



# OVERVIEW OF FUTURE SKILLS AND CYBER SECURITY


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# IoT (Internet Of Things)

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## Internet of Things (IoT):

- IoT refers to the network of interconnected physical devices, vehicles, appliances, and other objects **embedded with sensors, software, and connectivity.**



- IoT enables these devices to **collect and exchange data**, leading to automated processes and enhanced efficiency in various domains.

- Iot developed by **KEVIN ASHTON**





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## How IOT works



**Sensor:-** A sensor is a device that detects and measures physical phenomena like light, temperature, or motion, converting them into signals for use in various applications, including IoT devices.



**Connectivity:-** sending data to cloud.



**Data processing:-** making data useful.



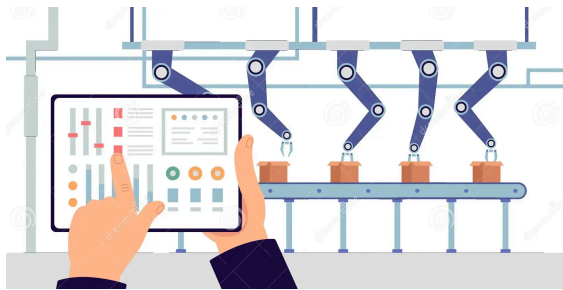
**User interface:-** delivering information to user.

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## Application of IOT

**1. Home Automation:** IoT allows remote control of home devices via smartphone or voice commands.

**Example:** Using Amazon Echo to adjust temperature or lights.



**2. Industrial Monitoring:** IoT sensors track machinery performance, inventory, and optimize production.

**Example:** Detecting equipment failures in manufacturing plants.

**3. Healthcare:** IoT aids remote patient monitoring, medication management, and tracking medical equipment.

**Example:** Wearable fitness trackers monitor heart rate for individuals and healthcare providers.





**4. Agriculture:** IoT monitors soil moisture, temperature, and crop health remotely for optimized irrigation and increased yield.

**Example:** Sensors in fields aiding farmers in irrigation scheduling.

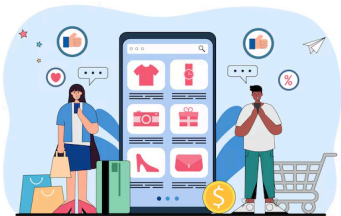
**5. Smart Cities:** IoT integrates systems for traffic, waste, and energy management.

**Example:** Smart streetlights adjust brightness based on real-time traffic flow, enhancing energy efficiency and safety.



## Advantages:

**1. Efficiency:** IoT improves efficiency by automating tasks and providing real-time data, leading to better decision-making.



**2. Convenience:** IoT enhances convenience by enabling remote control and monitoring of devices, making daily life easier.

**3. Cost Savings:** IoT helps businesses save costs by optimizing processes, reducing waste, and minimizing downtime.



**4. Connectivity:** IoT fosters connectivity between devices and systems, facilitating seamless communication and collaboration.

**5. Innovation:** IoT fosters innovation by enabling the development of new products and services that enhance quality of life.



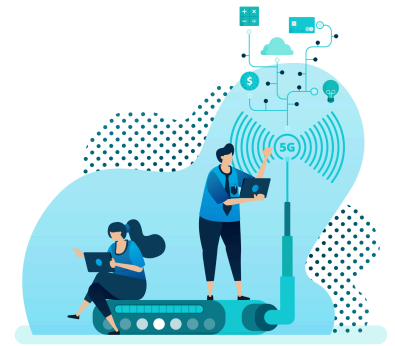
## Disadvantages:

**1. Security Concerns:** IoT devices are vulnerable to cyberattacks, raising concerns about data privacy and security breaches.



**2. Compatibility Issues:** IoT devices from different manufacturers may not always be compatible, leading to integration challenges.

**3. Dependency on Internet:** IoT relies heavily on internet connectivity, making it susceptible to disruptions and downtime.



**4. Data Overload:** The sheer volume of data generated by IoT devices can overwhelm systems, leading to information overload.


**5. Reliability Issues:** IoT devices may experience technical glitches or malfunctions, impacting their reliability and usability.



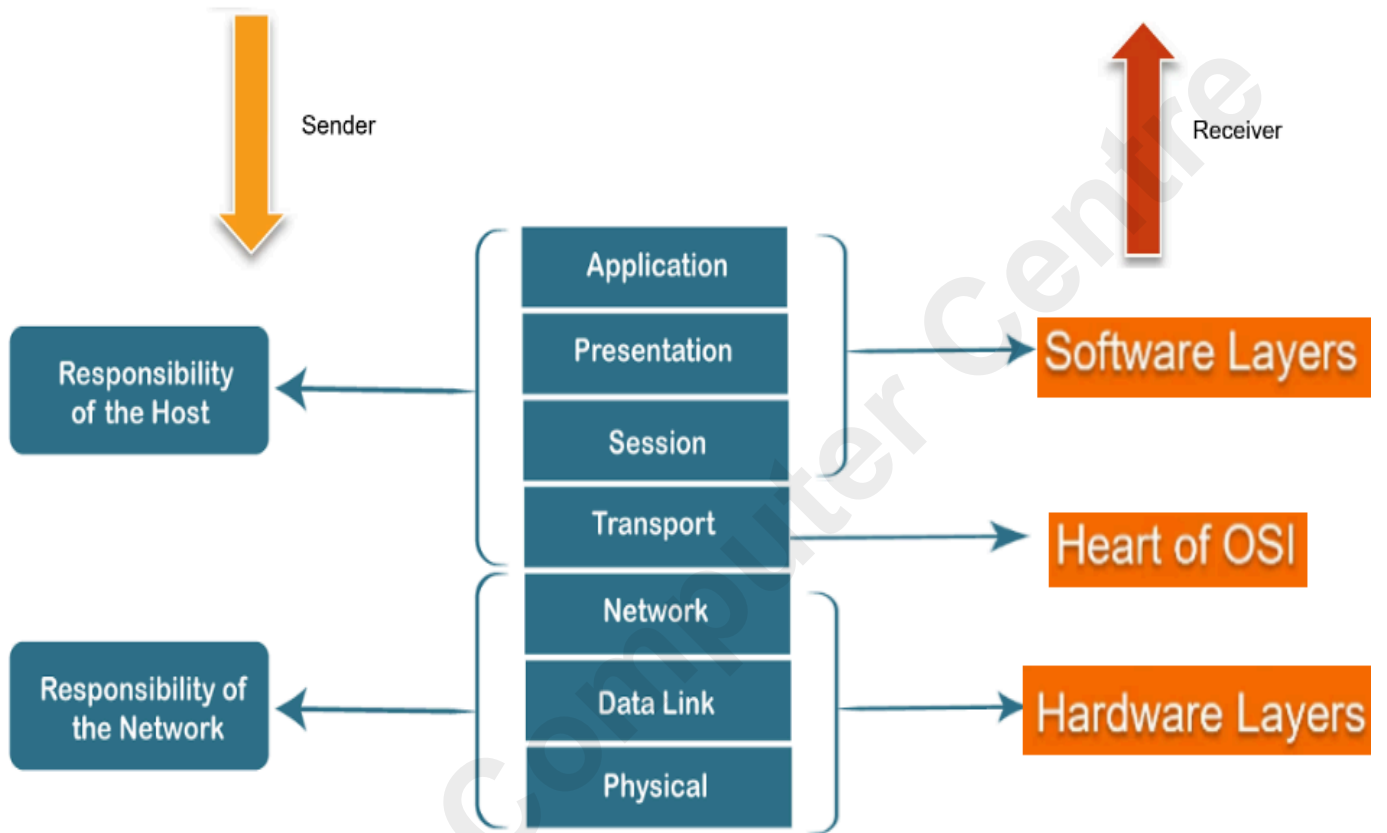
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# OSI (Open Systems Interconnection)

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- The OSI (Open Systems Interconnection) model is a conceptual framework.
  - It standardizes how different computer systems communicate.
  - The model consists of seven distinct layers.
  - Each layer has specific functions.
  - It was developed by the International Organization for Standardization (ISO).
  - The OSI model was introduced in 1984.
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## OSI LAYER



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## Layer 1: Physical Layer

- **Function:** Transmits raw data bits over a physical medium.
- **Example:** Ethernet cable transmitting binary data signals between two computers.



## Layer 2: Data Link Layer



- **Function:** Establishes, maintains, and terminates connections across the physical medium.
- **Example:** MAC address (Media Access Control) ensures data is delivered to the correct device on a local network.

## Layer 3: Network Layer

- **Function:** Routes data packets between different networks, ensuring they reach their destination.
- **Example:** IP (Internet Protocol) address directing data packets across the internet.





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## Layer 4: Transport Layer

- **Function:** Manages end-to-end communication sessions, ensuring data reliability and integrity.
- **Example:** TCP (Transmission Control Protocol) establishes connections, ensures data delivery, and performs error checking.



## Layer 5: Session Layer



- **Function:** Manages communication sessions between applications on different devices.
- **Example:** Establishing, maintaining, and terminating sessions for video conferencing applications.

## Layer 6: Presentation Layer

- **Function:** Translates, encrypts, and compresses data for efficient transmission.
- **Example:** Compression of image files before sending them over a network to reduce bandwidth usage.



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## Layer 7: Application Layer

- **Function:** Provides interface between the application and the network, allowing applications to access network services.
- **Example:** Web browsers using HTTP (Hypertext Transfer Protocol) to access websites over the internet.



Each layer performs specific tasks, encapsulating data as it moves down the layers and decapsulating it as it moves up. This ensures efficient and reliable communication between devices in a point-to-point network.

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# Big Data Analytics

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- Big Data Analytics involves the collection, processing, and analysis of large volumes of data to extract insights, patterns, and trends.
- It helps organizations make informed decisions, improve operational efficiency, and identify new opportunities.



## Application of Big Data



**1. Better Business:** Big data helps businesses make smart decisions to improve how they work and keep customers happy.

**2. Healthcare Help:** It lets doctors personalize treatments, predict diseases, and take better care of patients.



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**3. Safer Finances:** Big data helps catch fraud, understand risks, and make sure money transactions are safe.



**4. Ads That Work:** Social media and ads use data to show the right stuff to the right people and see if it works well.



**5. Smarter Cities:** It helps cities use resources better, manage traffic, and plan things like buildings and roads to make cities work well.

## Advantages of Big Data Analytics:



**1. Smart Choices:** Big data helps make better decisions using facts and patterns instead of guesses.

**2. Work Smoother:** It finds ways to do tasks faster and better, saving time and money.



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**3. Personalized Service:** Big data knows what individuals like, making it easier to offer them what they want.



**4. Predicting the Future:** It can tell us what might happen next, helping us prepare better.

**5. Staying Ahead:** Companies can be ahead of the competition by knowing what customers want before others do.

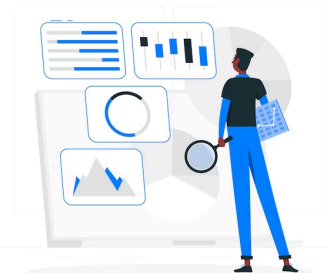


## **Disadvantages of Big Data Analytics:**



**1. Privacy Worries:** People get anxious about who's using their personal info.

**2. Hard to Set Up:** It's tough and costly to start using big data.





**3. Wrong Ideas:** Sometimes, it gives the wrong info if not handled right.

**4. Tech Risks:** Depending too much on tech can be dangerous.



**5. Fairness Issues:** People wonder if it's fair and okay to use their info.

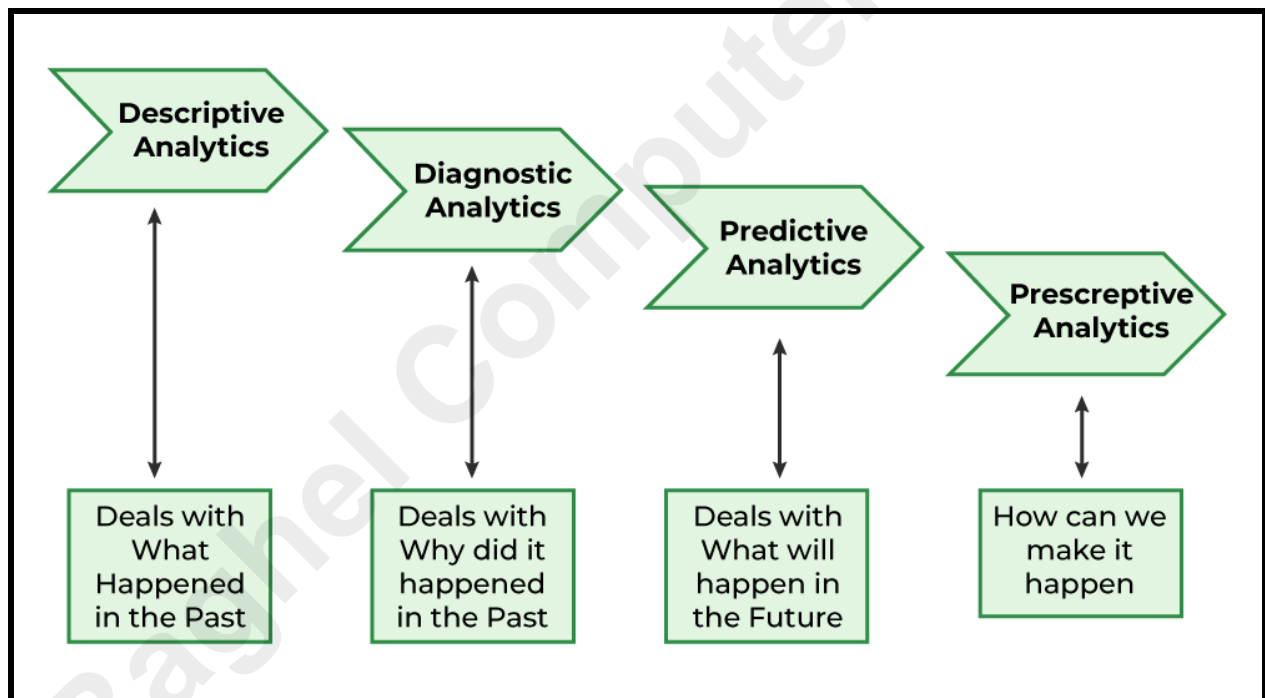
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## Types of Data Analytics

There are four major types of data analytics:

1. Predictive (forecasting)
2. Descriptive (business intelligence and data mining)
3. Prescriptive (optimization and simulation)
4. Diagnostic analytics



## "3 Vs" of big data analytics:

1. **Volume:** Big data systems are built to handle **huge amounts of information**.



2. **Velocity:** This is about **how fast data comes in** and needs to be processed.



3. **Variety:** Data comes in all sorts of forms - like numbers in spreadsheets, words in documents, pictures, videos, and more. Big data systems can handle all these **different types of data** and make sense of them together.



In short: Big data analytics deals with lots of data (Volume), coming in quickly (Velocity), and in many different forms (Variety).



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# Cloud Computing:

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- Cloud Computing involves the **delivery of computing services, such as storage, servers, databases, software, over the internet.**
- It provides on-demand access to shared computing resources, scalability, and flexibility for businesses and individuals.



## Advantages:

1. **Scalability:** Easily adjust resources as needed without big investments.
2. **Cost-Effectiveness:** Pay for what you use, no need for expensive hardware.
3. **Accessibility:** Access services from anywhere with the internet.
4. **Reliability:** Providers offer strong backup and recovery systems.
5. **Innovation:** Access to cutting-edge technologies fosters innovation.



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## Disadvantages:

**1. Security:** Concerns about protecting data from breaches.

**2. Internet Dependency:**  
Reliance on internet connection for access.

**3. Limited Control:** Less control over infrastructure and services.

**4. Data Transfer and Latency:**  
Slow data transfers and performance issues.

**5. Lack of Customization:**  
Limited ability to customize cloud services to specific needs.



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## Service model of cloud computing

### 1. IaaS (Infrastructure as a Service):

Renting virtualized computing resources like servers and storage.

- Example: Renting virtual servers.



2. PaaS (Platform as a Service): Offering tools for app development and deployment without worrying about infrastructure.

- Example: Google App Engine - Building apps without managing servers.

3. SaaS (Software as a Service): Accessing software over the internet without installation or maintenance hassle.

- Example: Salesforce - Using software online.



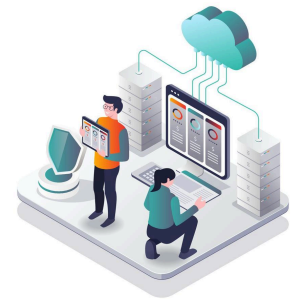
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## APPLICATION OF CLOUD COMPUTING

**1. Data Storage and Backup:** Store and access files and data online.



**2. Software Development:** Build, test, and deploy applications without physical servers.



**3. Web Hosting:** Host websites and web applications on scalable cloud infrastructure.



**4. Business Applications:** Use software like email and CRM over the internet.



**5. Big Data Analytics:** Analyze large datasets for insights and decision-making.

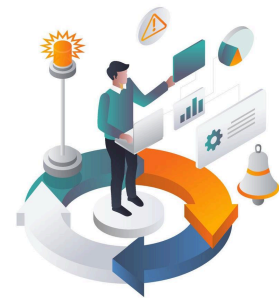
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**6. IoT:** Manage and analyze data from connected devices.



**7. Disaster Recovery:** Backup data and applications for protection against disasters.

**8. Content Delivery:** Deliver digital content quickly and efficiently to users.



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# Augmented Reality (AR) and Virtual Reality (VR)

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**1. Augmented Reality (AR):** AR enhances the real world by overlaying digital information or objects onto it. This means that when you look at the world through an AR device, you can still see the real world, but with added digital elements. For example, AR technology might allow you to point your smartphone camera at a landmark and see information about it displayed on your screen.



**2. Virtual Reality (VR):** VR, on the other hand, completely immerses you in a simulated, computer-generated environment. When you put on a VR headset, it blocks out the real world and replaces it with a virtual environment. This can range from realistic simulations of places and experiences to fantastical, imaginary

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worlds. You can interact with and explore this virtual environment as if you were physically there.

In summary, AR adds digital elements to the real world, while VR replaces the real world with a computer-generated one. Both technologies have various applications in entertainment, education, training, and other fields.

## Advantages of Augmented Reality (AR)/Virtual Reality (VR):

**1. Enhanced Experience:** AR adds cool digital stuff to the real world, making things more fun and interesting.



**2. Better Learning:** AR helps in learning by showing interactive stuff, like 3D models, in textbooks or training.



**3. Visualizing Things:** AR makes it easier to understand complex stuff by showing it visually, like how a new building would look in a city.







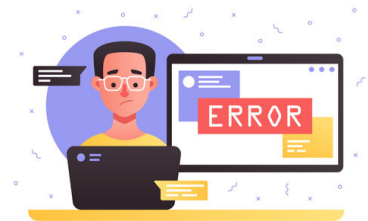
**4. Work Efficiency:** AR helps workers do tasks faster and better by showing them real-time instructions or tools.

**5. Cool Marketing:** AR makes ads more exciting and engaging by adding interactive elements that catch people's attention.



## Disadvantages of Augmented Reality (AR) / Virtual Reality (VR):

**1. Tech Problems:** Sometimes AR doesn't work perfectly due to technical issues, which can be frustrating.



**2. Privacy Worries:** AR collects data about you, which can raise concerns about privacy if not handled properly.



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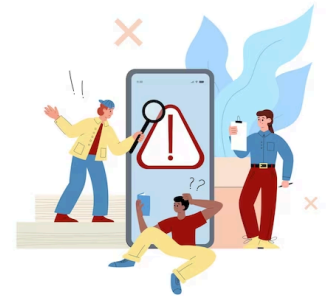
**3. Needing Devices:** AR requires special gadgets like smartphones or smart glasses, which not everyone has.



**4. Distractions and Risks:** AR can distract people or even cause accidents if used in dangerous situations.



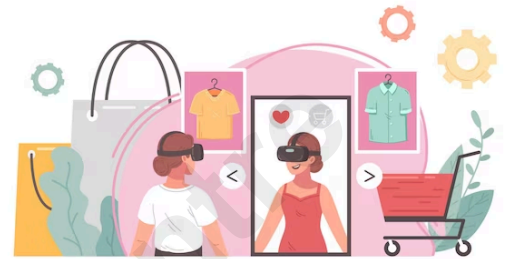
**5. Misuse Possibilities:** AR could be used for bad things, like spreading fake news or creating harmful experiences.



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## APPLICATION OF AR AND VR

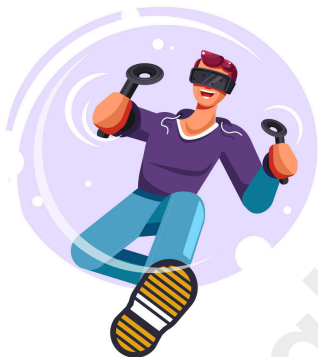
- 1. Retail:** Try on products virtually before buying.



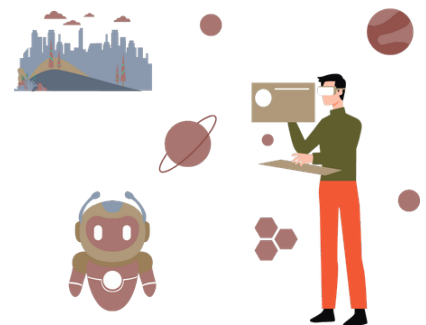
- 2. Education:** Interactive learning with digital overlays.



- 3. Navigation:** Directions overlaid on real-world surroundings.



- 4. Gaming:** Play games that blend virtual and real environments.



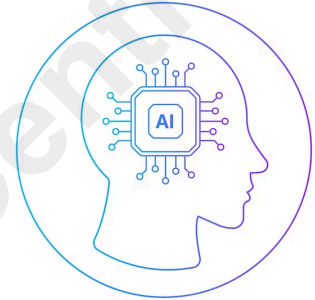
- 5. Maintenance:** Get visual instructions for repairs.

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# Artificial Intelligence:

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- Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks that typically require human intelligence.
- AI, or Artificial Intelligence, is like making computers smart enough to do things that usually need human



thinking. It's about teaching computers to learn, reason, solve problems, understand language, and make decisions, just like humans do.



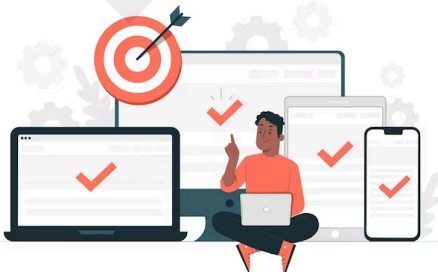
- John McCarthy is often called the "Father of AI."

## Advantages of AI:

1. **Automation:** AI can do repetitive tasks, saving time and effort.



2. **Accuracy:** AI works precisely, reducing errors in tasks.



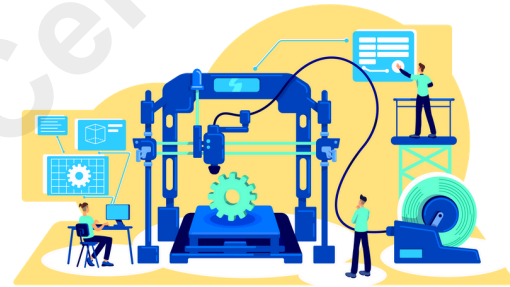
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3. **Decision Support:** AI helps make better decisions by analyzing data.



4. **24/7 Availability:** AI can work non-stop without getting tired.



5. **Innovation:** AI drives new ideas and solutions, making life better.

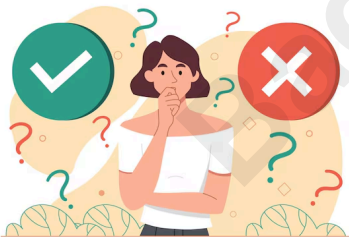


## Disadvantages of AI:

1. **Job Loss:** AI can take away jobs, causing unemployment.



2. **Bias and Discrimination:** AI might be unfair or biased in its decisions.



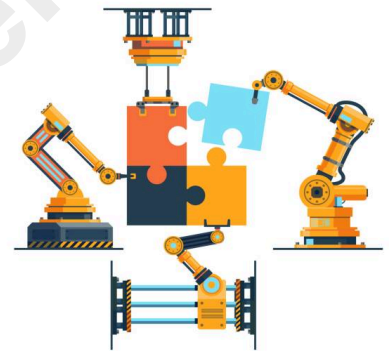
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3. **Privacy Issues:** AI may collect personal data, raising privacy concerns.



4. **Dependency:** Relying too much on AI can make us dependent.

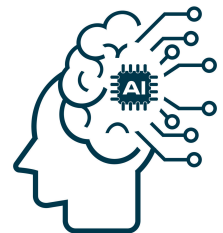


5. **Complexity:** AI systems are hard to understand and maintain.

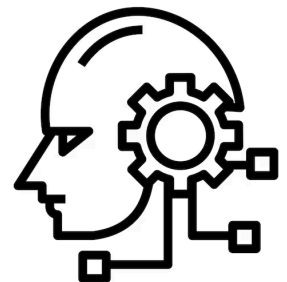


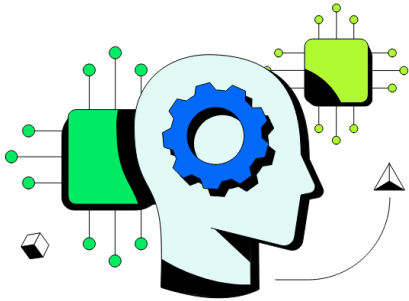
## Types of AI

1. **Memory-Limited AI:** This is AI that can only remember a limited amount of information. An example is a chatbot that forgets previous conversations after a short time.



2. **Theory of Mind:** This refers to AI understanding emotions and intentions. An example is a virtual assistant recognizing when you're sad and adjusting its responses accordingly.





**3. Reactive AI:** These AI systems react based on pre-defined rules without memory or learning. An example is a chess computer program that follows specific rules to make moves.



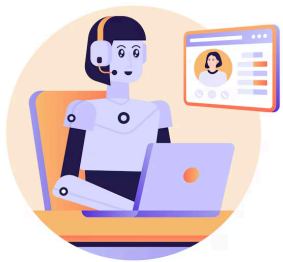
**4. Self-Aware AI:** This is AI that has consciousness and understands its own existence. Currently, there are no real-world examples of self-aware AI, as achieving self-awareness in artificial intelligence remains a theoretical concept. However, in reality, AI systems are not capable of

self-awareness and do not possess consciousness like humans do.

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## APPLICATION OF AI

**1. Virtual Assistants:** AI helps in tasks like answering questions and controlling devices through voice commands.



**2. Recommendation Systems:** AI suggests things you might like based on what you've done before, like recommending movies or products.

**3. Healthcare Diagnostics:** AI helps doctors diagnose diseases and analyze medical images to find problems.



**4. Autonomous Vehicles:** AI powers self-driving cars to see the road, navigate, and drive safely without human help.

**5. Fraud Detection:** AI spots unusual activity in things like bank transactions to catch fraud and protect against theft.





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# Blockchain Technology:

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- Blockchain is a **decentralized and distributed digital ledger** that securely records and verifies transactions across multiple computers.
- It offers **transparency, security, and immutability**, making it suitable for applications like cryptocurrency and supply chain management.
- It's **like a chain of connected blocks** where information is stored, making it reliable and transparent.



## Advantages of Blockchain:



**1. Security:** Blockchain is highly secure and resistant to hacking.

**2. Transparency:** All transactions are visible to everyone involved.





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**3. Decentralization:** No need for intermediaries, reducing risks.



**4. Immutability:** Once recorded, data can't be easily changed.

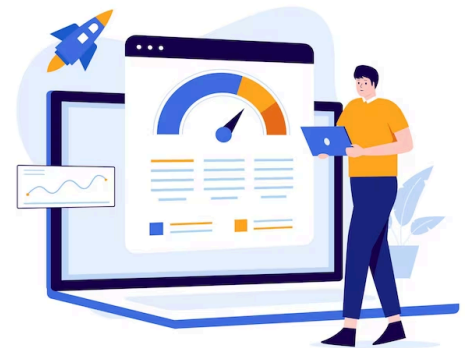


**5. Efficiency:** Streamlines processes, making them faster and cheaper.



## Disadvantages of Blockchain:

**1. Scalability:** May slow down as more people use it.



**2. Energy Consumption:** Uses a lot of electricity, which can be bad for the environment.

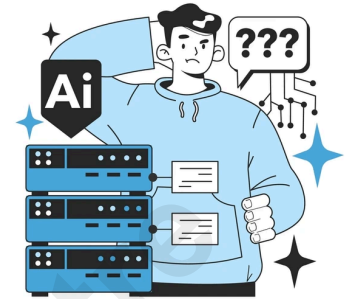


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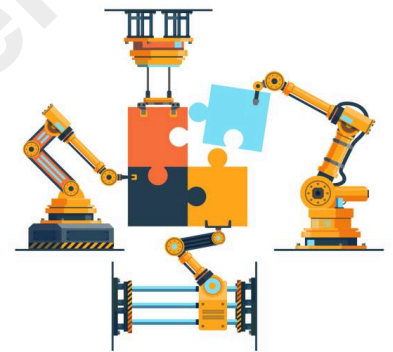
**3. Regulatory Uncertainty:** Laws and rules around blockchain are still unclear.



**4. Privacy Concerns:** Transactions are visible to all, raising privacy worries.



**5. Complexity:** Setting up and managing blockchain can be difficult and requires expertise.



## 3 PILLARS OF BLOCK CHAIN

1. Decentralization
2. Transparency
3. Immutability

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## APPLICATION OF BLOCK CHAIN

**1. Cryptocurrencies:** Use blockchain for digital currencies like Bitcoin.



**2. Supply Chain Management:** Track products securely through the supply chain.



**3. Smart Contracts:** Automate agreements without intermediaries.



**4. Identity Management:** Securely manage digital identities.



**5. Voting Systems:** Ensure transparent and secure elections.



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**6. Healthcare Records:** Share medical data securely.



**7. Supply Chain Finance:** Streamline financing for supply chains.



**8. Real Estate:** Record property transactions securely.



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# BITCOIN

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- **Bitcoin:** Decentralized digital currency for peer-to-peer transactions.
- **Founder:** Created by an anonymous person **Satoshi Nakamoto**.



- **Foundation:** Introduced in a whitepaper published in **October 2008**.

- **Inception:** Officially launched with the mining of the **first block on January 3, 2009**.



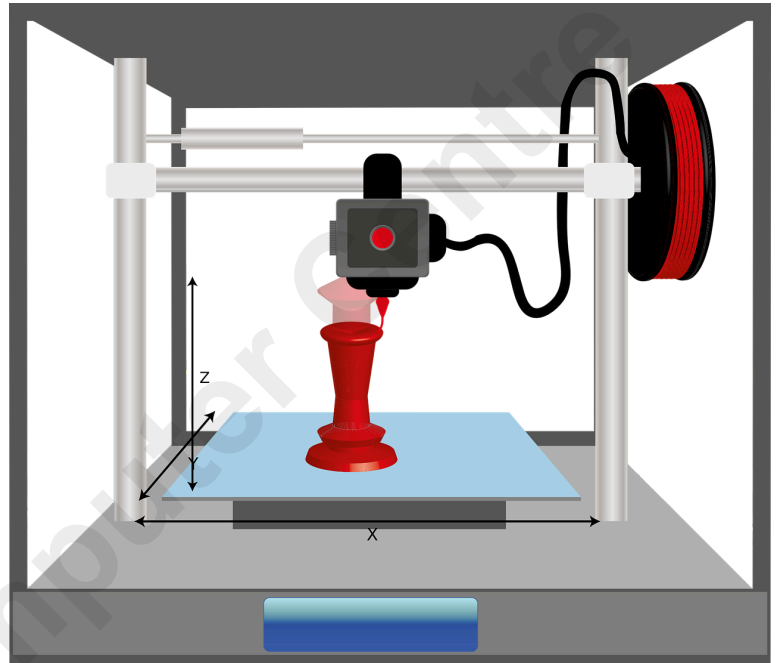
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## 3D Printing/ Additive Manufacturing:

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- 3D Printing, also known as **additive manufacturing**, is a process of creating physical objects by layering materials based on a digital model.
- It enables the production of complex and customized objects with applications in various industries.



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## How a 3D printer works:

**1. Designing:** A 3D model of the object is created on a computer.



**2. Slicing:** The model is sliced into thin layers using software.

**3. Printing:** The printer melts material (like plastic) and builds the object layer by layer.



**4. Cooling:** Each layer solidifies as it's printed.



**5. Finishing:** After printing, the object may need some touch-ups like removing supports or smoothing.



**6. Completion:** Once done, the 3D-printed object is ready to use.

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# Robotics Process Automation:

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- Robotics Process Automation (RPA) involves the use of software robots or bots to automate repetitive and rule-based tasks.
- RPA enhances productivity, accuracy, and efficiency by reducing manual effort.



## Advantages of RPA:

1. **Efficiency:** RPA saves time by automating repetitive tasks.



2. **Accuracy:** RPA reduces errors by performing tasks precisely.



3. **Cost Savings:** RPA lowers costs by cutting down on manual work.

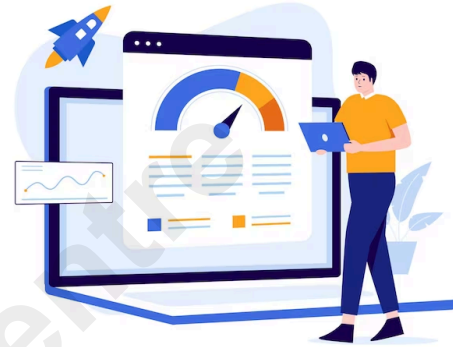




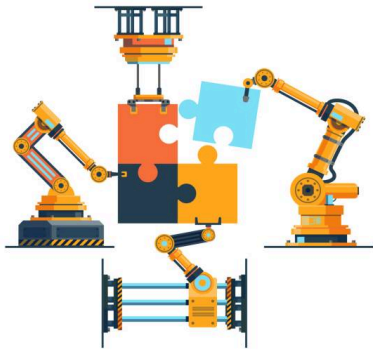
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**4. Scalability:** RPA can be easily adjusted to handle more work.

**5. Compliance:** RPA ensures tasks are done consistently to meet rules.



### Disadvantages of RPA:



**1. Complexity:** Setting up RPA systems can be tricky.

**2. Limited Skills:** RPA can't handle complex tasks that need human thinking.

**3. Integration Problems:** RPA may not work well with existing systems.

**4. Data Dependency:** RPA works best with structured data.

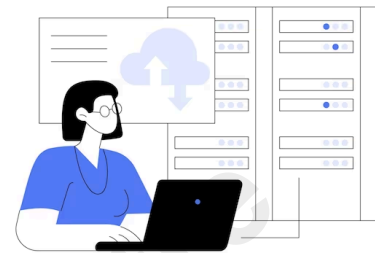
**5. Job Concerns:** RPA may replace some human jobs, raising workforce issues.



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## APPLICATION OF RPA

**1. Data Entry and Processing:** RPA automates tasks like entering data from forms or spreadsheets.



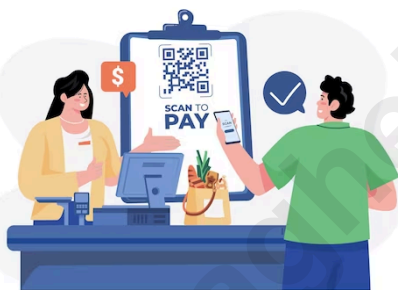
**2. Customer Service:** RPA handles routine customer inquiries and updates customer records.



**3. HR Operations:** RPA helps with tasks like onboarding employees and managing payroll.



**4. Finance:** RPA automates financial processes such as reconciling accounts and processing transactions.



**5. Supply Chain:** RPA streamlines tasks like inventory management and order processing.



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**6. IT Operations:** RPA assists with tasks like system monitoring and software deployment.



**7. Healthcare:** RPA automates administrative tasks like patient scheduling and billing.



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**1. Definition:** Criminal activities conducted through computers or digital devices.

### 3. Purpose: To gain unauthorized access, steal information, disrupt services, or commit fraud.



**4. Impact:** Results in financial loss, data breaches, privacy violations, and damage to reputation.

**5. Prevention:** Requires robust cybersecurity measures, awareness, and collaboration between law enforcement and tech experts.

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# CYBER SECURITY

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**1. Definition:** Protecting computer systems, networks, and data from cyberattacks.

**2. Purpose:** Prevent unauthorized access, ensure data confidentiality, integrity, and availability.

**3. Key Areas:** Network security, endpoint security, application security, data security, identity management.



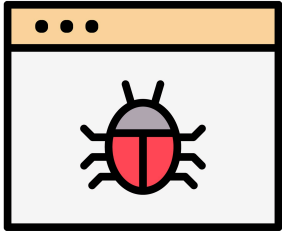
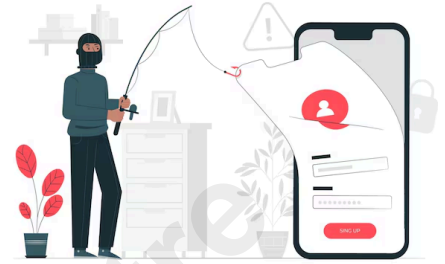
**4. Importance:** Essential for individuals, organizations, and governments in the digital age.

**5. Goal:** Mitigate cyber risks, detect and respond to security threats effectively.

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## TYPES OF CYBER CRIME

1. **Phishing:** Trickery to steal personal info.



2. **Malware:** Harmful software.

3. **Hacking:** Unauthorized system access.



4. **Identity Theft:** Stealing personal details.

5. **Online Fraud:** Deceptive internet schemes.

6. **Cyberbullying:** Harassment online.



7. **Data Breaches:** Unauthorized access to sensitive info.

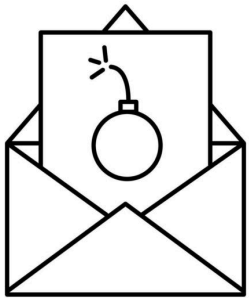


### 8. Denial of Service (DoS) Attack:

Overloads a system to make it unusable.

### 9. Trojan Horse Attack:

Malware pretending to be legit software to steal data.



10. Email Bombing: Sending too many emails to crash a server.

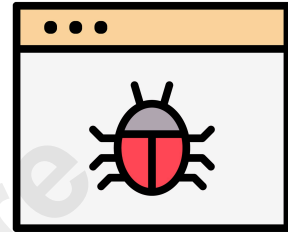
11. Salami Attack: Stealing small amounts of money from many transactions.





# MALWARE AND MALWARE TYPES

**Malware:** Bad software made to harm computers.



## Types:



1. **Viruses:** Copy themselves and spread.

2. **Worms:** Spread on their own across networks.

3. **Trojans:** Pretend to be good software but are harmful.

4. **Ransomware:** Locks files and demands money.



5. **Spyware:** Secretly watches what you do.

6. **Adware:** Shows unwanted ads.

7. **Rootkits:** Let attackers control your computer.

8. **Keylogger:** Software that secretly records keystrokes to steal passwords.





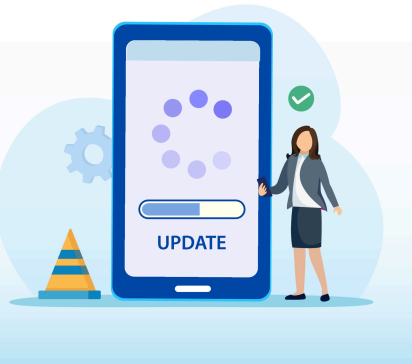
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## Top 10 Essential Steps to Secure Your PC

1. **Install Antivirus:** Use good antivirus software to catch and remove viruses.



2. **Update Software:** Keep your programs and operating system up to date to fix security holes.



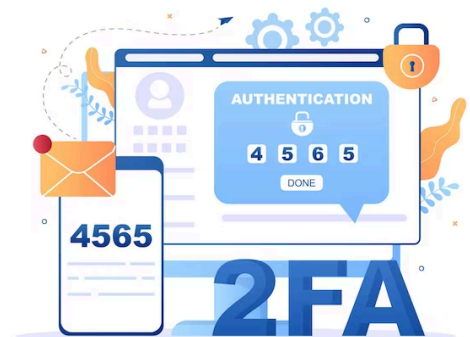
3. **Turn on Firewall:** Use the built-in firewall to block bad internet traffic.



4. **Use Strong Passwords:** Make unique, strong passwords for your accounts.



5. **Turn on Two-Factor Authentication:** Add an extra layer of security to your accounts.



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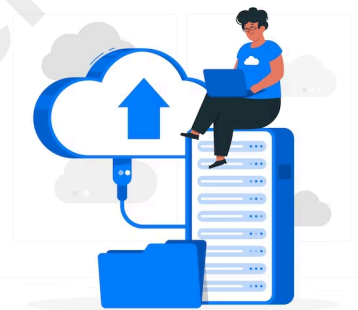
**6. Be Cautious Online:** Don't click on suspicious links or download unknown files.



**7. Secure Wi-Fi:** Protect your Wi-Fi with a strong password.



**8. Backup Data:** Save copies of your important files in case your PC crashes.



**9. Browse Safely:** Use secure websites and consider using a VPN on public Wi-Fi.

**10. Stay Informed:**  
Learn about the latest security threats and how to stay safe online.

