etaverse

CHRIST
(DEEMED TO BE UNIVERSITY)
BANGALORE · INDIA

Department of Computer Science

INFOBAHN

VOL
25

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Ashwin Kumar V

From the Vice Chancellor's Desk

At CHRIST (Deemed to be University), we have made it a permanent endeavor to equip our students with skills, technology, and an appropriate mindset through teaching, training, and exposure to the world's ever-changing scenario.

Our students have been trained and moulded to have the right type of approach and sensitivity to perceive things in the face of constantly varying national and global environment. This prepares them to work in a challenging context and be innovative in the face of disruptions. In fact, the students have been trained to evaluate their roles and responsibilities as well as take initiative to develop an effective approach while devising strategies to solve problems.

lnfobahn is one such initiative taken by the postgraduate students of the Computer Science Department to showcase their various talents and vast knowledge in their respective domains.

I congratulate everyone on the 25th volume of lnfobahn.

Col Dr Fr Abraham VM

From the Head of the Department's Desk

One of the founding cornerstones of CHRIST (Deemed To Be University) has always been to create a nurturing ground for holistic development of students. Our vision, 'excellence and service,' has driven our students to establish their presence in the path of their choice and reach greater heights.

Since its inception, the department of computer science has always nurtured the students' growth and encouraged initiatives. Our meticulously planned curriculum at CHRIST instills adaptability and competitive spirit which motivate our students to be a better version of themselves. The department of computer science provides the students flexibility to choose their pursuit of interest and mentors them throughout their academic journey.

Apart from academics, we encourage our students to participate in the various inter and intra-collegiate fests. The inclusive nature of the department facilitates the students to portray their multifaceted talents. In the department, we believe that an environment which fosters growth is crucial to prepare young minds for the demanding roles in the it world. I recommend the faculty and students make the best use of the facilities at the university to maximize their learning.

Infobahn is a prime example of the excellent learning process and the variety of skills our students develop. Like the previous versions, I am confident that infobahn will bring ample entertainment and knowledge to the readers.

Dr. Joy Paulose

From the Editoral Team

With the intra-departmental fest 'Revelations' arrives Infobahn, the biannual IT magazine that provides the post-graduate students of the Department of Computer Science with opportunities to showcase their talents. It enables the students to utilise their knowledge of various fields and interlink them to the current trends in technology. The advent of new technology sends ripples of impact through society as we are long past the era where humans and technology could be separated. This precisely influenced this year's theme for Infobahn to be 'Metaverse', the current technological revolution that can alter how humans interact with each other.

The implications of the Metaverse are profound where it can lead to a robust digital economy and allow users to connect virtually. Businesses need not be limited by geography while marketing and professionals may be trained virtually leading to better productivity.

Keeping this in mind, this year's Infobahn has been prepared with great care by the team with support from the faculty. Compiling this magazine has been an enlightening experience filled with new learnings and discoveries that we are sure to carry beyond the current academic journey. We hope you enjoy perusing the magazine as we step into the unknown.

Metaverse and Healthcare

Simply put, Metaverse is the grand convergence of Artificial Intelligence (AI), Augmented Reality (AR), and Virtual Reality (VR). Contrary to popular perception, Metaverse has been around since many years (primarily in the gaming industry) although it has become a buzzword ever since Facebook rechristened itself Meta Networks. Given the usual hype and noise around the term, it's easy to lose sight of the impact of Metaverse in the near future, which is way more phenomenal than what the gaming and entertainment sectors would like us to believe. The pandemic era has virtually institutionalized an all-remote workplace culture across verticals but the sector that has undergone a paradigm shift is healthcare.

Virtual consultations, online collaborations between surgeons, data-driven decisions, Electronic Health Records (EHR), and predictive genomics are well on their way to becoming the de facto standard of medical care and cure, and Metaverse will undoubtedly play a pivotal role in enhancing each of these critical elements that will separate the best from the rest.

Blockchain-based EHR

The drawn-out and now-defunct process of accessing one's medical records manually (often plagued with issues like data entry errors, inconsistent documentation, and doctor fatigue; factors which ultimately increase the inefficiency) will be completely replaced.

Virtual Consultations

Metaverse will virtually eliminate the need for physical interaction between the patient and the doctor, at least in minor risk cases. Some may argue that COVID has already

ushered in a wave of virtual hospitals, with 90% of their cases handled via a Video Call or Text Messaging service. But Metaverse would make the whole process 10x more realistic thanks to its 360-degree simulations. This would in turn lift patient satisfaction as it would guarantee focused doctor attention, something that is often found lacking in chat/call assistance.

Online therapy

Metaverse can go a long way in treating sensitive illnesses like paranoias, apprehension disorders, PTSD, delusions, and hallucinations. It will provide a realistic environment for conducting psychotherapies and psychometric tests to check the real-time patient reactions. These safe and secure experiences will hasten the recovery process and help the sufferers lead better lives.

Online collaborations between surgeons

Metaverse would promote real-time interactions between highly qualified doctors, thereby allowing an easy exchange of knowledge and insights. Resident doctors in the formative years of their medical training would be able to experience the feeling of "actually-being-there" while the fraternity stalwarts perform complicated surgeries. This hands-on experience will indeed elevate their understanding and in turn, help them become better surgeons and specialists. A few hospitals have already started conducting workshops and lectures by prominent thought leaders.

Predictive Genomics

Using Genomic Big Data, many healthcare companies are aiming to create a fourth-dimensional social platform that could have valuable applications in business and industry. The end goal is to have a meta-commerce system in place where everyone's avatar is ensured to be unique through saliva samples. Most importantly, a cyber model-based virtual space will help users to identify and manage the diseases that they are likely to suffer from in the future.

Prediction of Treatment Outcomes

"Digital Twins" are virtual entities that can be thought of as a 'real-time digital counterpart' of a person/object. This will be one of the premier features of healthcare in Metaverse as this would allow us to see not just the immediate treatment outcomes, but also the long-term effects. It would significantly reduce the risk of organ donation and surgery training, while also improving patient monitoring.

"Using Genomic Big Data, many healthcare companies are aiming to create a fourth-dimensional social platform that could have valuable applications in business and industry."

Paritosh Raikar
2MDS

Data Science And Cricket

Data science, Machine Learning (ML), and Artificial Intelligence (AI) are the flavors of the season worldwide, and India is no exception. Intellectuals and industrial practitioners are examining these methodologies' fundamental underpinnings and application potential, which has sparked much interest. As a result, data science is being considered for use in a wide range of subjects and subfields. Sports is one such field where data science applications have much potential. While sports analytics has been around for a long time, with sabermetrics as an example, the scope of what can currently be accomplished with analytics is pretty astounding.

The world of sports is no longer without big data and analytics. It is not just athletes who work hard on the field nowadays; data scientists do. Its purpose is to anticipate match outcomes while also assisting in developing game strategies. Some prominent names that use analytics to improve their game include the German football team and well-known NBA clubs.

Cricket generates a great deal of excitement and a great deal of data. Consider the statistics derived solely from batting and bowling. Consider the information pertaining to both the batsman and the bowler. Significant data insights provide adequate background information and projections for players, spectators, and broadcasters to make the best decisions possible about the team's performance. The position of an analyst

in cricket has been incresingly important in recent years, particularly in the hugely popular T20 tournaments such as the Indian Premier League (IPL). Unbeknownst to the hundreds of thousands of people tuning in from around the world to watch this worldwide athletic event, a massive quantity of data is being collected and analysed. Data science can help a team win a match by recommending the best strategies. It also gives a franchise enough information to make a bid on a player. There is an invasion of cricket statistics-oriented websites and organisations that provide precise information on the sport today.

> "Its purpose is to anticipate match outcomes while also assisting in developing game strategies"

The statistics data for a single batsman and bowler shows how many wickets were lost, how the ball was swung, how many runs were scored per delivery faced, how each player responded to the delivery, and so on. Instead of just watching the game, this data allows spectators to have a deeper understanding of the game. The uncertainty surrounding a bowler's or batsman's average performance can be solved with data analytics. What's important is to understand how they'll react in a specific situation. All of this data, taken together, has the potential to open up a world of possibilities for analysis and valuable insights, which may subsequently be used to forecast or classify future events. As a result, captains may make better judgments both on and off the field.

Winning and Scoring Prediction (WASP) is a machine learning technique that forecasts the ultimate score in the first innings and calculates the chasing team's chances of winning in the second innings. In the initial innings of a match, it also serves as a scoring predictor. WASP, for example, may estimate that the team will score 278 at the end of the innings based on its computations. It serves as a winning prediction in the second inning. If WASP announces 67 percent during the second innings of a match, that signifies the chasing side has a 67 percent chance of winning the match.

For a more in-depth analysis of cricket matches, researchers used Google trends to refer to data science. Some Indian analytics firms, such as Cricket-21, play a significant role in data analysis for most international teams. Big data and sports analytics present even more opportunities than normal. In the field of cricket, machine learning has a bright future. Big data has a critical role to play in cricket decision-making based on accessible facts. Cricket is no longer a popular sport. In truth, the sport is lagging behind fans in terms of statistics.

Adith AV
3 MCA

Blockchain Enabled Semantic Web and Applications

Semantic Web methods allow the creation of Web-based data storage, the development of vocabularies, and the writing of information handling procedures. The establishment of a series of principles by the internationally recognized group – the World Wide Web Consortium – was fundamental to accepting the Semantic Web concept. Technically referring, the Semantic Web has been based on various technological standards. The Semantic Web standards are:

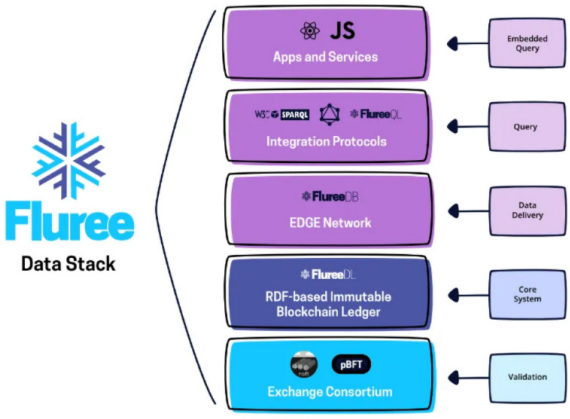
- **Resource Description Framework (RDF)** is a Web data transfer paradigm that is widely used. RDF contains capabilities that enable information integration even though the fundamental schemas are different, and it permits schema modification through the period without needing every user to be altered.
- **SPARQL** is an acronym for SPARQL Protocol and RDF Query Language. It is the industry-standard query language and protocol for databases that store Linked Open Data and RDF.
- **OWL** is the abbreviation for the World Wide Web Consortium's Web Ontology Language. It is a logic-based programming language that is intended to be translated by computers in order for them to analyze as well as reason about the Data it represents autonomously.
- **Uniform Resource Identifier (URI)** is a sequence of characters that enables definite resource identification and extension. It is designed to be used on the Web to identify abstract or physical assets.

Blockchain and its Essential Concepts
In simple terms, blockchain technology is a decentralized, distributed system that tracks the origin of a digital item. Blockchain

technology is comprised of three essential concepts: Blocks, Nodes, as well as Miners

- **Block**: A block contains a subset of the whole of the most recent transactions that have not yet been included in any previous blocks.
- **Miners**: A minor's function is to construct the Blockchain of records that constitutes the ledger. These ledgers are called blocks, and each block records all of the transactions that have taken place. A new block is added in response to the changing transaction in every instance.
- **Nodes**: Each node maintains its very own blockchain network, and the system needs to accept every freshly generated block computationally in order for the chain to be upgraded, authenticated, and confirmed.

servers that captures and saves data to create a chronological timeline of events on an immutable and transparent ledger system. The term "Semantic Blockchain" refers to applying Semantic Web concepts to blockchain systems. On the Blockchain, the standard



Blockchain-Enabled Semantic Web

In recent days, these two developing technologies have been utilized to get new insights into a range of factors, including financial security, production chain logistics, decision making, and generating varied datasets. Several blockchain systems are designed for fully decentralized use cases, with data types and defined actions around the data. For instance, Fluree, the blockchain-based data platform, was developed from trends that allowed verified data sharing and collaboration. Fluree's technology stack is given in Figure 1. Fluree is a blockchain-based graph database. And it just made the move to open source after the successful completion of a $1.5 million seed extension round as part of its DoD contract.

The Semantic Web (Web 3.0) combines technologies focused on data, primarily represented, modelled, and connected. Blockchain technology is a distributed network of

promotes standard data formats and trade standards. It allows comparison among a request and multiple resource descriptions by examining the semantics of their associated explanations based on a common ontology. AI and Blockchain-Enabled Semantic Web (BESW) - these techniques may create trust and provide excellent semantic web development outcomes.

Dr Arul Kumar N
Assistant Professor

The Role of NFTs in the Metaverse

While the world keeps evolving, our lives are slowly becoming a part of a science fiction movie that's scintillating yet unpredictable. Metaverse invites us to be part of this world, where our virtual selves get to interact with each other, reciprocating the real world. We can create, explore, and socialize in various virtual spaces of the Metaverse with augmented reality headsets. Even monetization is possible, where Metaverse can help in implementing virtual economies. Due to its expansive nature, the introduction of cryptocurrencies can significantly impact the Metaverse. Hence, the concept of NFTs comes into the picture. Non-Fungible Tokens, also known as NFTs, have recently stormed the market since it's new and provides a base for digital assets. These assets depend on value and popularity. Since they are non-fungible, they can be sold or traded but can't be replaced with one another. NFTs are unique and can help be a revenue model in various industries, especially art and gaming. So how can we use NFTs in Metaverse?

Like in the real world, imagine purchasing land resources in the virtual world. These

land resources can be NFT assets, where the users can either buy or trade with one another. Decentraland is a type of Metaverse project that helps you purchase such land resources, with proof of confirmation sent as NFTs. Introducing Blockchain into the Metaverse can help users have complete control over the land plot they bought. If they want to trade with others, platforms like OpenSea help facilitate the same.

NFTs can also impact the Metaverse projects involved in gaming by introducing a play-to-earn(P2E) system. Metaverse platforms like The Sandbox or Supremacy help players earn by playing games that support blockchain technology. The in-game items are treated as NFTs, where players can buy and trade them with others. So by integrating NFTs, gaming companies can earn massive revenue, with players contributing to the virtual environment.

Players can also customize themselves in the Metaverse, with each item treated as NFT. For example, if you purchase a red hat, there won't be another red hat in that Metaverse since you're the sole owner of the red hat. In other words, each item is unique, and there can't be duplicates of the same. If implemented well, players can own special items of high value, which will help them invest in NFTs.

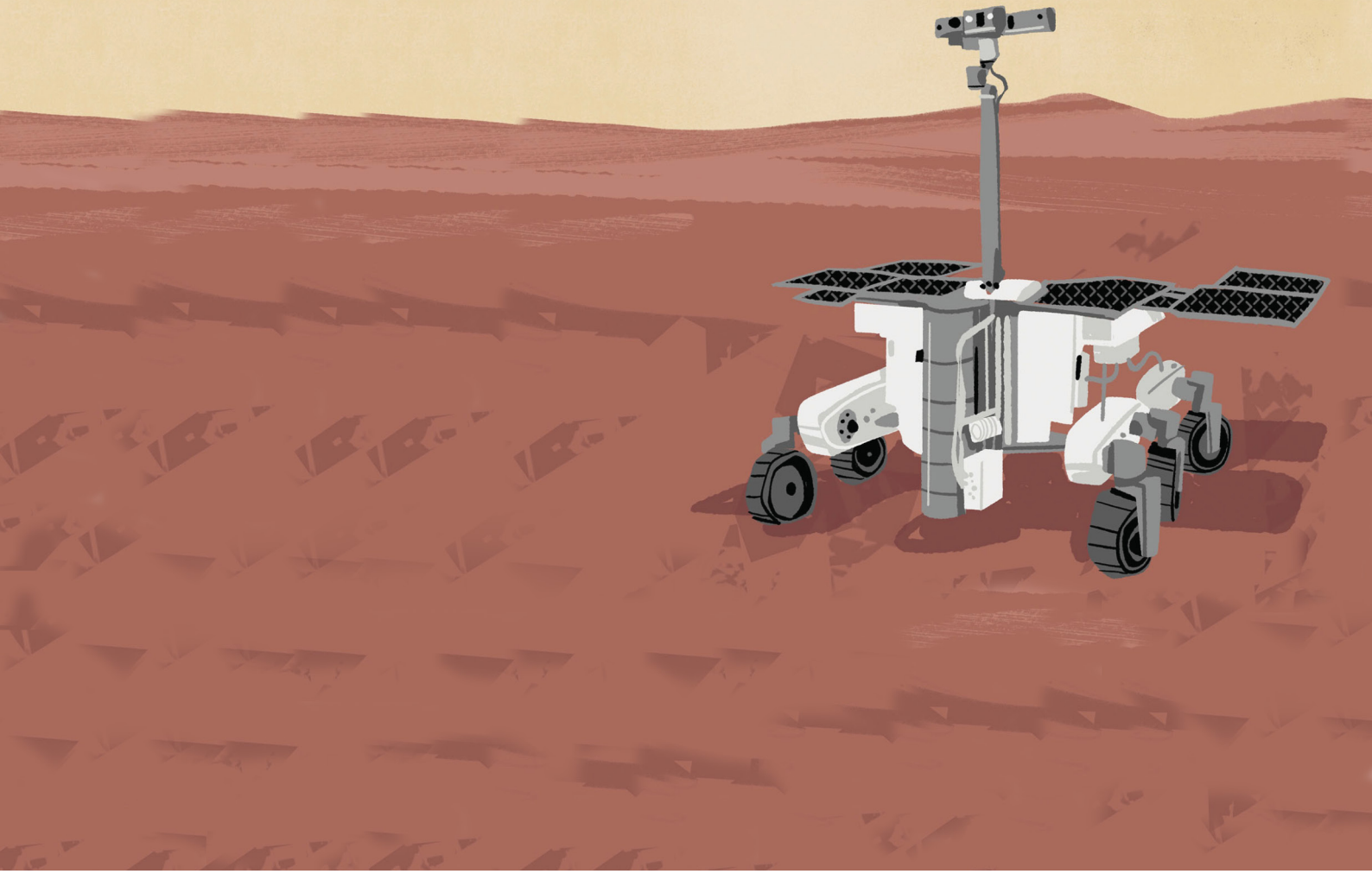
Apart from gaming, Metaverse platforms have premium virtual spaces that can connect users for various purposes. To gain access to these spaces, premium NFTs are introduced. Even luxury brands like Gucci and Louis Vuitton are buying into Metaverse.

While NFTs can influence the Metaverse greatly, we still don't know if the impact will be positive or negative. There have been various controversies regarding the use of NFTs. Gaming companies like Ubisoft have been promoting playable NFTs, while Valve hasn't shown any interest in doing the same. Since it's a new technology, some metaverse platforms are reluctant to include NFTs to avoid risks. However, is it reasonable to immediately transition from the physical to the virtual world? Is it safe? Is the usage of NFTs in the Metaverse ethical? Right now, it's just the inception. People are slowly learning about it, trying to combine the Metaverse technology to create something positive. Only time can tell if these technological advancements are a boon or bane to society.

To conclude, NFTs indeed can be implemented in the Metaverse, but we have to understand the technology well before we invest in the same. Consult experts, choose the right Metaverse platform, and be ready to take risks. If you play the cards right, NFTs can be highly profitable. But do be prepared for the repercussions caused by it. Play smart, conquer the Metaverse!

Renil Justin
3 MCA

Ingenuity
A Masterpiece in Mars



NASA's Perseverance rover completed its year on the Martian surface on February 18, 2022. It was launched on July 30, 2020. It has achieved a dozen records from launching till now. The most recent record was made in February of 2022 February, in which the rover broke the record of the most distance ever traveled by a Mars rover in a single day. It traveled 1,050 feet (320 meters) on February 12, 2022. Among the other features, the MOXIE (Mars Oxygen In-Situ Resource Utilization Experiment) also made a record for converting some Martian carbon-dioxide rich atmosphere into oxygen. This technology will be a significant lead to future human mars exploration. The Ingenuity Mars Helicopter, nicknamed Ginny, was the most critical part of the mission. The helicopter was developed as a test case for the first powered flight on Mars. Ginny is a solar-powered copter that landed on Jezero Crater of the Martian surface in the belly of the Perseverance rover. From the belly of the Perseverance rover, it was dropped to the Martian surface by the Mars Helicopter Delivery System designed by Lockheed Martin. Before dropping, the

Ingenuity was made to be flipped to the vertical position from the current horizontal position with respect to the rover and will take "multiple days," said Farah Alibay, who was the lead of Ingenuity's integration with Perseverance. The primary function of the Mars Helicopter Delivery System was to place Ingenuity's tiny landing legs on the surface of Mars. The Mars copter touched on the ground in early April 2021.

Although the first flight was planned to be conducted on Sunday, April 11, 2021, the high-speed rotor spinning test conducted on Friday, April 9, 2021, did not go as planned. After analyzing the result, it was found that there was an early shut down at full speed rotor spin test. The problem was solved by the command sequence software modification that has made a reinstallation of Ingenuity's flight control software.

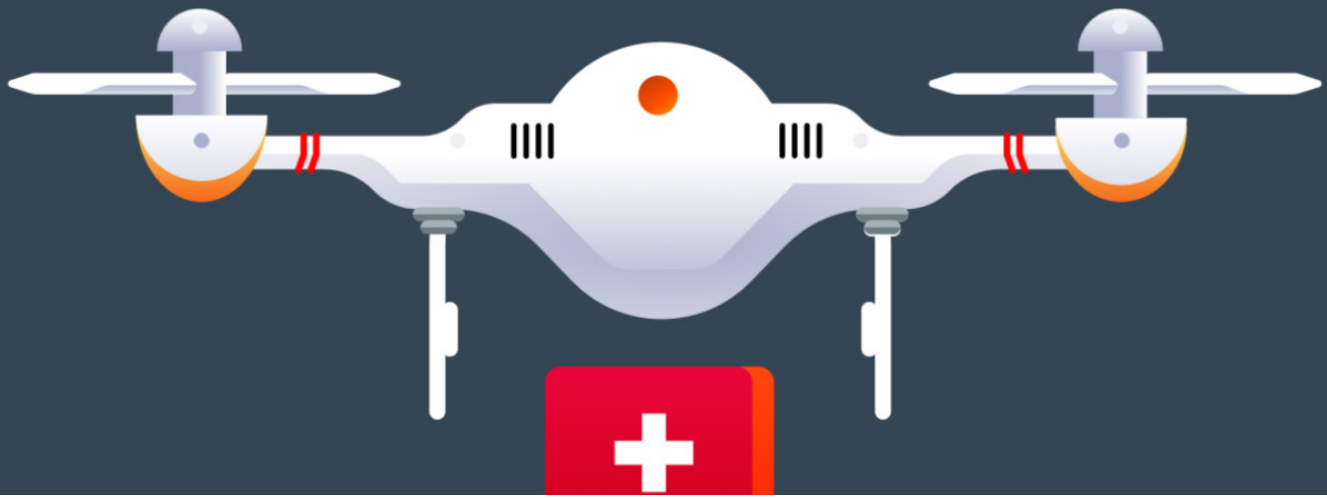
The successful first flight was carried out on April 19, 2021, marking the record for the First controlled flight on Mars. The Copter rose to a maximum of 10 feet from the ground for nearly 40 seconds. The 0.5-megapixel navigation camera situated on the side of the Copter can take 30 photos per second. It was also attached with a 13-megapixel camera pointing towards the horizon, and along with the stunning video that the Perseverance rover captured from the ground was sent back to earth.

Ingenuity has a 1.2-meter span rotor system with two rotors made of carbon-fiber blades that spin in opposite directions at 2,400 rotations per minute. A high rotation rate is needed to produce lift in the Martian atmosphere, which is one percent dense compared to earth. The rotors are rotated using six lithium-ion batteries that are solar-charged. The carbon-fiber legs also reduced the weight of the Copter to 0.68 kilograms on the Martian surface. The antenna of the Copter is connected with the transceiver placed on Perseverance. The contact between them stays up to 300 meters. It uses a Qualcomm Snapdragon 801 processor with a Linux Operating System. The most interesting of this Marscopter is that it carries a fabric from the wing of the 1903 "Wright Flyer," the Wright Brothers' airplane. The name 'Ingenuity' was given by Vaneeza Rupani, an 11th grader of Indian Origin. Ingenuity's initial take-off and landing region Wright Brothers Field by Nasa.

Initially, Ingenuity was planned as a 30-day test mission consisting of five flights. But after the first three flights, NASA changed the objective of Ingenuity from a technology demonstration to an operational demonstration. Ingenuity so far has taken 22 successful flights till now and is planning to have the 23rd flight by the end of March 2022. It has so far flown 4,647 meters on Mars and is currently in the Séítah region of the Jezero Crater. From the motivational lessons from Ingenuity, NASA has already started working on the "Dragonfly," which is a nuclear-powered octocopter (8 rotors) designed to explore the environment and the organic structure of Saturn's largest moon, Titan. It is scheduled to launch in June 2027. All these milestones reveal that technology is trying to make giant steps by using its small leaps.

Raynould Joseph
3 MCA

Drone Technology: Applications, Risks, Legal Considerations



Drones, or Unmanned Aerial Vehicles (UAVs), are flying robots that may be commanded remotely or fly autonomously by utilising software-controlled flight plans in systems that work in combination with sensors and a Global Positioning System (GPS). UAVs were initially employed with the military for anti-aircraft target practice, surveillance, and weapons platforms, but drone technology has progressed and thrived recently. Individuals, businesses, and governments have realised that drones can be used for various purposes, such as traffic monitoring, weather monitoring, aerial photography, sports coverage, delivery services, geographic mapping of difficult terrain, etc. Drones primarily have two functions: flight mode and navigation. Drones require a power source to fly, such as a battery or fuel. Rotors, propellers, and a frame are also included. A drone's frame is often built of a lightweight composite material to reduce weight and maximise manoeuvrability. Drones require a controller, which allows the operator to launch, navigate, and land the aircraft via remote controls. Radio waves, such as Wi-Fi, are used by controllers to connect with the drone.

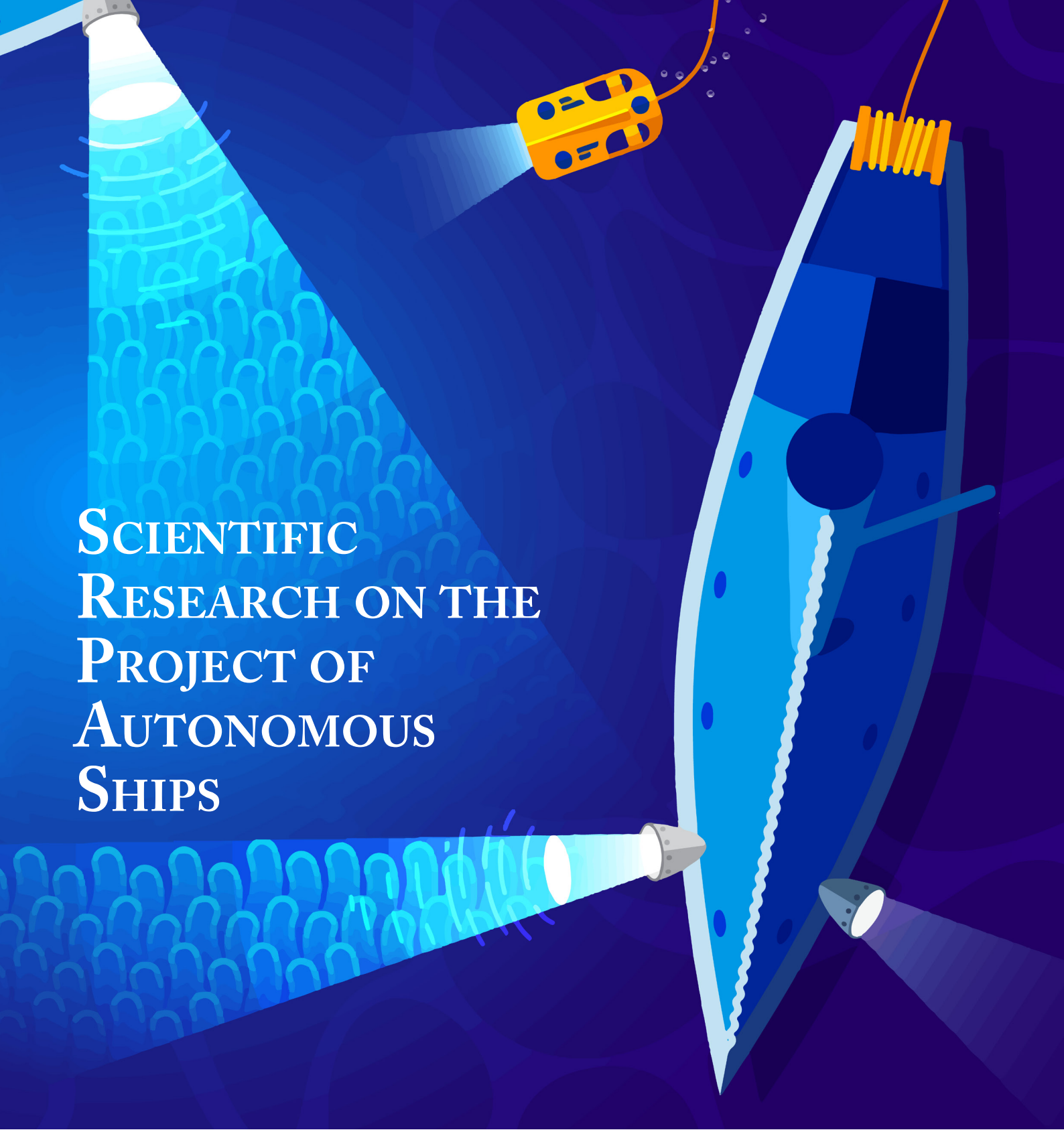
Over the last decade, drones' rapid acceptance has generated privacy, security, and safety concerns. UAV restrictions have been enacted in several nations. In China, flying over 400 feet necessitates a drone authorisation from the Civil Aviation Administration of China. Drones weighing more than 15 pounds also require a license and adherence to no-fly zones. The Civil Aviation Authority (CAA) in the United Kingdom prohibits its drones from flying higher than 500 feet. The CAA requires that any drone weighing more than half a pound be registered. India has classified drones into five catego

ries:- Nano (less than or equal to 250 grams), Micro (greater than 250 grams and less than or equal to 2 kg), Small (greater than 2 kg and less than or equal to 25 kg), Medium (greater than 25 kg and less than or equal to 150 kg), Large (greater than 150 kg). According to the Indian government's Drone (Amendment) Rules, 2022, a remote pilot certificate (formerly known as a license) will not be necessary for non-commercial flying of small to medium-sized drones weighing up to 2kg. Anyone flying drones over 2kg in weight or for business purposes is no longer required to obtain a 'Remote Pilot License' to fly lawfully. Instead, a 'Remote Pilot Certificate' is all that is needed. According to the new law, anyone can receive this certificate from an authorised remote pilot training organisation. This is a significant step forward for drone enthusiasts in the country. It is also expected to increase drone deliveries throughout the country.

Drones have a large impact on the cyber domain and data security. According to Forbes, the criminal use of digital platforms in the cybersphere is an unavoidable reality that can no longer be ignored. In order to defend national security and foreign policy objectives, the US government imposed export restrictions on one of the main drone manufacturers last Christmas. Drones can be hijacked by hackers because they are operated remotely. The Department of Homeland Security (DHS) stated, "Given their rapid technological advancement and proliferation, the public safety and homeland security communities must address that drones can be used maliciously to harm people, disrupt activities, and damage infrastructure." GPS Spoofing, Downlink Interception, Data Exploitation, Malware Infection, Data Interference and Interception, and other cyber domain threats are all caused by drone operations. The future drone market forecasts are both aggressive and hopeful. According to Grandview Research, the commercial drone market will generate $501.4 billion in revenue in 2028, up from $20.8 billion in 2021. According to Markets and Markets, the drone services industry will rise from $13.9 billion in 2021 to $40.7 billion in 2026. According to the Association for Unmanned Vehicle Systems International, the drone sector will provide more than 100,000 jobs in the United States by 2025. Many enterprises and government agencies will use drones and autonomous aircraft. Drone market growth is predicted to be fueled by the emergence of complementary technologies such as 5G, augmented reality, and computer vision, which will likely improve drone communication and intelligence.

Drone development is still in its early phase. Over the next few years, their capabilities will grow, and society and law enforcement must be mindful of the hazards that this could bring. The most severe issue is that drones are not adequately regulated. No single entity has claimed ultimate responsibility for enacting the regulations required to keep drones from posing a severe threat to civilisation.

Pulkit Khandelwal
4 MDS



Scientific Research on the Project of Autonomous Ships

What are autonomous ships ?

Autonomous cargo ships are crewless vessels that transport either container or mass freight over traversable waters with no human communication. They help reduce crashes, fuel costs, and functional expenses, and develop regularity by minimizing the frequency of human mistakes. According to European Maritime Safety Agency's (EMSA) research conducted in 2019, from 2011 to 2018, 54% of casualties were navigational casualties. Out of 4104 accidents, 65.8% were caused by human error. This error can be significantly reduced by implementing autonomy

in the operation of surface vessels.

How do autonomous ships work ?

Autonomy uses similar technologies to that of autonomous cars and autopilots. Sensors provide data using infrared and visual spectrum cameras, attached by radars, sonar, GPS, lidar, and AIS to gather data and supply it for navigational use. In 2018, Cyber-Physical Systems Laboratory (CPS Lab) launched an Autonomous Ships research project, to study methods and technology enabling autonomous separation of maritime vessels. It is geared toward SFI Autoship in which the CPS Lab is participating in WP3 on ROC and Human Factors.

Brief description of the hosting research team:

My host organization was the Norwegian University of Science and Technology (NTNU), Prof. Robin Trulssen Bye was my scientific coordinator. He is a professor at the Department of ICT and Natural Sciences, head of the BSc in Automation and Intelligent Systems study program, and Cyber-Physical Systems Laboratory at NTNU in Ålesund, Norway. The team members were Prof. Ottar Osen, NTNU Project Lead, Andreas BRANDSÆTER, Erlend Magnus Lervik Coates, Anete Vagale, Lars Ivar Hatledal, and Luka Grgicevic.

Scientific research work during my fellowship:

The focus was to investigate optimal algorithms based on AI for path planning, collision avoidance, and intelligent situational awareness for autonomous surface vessels (ASVs). Initially, I explored the traveling salesman problem (TSP) and how to use a genetic algorithm to solve it. Simultaneously, I learned about the swarm and evolutionary algorithms (EAs), and genetic algorithms (GA) for path planning. I also explored how path planning problems in the real world can be formulated as a TSP and solved using GA and other intelligent algorithms. After continuous discussions, it was decided by the team to work on path planning and collision avoidance of ASVs using genetic algorithms. Hence, I developed the code from scratch in Python for genetic algorithm and other methods like line-of-sight (LOS), waypoint refining path smoother (WRPS), and Interpolation path smoother (IPS) to ensure collision avoidance, smooth maneuvering of ASVs. The safe and optimal guidance of ASVs depends on several factors, like environmental disturbances, the presence of static, dynamic obstacles, and the types of criteria used for optimization (as shown in the figure). We implemented a GA for solving the path planning problem while considering ocean current as an environmental disturbance. This method allows the ASV to successfully avoid static obstacles. The objective function is designed such that the GA finds the shortest path and travel time along with the smallest average turning angle, to ensure smooth maneuvering. Each chromosome consists of a vector of turning angles at every time step. The results show that the GA converges to a collision-free, reaching the target whilst optimizing the objective function under constant ocean current.

Dr Ramesh Chandra Poonia
Associate Professor

Genesis Of GDSC - CDTU

Google Developer Student Clubs

One of the worst mistakes any business firm can make is failing to provide junior team members with the necessary leadership abilities. The tech landscape is constantly evolving and changing in response to the major changes of new developments produced every year. As a result, development roles have distinct personal requirements related to learning and growth; task execution will rarely suffice to meet the industry's requirements. Learning to quickly adapt to new abilities has become increasingly crucial, necessitating the creation of an agile, self-sufficient team capable of learning new IT skills while also adding unexpected value to the firm

Industry newbies are always on the lookout for career advancement and professional development opportunities, skills that prove critical when it comes to choosing their next job.

A lot of education consultancies and courses are springing up just to fulfill this need. However, a lot of them come at a high cost.

We, the Google Developer Student's Club, try to cater to this need by hosting various events related to tech, where we invite speakers renowned for their skills to share their knowledge with the students free of cost. What is Google Developer Student's Club, you may ask? We are a community of University Students - from every background combined who have joined together to further our own knowledge and skills as well as giving back to the community. By joining our community, anyone can get access to and use Google developer resources, and use them for peer-to-peer learning and coming up with solutions for local problems. For this, GDSC hosts Solution Challenges every year, where students coming up with the best solutions get recognition and goodies from Google.

GDSC not only gives the students a platform for learning, but it also provides the students with an environment to apply and share their knowledge amongst their peers. Joining the core team will give you access to the resources as well as give you the opportunity to host events and network.

GDSC Christ University, also known as GDSC-CDTU, hosts various events related to Machine Learning, Web Development, Mobile Development etc, where we invite speakers having a good grasp of their own field to give guest lectures on their topics. Study jams, hosted by the core members of the GDSC team every week, help students gain hands-on experience while also promoting the critical life skill of teamwork. We also encourage women coders to join the community to increase the ratio of women developers in our society. We have hosted events like "Women in Tech" which were targeted only at women developers, and have seen healthy participation.

GDSC not only gives the students a platform for learning, but it also provides the students with an environment to apply and share their knowledge amongst their peers. Together, we try to inculcate interest in the field of technology among young people. Joining the core team will give you access to the resources as well as give you the opportunity to host events and network. Joining as a member will let you attend the study jams and speaker sessions hosted by the core team and help you in enhancing your knowledge. We, the GDSC community at Christ, invite you to join us, where we'll elevate each other's knowledge bases, forming a fraternity of tech-savvy minds. GDSC proved to be a game-changer for me, making me a more competent data science aspirant, and I hope it does the same for you.

Oindrilla Banerjee
2 MDS

Ad Space - Tool For Next-Gen Marketing

Have you ever noticed those small advertisements on the sites you visit? If you might have seen, it is not just a random ad but an ad for the product which you looked for very recently on the shopping site. These are nothing but ad space. Precisely, ad spaces are spaces on a web page available for advertisements. These ads are target-specific, i.e., these ads display the best offers for the products which the customer looked for very recently. It needn't be from the same site you looked at, but it could be from any other site.

These ads play a crucial role on the internet; in fact, the internet wouldn't have gained so much importance without them. The ads on the internet are built on a very complex set of networks that the whole process of displaying the concerned ad happens in seconds.

In this process, our data goes around the globe. A whole lot of methods initialize from the browser we use. Our digital profile, which contains details like our age, gender, location, and the web pages you visited very recently, is used to display the most relevant ad with exciting offers on our web pages. For example, if we look for sportswear on Amazon or just on another webpage, we get an advertisement on the identical product but from a different site.

This request of offering us with variety of ads starts with the publisher's ad network. The ad network checks if your profile matches with any personal inventory ads; once it matches, the the product you recently looked for pops up on the screen. When the relevant ad is not found for our product of interest, our profile is sent across different auction blocks (the auction determines which ads will show up on your pages and how much each advertiser will pay) like Facebook, Google, and other prominent auction blocks. In simple terms, our profile goes on a world tour to find us the most relevant offers. Then, different third parties try to match their ads with your profile for the right price.

"The ads on the internet are built on a very complex set of networks that the whole process of displaying the concerned ad happens in seconds."

Within a few milliseconds, the impression is sold to the highest bidder, and the ad itself is sent to your web browser for your eyes to behold. Over the years internet and social media have revolutionized the online advertising industry. It's interesting to note its development. It won't be wrong to say that online advertisements have gotten powerful in a brief period.

Further customization and additional improvements in the booming field of social media advertisements can add an edge over the advertising industry. In addition, since millions of people are starting to use social media, advertising through these sites will help enterprises sell their products in a much easier and more efficient way.

K Nidhi Sharma
2MDS

Implications of Metaverse

Humans are social animals, and being around other humans is essential for survival. Most, if not all, of our inventions, help us get closer to our kind. Be it transport, communication or the internet. The human-computer interaction has evolved from punched cards to touch screens that we see everywhere today, but a 2-dimensional grid of pixels can convey only so much information. Since these screens are portals to communicate with other humans, the limitations of these screens limit our interaction with other humans.

Metaverse solves this problem through a new

set of input and output devices. As Mark Zuckerberg said, "There will be new ways of interacting with devices that are much more natural. Instead of clicking and typing, the new inputs will be through gestures, voice commands or even just thinking about it". Virtual reality is the technology that allows users to be in the same room and experience a virtual world making the user feel as though they are in the same room with other people. Metaverse will revolutionize the manner in which people interact with their loved ones and co-workers through virtual get-togethers and office space and presents unimaginable possibilities as the user can be wherever they want, with whomever they want, and look however you like in reality as the perfect world they envision can be achieved through the Metaverse.

The scenarios mentioned above may sound like a far-future world, but the required technologies are already available, and the concept of a virtual world is not unique either. There are games like Minecraft and Fortnite that allow you to build virtual worlds with your friends. Technologies like VR, AR, NFTs, and virtual world-building are already around and famous in their own space. Metaverse brings it all together and gives its users one medium to do whatever they want. Users will be able to access the same worlds on different platforms like VR headsets, AR goggles, or just their phones or computers. Combined with Elon Musk's Neuralink, Metaverse can fundamentally alter how we do everything.

Everything comes with a set of disadvantages. So does Metaverse. The company leading this development has a history of not respecting users' privacy as their business's primary source of revenue is targeted advertising. To recommend users products that they are more likely to buy, Facebook (or Meta as they call themselves these days) has to develop a user profile and understand their interests and mentality. They do not just show ads based on the person's interest; they show posts based on their interests, making the platform an eco-chamber where thoughts never evolve.

Censorship is another major problem. Social media platforms get to dictate what or who stays on their platform. Donald Trump's ban was the best example of this, as social media platforms were able to significantly reduce the digital presence of a man who is ex-president of a superpower. With Metaverse, users will be sharing a lot more data with Facebook than they already do, which may quickly lead to a world whose significant population falls under Facebook's control. It is dangerous even to allow the possibility of a single entity wielding that power.

As we forge ahead, it is crucial to consider technology's ramifications on user privacy. The technology is alluring as it presents a digital world with endless possibilities, and hence it is prudent to exercise restraint while still appreciating the innovation. We must find ways to protect user privacy and develop a system of checks and balances to minimize the number of victims of cybercrimes.

Adhokshaja Dinesh
Acharya
3 MCA

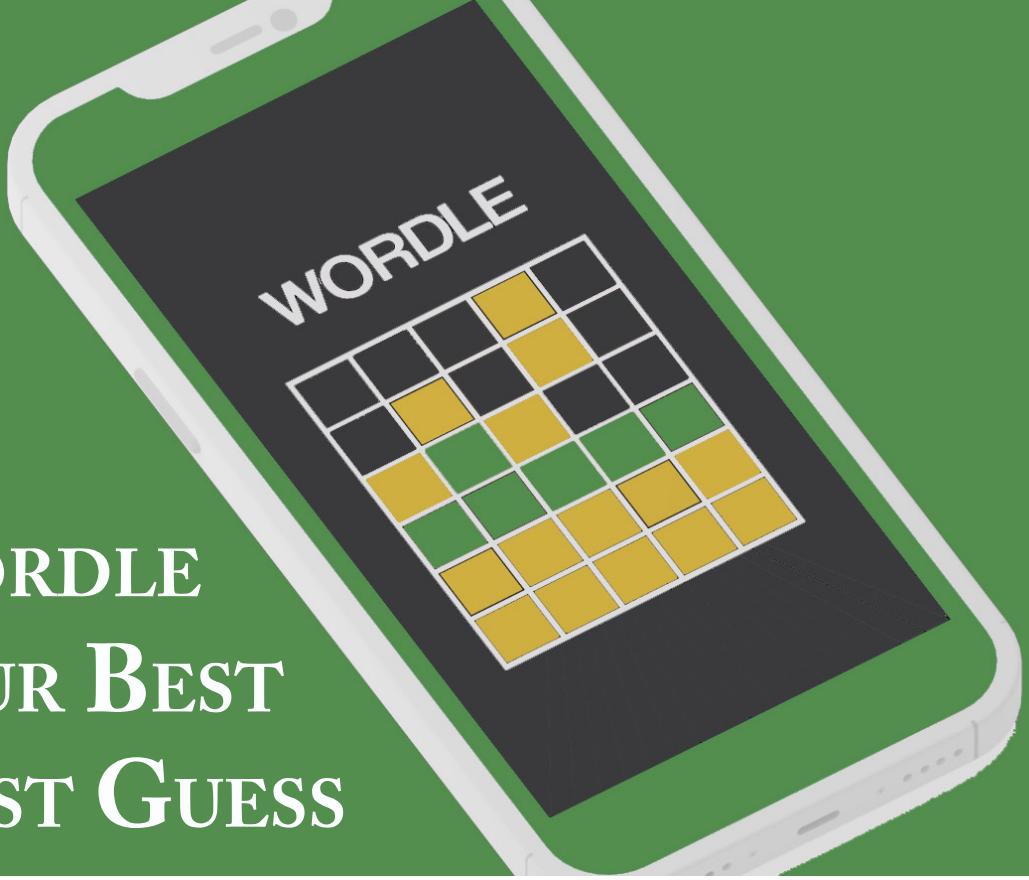
An Alumni's Experience as Infobahn Editor

In 2007, my eyes lit up when the seniors Meghana and Rajiv (2006 batch) came to our class and asked us to send articles for Infobahn Magazine. We were told that the authors of the articles selected would get a chance to be a part of the future editorial team of the magazine. I submitted an article about 'Botnets,' which was then selected. I was very curious and excited to be a part of the editorial team and other mates, Girish and Jeffin. We occasionally even invited others to help us with the magazine.

This extra-curricular activity was one of the most enjoyable memories alongside the regular curriculum. Not only did we have fun, but this also helped us learn some essential skills like communication, planning, teamwork, coordination, creativity, etc. To spill out a secret, on rare occasions when our magazine related tasks were completed beforehand, we ended up playing some Counter-Strike. While organising multiple events for the Revelations fest (included gaming - CounterStrike), we would work on gathering articles and content from students (seniors and juniors), lecturers and guests for Infobahn. All of this was aimed at giving opportunities for everyone to contribute and targeted at growth and knowledge in preparation for the corporate world.

When an opportunity like this knocks at your door, grab it! Even if it's something you have not done before, we can always learn by doing something new. Always make connections, explore new things, and keep learning. Every opportunity is unique, and it might be something you do not know or like, but explore it, and you might surprise yourself and discover something you like or be good at. If we find that something is not easy, let us not be discouraged and always remember to Do Our Best and Never Give Up!

Jordan Lazarus
MCA Batch 2007



Wordle Your Best First Guess

This year green, yellow, and grey tiles slowly took over the social media narrative. Wordle, whose namesake is also its creator, is designed to make you guess a mystery word in 6 guesses. Every guess reveals some information about the word. Players are told which letters are in the assigned word for the day and in the correct location (green), which letters are in the word but in a different position (yellow), and letters that do not exist in the word (grey). Because all guesses and targets must be true words in Wordle, some letters are more likely to appear than others, making some guesses better than the others, which leads to an interesting question. What is the best possible first guess? The "best first guess" is the one that gives us maximum information about the word. If we know how common each of the 26 letters is in 5 letter English words, we can answer this question. While trying to answer, we needn't consider uncommon words like amain (at full speed) sward (land covered by grass). A recent study examining the word prevalence and letter frequency of almost 60,000 words revealed some interesting statistics. The letter "e" was the most common, appearing in 46 percent of observations. The introduction of silent e's at the end of words in the 16th century, meant to convey anything about the preceding sounds, is one reason that "e" is so prevalent. The next most common letters were: "a" (39%), "r" (34%), "o" (29%), and "i" and "s" tied for fifth (28%). One word "arose" as the greatest option from these six letters right away! "Samey" (monotonous, repetitive, unvaried) is the greatest selection for a word that is most likely to get letters in their correct placements. Let's not stop there, though. When we combine these ways into a single final score, we get a word that sounds like our eureka: "soare" meaning a young hawk which has the same letters as "arose" but placed in more strategic order. Next time you solve a wordle, try using "soare".

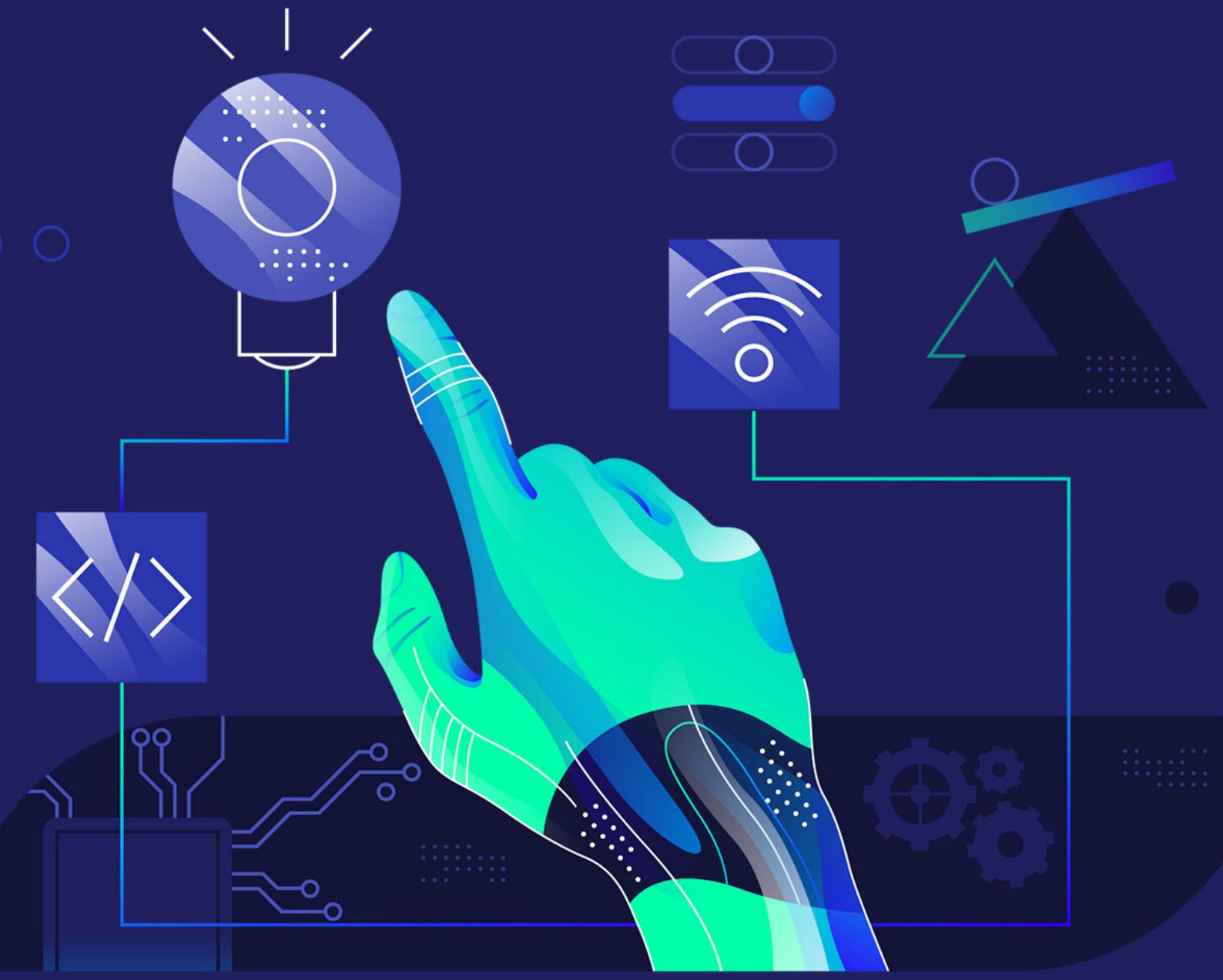
KM Vaishnavi
3 MCA

A Glitch in the Matrix

As you are running down the halls of the central block, late to class, wondering if you'll make it in time to catch a lift to avoid being scolded by the faculty at the door, you cannot help but notice another student struggling to find their way around, probably a fresher in the campus. You take a split second to decide whether to continue rushing to class or to stop by and help the confused little soul. As stupid as you are, you stop to help her (yes, it's her, or him, whatever makes you happy). You try your best not to look creepy approaching her, yet you've seen your face in the mirror every morning. Just as you're about to say hello and offer help, she waves at you, and now you're wondering what's happening. Has the universe finally answered your prayers? Let's see. When you're about to wave back, you feel the shockwave from a nuclear blast hit your face as you realize that she was waving at her friend behind you. Damn! You wait for a second to also realize that she wasn't actually lost but just searching for her friend among the crowd. Double damn! Now not only do you feel stupid, but you're also late to class. You pretend to scratch your head, look at your watch and rush to class and continue with your daily schedule (of course, with the dose of being late). It's a lunch break, and you head out to the cafeteria with your friends to grab a bun-samosa and lemon iced tea while you see her there in the crowd at Mingos (gourmet Mingos just to be clear). As much as you pretend not to look at her, you can't help but remember the morning incident. Just as you're about to leave the counter with your food, you feel a gentle tap on your shoulder. You turn around and notice her right in front of you, staring right into your eyes. Now the eye contact is too long, and before it gets awkward, she says "Hi!" to which you reply, "Hey!". She says, "You forgot to pay for your food, and the people at Mingos are calling you." Uff! Can this day get any worse? You say to yourself. With an awkward smiley face, you reply "Oh my bad, I'll go pay right away. Thanks for letting me know!". You pay at the counter and go back to your friends with the walk of shame. The day is almost over, classes are done for the day, and you have your daily dose of badam milk at Nandini's when your favorite stranger bumps into you again. You subtly say sorry and try to walk away, but this time she calls you by your name. With a surprised yet happy face, you turn back and look at her as though you just heard that the CIA had been postponed. As she walks up to you, you think harder to remember if you paid for your badam milk. But she asks you how's it going, and you're wondering if you know her already. You ask yourself, "Is this a glitch in the matrix?". She then tells you that she knows you through a mutual friend. You try your best to hold yourself together as the conversation goes great. Towards the end, before leaving, she says that we should catch up later and asks for your contact number. Just as you're about to exchange numbers, someone taps your back, and when you turn around, you see the scariest face ever, and you startle to wake up from your sleep in the data structure lab. You look down to see many bugs in your Linked Matrix program. You say to yourself, "What a glitch in the matrix!" and continue coding.

Ashwin Kumar V
3 MCA

Nomophobia



"I fear the day that technology will surpass our human interaction. The world will have a generation of idiots." – Albert Einstein

The burning question today which plagues the entire world is, "Do you control your device, or does your device control you?" Nomophobia is the fear or anxiety of being without your phone. We live in a day and age where the so-called 'smart' phone is an imperial institution and we are its faithful, acquiescent slaves, at its beck and call. The tycoons of social media have to stop pretending that they are the friendly 'Nerd Gods' building a better world and should admit that they're just tobacco farmers in T-shirts, selling an addictive product to children, because let's face it: checking your likes is the new smoking.

A new significant health issue that has propped up in recent years is digital dementia- losing the ability to memorize figures. The earlier generation had the ability to remember and retain things, which is unheard of in recent years, as we are so dependent on our devices to store facts and figures for us. An average person checks his/her phone every 15 minutes or less. Studies show that this routine is followed to maintain the dopamine balance inside our brains. Another hormone, cortisol, solely responsible for generating the feeling of anxiety in our body, is secreted if a constant dose of our primary addiction is not fed to our body.

Our sleep cycles have been disturbed. Every device's screen emits a blue light that has been shown to alter our circadian rhythms, diminishing the time spent in deep sleep, which is in turn linked to the development of diabetes, obesity, and even cancer. Human relationships have taken a backseat and the degradation observed in this sphere of our lives is the worst. If we compare the time spent on our devices and the time spent with our loved ones, we'll notice a negative trend. We are losing people at the cost of something which was built to connect people in the first place. A recent study showed that an average human spends 4.7 hours/day on their phone(s), while they spend only 1 hour and 24 min every week with their loved ones. If these facts are not wrong, our priorities are quite messed up, revolving around one singular object of destruction- cell phones.

"A new significant health issue that has propped up in recent years is digital dementia- losing the ability to memorize figures."

Get off Instagram and put your face in a book! Let us hope that we, as humans, don't lose the significance of human values and survive this phase of digital anarchy that is prevailing in the world today.

Sanjay S
2 MDS

Dennis MacAlistair Ritchie – The Unsung Hero

"Posterity will always remember him as the father of modern computing. This man was an iceberg that hid from the common people, but the roots of whose work tap into the very depths of the technical universe."

During the month of October in the year 2011, a luminary died, though his bequest will live on and inspire people till the very end of this world. Even though he was not a soldier, but yet was a true hero. His work gave direction to the future of technology and, considering our dependency on it, the future of the complete race. His benefaction in the form of his inventions led to some of the most famous technological paragons of our times. I'm sure none of us has been eluded by the mania that was created in the form of iPhone, iOS, and Mac OS X. But he was human in the end. The legend failed in his battle with prostate cancer and ultimately, death. Posterity will always remember him as

the father of modern computing. This man was an iceberg that hid from the common people, but the roots of whose work tap into the very depths of the technical universe. I am writing about an unsung hero - Dennis MacAlistair Ritchie.

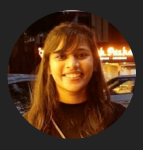
Surprised enough? I'm sure 99 per cent of people who read this article know about Dennis M. Ritchie. Dennis Ritchie, or simply 'DMR' as his workmates affectionately called him, was the devisor of the C programming language and the co-composer of the symphony that the UNIX operating system is. The list of devices, software, applications, and services that run on the so-called simplistic 'low level' language he created and the operating system he helped build has greatly impacted the world of computing.

Ritchie joined Bell Labs in 1967, and the rest, as they say, is history. For his unparalleled offerings in technology, he was awarded the Turing Award in 1983, the IEEE Richard W. Hamming Medal in 1990, the Fellowship of the Computer History Museum in 1997, the National Medal of Technology in 1991, and the Japan Prize in 2011. The C programming language today has its own family of languages which encompass C++, C#, and even JAVA! Together, they subjugate a colossal 60% market share of the software industry in the world.

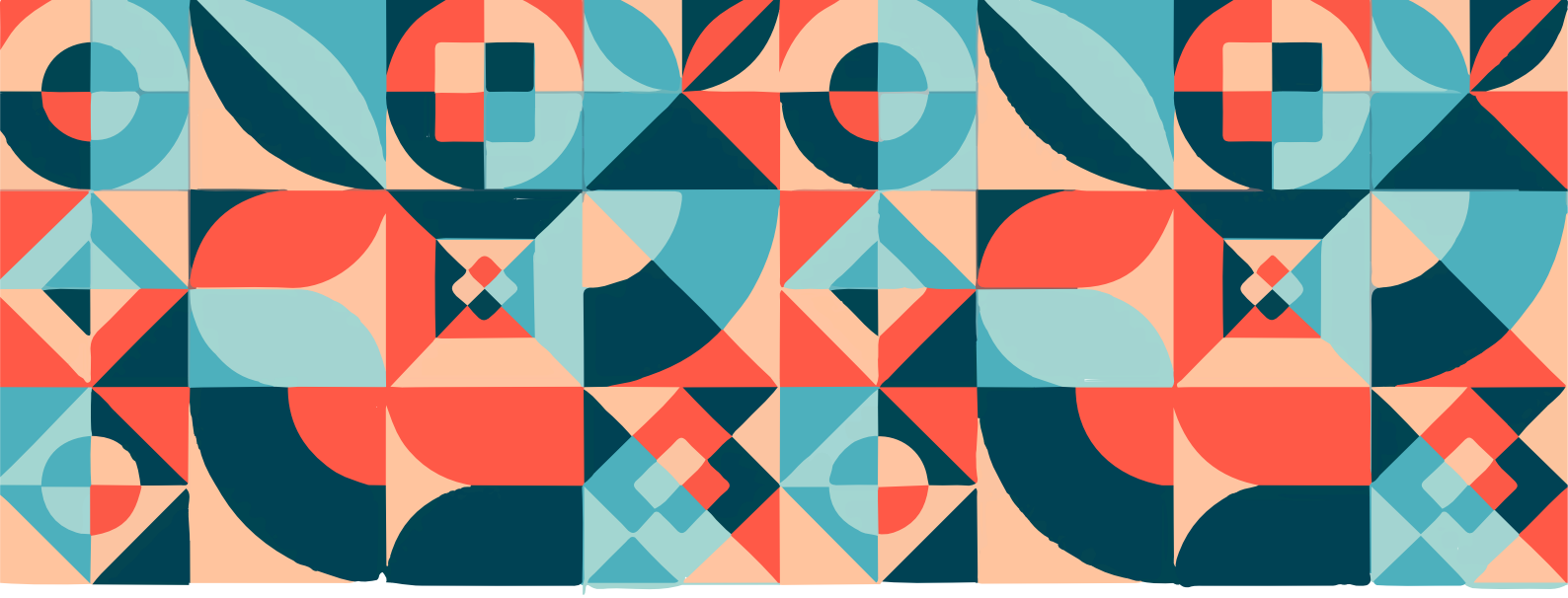
Every major player in today's computer market thrives on what DMR created. The trailblazer did not believe in acquiring stardom or accumulating substantial riches. The UNIX operating system that he developed was open source and given to universities and anyone who would ask so that people could assimilate and evolve his vision further. He helped port UNIX to different machines and platforms, which now exist in the likes of HP-UX, IBM AIX, and Oracle Solaris. Apart from these, the Mac OS X, Linux, Android and iOS, and even MS-DOS are also UNIX derivatives and fall under the category of 'UNIX like' or 'UNIX based' operating systems. Like the stones of the Ram Setu float with the very name of Shri Ram, every fibre of the Internet vibrates with the name of DMR, as does every PC, MAC, smartphone, and tablet.

DMR baled from prostate cancer and heart disease during the last years of his life. On 12th October 2011, he was found dead in his New Jersey home, where he lived alone. He was 70 years old. Had he been given a chance to write his last computer program, I am sure it would have been this,

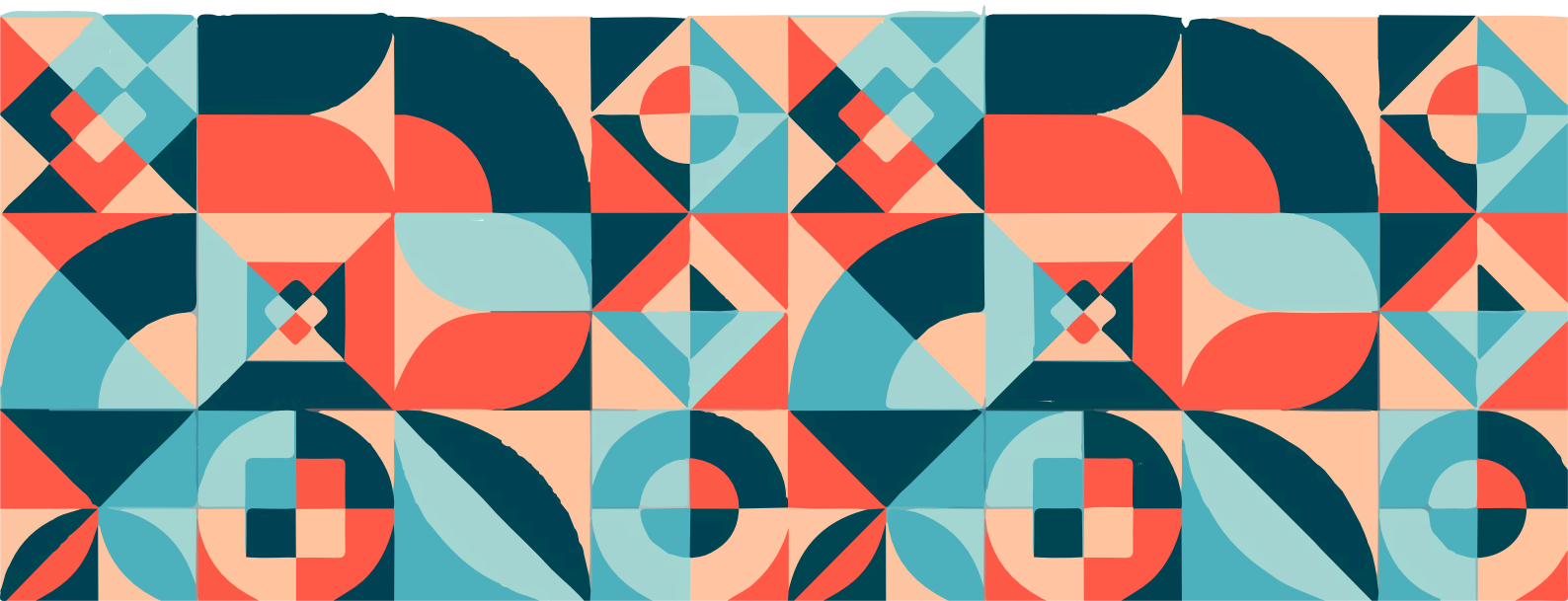
```
#include <stdio.h>
  void main()
{
  printf("goodbye,
world\n");
 }

/*Give some credit where
credit is due!*/
```



Durga Kumari Malani
2 MDS



QUILLS



My Shooting Star

The day I saw you with my small wide eyes,
The day I cried within your wide hands,
And your hard hands relieving me,
Every expression was scrutinized,
Every step was noticed,
Every moment was clicked.

When I made a mistake there was a call yelling NO.
Those days when everyone pointed their fingers at me,
You were the only one who stood by me.
I despised you whenever you rose against me
But now I regret my deeds.
I didn't expect that you would leave me so soon.
I didn't know that was the last kiss you had for me.

You were the only one who laughed with me,
Cried with me, stood for me, and left your time in me.
Every dream of yours makes me jovial,
Every memory of yours brings me tears,
For the truth that you would never join us again.

Aneeta Mahesh
3 MCA

Miracles Do Happen

Walls aren't deaf
Doors aren't blind
Flowers aren't mute
Trees do have mind.
Believe the sunshine
Believe the rain
Believe the love
Believe the pain
Believe the God
Believe the spiritual gain
Believe in the miracles
Miracles do happen again n again.

Dr Ummesalma M
Assistant Professor

The Marginalised

I stand here behind the rails and the curtains,
My gaze was drawn to the marketplace,
And my ears were drawn to the
Blabberings in the thoroughfare.
Segregated rooms, seats, food, shelter,
What a hysterical condition!

I can view the festive that happens down the lane.
And still I stand here behind the iron rods.
Dark nights conjure up terrifying visions
of terrifying spots that I had never thought of .
Those who walked with me left me too soon
All alone in the unknown crossroad.

Now I stand here all alone without knowing
Where the path leads to.
Some don't even recognize,
Some knowingly flings fireballs.
Now I'm all alone. But I won't give up,
For the strength that ignited within me still awaits me.

Aneeta Mahesh
3 MCA

Unease

A distant murmur wakes me up,
Ripe with simmering conflicts;
I shut my eyes to defy the blizzard
While the winter chill lures me in.
The blanket, warm and fuzzy,
Is more than reassuring,
The argument gaining conviction
As my feet touch the frigid floor.
There's a will to kill,
Not men, but time;
Rooted in inaction,
Devoid of purpose and poise.

The world soars high
On digitally-mastered wings;
Ludicrously linked-in and
Wastefully whatsapped;
The TV blares nonstop,
Fancy names of impending variants
Flashed with perfunctory ease,
Courtesy the WHO.

Wonder why we pander
To the toxic machinations of
The global custodians of truth,
The ones Orwells and Kafkas
Warned us of long before Covid,
While the world looks back at
Those consumed by the virus
With rehearsed pity.
You, me none.

Paritosh Raikar
2 MDS

Metaverse – Hype or Hope

Neal Stephenson's snow crash
Two in one, real and virtual
Virtual reality!
Indeed a reality… Yes… No
Time is an answer!

Screenless machines one day
networked touch and voice-activated
devices today! Cutting edge technologies
Connecting Digital spaces
Multiple verses beyond imagination…
MetaVerse

Users' Avatars web of virtual connections
Enriched quality, yes with
Augmented Reality!
3D headsets Holograms
In-depth experience
The new world of virtual retail banking
education social interaction…
Game changer

Cryptocurrency non-fungible
assets Sandbox
SuperWorld Possible Buy anywhere
Shop anywhere Virtually!
Marketing Sales Opportunity
Immersive interface interoperability…
Challenges

New Innovative Technology
More Hypes or Hopes
3D modeling and 360° videos
Manipulation touch-screens
Challenges are many…
Be Ready

New Innovative… world!
Explore Enrich Experiment Experience
Excel!!!

Dr. K. Saravanakumar
Associate Professor

Covid 19! The Invincible Enemy

Covid 19 came to many Iike a dreadful wave
Sweeping through the pores of the daily wage
Covid 19, many have called you a fearful pandemic
Funny how a virus so small could cause a mighty epidemic
National Emergencies have been declared upon your arrival
Cities have been shutdown Covid 19 has gone viral
Global economy freezes at innocent sneezes
The world goes dim
And the air goes thin
When our lungs force breath
And our hearts false beat.

But do not feed your fears
But instead starve your fears
Fuel your faith to escape this fate
God has not given us the spirit of fear but of power and love Oh Dear!
This too shall pass.

Aleena Mary Varghese
3 MCA

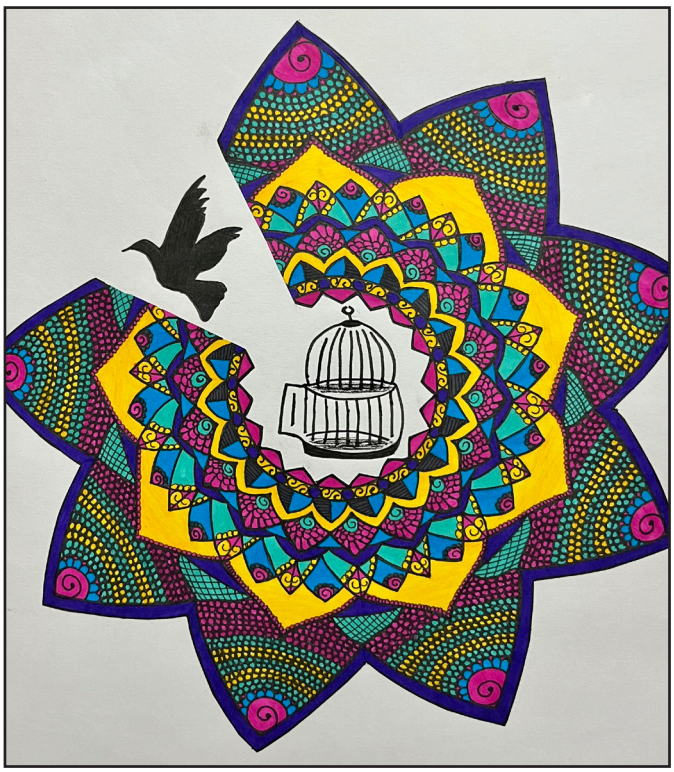
You are my metaverse!

I just wanna know, wanna know
Because how could you be unknown!
I wanna, wanna know, wanna know,
I just wanna be known.
How could you turn my reality
Into virtual reality,
Pouring a positive mentality.
Forgetting negative reality,
Creating originality,
Appreciating my ability.
You respect the artwork and the
Hard work,
Those artists put up.
You showed them a way to
Learn, earn and turn their lives into
Beautiful nights! Beautiful nights!
Beautiful nights!
Let's go!
I just wanna know, wanna know,
Because how could you be unknown!
I wanna, wanna know, wanna know,
I just wanna be known.
I just wanna be known.
I just wanna be known.

Now I am rocking, shocking
The people who didn't believe me.
You are a something, a big thing,
That's what I think.
Let's do this real thing
Together! I am not joking,
I became a cool king
who would never be broke.
Never be broke! Never be broke!
Never be broke! Never be broke!
I gotta say, gotta say,
You are not worse
Metaverse!
I gotta, gotta say, gotta say
You are my metaverse! You are my metaverse!
You are my metaverse! You are my metaverse!
You are my metaverse! You are my metaverse!

Logesh N
3 MCA

ARTWORKS



“ There is no greater agony than bearing an untold story inside you.”
- Maya Angelou

“Nothing ever exists entirely alone; everything is in relation to everything else.”
- Anonymous

Svetha Venkatraman
Almuni

"The flower that blooms in adversity is the rarest and most beautiful of all."
- Walt Disney

"Hate cannot drive out hate, only love can do that."
- Martin Luther King Jr

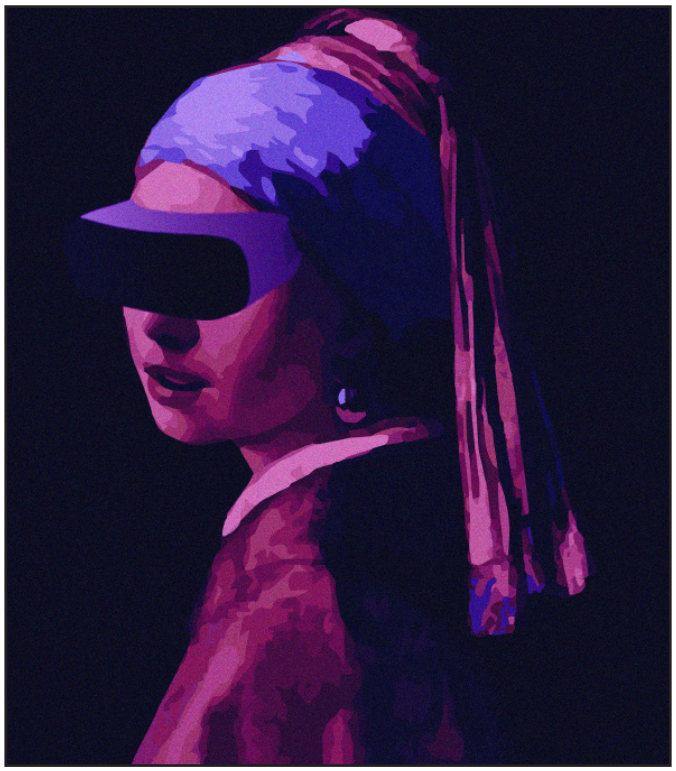
Srijan Dixit
2 MDS

"The human voice is the organ of the soul."
- Hendry Wadsworth

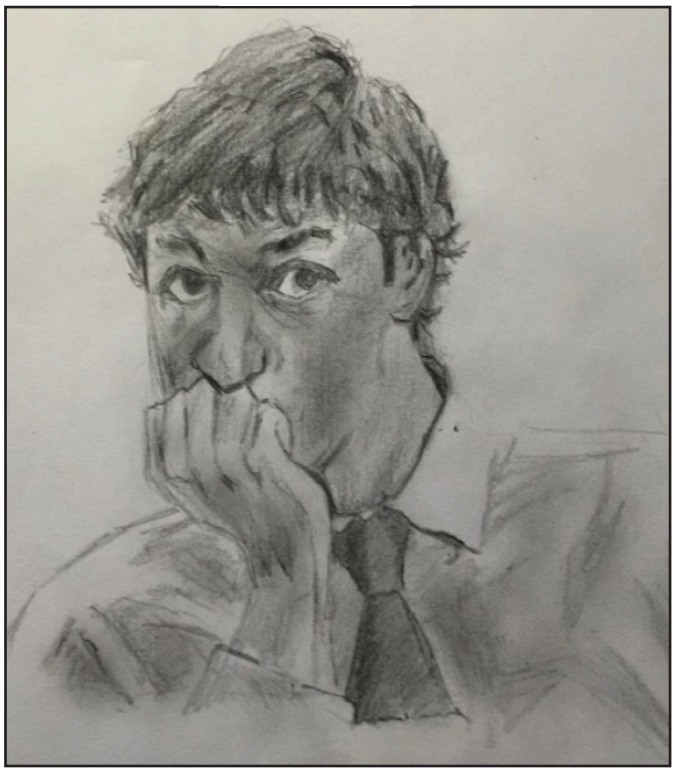
Teyash Basu
3 MCA

"Courage is not the absence of fear, courage is acting inspite of fear."
- Carly Fiorina

Ashwin Kumar V
3 MCA



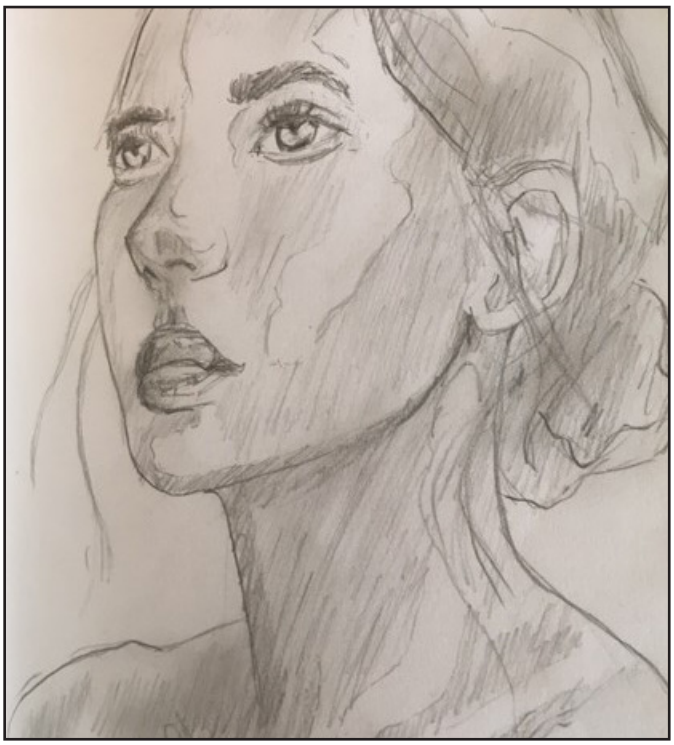
"There is a lot of beauty in ordinary things. Isn't that kind of the point?"
- Pam Beesly
(The Office)



"The world always seems brighter when you've just made somthing that wasn't there before."
-Neil Gaiman

"If everyone is thinking alike, then somebody isn't thinking."
-George S Patton

Parithosh Raikar
2 MDS



"A life of joy and happiness is possible only on the basis of knowledge and science."
-Dr S Radhakrishnan

Logesh N
3 MCA

PUZZLES

Double Trouble

ETOKWNR

EUSRLCT

ETER

TOSFRE

ISLYFASC

IORGESRESN

VLABRIAE

TDAAETAM

Rules and Guidelines

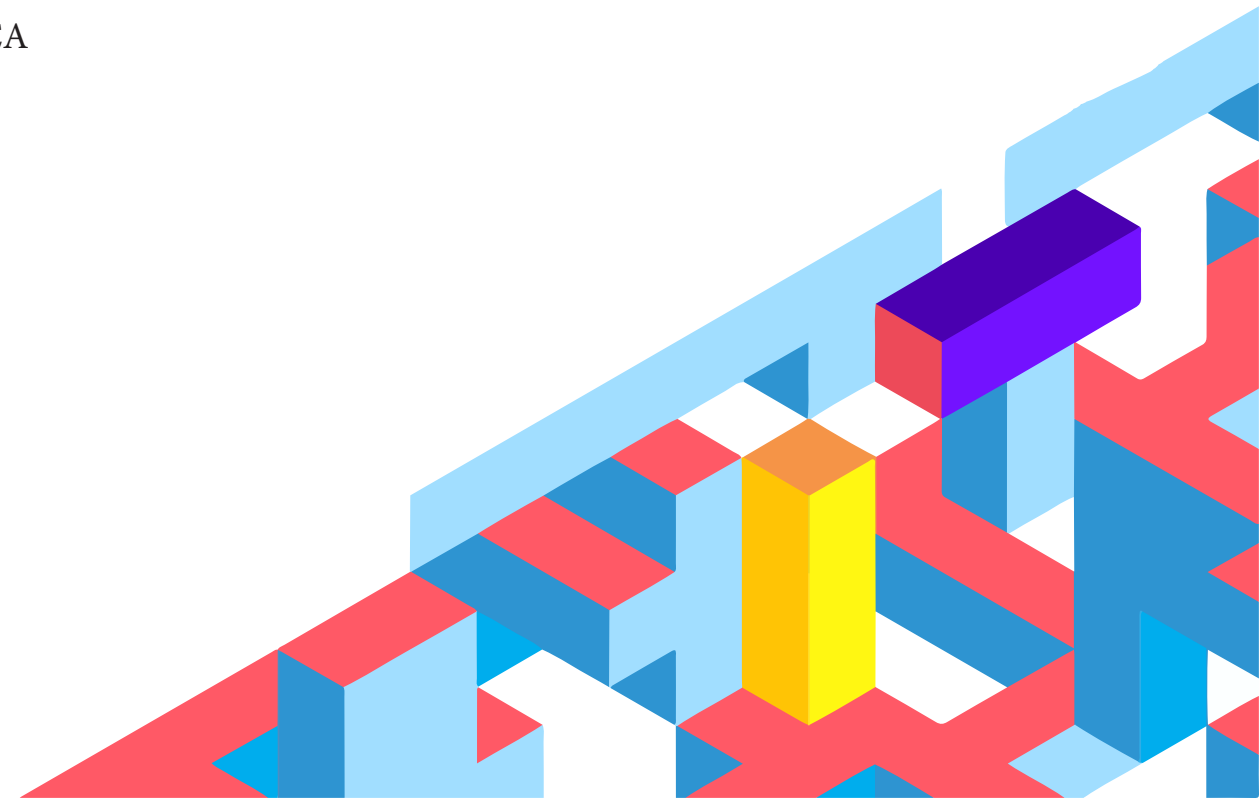
1. Solve the given anagrams to reveal the letters of the final message.
2. Use the encircled letters from the solved words to obtain the final word.
3. Each encircled letter is used just once.

Aditi K
2 MDS

Bits and Bytes

Column A	Column B
Which data structure is used in the breadth-first traversal of a graph?	_ _ _ u _
Wrapping up of data & method into a single unit is known as	_ _ c _ _ _ _ _ _ _ u _ _
It makes a variable that belongs to a class, rather than being defined for each instance of the class	_ _ a _ _ _
The concept of using methods & variables defined in another class	_ _ h _ _ _ _ e _ _ e
IC chips used in computers are usually made up of	_ _ _ i _ _ _
Who is the father of artificial intelligence	_ o _ _ _ _ c _ _ _ _ _
Name of first computer virus	_ r _ _ _

Yash
3 MCA



Solutions

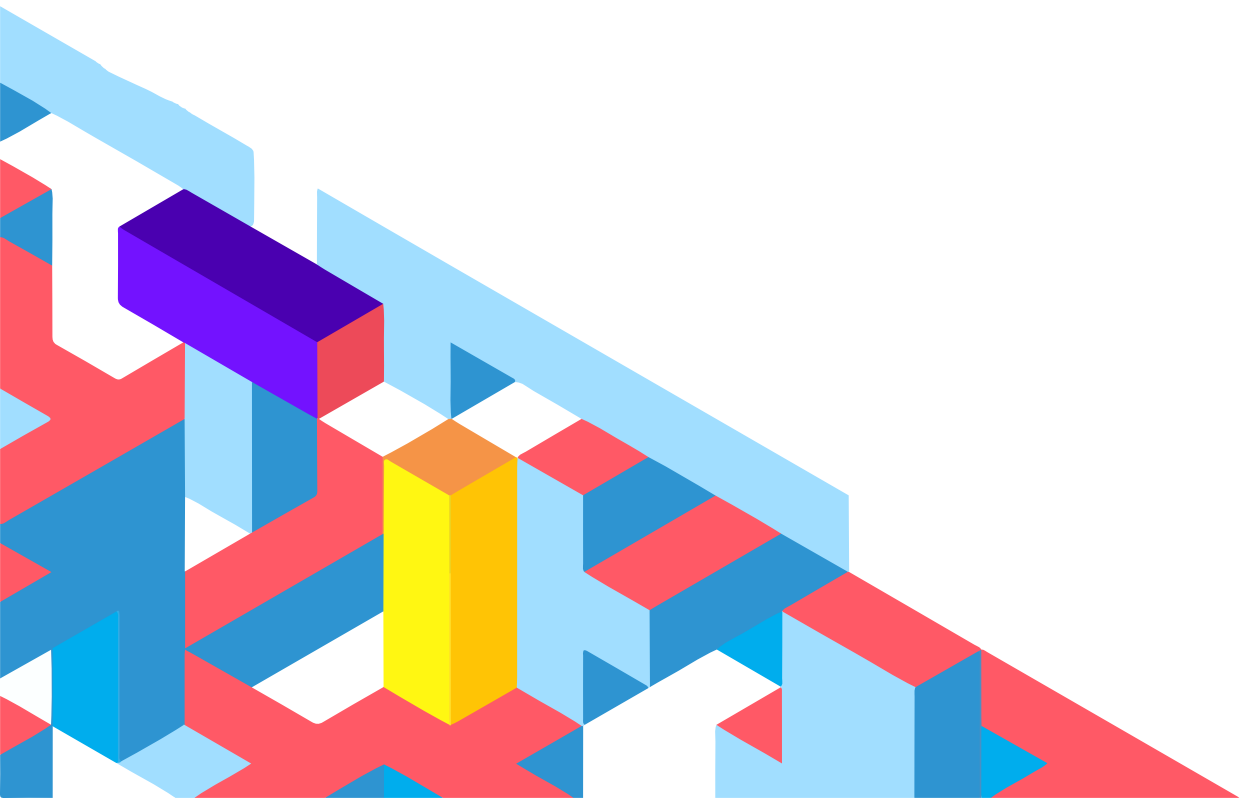
Double Trouble

1. Network
2. Cluster
3. Tree
4. Forest
5. Classify
6. Regression
7. Variables
8. Metadata

   Metaverse

Bits And Bytes

1. Queue
2. Encapsulation
3. Static
4. Inheritance
5. Silicon
6. John McCarthy
7. Brain

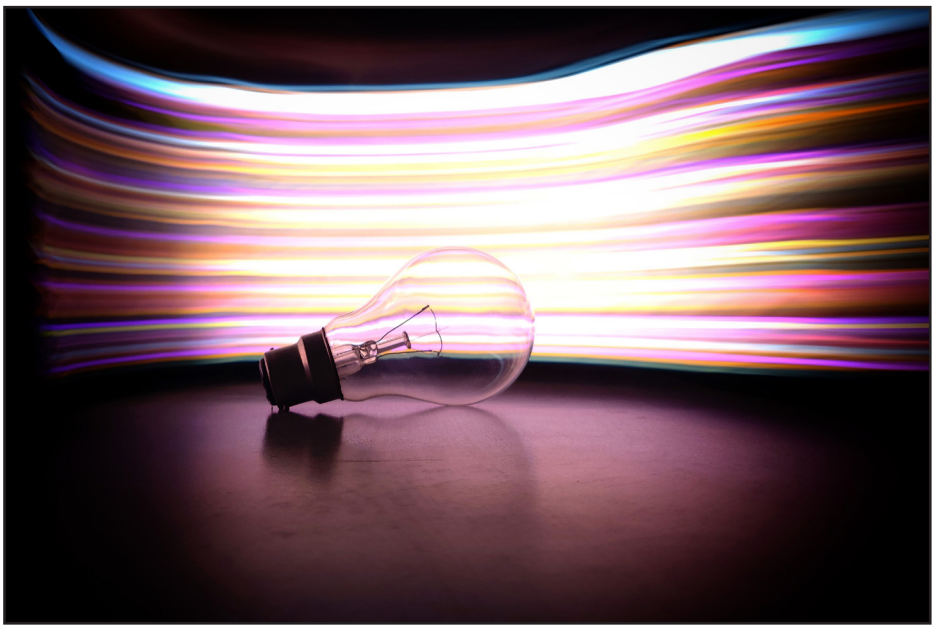


STILLS

Shutter Speed - 1/125
ISO - 1600

"The art of being happy is just being satisfied and grateful for what you have."

"All of the lights of the world cannot be compared to a ray of the inner light of the self."



Shutter Speed - 4
ISO - 100

Reuben Kurian
3 MCA

"From all white sidewalks to powder dusted rooftops - the winter is here!"

Shutter Speed - 1/60
ISO - 1600

" With frosty mornings, bright, crisp days and powdery snows falling!"

Shutter Speed - 1/60
ISO - 1800

Adith AV
3 MCA

"A cloud does not know why
it moves in such a
direction and at such a speed,
it feels an impulsion."

Shutter Speed - 1/60
ISO 100

"Peace can become a lens through which you see the world. Be it. Live it. Radiate it out. Peace is an inside job."

Shutter Speed - 1/60
ISO 100

Anurag Chowdhury
2 MDS

"So many little things go unnoticed, making it impossible to even know how exceptionally beautiful such small things in this big world are."

Shutter speed - 1/342
ISO - 100

"The bird is powered by its own life and by its motivation."
– Dr. A. P. J. Abdul Kalam

Shutter speed - 1/30
ISO - 448

Pankaj Sharma
3 MCA

"Let your dreams set sail regardless of the winds direction"

Shutter speed - 1/342
ISO - 100

"Mighty sun hiding from the world for sometime."

Shutter speed - 1/30
ISO - 448

Piyal Banik
2 MDS

"Peace begins with inner reflections."

Shutter speed - 1/100
ISO - 250

"Colours of hardwork."

Shutter speed - 1/250
ISO - 200

Ashwin Kumar V
3 MCA

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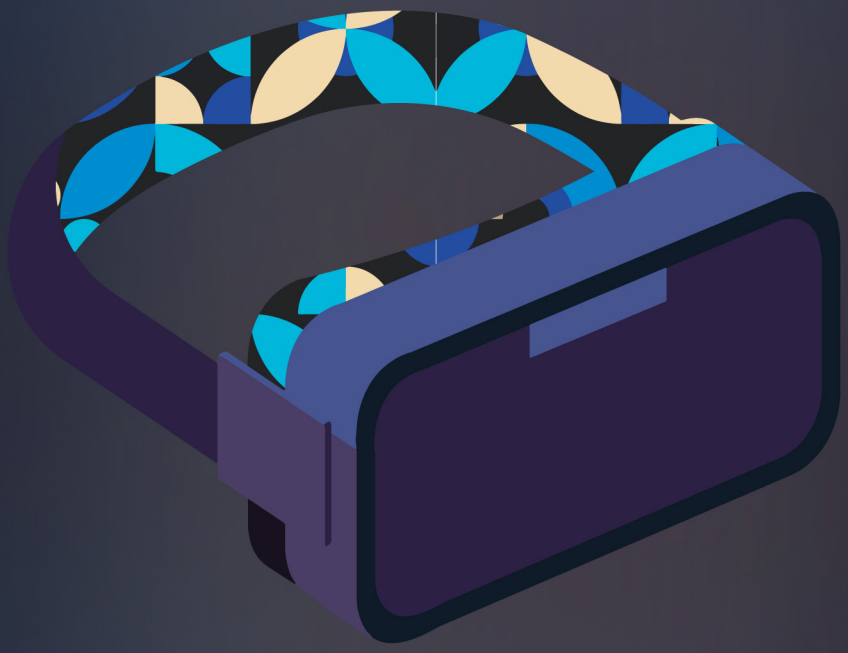

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