



**COMPUTER SCIENCE &  
ENGINEERING**

# TECH VIGNAN

- ♦ **PROGRAMMING**
- ♦ **TECHNICAL**
- ♦ **COMMUNICATION**
- ♦ **ANALYTICAL**

# **About us**

## **Vision**

To become a center of excellence in computer science education and research by imparting students with latest technical skills through high quality teaching methodologies supplemented with practical orientation to face the challenges in the field of computer science and engineering for the benefit of the society.

## **Mission**

- To educate and train next generation computer professionals with strong theoretical and practical foundations in computer science discipline
- To amplify the hidden technical skills in the graduates by cultivating research and apply attitude in the field of computer science and engineering.
- To instill value-based professional behavior and strong ethical morals in the graduates and motivate them to apply their knowledge to the benefit of the society.





# Our Team

**Edited by**  
**Coordinated by**  
**Supported by**

## **Faculty Team**

Dr. K. Madhavi, Professor, Dept. of C.S.E.,  
Mr. G. Pradeep Reddy, Assistant Professor (Adhoc), Dept. of C.S.E.

## **Student Team**

Mr. Deepak Reddy  
Mr. K. Harsha Vardhan  
Mr. N. Narasimha  
Mr. J. Visweswara

**Designed by**

**Department of Computer  
Science & Engineering**



# Prof. P. Chenna Reddy

## Professor & principal

### MESSAGE

I am very happy to see that the department of CSE is organizing a student club by name "TechVignan". It gives me immense pleasure to appreciate this laudable initiative taken up by the department of CSE. I hope this fabulous club will motivate the students to learn Programming Skills with enthusiasm. It will also keep them aware of the various methods of solving Programming Problems in different perceptions. I hope this event moulds our students to face the Campus Interviews by enriching their technical and personal skills. I am sure that this platform will encourage the students of JNTUACEA and motivate them forward and contribute for their career development. I wish all the success to the TechVignan.



# Prof. S. Vasundara

## Professor & Vice Principal

### MESSAGE

TechVignan has been running successfully since 2012. Students are able to learn the importance of communication skills, administrative skills and event management skills. Further, the club has also been boosting the technical competitiveness of the students in various programming languages. I wish the Programming Club to reach good heights.



# Dr. K. F. Bharathi

## HEAD OF THE DEPARTMENT COMPUTER SCIENCE & ENGINEERING

### MESSAGE

TechVignan events are playing a vital role in the techie's life. It's a wonderful platform to create ideas and innovations for startups. Now a day's most of the techies are interested to create jobs with startups. You will get lot of fun, knowledge, exposure and good friends from these events. I am sure that TechVignan will help every student achieve their dreams. All the best!



# Prof. K. Madhavi

## Professor

### MESSAGE

TechVignan is an excellent opportunity to learn things through various activities. I hope these kinds of events help the students to gain more knowledge and in turn help them get better placements. I appreciate the team behind TechVignan's success. A quiz competition is one of the most exciting and entertaining events, which helps the students to gain knowledge and also gives them a chance to interact with other students.

I express my gratitude to the management for the opportunity to be part of the magazine and thankful to all the staff and students of the CSE department for their contributions to the making "TechVignan" and I hope to build on this ethos just as much during the upcoming academic years.



# CYBER SECURITY



**K.HARSHA VARDHAN**

Cyber security encompasses a broad range of practices, tools, and concepts related closely to those of information and operational technology (OT) security. Cyber security is distinctive in its inclusion of the offensive use of information technology to attack adversaries. The use of the term “cyber security” as a key challenge and a synonym for information security or IT security confuses customers and security practitioners and obscures critical differences between these disciplines.

## INTRODUCTION

Cyber Security is a process that's designed to protect networks and devices from external threats. Businesses typically employ Cyber Security professionals to protect their confidential information, maintain employee productivity, and enhance customer confidence in products and services. The main element of Cyber Security is the use of authentication mechanisms. For example, a user name identifies an account that a user wants to access, while a password is a mechanism that proves the user is who he claims to be.

## TYPES OF CYBER CRIMES

Cybercrime is any unauthorized activity involving a computer, device, or network. The three types are computer-assisted crimes, crimes where the computer itself is a target, and crimes where the computer is incidental to the crime rather than directly related to it. Cybercriminals usually try to profit off of their crimes using a variety of tactics, including:

- **Denial of Service or DOS:** Where a hacker consumes all of a server's resources, so there's nothing for legitimate users to access.
- **Malware:** Where victims are hit with a worm or virus that renders their devices useless.
- **Man in the Middle:** Where a hacker puts himself between a victim's machine and a router to sniff data packets.
- **Phishing:** Where a hacker sends a seemingly legitimate-looking email asking users to disclose personal information.

Other types of cyber attacks include cross-site scripting attacks, password attacks, eavesdropping attacks (which can also be physical), SQL injection attacks, and birthday attacks based on algorithm functions.

### WHO ARE CYBER SECURITY EXPERTS?

So, what do Cyber Security experts actually do? On any given day, they:

- Find, test, and repair weaknesses within a company's infrastructure
- Monitor systems for malicious content
- Identify network breaches
- Install regular software updates, firewalls, and antivirus protection
- Strengthen areas where attacks may have occurred

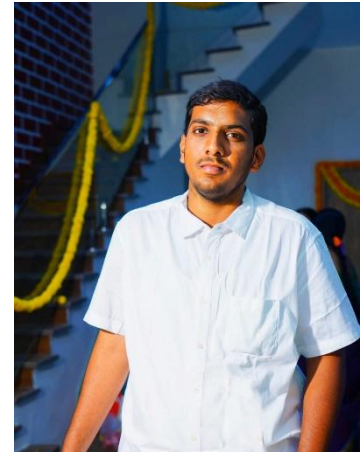


Cyber Security experts employ different tactics to secure computer systems and networks. Some of the best practices include:

- Using two-way authentication
- Securing passwords
- Installing regular updates
- Running antivirus software
- Using firewalls to disable unwanted services
- Avoiding phishing scams
- Employing cryptography, or encryption
- Securing domain name servers, or DNS

Cyber Security is one of the most important aspects of the fast-paced growing digital world. The threats of it are hard to deny, so it is crucial to learn how to defend against them and teach others how to do it too.

# NEURALINK CHIP



**DEEPAK REDDY**

Neuralink is a Tech company that was focused on researching and developing products for brain interface devices. The main goal of the company is to develop devices for physically disabled people so that they can do their daily activities through a device that is connected to their brains. It is focused on building devices now that will help people with paralysis and inventing new technologies that will expand our abilities. Elon Musk is the CEO of the company Neuralink.

## INTRODUCTION

Elon Musk's ambitious project of connecting the human brain to the internet to help control machines is almost at the stage of being released for commercial use. Neuralink is a device that will be surgically implanted into your brain and with it, you'll be able to communicate with machines and even control them. It will also help study the electrical signals in the brain and arrive at solutions that can help cure various medical problems.

## HOW DOES NEURALINK WORK?

Have you seen the Hollywood action flick The Matrix? Remember the scene where Neo (played by Keanu Reeves) learns martial arts just by loading a computer program into his brain? Neuralink might not be able to teach you martial arts but it will be able to send and receive electrical signals through your brain to control machines. Right now, the company has said that you will be able to control basic devices like your smartphone, computer, and maybe even type using thoughts. In order to understand how Neuralink works you must understand that your brain sends information to different parts of your body using neurons. These neurons in your brain connect with each other to form a large network and communicate using chemical signals called neurotransmitters. This reaction generates an electric field and you can record these reactions by placing electrodes nearby. These electrodes can then understand the electrical signal in your brain and translate them into an algorithm that a machine can read. This way Neuralink will be able to read what you are thinking and find a way for you to talk to machines without even opening your mouth. So no more calling out "OK Google" or "Alexa"



## ADVANTAGES

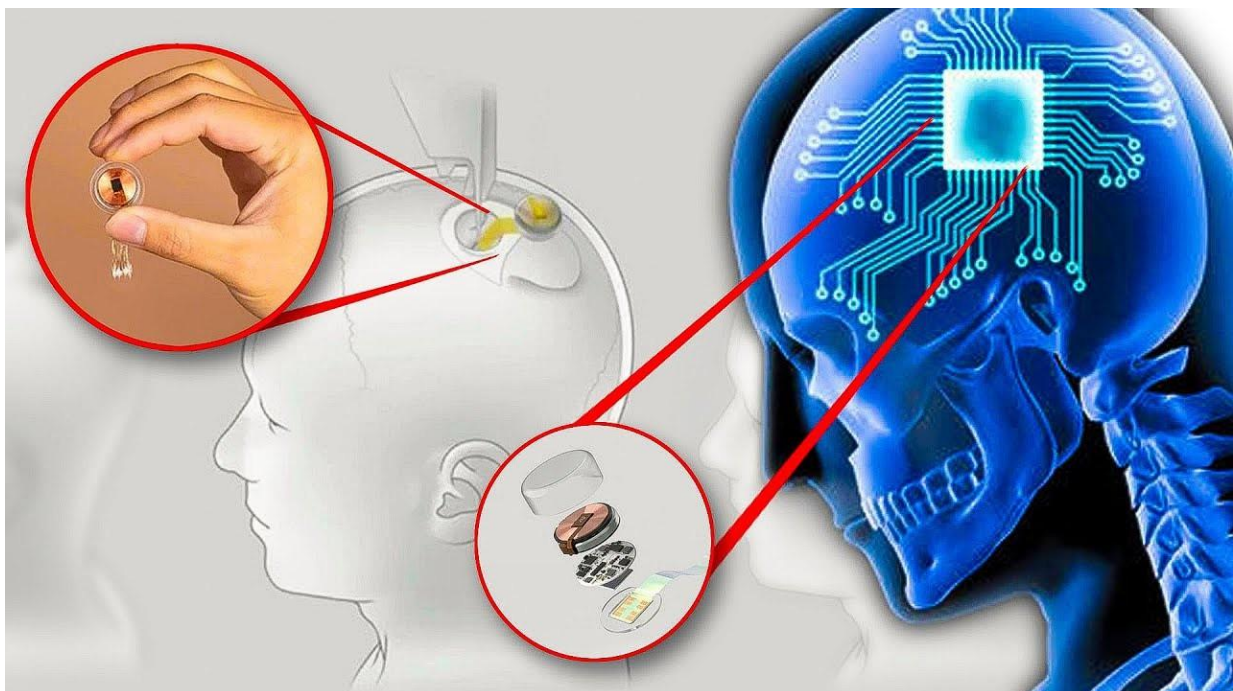
The company said that the initial phase of the project will focus on helping the healthcare industry. The machine will be able to help paraplegics with simple tasks like operating a phone or interacting with a computer. It may also be used to treat epilepsy. In an interview, Elon Musk said that the device will also be able to help regain someone's eyesight even if they have lost their optic nerve. Musk added that Neuralink can also be used to restore the memory, speech, and movement of a paralyzed person.

## INTRESTING POINT

The most recent revelation by the company is about how users will be able to stream music directly into their brains. This will require a hardware call link to be attached to the back of the ear which will directly communicate with the Neuralink to stream music.

## DISADVANTAGES

Neuralink may be the bridge that connects human beings to the next level of artificial intelligence but many people might have reservations on a computer chipset inside their brains. As of now, the technology has not been tested on humans. The first live specimens to have undergone a symbiosis have been a rat and a monkey. There are also concerns that if the device is connected to the internet how will we be protected against hackers who might try to steal data directly from our brains. And what's stopping a person from spying on my thoughts through the device? How long will the device be inside your head?



# MACHINE LEARNING



**ESWAR**

Machine learning enables computers to think, decide and act like humans have been one of the most significant and noteworthy developments in the field of computer science. Machine learning techniques enable a planning system to automatically acquire search control knowledge for different applications. Machine learning refers to a system's ability to acquire, integrate knowledge through large-scale observations, and improve, and extend itself by learning new knowledge rather than by being programmed with that knowledge.

## INTRODUCTION

Machine learning is a type of artificial intelligence that allows software applications to become more accurate at predicting outcomes without being explicitly programmed to do so. Machine learning algorithms use historical data as input to predict new output values. The difference between normal computer software and machine learning is that a human developer hasn't given codes that instruct the system how to react to situations, instead it is being trained by a large number of data.

## TYPES

As the machine learning is the process of learning automatically from data, improve performance from past experiences, and make predictions, Based on the methods and way of learning, machine learning is divided into mainly four types, which are:

**Supervised Learning:** Supervised learning is the type of machine learning in which machines are trained using well "labeled" training data, and on basis of that data, machines predict the output. The labeled data means some input data is already tagged with the correct output.

**Unsupervised Learning:** Unsupervised learning is the type of machine learning in which the machine is trained using the unlabeled dataset, and the machine predicts the output without any supervision. In unsupervised machine learning, the machine is trained using the unlabeled dataset, and the machine predicts the output without any supervision.

**Semi-Supervised Learning:** Semi-Supervised learning is a type of Machine Learning algorithm that lies between Supervised and Unsupervised machine learning. Semi-supervised learning is the middle ground between supervised and unsupervised learning and operates on the data that consists of a few labels, it mostly consists of unlabeled data.

**Reinforcement Learning:** Reinforcement learning is the type of machine learning which it works on a feedback-based process, in which an AI agent (A software component) automatically explore its surrounding by hitting & a trail, taking action, learning from experiences, and improving its performance.

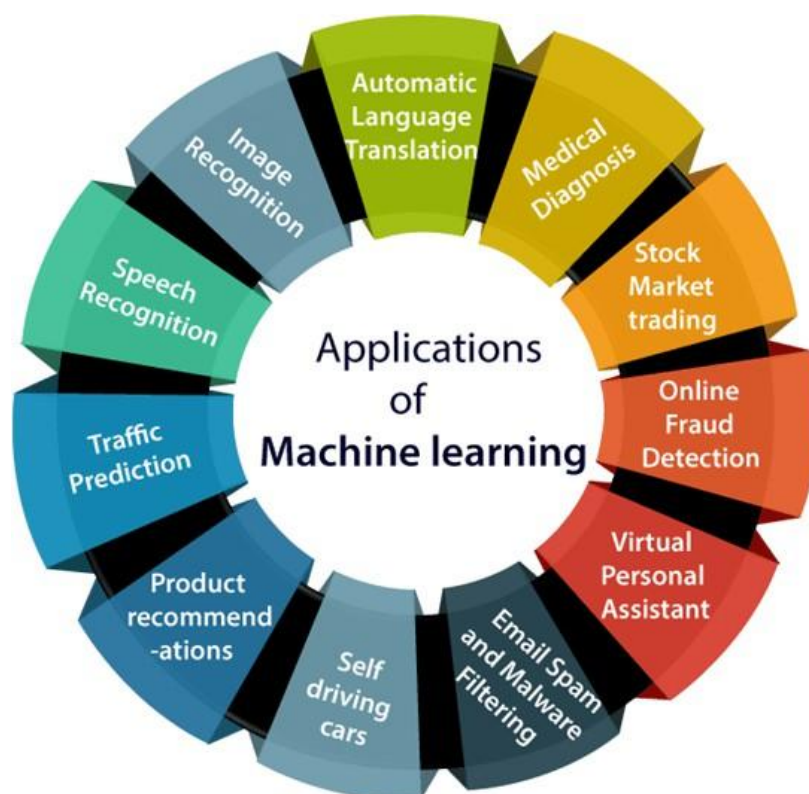
### KEY ELEMENTS

There are three main elements to every machine learning algorithm, and they include:

- **Representation:** what the model looks like; how knowledge is represented
- **Evaluation:** how good models are differentiated; how programs are evaluated
- **Optimization:** how good models are differentiated; how programs are evaluated

### APPLICATIONS

1. **Prediction** —Machine learning can also be used in prediction systems. Considering the loan example, to compute the probability of a fault, the system will need to classify the available data into groups.
2. **Image recognition** —Machine learning can be used for face detection in an image as well. There is a separate category for each person in a database of several people.
3. **Speech Recognition** —It is the translation of spoken words into the text. It is used in voice searches and more. Voice user interfaces include voice dialing, call routing, and appliance control. It can also be used a simple data entry and the preparation of structured documents.
4. **Medical diagnoses** —ML is trained to recognize cancerous tissue





# DATA SCIENCE



**SAWTHIKREDDY**

Data science encompasses a set of principles, problem definitions, algorithms, and processes for extracting nonobvious and useful patterns from large data sets. Many of the elements of data science have been developed in related fields such as machine learning and data mining.

## INTRODUCTION

Data science is the domain of study that deals with vast volumes of data using modern tools and techniques to find unseen patterns, derive meaningful information, and make business decisions. Data science uses complex machine learning algorithms to build predictive models. The data used for analysis can come from many different sources and presented in various formats.

## PREREQUISITES FOR DATA SCIENCE:

**Machine Learning** - Machine learning is the backbone of data science. Data Scientists need to have a solid grasp of ML in addition to basic knowledge of statistics.

**Modeling** - Mathematical models enable you to make quick calculations and predictions based on what you already know about the data. Modeling is also a part of Machine Learning and involves identifying which algorithm is the most suitable to solve a given problem and how to train these models.

**Programming** - Some level of programming is required to execute a successful data science project. The most common programming languages are Python, and R. Python is especially popular because it's easy to learn, and it supports multiple libraries for data science and ML.

## WHAT DOES A DATA SCIENTIST DO?

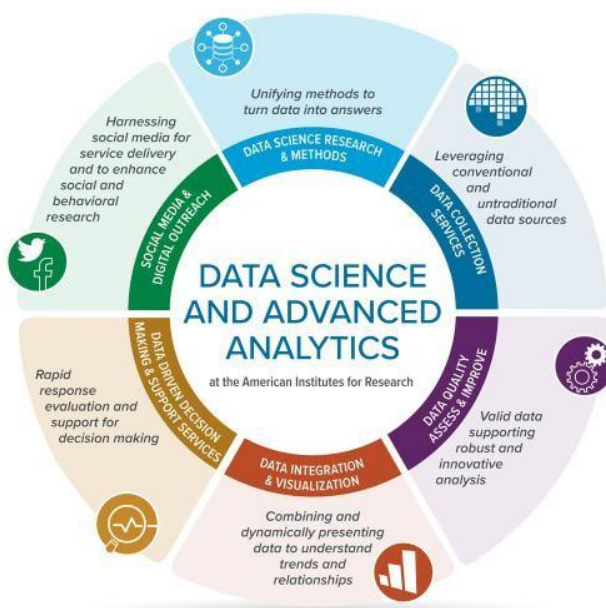
A data scientist analyses business data to extract meaningful insights. In other words, a data scientist solves business problems through a series of steps, including:

- Before tackling the data collection and analysis, the data scientist determines the problem by asking the right questions and gaining understanding.
- The data scientist then determines the correct set of variables and data sets.
- The data scientist gathers structured and unstructured data from many disparate sources—enterprise data, public data, etc.
- Once the data is collected, the data scientist processes the raw data and converts it into a format suitable for analysis. This involves cleaning and validating the data to guarantee uniformity, completeness, and accuracy.
- After the data has been rendered into a usable form, it's fed into the analytic system—an ML algorithm or a statistical model. This is where the data scientists analyze and identify patterns and trends.

## DATA SCIENCE TOOLS:

The data science profession is challenging, but fortunately, there are plenty of tools available to help data scientists succeed at their job.

- **Data Analysis:** SAS, Jupyter, R Studio, MATLAB, Excel, RapidMiner
- **Data Warehousing:** Informatica/ Talend, AWS Redshift
- **Data Visualization:** Jupyter, Tableau, Cognos, RAW
- **Machine Learning:** Spark MLib, Mahout, Azure ML studio





# ETHICAL HACKING



**N YASWANTH**

Hacking is basically expertise in any field. Hackers are classified as per working and as per knowledge. Ethical hackers come under white hat hackers. Ethical hackers use hacking techniques in order to provide security. They are legally authorized, hackers.

## INTRODUCTION

Ethical hacking is to scan vulnerabilities and to find potential threats on a computer or networks. An ethical hacker finds the weak points or loopholes in a computer, web applications or network and reports them to the organization. Ethical hacking involves an authorized attempt to gain unauthorized access to a computer system, application, or data. Carrying out an ethical hack involves duplicating strategies and actions of malicious attackers.

## TYPES OF HACKERS

**White Hat Hackers:** They are authorized as a user to test for bugs in a website or network and report them to them. White hat hackers generally get all the needed information about the application or network to test for, from the organization itself. They use their skills to test it before the website goes live or is attacked by malicious hackers.

**Black Hat Hackers:** They unethically enter inside the website and steal data from the admin panel or manipulate the data. They only focus on themselves and the advantages they will get from personal data for personal financial gain. They can cause major damage to the company by altering the functions which leads to the loss of the company to a much higher extent.

**Grey Hat Hackers:** They sometimes access the data and violate the law. But never have the same intention as Black hat hackers, they often operate for the common good. The main difference is that they exploit vulnerability publicly whereas white hat hackers do it privately for the company.

## TOP TOOLS FOR ETHICAL HACKING

### NMAP (NETWORK MAPPER)

Nmap is basically a network security mapper capable of discovering services and hosts on a network, thereby creating a network map. Used in port scanning, one of the phases in ethical hacking, is the finest hacking tool ever. Primarily a command-line tool, it was then developed for operating systems based on Linux or Unix, and the windows version of Nmap is now available.

### NIKTO

Nikto is a web scanner that scans and tests several web servers for identifying software that is outdated, dangerous CGIs or files, and other problems. It is capable of performing server-specific as well as generic checks and prints by capturing the received cookie.

### AIRCRAK-NG

Wireless network use is rising, so it's becoming more important to keep Wi-Fi secure. Aircrack-Ng offers ethical hackers an array of command-line tools that check and evaluate Wi-Fi network security. Aircrack-Ng is dedicated to activities such as attacking, monitoring, testing, and cracking. The tool supports Windows, OS X, Linux, eComStation, 2Free BSD, NetBSD, OpenBSD, and Solaris.

## ADVANTAGES OF ETHICAL HACKING

- This helps to fight against cyber terrorism and to fight against national security breaches.
- This helps to take preventive action against hackers.
- This helps to build a system that prevents any kind of penetration by hackers.
- This offers security to banking and financial establishments.
- This helps to identify and close the open holes in a computer system or network.

## DISADVANTAGES OF ETHICAL HACKING:

- This may corrupt the files or data of an organization.
- Hiring such professionals will increase costs for the company.
- This technique can harm someone's privacy

# VIRTUAL REALITY



**Praneeth**

Today we are talking about Virtual Reality, a sector that has grown exponentially in recent years and for which numerous applications have been found.

## WHAT IS VIRTUAL REALITY?

Virtual Reality (VR) is a computer-generated environment with scenes and objects that appear to be real, making the user feel they are immersed in their surroundings. This environment is perceived through a device known as Virtual Reality headset or helmet. Virtual Reality is a technology that stimulates vision to end up with a 3D environment in which a user appears to be immersed while browsing through it or experiencing it. The 3D environment is then controlled in all 3D by the user who is experiencing it.

## VIRTUAL REALITY IN EDUCATION

Virtual Reality removes distractions through full immersion and promotes the student's curiosity for further learning. VR is a powerful tool that is being used in the medical field, architectural design, and more. Medical students use VR to study human anatomy and perform virtual surgeries. Virtual Reality gives teachers the ability to adapt learning to technology and improve the level of engagement that students have on a regular basis. It is important that educators provide inspiration and encouragement for students to explore more opportunities and to learn new ways to solve problems. Virtual Reality immerses learners in the virtual world, allowing them to learn effectively and with confidence. Besides this, there are so many ways to use virtual reality in eLearning, and these activities are more like fun. This increases the student motivation to keep on learning.

## THE FUTURE OF VIRTUAL REALITY

Virtual Reality is one of the technologies with the highest projected potential growth. According to the latest forecasts from IDC Research, investment in VR will multiply 21- fold over the next four years. Also, VR technologies will make smartphones smarter, and many more smart tools like VR goggles and VR devices will flood the market. VR would be implemented in medical education, through which the students learn everything more practically than theoretically. With VR, we can enjoy history, which is boring theoretically. We can explore space (from earth), can see the surface of the moon in 3D and much more.

## APPLICATIONS OF VIRTUAL REALITY

Virtual Reality is used in many fields like medicine, architecture, and more. VR is used in gaming to create a real feeling for gamers. It is used in military, health care, fashion designing, business, sports, scientific visualization, entertainment, multimedia, telecommunications, and much more. All this means that Virtual Reality is no longer science fiction. It is integrated into our present and, in the coming years, it will lead to advances that will shape the future





# BLUE BRAIN TECHNOLOGY



**J. Visweswara**

Augmented reality technology has proven to be one of the top innovations opening up new growth points for businesses around the world. Analysts predict that the AR market will reach \$198 billion in 2025. This year, the number of mobile AR users is expected to reach 3.5 billion. Mobile augmented reality has many clear advantages that make it the centre of much of the technology's attention. Many users already own an AR capable smartphone, so there's no need for them to go out of their way to get an expensive and bulky headset. Mobile devices, by their nature, are very portable and easy to bring into nearly any space.

## What Is Augmented Reality?

Augmented reality (AR) is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology. It is a growing trend among companies involved in mobile computing and business applications in particular. Augmented reality is used to virtually bring a digital object into the real-life world. It is also known as mixed reality because reality is augmented by superimposing virtual images over a physical object. The concept of augmented reality is somewhat related to virtual reality as both make use of artificial digital objects to create a live experience. AR is basically used to digitally place an object on the surface of a real-life existing body. AR allows us to interact with virtual stuff just like it is actually present in front of us. The process of augmented reality is preliminary. The device supporting the AR feature uses the lens to scan the object on which the digital impression is to be created. The algorithm and the software then measure the distance of the object. Finally, the object is digitally placed over it. AR is, in fact, an enhancement version of the real physical world.

## Examples of Augmented Reality in Everyday Life

### Photography and Editing

We can see this in our daily life and also majorly in social media where the epic edits and images are moving and having effects on it. These videos are created with the help of augmented reality. The AR enriched software is downloaded on a device and an algorithm is generated in such a way that when the device's lens scans the image, a moving and colour-changing video gets supplemented over its surface.



### Hololens

Hololens technology is developed by Microsoft. It allows the users to operate their gadgets by looking at the screen levitating in front of them. In order to establish an easy user-machine interface, it employs features such as air tap, head tracking, gesture command, voice command, etc. This technology makes use of several "environment understanding" sensors, a depth camera, and spatial mapping. Hololens is an ideal example of augmented reality and holds a promising future

### Google Glass

Google Glass is a gadget that eliminates the need to continuously hold a cell phone in hand, in order to operate it. It allows us to access the phone virtually with the help of voice commands and gestures. Google Glass can be connected to the phone with the help of Wi-Fi or Bluetooth. It can perform various operations such as accessing the internet, manage phone calls and messages, taking a picture, recording a video, etc. This hands-free operation makes the mobile phone seem almost real, and it is possible only with the help of augmented reality.

### Neurosurgery

Augmented Reality finds its prime application in the medical domain. During surgeries, neurosurgery to be precise, AR serves to be the perfect assisting partner as it highlights the blocked and damaged nerves digitally. This helps the doctors to easily operate on the affected nerves and avoid any possibility of human error.

### Interior Designing

We all want our home to be perfect, and we do everything to make it possible; however, making a permanent change such as changing the wall colour, buying new furniture, etc. is risky because such huge changes can't be undone easily. This is why a lot of apps have been developed that allow us to virtually impose a picture over the physical objects to get an idea of how the change that we desire would look like after getting implemented. This provides us with the flexibility to try all available combinations and choose the best product. Asian paints, IKEA place, etc. are some examples of augmented reality-based interior decoration apps.

### Google Street Vi

Street view is an upgraded feature of Google maps that allows us to move a step further in the direction of advancement. With the help of street view, the direction arrows and markings can be seen live in front of us. It makes use of augmented reality to superimpose the information over real-life objects. Thereby, making the maps easy, comfortable, and advanced to use. Also, they provide us with a bonus feature of zoom-in. The role of humans in this future is misunderstood. While the advances in artificial intelligence and robotics are impressive, we believe that combining the capabilities of machines with humans' distinctive strengths will lead to far greater productivity and more value creation than either could generate alone. What's needed to realize this opportunity is a powerful human interface that bridges the gap between the digital and physical worlds. We see AR as a historic innovation that provides this. It helps humans enhance their own capabilities by taking full advantage of new digital knowledge and machine capabilities.

# BLOCKCHAIN TECHNOLOGY

Most of you must have heard of the words “bitcoin” or “cryptocurrency” and by this point, you must have known that these are a kind of digital currency with no government to issue it and no banks managing the transactions. For any currency to work, there are two questions to be addressed:

- Who issues the currency?
- Who is the person or organization that we trust to maintain our transactions?

In the case of paper currency that we use, the governments are the ones that issue the currency, and banks/some other organizations manage our transactions. By the end of this article, you would get some idea about eliminating the need for these trusted intermediaries in the case of cryptocurrency using blockchain.

Blockchain is the underlying concept in the working of cryptocurrency and let's see it at a very basic level. Let us first look into how the cryptocurrency would have evolved.

Suppose you along with your friends maintain a communal ledger (ledger is where you keep track of the transactions and balances) to remember who owes how much to whom as follows: The real problem here is that every one of you is free to add what you wish to add to the ledger which means that nothing is going to stop John from adding to the ledger

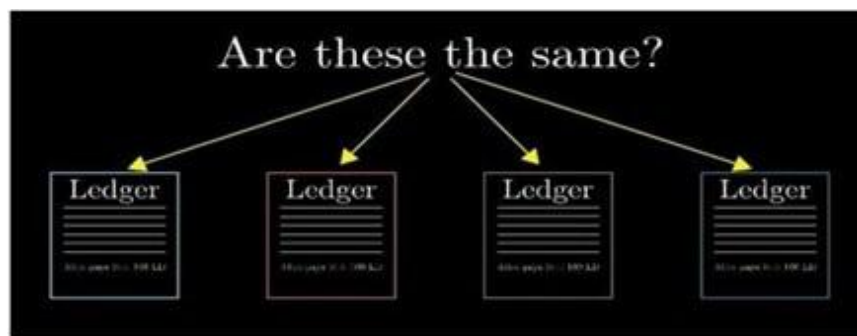
“Rock pays John \$100” which Rock really doesn't owe him. Here comes the idea of a digital signature. But this however works only to some extent as it is not too secure. We extend this idea of a digital signature using cryptography as you'll see.

- John pays Rock \$50
- Rock pays Shawn \$20
- Shawn pays John \$70

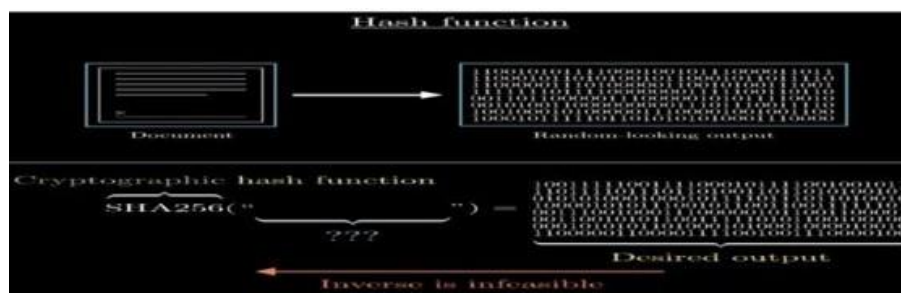
Now let us say, instead of meeting at regular intervals and settling in cash, you and your friends decide to come up with the term “ledger coin” and you just keep adding the transactions to the ledger and every one of you has a copy of the ledger. This way there is no need to actually settle in cash. You can exchange real money with this ledger currency and vice versa and how you do that depends upon how you value each of those currencies. This is the basic idea that led to digital currency as well but with some differences in its working as you'll see. Now we have established that each of you has a copy of the ledger. But in the real world, what it means to have a communal ledger is that each transaction will be sent out to the world in some way and everyone notes down that transaction in their ledger. Now here comes an interesting question “How do you ensure that everyone has the same copy of the ledger i.e, how do you ensure the correct order of transactions?”



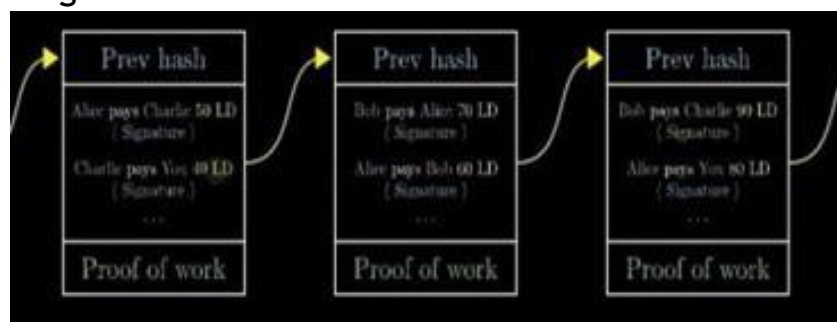
**SWAPNIL**



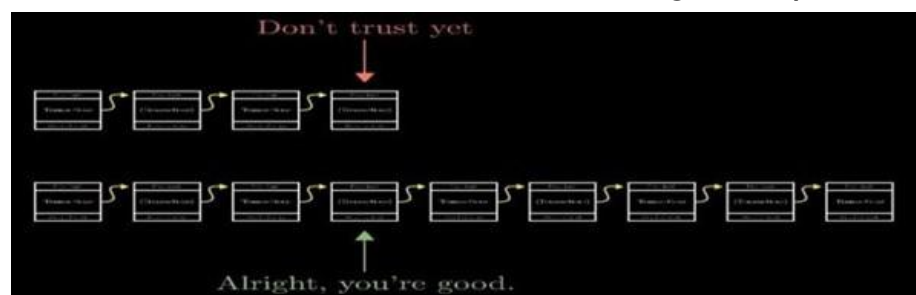
This is where the BLOCKCHAIN comes into play. Before getting into that, we need to know something called a 'cryptographic hash function'. It is basically a function that maps a string into some sequence of bits (usually of length 256 bits). For example, consider a hash function 'H'  $H(\text{ram}) = 0000000000001010001000000\ldots$ . This is how a hash function works basically. Finding the inverse in the case of a hash function is practically impossible.



Now, coming to the blockchain, you put some transactions together as a block and you attach it with some number to which when you apply the hash function you get some specified sequence of bits also for each block we put the hash of the previous block as it's a header which eliminates the problem of identifying the order of transactions. Now we found a way to build a ledger with ordered transactions.



In the above picture, proof of work just means finding a number whose hash matches the specific sequence of bits. Now we have another problem. What if someone creates a fake block and sends it out into the world. How do we know which sequence of blocks to trust? The protocol that we follow is that we consider the longest sequence of blocks to be the correct one.



This is how the system works without a central point of trust. So we have got the answer to one of the two questions that we began with. The answer to the other question of who issues the currency goes like this: People who find the number whose hash matches certain sequence of bits are called miners and the process is called Mining.

## 5G & WIFI CONNECTIVITY

5G simply refers to the next and newest mobile wireless standard based on the IEEE 802.11ac standard of broadband technology. Rather than faster Internet connection speeds, 5G aims at a higher capacity than the current 4G LTE, allowing a higher number of mobile broadband users per area unit, and allowing consumption of data quantities in gigabytes per second. This would make it feasible for a large portion of the population to consume high-quality

streaming media many hours per day on their mobile devices, also when out of reach of wi-fi hotspots. 5G has advanced characteristics that earlier generations lacked, such as ultra-fast communication due to decreased latency & 5G wholesale led is also available in the market. High performance, efficiency, mobility, long battery lifetime, very high data rate, Reliability, and dependability are all advantages of 5G. It meets the connection needs of large numbers of IoT devices, objects, and machines.



**Rakesh**

### Where is 5G being used?

- Internet of Things - IoT
- Health care
- Public safety and infrastructure
- Manufacturing
- Entertainment/Gaming
- Supply-chain management



5G has a usage efficiency of 256QAM.

It has only SIM Authentication but a higher cost of operation. It gives Mission-Critical Use. It is indoor and Long-Range Coverage.

### Disadvantages of 5G:

5G smartphones are costly. Hence it will take some time for the common man to make use of 5G technology. It will take time for security and privacy issues to be resolved fully in the 5G network. Wi-Fi 6 is also called WLAN (Wireless Local Area Network). Wi-Fi 6, also known as 802.11ax, provides more speed, lower latency, and increased device density. Wi-Fi 6 has 1024 QAM usage efficiency. It is a Lower Cost of operation, mainly indoor and Short-Range coverage. It has WPA3 Security. Having more bandwidth means connecting more IOTs. It has high-capacity coverage in a shared spectrum. In the WLAN architecture, the wi-fi-6 router is connected to the internet using a broadband connection. All the wi-fi 6 mobile phones and other compliant devices connect with the wifi-6 router.

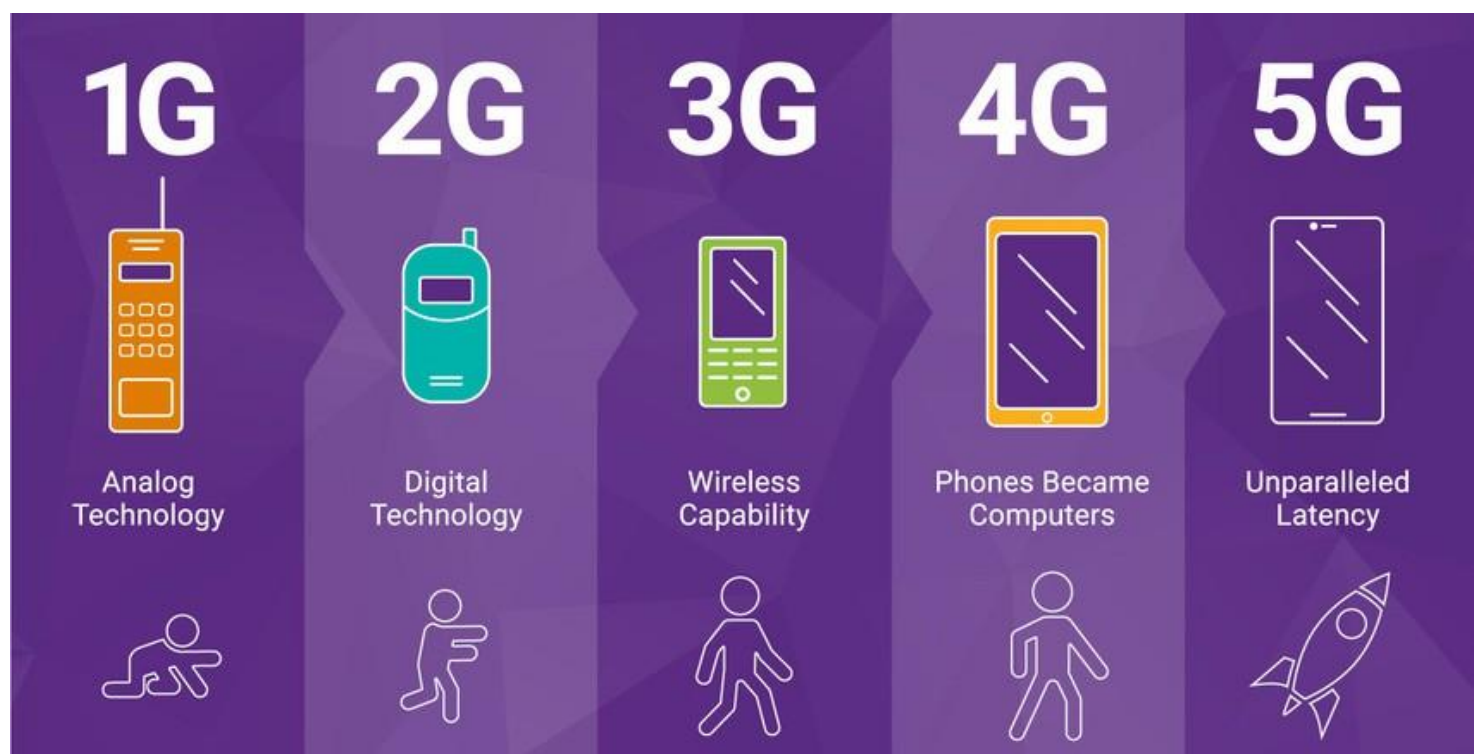


### Advantages of Wi-Fi

- It has been developed to deliver 40% high peak data rates using a single client device. Average throughput per user is improved by at least 4 times in dense environments.
- It offers a four times increase in network efficiency compared to 802.11ac.

In Education, 5G - connect buildings and track transportation across the entire campus  
Wi-Fi 6 - Learn better with immersive learning using virtual & augmented reality.

In HealthCare, 5G - Not on campus, no problem. Get a seamless campus access experience whenever you're needed  
Wi-Fi 6 - Connect healthcare workers & patients on campus, so it seems like everyone is in the same rooms  
As indoor networks, wi-fi 6 offers low latency, high speed, and greater device density compared to 5G. Moreover, both 5G and Wi-Fi 6 have unique features. We can conclude that both technologies are going to exist together. There is no chance that one will replace the other. Both 5G and wfi-6 technologies have their unique use cases. Moreover, in certain use cases, 5G can complement wfi-6.



## HISTORY OF MOBILE TECHNOLOGY



# EDGE COMPUTING



**NESE NARASIMHA**

The IT industry loves a new paradigm. The latest paradigm is Edge Computing. Edge computing is an advanced version of Cloud Computing. It was developed due to the exponential growth of IoT devices. In 1997, computer scientist “BRAIN NOBLE” demonstrated how mobile technology could use the edge computing for speech recognition.

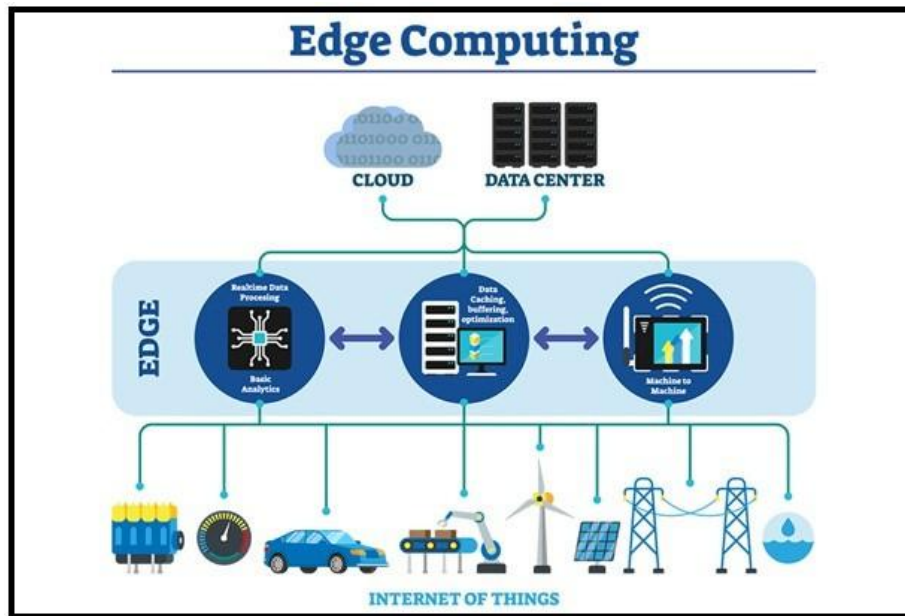
It is a strategy for computing on location where data is collected or used. The best and easiest way to manage and optimize applications and rapidly analyze data in real time. In this we can transfer large amount of data within the required time. Edge computing makes IoT more efficient, as it allows to extract only the valuable data from raw image.

It brings computation and data storage closer to where data is generated, enabling better data control, reduced costs faster insights and actions, and continuous operations. It can provide enhanced security and more privacy protections also saves the bandwidth. It is mostly used in the manufacturing sector and apply machine learning to improve quality products.

The edge computing market will grow from the already sizeable amount of \$36.5 billion in 2021 to \$87.3 billion by 2026, with a compound annual growth rate of 19% during those five years.

The aim of Edge Computing is to push computation to the edge of the network away from data centers, exploiting the capabilities of smart objects, mobile phones, and network gateways to provide services and processing on behalf of the cloud.

Cloud computing works on big data and can process them all without direct control from the users. While edge computing works on smaller data batches and closer to the users. Moreover, the users have control of the data.



Edge computing allows data produced by the internet of things (IoT) devices to be processed closer to where it is created instead of sending it across long routes to data centers or clouds.

It has become relevant because it offers an effective solution to emerging network problems associated with moving enormous volumes of data that today's organizations produce and consume.

With edge computing, things have become even more efficient. As a result, the quality of business operations has become higher. Edge computing is a "viable solution for data-driven operations that require lightning-fast results and a high level of flexibility", depending on the current state of things.

The edge computing market will grow from the already sizeable amount of \$36.5 billion in 2021 to \$87.3 billion by 2026, with a compound annual growth rate of 19% during those five years.

The aim of Edge Computing is to push computation to the edge of the network away from data centers, exploiting the capabilities of smart objects, mobile phones, and network gateways to provide services and processing on behalf of the cloud.

Cloud computing works on big data and can process them all without direct control from the users. While edge computing works on smaller data batches and closer to the users. Moreover, the users have control of the data.



**cse**

