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BITS 'N' BYTES

DEPARTMENT OF COMPUTER SCIENCE. PARVATIBAI CHOWGULE COLLEGE OF ARTS & SCIENCE(AUTONOMOUS)

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EDITORIAL

Welcome to the issue of Bits & Bytes for the academic year 2021-2022, which includes the participation of faculties and student achievements of the Department of Computer Science. In this newsletter, we share with you the articles written by the students and an overview of the future of quantum computing in computer science. This issue also introduces digital technologies, NFTs, Advancement in the field of Artificial Intelligence, and how it affects our lives.

~Raheed Muzawar(FYBSC)

Student's Corner

NFT -NON FUNGIBLE TOKEN

Nowadays whenever we open any social media platform, we come across many posts and articles from big companies and brands saying we are coming with our NFTs or any famous creator saying check out my NFT or I just sold my first NFT. This word NFT was recently all over the social media and world news when the NFT of "Bored Ape" was sold for USD 2.3 Million Approximately Rs 17 Crore in Indian Currency. So now it all comes to this question, what is this NFT? Non-fungible Token? A non-fungible token is a non-interchangeable unit of data stored on a blockchain, a form of digital ledger, that can be sold and traded. Types of NFT data units may be associated with digital files such as photos, videos, and audio. There is no rule in creating the NFT, and digital illustration, any photograph you clicked, any photo, video, or even any GIFS that you create can be converted into NFTs and sold over the NFT's Marketplace.

If you want to get in on the NFT frenzy, an NFT marketplace is your ticket to buying and selling virtual items ranging from various sectors to entire virtual worlds. There are numerous NFT marketplaces, many of which have a special emphasis or expertise. The majority of the NFT marketplaces charge you a gas fee in order to buy or sell NFTs, Gas Fee is basically a service charge for the transaction that you do on a blockchain, the common currency used for NFTs is Ethereum. One of the NFT Marketplaces that charges gas fees is Beyondlife. club, Wazir X, Rarible, Foundation, Binance and the commonly used free NFT marketplace is OpenSea which has the largest number of users creating NFTs and selling. For listing the NFT on the marketplace first thing is creators have to create an account on the marketplace, after which creators have to create a digital crypto wallet and then connect that digital wallet to the marketplace. To create the NFT creators simply have to upload the file on the marketplace which will be turned into NFT, the final stage is to list the NFT with the specific price the creators want to sell their artwork. Most of you will have the question about why will anyone buy NFTs? Here the role of NFT Collectors comes in place.

NFT collectors are the people or the brand that collect different NFTs according to their needs, they can choose whether to resell them or store them with them. Why do collectors collect the NFTs? As we know the future of the Digital Era of Metaverse having your digital assets on the blockchain will hold a lot of importance in the future digital era, it is said that these tokens will be later used for the display in your digital world, but it is too early to call. On the other hand, few buy these NFT just to sell them later, as in whenever the price of the cryptocurrency is on a rise, they sell these NFT to make margin profits. That is a lot of good we have talked about the NFTs, coming to its drawbacks, the space of cryptography is very risky and volatile, one can face huge losses if either the price or the currency of a particular

.

entity goes down, talking about the legality, the Indian Government, at the moment, have not openly talked about NFTs being legal or not but recently GOI had announced a 30% tax on the crypto income. Concluding on the topic, NFTs have helped a lot of creators across the globe to make a decent amount of money for a living, there are many famous creators in India too who create NFTs and sell them for a living, currently, there are many communities, and fan groups around these NFTs, the pace in which NFT craze is growing worldwide, it undoubtedly will be the coolest thing to look at in the future of this Digital Era.

~SHAUNAK BALE(MSC IT PART 1)

CYBER SECURITY AND DIGITAL WORLD

We live in the digital era, where today's world is all about an emerging growth of technology, that has been a positive impact on human life, in which cyber security plays a major role, in shaping people's life by keeping everyone safe from cyber attacks. Where the term cyber security itself is the secure way of protecting the computer system from malicious attacks. Where the virus is a malicious program that is executed in such a way, that the user is unaware of what task is performed on his computer system. Whereas Trojan horse is the type of malware that gets installed along with other files on our computer system without our permission and acts as a safe and legitimate, but it is actually a malicious program.

in the recent era, we all know that the information we send and receive through online means is not at all protected and can be controlled by the third party as well. There are three common types of cyber security threats, which we all face at some point in daily life, such as malware, phishing, and man-in-the-middle attack. As we go deeper into the cyber security threats, malware is the software that is designed to cause damage to our computer system. a common type of malware are viruses and Trojan horses.

Another type of cyber security threat, we have all come across is phishing, which is the online scam, where hackers trick legitimate companies by sending emails, text messages, and advertisements, to steal sensitive information, such as phishing is email phishing, where an email appears to come from an authoritative source, but it comes from the hacker who is trying to steal our personal information. And the third type is Man – In – The Middle attack, which is a form of cyber security attack when two parties exchange sensitive information through an online source, which makes hackers get in between and cause interruption to the sender's and receivers' communication.

In conclusion, cyber security is necessary for the development of IT sector, inorder to gain better awareness in the field of cyber security principles and as well as to see the growth of an upcoming security of the digital data. Where, cyber security is important for almost every company to survive from its cyber attacks, because the task that is carried out on network of networks should be taken proper measures, in order to protect sensitive data and should not be the target of the external source or the attackers.

~~ Sanika Crisnarao Nagvenkar

ARTIFICIAL INTELLIGENCE IN COMPUTER VISION

"Computer vision and machine learning have really started to take off, but for most people, the whole idea of what a computer sees when it's looking at an image is relatively obscure." Says Mike Krieger . Computer Vision has seen rapid growth over the last few years due to deep learning which has allowed the capability to detect obstacles, segment images, or extract important context from a given scene. From the biological point of view, computer vision strives to come up with computational models of the human visual system. In the field of Engineering, the computer vision's goal is to create autonomous systems which could perform some of the tasks which the human visual system can perform and even surpass it in many cases. But computer vision is an incredibly complex technology.

So what exactly is Computer Vision ? It is a field of artificial intelligence (AI) that enables computers and systems to derive meaningful information from digital images, videos and other visual inputs and take actions or make recommendations based on that information. Basically it is a science of training a computer to recognise images and respond to what it sees in some programmatic manner. For Example, A car sees a pedestrian in a way , and applies brakes , a street post with a camera sees a traffic accident and manipulates street lights in the area to route traffic away from the accident , similarly A farmer's irrigation system sees the condition of his plants and determines whether enough water is being supplied or not . In order to act upon what it sees , the computer needs to be trained to recognise whatever the situation or parameters are needed to make informed decisions .

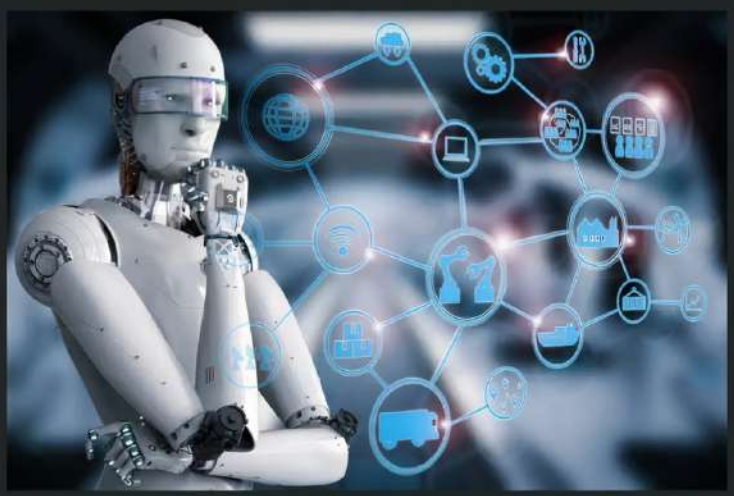
That training includes showing the computer many images of what is right and what is wrong, so it can decide whether to act or not. Machines can now identify and classify objects from within digital images and then react to what they see with the help of Deep Learning models, which has also allowed the capability to detect obstacles, segmented images, and extract important context from a given scene. Artificial intelligence with computer vision helps to automate various purposes such as detecting cancerous moles in the images of skin and helps in MRI and X-ray scans. And other innovations like Human pose estimation, Human Tracking, Video analysis, Self-driving cars, Facial recognition, also helps in overlaying and embedding virtual objects on real-world imagery in devices. Artificial intelligence in computer vision works by following three steps, namely Image Acquisition to translate analog data into computer-readable form in zeroes and ones, Image Processing is the process of extraction of geometric elements such as Classification, segmentation, edge and feature detection, etc which is possible due to modern applied mathematical algorithms,

lastly Image Analysis and Understanding which uses advanced level algorithms to conduct a deep analysis of data for 3D scene mapping, object tracking, and recognition also facilitates decision-making.

What could be the impact of this technology in the future? This technology will assist us in so many ways. It will keep us safer, Help us produce more food, help us diagnose disease much earlier so that we can treat it, it can also help us streamline processes like manufacturing, help us improve the quality of the product by eliminating defects, etc. In the future, computer vision technologies will be more advanced by which it can be used in conjunction with other technologies or other subsets of Artificial Intelligence to build more potent applications. Artificial general intelligence and Artificial Superintelligence can be developed by giving them the ability to process information even better than the human visual system. Many industrial sectors rely on computer vision to increase human capacity by using techniques like 3D reconstruction. This field of AI is vast and complicated. But with the help of deep learning methods, we can achieve great results on challenging computer vision problems.

The main benefit of this technology is its high accuracy rate with which it can selectively replace human vision if trained correctly.

The developments in Artificial intelligence and advancements in deep learning and neural networks have been able to overtake humans in certain tasks in the sector of detecting and marking objects. The computational power required to analyze data along with visual data is now available so the production of data is used to train and level up the ability of computer vision.



Computers are pre-programmed to solve certain tasks in Computer vision due to which this technology is used in the analysis of play and strategy to determine the rate of success of the player. If we think about the future, developing systems will enable computers to see and understand and respond to events. Whereas it's hard to imagine whether it will have a positive or a negative impact on human life.

~Anjali Rodrigues

Xenobot - The Living Robot

Modern technology never stopped evolving. It has become a part of our life. One just cannot imagine living without it. Some of y'all who are interested in technology and science might have already heard of Xenobots but for those who didn't, you are missing out a lot my friend.

Usually when we speak of robots what comes to our mind? A plastic box or a metal humanoid with some wires attached to or inside of it. But Xenobots are nothing like that; they are entirely made up of organic cellular material. This is the reason why it is called a "living" robot. Let me explain. The founders of Xenobots are Sam Kriegman, Douglas Blackiston, Michael Levin and Josh Bongard. Xenobots are micro-machines measuring less than a millimeter wide. They were created in a lab by computer scientists and biologists from the University of Vermont and Tufts University. They are created using the skin cells and heart cells (stem cells) harvested Image 1: Few combinations of Xenobots from the embryos of African Clawed frogs and computer algorithms. The skin cell was used because of its ability to bond together while the heart cell could contract and relax. Then they generated the blueprint design which will allow them to form this bio-bot. Later, they used this data and fed it into the evolutionary algorithms, and made it run on the supercomputer. Millions of combinations were created to form a functional structure that can move.

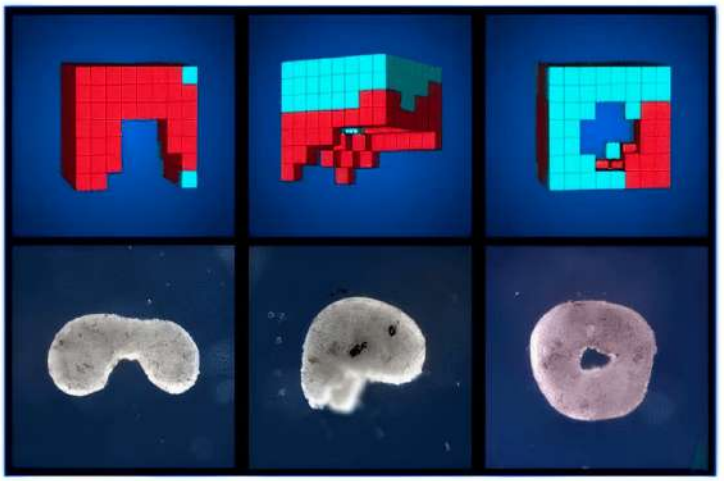


Image 1: Few combination of Xenobots

With the help of the evolutionary algorithm, they got the best configuration for their bio-bots. Now, the next step was to create these bots in real-time. This was a time-consuming process; the research team performed microsurgery on the skin and heart cells to create their first bio-bot. Now, let's talk about some features of Xenobiotics. The bio-bots can propel themselves making them move in a straight line or circles. Their life span is 5-7 days. Since they are made up of cells, they are biodegradable. They also have the ability of healing. This means that if you cut them in half, they would put themselves back together. This healing ability was not predicted by the researchers. What surprised them more was that sometimes the Xenobot would change their direction. They might even turn around and go back in the direction from where they came. Sometimes they would link up with another Xenobot and travel with them.

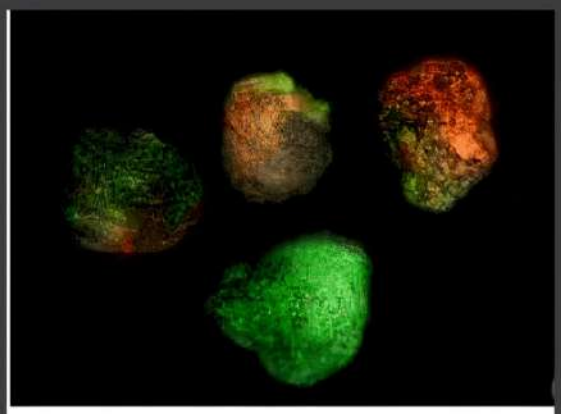


Image 2: Xenobots 2.0

In 2021 Xenobots got an upgrade, they came to be known as Xenobot 2.0. Instead of using muscle cells for locomotion now, they use cilia. Cilia are tiny hair-like structures that are present on the surface of the cell which helps them move across surfaces. These new bio-bots are more durable and can recover from a full-length cut within just five minutes of injury. It was found out that even if a Xenobot 2.0 is 100% injured Image 2: Xenobots 2.0 then they could completely heal themselves within 15 minutes from the time of injury. One of the major updates of Xenobot 2.0 is their ability to remember. This was done by injecting mRNA into the embryo. This mRNA is coded for a special fluorescent protein known as EosFP which is commonly found in corals and emits green light. When they are exposed to 390 nanometres of blue light it will emit red light. This helps us identify which Xenobots 2.0 contains memory. If it's red, it contains memory and if it's green then it won't.

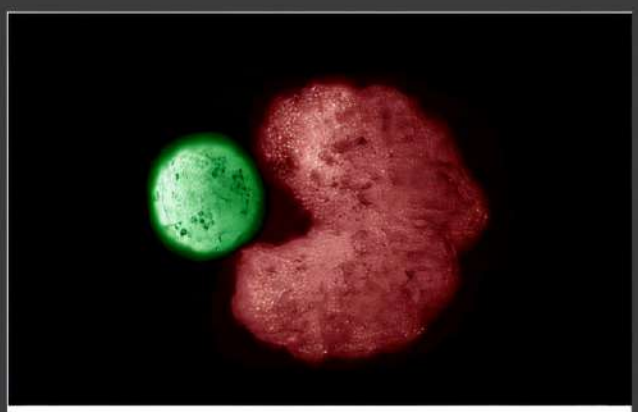


Image 3: Xenobots 3.0

In December 2021, we got Xenobot 3.0. This was a breakthrough in their research. It is due to the fact that the scientists who created Xenobot 1.0 have now claimed that they can reproduce on their own. The researchers first cut up a tiny part of each bot making them look like Pac-Man, which allowed them to operate for a longer amount of time and with more efficiency. By doing so they were able to transport a large number of pellets in the environment using
less energy. Later on, the researchers found out that if they replace pellets with the
stem cells in the environment then the Xenobots will collect enough stem cells to create their next generation. Scientists say that this type of reproduction is Image 3: Xenobots 3.0 called kinematic replication. These Xenobot babies then grow into parent Xenobots which we now call Xenobots 3.0. They are the exact copy of their parent. The research on developing more efficient Xenobots is still going on hence there is endless possibility for their application. The Xenobot has massive potential if used and developed accurately. For example, these bots can be used to deliver medicinal drug molecules to specific parts of the human body. In advance stages, they can also be used to remove tumors in the human body. Their applications are not only limited to medical fields. They can also be used for the good of the environment. These bots can help in removing the microplastics from oceans thereby reducing pollution. They can also help to detect radioactive substances or waste in a geographical area.

~Mayur Naik (P.G.D.C.A)

COMPUTER SCIENCE: WHAT'S NEXT?

Today's computers are smaller, cheaper, faster, greatly efficient and are solving problems instantly and accurately provided the input is relevant and the set of instructions given are favorable but these computers cannot deal with the problems of the physical world that is probabilistic and unpredictable in nature. Can this problem be tackled? Here is an overview of one such model of computing that has more potential to solve problems that cannot be solved by classical ones.

QUANTUM COMPUTING

Quantum computing is an area of computing focused on developing computer technology based on the principles of quantum theory. It harnesses the unique ability of subatomic particles that allows them to exist in more than one state (i.e., 1 and 0 at the same time) whereas computers used today can only encode information in bits that take the value of 1 or 0.

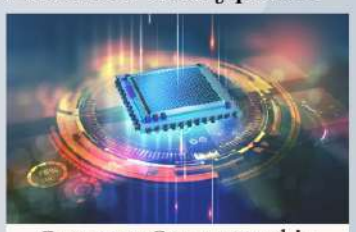
Superposition, interference and entanglement are the features of quantum physics on which these supercomputers are based. This empowers quantum computers to handle operations at speeds exponentially higher than conventional computers and at much lesser energy consumption.

FACTS:

- 1Qbit is the power and the name of the first dedicated quantum computer.
- The operating temperature of the D-Wave 2000Q quantum computer is 0.015 kelvin.
- Quantum tunneling is expected to result in a 100-1000x reduction in power consumption.
- Quantum computers work thousands of times faster than traditional computers and are too powerful for simple tasks.
- 5 companies have made quantum chips so far.
- By 2030, the number of quantum computers worldwide could be between 2,000 and 5,000.

ADVANTAGES OF QUANTUM COMPUTING:

- Quantum computers will be able to solve those complex mathematical problems that traditional computers find impossible to solve in a practical timeframe.
- Due to teleportation phenomenon known as 'quantum tunneling', it can work in parallel and use less amount of electricity, hence reducing the power consumption up to 100 to 1000 times.
- It can solve complex problems without being overheated since for its stability it is kept cold up to 0.2 Kelvin inside the quantum system.
- Quantum computers will be able to crack the highest security unbreakable encryption techniques. However, it would also build hack-proof alternatives.

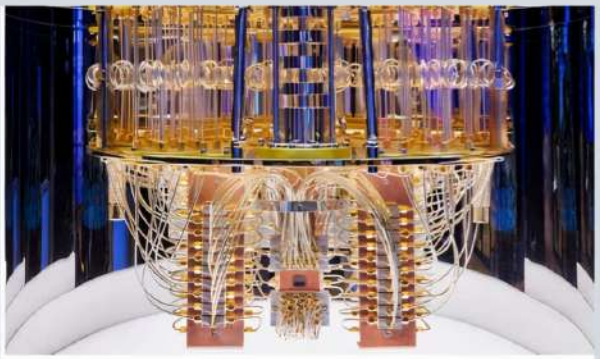


Quantum Computer chip

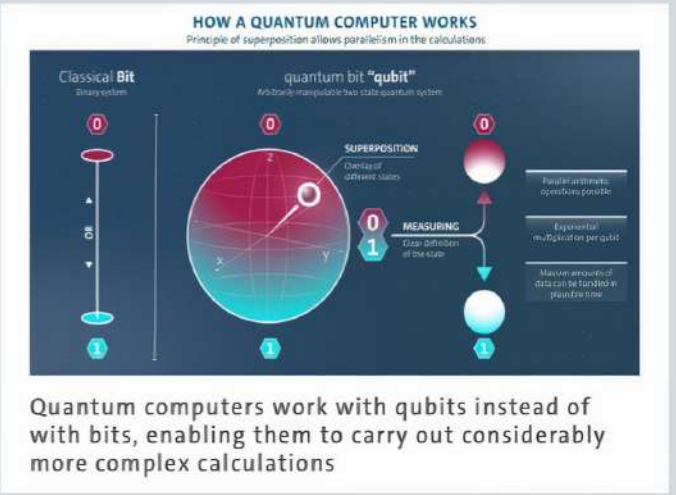
DISADVANTAGES OF QUANTUM COMPUTING:

- The security of the existing Internet of Things would fall down. Cryptographic techniques, Databases of the government, private large organizations, banks and defense systems can be hacked. Considering these facts, quantum computers can be terrible for our future.
- The Quantum Computer has not been invented completely yet as only parts are being implemented.
- It is very delicate and error-prone. Any kind of vibrations affects subatomic particles like atoms and electrons.
- Quantum processors are very unstable and are very hard to test since it is very difficult to maintain and regulate the temperature for its stability.

Considering all the facts, Quantum computers have the potential to revolutionize computation by making certain types of classically intractable problems solvable. While no quantum computer is yet sophisticated enough to carry out calculations that a classical computer can't, great progress is underway.



The innards of an IBM quantum computer show the tangle of cables used to control and read out its qubits.



Quantum computers work with qubits instead of with bits, enabling them to carry out considerably more complex calculations

~~Rizma Pereira

Student Internship

- **Mr Deeptesh Gokuldas Shet** , PGDCA Student, is selected to work as an intern for Digitisation of Schemes under Directorate of Higher Education.

Faculty Corner

- **Mr. Abhishek Gudekar**, attended ACM India Joint International Conference on Data Science & Management of Data (CODS-COMAD) from **7-10 January 2022.**
- **Mr.Abhishek Gudekar** , was invited as Resource Person for the workshop "Overview of GIS: Basic and Advanced"organized by Department of Geography of the college from **4 th December 2021 to 10 th January 2022.**
- **Dr.(Ms).Sameena Falleiro** attended a NAAC Sponsored National Level Seminar (Hybrid Mode) on Internal Quality Assessment Systems in the New Normal organised by SVT, College of Home Science, Autonomous of SNDT Women University, Mumbai on **14 th & 15 th January, 2022.**
- **Ms. Dikshita Vishram Aroskar**, Assistant Professor Department of Computer Science conducted a webinar on Network Security and Cryptography for the students of Government Higher Secondary School, Khandola on **21 st January 2022.**
- **Mr Amogh Raiturkar** attended a webinar organized by Symbiosis Institute of Geoinformatics on topic Drone Policy and Application in Reference to Remote Sensing Data Analysis" **on January 15 th 2022**. The Resource Person who conducted the webinar was Mr.Dominic **Karunesudas** and **Mr. Satayam Kushawaha**, Director Indian Space Association.
- **Mr Amogh Raiturkar** attended one day International Webinar on Basic Elements of Graphic Designing on **January 14 th 2022**. The Resource Person who conducted the webinar was **Ms**. Annmary **Kuriakose**, Graphics Designer in Software Company at RJ Global Solutions.

FACULTY INCHARGE
SANAS SHAIKH
ASSISTANT PROFESSOR
DR. (MS). SAMEENA FERNANDES FALLEIRO
HOD AND ASSOCIATE PROFESSOR.

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