

# ABHIVARG

Volume 6.2

Department  
of  
Electronics and telecommunication



2021-2022



# ABHIVARG

Volume 6.2

## METaverse

# DEAN'S MESSAGE



**Dr. Lochan Jolly**

**Dear Students,**

**I am happy to see the theme for this edition. It is great that you have taken the first step to talk about mental health through your magazine.**

**In today's world the rat race and goals restricted to selfish motives create unwanted stress and dissatisfaction in the people. If it stays for long time can be fatal and have adverse effects on the mental health of the individuals. The effect could be anxiety attacks, mental depression etc.**

**We all know we cannot change the ecosystem to which we belong but we can change ourselves. We should not allow the environment and people around us to control and drive us. For this we need to make ourselves strong by doing few simple things which used to be part of our tradition:**

- 1. Believe in "Vasudhava kutumbhukam" i.e. whole world is one family. Keeping big goals for the welfare of whole humanity and environment.**

- 2. Not trying to analyse and change past**

- 3. Not worrying and working for future**

- 4. Enjoying the present moment**

**In addition, doing Yoga, chanting mantra, reading good books, and doing service to mankind help to release stress and dissatisfaction.**

**I hope you will adopt few tips. Experiment on your own to see the impact of our old traditions which were scientific and helped to remain happy irrespective of adverse situations.**

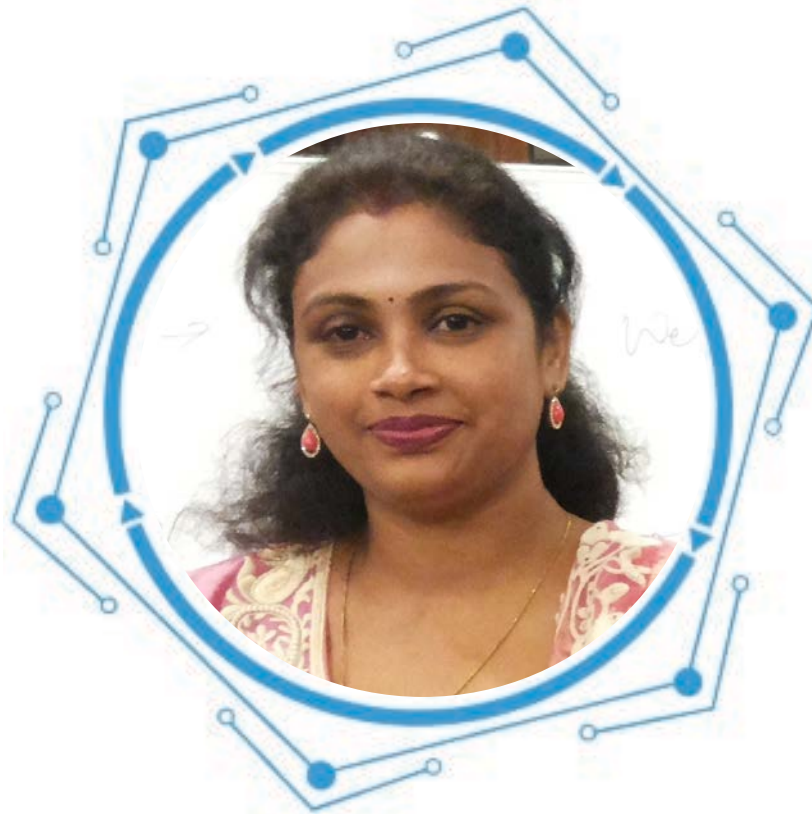
**Keep smiling.**

**Take care.**

**God Bless you all.**



# HOD'S MESSAGE

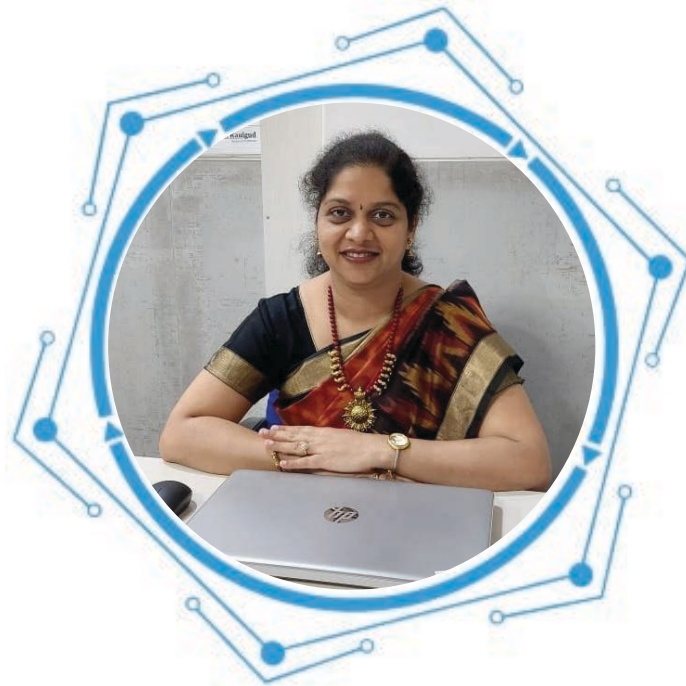


**Dr. Payel Saha**

**I am delighted to pen for “Abhivarg” this message as an appreciation of the commendable efforts put forth by the editorial team to bring about innovative content. I proudly applaud the dedication and sincerity of the team to bring out this issue highlighting the latest trends in the technical world.**

**The theme for “Abhivarg 6.2” this year is METAVERSE which will surely excite the minds of students and inspire passion among the members of the faculty of Electronics and Telecommunication Engineering department. My greeting to the editorial board to keep the good work and also thank the authors for their contribution. I wish you all triumph and a grand operation throughout the year.**

# FACULTY INCHARGE'S MESSAGE



## Mrs. Sukruti Kaulgud

Our universe is evolving. TCET through Abhivarg tries to bring our students to the forefront of the next emerging curve. During the pandemic our physical world became virtual and the level to which digital got accelerated by organizations, employees and consumers was unprecedented. Almost everyone now knows video calling apps, digital signatures, digital security, deep fake, and hacking. Many business processes have moved to the virtual mode those we never thought we could not do without visiting a bank and signing in front of an officer. One of the waves catching up fast is that of Metaverse. Many organizations are scrambling to be first movers in this space and this magazine brings you insights in the ways it is unfolding. My request to the students of TCET would be to never forget these three A's:

- 1) **Attention:** Pay attention to the way things are evolving
- 2) **Anticipate:** Anticipate the next change and lead them
- 3) **Adopt:** Adopt quickly to the evolving trends and be on top of it

As Abraham Lincoln once said, the best way to predict the future is to create it. We sincerely hope you enjoy the magazine articles that has a good combination of articles from our students and industry experts.

Happy Reading.



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STUDENTS

# NON-FUNGIBLE TOKENS



**SOHAN CHHANGANI**  
TE E&TC A

## Introduction

Recently, non-fungible tokens (NFTs) appear to have burst from the ether. These digital assets, which range from art and music to tacos, are selling like 17th-century artifacts, with some fetching millions of dollars. But are NFTs even worth the hype and money? Some analysts believe that NFTs will fade away into thin air. Others feel that they are here to stay and will permanently revolutionize investments.

## WHAT IS AN NFT?

Any digital asset that depicts real-world elements such as music, artwork, films, etc., is known as an NFT. They can be bought and traded online, often using cryptocurrency, and they're typically encoded with

about the same software as many other cryptos. Despite the fact that they've been there since 2014, NFTs are gaining popularity currently as a means to trade digital artwork. Since November 2017, a whopping amount of 174 million dollars has been spent on NFTs. NFTs are usually one-of-a-kind, or at the very least one of a very small batch, and contain unique identification codes.

This is in striking contrast to the huge majority of digital items which are nearly always available in endless quantities. If a certain asset is in demand, cutting down on the supply should theoretically increase its value.

However, most NFTs have been digital works that already exist in some capacity elsewhere, such as legendary clips from NBA games or copies of digital art that are already circulating around on social media, at least in these early days.

Famous digital artist Mike Winklemann, for example, used a compilation of 5,000 daily drawings to produce "EVERYDAYS: The First 5000 Days," which set the record for the most expensive NFT ever sold at a whopping \$69.3 million.

Individual images—or perhaps even the full collage of images—can be seen for free on the internet. So, why are individuals prepared to spend millions of dollars on something that might be simply downloaded? Because a NFT permits the purchaser to own the original asset. It also comes with in-built authentication, that acts as evidence of ownership. The "digital bragging rights" are almost as valuable to NFT collectors as the object itself.

How are NFTs different from Cryptocurrency?

The full form of NFT is "non-fungible token". As mentioned before, it is usually programmed in the same way as cryptocurrencies like Bitcoin or Ethereum, but that's where the similarities end.

Physical money and cryptocurrency are both "fungible," meaning they may be traded or swapped for one another. They're also worth the same amount of money—one dollar is always equal to another dollar, and one Bitcoin is always worth another Bitcoin. The fungible aspect of cryptocurrency gives it a secure way to execute blockchain transactions.

But NFTs are different. Each NFT contains a digital signature that prevents it from being substituted for or compared to another (hence, non-fungible). Just because they're both NFTs, one NBA clip, for instance, isn't the same as EVERYDAYS. For that matter, one NBA footage isn't necessarily comparable to another NBA footage.

### **How does an NFT work?**

NFTs are stored on blockchains. A blockchain is a decentralized public ledger that keeps track of transactions. Most people are familiar with blockchain as the underlying technology that allows cryptocurrencies to exist.

An NFT is made up of digital objects that represent both physical and immaterial objects, such as, but not limited to, Artwork, Videos, Music, Collectibles, GIFs, etc. Even tweets are taken into account. Jack Dorsey, a co-founder of Twitter, sold his first tweet for over \$2.9 million as an NFT.

NFTs are essentially digital versions of conventional collector's artifacts. Instead of receiving an actual painting to put on a wall, the customer receives a digital file.

They also obtain exclusive rights

to the property. An NFT can have only a single owner at a particular time. Because NFTs include unique data, it's simple to verify ownership and exchange tokens between owners. They can also be used to hold information by the owner. For example, an artist can sign their work by putting their signature in the metadata of an NFT.

### **WHAT ARE NFTS USED FOR?**

Content creators have a one-of-a-kind chance to monetize their work thanks to NFTs and blockchain. For instance, artists no longer have to sell their work through galleries. Instead, they may sell it as an NFT straight to the consumer, allowing them to keep a larger portion of the profit. Additionally, artists may integrate royalties into their software so that they get a share of revenues when their work is sold to a new buyer. This is desired because most artists do not earn subsequent revenue after their initial sale.

#### **How to buy an NFT?**

If someone is interested in starting their own NFT collection, they will require the following items:

To begin, they will need a digital wallet that can hold both NFTs and cryptocurrencies. Depending on what currencies your NFT supplier accepts, they will probably need to buy some cryptocurrency, such as Ether.

When researching for alternatives, the additional fee needs to be kept in mind. When someone acquires crypto, most exchanges charge a portion of the transaction.

There are many NFT sites to choose from once they have set up and funded their wallet. Rarible, Foundation OpenSea.io, etc, are some of the major NFT marketplaces at the moment

Though these sites are home to hundreds of NFT artists and collectors, prior homework is required before purchasing. Some artists have been scammed by impersonators who

have published and auctioned their work without their knowledge.

Moreover, the verification methods for creators and NFT listings vary by platform, with some being more strict than others. For NFT postings, OpenSea and Rarible, for instance, do not need owner verification. Buyer safeguards appear to be limited at best, therefore it's wise to remember the ancient adage "caveat emptor" (let the buyer beware) while buying NFTs.

#### **Should one buy NFTs?**

Just because one can purchase NFTs, does it mean they should? The choice to invest in NFTs is essentially a personal one.

If someone has some savings, it is something to think about, especially if an item has sentimental value.

However, it is worth remembering that the value of an NFT is solely determined by what someone else is prepared to pay for it. As a result, unlike in the case of the stock market, where economic factors impact the stock prices, demand will drive the price for NFTs.

What this means is that an NFT might sell for less than the purchase price. If no one wants it, the NFT might not be sell at all.

Hence, NFTs are to be approached in the same way as one might other investments - with thorough research and a complete understanding of the hazards, including the possibility of losing all money invested.

Moreover, the verification methods for creators and NFT listings vary by platform, with some being more strict than others. For NFT postings, OpenSea and Rarible, for instance, do not need owner verification. Buyer safeguards appear to be limited at best, therefore it's wise to remember the ancient adage "caveat emptor" (let the buyer beware) while buying NFTs.



# DIGITAL TWINS AND THE METAVERSE

## Introduction:

The Metaverse has the potential to change our digital lives in a world where everything is quickly becoming digital and virtual. It is a point of convergence between the actual and virtual worlds, where people can sense the real world while retreating to the digital world's realistic experiences. In other terms, Metaverse might be considered the internet's next generation. The Metaverse, as the next step in the evolution of the web and social media, pushes us closer to fully stimulated virtual reality through disruptive innovation. However, in order to provide fully integrated, immersive, and engaging 3D experiences, the Metaverse requires a digitalized duplicate of the real world as a point of access. Many firms and corporations are already investigating and expanding on metaverse-based basics in order to provide new possibilities and experiences for digitally-driven consumers. Enterprises can use



**SHWETA CHAVAN**  
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digital twins to bring dimensionally precise real-life spaces into the metaverse virtual mirror world. So now we ask what is a digital twin?

## Digital twin:

A digital twin is a virtual representation of a process, product, service or system. It serves as the real-time digital counterpart of a physical object or process. It is updated in real time and aids decision-making through simulation, machine learning, and reasoning. This technology can synchronise the digital environment with the real world and vice versa, by using sensors that convey



information and two-way internet of things (IoT) device connections. Any alterations or movement in the physical world are mirrored in the twin's digital representation. This combination of the physical and virtual world enables data analysis and monitoring systems to anticipate problems, save downtime, discover new opportunities, and even plan for the future using simulations.

### **How it works?**

Let's look at how to add digital twins into the Metaverse to better understand how they work in the Metaverse:

- 1.As product digital twins are utilized to create things.
- 2.In production digital twins are used to verify manufacturing or production processes.
- 3.For performance, the performance digital twin collects and analyses data from in-use items to provide actionable knowledge for better decision-making.

Digital threads are the combination and integration of these three forms of digital twins.

By gathering data at every product and manufacturing lifestyle level, they can be weaved into other goods.

For example, let's say the object under investigation is a wind turbine. This wind turbine will be equipped with a variety of sensors that monitor various aspects of its operation. These sensors

collect data on the energy production, temperature, weather conditions, and other characteristics of the physical object's performance. This information is subsequently sent to a processing machine, where it is applied to a digital copy. After being given this information, the virtual model may be used to run simulations, investigate performance concerns, and suggest changes, all with the purpose of gaining important insights that can later be applied to the original physical product. The constant flow of data aids in obtaining the most accurate asset analysis, allowing the digital twin to function as a live model of the actual equipment.

### Use cases:

Organizations and corporations can gain a better understanding of product performance and improve customer service by integrating digital twins in the Metaverse. There are various industries where the use of digital twins in the Metaverse can be useful; let's have a look at a few of them:

**Manufacture:** In the manufacturing industry, digital twin technology is commonly used. Virtual replicas of complete industries and plants ensure that manufacturing processes are transparent. Digital twins have a huge impact on how things are designed, manufactured, and maintained, making them more efficient and optimised while cutting down on time spent on maintenance.

**Automobile:** In the automobile sector, digital twins can be used to construct a virtual representation of a physically connected car. It records the vehicle's behavioural and functional data and aids in the analysis of the vehicle's overall performance and related features. Customers benefit from digital twins because they may receive

completely tailored customer service. Metaverse might become a platform for vehicle expos, virtual showrooms, and digital twins, allowing consumers to have a real-world experience with automobiles.

**Healthcare:** Digital twins have helped the medical industry with organ donation, surgery training, and making other medical operations less dangerous. By increasing patient monitoring, digital twins with IoT data can play a critical role in healthcare. It can provide patients with tailored health care and preventive actions.

**Retail:** By developing 3D virtual models of showrooms and products and offering customers a real-like experience, Metaverse's digital twin can play a vital role in improving the retail customer experience. Retailers, for example, can give customers a selection of ideal fashion clothing products based on their digital twin models. The digital twin also aids in more efficient in-store planning, security implementation, and energy management.

### **Conclusion:**

If the Metaverse is a concept for bringing the virtual and physical worlds together, then the digital twin is one of the techniques or technologies to make that concept a reality. As more organisations and corporations use digital twins to create Metaverse products and dApps, they will be able to build the entire ecosystem in the near future. Using 3D spatial data technology, digital twins, and simulation technology, as well as other new-age deep technologies like Blockchain, AI, ML, IoT, and Cloud computing, a physical area may be swiftly collected and transformed into an accurate and immersive digital replica. Businesses and enterprises can effectively reach out to every corner of the globe, enabling the formation of virtually limitless and numerous future metaverse services.

### **Reference:**

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2. <https://www.ibm.com/topics/what-is-a-digital-twin#:~:text=A%20digital%20twin%20is%20a,reasoning%20to%20help%20decision%2Dmaking>

# A REVIEW OF EXTENDED REALITY



**SAKSHI CHAVAN**  
TE E&TC A

## ABSTRACT:

So, what is Extended Reality, and how does it differ from Virtual Reality? While it may appear to be a continuation of Virtual Reality or Augmented Reality, the notion goes much beyond, at least for the time being. AR, VR, MR, and everything in between are now classified as Extended Reality. Extended Reality is a brave new frontier for human connection and technology. The actual world serves as a backdrop for synthetic items or information in augmented worlds, which layer visuals over physical locations. Mixed realities are a hybrid experience in which the user can flip between what is real and what is artificial at any time (and sometimes within moments).

## Introduction:

Consider what life and work in our society will be like in 2030 and beyond. Perhaps, owing to advances in extended reality (XR), an umbrella word for immersive technology that can blend the physical and virtual

worlds, you'll be able to shop for a new house anywhere in the globe as if you were truly there, or go to lunch in a foreign location. Because of this enormous expansion, the realities of our life in 2030 may be beyond our comprehension. XR is a new umbrella term that encompasses all immersive technology. We by now have augmented reality (AR), virtual reality (VR), and mixed reality (MR), as well as those that will be developed in the future. Immersive technology may integrate the virtual and "real" worlds and provide a full immersive experience, extending our perception of reality. According to a recent survey, more than 60 percent of the surveyed respondents predict XR will become mainstream in the next five years. Let's have a look at each of the current technologies to acquire a better understanding of XR.

**Augmented Reality (AR):** Virtual information and objects are superimposed on the actual environment in augmented reality. This experience adds digital features like photographs, text, and animation to the actual world. The experience may be accessed via AR glasses, displays, tablets, and smartphones. This means users are really not cut off from the outside world and can still interact and understand what's going on. The Snapchat filters, which place digital things like as hats or spectacles on your head, is one of the most well-known applications of AR.

**Virtual Reality (VR):** Users are totally immersed in a simulated digital environment in a virtual reality encounter, as opposed to augmented

reality. Individuals must put on a virtual reality headset or head-mounted display to gain a 360-degree picture of an artificial world that deceives their brain into believing they are, for example, walking on the moon or stepping into whatever new universe the VR creators have built. The gaming and entertainment sectors were early adopters of this technology, but it is now being used by firms in a variety of industries, including healthcare, construction, engineering, the military, and more.

**Mixed Reality (MR) :** Digital and real-world things coexist in mixed reality, and they can interact in real time. This is the most recent immersive technology, sometimes known as hybrid reality. It necessitates the use of an MR headset as well as significantly more computing power than VR or AR. In the movie Jumanji, the physical structure of the house where the storey took place was blended with a jungle environment. Companies are looking at how they might use mixed reality to solve problems, support projects, and improve their bottom lines.

### **Future Scope:**

Extended reality (XR) technology is becoming increasingly prevalent in a variety of industries and sectors, offering significant benefits in a variety of areas of work and business, including training, collaboration, and marketing. XR bridges the distance between instructors and trainees in education and training, allowing for deeper cooperation even when people attend classes afar. XR can help firms save money on training by speeding up the learning process. It creates risk-free learning settings in which learners may learn from their failures. Extended reality also

aids attention and provides high levels of engagement and information retention. XR allows for shared, large-scale visualization and dynamic, walk-through renderings of designs and structures for presentation and collaboration. Immersive experiences allow companies to boost their product marketing by bringing people closer into their reality.

At the moment, there are a number of obstacles related with Extended Reality technology, including battery life concerns and storage capacity limits for mobile devices. Many individuals still regard Extended Reality as little more than a curiosity, while others are concerned about its potential to blur the barrier between imagination and reality.

### **Conclusion:**

Extended Reality is expected to become widespread in the next ten years or so, but others feel it might have a significant influence on our lives much sooner. Extended Reality, according to some experts, will be used to supplement education, enabling subjects like history to come alive using extended realities. Extended realities may also enable people with disabilities to enjoy activities they previously thought they were unable to do; simulations of everyday activities such as cooking and running errands can provide them with the opportunity to do things that would be difficult or impossible in the real world.

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1. <https://www.forbes.com/sites/bernardmarr/2019/08/12/what-is-extended-reality-technology-a-simple-explanation-for-anyone/?sh=54144ced7249>
2. [https://acodez.in/what-is-extended-reality/#What\\_Is\\_Extended\\_Reality\\_XR](https://acodez.in/what-is-extended-reality/#What_Is_Extended_Reality_XR)



# EXTENDED REALITY: THE FUTURE

## Introduction

Extended Reality is a term that combines 3 technologies - augmented reality, virtual reality, and mixed reality. The XR umbrella encompasses practically all forms of electronically enhanced reality. XR is rapidly gaining traction in businesses, augmenting human experience in previously imagined ways. XR stands for "cross reality" or "extended reality," and it refers to a number of separate but related technologies. It combines acronyms like VR (virtual reality), AR (augmented reality), and MR (mixed reality) (mixed reality). In a word, XR is "reality-plus" technology that can be used with any type of display. XR is a hybrid of virtual reality and augmented reality. All XR technology affects the human-to-PC screen interaction, either by immersing you in a virtual environment (VR), adding to or augmenting the user's surroundings (AR), or a combination of the two (MR). Let's first understand what AR, VR, MR mean individually.



**ROSHINI KINI**

TE E&TC-A

## What do AR, VR and MR mean individually

### Augmented Reality(AR)

Augmented reality is the simplest of the three XR subsets and describes the interaction between virtual experiences and the real world, resulting in an augmented or augmented environment. 'Pokemon Go' is one of the best examples of this technology. Augmented reality is slowly making its way into industries beyond entertainment, such as market, e-commerce, mass production and manufacturing. Augmented reality can be found in any environment that contains two essential features:

1. A camera that capture the surroundings
2. A processor that understand the environment and takes the initiative to simulate a virtual object placed in that environment.

### Virtual Reality(VR)

As the name suggests, Virtual Reality (VR) creates a completely virtual environment that enables users to immerse themselves in an alternate parallel universe.



Virtual Reality is completely simulated, hence people can also broaden the virtual, simulated environment with controllers and other sensory stimulators. The clearest tangible added substances, like earphones and haptic gadgets, have proactively advanced into the augmented experience market. VR innovation is as of now restricted by low-power handling gadgets and GPUs.

### **Mixed Reality(MR)**

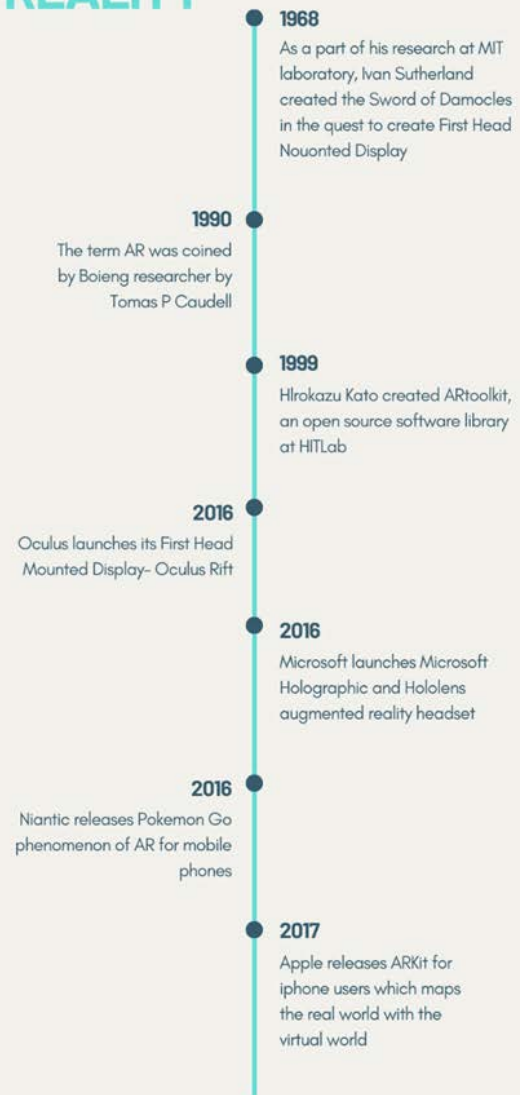
The freshest and most complex feature of XR is blended reality. Consider blended reality a mixture among increased and augmented reality. Mixed reality has embarked to fill the gap between the Virtual and expanded world; this exceptionally progressed increased reality takes into consideration an intelligent encounter that is like computer-generated simulation. Mixed Reality's limitations lie in the handling capacities of accessible gadgets. Be that as it may, this innovation might hold the most encouraging future for upsetting how we connect with genuine reality. Blended reality has proactively advanced into worker preparing, assembling, military, and the shopper area. Envision putting on your MR goggles to analyze interior issues inside your vehicle, see your present exhibition, and change settings.

### **History of Extended Reality(XR)**

The beginnings of extended reality (XR) - the range of vivid advancements that incorporates computer virtual reality (VR), augmented reality (AR) and mixed reality (MR) - stretch as far as possible back to the 1800s. The capability of XR is just barely beginning to be found. Research recommends around 60% of individuals accept XR will be a

#### **A BRIEF HISTORY OF**

## **EXTENDED REALITY**



"standard" climate in the following five years. The ascent of XR is additionally preparing for the disclosure of new ideas, similar to the "metaverse".

### **XR IN BUSINESS**

Organizations are receiving the rewards of XR tech as of now, with vivid innovations as a component of attempt before-you-purchase encounters. For instance, in the event that you're shopping on the web for a lounge chair you can perceive how it really squeezes into your parlor. A few retailers are utilizing XR tech

to permit you to get a see of the genuine article. That prompts a decrease in returns and, surprisingly, one-ups the physical retail insight. Fabricating is getting a lift from XR, as well. AR can show how new processing plant formats will look before they're set up, and support groups will before long make plant walkthroughs that make machines that need adjusting hang out in lively red or orange. XR involved preparing can give bit by bit virtual encounters in genuine offices.

With AR, organizations can permit clients to have a go at attire, furniture, and different items, seeing what they resemble face to face prior to making a buy. Augmented reality can make additional drawing in exhibits for clients or give valuable approaches to organizations to furnish their clients with administration and backing.

### **XR in gaming and technology**

Virtual reality events are quickly taking over as the new trend for the event industry. Similarly, XR environments can offer a wide range of valuable entertainment experiences by submerging users into immersive experiences. Star Wars: Squadrons is a VR game that takes advantage of your youth dreams, allowing you to guide a X-Wing or TIE Fighter with a VR headset. Other top XR titles incorporate Trover Saves the Universe, Half-Life: Alyx, and No Man's Sky. You've presumably currently played one of the top XR games ever, Pokémon Go, which puts well-disposed pretty much nothing "pocket beasts" in your room and neighbourhood.

### **XR in remote work, training and development**

XR is turning out to be especially normal in the instructive scene. In

colleges, educators are utilizing augmented reality to put their understudies in scenes where they can collaborate with instructive substance. In the business world, AR, MR, and VR can all assist workers with creating abilities without endangering them. Laborers can associate effectively to different representatives, interface on shared content, and even work on projects cooperatively through XR gadgets. With MR and AR, experts could direct colleagues through complex errands, similar to how to fix an issue on a piece of assembling hardware.

### **Future scope of XR**

Extended Reality is probably going to become standard in decade or thereabouts, yet there are some who accept Extended Reality could enormously affect our lives sooner than that! A few specialists have anticipated that Extended Reality will be utilized to expand instruction, Broadened real factors may likewise permit individuals with handicaps to appreciate things they thought they couldn't do. While a few points that need to be kept in mind are:

**Expensive hardware:** While affordable tools for Extended Reality are emerging in today's market, the most advanced solutions can still be very expensive. More innovation will be necessary to create products accessible to all budgets.

**Consumer comfort:** Uncomfortable and disorienting headsets can make it really tough for people to spend longer time in XR. Consumer comfort will be a necessity for the future of XR development.

**Security and safety:** A lot of the benefits of XR rely on the ability of tools to safely transfer data. Security and privacy concerns will need to be addressed by XR vendors.



# USE OF HYDRO POWER ENERGY FOR GENERATION OF ELECTRICITY FOR REDUCING CARBON EMISSION

## Hydro Power?

Hydro is a term for Water. As water is an abundant resource on Earth, it has been used from the dawn of life. As it is an important resource it is mainly used for drinking, cooking, and for other household work.

But water in large quantity can make a huge energy source, which if used the right way can be more helpful to the human kind. As we have noticed that large water bodies can be very dangerous when they show their power on

the surface, like Floods, Heavy rain, or The Tsunami.

As technology has been advanced from Zero to reaching into deep space. Power plants are way in the middle of these gaps of advancement. They have been useful for generation of electricity, manufacturing and other heavy duty operations that depend on them.

Similarly, hydro power plants are very useful for the same thing; They can be used for storing large water bodies till their highest potential or used their path of flow and used their potential energy for power generation. This naturally generated power from water bodies is Hydro Power.

## Energy from Hydro Power Plants for Electricity generation:

Using the advancement in technology and the Hydro Power generated is driven through a huge Generator (Dynamo) much rotational can be produced which can induce huge EMF as a result.

This can also be proved by the Faraday's law. This EMF is nothing but an Electric Output which can be fed further to the stabilizing, boosting,

or control circuits for production of useable electricity for day to day needs.

In Real Life, this same concept is used by building these Hydro Power Plants Near or in the flow of water bodies.

Dams are the most common or first to mind structure for a Hydro based power plant, as they cost the most in building, they provide a huge amount of electricity in the end. They can also be useful as they solve many problems like, providing agricultural land, connecting surfaces, flood management, and obviously in producing electricity.

## Help in reduction of carbon emission:

As normally produced electricity is steam generated which is created by burning fossil fuels which causes their extinction but also produces CO gas in the end which causes adverse effects on the environment. BUT electricity produced in the Hydro Power Plant is generated with high potential energy of water so they do

not produce any other toxic gas in the end results they also contribute very less in the environment decay.

# MISSION 2070

**Upkar Chaurasiya**  
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**Kamal Choudhary**  
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**Ajay Mali**  
SE E&TC A

One of our era's greatest curses is air pollution, on account not only of its impact on climate change but also its

impact on public and individual health due to increasing morbidity and mortality. Not only humans, but carbon

emission has also adversely affected our environment. India emitted 2,299 million tonnes of carbon dioxide in

2018, a 4.8% rise from last year, according to a report by the International Energy Agency (IEA).

To curb

carbon emission from our surroundings we need to change our habit of waste disposal, over-shopping, and transportation.

We need to understand that we the Individual people only is responsible for raising sea level coz, our

requirements never get fulfilled, we need more dresses even having 2-3 pair in cupboard for fashion, we prefer

private transportation mode over public to produce more & more carbon which is very bad.

Let first start with the issue related to human health due to carbon emission. There are many pollutants that

are major factors in disease in humans. Among them, Particulate Matter (PM), particles of variable but very small diameter, penetrate the respiratory system via inhalation,

causing respiratory and cardiovascular diseases,

reproductive and central nervous system dysfunctions, and cancer. Carbon monoxide can even provoke direct

poisoning when breathed in at high levels. Heavy metals such as lead, when absorbed into the human body, can

lead to direct poisoning or chronic intoxication, depending on exposure. Diseases occurring from the substances

include principally respiratory problems such as Chronic Obstructive Pulmonary Disease (COPD), asthma, bronchiolitis, and lung cancer, cardiovascular events, central nervous system dysfunctions, and cutaneous diseases

Apart from human health carbon emission has also affected Environment. India's emission growth this year

was higher than that of the United States and China — the two biggest emitters in the world — and this was primarily due to a rise in coal consumption. Due to which the average global temperature rises drastically which

also causes melting of glacier and it result into flood in coastal region.

Well China, USA, and India together accounted for nearly 70% of the rise in energy demand. India's per capita emissions were about 40% of the global average and contributed 7% to the global carbon dioxide burden. As USA, the largest emitter, was



responsible for 14%. India says it will cost at least \$2.5trillion (₹150 trillion approx.) to implement its climate pledge, around 71% of the combined required spending for all developing country pledges and India also Aim to achieve Net-zero carbon emission by 2070.

To reduce these emissions, we individually must contribute to our society by the following below methods:

- Reduce your frequency of air travel until fuel become green: one can plan a long duration journey instead of frequent journey so that their personal air travel Carbon-emissions can be reduced.
- Solar panels installation: this method is little costly and long-term investment but, cost can be reduced by some subsidies provided by both state or central government to promote solar installation at individual level.
- Three R's: If we follow this three RRR's carbon emission in environment will decrease drastically. because it will not require the produce, packaging & transportation processing which causes carbon and other greenhouse Emission
- Eat locally-produce food: hardly people know that when they eat food which is outsourced, they generally eat that food by raising sea level. Yes, you heard that right! That food you'd eaten was imported/transported via. Some IC Engine powered vehicles, which produces huge amount of carbon.
- Driving habits: when possible, walk for shorter distance or ride through

your bicycle instead of using motor bike (IC-Engine bikes)

- Switch to low/zero carbon vehicle: we need to understand that electric is future and need to switch to electric vehicles. Even various state-government along with central government in India proving subsidies for EV-owners, in recent news even privet company named JSW-Steel also decide to provide some subsidies to their employees to buy electric vehicle.
- Update your home appliances periodically: we need to upgrade our home appliances in 3-5 years, coz as product rating increases it consumes less electrons to be excited, hence you'll get less number in your electric bill and book. You have produced less carbon than you neighbours.

# AFFORESTATION: LET'S DO OUR PART!

**Tanya Gupta**  
SE E&TC A

**Dhruvi Khimasiya**  
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**Purva Kulkarni**  
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“ A nation that destroys its soil destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people”  
- Franklin D. Roosevelt

With all of the progress we are making in technology and science, we are losing sight of the fact that we must also care for our environment. It is necessary for us to prioritize our environment and ensure that we are not harming it. We are all directly and indirectly dependent on trees and plants but, we are inept when it comes to caring for them. Almost everything we use in our daily lives, is made up of trees. Plants, trees and forests provide us with wood, timber, medicinal plants, fruits, vegetables, flowers, latex, rubber, raw materials and a lot more. They prevent soil erosion by holding onto the soil tightly using their roots, act as homes to different animals, provide us with fresh air, regulate the climate, balance the amount of oxygen and carbon dioxide in the air, serve as landmarks, provide us shelter from the sun-rays and most importantly increase the beauty of the place they are present as well as the surroundings. I believe, a tree is an excellent teacher, it teaches us how to soar high in the sky with our roots grounded. A tree has roots in the soil yet reaches the sky, it tells us that in order to aspire we need to be grounded and that no matter how high we go it is from our roots that we draw sustenance. It teaches us that no matter what challenge comes in our way, we must always face it standing upright, never lowering our guards. It

what challenge comes in our way, we must always face it standing upright, never lowering our guards. It teaches us that nothing comes in our lives easily, to be able to grow as sweet fruit, we must go through all that takes to be able to bear that fruit. Trees also teach us to be selfless, cutting a tree does not stop it from helping us, the barks of the tree are converted into the books we write on everyday, its leaves are given to the cattle, its branches are used for making homes and the fruits grown on it, are consumed by us. Whenever I think of selflessness, the images of trees flash in my mind. We must learn all of these qualities from the trees. To be able to reach the sky but always have our feet on the ground, to be able to face all the difficulties and challenges without losing hope, to be able to grow capable enough to succeed in life and to be able to exude selflessness.

There is a lot that can be learnt from the trees but, we humans never think twice before cutting them. We have been cutting down trees at an alarming rate for various reasons. Some of which include construction of buildings, offices, malls; wood; clearing space for

for making grounds; raw material and etc. But, have we ever thought of its consequences? The answer is No, which is why we are not stopping it. By doing so, we are not only disturbing the balance of nature but also, making millions of innocent animals homeless by destroying their homes. How would we feel if one fine day someone comes and destroys our homes? Disturbed, this is exactly how the animals feel when we destroy their homes. What if we go on cutting them down and there comes this day when there would be no trees remaining? How would it be? Terrifying, an Earth without plants, trees and forests would be like a plate of food served with no salt or seasoning in it. For me, it would be meaningless.

. Let us all try and prevent this possibility from turning into reality. This is pretty easy only if we put all our efforts into it and be patient. Reversing deforestation is extremely difficult, but planting trees and looking after them is easy. Afforestation is time consuming and would not give us the results instantly but, would help us in the long run. Our future generations would thank us for it. We all can do our part by keeping in mind a few things like preventing cutting of trees and educating the others regarding the

same, taking part in tree plantation drives, looking after the trees and plants in our vicinities, planting a sapling every year and looking after it, planting ten more trees if we cut one or witness someone cutting one and most importantly spreading the message of afforestation. Let us all pledge to make our earth greener and happier. Let us all befriend trees and love them as much as we can.

“Trees exhale for us so that we can inhale them to stay alive. Can we ever forget that? Let us love trees with every breath we take until we perish.”

- Munia Khan

# USE OF VEHICLES THAT ARE POWERED BY ELECTRICITY IN INDIA – A WIDER PERSPECTIVE

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Electricity is considered as an alternative fuel under the international energy policy act 1992 which means it will be used as the primary fuel in the upcoming future. As we are also aware that the CO<sub>2</sub> emission from vehicles is a major source of pollution in our environment. So this change from fossil fuel to electricity can be looked like a major step in controlling is huge pollution problem !!.

The concept of electric vehicles is primarily based on batteries that can be charged from an electric source. Previously in combustion engines, the energy was produced from the heat that was produced due to the burning of fossil fuel, as a result, the smoke coming from the engine can be easily seen. So when we first see a running electric vehicle it is very eye comforting that the vehicle is so quiet and smoke-free, that is safe for the environment. But

when one observes the whole process it is very easily noticeable that it is the same as a combustion engine or to be precise it is just half of it !!! In the combustion engine, electricity was also produced to power headlights, horns, etc types of equipment. Actually, in a combustion engine, electricity production, as well as pollution, can be seen, but in electric vehicles, neither production nor pollution can be seen. So to take a wider perspective of this whole scenario we have to look at the electric source of the electric vehicle that is the production of electricity in India.

In India, electricity is produced mainly from a nonrenewable source which is 76%, and 22% from renewable sources. So we can see that the electricity produced in India is large - produced by burning fossil fuels. At first, that was seen as a major revolutionary step is just a process of hiding the CO<sub>2</sub> emission from vehicles to some far located electricity-producing power station. So if we truly care for the environment what we have to do is to

to produce electricity from sustainable methods and that is only the true revolution not producing electric vehicles although that is also an appreciable step!!!!.

If we see the recent development in India, we can see that the government is focused on shifting to a sustainable mode of electricity production. Recent development shows that India is determined to unlock its full potential in sustainable electricity production. India is also committed to becoming a net-zero carbon country till 2070. But all this is not enough we all have to make a constant effort in determining the direction of our nation in making a sustainable world. After seeing so many developments in this field we can hope we can achieve our dream of becoming a carbon neutral nation.



# E-WASTE MANAGEMENT SYSTEM

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E-waste may be a term detected by several, far-famed by few. E-waste is any waste created by discarded electronic devices and parts also as substances concerned in their manufacture or use. The disposal of electronics may be a growing drawback as a result of equipment often containing venturous substances. For instance, mercury in switches and housing, metal in steel parts, among alternative equally virulent substances. Knowing what e-waste is critical for us to grasp the importance of its use also. Here are some reasons: It protects the environment and reduces business prices. E-waste recycling is not only good for Mother Nature; it can also be good for non-renewable recycling. The growing demand for electronic devices and appliances means that a variety of metals and alternative non-renewable resources got to be deep-mined and processed. It shows your eco- friendly credentials. It's super straightforward to recycle e-waste. Recycling e-waste has never been easier. There's a variety of places where you can drop off a recent phone, TV, or alternative home appliances. For instance, merchandise that will be recycled is

is newspapers, steel cans, glass containers, plastic luggage, paper, cardboard, all arduous plastic bottles, containers, steel.

The economical way in which to get rid of e-waste is:

**Donate recent Electronic Devices:** If they're still absolutely useful, recent electronic devices are often given to colleges, churches, and charitable organizations. Adult literacy organization will use a pc running on last year's software package to effectively teach basic pc skills to students.

**Look for an accountable Recycler:** If an electronic device is just too recent or too broken to gift, search for an accountable recycler. Several recyclers dump e-waste in Third World landfills, wherever employees method e-waste manually and are exposed to venturous substances.

Due to our improper deposition of e-waste folks affected are on an outsized scale. The negative health effects of those toxins on humans body, brain, heart, liver, kidney, and system injury. It may significantly

affect the nervous and procreative systems of the flesh, resulting in malady and birth defects. Improper disposal of e-waste is improbably dangerous to the world setting; therefore it is necessary to unfold awareness on this growing drawback and also the threatening aftermath. To avoid these virulent effects of e-waste, it's crucial to properly e-cycle, so that things are often recycled, refurbished, resold, or reused. The growing stream of e-waste can solely worsen if not educated on the right measures of disposal.

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# ROLE OF INDIVIDUAL TO REDUCE CARBON EMISSION

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“A host of countries have recently announced major commitments to significantly cut their carbon emissions, promising to reach "net zero" in the coming years. The term is becoming a global rallying cry, frequently cited as a necessary step to successfully beat back climate change, and the devastation it is causing”

– United Nations.

A growing number of countries are making commitments to achieve carbon neutrality, or "net zero" emissions within the next few decades. It's a big task, requiring ambitious actions starting right now. A key element is powering economies with clean energy, replacing polluting coal - and gas and oil-fired power stations - with renewable energy sources, such as wind or solar farms. This would dramatically reduce carbon emissions. Plus, renewable energy is now not only cleaner, but often cheaper than fossil fuels.

A wholesale switch to electric transport, powered by renewable energy, with the bonus of slashing air pollution in the world's major cities. Electric vehicles are rapidly becoming cheaper and more efficient, and many countries have proposed plans to phase out the sale of fossil-fuel powered cars. Other harmful emissions come from agriculture (livestock produce significant levels of methane). These could be reduced drastically if we eat less meat and more plant-based foods. Here again, the signs are promising, such as the rising popularity of "plant-based meats" now being sold in major international fast-food chains.

Here are some roles for us to play individually:

## **Transport**

**Health benefits** - Increased physical activity can result in reduced obesity, heart disease (including the lowering of high blood pressure), diabetes, osteoporosis and cancer. Reduced air pollution can lead to less respiratory disease, including asthma and chronic obstructive pulmonary disease. Reduced road related injuries will result in

fewer deaths and hospitalizations and less suffering.

**Environmental benefits** -Changes in choices and technologies can reduce transport's major contributions to global CO<sub>2</sub> emissions, small particle air pollution, noise and injuries.

**Actions include:**

1. Try one of the following ways to get to work or school - Cycling, walking, car-pooling, public transport. On average, for each litre of fuel burnt in a car engine, more than 2.5 kg of CO<sub>2</sub> are produced. Try to avoid short car journeys because fuel consumption and CO<sub>2</sub> emissions are disproportionately higher when the engine is cold.
2. Travel by train - One person travelling by car alone produces three times more CO<sub>2</sub> emissions per km than if this person were travelling by train.

**Food**

**Health benefits** - Better dietary choices can reduce intake of saturated fats, excess sugar and salt and thus lower the risk of obesity, heart disease, stroke, diabetes and colon and breast cancers.

**Environmental benefits** - Food production is a major contributor to global emissions. Reducing total

global consumption of animal products can lead to reduced CO<sub>2</sub> and methane emissions produced by animals. Using more locally produced seasonal products reduces "food miles" and uses less fossil fuel in delivery.

**Actions include -**

1. Reduce intake of animal products in developed countries. Industrialized countries need to reduce their meat consumption from the current 224 g/person/day. Global convergence to 90 g/person/day would have a significant effect on carbon levels and health.
2. Eat local and seasonal produce - Fresh, locally grown, seasonal food generally uses less energy to produce. It burns up fewer food miles, as the distance it must travel from farm to plate requires less fuel.
3. Try not to waste food - Only buy or order what you need.

**Energy**

**Health benefits** - Access to clean and reliable energy can reduce ill-health consequences of in - door air pollution, outdoor air pollution and occupational health hazards, particularly in low income countries. Currently, 2.4 billion people depend on

traditional biomass fuels & 1.6 billion do not have electricity.

**Actions include** (depending on geographical and social circumstances):

1. Turn down the heat - Reducing the temperature by just 1 °C can cut 5–10% off your family's energy bill and avoid up to 300 kg of CO<sub>2</sub> emissions per household per year.
2. Turn down the cold - Air conditioners are real energy wasters — an average room air conditioner operates at 1000 W, causing around 650 g of CO<sub>2</sub> emissions per hour. Fans might be an alternative, otherwise use air conditioners sparingly and look for the most energy-efficient model.
3. Turn off fans in rooms not in use - Programme your thermostat so that at night, or while you are out of the house, you minimize your heating or cooling use by 7–15%.

### **Waste Management: Reduce, Reuse, Recycle Environmental and health benefits**

**Waste is an important contributor to carbon emissions** - Reducing waste can lead to big emission savings and lower land fill requirements, with consequent reductions in air and land pollution. Actions include: Recycle as much as possible. Recycling one aluminium can

saves 90% of the energy needed to produce.

**Reduce waste** - By taking your lunch in a reusable lunch box instead of a disposable one, you save the energy needed to produce new lunch boxes.

**Reuse your shopping bag** - When shopping, it saves energy and waste to use a reusable bag instead of accepting a disposable one in each shop.

### **Conclusion**

Carbon dioxide emissions are the primary driver of global climate change. In 1950 the world emitted 6 billion tons of CO<sub>2</sub>. In 1990 this had almost quadrupled, reaching more than 22 billion tons. Emissions have continued to grow rapidly; we now emit over 34 billion tons each year. In the second half of the 20th century, we see a significant rise in emissions in the rest of the world. Carbon footprint is also an important component of the Ecological Footprint since it is one competing demand for biologically productive space. We all must understand it's not just about just saving our life it's also about what we leave for our future generation and how we support the ecosystem of planet earth and beings which lives on it.



# SECURITY ISSUES IN BLOCKCHAIN NETWORKS



**ANANYA SRIVASTAVA**  
TE E&TC B

A blockchain is a digital log of transactions that is duplicated and distributed across the complete network of computer systems. Each block in the chain contains a set of transactions, and each time a new transaction occurs in the blockchain, a record of that transaction is added to each user's ledger.



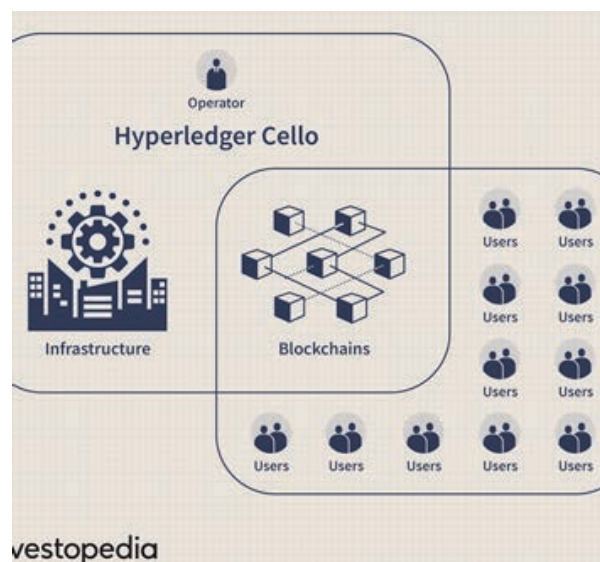
Blockchain functions on the following constituents:

1. **Distributed ledger technology:** A digital system that records asset

transactions is referred to as distributed ledger technology. In this system, transactions and their details are recorded in multiple locations. The distributed ledger database does not include an administration facility or centralized data storage. Instead, the database is shared among several participants or spread across multiple geographical locations.

2. **Immutable records:** Each transaction recorded is final. Users cannot change any detail of the transaction after it has been recorded. If there is any error, a new transaction should be made to rectify the error.

3. **Smart Contracts:** Terms of transactions are created with these smart contracts. This is said to increase the speed of transactions and reduce errors or frauds.



## WHY IS BLOCKCHAIN GAINING TRACTION

Blockchain is turning out to be revolutionary in various fields as it is bringing transparency for its users.

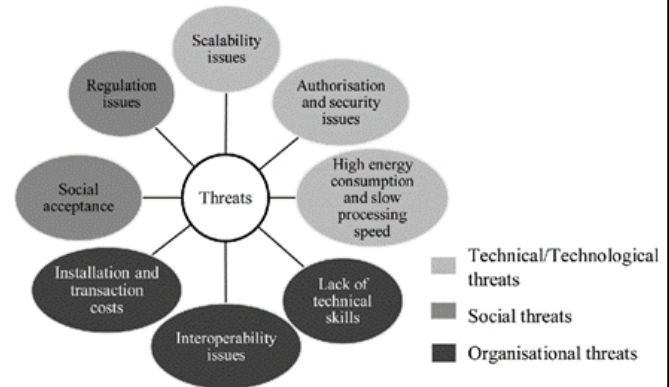
The MIT Technology review states that—"The whole point of using a blockchain is to let people — in particular, people who don't trust one another — share valuable data in a secure, tamperproof way."

Blockchain is ideal for delivering that information because it provides immediate, shareable, and completely transparent data stored on an immutable ledger that can only be accessed by network users with permission. A blockchain network tracks orders, payments, accounts, and production. One can see all the transactions since members share a single view of the truth, greater confidence as well as additional efficiencies.

## SECURITY ISSUES IN BLOCKCHAIN

Initially used in cryptocurrency, today blockchain is being used in various fields such as healthcare, administration etc. With this progress also comes some detriments. Errors in implementation of blockchain networks have led to vulnerabilities, which are often exploited. These exploitations include delaying the

chain's operation, reversing transactions on the blockchain, stealing users' private keys, and much more.



In June 2021, The price of SafeDollar (SDO), an algorithm DeFi (DeFi) stablecoin based on the polygon (MATIC) blockchain, dropped to zero following an exploit. Finding a loophole in the network, money was moved in and out, confusing the system and driving up the price share. In the end the hackers got away with \$250,000.

Six types of attacks are considered most prominent among blockchain exploitation.

1. **51% Attacks:** The 51% attack, also known as the majority attack, occurs when one or a group of people gains control over 50% of the blockchain's hash power. This is usually achieved by adopting mining hash power from a third party. An attacker could prevent or undo transactions from being and stop payments between some or all users.

2. **Double Spending Attacks:** Double payment is a problem that occurs in digital currency transactions

where the same payment method is used multiple times. Multiple transactions that share the same input sent over the network can be problematic and are a unique flaw in digital currencies. The main reason for double payments is that digital currencies are very easy to reproduce.

3. **Routing Attacks:** Routing table poisoning means unnecessary or malicious changes to the router's routing table. This is done by editing the routing information update packets advertised by the router. This attack can cause serious network damage by creating incorrect routing table entries in the routing table.

4. **Private Key Securities:** A key detection attack is an attack on a network system that uses encryption, and the blockchain memory looks for a secret encryption key that can be used to decrypt or sign the data.

5. **Mining Attacks:** Crypto jacking is the fraudulent use of someone else's computer to mine cryptocurrencies. Hackers trick victims into clicking on malicious links in emails that download encryption codes to their computers, or on websites or online ads that run automatically when loaded into the victim's browser.

6. **Vulnerable Smart Contracts:** Smart Contracts are coded agreements for blockchain transactions. However, with errors in coding, flaws are created

in the system. These flaws are then exploited for various gains.

## **PREVENTING BLOCKCHAIN SECURITY ISSUES**

1. A large part of the issues regarding blockchain security stem from improper enforcement of blockchain networks.

2. Using proof of stake, in which the decisions are made by users who already control the majority stake.

3. Use of secure routing protocols can prevent several exploitations.

4. Keeping track of transactions and mining polls reduces attacks.

5. Smart contracts must be thoroughly examined before implementation

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# NON-FUNGIBLE TOKENS OR NASTY FUNGUS TRADES?



**Advait Chirmule**

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NFTs or Non-Fungible Tokens is a new emerging type of cryptocurrency which tackles the problem of not having anything for having cryptocurrency by giving the users a small jpg or gif file in return.

Let's talk about cryptocurrency first, you might have heard of the terms "Bitcoin" or "Ethereum", they are both cryptocurrencies. Although in theory not a lot different from the traditional stock market, cryptocurrency lets you bid on literally nothing. There's no company for you to place a bet on, help with your stocks to grow better, it's just people helping each other by investing and divesting as they wish to and by securing your transactions. Because there's no one regulating anything,

there's nowhere your money is actually going, if people collectively decide to sell their stocks, it's the end of your money and there's no safety net, it is also used for illegal purposes by many. No one saw the Covid-19 pandemic coming, but the ink for the theme of the next pandemic has already set in and dried: climate change. And NFTs are paving us a path to that pandemic as well! How can a virtual currency do that you may ask? It's very easy, it's because of the computational power of generating these blockchains. "Mining" is a term which is used for the users who actively trading in NFTs or cryptocurrency and this process typically involves running a highly complex program for literally 24 hours a day.

Remember how a PC/laptop heats up when you run multiple applications at once, now imagine how it would be if it ran for 24 hours a day, now obviously no one would keep their PC/laptop in the heated mode, they add some cooling aspect to it which would take even more energy (remember, the heat given out by the PC/laptop still remains the same). More electricity is

consumed to keep your setup running too, on a local level, it doesn't matter because of the volatility of the cryptocurrency, they end up earning more money than they spend but when you add up the excess energy from each user it only speeds things up to usher the global warming and the climate change effects.

Another problem with NFTs are that they are spreading like a wildfire with the celebrities and big companies, it is the perfect tool for money laundering and an extra income so they are all jumping the ship quickly, however, it has been observed that with the widespread dislike of NFTs, people aren't willing to invest in it and most of it is due to the hype by the celebrities and companies which means that it is very likely it may all fall down and whatever investments you have done are lost forever. Though that risk remains in Bitcoin etc. as well, it feels we have reached a stage where many users are actually investing in it keeping it afloat (for now).

To conclude, NFTs may or may not be the next big thing but it already is the next big thing in terms of global warming so it is advisable to stay off it for the time being.



# NFT (NON-FUNGIBLE TOKENS)



**SHARATH KULAMPURATH**  
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In this new era of technology we have been leading towards the metaverse and promoting the use of crypto currency we also introduced this new term “NFT” what is NFT? – It’s a Non – fungible token in simple terms (NFT) is a non-interchangeable unit of data stored on a blockchain, a form of digital ledger, that can be sold and traded. NFT are of different types such as audio, video, images, animation etc. These NFTs differ from blockchain cryptos such as Bitcoin, Ethereum, so to put it into simple terms if we talk about Mona Lisa there is only one Mona Lisa painting and rest we see is its copies so minting an NFT is same as creating an original artwork having its full ownership and people can buy or sell this NFTs with its complete ownership, NFT ledgers claim to provide a public proof of ownership, but the legal rights conveyed by a NFT

can be uncertain. Minting is the process to convert this digital files into crypto collections or assets which is stored on the blockchain, NFTs do not restrict in sharing or copying the underlying digital files, do not necessarily convey the copyrights of the digital files, and do not prevent the creation of NFTs with identical associated files. The major difference between a crypto and NFT would be each bitcoin has a same value where as each NFT may represent a different asset and thus may have a different value. Ownership of an NFT does not inherently grant copyright or intellectual rights to the digital asset a token represents., "In one sense, the purchaser acquires whatever the art world thinks they have acquired. They definitely do not own the copyright to the underlying work unless it is explicitly transferred. On June 2021, London's auction house Sotheby's saw CryptoPunk #7523, also called as “Covid Alien,” sold for \$11.75 million. This is the forth most expensive NFT sold yet there are some others ,The Merge being the most expensive NFT sold yet for \$91.8 created by an anonymous digital artist nicknamed as Pak.



Covid Alien or CryptoPunk #7523

There are other NFTs available which can cost starting from \$0.000000001593 the NFTs are leading as the most important asset in the metaverse as user can interact with it in the metaverse. The metaverse provides immutable confirmation of ownership which underpins in this virtual world, The ways to buy NFT right now is either using crypto currencies like ETH – Ethereum, SOL – Solana, SHIB – Shiba Inu and many other, you can also buy NFT using USD some websites to buy NFTs are OpenSea. OpenSea is the leader in NFT sales. Axie Marketplace. Axie Marketplace is the online shop for the video game Axie Infinity, Larva Labs/ Crypto Punks, NBA Top Shot Marketplace, Rarible, Super Rare, Foundation, Nifty Gateway,



Ethereum and Solana

The NFTs are also used to buy virtual land in the metaverse this places in

metaverse are based upon places in real world and NFTs are one way to buy and use them this places can cost upto more or less then the real value of plot in the realworld.

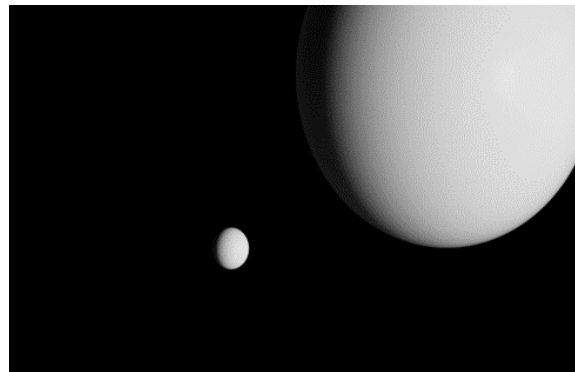


The Metaverse Generation

The first famous "NFT", Quantum, was created by Kevin McCoy and Anil Dash in might 2014, consisting of a video clip created by McCoy' wife, Jennifer. McCoy registered the video on the Namecoin blockchain and sold-out it to Dash for \$4, throughout a live presentation for the Seven on Seven conference at the New depository in ny City. McCoy and Dash stated the technology as "monetized graphics". A non-fungible, tradable blockchain marker was expressly connected to a piece of art, via on-chain information (enabled by Namecoin). In October 2015, the initial NFT project, Etheria, was launched and incontestible at DEVCON one in London, Ethereum' first developer conference, 3 months when the launch of the Ethereum blockchain. Most of Etheria' 457 purchasable and tradable polygon tiles went unsold for over 5 years till March

13, 2021, when revived interest in NFTs sparked a shopping for frenzy. Inside twenty four hours, all tiles of the present version and a previous version, every hardcoded to 1 ETH (\$0.43 at the time of launch), were sold for a complete of \$1.4 million. The word "NFT" only gain currency with the ERC-721 standard, initial planned in 2017 via the Ethereum GitHub, following the launch of varied NFT comes that year the quality coincided with the launch of many NFT projects, as well as rarity Cards, CryptoPunks (a project to trade distinctive cartoon characters, discharged by the yank studio animal Labs on the Ethereum blockchain) and rare Pepe commercialism cards. NFT purchases and deals are netted in a contestation regarding the high energy operation, and consequent hothouse gas emigrations, associated with blockchain deals. A major aspect of this is the evidence-of- work protocol needed to regulate and corroborate blockchain deals on networks similar as Ethereum, which consumes a large quantum of electricity; estimating the carbon footmark of a given NFT sale involves a variety of hypotheticals about the manner in which that sale is set up on the blockchain, the profitable geste of blockchain miners (and the energy demands of their mining outfit), as well as the quantum of renewable energy being used on these

networks. There are also abstract questions, similar as whether the carbon footmark estimate for an NFT purchase should incorporate some portion of the ongoing energy demand of the underpinning network, or just the borderline impact of that particular purchase. An analogy that is been described for this is the footmark associated with an fresh passenger on a given airline flight. This NFTs are the new future of the metaverse and thereby the indroduction to this blockchains and NFTs are a must as this is the new future of the technology and digital currencies.



The Merge NFT

# HOW METAVERSE WILL IMPACT US



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On 28th October 2021, At Facebook's Connect event on Thursday, CEO Mark Zuckerberg announced that the company's new name will be Meta. "We are a technological company that connects people," Zuckerberg explained. "We can finally put humans at the heart of our technology if we work together." And by working together, we can create a far larger creator economy."



Metaverse is a post-reality world, a multi-user environment that combines physical and digital virtual reality. It is based on the convergence of technologies that allow multisensory interactions with virtual environments, digital objects and people with the use of technologies such as virtual reality (VR) and augmented reality (AR). Therefore, the metaverse is an interconnected network of immersive social environments networked in persistent multi-user platforms. This enables seamless real-time user interaction and dynamic interaction with digital artifacts. Its first iteration is a network of virtual worlds where avatars can move between them. Contemporary versions of Metaverse include a social and immersive VR platform that is compatible with large online multiplayer video games, open game worlds and collaborative AR spaces.

In three respects, the Metaverse varies from augmented reality (AR) and virtual reality (VR). First, whereas most VR-related research focuses on the physical approach and rendering, Metaverse stands out as a service with



more long-term content and social significance. Second, the Metaverse does not always make advantage of AR and VR. It can be a Metaverse application even if the platform does not support VR or AR. Finally, having a scalable setting that can accommodate a large number of people is critical for reinforcing social meaning in the Metaverse. The large-scale Metaverse implementation necessitated three factors:

1. Hardware improvements (e.g., GPU memory, 5G)
2. The development of a recognition and expression model that took advantage of the hardware's parallelism
3. The availability of content that people could immerse themselves in.



As such metaverse finds applications in many fields:

## I. SIMULATION

The Metaverse may be suitable for manufacturing, in particular, when considerations such as labor costs, inventory, and production speed dictate decision making. Some experts predict that the industrial metaverse will require Internet of Things (IoT) sensors to collect data from real-world devices so that companies can accurately model in the digital world. Metaverse technologies can help prevent disasters, for example by entering data from the physical world and synchronizing it with a revisited copy. Companies in industry and manufacturing as well as energy and telecommunications have begun to accept metaverse for this purpose.

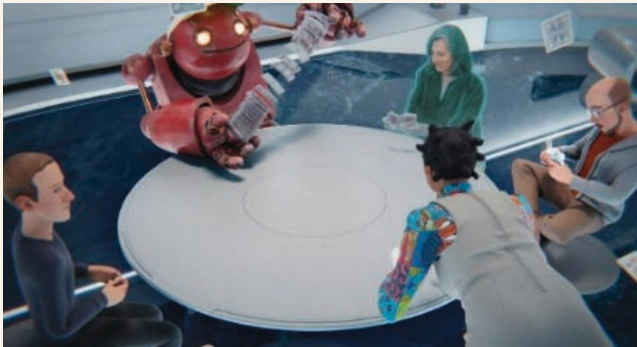


## II. SOCIAL

In the conference, A glimpse into what the metaverse will provide was shown to audiences all over the world. The record showcased people from



different parts of the world playing a game of cards in the metaverse. The idea behind the metaverse is a shared virtual environment that people can interact with, interact with, and attend events with along with personal digital avatars. The biggest environmental benefit is that it will significantly reduce the need for human travel, leading in fewer traffic, accidents, and pollution.



### III. WORK

Another application of metaverse are virtual offices. Even if everyone is in the same office, they could be in different cities or on other countries. A virtual workspace gives everyone a consistent experience, whether they're working from home, a satellite office, or the main office. Customers and clients can also be brought into these venues as a method to decrease the need for travel for meetings.

### IV. EDUCATION

Metaverse can provide an immersive experience, facilitating teamwork and providing knowledge. While the metaverse is being constructed, it is critical that scientists, educators, and developers collaborate to create interesting, immersive, and collaborative experiences for children and families. Understanding how to use active, engaging, meaningful, socially interactive, iterative, and joyous environments to support learning goals will transform flashy and exciting digital experiences into truly instructive ones with true social interaction at their core. The distant learning experience only reinforced the need of social-emotional interaction for children and the need for it to be included into the metaverse from the outset.

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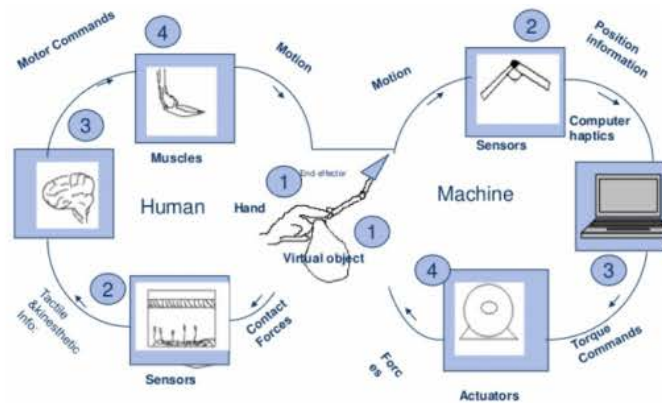
# HAPTIC TECHNOLOGY



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Haptic technology, haptic feedback, or simply haptics, is technology that incorporates tactile experience or feedback as part of its user interface, creating a sense of touch through vibrations, motion, or other forces. Haptic science also involves any tactile feedback such as air pressure or sound waves. Also known as 3D touch or kinaesthetic communication, this technology creates experiences using vibrations, motions, and other forces. Since touch is the most fundamental method of interaction, leveraging sensation within your products is fast becoming the newest approach for creating memorable brand experiences.

It is helpful to distinguish between haptic technology and two similar terms—haptics and haptic feedback.



- Haptic technology refers to the technical applications (virtual or physical) that create tactile stimulations.
- Haptic feedback comprises the methods in which haptic technology communicates tactile information to users.
- Haptics is the overarching umbrella term that describes the science of haptic feedback and haptic technology, in addition to neuroscience and physiology of touch.

## WHY IS BLOCKCHAIN GAINING TRACTION

Immersion Corporation is a pioneer in haptic technology that powers over 3 billion devices worldwide. One study on haptics demonstrated that participants could recall objects purely

through touch 94% of the time. As the global user base grows, haptics will continue to expand across multiple applications.

- **Vibration**

Most haptic experiences focus on vibration-centric feedback. Technology such as linear resonant actuators (LRA) and eccentric rotating mass (ERM) create much of the haptic experiences you encounter for mobile and wearable devices (think of the vibration included with a game controller).

- **Button Simulation**

Smart screens don't naturally offer tactical feedback and versatility like mechanical buttons. And so, we can expect simulated buttons to become more popular, like the technology in the Apple Force Touch trackpad. Buttons can use haptic and audio feedback to mimic the feeling of a mechanical pressure pad under your finger.

- **Thermal**

Thermoelectric effects can create temperature-based haptic experiences. By manipulating the flow of electric currents between alternating conductors on a device (one hot and one cold), your users can experience different perceived temperatures.

- **Kinesthetic**

Haptic feedback devices mount on your customer's body and create the sensation of mass, movement, and

shape. Technology such as the Dexmo haptic glove is an example of the potential growth available in the kinesthetic modality.

## APPLICATIONS

The emerging field of haptics has tremendous scope in the coming future, the technology has gained a lot of attention in recent times and yet it is in its infancy stage.

- **Gaming**

A major eye turner would be the application of haptics in the gaming world. By designing a suitable suit or a glove or any such sensor which is suitable for the game, the gaming experience can be made real. The future of the gaming world will be taken over by the haptics soon as this can not only display the images but also give a tactile feedback to the user.

- **Computers**

Haptics technology can be used specially to create a three dimensional virtual world and this when compared to the normal graphical user interface given by the computer display unit is far better as this technology can give feedback such as pressure, resistance which a common graphical interface cannot give. By making use of this, a user can sit at one side of the computer and experience the real object which is virtually on the other side of the system

- **Medical Field**

The technology has raised another system called the telepresence, this is specially used in the medical field. With the help of haptics a doctor at some remote area can operate a patient with high accuracy using a 3D video and robotic arm which is given haptic control. This can be implemented and the operation can be done without the doctor being present at the place.

- Artifact Simulation

This technology can also be used in the areas where a human cannot be given to operate a system without the experience of it before such as flying an aircraft. Under such a situation haptic technology can give a feedback similar to the real experience and hence help in the learning experience of a pilot.

- Video Conferencing

This technology can also be implemented in the field of wireless communications, the technology helps in virtually interacting with the objects and also helps in saving the time to travel to the place.

The technology will be implemented in daily life applications very soon, as the technology is very new to the field and the research on this technology is gaining importance lately, the way humans are interacting with the machines changes drastically. Technology makes the handling of complicated things easy and effective.

Thus Haptics technology will be changing the way humans interact with the machines.

# SMART CITY

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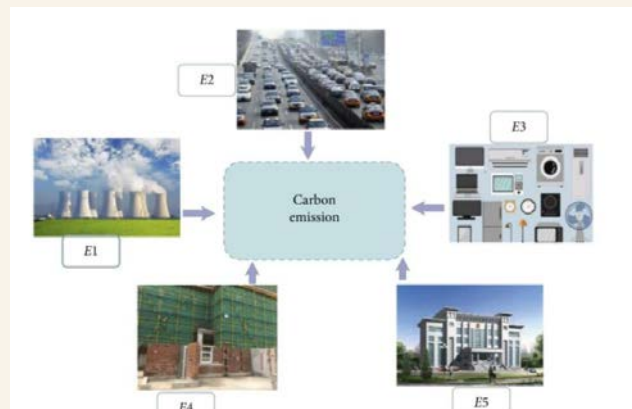
## **Introduction;- What is smart city?? Where this concept came from**

A smart city is a technologically modern urban area that uses different types of electronic methods to do needful works to help people. A smart city uses Information and Communication Technology (ICT) to improve operational efficiency, share information with the public and provide a better quality government service and citizen welfare. The main goal of a smart city is to optimize city functions and promote economic growth while also improving the quality of life for citizens by using smart technologies and data analysis. The value lies in how this technology is used rather than simply how much technology is available. The concept of smart cities originated at the time when the entire world was facing one of the worst economic crises. In 2008, IBM began work on a 'smarter cities' concept as part of its Smarter Planet initiative. By

the beginning of 2009, the concept had captivated the imagination of various nations across the globe.

## **Main source of Carbon emissions in the urbanization process.**

An overview of urbanisation reveals migration from rural areas to cities, a phenomenon associated with many parameters: household size, changing industrial structure, new housing and public facilities, city size distribution, etc. Basically, urbanisation creates upward pressure on energy consumption and CO<sub>2</sub> emissions.



## **Land use changes**

Land use changes are a substantial source of carbon dioxide emissions globally, accounting for 90% of human carbon dioxide emissions and contributed 3.3 billion tonnes of



carbon dioxide emissions in 2011. Land use changes are when the natural environment is converted into areas for human use like agricultural land or settlements. From 1850 to 2000, land use and land use change released an estimated 396-690 billion tonnes of carbon dioxide to the atmosphere, or about 28-40% of total anthropogenic carbon dioxide emissions

### **Industrial processes**

There are many industrial processes that produce significant amounts of carbon dioxide emissions as a by-product of chemical reactions needed in their production process. Industrial processes account for 49% of human carbon dioxide emissions and contributed 1.7 billion tonnes of carbon dioxide emissions in 2011. Many industrial processes emit carbon dioxide directly through fossil fuel combustion as well indirectly through the use of electricity that is generated using fossil fuels. But there are four main types of industrial process that are a significant source of

carbon dioxide emissions: the production and consumption of mineral products such as cement, the production of metals such as iron and steel, as well as the production of chemicals and petrochemical products.

### **Electronic Devices**

The information technology (IT), telecommunications, media and entertainment sectors produce roughly three percent of global greenhouse gas emissions, as compared to four to five percent for the airline industry when all supporting infrastructure is included, according to a study by the KTH Royal Institute of Technology in Stockholm, reports Triple Pundit.

However, a study released in May by the American Chemical Society's Environmental Science & Technology Review indicates that CO<sub>2</sub> emissions from the airline industry accounts for approximately two to three percent of global GHG emissions. The KTH study, "Greenhouse Gas Emissions and Operational Electricity Use in the ICT and Entertainment & Media Sector," finds that the IT and telecom sector in 2007 accounted for 1.3 percent of the world's total

greenhouse emissions, equivalent to 620 megatons of carbon dioxide equivalent (CO<sub>2</sub>e), while the media and entertainment sector accounted for 1.7 percent of world greenhouse emissions, or 820 megatons of CO<sub>2</sub>e. These figures also include the actual IT infrastructure — networks and data centres — that are necessary to enable the global services, says KTH.

#### To Improve Energy Efficiency through a Series of Technological Innovation

As human society enters the era of Industry 4.0, the concept of smart city and many new technologies are integrated, which realize the information sharing among the government, enterprises, and residents, for example, the use of Hadoop software for energy information management to monitor energy dynamics through the Internet of Things (IoT) and big data to achieve real-time monitoring of energy consumption terminal, so as to optimize energy storage and distribution. In addition, devices in smart cities are embedded

with self-sustaining and automated sensors. The integration of physical devices, services, and management can be achieved with the help of network physical systems. Through these technological innovations, to improve energy efficiency and effective distribution of energy and to reduce urban carbon emissions, Babar and Khattak proposed an overall design scheme of smart city energy management based on Internet of things, ensured the energy efficiency of IOT equipment through data analysis, and constructed a model composed of energy management, data processing, and service management. It is verified that the model can achieve energy-efficient clustering, peak shaving, optimal scheduling, and load balancing optimization. Luo et al proposed a short-term energy prediction system based on edge computing architecture. The system distributes data acquisition, data processing, and regression prediction on sensor nodes, routing nodes, and central servers, respectively. Semantic and stream processing technologies are used to support efficient data acquisition and processing in the IOT. And, some studies have verified that blockchain technology

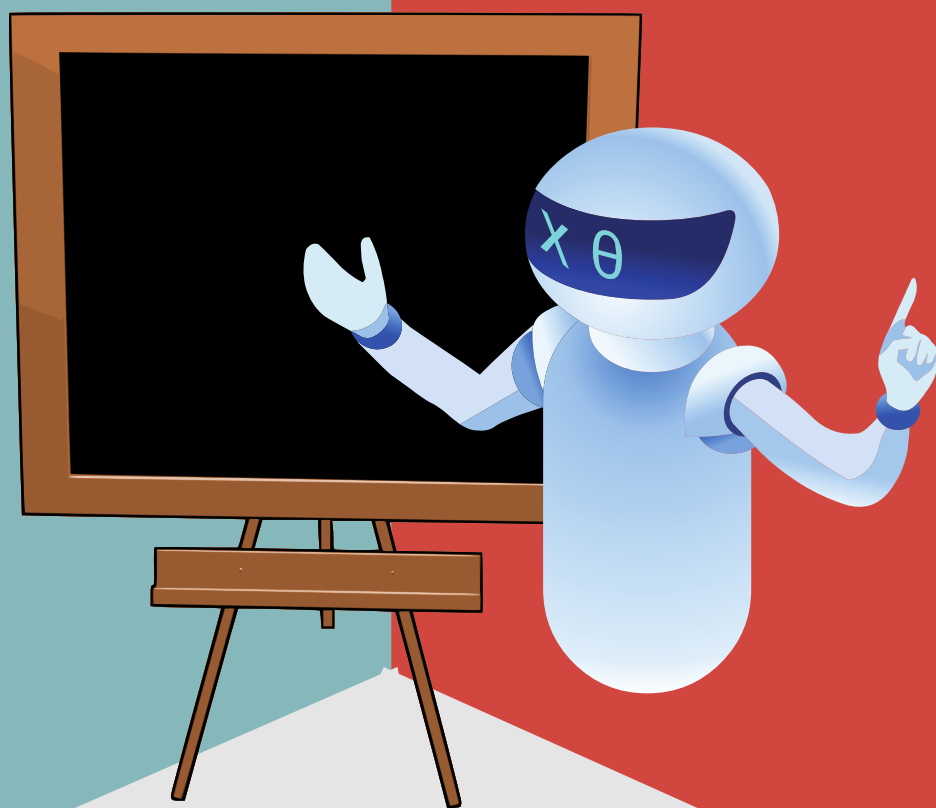
provides an unchangeable account book for security value transactions in the smart city network. This time, grassroots technology can improve the efficiency of various processes in the energy sector. Therefore, blockchain technology promotes the innovation and transformation of the energy market and realizes the point-to-point energy microgrid, thus reducing urban energy consumption. In addition, academic research has found that smart cities have more professional application and spillover effects of technological innovation, thus improving the utilization efficiency and output level of resources. such as clean energy and clean technology.

### Conclusion

This Article proposes that the construction of smart cities should be based on the characteristics of different regions and explores strategies to promote local LCE performance according to local conditions.

Specific recommendations are as follows: based on the advantages of excellent development foundation, environmental protection policy, and good business environment, cities in eastern and coastal areas

can integrate with traditional industries and promote the diffusion of the digital low-carb sharing business model through the digital infrastructure of smart cities in strategic planning, so as to realize the nonlinear feature of increasing marginal effect of smart cities on local LCE and even high-quality economic development. The cities in the central region are adjacent to the eastern region, which has the geographical advantage of further developing LCE. In order to better play the role of SCP, we should actively attract outstanding talents and promote the upgrading end transformation of traditional industries. At the same time, the government should actively learn from the experience of advanced regions, strengthen the shaping of sustainable business environment and build a knowledge sharing system. Affected by topography and location, the western region is relatively backward in economic development, and the advantages of natural resources have not been brought into full play. Then, driven by the dual policies of SCP and western development, we should actively conceive how to better develop and utilize local new energy sources, such as solar energy and wind energy, and devote ourselves to cultivating characteristic new energy development centres and promoting the development of regional LCE.



FACULTY



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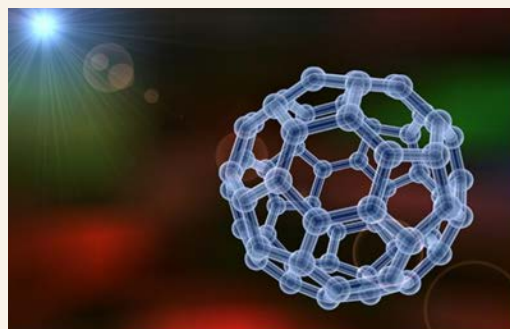
Nanomaterials are attracting a lot of attention of the scientists and technologists on the one hand and on the other hand, both undergraduate and postgraduate students in various universities and institutes.

The shortest and most quoted definition of nanotechnology is the statement by the US National Science and Technology Council (NSTC, 2000) which states: “The essence of nanotechnology is the ability to work at the molecular level, atom by atom, to create large structures with fundamentally new molecular organization. The aim is to exploit these properties by gaining control of structures and devices at atomic, molecular, and supramolecular levels and to learn to efficiently manufacture and use these devices”. In short nanotechnology is the ability to

build micro and macro materials and products with atomic precision.

The promise and essence of the nanoscale technology is based on the demonstrated fact that materials at the nanoscale have properties (i.e. mechanical, optical, chemical, and electrical, etc.) quite different than the bulk materials. Compared to bulk materials, it is demonstrated that nano materials possess enhanced performance properties which can be best described using photonics.

Photonics is a key to many important nanotechnological devices and structures and is used extensively in their fabrication. Photonics and nanotechnology interact in contributing to a large number of important applications such as optical couplers, solar cells, light emitting diodes (LED), diode lasers, and photodetectors. Thus, photonics is an important supporting area that will enable the promise of nanotechnology to be fulfilled.





Nanotechnology is still in the early stages of development. Some commercially developed products have reached the marketplace, but most of the work is still in experimental laboratories. Nanodevices are still relatively expensive and require extensive effort to produce.

Many technologies support the development of nanotechnology. These include microscopy, chemical vapor deposition, wet chemistry, and materials science, among others. Photonics also supports and promotes the development of nanotechnology. In particular, photonics allows nanodevices to be fabricated more rapidly and at less expense.

Photonic techniques are also valuable for characterizing the properties of nanomaterials. Because of these facts, we say that photonics enables nanotechnology. Basically, the laws of physics should not change as the sizes of the materials. But in the early 20th century, as the atomic nature of matter became known, scientists came to realize that the classical laws of motion were not adequate to explain and predict the motions of subatomic particles. In the first few decades of the 20th century, scientists developed a new branch of mechanics was developed—quantum mechanics—that could be used to predict the motion and

interaction of subatomic particles at nanoscale.

Many quantum mechanical phenomenon that are key concept in nanotechnology are wave-particle duality of light and matter, and tunneling. Nanotechnology entails bringing together individual atoms to create useful aggregates. These aggregates are typically atoms of the same element arranged in some nanostructure. The energy level structures of the aggregates or nanostructures are different from the energy level structures of the individual atoms that compose them. In nanotechnology, the main objective is to produce nanostructures whose energy level structures meet the requirements of specific applications. Quantum mechanical also determines *band model of nanomaterials* and useful to obtain the allowed energy levels for some individual atoms in nanostructures. Nanostructures could be manufactured so the difference between those two levels is exactly the energy carried by a photons to produce one of the specific colors (red, green, and yellow). Photonics is also used for fabrication of nanostructures devices that are important in nano

technology using laser interactions with materials. These devices include quantum dots, lasers, nanowires, nanotubes, nanobelts, and quantum wells. The optical features of all these devices have potential applications light sources, photodetectors, displays, optical sensors, quantum computation, etc.

It may be fair to say that characterization may be the most important aspect of photonics-enabling nanotechnology. Photonic devices and techniques are widely used for measuring the properties of nanostructures and characterizing their performance. Techniques used include fluorescence, photoluminescence, optical spectroscopy, two-photon excitation of nanostructures, and Raman spectroscopy.

We have so far considered how photonics enables and supports nanotechnology. There is an another side of photonics in nanotechnology known as *Photonics and Nanotechnology Joint Ventures*. The joint interaction of photonics and nanotechnology, in which nanotechnology improves the devices and techniques of photonics and in which photonics supports nanotechnology by utilizing nanostructures known as interaction nanophotonics.

These discussions show how photonics is important in nanotechnology to describe their fundamental physical, optical, electrical properties, fabricate, and characterize various nanostructures.





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The metaverse is a persistent, online, three-dimensional environment that integrates numerous virtual spaces. It can be compared to a future version of the internet. Users will be able to collaborate, meet, play games, and socialise in these 3D environments thanks to the metaverse. The metaverse isn't fully in existence, but some platforms contain metaverse-like elements. Video games currently provide the closest metaverse experience on offer. Developers have pushed the boundaries of what a game is through hosting in-game events and creating virtual economies. Although not required, cryptocurrencies can be a great fit for a metaverse. They allow for

creating a digital economy with different types of utility tokens and virtual collectibles (NFTs).

The metaverse would also benefit from the use of crypto wallets, such as Trust Wallet and MetaMask. Also, blockchain technology can provide transparent and reliable governance systems. Blockchain, metaverse-like applications already exist and provide people with liveable incomes. Axie Infinity is one play-to-earn game that many users play to support their income. SecondLive and Decentraland are other examples of successfully mixing the blockchain world and virtual reality apps. When we look to the future, big tech giants are trying to lead the way. However, the decentralized aspects of the blockchain industry are letting smaller players participate in the metaverse's development as well. This review aims to define the

4 types of the metaverse and to explain the potential and limitations of its educational applications. The metaverse roadmap categorizes the metaverse into 4 types: augmented reality, lifelogging, mirror world, and virtual reality.

An example of the application of augmented reality in medical education would be an augmented reality T-shirt that allows students to examine the inside of the human body as an anatomy lab. Furthermore, a research team in a hospital in Seoul developed a spinal surgery platform that applied augmented reality technology. The potential of the metaverse as a new educational environment is suggested to be as follows: a space for new social communication; a higher degree of freedom to create and share; and the provision of new experiences and high immersion through virtualization. Some of its limitations may be weaker social connections and the possibility of privacy impingement; the commission of various crimes due to the virtual space and anonymity of the metaverse; and maladaptation to the real world for

students whose identity has not been established.

The metaverse is predicted to change our daily life and economy beyond the realm of games and entertainment. The metaverse has infinite potential as a new social communication space. The following future tasks are suggested for the educational use of the metaverse: first, teachers should carefully analyze how students understand the metaverse; second, teachers should design classes for students to solve problems or perform projects cooperatively and creatively; third, educational metaverse platforms should be developed that prevent misuse of student data. The characteristics of 4 types of the metaverse, the possibility of educational applications, the convergence and complex characteristics of the types of the metaverse, and the potential and

limitations of the metaverse for educational applications were described. The metaverse is predicted to change our daily life and economy beyond the realm of games and entertainment. Furthermore, all social, cultural, and economic activities are moving to the metaverse's new platform. The metaverse has infinite potential as a new social communication space. It provides a high degree of freedom for creation and sharing and provides a unique and immersive experience.

Since the metaverse is expected to grow rapidly during and after the COVID-19 pandemic, it also has risk factors that do not have appropriate regulations. The following are suggested as future tasks for the educational use of the metaverse. First, it is necessary to carefully analyze how students understand the metaverse, what they want to do there, why they like it, and what value they attach to their avatar in virtual reality. It is necessary to study students' activity patterns, level of immersion in the metaverse, and its positive and negative effects on students' learning activities.

Second, an effective and attractive aspect of the metaverse is that it allows us to experience events that would be impossible or limited in the real world.

However, there is room for uncritically accepting the intentions of content developers or service designers rather than students' cognitive abilities and imagination.

Therefore, instructional designers and instructors who want to utilize the metaverse for education need to properly understand each type of metaverse's technical characteristics and design classes so that they can solve problems or perform projects collaboratively and creatively. Third, developing an educational metaverse platform to prevent the misuse of student data is required. Evaluation studies on data collection to support teaching and learning are also required.





**ALUMNI**

# SEMICONDUCTORS: THE WIRES TO WIRELESS COMMUNICATION.

*“Two roads diverged in a wood and I – I took the one less travelled by, and that has made all the difference” – Robert Frost.*

Usually, the trend for any engineering student in electrical engineering trade is to enter the IT industry in an MNC and become a software developer. No harm in that, as this trend is ever increasing since the dot com boom in 2000's and has become an economically successful and a mutually supportive ecosystem. Perhaps that's why the IT service industry of India is well developed and generating maximum jobs.

However, the question is: is it sufficient in order to develop our nation? India is an agrarian nation and many experts argue that to get an exponential growth one should focus on this sector. As per market study, following are the booming technology domains: Medical, Electric Vehicle, IoT, ADAS, 5G (and beyond).

To enhance these, we need something which is manufactured within the nation and along with that a skilled workforce to cultivate this ecosystem. They all will definitely run software which requires even more efficient and robust hardware support, that is where semiconductor (VLSI chip) plays an important role.

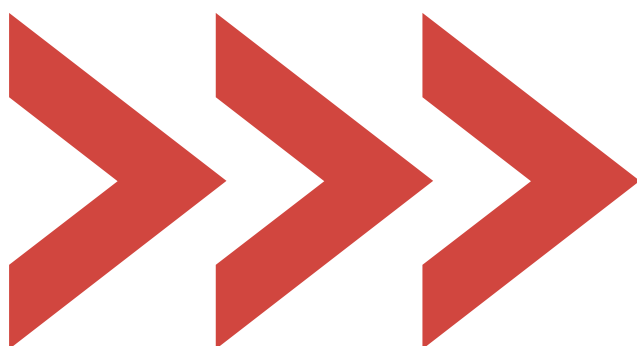


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## **Semiconductors in communication:**

The combination of communication & VLSI, creates a niche level of expertise. Most of the cream jobs in communication are system level design & development, R&D standardisation, etc. which often requires a background of Masters in communication or at least a specialisation which takes a deep dive. A VLSI Skilled fresher can however gain entry in ASIC design or at least FPGA design.



### **FPGA: the MCU killer.**

Field programmable gate arrays are like the Lego blocks of electronics world.

It has all the resources available for designing a digital system, namely LUTs

which are like RAM's whose outputs can be mapped to truth tables of logic gates using the address lines. One can even program an FPGA to function as a processor and with the entry of RISC V, an open-source ISA, it has made it more convenient to design any system.

FPGA were only utilised earlier for complex embedded system development mostly in research and for prototyping an ASIC in the industry as it helps in its validation and emulation.

However recently FPGA has replaced the microcontroller/microprocessors and in some cases the DSP, as the central device in many space, defence and industrial applications, as it provides the performance akin to an ASIC and has shorter time to market too. That's why, in the recent years, many VLSI giants like Intel, Microchip, & recently AMD have acquired FPGA firms like Altera, Microsemi, Xilinx respectively.

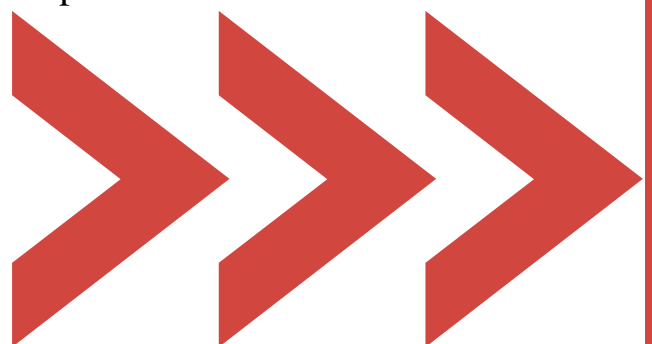
A fresher can easily gain entry into FPGA design role and this can also serve as jumping platform after gaining experience to enter an ASIC RTL (frontend) design role, or even validation/verification roles.

### **The RISC V Catalyst:**

RISCV is an Instruction set architecture developed by UC Berkeley way back in 2010s and it is now a hot topic in industry. RISCV is often quoted as the linux for Hardware. This Processor ISA has saved millions in licensing money for many startups who have adopted this as the processor architecture. Some startups like EDGE Q who have developed a Base station SoC, have utilised RISCV as their processor architecture. Knowledge about RISC V and even having a small project developed on the base integer set RV32-I will be a good add-on to any fresher's profile.

### **India's Indigenous 5G testbed:**

The 5G testbed is a collaborative project undertaken by various IITs, IISc, CEWiT and SAMEER. An end-to-end 5G system which is basically a small 5G infrastructure, and helps start-ups in India to procure validated IPs from the repository as well as utilise the entire system or a component from the system to test and validate their own system. This project has created skilled human resource in communication system development.



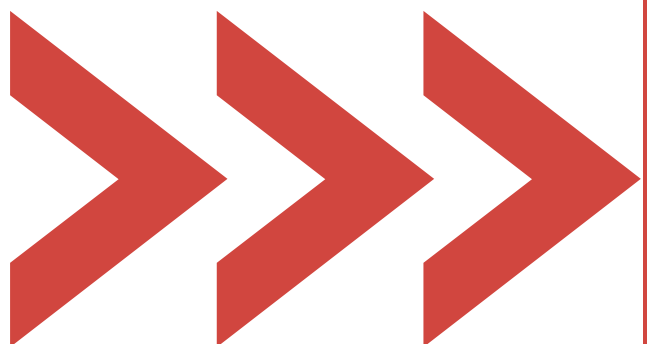
**How to enter:**

Contrary to popular opinion that there are no jobs in electronics core sector, there infact a lack of skilled professionals. The hub for this is our India's very own Silicon Valley i.e., Bengaluru. This industry has arms extended in other cities too like Delhi NCR, Hyderabad, Chennai and Pune.

Students should focus on basic subjects taught to them: Digital Design, Electronic devices and circuits, etc. along with skills in Verilog/VHDL, C, C++, scripting in shell, Perl, python, developing projects using Verilog, FPGA, etc. & maintain a GitHub page. GitHub is like the new age resume and is more impactful in showcasing skills.

**Conclusion:**

The semiconductor field is constantly upgrading, in future, technology may reach to quantum/electron level dimensions, making it more challenging. That is why one should constantly upgrade their skills to sustain. Nevertheless, working in areas overlapping in 5G/communication and semiconductor, VLSI Design skills is promising and will ensure multiple folds of professional growth.



# METaverse

What is Metaverse? Why would one use it? Is it even something that was asked for? How do we access it now? These are few questions that we will try to go through.

To be really honest for me to explain what is metaverse and for you to visualize all these things its going to be really tricky as it is similar to asking someone in the 1970s to log on to the internet when there was no such thing called as Internet.

## WHAT IS METAVERSE?

The easiest way to understand this is by taking help of an example of technology that we use today and to look at how things might change in future. During the pandemic period many of us got introduced to Zoom, Meet/other video conferencing applications. You see your classmates/colleagues in small boxes appearing on your screen with their video feed. Now imagine instead of that you are in a 3D environment where you can interact with all of them OR imagine that you are in an astronomy class where you are learning about planets and stars.



**VIGNESH V IYER**

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You can now fully immerse yourself in the solar system as if you were actually physically present there OR imagine that you want to attend a concert in 3D.

All of these are examples of how experiences become much more immersive and richer in the metaverse. Now you might be wondering where did this word METAVERSE even come from.

## ORIGIN

It is a combination of two words, META – which in Greek stands for next or beyond and UNIVERSE. So basically, Metaverse means beyond or the next universe.



## **PROBLEM METAVERSE AIMS TO SOLVE**

In case of technology in general, the basic rule of thumb or yardstick to gauge the impact of a new technology is that it should be at least 10x better than the existing technology. The problem that metaverse attempts to solve is when you meet and collaborate with others on the internet it just doesn't feel that personal. That is exactly the reason why people travel nearly half way around the world for a one-hour business meeting and if you have a look at the last two years in spite of having all of the current technology like mobile phones/laptops/tablets etc. that claim to connect us we all still feel so isolated. The reason many of us still prefer meeting in person is because you can see all of the facial expression, read the body language, hear the tone of the voice which the metaverse aims to replicate as much of this as possible so when you meet in a 3D digital environment you get a similar experience. Today when you play video games, you are typically in front of the screen or maybe on your phone. With metaverse you would be using VR/AR goggles, maybe you have haptic gloves so that you can interact with objects in this 3D space.

Metaverse aims to make everything much more lifelike and more realistic.

## **HOW TO ACCESS IT?**

Today you already have some metaverse experiences. Facebook as an example has a line of product called Horizon which allows you to meet others in a highly immersive 3D world. Microsoft has Mesh for Microsoft teams. In a sense all of these are already the metaverse but overtime all of these experiences will become even richer and even more immersive. You are most likely to experience these using VR goggles.

## **BENEFITS**

Companies like Meta (previously known as Facebook), Microsoft, Epic games have already started heavily investing in Metaverse. For consumers, we will have a more life like meeting experience which will hopefully cut down on commute time. It might also cut down on the business traveling that we have to do which will be a net profit for the planet. Most importantly this will generate millions of jobs, after all you need someone to build this 3D world. You might also have people offering services within this 3D world.

## CHALLENGES

Battery life is going to be a serious concern on the devices that will be used to tap into this 3D digital world. Also, it would be challenging for someone who is using a VR goggle to keep it on for hours at a time. Aside from all these hardware concerns there is also a concern of privacy. Meta is one of the leading companies pushing for Metaverse and it is well known how much user data they already capture to track user habits. Imagine how advertising is going to look like in the metaverse. Its probably going to be more aggressive; not to mention the potential for bullying and harassment which happens online even nowadays. Lastly, there is also the cost factor to manufacture and maintain these high-tech goggles, sensors and haptics and probably only a small amount of people would be able to afford it at least initially.

## FUTURE

Mark Zuckerberg from Meta, the parent company of Facebook has already invested substantially in Metaverse, the dedication for which can be already seen in the name change of the Company.

He has been betting hard on Metaverse for the future of the Company and will continue to invest heavily in future to develop this technology. There is a high possibility that we would be able to have interactive meetings in the metaverse right from the messenger app. All in all, Metaverse is still at least a decade away. There is still a lot of advancement that needs to happen on the hardware and on the software side of things. How would the experience be in the Metaverse – only time will tell.

Best Regards,

Vignesh Iyer

EXTC-A, BATCH OF 2017



# INDUSTRY

# INTO THE METAVERSE: A SNEAK PEEK INTO THE FUTURE OF EVERYTHING!

**NINAD CHHAYA**  
GoPhygital



You've probably heard a lot about the concept of a digital universe in the last few months, and the reason you've heard so much about it is because of Facebook's October 2021 announcement, in which CEO Mark Zuckerberg showcased the company's next vision towards investing billions of dollars over the years to come into this space. He even declared back then that to focus on this vision of the future, the company is changing its name to Meta.

Yes, we are talking about the "Metaverse". The word "Metaverse" is a combination of "meta" (meaning beyond) and "universe". A basic understanding is that the metaverse consists of an infinite number of digitally connected habitats populated by avatars of real people, who work, play, and socialize together. People will be able to access the metaverse whenever they want and wherever they

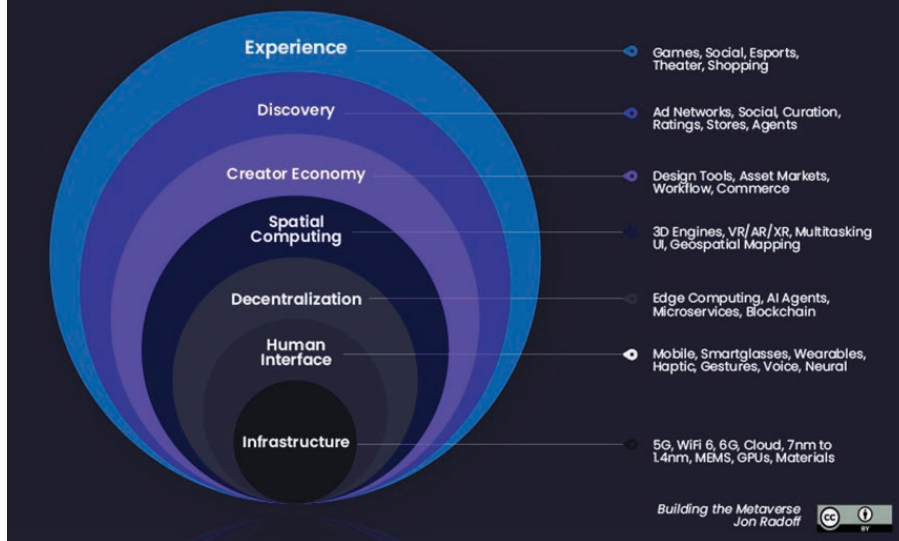
are, thanks to emerging technologies such as Augmented Reality (AR), Virtual Reality (VR), spatial computing, 5G, and blockchain.

## **SO WHY IS THERE SO MUCH HYPE AROUND THE METAVERSE AND WHY ARE PEOPLE AND BRANDS INVESTING MILLIONS OF DOLLARS INTO IT?**

To understand the potential that the Metaverse holds in the near as well as the distant future, we need to take a journey back into the not-so-distant past, around the time the Internet was introduced to the masses.

In the past, Web 1.0 introduced us to the internet and a world of connected information. Jump to the present, Web 2.0 enhanced the internet and introduced us to a world of connected people, or in other words, the social media network as we know it today. The future, Web 3.0 will

## The Seven Layers of the Metaverse



The images shown give an overview of the building blocks of the Metaverse along with the 7 Layers that form the Metaverse.

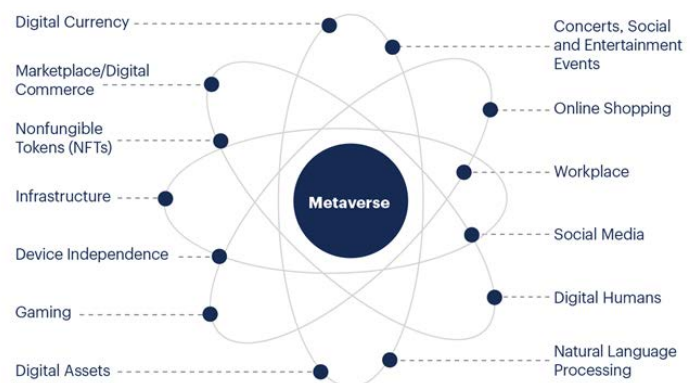
introduce us to a world that connects people, places, things, and experiences.

In short, the Metaverse is not just a particular technology or platform, it is going to be an immersive and interactive experience comprising of a combination/ a confluence of multiple platforms and technologies as mentioned above, along with trends (sports, gaming, entertainment, fashion, commerce, etc) and user behaviour (social interaction, content creation, collaboration, etc) all set in a Phygital environment on a secure, decentralized blockchain platform.

In other words, the Metaverse is going to be an immersive, interactive, and decentralized form of the internet as we know it today that will be accessible to all

and not controlled by a few big tech companies.

## Elements of a Metaverse



**gartner.com**

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**Gartner**

To help you get a better perspective of the metaverse and its potential, I recommend watching movies such as “The Matrix” or “Ready Player One”.

If movies are not your thing and you want to experience the Metaverse in action, I





recommend you try out “Rec Room”, which recently hit 3 million monthly active users. You see, for a universe that doesn’t exist yet, at least as demonstrated by Hollywood movies and Meta, the metaverse is surprisingly real. In its full glory, the metaverse will introduce full-fledged virtual economies, complete with property ownership, offices spaces, travel destinations, social events, and so much more.

In fact, according to various industry reports, **the Metaverse economy could be an \$8 trillion to \$13 trillion total addressable market by 2030.**

Today’s organizations / businesses,

especially brands that see customer experiences as a huge competitive advantage, should consider exploring the metaverse and the possibilities it can deliver. Recently, Sony and Lego signalled their interest in the metaverse by investing \$2 billion into Epic Games, the creators of Fortnite and Unreal Engine.

Organizations and brands globally are already making inroads in building Metaverse experiences for their audiences across the ecosystems. The images below show the various companies already investing across the Metaverse ecosystem; be it building the foundation and tools of the Metaverse or the experiences.

## The companies building each layer of the metaverse

### Infrastructure (network & computing)

#### Chips & processors



#### 5G & low latency networks



#### Cloud infrastructure



#### Edge infrastructure



### Access/interface (hardware)

#### Haptics



#### Headsets (VR)



#### Holographics



#### Smart glasses (AR)



### Virtualization tools

#### 3D design engines



#### 3D modeling & capture



#### AR development kits



#### Avatar development



#### Volumetric video



### Virtual worlds

#### Centralized worlds



#### Decentralized worlds



### Economic infrastructure

#### Payments



#### Crypto exchanges



#### Crypto wallets



#### NFT marketplaces



### Experiences

#### Gaming



#### Virtual concerts



#### Virtual fashion



#### Virtual real estate



#### Virtual work



#### Other





This is just the beginning... and what we are seeing and experiencing so far in the Metaverse is just the tip of the iceberg. It would be interesting to explore what the future of the Metaverse holds for us.... But that's an article for another day!

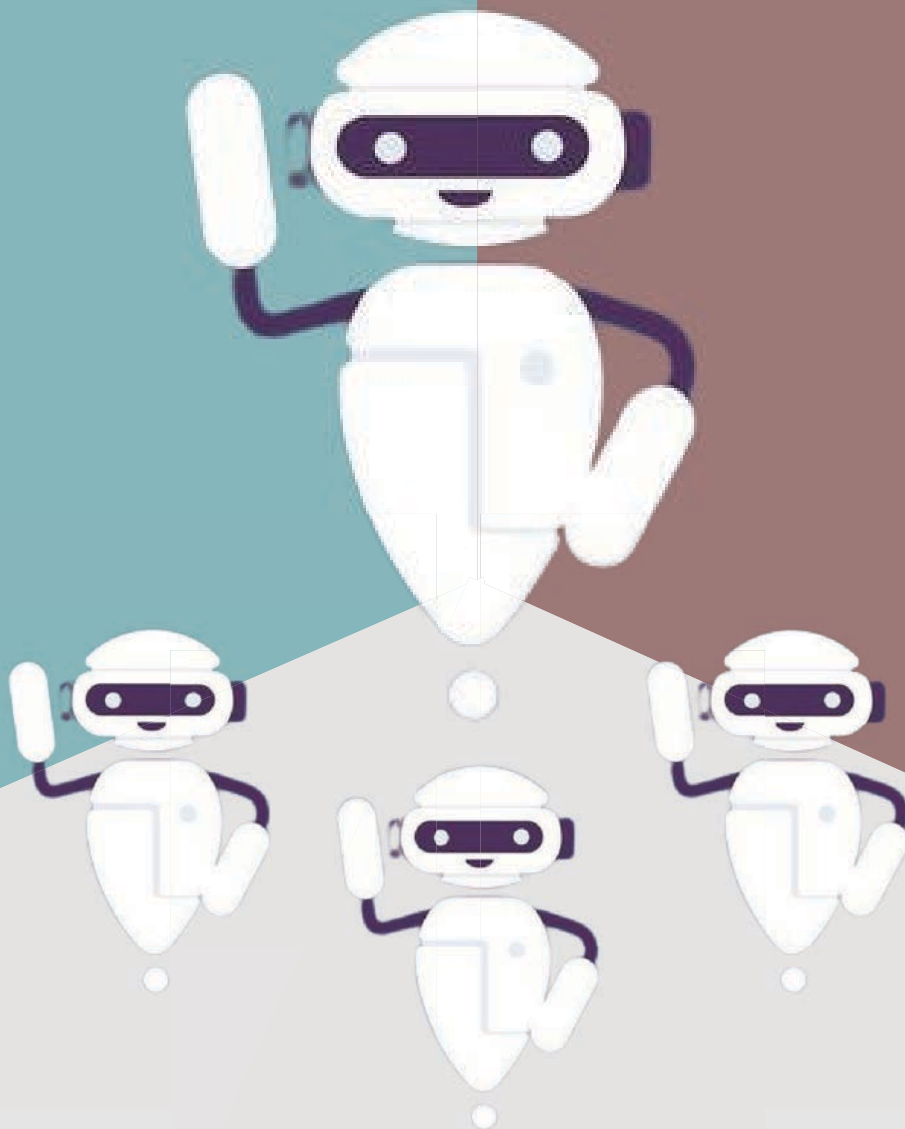
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## ABOUT THE AUTHOR

Ninad has been in the gaming industry for 25 years now and has been building solutions for the Metaverse for almost a decade. He regularly speaks at conferences and events on Gaming, AR, VR, Metaverse etc and often shares his thoughts on these topics in various articles, interviews, podcasts, and the social media. In his spare time, Ninad likes to watch movies, read comics, books, play video games and explore new tech trends like AR/VR etc.

He is currently the Chief Metaverse Officer of GoPhygital, a Metaverse and Web3 focused startup.

# PARENT ARTICLES





# DIGITAL TWIN IN IOT

Digital twins are rapidly emerging as an important strategic accelerator for digital transformation, unleashing the potential hidden in the data generated by the Internet of Things (IoT). In this article, you'll learn everything you need to know about Digital twins. Let's start:



## **The definition of “digital twin”**

In simple words, a digital twin represents any physical object in

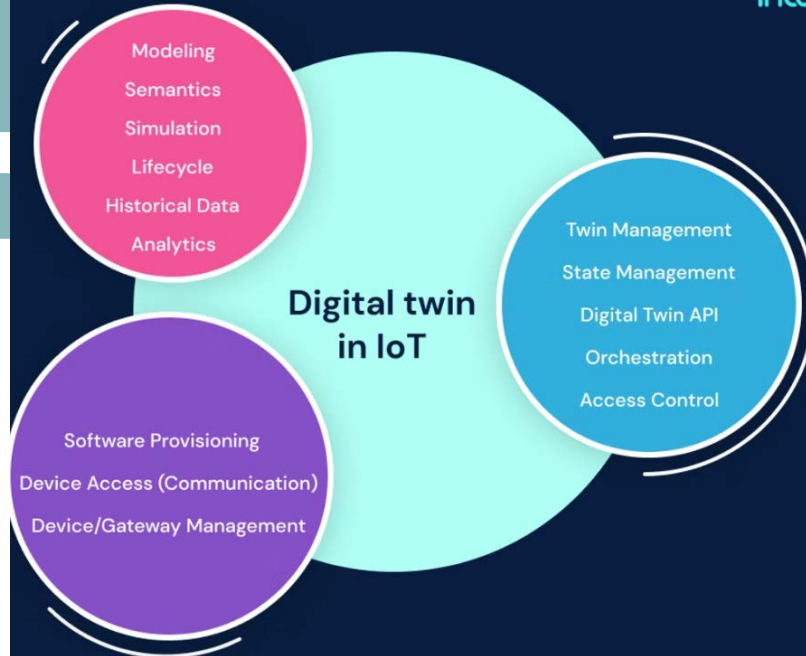
a digital form. A replica of the original device. It is commonly used in IT by data scientists and analysts who want to perform simulations before designing and deploying real devices. Digital twin technology was first applied in the manufacturing industry but is now widespread in a wider variety of areas, such as the Internet of Things (IoT). This concept has also become useful in data analysis and artificial intelligence technology.



**SURESH JAISWAR**  
BARC

Digital twins are based on the concept that large objects and products need to be modeled and manufactured on a large scale in small versions in advance. This allows you to detect problems or issues that occur later in this phase. In this way, manufacturers can reduce the losses that can occur if these errors are not detected and corrected in a timely manner. Today, the concept is expanding exponentially, including even more important things such as buildings, factories, and other facilities.





## THE IMPORTANCE OF A DIGITAL TWIN IN IOT

Before we look into the relationship between the two, let us first understand what IoT actually is.

The Internet of Things (IoT) represents a network of the Internet and/or interconnected physical objects (“things”) that can collect and transmit data over the network without human intervention.

Clearly, the rise of IoT sensors is partly responsible for making digital twins possible. As IoT devices are refined, digital twin scenarios can involve smaller and less complicated objects.

### DIGITAL TWINS HELP IOT SYSTEMS IN THE FOLLOWING WAYS:

#### 1. Status of the device

Since the internet connects all the devices and machines in the IoT, digital twins help us determine how

they work in real-time. This makes it much easier and faster to access information about the patient's condition. This is an advantage in areas such as patient care.

#### 2. Documentation & communication

Each machine has its own unique behaviors and processes. Creating a digital twin model will help you better understand these behaviors and properly document this information. Don't rely on physical records!

#### 3. Measurement of different outcome

You can use a digital twin model of a machine or device to measure different possible outcomes of the process by changing the input variables. In this way, the digital twin model helps to estimate the data in the IoT product development system without wasting time and money.

# METaverse IN TODAY'S WORLD!



**DR. SUHAS RAO**

Consultant HR & L&D at  
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Conversations with Tech Stalwarts like Mark Zuckerberg [Facebook /Meta Platforms] & Satya Nadella [Microsoft] endorse Metaverse to be the future of the internet era. But still it is difficult to propound the theory of metaverse till well researched and proved. Ambiguity prevails with relating it with Zoom/Video Games etc. vaguely. Facebook has transitioned to Meta and associates with the Virtual Reality Social Platform whereas some others use it for facilitating user generated video games. There are others who connect it with NFTs (No Further Text). More and more organisations with a strong digital presence are lobbying with the concept of the virtual tick- metaverse to gain financially.

The word 'metaverse' often tends to replace cyberspace significantly. Metaverse cascades to adoption of various technological types rather than any one selective or specific type making it more and more speculative

in today's world. It sometimes overlaps with e-use of Virtual Reality and Augmented Reality. Some organisations even envision it with the digital economy and are using it for creating, buying and selling of virtual goods. But nevertheless, it is a complex digital phenomenon. the concept of being in a virtual avatar or world which is in fact challenging the physical world has come into normal parlance. Millions of users are hooked to the concept of metaverse or the centralised virtual world. Words like digital ownership have started appearing in vogue and sound very trendy and fashionable to the tech nerds. For the very young the expectation would be to accept that their lives are going to be governed by the metaverse and for us we are transitioning into this digital wilderness-metaverse. Most of the times the promise of the metaverse is to allow a greater overlap.



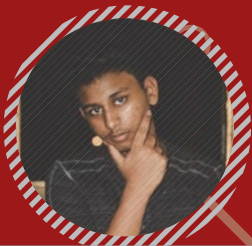
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**We take immense pleasure in presenting before you, Abhivarg 6.2. The magazine isn't just a drop in the ocean, it's another milestone for the years down the lane and years to come. We rest assured that we have strived to maintain the dignity and the pride of the magazine.**

**We would like to place on record our gratitude to the Chairman, Trustees, and CEOs of the Thakur Educational Group. We profusely thank our principal, Dr. B.K. Mishra, our vice principal, Dr. Deven Shah and Dean (SSW), and Dr. Lochan Jolly for their constant support and encouragement. We take this opportunity to express our gratitude towards everyone associated with the magazine's publication. We are grateful to all our esteemed professors, especially our Faculty In-charge, Mrs. Sukruti Kaulgud for her support and guidance.**

**As the Abhivarg magazine passes yet another edition, a heart-warming thanks to all the people who bestowed us with their support, many authors who gave way to this magazine by yielding their magnificent research work and the roof of it all, our readers for their ceaseless support.**

**-Team ABHIVARG**



