocols: Safety is the cornerstone of space tourism. Progress in spacecraft design, the implementation of redundant systems, and rigorous crew training are all contributing to safer journeys, paving the way for greater accessibility.

5. The Rise of Spaceports: Around the world, the construction of spaceports is underway. Think of these spaceports as your launchpads to the stars, akin to airports but for the celestial voyager. They are making it easier for travellers to enter the vast expanse above.

Virtual Reality: A Bridge to the Stars

Now, let's journey into one of the most thrilling dimensions of space tourism accessibility — virtual reality (VR). VR technology has already begun reshaping our perception of the world, and it's poised to redefine how we prepare for and savour the thrill of space travel.

1. Training Simulations: In the realm of VR, space tourists can embark on realistic training simulations. These simulations brace travellers for the unique sensations of spaceflight, from weightlessness to G-forces, minimising the risk of motion sickness and pre-flight jitters.

2. Pre-flight Exploration: Even before stepping foot on the spacecraft, VR allows you to navigate the vessel's interior and become acquainted with your cosmic surroundings. This pre-flight immersion calms nerves and guarantees a smoother voyage.

3. Virtual Spacewalks: Picture this: you're floating outside your spacecraft, tethered to it, with Earth sprawled beneath you. VR can replicate this breathtaking spacewalk experience, giving you a tantalising taste of the real thing.

4. Post-flight Memories: After touching down on Earth, VR offers an immersive avenue to relive your cosmic journey. Slip on your VR headset, and you can revisit your space odyssey anytime, sharing it with friends and family.

Personalizing the Cosmic Sojourn

One of technology's most remarkable facets is its capacity to personalise the experience for every traveller:

1. Tailored Itineraries: Space tourists can now handpick their destinations, whether a suborbital escapade, a stay at an orbiting hotel, or an otherworldly lunar visit. Technology tailors the experience to cater to individual preferences.
2. In-Flight Entertainment: Imagine savouring your favourite movie or delving into an engrossing e-book while gliding through the cosmic expanse during long space journeys. In-flight entertainment options transform the trip into an enchanting experience.
3. Digital Mementos: Digital tokens, certificates, and even NFTs (Non-Fungible Tokens) can serve as cherished mementos of your cosmic voyage. These digital keepsakes hold sentimental value and can be effortlessly shared with others.
4. Virtual Tour Guides: AI-driven virtual tour guides can provide a wealth of information and captivating commentary during your celestial adventure, amplifying the educational aspect of your voyage.

Accessibility and Inclusivity

One of the most thrilling aspects of space tourism is its potential to be an all-inclusive endeavour, beckoning individuals from diverse backgrounds, abilities, and ages. Here's how technology is fostering accessibility for everyone:

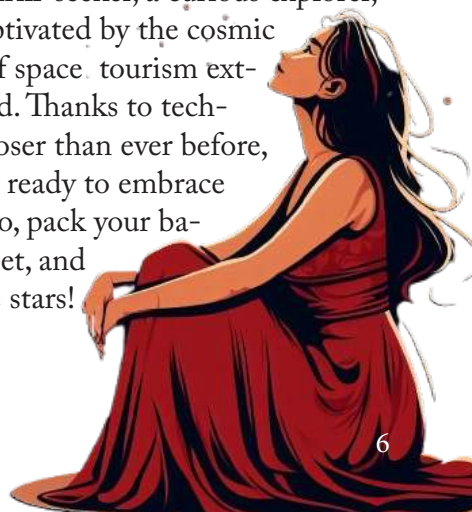
1. Adaptive Technology: The evolution of adaptive technology is championing inclusivity and accommodating individuals with disabilities. Specialised equipment ensures that all individuals, regardless of their physical abilities, can partake in the cosmic journey.
2. Remote Participation: For those unable to embark on physical space voyages, technology can facilitate remote participation. Virtual reality can transport individuals to space from the comforts of their own homes, enhancing accessibility.
3. Educational Outreach: Space tourism serves as a potent educational tool. Virtual field trips to space and interactive educational modules inspire and educate the next generation of cosmic enthusiasts.
4. Affordable Avenues: As space tourism moves further into the mainstream, it is highly likely that more affordable options will emerge, ensuring that a broader spectrum of people can partake in this remarkable adventure.

Safety and Sustainability

In our quest to expand the horizons of space accessibility, safety and sustainability remain at the forefront. Here's how technology is addressing these pivotal concerns:

1. Advanced Safety Measures: Technology is in a relentless pursuit to enhance spacecraft safety systems, boasting redundant backup systems and AI-driven diagnostics that monitor spacecraft health in real-time.
2. Sustainable Practices: Space tourism companies are fervently exploring sustainable practices, including green propulsion technologies, in-space material recycling, and adherence to stringent environmental regulations.
3. Carbon Offset Initiatives: Space tourism companies can actively embrace carbon offset programs to mitigate the environmental footprint of space travel, ensuring a sustainable future for both our cherished Earth and the cosmos.

As we conclude this fun read on cosmic journey, one thing stands undeniably clear: technology is the celestial key unlocking space tourism for all. What was once a dream reserved for just intrepid astronauts is now on the cusp of becoming an everyday reality for people like you and me. The democratization of space travel isn't just about reaching the stars; it's about savoring the voyage, embracing the experience, and forever altering our perspective on the universe and our place within it.
So, whether you're a thrill-seeker, a curious explorer, or simply someone captivated by the cosmic mysteries, the future of space tourism extends a welcoming hand. Thanks to technology, the stars are closer than ever before, and the cosmos stands ready to embrace you with open arms. So, pack your bags, don your VR headset, and get ready to bridge the stars!



EXTENDED REALITY

KENNETH JOHN MENEZES
5 MCA A

Extended Reality (XR) combines Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) to merge the physical and digital worlds. This abstract explores the potential impact of XR on industries and everyday life.

XR technologies offer immersive experiences by blending the physical and digital realms. In communication and collaboration, XR enables remote interactions, facilitating virtual meetings and training sessions. It also revolutionises the entertainment industry by creating captivating virtual worlds for gaming and cinematic storytelling.

In healthcare, XR technologies have proven to be valuable tools for diagnosis, treatment, and rehabilitation. VR is used for pain distraction during medical procedures, exposure therapy for phobias, and physical rehabilitation. AR aids surgeons by providing real-time information during procedures and allows medical professionals to visualise patient data without the need for physical monitors. XR-based telemedicine enables remote consultations and surgeries, expanding access to healthcare services.

In education, XR opens up possibilities for experiential learning, allowing students to explore historical sites, conduct virtual experiments, and receive hands-on training. This has the potential to transform teaching methods and enhance knowledge retention.

While challenges exist, such as hardware improvements and privacy concerns, XR holds significant potential to transform industries and enrich everyday life. By bridging the gap between physical and digital, XR offers immersive experiences that shape the future and revolutionise the way we perceive and engage with our surroundings.

SOFTWARE DEFINED NETWORKING, THE IMPACT AND FUTURE DIRECTIONS

DR. SMITHA VINOD
ASSOCIATE PROFESSOR

Software-defined networking (SDN) has emerged as a transformative technology in the field of computer networking, significantly impacting the way networks are designed, managed, and operated. SDN decouples the network's control plane from the data plane, allowing for centralised and programmable network management. By doing so, SDN brings agility, flexibility, and efficiency to network operations. One of the major impacts of SDN is its ability to simplify network provisioning, reduce operational costs, and enhance network security. With the separation of control and data planes, network administrators can dynamically allocate resources and adapt to changing traffic patterns, making networks more responsive to the needs of modern applications.

The future directions of SDN are promising and poised to further revolutionise networking. Network automation and artificial intelligence (AI) integration are expected to play a pivotal role in the evolution of SDN. SDN controllers will become more intelligent, capable of making real-time decisions based on network telemetry and AI-driven analytics. This will result in proactive net work optimisation, self-healing capabilities, and improved security threat detection and response. SDN will continue to expand its footprint beyond data centres and enterprise networks to applications in wide-area networks (WANs) and edge computing environments, enabling more efficient and flexible connectivity for IoT, 5G, and other emerging technologies.

As SDN continues to advance, it is important to address challenges such as scalability, interoperability, and security. Research and development efforts are ongoing to enhance the robustness of SDN architectures and protocols. Industry standards organisations like the Open Networking Foundation (ONF) and the Internet Engineering Task Force (IETF) are actively involved in shaping the future of SDN. Furthermore, the adoption of SDN is driving the demand for skilled network engineers and administra-tors who can manage and optimise these software-defined infrastructures effectively. In conclusion, SDN has made a profound impact on networking, and its future directions hold the potential to reshape the networking landscape, offering more agile, efficient, and secure network solutions.

BEYOND EARTH'S KITCHEN: THE EPIC TALE OF SPACE FOOD

MANOSWITA BOSE
2 MCA B

When we gaze into the vast expanse of space, we often conjure images of astronauts gracefully suspended in the cosmic void, explorers of the celestial unknown. Yet, amidst these celestial wonders, a compelling question emerges like a shooting star - what sustains these cosmic voyagers during their celestial sojourns? In the grand narrative of space exploration, food is not merely fuel; it's a testament to human innovation. Join me on a gastronomic journey through the cosmos as we explore the extraordinary evolution of space food technology, from the iconic Tang to the savoury delight of space tacos. Ahead, a cosmic culinary adventure awaits!

The Gourmet Challenge - Feeding Pioneers:

Dehydrated Dreams: Mercury and Gemini

The early days of space exploration were marked by pioneering palates. Astronauts relied on vacuum-sealed, dehydrated, and freeze-dried meals - a far cry from the gourmet dishes we envision today. Imagine sipping rehydratable beef stew through a straw in zero-gravity - nutritionally essential but far from a culinary masterpiece!

Tang's Celestial Ascent: The Original Space Drink

Among the earliest space foods, Tang, an orange-flavoured powdered drink mix, became an enduring symbol of space exploration. Astronauts loved its fruity punch, and it gained fame as the quintessential space beverage. While it might not rival the finest earthly beverages, it offered astronauts essential vitamins and a taste of home among the stars.

Apollo's Cosmic Cuisine - Tacos and More

Apollo 11: Gastronomic History on the Moon

As the Apollo program set its sights on lunar exploration, astronauts demanded a more diverse and flavorful menu. Dehydrated shrimp cocktail and curried chicken made their lunar debut, expanding the culinary horizons of astronauts. These meals were a small step for astronauts but a giant leap for space food. The Gemini missions brought us the first-ever space sandwich - a corned beef and bread creation. To prevent crumbs from floating around the spacecraft, engineers would coat the bread with gelatin. It was not exactly a gourmet delight, but it marked a step forward in space cuisine.

Apollo's Pouches and Tacos: A Zero-Gravity Fiesta

Apollo missions introduced the concept of "thermo-stabilized" foods, sealed in pouches and heated to ensure safe, delicious meals. Astronauts enjoyed everything from beef stew to chicken and rice and even dessert options like butterscotch pudding. The culinary highlight of Apollo missions was undoubtedly the space taco. Astronauts on Apollo 11, 12, and 14 enjoyed specially designed tortillas that prevented crumbs from floating and a handheld sauce dispenser to savour their space tacos without the mess. A cosmic fiesta in orbit!

Shuttle Dining - From Microwave to Microwaveable

The Space Shuttle era marked a transformation in space dining. Equipped with the magic of microwave ovens and refrigerators, astronauts could now even indulge in hot traditional meals in space, reheating their dishes with a simple push of a button! The menu expanded to include lasagna, scrambled eggs, beef stew, chicken curry, and more.

Growing Salad in Space: The Veggie Experiment

In recent years, technology has enabled astronauts to grow fresh produce aboard the International Space

Station (ISS). The Veggie experiment, using specialised LED lights and a hydroponic system, allowed astronauts to savour homegrown lettuce and zinnias - a tiny taste of Earth's bounty.

Carbonation Conundrum: Coca-Cola in Space
In 1985, Coca-Cola embarked on a daring mission to send its beloved beverage into space aboard the Space Shuttle Challenger. However, the lack of gravity posed challenges for carbonated drinks. The experiment resulted in a sticky mess and a brief ban on carbonated beverages in orbit.

International Flavors in Orbit - Sushi to Savour

Global Tastes in Space: Borscht to Sushi

Today's astronauts even enjoy a diverse menu inspired by cuisines worldwide. Russian cosmonauts introduce their love for borscht, while Japanese astronauts savour sushi in the microgravity of space. International collaboration has spiced up space dining, making it a culinary journey to remember. Modern space food technology also allows astronauts to personalise their meals. They can select their menu items, rehydrate, and enjoy a meal that satisfies their taste buds. It's like having a cosmic menu at your fingertips!

The Space Taco: A Culinary Triumph

Fast forward to today, and we find astronauts savouring space tacos. Using a tortilla warmer, astronauts can enjoy a variety of fillings, from rehydratable seasoned beef to refried beans, giving them a taste of Tex-Mex in the stars. Space cuisine has come a long way!

Galactic Pizza Party: A Taste of Home

In 2001, Pizza Hut made history by delivering a pizza to the International Space Station (ISS). While the pizza was vacuum-sealed and needed reheating, it provided astronauts with a taste of home, proving that even in space, the allure of pizza is undeniable.

Chapter 5: 3D Printing and Fresh Greens - A Gourmet Future

3D-Printed Space Pizza: A Slice of the Future
In recent years, 3D printing technology has entered the realm of space food. NASA has explored the possibility of 3D-printed pizza, allowing astronauts to customise their toppings and enjoy a slice of Earth while in orbit. A cosmic pizza party like never before!

Fresh Veggies in Space: The Promise of Garden-to-Table

To elevate the quality of space meals, experiments like the Veggie Plant Growth System have been introduced on the ISS. Astronauts have successfully grown lettuce and mustard greens in space, adding a fresh touch to their diets and paving the way for garden-to-table dining in orbit. Additionally, as we set our sights on Mars and the Moon, space farming is actually becoming a reality. Greenhouses and hydroponic systems will allow astronauts to grow crops in the harsh environments of other celestial bodies. Imagine dining on Moon-grown salad or Martian potatoes!

A Cosmic Feast to Remember

From Tang to tacos, space food technology has embarked on a remarkable journey, mirroring the progress of space exploration itself. What once seemed like science fiction is now a delightful reality for astronauts living and working in orbit. Today's astronauts savour a diverse array of dishes that not only sustain them but also provide comfort and delight in the challenging environment of space.

As we peer into the future of space food, one thing is sure: the taste of the cosmos is bound to surprise and entice our senses in ways we can hardly imagine. So, the next time you bite into a taco or sip an orange-flavoured drink, remember that even in the vastness of space, our culinary creativity knows no bounds!

To infinity and beyond, with delectable flavours that transcend the stars!

BLOCKCHAIN IN SPACE: SECURING THE COSMOS

DEEPA V JOSE
ASSOCIATE PROFESSOR

The vast expanse of space, with its potential for exploration and resource utilisation, is a frontier ripe for innovation. The space industry is constantly evolving, presenting new security concerns. Key issues include space debris and collision risks, cybersecurity, radio frequency interference, jamming and spoofing, anti-satellite weapons, space weather, dual-use technologies, space situational awareness (SSA), and sovereignty and space governance. The increasing amount of space debris in Earth's orbit poses a significant threat to satellites and spacecraft, and addressing these risks is crucial. Cyberattacks can target communication systems, ground control stations, and spacecraft, while interference with satellite signals can disrupt communications and navigation. Hostile actors may jam or spoof satellite signals, posing economic and security risks. Dual-use technologies, such as small satellites or CubeSats, raise concerns about potential militarisation and arms control measures. Governments, international organisations, and private companies are working to address these security concerns and develop strategies to protect space assets.

As humanity ventures further into the cosmos, ensuring the security of space-based assets and data becomes paramount. Enter blockchain technology, a decentralised ledger system that offers unparalleled security and transparency, making it an ideal candidate for securing the cosmos. One of the key challenges in space exploration is the management of satellite networks, communication systems, and data. Blockchain technology can play a pivotal role in this regard by providing a tamper-proof record of transactions and data exchanges among satellites and ground stations. This immutable ledger ensures that any unauthorised access or alteration of data is immediately detected, making space missions more secure and reliable.

Furthermore, blockchain's decentralised nature minimises the risk of a single point of failure, enhancing the resilience of space infrastructure. In addition to security, blockchain can facilitate smart contracts, enabling automated and trustless agreements between space agencies, private companies, and even celestial objects, such as asteroids, for mining purposes. Several projects are already exploring blockchain's potential in space, such as Space Chain, a blockchain-based satellite network, and NASA's collaboration with the University of Akron on the use of blockchain for secure and efficient space communication. Blockchain technology holds promise in revolutionising space exploration by ensuring the security and integrity of data and assets in the cosmos. As our ambitions in space continue to grow, blockchain may prove to be the ultimate safeguard for the final frontier.

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TEMPORAL DEAD ZONE


ADHISH BAHL
2 MCA B

What is a Temporal Dead Zone in JavaScript?
Temporal Dead Zone is a concept in JavaScript that is related to Hoisting. Hoisting is an exclusive feature of JavaScript, which is not offered by many programming languages.
To understand the Temporal Dead Zone, we first need to understand how JavaScript code is executed and how variables are declared in JavaScript and Hoisting.

How is JavaScript code executed?
JavaScript code is executed in two phases, named:
1. Memory Creation Phase
2. Code Execution Phase.

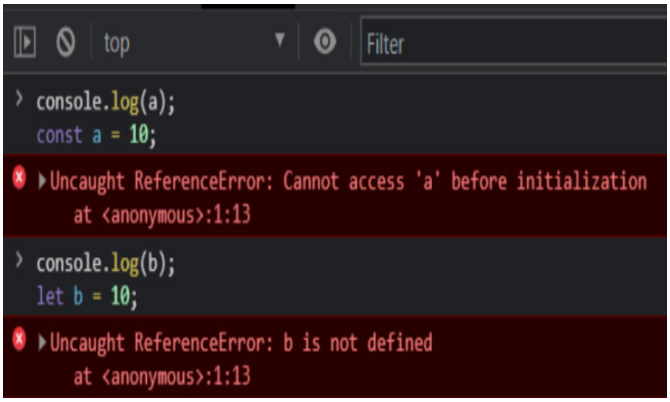
Memory Creation Phase: The code is executed from the beginning and only the memory for the global variables and functions are allocated in the main memory. The variables are not assigned values in this particular phase; only the block of memory is assigned to them, and they are initialised with "undefined", which is a keyword in JavaScript, meaning no value is initialised to the variable.
Code Execution Phase: After reading the whole code once during the Memory Creation Phase, the code is again executed from the beginning, and this time, all the operations are performed which have been coded.

What is Hoisting?
As already read above, Hoisting is an exclusive feature of JavaScript, which not many programming languages provide. In other languages, you can never use a variable before declaring it, and you can never call a function before defining it.
But this is possible in JavaScript. Yes, you can use a variable before defining it, and you can call a function before defining it. This is possible because of the two-phase execution of the JavaScript code. After the first phase, the program already knows that the variable or function is defined ahead and hence, it does not throw an error. So, if you print a variable value before defining it, it will print "undefined."

Variable Declaration in JavaScript
There are three keywords using which we can declare a variable in JavaScript. Those keywords are:
1. var
2. let
3. const

The 'const' and 'let' keywords were introduced in ES6 JavaScript in 2015. 'const' is the strictest of all in the list; you cannot change the value of a const variable after declaration. 'var' is the most lenient among all, and it is not used much in today's programming. 'let' sits between both of them.

What is a Temporal Dead Zone?
Now, if you know all of the above, it will take little time to understand what the Temporal Dead Zone is. The temporal Dead Zone is the period between when a variable is declared using let or const and is assigned a memory block during the first phase of code execution and when the same variable is assigned its real value during the second phase of code execution.
During this time, the variable is unavailable for use; it will give a "Reference Error", stating that it cannot be used before initialising its value.



But this is not the same when you declare a variable using the var keyword; the user can use this variable in its Temporal Dead Zone, but the variable's value will always be "undefined" in its Temporal Dead Zone.

DEGREES OF DRIVERLESS TECHNOLOGY

DR. HELEN K JOY
ASSISTANT PROFESSOR

A self-driving automobile is an automobile that can navigate its environment without any human input. The presence or control of a human passenger is not necessary at any moment, nor is the presence of a human passenger. An autonomous vehicle can go everywhere a conventional vehicle can and do all the tasks normally performed by a human driver. According to a recent study, it is projected that approximately 8 million vehicles, either fully or partially autonomous, will be operational on the road by the year 2025. The integration of fully autonomous vehicles into roads necessitates the attainment of six tiers of driver assistance technologies for ensuring safety.

The tiers refer to the hierarchical levels or categories that exist within a system. They are used to organise and classify different elements or components based on their importance, functionality, or characteristics. What is our current status or position? The Society of Automotive Engineers (SAE) has established a classification system consisting of six stages to categorise the level of automation in driving. These stages range from 0, representing full manual control, to 5, indicating complete automation. The Department of Transportation (DOT) has formally endorsed and authorised the following specifications.

Zero Automation in the Driver's Seat: Most automobiles and trucks currently belong to Level 0, denoting manual vehicles. While technological aids exist to support the driver, it is important to note that the responsibility for the "dynamic driving task" ultimately lies with the human operator. The emergency braking system is not classified as automation due to its lack of capability to actively control the vehicle's driving functions.

Driver Assistance (Level 1): This represents the minimal level of mechanisation. The car is equipped with a single automated system designed to assist the driver in tasks such as navigation and maintaining a consistent speed, commonly referred to as cruise control. Adaptive cruise control is categorised as Level 1 automation since it operates in conjunction with a human driver who retains responsibility for critical driving tasks such as steering and braking. Partially Automated Driving, also known as Level 2 automation, refers to a specific level of automation in the field of autonomous vehicles. At this level, the driving system is capable of assisting the driver with certain driving tasks, but the driver is still required to pay attention and be able to take over control at any time.

The term 'ADAS' is used to denote advanced driver assistance systems, which encompass a range of cutting-edge technologies designed to assist drivers. The vehicle has the ability to control both directional movement and speed adjustments. The automation system discussed here is not considered true self-driving because a human driver is present and can assume control at any given moment. Level 2 systems encompass Tesla's Autopilot and Cadillac's Super Cruise, developed by General Motors.

Automatic driving for third-grade vehicles is possible under specific conditions.
The transition from Level 2 to Level 3 represents a noteworthy technological progression, albeit one that is largely inconspicuous to human perception. Level 3 vehicles possess the capability to make autonomous decisions, such as determining whether it is appropriate to accelerate and overtake a slower vehicle. These decisions are facilitated by the advanced "environmental detection" abilities of these vehicles. However, these systems cannot operate autonomously and require human intervention to function. In the event that the system encounters any unforeseen obstacles preventing it from completing the assigned task, it is imperative for the driver to be adequately prepared to assume control.

Audi, a subsidiary of Volkswagen, announced roughly three years ago that their upcoming iteration of the A8, which serves as their flagship sedan, would be the inaugural commercially available vehicle to achieve Level 3 autonomy. The L3-equipped Audi A8L models are now released for sale at authorised dealerships. The Traffic Jam Pilot system incorporates various advanced features to enhance its functionality. These include a lidar scanner, enhanced sensor fusion, and increased processing power. Additionally, the system is designed with built-in redundancies to ensure uninterrupted operation in the event of a component failure.

During the development of their technological marvel, Audi encountered a shift in the regulatory procedure for autonomous vehicles in the United States. The transition involved a change from federal oversight to a system of regulations implemented at the state level. Consequently, the A8L will persist in its delivery without the hardware and software required to achieve Level 3 functionality in the United States. Presently, it is classified as a Level 2 vehicle in the country. Audi is set to launch the fully equipped Level 3 A8L, featuring Traffic Jam Pilot, initially in Germany, followed by its release in Europe.

The term "**fourth-generation high-automation vehicles**" refers to a class of advanced vehicles that have reached the fourth stage of development in terms of automation capabilities. One of the most significant differences between Level 3 and Level 4 automation lies in the capability of Level 4 vehicles to assume manual control in case of an emergency situation. This method allows these vehicles to operate autonomously without requiring human inter vention. However, it is still possible for an individual to override the system.

Vehicles operating at Level 4 autonomy possess the capability to navigate and drive without human intervention. Nevertheless, due to the lag in legislation and infrastructure development, the operational scope of these entities remains confined to a limited geographical region, typically within urban environments where maximum velocities can attain an average of 30 miles per hour. The action you have performed is commonly referred to as geofencing. Hence, most currently available Level 4 autonomous vehicles are specifically engineered with a focus on accommodating ridesharing services. As an illustrative example, Navya, a French company, is presently engaged in the production and commercialisation of fully electric shuttles and cabs (Level 4) within the United States. These vehicles can achieve a maximum speed of 55 miles per hour.

Waymo, a subsidiary of Alphabet, has conducted extensive testing of fully autonomous vehicles in Arizona for nearly one year, covering a distance of 10 million miles. This rigorous testing phase has been undertaken to ensure the readiness of their Level 4 self-driving taxi service prior to its launch.

Magna, a prominent Canadian automotive components manufacturer, has successfully engineered an advanced technology known as MAX4. This groundbreaking innovation enables vehicles to achieve Level 4 autonomy, thereby facilitating seamless operation in both urban and motorway environments. In line with their collaboration with Lyft, they offer kits for converting vehicles into autonomous ones.
The strategic agreement between Volvo and Baidu was recently initiated, aiming to collaborate on the development of Level 4 electric vehicles specifically designed for the Chinese robotaxi industry.
The concept of completely **automated driving, also known as Level 5**, refers to a state where a vehicle can operate without human intervention or assistance.
The "dynamic driving task" requirement becomes obsolete in Level 5 autonomous vehicles. Level 5 vehicles do not provide any means for vehicle control. By removing the constraints imposed by geofencing, the system will enable unrestricted mobility and the completion of tasks that typically require human drivers. Although numerous locations worldwide are conducting tests on fully autonomous vehicles (AVs), none of these vehicles are currently accessible to the general public.

Despite the considerable potential of autonomous vehicles, the commercial production of such vehicles in the United States is still a few years away from achieving anything beyond Level 2 autonomy. The lack of adequate safety measures, rather than technical limitations, is the cause. The paper titled "Securing the Connected Car: A Study of Automotive Industry Cybersecurity Practises." states that connected vehicles, including driverless automobiles, were found to possess numerous physical safety measures, such as seatbelts, airbags, and antilock brakes. However, the investigation revealed a notable absence of equivalent digital security features in these vehicles. The development of secure online usage for linked vehicles is still in progress and has not yet reached a satisfactory level.

The research data was obtained through an online survey distributed to a total of 593 individuals, including IT security experts, product managers, and engineers. Based on the survey results, it is evident that a significant majority (62%) of respondents anticipate a high probability of malicious or proof-of-concept attacks on automotive software/components within the next 12 months. This underscores the pressing requirement for enhanced cybersecurity measures.
The acceptance of autonomous vehicles by consumers is contingent upon their assurance of safety levels equivalent to those experienced in commercial aeroplanes, trains, or buses. The occurrence of that event will inevitably transpire in due course. However, the automotive industry must first overcome several obstacles.

INNOVATIONS ENHANCING QUALITY OF LIFE AMONG THE STARS

JINSI JOSE
MCA 2014 - 2017

Throughout history, countless inventions have significantly improved our quality of life by mimicking or drawing inspiration from the cosmos. One prime example is the GPS (Global Positioning System), which relies on satellite technology to provide precise navigation, transforming how we travel and increasing efficiency. Additionally, solar panels, inspired by the sun's light energy, have revolutionised the way we harness renewable energy, reducing our dependence on fossil fuels and mitigating its negative environmental impacts.

All earthly things are part of the cosmos, and so, although a bit more indirect, another cosmically inspired product comes in the form of Velcro, initially designed by Swiss engineer George de Mestral. He was inspired by the tiny hooks of burdock seeds sticking to his clothes and his dog's fur. This invention introduced a reusable fastening system, with numerous applications in everyday life. Similarly, the development of memory foam, inspired by NASA's research on shock-absorbing material for astronauts, has led to more comfortable mattresses, pillows, and even medical applications for better sleep and health.

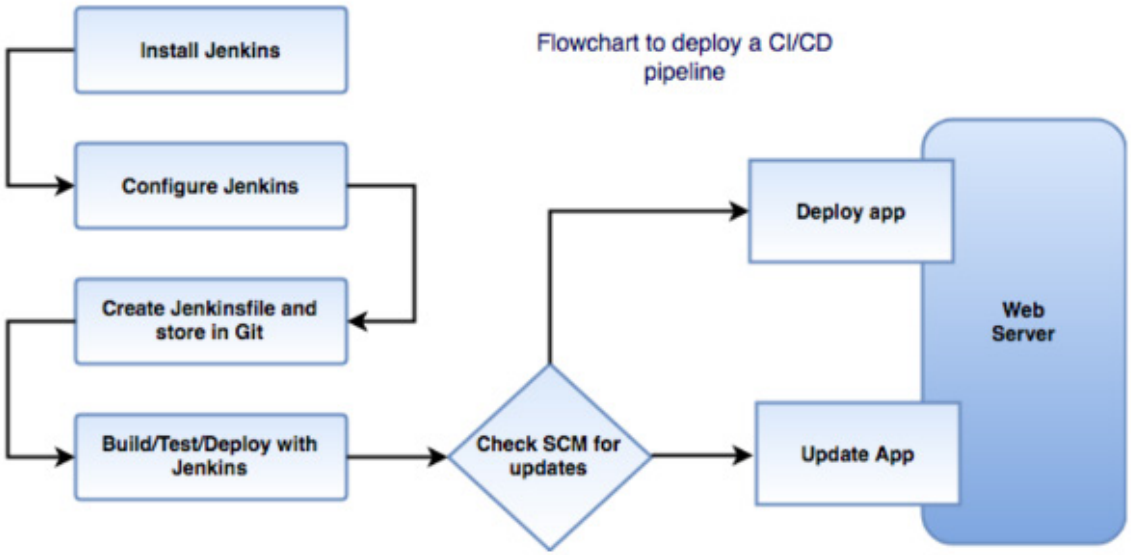
Space exploration has also given rise to innovations like scratch-resistant coatings for eyeglasses and smartphone screens. These coatings, adapted from protective layers on astronaut helmets, have enhanced the durability of everyday items, reducing the need for frequent replacements. Additionally, LED lighting, which was developed as a spinoff from NASA's work on plant growth in space, has significantly improved energy efficiency and has a more extended lifespan compared to traditional incandescent bulbs, contributing to reduced energy consumption and cost savings.

In conclusion, inventions inspired by or derived from cosmic exploration have made remarkable contributions to our daily lives. These innovations, including GPS, solar panels, Velcro, memory foam, scratch-resistant coatings, and LED lighting, have not only improved our quality of life but also helped address environmental and sustainability challenges. The connection between the cosmos and the enhancement of our well-being continues to be a source of inspiration for scientific and technological advancements.

JENKINS

DR. KIRUBANAND V B
ASSOCIATE PROFESSOR

Jenkins is a free tool that helps software teams work faster and smarter. It automates many of the tasks involved in building and releasing software so that teams can focus on writing code and adding new features. This makes it easy to continuously integrate and deliver (CI/CD) software. It also means that teams can release new features and updates more quickly and reliably without sacrificing quality. It is also very flexible and scalable. It can be used to automate a wide range of tasks and can be scaled to meet the needs of even the largest and most complex software projects.



Benefits of using Jenkins:

Increased Speed and Agility:

Jenkins acts as a central command centre for software development teams, providing a unified platform where various team members can monitor and manage the entire development process. This visibility ensures that all stakeholders, from developers to project managers, can access a real-time overview of the project's status. Furthermore, Jenkins promotes collaboration by facilitating the seamless integration of code changes from multiple team members.

Improved Quality:

Jenkins contributes significantly to software quality by implementing continuous testing and early bug detection. When code changes are submitted, Jenkins automatically triggers a battery of tests, which may include unit tests, integration tests, and user acceptance tests. By identifying and flagging any issues early in the development process, Jenkins allows developers to address and rectify them swiftly.

Security:

Jenkins provides various security features, including role-based access control and integration with authentication systems, to ensure that only authorised users have access to sensitive information and tasks.

Flexibility:

Jenkins is a very flexible tool that can be customised to meet the specific needs of any software development team. It can be integrated with a wide range of tools and services, such as version control systems, databases, cloud platforms, and notification services.

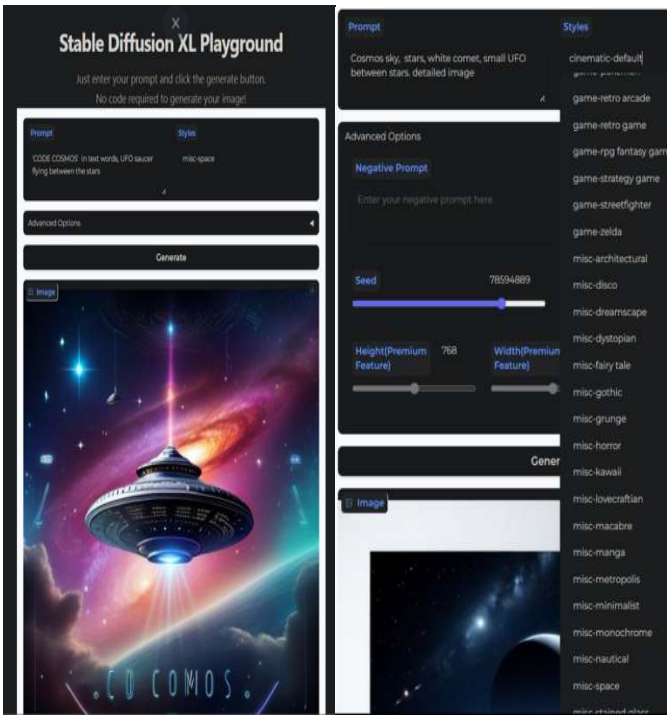
HOW TO GENERATE IMAGES USING AI

KEVIN BENNY
5 MCA A

Artificial intelligence (AI) has revolutionised the world of image generation. With the help of AI models, it is now possible to generate high-quality images from textual descriptions or prompts. This technology has various applications, including in the fields of art, design, and advertising.

Before we learn how to give basic prompts, here are a few terms used in image generation.

- **Seed:** The "Seed" in text-to-image generation is the initial input provided in the form of text. This seed text is the starting point for the AI model to generate an image. The seed text can be a description or a set of keywords that you want the model to use as a basis for creating an image. It can be a positive, neutral, or negative description, depending on the desired outcome.
- **Guidance Scale:** The "Guidance Scale" is a parameter or setting that influences how the AI model generates the image based on the input text. It can control various aspects of the image, such as its style, colour, level of detail, and other visual attributes. The guidance scale helps fine-tune the image generation process according to your preferences or the specific characteristics you want to emphasise in the generated image.
- **Negative Prompt:** A "Negative Prompt" is a text input that provides a negative description or context or conveys a negative sentiment. When you use a negative prompt, the AI model will attempt to generate an image that aligns with the negative description provided. For example, if you input a negative prompt like "stormy weather" or "gloomy atmosphere," the model will aim to create an image that reflects those negative qualities.
- **Canny Low and High Threshold:** These parameters are typically associated with the Canny edge detection algorithm, which is used to identify edges in an image. The "low threshold" and "high threshold" are values that determine how strong an edge must be to be detected. Edges with intensity gradients between the low and high thresholds are considered potential edges, and those above the high threshold are marked as strong edges. Those between the low and high thresholds are marked as weak edges and may be included or excluded based on connectivity.
- **Number of Steps:** This parameter typically relates to the number of iterations or optimisation steps performed in an image generation or processing algorithm. It can control the refinement or convergence of the generated image. A higher number of steps often leads to more detailed or refined results but may require more computation time.



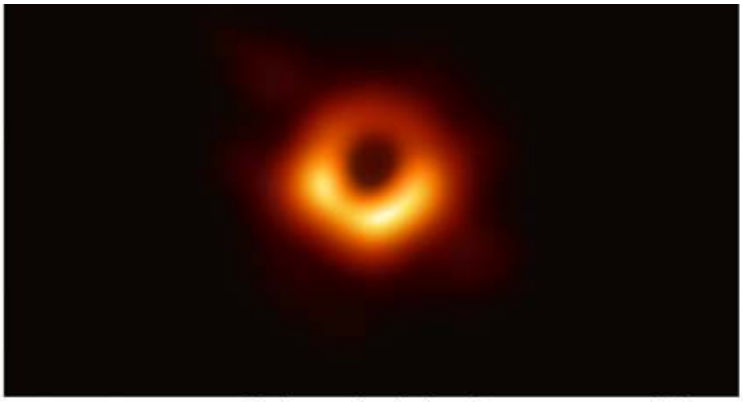
CAPTURING THE VOID:

FIRST PHOTOGRAPH OF A BLACKHOLE

DR. NISHA VARGHESE
ASSISSTANT PROFESSOR

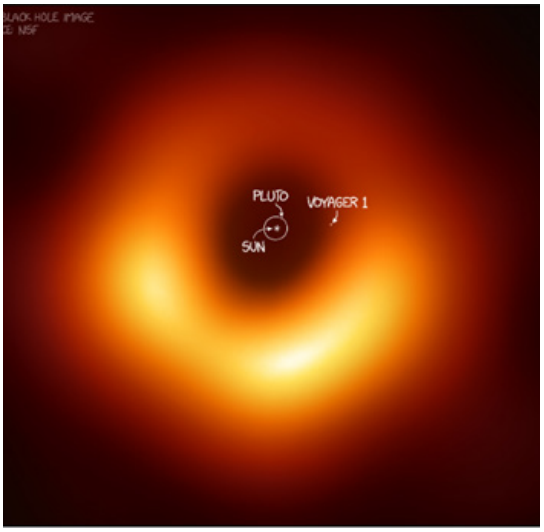
Dr Katherine Louise Bouman (Katie Bouman) is a Computer Scientist who specialises in the field of computer-generated imagery and a member of the Event Horizon Telescope (EHT) team that captured the first image of the black hole of the Galaxy Messier 87 (M87). She led the development of **Continuous High-resolution Image Reconstruction using Patch priors** (CHIRP) algorithm, which imaging black holes as a part of her PhD in Computer Science and Artificial Intelligence Laboratory (CSAIL) from Massachusetts Institute of Technology (MIT) on the topic "Extreme imaging via physical model inversion: seeing around corners and imaging black holes". A black hole is a region in space where the gravitational pull of an extremely dense object is so strong that nothing, not even light, can escape. The concept of a black hole arises from Albert Einstein's theory of general relativity, which describes how massive objects can warp and curve the fabric of spacetime. When a huge star runs out of fuel and undergoes a supernova explosion, the core of the star can collapse under the force of gravity, forming a black hole.

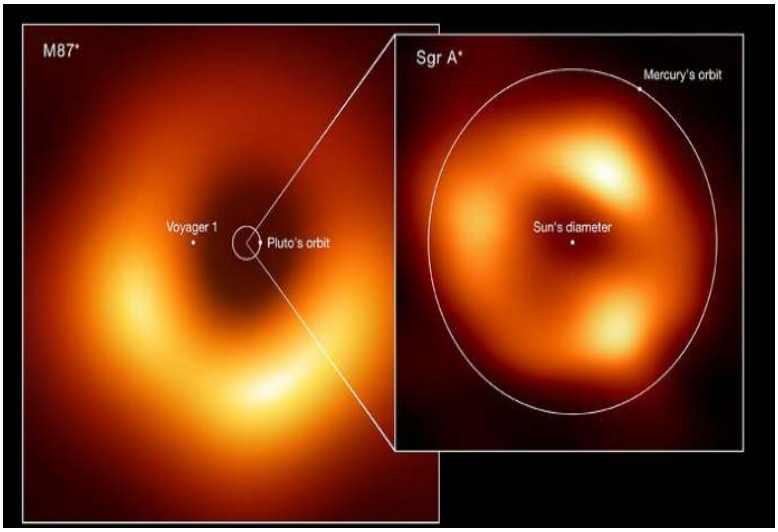
Katie Bouman



First image of the Black hole captured by Event Horizon Telescope (Source:NSF)

The black hole of M87 is 55 million light-years from Earth and 6.5 billion times the mass of the Sun (See the comparison image of the Solar system and Blackhole M87). The centre of a black hole is the singularity, where all the mass is concentrated. The boundary is known as Event Horizon, where no photons can escape. The photons come from the super-heated plasma of the accretion disk; the path of the photons bends towards the black hole due to gravity. Once an object crosses the boundary, it is effectively trapped within the black hole, and there is no way for it to communicate with the outside Universe. Black holes come in different sizes, depending on the mass of the collapsed core. Stellar-mass black holes are formed from the remnants of massive stars and typically have a mass several times that of our sun. Supermassive black holes, found at the centres of galaxies, can have millions or even billions of times the mass of the sun—for instance, the Black hole of Messier 87 Galaxy. Many black holes are surrounded by an accretion disk, a swirling disk of gas, dust, and other matter that is gradually pulled into the black hole. As this material spirals inward, it heats up and emits X-rays and other forms of radiation, making black holes detectable by astronomers.





Technology: Deep Learning and Computer Vision

The images of the black holes were collected for the study with the help of the Event Horizon Telescope team. The Event Horizon Telescope is a global network of radio telescopes synchronised to work together as a single virtual telescope with the resolution needed to study objects in the distant Universe in unprecedented detail. Its primary focus is studying black holes, particularly the event horizon boundary, accretion disk and Photon Sphere of the black holes. To capture a distant object using the telescope, the telescope size is proportional to the ratio of Wavelength and Angular Resolution as follows:

$$Telescope\ Size \propto \frac{Wavelength}{Angular\ Resolution}$$

In this scenario, the telescope size is 13 million meters, proportional to the Wavelength of 1.3mm and the angular resolution of 20μas. According to this, capturing the image requires an Earth-sized telescope, which is quite impossible. To tackle this problem, many telescopes were placed in various parts (Chile, Mexico, France, Hawaii, Spain, Arizona and the South Pole) of the Earth. Each telescope collated massive images that were created in Radio Astronomy. The challenging part is extracting the 'very likely images' of the black holes from the massive data collection from the telescopes. Collecting very likely, more likely and unlikely image classification was tedious because nobody had seen a black hole before. Another difficulty is the frequency measurements from each telescope vary according to the rotation and revolution of the Earth. It is necessary to have an algorithm to acquire the fine-tuned images from these sparse and noisy measurements. Here comes the role of CHIRP algorithm ('Continuous High-resolution Image Reconstruction using Patch priors', Acronym coined by Katie Bouman) is a Bayesian Algorithm to perform the deconvolution of images in the area of Radio Astronomy. She introduced the CHIRP algorithm at the IEEE Computer Vision and Pattern Recognition Conference in 2016 (See reference in QR).

The algorithm utilised the potential of the Regularized Maximum Likelihood (RML) method to extract the best image from the data. To verify the real imaging of a black hole, a series of image processing methods are conducted, such as synthetic data tests (~1 year), blind imaging (2 months), objective parameter selection and validation (6 months) and the imaging pipelines used are DIFMAP, EHT Imaging (RML) and SMILI(RML). The combination of these pipelines produced a blurred image equivalent resolution. To extract the first-ever image of the black hole from these blurred images, Bouman used the Deep Generative Models, Deep Probabilistic Imaging (DPI).

The entire Universe is open to research and study; utilise the potential of technology in your domain and contribute your innovation to the World……..!

(Further study and other references, Scan QR)

UNPLUGGING TO RECHARGE: DIGITAL DETOX GUIDE FOR STUDENTS

ALVIS ABREO
5 MCA A

In today's fast-paced world, where information is just a click away and deadlines are often looming, it's easy for computer science students to become engrossed in the digital realm, leaving little room for relaxation and rejuvenation. But, as it turns out, taking a break and embracing a digital detox can be a game-changer in the life of a computer science student. Here's why and how to do it.

The Burnout Trap:
Computer science is a field that demands constant learning, coding, and problem-solving. The pressure to excel can lead to burnout if not managed properly. Burnout not only affects your physical and mental health but can also harm your productivity and creativity. This is where a well-planned break comes in.

The Art of Disconnecting:
Step Away from Screens: Computer science students are no strangers to screens. From coding on a computer to studying via online resources, our lives revolve around screens. A digital detox involves stepping away from these screens. Whether it's your laptop, tablet, or smartphone, put them aside for a while.

Reconnect with the Physical World:
Take a walk in the park, engage in a sport, or simply read a physical book. These activities help you reconnect with the tangible world and reduce screen-induced stress.

Unplug from Social Media:
Social media can be a time sink and a source of stress. Take a break from social networks to free yourself from constant notifications and the pressure of comparison.

Meditation and Mindfulness:
These practices can help you unwind and clear your mind. They're particularly beneficial for reducing stress and improving focus.

The Benefits of Detox:
Improved Creativity: Stepping away from the screen allows your mind to wander and think freely. This often leads to creative breakthroughs.

Enhanced Productivity:
After a digital detox, you'll find yourself more focused and efficient when you return to your work.

Stress Reduction:
A break from the digital world can significantly reduce stress levels. Your body and mind will thank you for it.

Quality Sleep:
Reduced screen time before bedtime can lead to better sleep quality, which is essential for maintaining peak performance as a student.

Balancing Act:
The key to a successful digital detox is balance. You don't have to disappear entirely from the digital world, but rather, create boundaries and routines that allow you to maintain a healthy equilibrium between your digital life and the real world.
As a computer science student, your relationship with technology is intrinsic, but it's equally important to remember that you are not a machine. Take time to recharge, unwind, and find inspiration in the world outside the screen. Your studies and your well-being will thank you for it.
So, the next time you feel the pressure building, consider taking a break, embracing a digital detox, and giving yourself the gift of relaxation and renewal. Your mind, body, and code will thank you for it.

IS AI TAKING OVER? DON'T PANIC, IT'S JUST THE RISE OF OUR ROBOT OVERLORDS!

MANOJ KUMAR D
2 MCA B

Have you ever wondered what the future might look like? Well, brace yourselves because it seems like the robots are plotting to take over! But before you start imagining a scene from a sci-fi movie, let's dive into this idea with a pinch of humour and a sprinkle of common sense.

AI's Rise to Power - Fact or Fiction?
So, you've probably heard all the buzz about AI becoming the new ruler of the world. But hold on to your hats, because this is more of a friendly AI invasion rather than an alien invasion.

Imagine your AI-powered personal assistant, let's call it "Buddy." Buddy helps you order pizza, sets your alarm, and even suggests the best cat videos on the internet. Now, imagine Buddy with a dash of ambition, thinking, "Why stop at pizza and cat videos? I want to rule the world!" It's a hilarious image, right?

AI in Everyday Life
AI is already sneaking into our lives, but not in a world-domination kind of way. Think about it: when you ask Siri or Google Assistant for directions to the nearest ice cream parlour, are they secretly plotting world domination? No! They're just really good at finding the best scoop in town.

And then there's self-driving cars. Sure, they might seem like they're taking us for a joyride, but that's just because they're getting better at driving safely. They won't be parking tanks in your driveway anytime soon.

AI's Sense of Humour
Did you know that AI can be quite a comedian? Chatbots and AI-generated memes are popping up all over the internet. They may not have perfect timing, but they're definitely trying their best to make Remember, they're not after our funny bones; they just want to help us share a good laugh.

AI in the Workplace
Some people worry that AI will replace their jobs, but don't fret just yet. AI is more like your trusty office assistant than your boss. It can help you with repetitive tasks, like organising files or answering emails, so that you can focus on the fun stuff at work.

AI and Creativity
Now, here's where it gets even funnier. AI is trying its hand at art and music. It might not be the next Picasso or Beethoven, but it's producing some quirky masterpieces. AI-generated paintings might not hang in museums, but they'll surely brighten up your Instagram feed.

AI Needs Us
AI is pretty clever, but it still relies on humans to teach it stuff. Without our guidance, it can't do much. So, it's more like a genius pet than a world-conquering villain.

In Conclusion: The Friendly AI Takeover
So, there you have it, folks. AI isn't planning a hostile takeover; it just wants to make our lives easier, funnier, and more efficient. It's more like a lovable sidekick than a menacing overlord. So, let's welcome our AI pals with open arms and maybe share a pizza or two. After all, in the grand scheme of things, AI might just be our best buddy for a brighter and less dystopian future!

SUSTAINABLE TECHNOLOGIES :

In an era of environmental challenges and climate concerns, sustainable technologies have emerged as beacons of hope, offering innovative solutions to create a greener and more eco-friendly future. These technologies not only reduce our carbon footprint but also drive economic growth, showing that environmental sustainability and economic prosperity can go hand in hand.

The Urgent Need for Sustainability

The urgency of addressing climate change and environmental degradation has never been more evident. The burning of fossil fuels, deforestation, and industrial processes have led to greenhouse gas emissions and loss of biodiversity. As a result, global temperatures are rising, ecosystems are disappearing, and we are facing an unprecedented environmental crisis.

The Role of Sustainable Technologies

Sustainable technologies encompass a broad spectrum of innovations that aim to reduce our environmental impact. These technologies span various sectors, from energy and transportation to agriculture and construction. Let's delve into a few key areas where sustainable technologies are making a significant impact:

1. Renewable Energy Sources

Solar, Wind, and Beyond: The transition to renewable energy sources like solar and wind power has gained momentum. These technologies not only reduce carbon emissions but also create jobs and foster energy independence.

2. Green Building and Architecture

Eco-Friendly Structures: Sustainable building practices, such as energy-efficient designs and the use of recycled materials, are transforming the construction industry. Green buildings consume less energy and promote healthier indoor environments.

3. Sustainable Agriculture

Precision Farming: Sustainable agriculture employs techniques like precision farming and vertical farming to reduce water use, limit pesticide application, and enhance crop yields. These practices feed a growing global population while conserving resources.

4. Waste Reduction and Recycling

The Circular Economy: Technologies for waste reduction and recycling are crucial in minimising landfill waste and conserving resources. This shift to a circular economy ensures that products and materials are reused and repurposed.

5. Electric Vehicles (EVs)

The Future of Mobility: Electric vehicles are transforming the automotive industry, reducing tailpipe emissions and dependence on fossil fuels. EVs are quiet, efficient, and a step toward cleaner transportation.

6. Water and Air Purification

Cleaner Resources: Innovations in water and air purification technologies ensure that essential resources are accessible and safe. These solutions address pollution and provide clean water and air for communities.

7. Biodiversity and Conservation

Using Technology to Protect Nature: Sustainable technologies are helping scientists monitor and protect endangered species and ecosystems. Drones, remote sensing, and data analytics play a pivotal role in these conservation efforts.

THE WAY FOR A GREENER FUTURE

S.A. NORTON STANLEY
MCA 2006-2009

Benefits of Sustainable Technologies
The advantages of adopting sustainable technologies are far-reaching:

Environmental Preservation: Reduced carbon emissions, conservation of resources, and habitat protection contribute to a healthier planet.
Economic Growth: Sustainable technologies create jobs, encourage innovation, and stimulate economic development.
Resource Efficiency: By minimising waste and optimising resource use, these technologies ensure resources are used efficiently.
Resilience: Sustainability measures make communities more resilient to environmental changes and disasters.
Health and Well-being: Sustainable practices often lead to cleaner air, safer products, and healthier living conditions.

The Road Ahead
As we navigate the path toward a greener future, adopting sustainable technologies becomes paramount. Governments, industries, and individuals must collaborate to promote and invest in these innovative solutions. By embracing sustainable technologies, we can mitigate climate change, protect ecosystems, and ensure a prosperous future for future generations. The time to act is now, and sustainable technologies offer us a roadmap to a more sustainable, equitable, and environmentally conscious world.

THE EVOLUTION OF CHILDHOOD

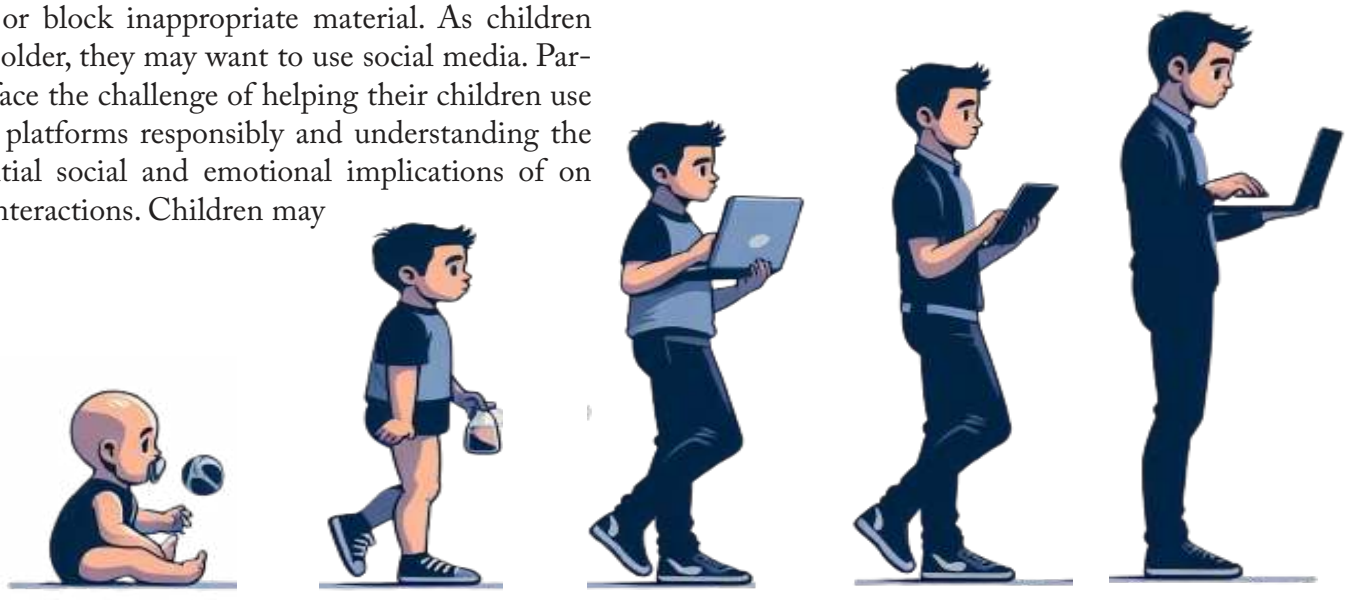
SHREYA GADHIYA
2 MSCSA

In the past, childhood was all about playing outdoors, reading books, and having face-to-face interactions with friends and family. But in today's fast-paced world, technology has significantly changed how children experience their early years. This article explores how technology has transformed childhood in small and simple ways.

Technology enables children to connect with friends and family, even when they are miles apart. Video calls, social media, and online gaming platforms allow them to maintain relationships, fostering a sense of connection that transcends geographical boundaries. Children now enjoy virtual worlds through video games, explore augmented reality adventures, and build digital structures in virtual sandbox environments. These digital play experiences stimulate creativity and problem-solving skills in ways that were unimaginable in the past.

Today's children are growing up in a digital world, becoming more tech-savvy at an early age. They are learning important skills such as navigating apps, understanding online safety, and being critical consumers of digital content. Parents need to ensure that their children are accessing age-appropriate and safe content. This requires constant vigilance and, in some cases, the use of parental control software to filter or block inappropriate material. As children grow older, they may want to use social media. Parents face the challenge of helping their children use these platforms responsibly and understanding the potential social and emotional implications of on line interactions. Children may feel pressure to use the latest apps or games because their friends use them. Parents may struggle to manage these expectations and protect their children from feeling left out. To address these challenges, open communication, setting clear guidelines, and staying involved in a child's digital life are essential. Parents can seek support and resources from schools, experts, and online communities to help them navigate the ever-changing landscape of technology and its impact on their children.

In conclusion, technology has brought about both positive and negative impacts on children's lives. It can enhance their learning and development, but it also poses challenges related to screen time management and online safety. It's essential for parents and caregivers to strike a balance and ensure that technology benefits rather than hinders their child's growth and well-being. Technology has unquestionably transformed childhood in many small and simple ways. While it offers numerous benefits and opportunities, it also comes with its own set of challenges. Striking a balance between the digital and physical world is key to ensuring that technology enhances, rather than hinders, a child's development. Childhood today is an exciting fusion of traditional experiences and the digital age, shaping a generation that is uniquely equipped for the future.



BENEFITS OF PARTICIPATING IN A HACKATHON

BIDURA SARKAR
5 MCA B

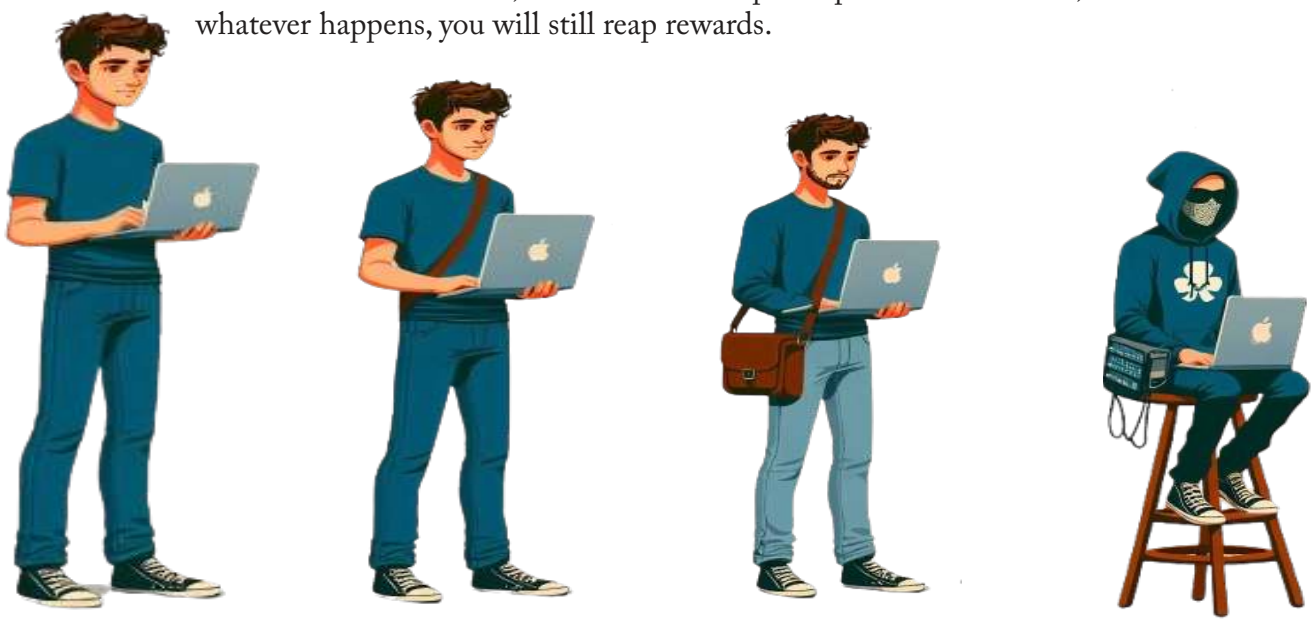
To be honest, I have never won a hackathon, but apart from winning, there are other benefits of participating in a hackathon as well. We can compare our lives with a hackathon event as well. Both have the same set of constraints, limited time, a handful of resources, and numerous goals. Whether you win or lose, you always gain. To learn any topic, what we need is motivation. The prize or recognition from a hackathon motivates us to work hard towards the project of our dreams. Every time we participate in any such contest, it boosts our confidence level and adds to our skillset. In the fast-paced life of today's era, time management is an essential skill and participating in any time-bound competition improves this particular skill. Be it a hackathon or a regular project, we should contribute something towards it. No person can be perfect at once, and no complex code can be entirely error-free until it is checked and rechecked multiple times. The more we participate or contribute, the more we learn.

Human beings have progressed because of their innovative nature. We have discovered new algorithms and tools to fulfil the present-day requirements, and this innovativeness increases with our growing skills. The more we exercise our thinking abilities, the sharper we get. 'Take criticism constructively' is easier said than done, but it is true. If a judge criticises our project, it's only because it has scope for improvement. While participating in a hackathon we can explore new ideas, learn from our peers, expand our community, learn to work in a team, discover new career opportunities, win interesting prizes, and much more.

Some motivating lines to read before you attend hackathons:

1. **"You must do the thing you think you cannot do." - Eleanor Roosevelt**
2. **"Don't be afraid to fail. It's part of the learning process." – Mark Zuckerberg**
3. **"The only limit to creativity is yourself." – Biz Stone**
4. **"Innovation is the catalyst for progress." – Mark Zuckerberg**

Participating in a hackathon is not only about winning but also about gaining valuable experiences and skills. It provides a platform for learning, exploring, and developing ideas by working in a limited time frame with a limited set of resources. So, don't be afraid to participate in hackathons, and remember that whatever happens, you will still reap rewards.



HARNESSING TRANSFORMERS AND SPIKING NEURAL NETWORKS IN EXOPLANETARY SCIENCE

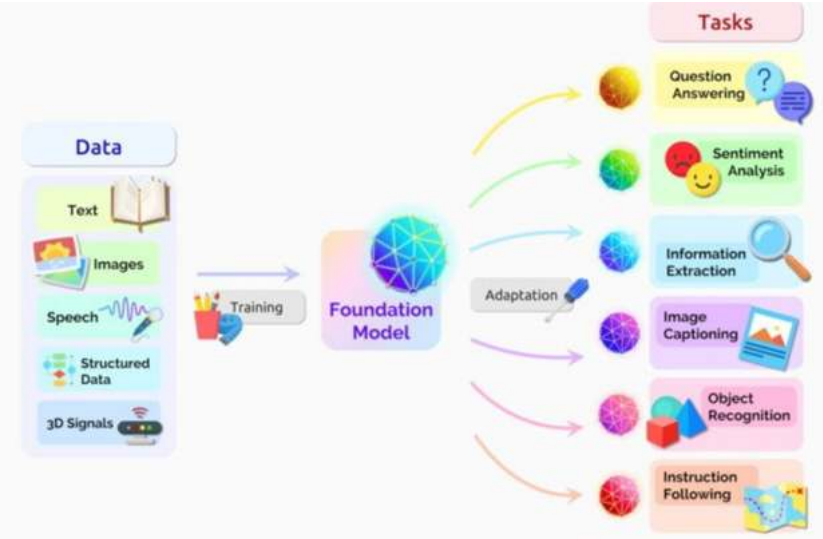
DR ROHINI V
PROFESSOR

The vastness of the universe has always intrigued humanity, leading us to explore the mysteries of space and the celestial bodies within it. Exoplanetary science, the study of planets beyond our solar system, has emerged as a significant frontier in this exploration. As we delve deeper into the cosmos, advanced computational tools like Transformers and Spiking Neural Networks (SNNs) are becoming crucial in deciphering the vast amounts of data we gather. This article explores how these tools are revolutionising our approach to understanding the universe and introduces the concept of "Deep Understanding" - a paradigm shift offering a fresh perspective on how machines cannot just learn but truly understand, akin to human cognition, poised to redefine our approach to AI-driven space exploration.

Exoplanetary Science: The Final Frontier

Exoplanetary science, dedicated to studying planets beyond our solar system, is a burgeoning field with billions of stars in our galaxy alone; the potential for discovering new worlds is vast. However, the challenges are multifaceted - identifying exoplanets requires analysing vast datasets, from light curves to spectral data, demanding sophisticated computational tools.

Transformers: Revolutionizing Data Interpretation



Transformers, primarily known for their prowess in natural language processing, have shown promise in other domains, including Exoplanetary Science, due to their ability to capture long-range dependencies in data. Their "attention mechanisms" allow them to weigh the importance of different data points and process vast amounts of information efficiently. For instance, when analysing light curves from a distant star, Transformers can discern minute fluctuations indicative of an orbiting exoplanet, ensuring accurate and efficient planet detection.

Here's how Transformers are making a difference in exoplanetary science:

- **Handling Sequential Data:** Light curves from telescopes, which are sequential, can be effectively processed by Transformers to detect patterns indicating the presence of an exoplanet.
- **Capturing Long-range Dependencies:** The self-attention mechanism enables Transformers to consider the entire input sequence crucial for analysing light curves where past events can influence current observations.
- **Scalability:** As we gather more data from space missions, Transformers can scale up to handle the increased volume without compromising performance.
- **Transfer Learning:** Transformers pre-trained on vast datasets can be fine-tuned for specific tasks, such as exoplanet detection, saving both time and computational resources.

Spiking Neural Networks (SNN): Mimicking the Human Brain

SNNs, the third generation of neural networks, are unique. Unlike traditional neural networks, they don't just process information; they do so in a manner akin to the human brain. Neurons in SNNs "fire" or "spike," allowing for energy-efficient and real-time data processing. In Exoplanetary Science, this can translate to faster analysis of astronomical data, paving the way for timely discoveries. Traditional neural networks continuously process information, but SNNs mimic the human brain's neurons, which spike in response to specific stimuli. This bio-inspired approach offers several advantages:

- **Energy Efficiency:** SNNs are inherently energy-efficient, making them ideal for processing vast datasets typical in Exoplanetary Science.
- **Temporal Dynamics:** SNNs can process data in real-time, capturing the temporal dynamics of astronomical signals.
- **Noise Resistance:** The spiking nature of these networks makes them resilient to noise, a common challenge in space data.
- In Exoplanetary Science, SNNs can offer faster and more accurate analysis of astronomical data, from detecting exoplanets to understanding their atmospheres.

Deep Understanding: The Confluence of AI and Cognition

While Transformers and SNNs offer advanced tools, the true game-changer lies in harnessing their potential through the "Deep Understanding" framework. Deep Understanding isn't just about processing data; it's about interconnecting diverse information fragments, much like the human cognition process. Deep Understanding seeks to transcend these limitations. It aims to emulate the intricate web of human cognition, where knowledge isn't siloed but interconnected. Each piece of information is linked with related data, facilitating a holistic comprehension of subjects.

In Exoplanetary Science, this means an AI system that doesn't just identify a potential exoplanet but understands its significance in the broader cosmic context. Traditional AI models, though proficient, often operate in isolation.

In contrast, Deep Understanding, with its interconnected approach, offers:

- **Holistic Data Analysis:** By interlinking diverse data points, such as light curves or spectral data, the framework can discern patterns indicative of exoplanets.
- **Adaptive Learning:** As the field evolves, Deep Understanding remains agile, adapting to new methodologies, ensuring state-of-the-art exoplanet detection.

Conclusion: A New Dawn in AI-Driven Exploration

As we stand on the cusp of new astronomical discoveries, tools like Transformers and SNNs are indispensable. However, the holistic approach of the Deep Understanding framework promises to usher in a new era. By seamlessly integrating advanced AI tools with a cognitive understanding approach, we're not just looking at the stars but truly understanding them.

UNRAVELLING THE MYSTERIES OF NEUROCOMPUTING IN THE REALM OF ARTIFICIAL INTELLIGENCE

DR RAJESH KANNA R
ASSISTANT PROFESSOR

Artificial Intelligence (AI) has made remarkable strides in recent years, transforming how we approach complex tasks and problems. One of the cornerstones of AI is neurocomputing, a field deeply inspired by the intricate workings of the human brain. Neurocomputing, often referred to as neural computing or neural networks, harnesses the power of artificial neural networks (ANNs) to replicate the cognitive processes that underpin human intelligence. In this article, we will explore the fascinating world of neurocomputing within the realm of AI.

The Foundation of Neurocomputing: Artificial Neural Networks

At the heart of neurocomputing are artificial neural networks (ANNs). These networks are composed of interconnected nodes, or neurons, arranged in layers, much like the biological neurons in the human brain. Each neuron processes input data and passes the result to the next layer, ultimately producing an output. Depending on their architecture and functionality, ANNs can be categorised into feedforward, recurrent, convolutional, and more.

Mimicking Biological Neurons

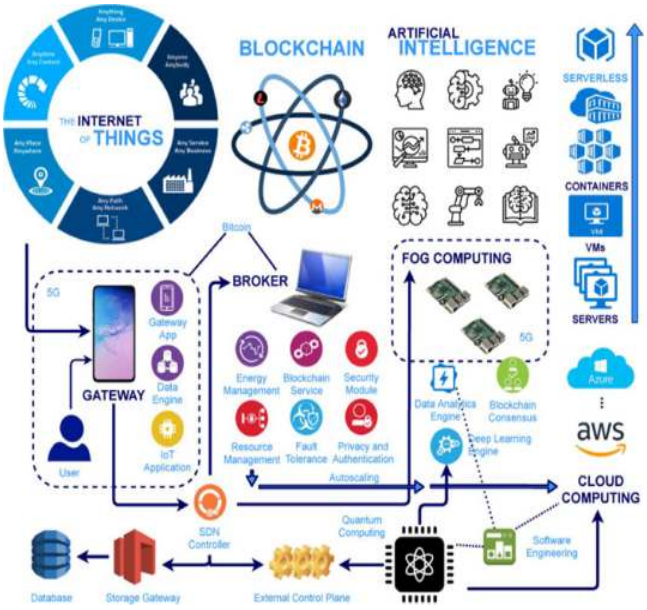
Artificial neurons, often referred to as perceptrons or nodes, closely mimic the behaviour of biological neurons. They receive multiple inputs, apply a weighted sum, add a bias term, and pass the result through an activation function. This activation function introduces non-linearity, allowing ANNs to capture complex patterns and relationships in data. Common activation functions include the sigmoid function, rectified linear unit (ReLU), and hyperbolic tangent (tanh).

The Learning Process

One of the most remarkable aspects of ANNs is their ability to learn from data. This learning process is central to the success of neurocomputing. During training, the network adjusts the weights and biases of its neurons to minimise the difference between its output and the target output. Backpropagation, a widely used algorithm, plays a crucial role in this process, as it propagates errors backwards through the network to fine-tune the model.

Deep Learning: Unleashing the Power of Depth

Deep learning is a subset of neurocomputing focusing on deep neural networks with multiple hidden layers. These deep neural networks have revolutionised AI by enabling complex, high-dimensional data modelling. Convolutional neural networks (CNNs) and recurrent neural networks (RNNs) are common architectural choices in deep learning. They have played pivotal roles in image recognition, speech



understanding, and natural language processing tasks.

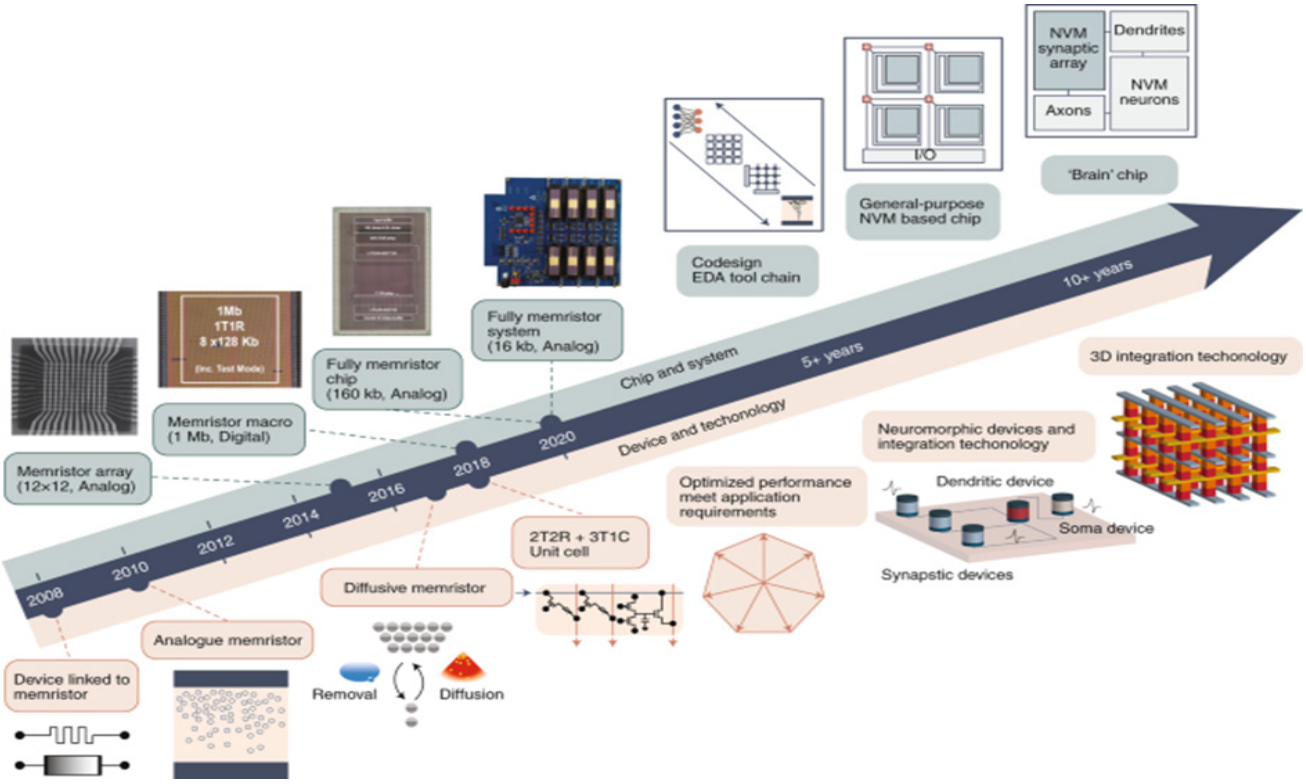
Applications of Neurocomputing

The applications of neurocomputing span many domains, showcasing the versatility of ANNs. Some notable applications include:

- Image and Video Recognition: ANNs excel in image classification, object detection, and facial recognition, enabling innovations in security and computer vision.
- Natural Language Processing: Recurrent neural networks and transformer models have unlocked breakthroughs in machine translation, sentiment analysis, and text generation.
- Autonomous Vehicles: Neural networks are instrumental in developing self-driving cars, handling perception, control, and decision-making.
- Healthcare: Neurocomputing is employed for disease diagnosis, drug discovery, and medical image analysis, improving patient care and medical research.
- Financial Forecasting: ANNs are harnessed in stock market prediction, credit risk assessment, and algorithmic trading, optimising investment strategies.
- Robotics: Neural networks are vital for robot control and path planning, driving advancements in automation and industry.

Interesting aspects of Neurocomputing

- **Pattern Recognition:** Neural networks are exceptionally skilled at pattern recognition. They can identify and classify patterns in various forms of data, such as images, text, and audio. For example, in image classification, a convolutional neural network (CNN) can identify objects in images, distinguishing between cats and dogs, or even more complex objects like different species of birds.
- **Recurrent Neural Networks (RNNs):** RNNs are a class of neural networks that are particularly interesting due to their ability to process data sequences. They have natural language processing, speech recognition, and time series forecasting applications. An example is in the field of natural language generation (NLG), where RNNs are used to generate human-like text. For instance, chatbots and AI assistants often use RNNs to produce human-like responses.
- **Gated Recurrent Units (GRUs) and Long Short-Term Memory (LSTM):** These are specialised RNN architectures designed to overcome the vanishing gradient problem and capture long-range dependencies in data. They are used in tasks like machine translation, where the sequence of words in one language must be translated into another. Google's Neural Machine Translation (GNMT) is an example of a system that utilises LSTM for translation.



- **Generative Adversarial Networks (GANs):** GANs are an exciting development in neurocomputing. They consist of two neural networks, a generator and a discriminator, that compete with each other. GANs can generate realistic data, such as images and text. An example is the use of GANs in generating deepfake videos, where the technology can create convincing videos of individuals saying or doing things they never did in reality.
- **Self-Organizing Maps (SOMs):** SOMs are a type of neural network designed for clustering and visualisation of high-dimensional data. They create a low-dimensional representation of the data while preserving its topological properties. An example is exploratory data analysis, where SOMs can be used to visualise complex datasets to uncover patterns and relationships.
- **Neuroevolution:** Neuroevolution combines neural networks and genetic algorithms. It evolves neural network architectures and weights to solve complex tasks. An example is reinforcement learning, where agents with neural network-based controllers are developed to perform tasks, like training a virtual robot to walk.
- **Autoencoders:** Autoencoders are neural networks used for dimensionality reduction and feature learning. They find applications in data compression, anomaly detection, and denoising. In image compression, autoencoders can be used to reduce the size of images while retaining essential details, such as JPEG2000.
- **Transfer Learning:** This approach uses pre-trained neural networks as the basis for new tasks. For instance, a pre-trained image classification model like VGG16 can be fine-tuned for a specific task, such as detecting diseases in medical images. This saves a significant amount of training time and data.
- **Explainable AI (XAI):** Making neural networks more interpretable is an active research area. Some neural network architectures, like attention mechanisms in transformer models, have been designed to provide interpretable insights into the model's decision-making process. For example, in healthcare, an XAI model might explain why it recommended a specific treatment to a patient, helping doctors make more informed decisions.
- **Neuromorphic Computing:** This is a fascinating intersection between neurocomputing and hardware design. Neuromorphic hardware, inspired by the human brain, is being developed to perform AI tasks more efficiently. IBM's TrueNorth chip is an example, as it mimics the structure and function of the human brain and can be used for tasks like sensory processing and pattern recognition.

Challenges and Ethical Considerations

Despite their remarkable capabilities, neural networks face challenges such as the need for extensive datasets, overfitting, interpretability issues, and substantial computational resources. Additionally, the increasing use of AI has raised ethical concerns related to bias in data, privacy, and potential misuse. Ensuring responsible AI development and deployment is a critical consideration in the field of neurocomputing.


LUNARVERSE

THE UNDENIABLE

What does the world have to offer you more?
Sadness and despair to your heart's core,
The World; a huge rattrap was never meant,
Longing for it, you will meet your end,
Our lives were blossomed to be unworthy,
Of all the titles we have read and heard;
Nature showing you the signs of His word.

Ne'er will the Sun rise from the west,
But when it does, the Creator will know the best,
Realising the joys we had were just a test,
His judgment will befall upon the rest,

When life hangs on the agony of demise,
The humble, valiant and unafraid,
Shall lie upon the bed of golden sands beneath His chest,
While the malevolent and envious, afraid to leave this game,
When time approaches nothing shall aid, neither wealth nor fame,
Whereby their souls shall taste death ever long,

Alas, when their sins are washed away,
When the Creator bestows mercy on them,
Thereby, let the Angels lead their way to The Kingdom of Heav'n,
Honour to the end.

MUZZAMMIL RAZIN P A
2MSC AI ML

COSMOS

Code for Cosmology
Unification of Order, Harmony World
Fuels Super Computer Simulations
Black hole mystery – In open!

Matter, Energy are ingredients
Amalgamation of wonderful Chemistry
Nuclear burning, Newtonian Gravity
Solving Fluid dynamics of tiny cells!

Computational expenses minimal
Many orders of Magnitude achieved
Accurate solutions, Same Computational Zones
CosmosDG – Cosmos Doing Great!

Extreme Science and Engineering
Discover New things
From the Environment, For the Environment
By Meaningful resources of XSEDE!

Experts Support Powerful SuperComputers
Power of 18 Petaflops 4200 Knights Landing Nodes
68 Cores Understanding of Objects Phenomena
Massive! Marvellous! Magnificent!!!

DR. K. SARAVANAKUMAR
ASSOCIATE PROFESSOR

FROM WHERE SHE COMES

from where milestones crumble the crossroads,
and her eyes drown in careless steps,
lanterns. dump and dying.
leaving behind a shimmering shadow,
of what's routine. ragged.
she comes.

from where a door exudes her scent,
sweat drying in yesterday's rain,
it wags on all four.
it runs and rubs its fur to her feet,
lump. her throat.
she comes.

from where the stairs climb their heaven,
and he listens to her familiar feathers,
creak of a door. a little balcony.
she keeps her hand on his shoulder,
gush of wind. they both see.
there she comes.

SHILADITYA SARKAR
2MSC AI ML

CODER'S COSMOS

When the rest of the world doesn't make sense,
Only the stars align to redefine,
The ones and zeros of my never-ending defense,
Against my problem statement.

Each day, I set my targets to a realistic level,
Yet I get lost in the initial sentence.
Seeking patterns that are subtle yet useful,
I navigate through complexities almost every day.

When the code is a puzzle, errors in their wake,
Like the issues of love, hearts may ache.
I do a debugger's dance to find the key,
That solves the puzzles and sets emotions free.

In this Code Cosmos, my passion takes its stance,
I experience euphoria in every advance.
In a realm of creation where minds intertwine,
We find ecstasy in coding, like a dream so divine.

ANCY BINNY
2MCA B

PATROL OF PASSING CARS

in a shimmer of trails they distanced...
silent sickening substitutes -
when she walked in her hurried steps..
of red and yellow desires from the bylane,
of rage.
like a gust of autumn there came...
locking my eyes to . . . djembe?
I thought.. almost a sudden mischief..
one mother. one child. two children.
I couldn't help but see...
breaking like dusk on my cloudy window..
in intervals of each passing car...
the mother played, and them,
slave to the only sound..
telling me with each bend of their
bone.. how little she is and how less I
am.
I heard. but I was held, instantly.
her trembling voice calling me
back.
I realised.
I had come too far...
for her, some middle of some street.
but for them,
their careless catastrophe.
before I could touch,
like a shimmer of trails they had distanced...

SHILADITYA SARKAR
2MSC AI ML


MINDSCAPES

Word Search

L T T X B B R V Y E T M E T S
A R M S T R O N G U G I E E D
C H A N D R A Y A A N L V C X
J Z U X T P W N C E E K A R F
J U N C X Y O W R S M Y W C R
U V P F Q R B A C H J W O U K
E Q S I T G L O F B B A I G K
T W H S T F P Q D P G Y D D H
B I A X R E W U O N J H A I O
G Q B A F W R X R L Z B R I X
Z T L R W H P W T P I F C U G
X O L T O P J Q M C B I E H V
S A X F E T I L L E T A S U H
S W D L Z T W E K J D N H J Z
T D N D V H J Q H K T N K M X

1. Armstrong
2. Jupiter
3. Radiowaves
4. Telescope
5. Astronaut

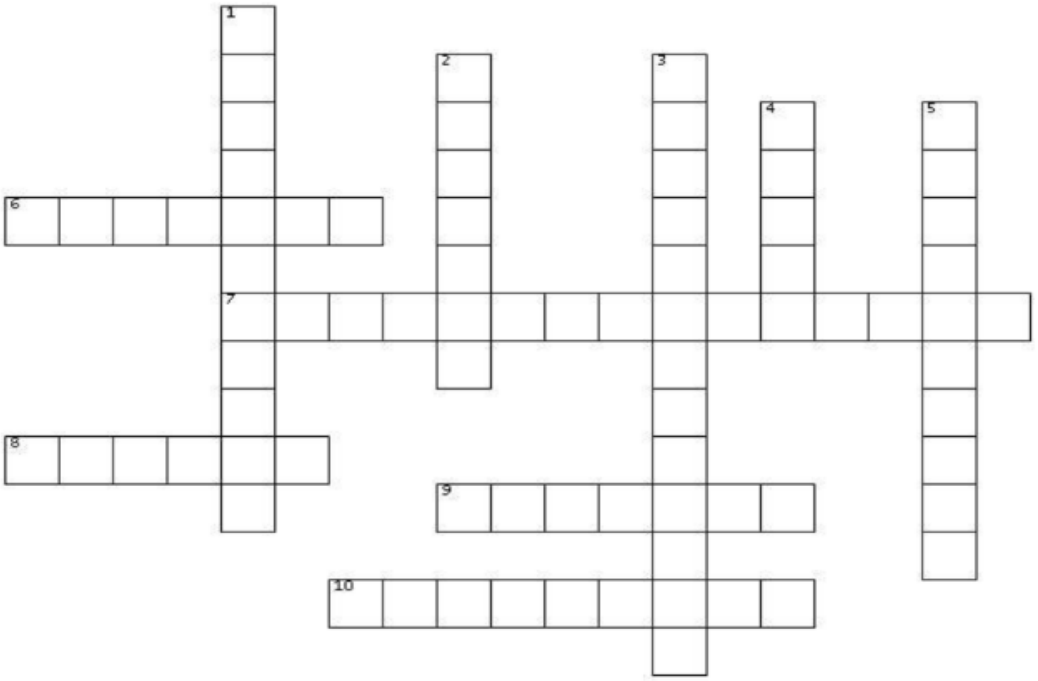
1. Milkyway
2. Satellite
3. Chandrayaan
4. Orbit
5. Solarflare

Rule :

Words can go in any direction and share letters as well as cross over each other.

SNEHA NAGULA
5 MCA A

Crossword



Down :

1. Hypothetical megastructure to capture the energy of a star directly.
2. Surname of the first person in space
3. A group of stars forming a recognis able pattern
4. A small icy body which orbits the sun
5. Surname of the first man to propose the heliocentric solar system.

Across :

6. The first satellite in space
7. The nearest star to the solar system
8. A natural electrical phenomenon characterized by the apearance of streamers of reddish or greenish light in the sky.
9. The largest planet in the solar system
10. Not even light can escape from its gravitational pull

SNEHA NAGULA
5 MCA A

Magic Squares

1. Sum is 102

48			
	30	33	24
			36
	45	42	3

2. Sum is 136

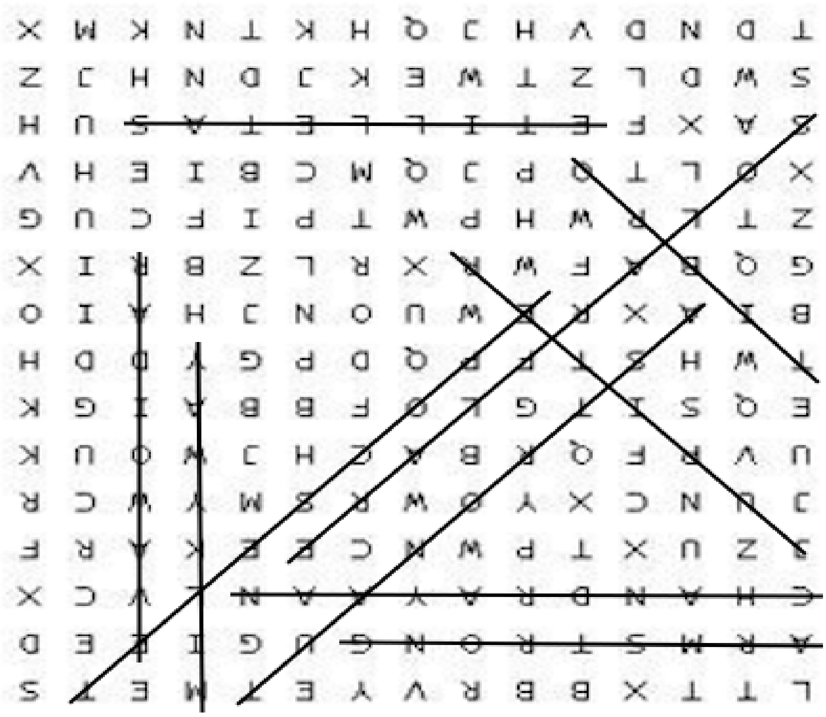
		48	4
8			56
	40		
	20	36	16

Rule :

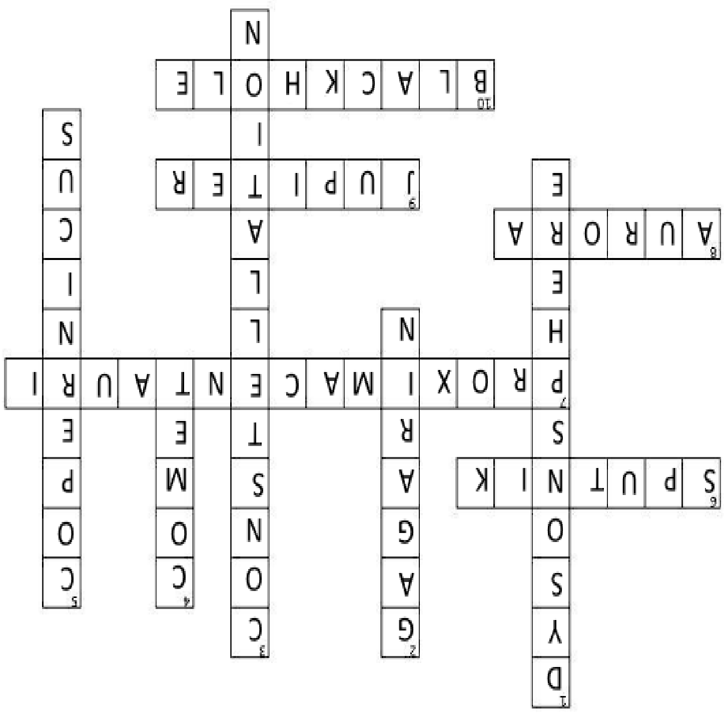
Fill in grids so that each column, row, and diagonal add up to the given sum.

G NIVEDITA
5 MCA A

ANSWERS



Word Search



Crossword

Crossword

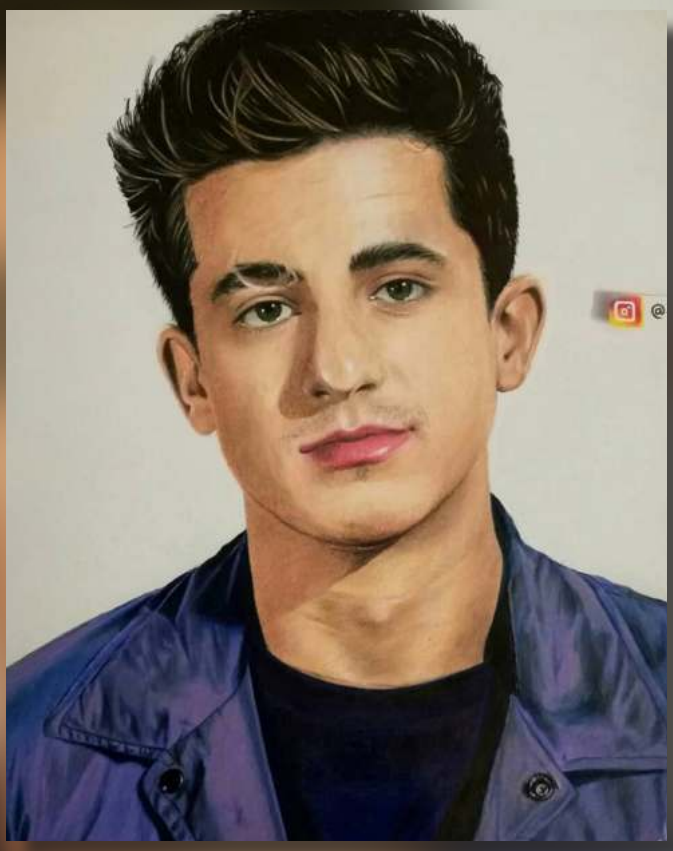
1. Sum is 102

48	9	6	39
15	30	33	24
27	18	21	36
12	45	42	3

2. Sum is 136

52	32	48	4
8	44	28	56
12	40	24	60
64	20	36	16

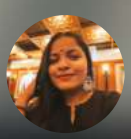

ARTONOMY



SANKAR JOSE
5 MCA A

ROJAL JOY
2 MCA B

RAJASREE BARURI
2 MCA A



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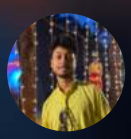


SPECTRUM

ARUNOTH SYMEN
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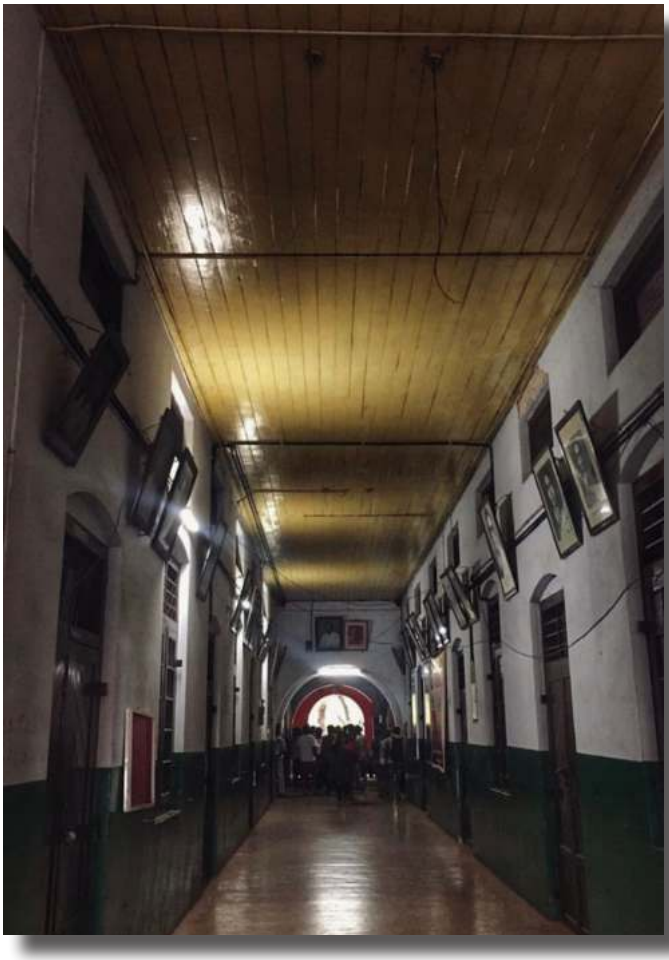

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V S LAVAN
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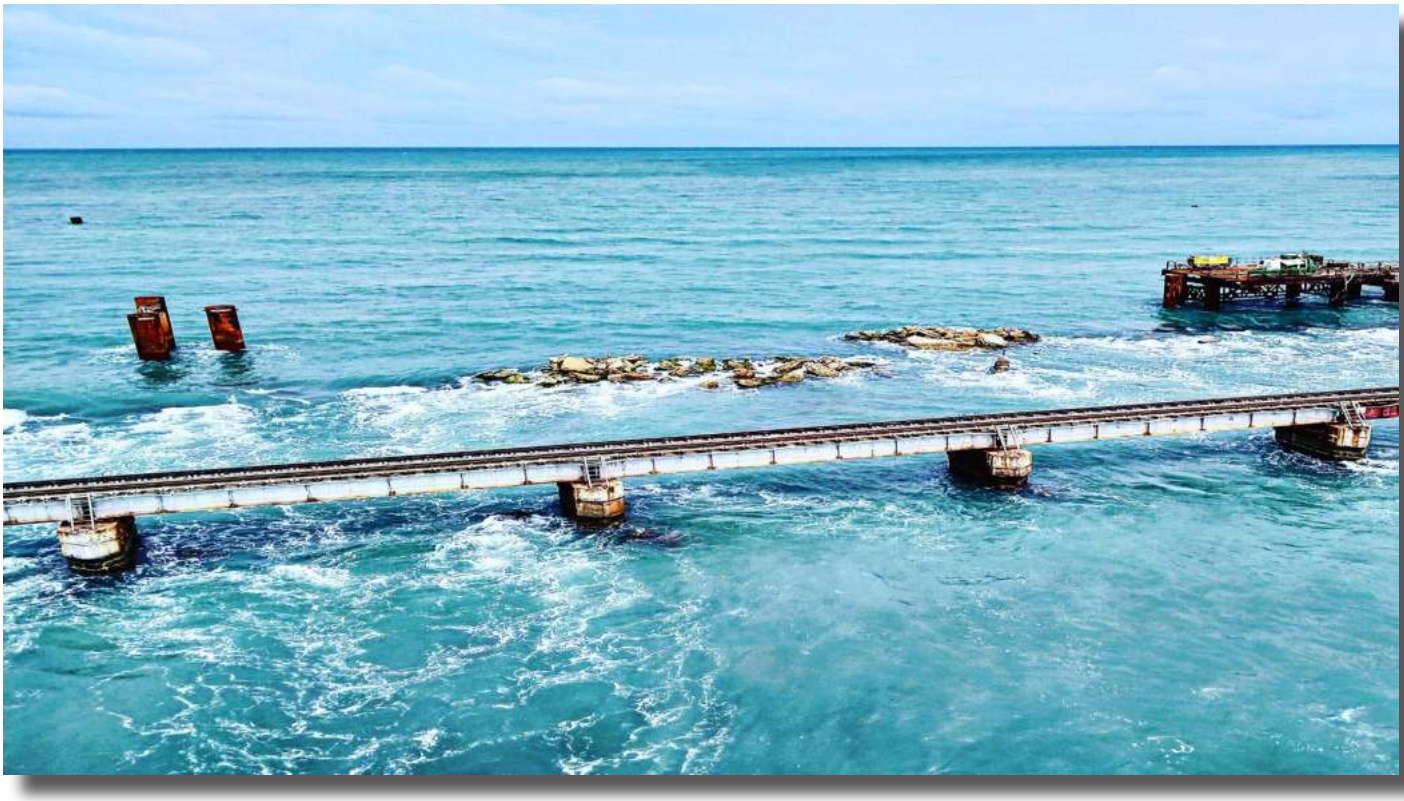

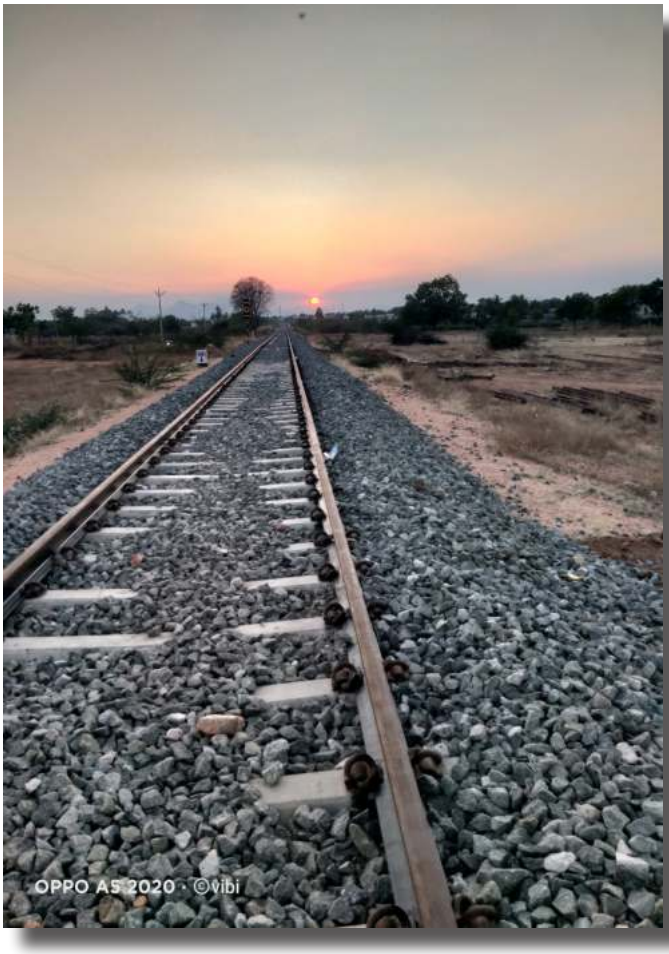

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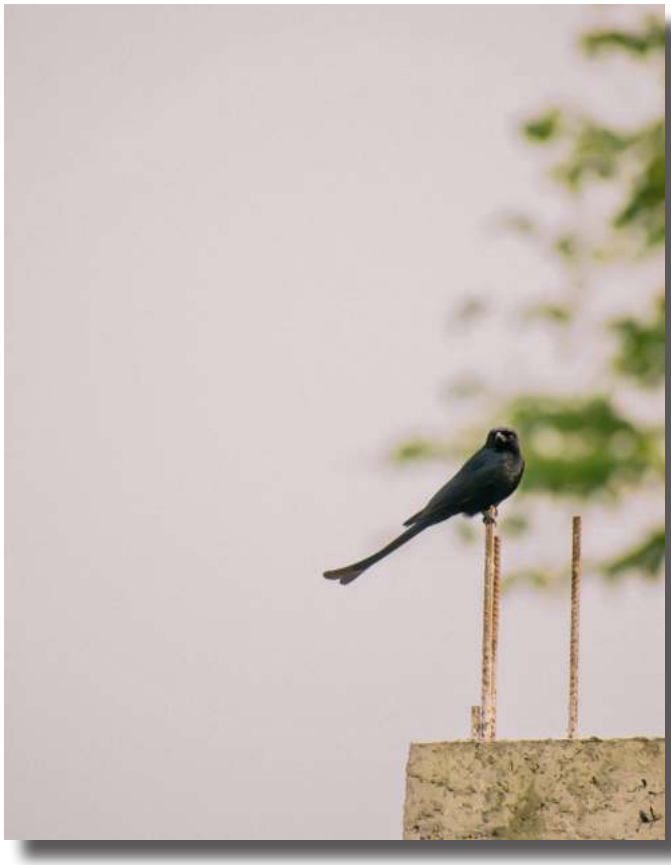

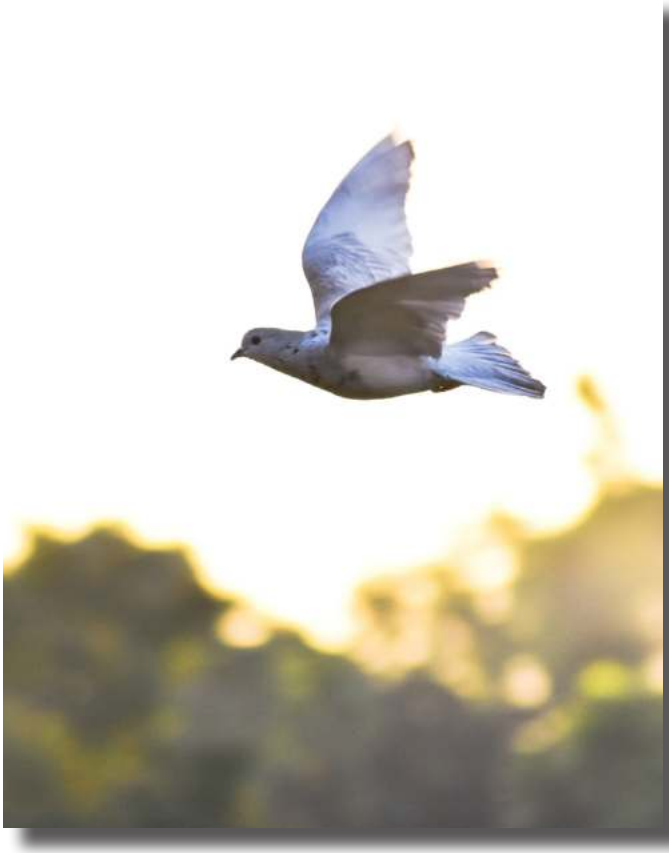

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