

Lecture I: Security and Networking

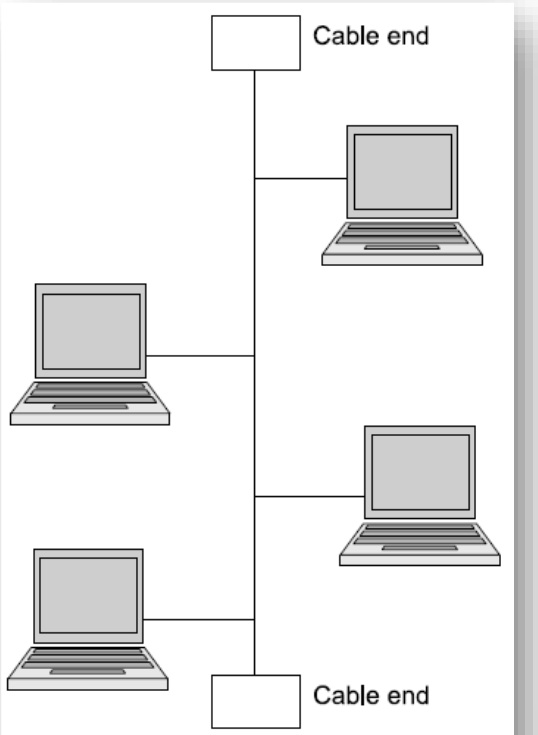
Networks - Overview

- **Computer network** is a system of **interconnected** computers that enable the computers to communicate, with each other and **share** their resources, **data** and **applications**.
- A **network** may include only **personal computers** or a mix of PCs, **minis** and **mainframes** spanning a particular *geographical area*.
- **Computer networks** that are commonly used today may be classified as follows based on **geographical** area:
  - ✓ Local Area Networks (**LANs**) - a group of computers and associated devices that share a common communications line within a **small** geographical area.
  - ✓ Home Area Network (**HAN**) -LAN located in a home, connecting digital devices, such as computers, peripherals, phones, gaming devices, digital video recorders (DVRs), and televisions.
  - ✓ Wide Area Networks (**WANs**) - a geographically dispersed network that is usually made up of smaller **LANs.**
  - ✓ The **Internet -** a network of **networks** across the **globe**. that allows computers connected over the network to **share** resources and information using **different protocols.**

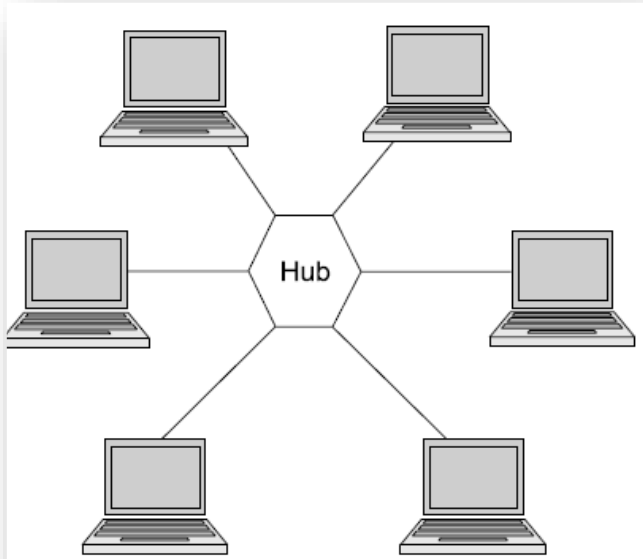
Network Topologies

- Network **topology** refers to the **arrangement** of computers connected in a network through some **physical** medium such as **cable**, **optical fiber** etc.
- **Topology** generally determines the **shape** of the network and the **communication path** between the various computers (**nodes**) of the network.
- The **various** types of network **topologies** are as follows:

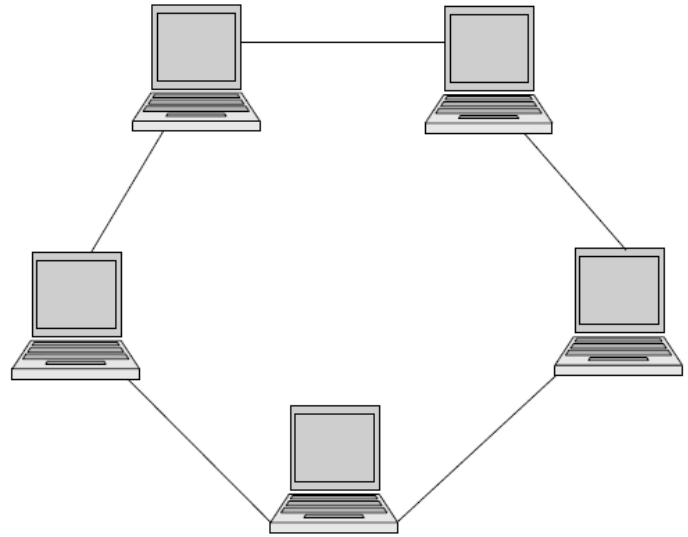
  - **Bus** topology : All devices share a single communication **line.**
  - **Star** topology : All devices are connected to a central **hub.**
  - **Ring** topology :Devices are connected in a **circular** format.
  - **Mesh** topology: Devices are interconnected with Highly **reliable.**
  - **Hybrid** topology: different networks topologies interconnected.



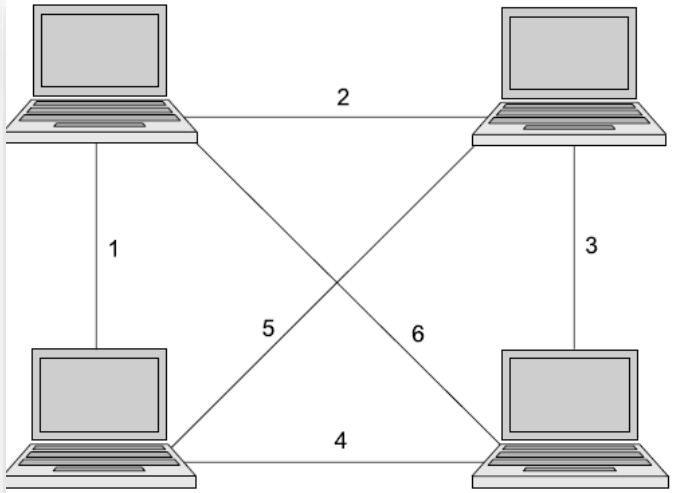
A linear bus topology



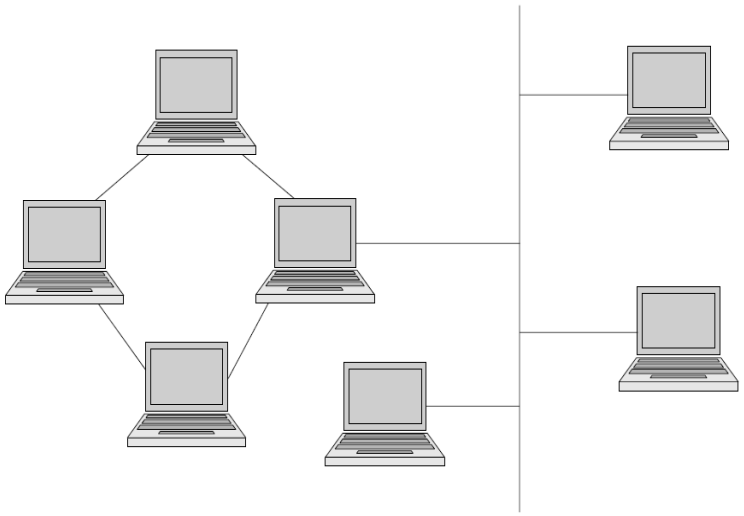
A star topology



A ring topology



Mesh topology



A hybrid topology

What Is Network Security?

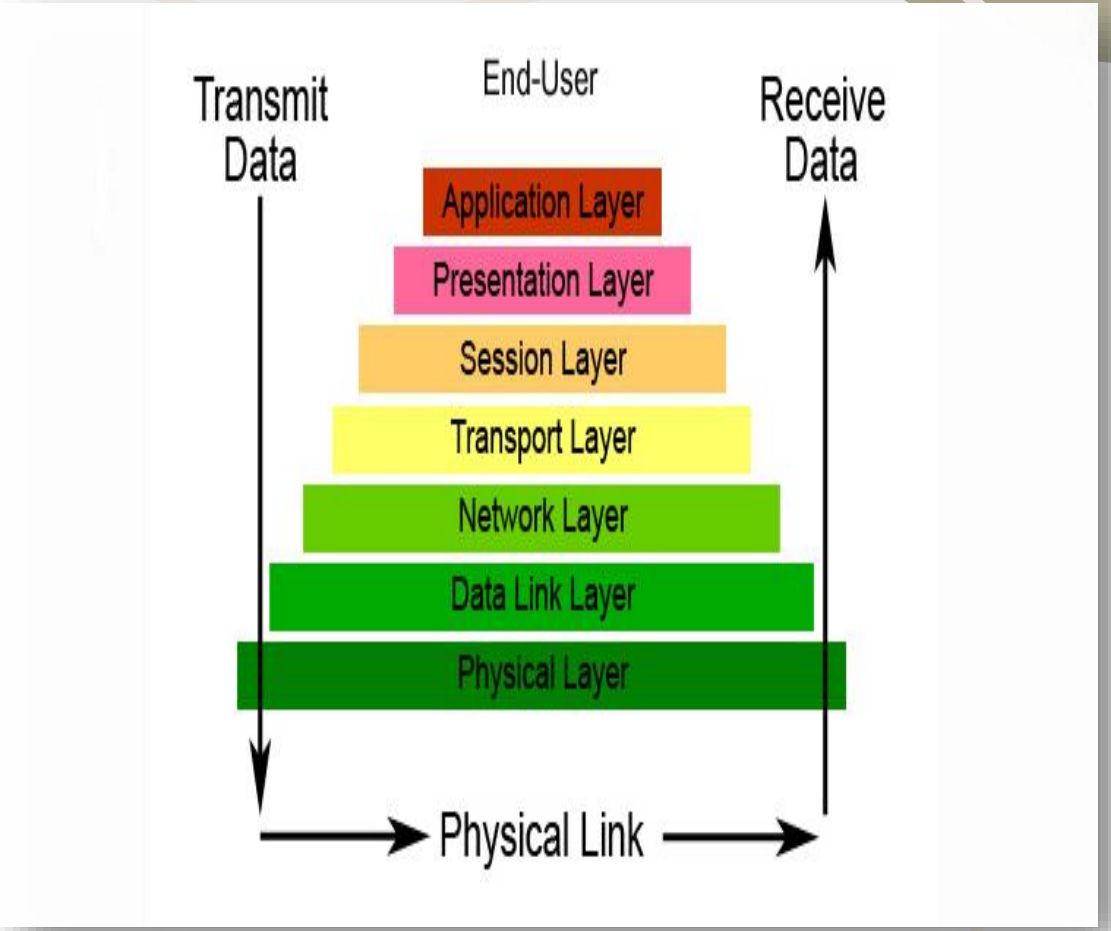
- Every company or organization that handles a large amount of data, has a degree of solutions against many cyber threats.
- This is a broad, all-encompassing phrase that covers software and hardware solutions, as well as procedures, guidelines, and setups for network usage, accessibility, and general threat protection.
- The most basic example of **Network Security** is **password** protection which the user of the network chooses.
- In recent times, Network Security has become the central topic of cyber security with many organizations inviting applications from people who have skills in this area.
- The network security solutions protect various vulnerabilities of the computer systems such as **users**, **location**, **data**, **devices**, and **applications**.

Cont.

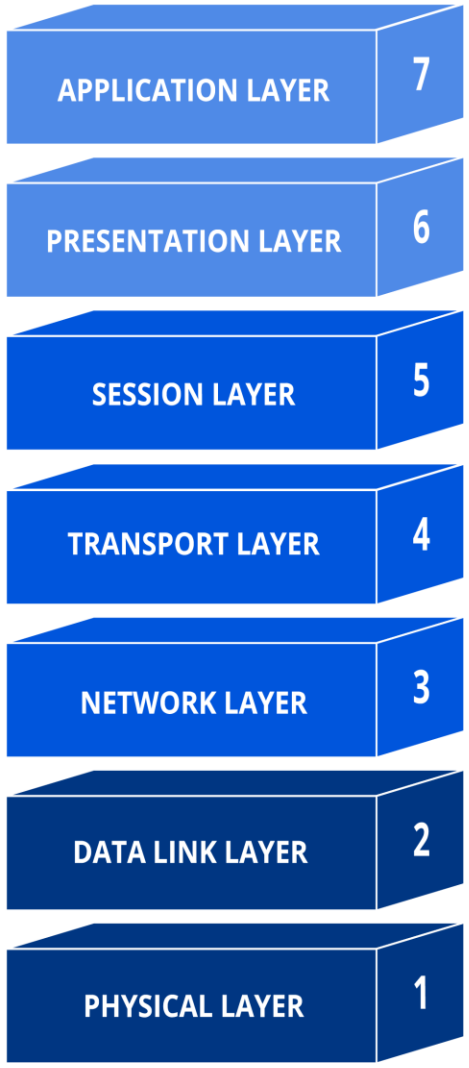
- Any action intended to **safeguard** the integrity and usefulness of your data and network is known as **network security**.
- In other words, **Network security** is defined as the **activity** created to protect the integrity of your network and data.
- **Network security** is the practice of **protecting** a computer network from **unauthorized** access, misuse, or attacks.
- It involves using **tools**, **technologies**, and **policies** to ensure that data **traveling** over the network is **safe** and **secure**, keeping sensitive information away from **hackers** and other **threats**.

How Does Network Security Work?

- Network security uses **several layers** of protection, both at the edge of the network and within it.
- Each layer has **rules** and controls that determine who can access network resources.
- People who are **allowed** access can use the network safely, but those who try to **harm** it with attacks or other threats are **stopped** from doing .



The open systems interconnection (OSI) model



— Human-computer interaction layer, where applications can access the network services

— Ensures that data is in a usable format and is where data encryption occurs

— Maintains connections and is responsible for controlling ports and sessions

— Transmits data using transmission protocols including TCP and UDP

— Decides which physical path the data will take

— Defines the format of data on the network

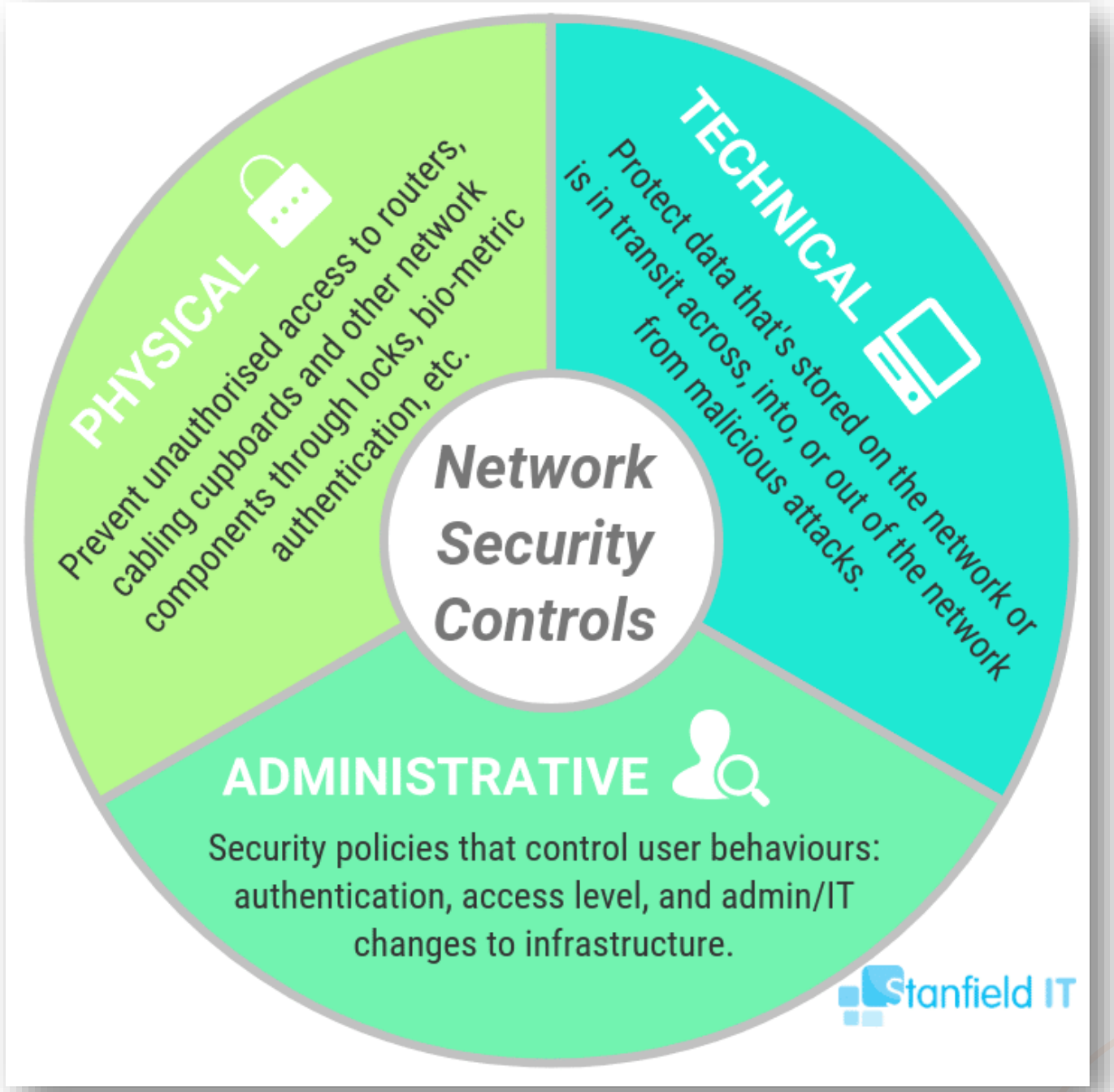
— Transmits raw bit stream over the physical medium

The basic principle of network security is protecting huge stored data and networks in layers that ensure the **bedding** of rules and regulations that have to be **acknowledged** before performing any activity on the data. These **levels** are:

- **Physical Network Security:** This is the most **basic** level that includes **protecting** the **data** and network through unauthorized personnel from acquiring control over the confidentiality of the network. The same can be achieved by using devices like **biometric** systems.

- **Technical Network Security:** It primarily focuses on protecting the data **stored** in the network or data involved in **transitions** through the network. This type serves two purposes. **One** is protected from **unauthorized** users, and the other is protected from **malicious** activities.

- **Administrative Network Security:** This level of network security **protects** user **behavior** like how the permission has been **granted** and how the **authorization** process takes place. This also ensures the level of sophistication the network might need for protecting it through all the attacks. This level also **suggests** necessary **amendments** that have to be done to the **infrastructure**.


PHYSICAL
Prevent unauthorised access to routers, cabling cupboards and other network components through locks, bio-metric authentication, etc.
TECHNICAL
Protect data that's stored on the network or is in transit across, into, or out of the network from malicious attacks.
Network Security Controls
ADMINISTRATIVE
Security policies that control user behaviours: authentication, access level, and admin/IT changes to infrastructure.
Stanfield IT

Types Of Network Security

- There are **several** types of network security through which we can make our network more secure,
- Your network and data are **shielded** from breaches, invasions, and other dangers by network security. Here below are some important **types** of network security:

- **Email Security**
- **Network Segmentation**
- **Access Control**
- **Sandboxing**
- **Cloud Network Security**
- **Web Security**
- **Intrusion Prevention System(IPS)**
- **Antivirus and Anti-malware Software**

- **Firewalls Security,**
- **Application Security,**
- **Wireless Security,**
- **Web Security,**
- **Mobile Device Security,**
- **Industrial Network Security,**
- **VPN Security**

Benefits Of Network Security

Network Security has **several** benefits, some of which are mentioned below:

- Network Security helps in **protecting** **clients** information and data which ensures **reliable** access and helps in protecting the data from **cyber** threats.
- Network Security **protects** the **organization** from **heavy losses** that may have occurred from data **loss** or any security **incident**.
- It overall protects the **reputation** of the organization as it **protects** the data and **confidential** items.

Advantages Of Network Security

- **Protection from Unauthorized Access:** Network security measures such as **firewalls** and **authentication** systems prevent unauthorized users from accessing sensitive information or disrupting network operations.
- **Data Confidentiality:** **Encryption** technologies ensure that data transmitted over the network **remains** confidential and cannot be intercepted by unauthorized parties.
- **Prevention of Malware and Viruses:** Network security solutions like **antivirus** software and intrusion detection systems (IDS) detect and block **malware**, **viruses**, and other **malicious** threats before they can infect systems.
- **Secure Remote Access:** Virtual private networks(**VPNs**) and other secure remote access methods enable employees to work **remotely** without compromising the security of the organization's network and data.

Disadvantages Of Network Security

- **Complexity and Management Overhead**: Implementing and managing network security measures such as **firewalls**, **encryption**, and **intrusion detection systems**(**IDS**) can be complex and require specialized knowledge and resources.

- **Cost:** Effective network security often requires **investment** in hardware, software, and skilled personnel, which can be **expensive** for organizations, especially smaller ones.

- **Privacy Concerns**: Some network security measures, such as deep packet **inspection** and **monitoring**, may raise privacy concerns among users and **stakeholders**, requiring careful balancing of security needs with individual **privacy rights**.

In **conclusion**, network security is **essential** for protecting computer networks from unauthorized access, data breaches, and cyber attacks. By implementing **layers** of defenses such as **firewalls**, **encryption**, and **intrusion detection systems**. Organizations can safeguard their data and systems from **malicious** actors.

Regular **updates**, strong **passwords**, and user **education** are also vital to maintaining network security. Ultimately, a well-managed network security strategy ensures safe and reliable communication while **mitigating** potential risks and **vulnerabilities**.

Lecture II: E-Commerce



E-COMMERCE CONCEPTS

- **E-Commerce** stands for '***Electronic Commerce***'. It refers to **buying** and **selling** of goods, products, or services over **the internet**.
- **E**-commerce as **anytime** commerce is the ability to buy and sell goods and services **online** at any time of day or night, from anywhere in the world, e-commerce **websites** are hosted on the internet, which is accessible **24/7**.
- **E**-commerce is a **powerful** tool that can be used to **improve** the customer **experience** and increase sales. This can be especially convenient for people who work long hours or who have **busy** lifestyles.
- Some examples of anytime commerce:
  - ✓ You can shop on **Amazon** at any time of **day** or **night**, from anywhere in the world.
  - ✓ You can order a **dinner** from **Pizza Hut** online and have it **delivered** to your door in minutes.
  - ✓ You can book a flight or Hotels at any time of day, even if it's in the **middle** of the night.
- The term **'e-Commerce'** also comprises other activities including- **online** auctions, internet **banking**, payment gateways, and online **ticketing**. **E**-Commerce is also known as **'Internet Commerce'.**

Features Of E-commerce

- **Cashless Payment:** E-Commerce allows the use of electronic **payment**. It allows the transaction from *credit cards*, *debit cards*, *electronic fund* transfer via **bank's** website, and other electronic payment methods.
- **24x7 Availability**: E-Commerce provides ***24x7*** service availability. It is available anywhere, anytime.
- **Improved Sales**: Using e-commerce, orders for the products can be generated anytime, anywhere without any ***human intervention***. It gives a big **boost** to existing sales volumes.
- **Advertising and Marketing**: E-Commerce helps in good marketing management of products and services. It helps to increase the reach of ***advertising*** of products and services of businesses.
- **Support**: E-commerce *provides* various ways to provide **pre-sales** and **post-sales** assistance to provide better services to customers.
- **Improvement in Communication:** E-commerce gives **faster**, **efficient** and **reliable** communication with customers and partners.
- **Global Reach**: It enables a **business** to easily reach across **geographic boundaries**.

Electronic Banking



- ✓ A range of services enabling financial transactions via electronic channels, providing consumers and businesses with efficient ways to manage their finances.
- ✓ Enhances convenience and accessibility.
- ✓ Reduces the need for physical bank visits.
- ✓ Online banking platforms are integral to modern banking, offering users a comprehensive suite of services.

Features of Online Banking

Online banking platforms are integral to modern banking, offering users a comprehensive suite of services. Features are:

- ✓ **Account Aggregation:** Link accounts from **multiple** banks for a single view of finances.
- ✓ **Budgeting Tools**: Tools to **track** spending, categorize expenses, and set budgets.
- ✓ **Financial Planning:** Access to financial advisors and planning tools for goals and retirement.
- ✓ **Personalized Offers:** Tailored promotions based on spending habits

Benefits Of Online Banking

- ✓ **Convenience:** Perform **transactions** from anywhere at any time without visiting a physical bank branch.
- ✓ **Reduced Costs:** Lower operational costs for banks can translate to **lower fees** for customers.
- ✓ **Eco-Friendly: Reduces** the need for **paper** statements and receipts, contributing to environmental sustainability.



Security Of Online Banking

- ✓ **Encryption**: Advanced **encryption** methods protect sensitive customer information transmitted over the internet.
- ✓ **Two-Factor Authentication (2FA):**Many banks require an **additional verification** step (such as a text message code) for enhanced security.
- ✓ **Fraud Monitoring**: Sophisticated **algorithms** monitor account activity for **suspicious** transactions, **alerting** customers of anomalies.



ATM And Debit Card Services

The integration of **A**utomatic **T**eller **M**achines (**ATMs**) and **debit cards** into everyday banking enhances user convenience. **ATM** services such as:

- ✓ ATMs in tourist areas allow **withdrawals** in multiple currencies, facilitating international travel.
- ✓ Some ATMs enable customers to **withdraw** cash without a card by using a **mobile app.** for authentication.
- ✓ Advanced ATMs can **automate** the entire deposit process, including **check scanning** and cash counting.



Benefits Of Debit Card Services:

- ✓ **Budget Control:** Debit cards allow users to **spend** only what they have in their **accounts**, helping avoid debt.
- ✓ **Wide Acceptance:** Debit cards are **accepted** globally for online and **in-store purchases**, making them versatile.
- ✓ **Loyalty Programs:** Many banks **offer** rewards or cashback programs linked to debit card usage, **incentivizing** regular use.

Security Of Debit Cards:

- ✓ **Chip Technology:** **EMV chips** on debit cards provide enhanced security compared to **magnetic** stripes, reducing **skimming** risks.
- ✓ **Card Lock Features:** Many banks allow users to **lock** or **unlock** their debit cards via their **mobile app**, providing immediate control.
- ✓ **Fraud Alerts:** Banks monitor transactions for **unusual** activity and **notify** customers if suspicious transactions are detected**.**



Phone Banking

Phone banking remains a crucial service, especially for customers who prefer **personal** interaction or do not have internet access with features:



- ✓ **Automated** systems **guide** users through transactions via **voice** prompts, allowing efficient service.
- ✓ Customers can **speak** to bank *representatives* for assistance with account issues, fraud reports, or inquiries.
- ✓ Users can request **recent** transactions, account **balances**, and **mini-statements** via phone.

Benefits Of Phone Banking

- ✓ **Phone banking** is available **24/7**, allowing customers to access services without needing **internet connectivity**.
- ✓ **Customers** can receive **tailored** assistance based on their individual banking needs.
- ✓ **Phone banking** serves those who may **struggle** with online banking technology.

Security in Phone Banking

- ✓ Some banks use **voice biometrics** for authentication, **adding** an extra layer of security.
- ✓ **Banks** monitor calls for quality **assurance** and **fraud** detection, ensuring customer safety.

SMS Banking

SMS banking is particularly useful in areas with limited **internet** access, providing **essential** banking **services** through **text** messages with features:

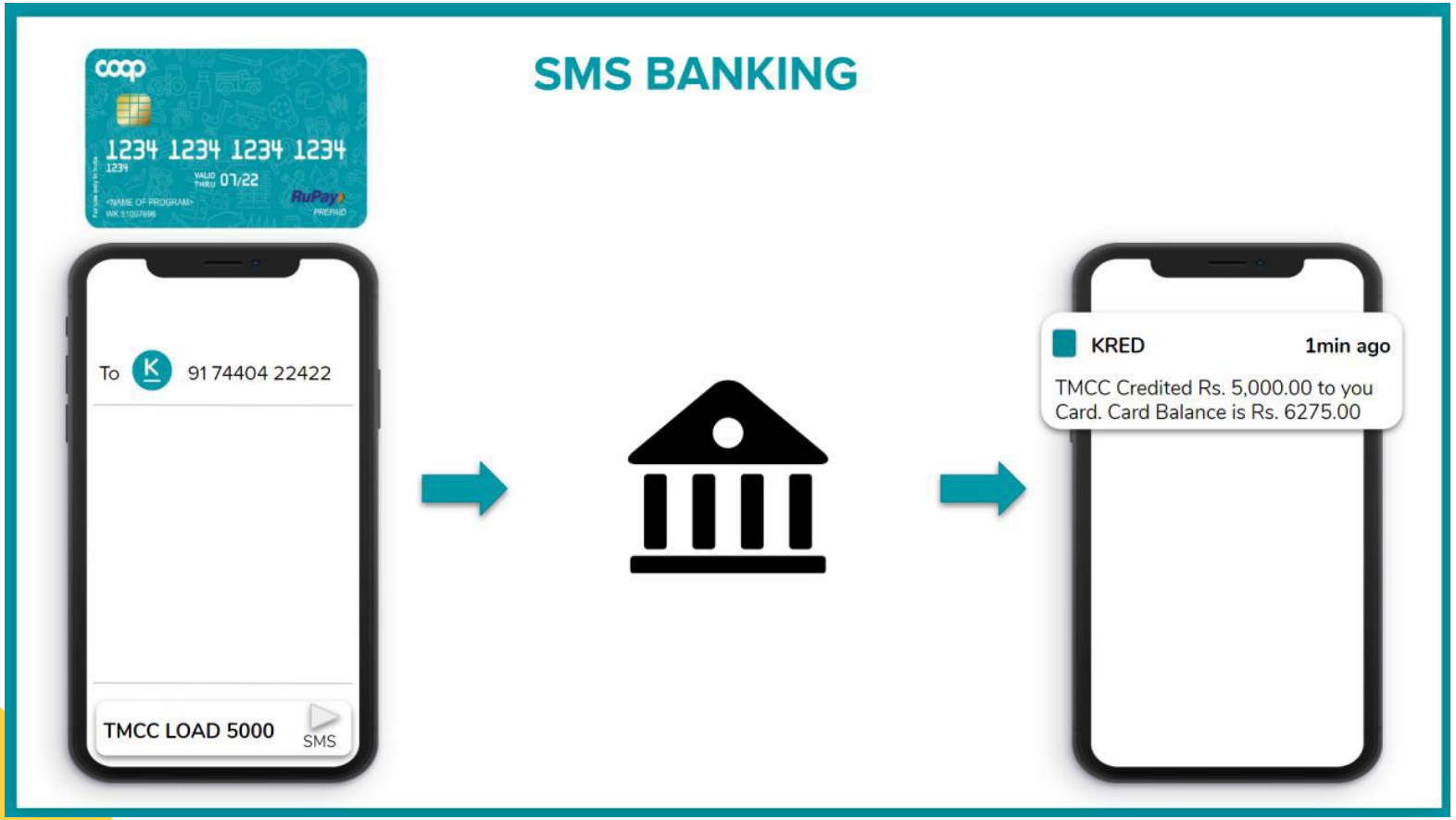
- ✓ Users can **customize** alerts for specific account activities, such as **deposits**, **withdrawals**, or low balance notifications.
- ✓ Some banks allow users to **initiate** transfers or payments through SMS commands.
- ✓ **Notifications** can be sent if transactions are attempted from locations outside of the user's usual patterns.

Benefits Of SMS Banking:

- ✓ Users receive **immediate** notifications regarding their account activities.
- ✓ SMS banking is **straightforward**, requiring only basic mobile phone capabilities.
- ✓ SMS banking often incurs **lower fees** than mobile data usage, making it accessible for all users.

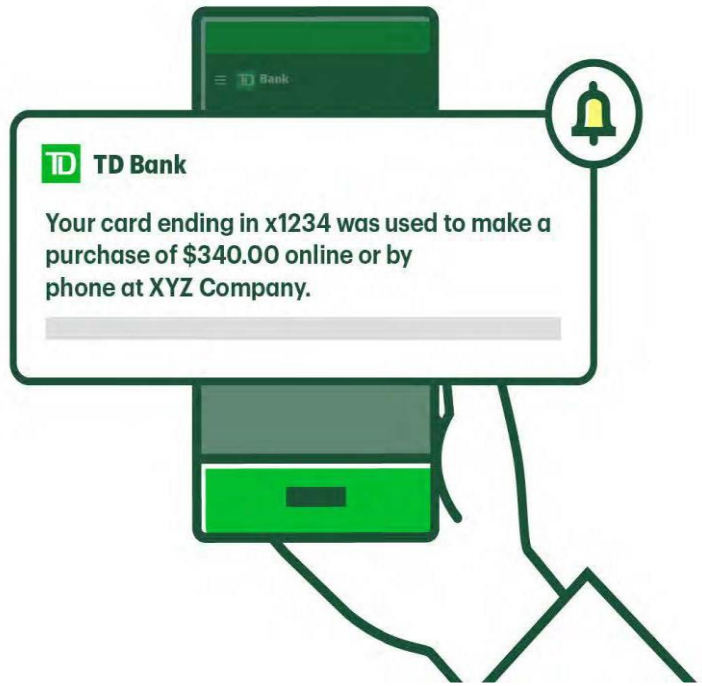
Security For SMS Banking:

- ✓ While SMS is generally secure, banks encourage users to be cautious about sharing personal information via text.
- ✓ Users are advised to set alerts that are specific enough to reduce false alarms but comprehensive enough to catch fraudulent activities.



Electronic Alerts

Electronic alerts have become an **integral** part of customer communication, enhancing user engagement and security.



✓ **Notifications** about changes in a user's **credit** score, providing insights for financial management.

✓ Alerts **confirming** successful **payments** or **transactions**, assuring customers that their requests have been processed.

✓ **Banks** can **send** personalized **offers** based on a user's account history or spending patterns.

Benefits Of Electronic Alerts

✓ **Customers** can stay informed about their account activity, helping **identify** unauthorized transactions quickly.

✓ Alerts can help users **manage** their finances more **effectively** by providing timely reminders for payments and account balances.

✓ **Immediate** notifications about suspicious activity **empower** users to take **swift** action if they detect fraud.

Mobile Banking

Mobile banking applications have rapidly evolved, incorporating advanced technologies to enhance user experience.

- ✓ Many **mobile banking** apps include **budgeting** tools, **expense** tracking, and **financial** goal setting.
- ✓ Users can **link** their bank accounts to mobile **wallets** like **Apple Pay** or **Google Pay** for contactless transactions.
- ✓ **Apps** can **send** real-time notifications for *transactions*, *promotional* offers, and *security* alerts.
- ✓ Some **banks** offer **video** consultations with representatives, allowing for ***face-to-face*** interactions from anywhere.



Benefits Of Mobile Banking

- ✓ **Users** can manage their finances from *anywhere*, making it convenient for busy lifestyles.
- ✓ **Mobile banking** allows for **immediate** access to account **updates** and **transaction** alerts.
- ✓ **Modern** apps *focus* on user **experience**, often providing a more **intuitive** interface than **traditional** online banking.

Security in Mobile Banking

- ✓ **Mobile** banking apps often use **multiple layers** of security, including **biometric** authentication, **password** protection, and **encryption**.
- ✓ Banks frequently **update** their apps to address security vulnerabilities and enhance features.
- ✓ Banks **educate** *customers* about safe **practices**, such as *not accessing* banking apps over **public Wi-Fi** networks to mitigate security **risks**.

Future of Mobile Banking

- ✓ Banks are **increasingly** using **AI** to enhance customer service through **chatbots**, **predictive analytics**, and **fraud detection**.
- ✓ **Adoption** of **blockchain** for secure and *transparent* **transactions**, particularly for **cross-border** payments.
- ✓ Regulatory changes push banks to **share** customer data with **third-party providers** for *innovative* financial products through APIs.
- ✓ The **rise** of **neobanks**, which focus exclusively on **digital** services, catering to **tech-savvy** consumers.
- ✓ Ongoing investment in **advanced** **cybersecurity** measures to protect against rising threats.



Lecture III: Computer Troubleshooting

Mohammed Q. Ali

Introduction To Computer Troubleshooting

- **Troubleshooting:** is the process of figuring out how to **solve** a computer **problem**. Even with the most updated software and hardware, occasionally computers can malfunction.

Why It's Important :

- ✓ **Keeps** computers running smoothly.
- ✓ **Saves** *time* and *money* by avoiding **repairs**.
- ✓ **Helps** build skills you can use in *tech jobs.*

Types Of Computer Problems

Two Main Types:

- **Hardware Problems:** Physical parts like *keyboard, mouse, or hard drive.*
- **Software Problems:** Programs and *apps* not working correctly.

Planning to Solve a Problem

1) **Must** figure out which *part* of the system is **malfunctioning**.
2) **Need** to check each component of the computer, unless it is **obvious** where the problem is coming from.
3) **Isolating** the problem will help you solve the problem **quickly**.
4) **Knowing** how to solve these problems with a shortcut perhaps using only a few keys on the *keyboard* can save time and effort.
5) **Backing up** your important computer files to another source will ensure that if your problem cannot be corrected, you will still have a **safe copy** of your information.

Basic Troubleshooting Steps

1) **Close** open programs and windows you are **not** currently using.
2) **Make** sure all of your **cords** are connected properly.
3) **Try** to **repeat** the *sequence* of commands you performed before the problem occurred. See if this causes the same response by your computer.
4) **Press** the **F1** key to access the Help window. You can **search** for a solution to your problem once the Help window appears.
5) **If** there is an **error** message, record the full message for *future* reference.
6) **Restart** your computer to see if it clears the problem.
7) **If** **restarting** the computer does not clear the problem, **shut down** the computer and then *start* it back up again.

Common Technology Issues

1) The **printer** is not working.
2) The computer is **frozen**.
3) A **program** is not responding.
4) The **keyboard** is not working.
5) New **hardware** or **software** is working **incorrectly**.
6) The **mouse** is not working.
7) The **computer** is **slow**.
8) The **browser's** homepage suddenly **changed**.

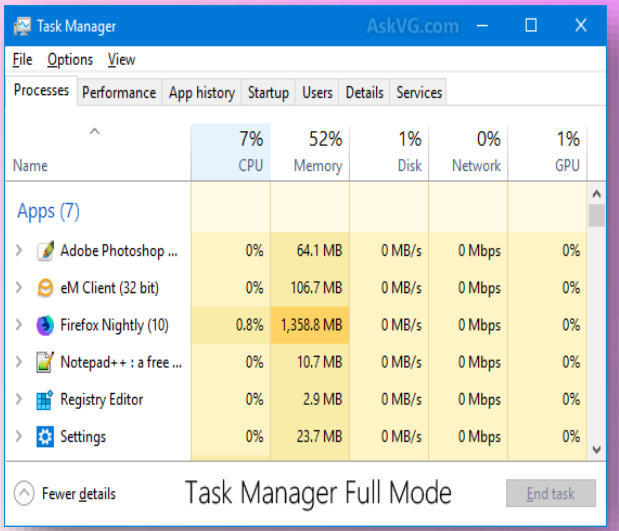
Issue: The printer is not working

1) **Check** if the printer is **turned on**.
2) **Check** if the printer has **paper**.
3) **Check** if the printer has a **paper jam**.
4) **Ensure** that all printer **cables** are properly **connected**.
5) **Turn off** the printer and **turn on** again.
6) **Restart** the computer and try again.
7) **Check** to see if a **new** printer **driver** is needed.
8) **Seek** assistance from your system **administrator** before **installing** any *drivers*.



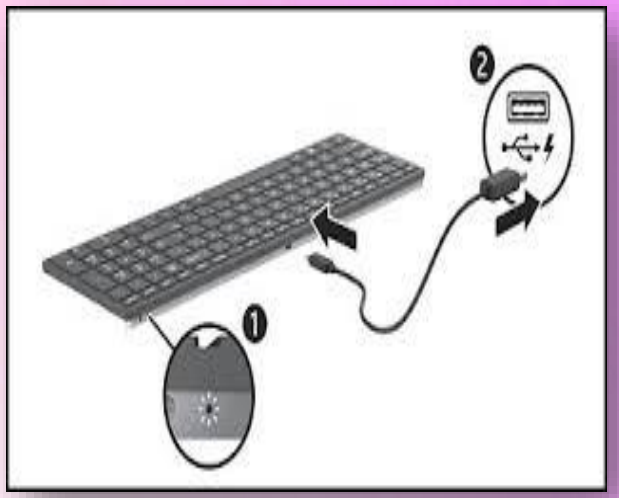
Issue: The computer is frozen. A program is not responding.

1) **Push** the **Ctrl**, **Alt**, and **Delete** keys at the *same time* *or* **R-Click** *on* **Taskbar** and choose **Task Manager**.
2) **Start** the **Task Manager**, highlight the program's name, and hit the **End Task** button.
3) **Perform** a hard **reboot** by simply pressing the **on/off** button to **turn off** the computer **manually**. This action should only be done as a last resort if you have an **unresponsive** program or **critical** error.
4) **Once** the computer is **responding** again, run a **virus check**.



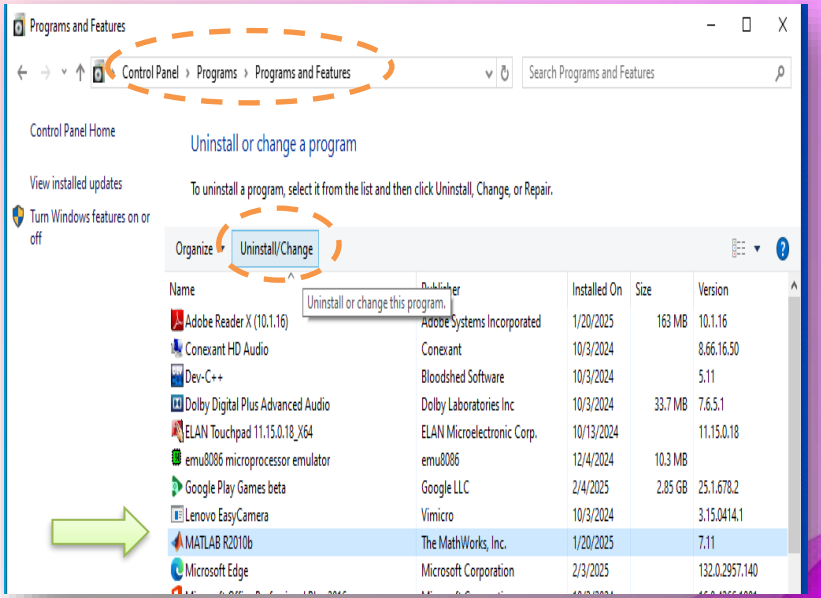
Issue: The keyboard is not working.

1) **Make** sure the **keyboard** is connected to the computer.
2) **If** you are using a **wireless** keyboard, try changing the **batteries**.
3) **If** one of the keys on your keyboard gets **stuck**, turn the computer **off** and clean with a **damp** cloth.
4) **Use** the **mouse** to **restart** the computer.



Issue: New hardware or software is working incorrectly.

1) **Verify** your computer meets the **requirements** of the program or utility.
2) **Uninstall** and **install** the program by opening the **Programs And Features** window form **Control Panel** and highlight the program then click **uninstall.**
3) There could be a **conflict** with another installed program and you should contact your system **administrator**.



Issue: The mouse is not working correctly.

1) **Check** if the mouse is **securely** plugged into the computer.
2) **Check** to see if the **cord** has been damaged. If so, the mouse may need **replacing**.
3) If you are using a **cordless** mouse, try pushing the connection button on the underside of the mouse to **reestablish** a connection.
4) **Clean** the mouse, especially on the **bottom**.

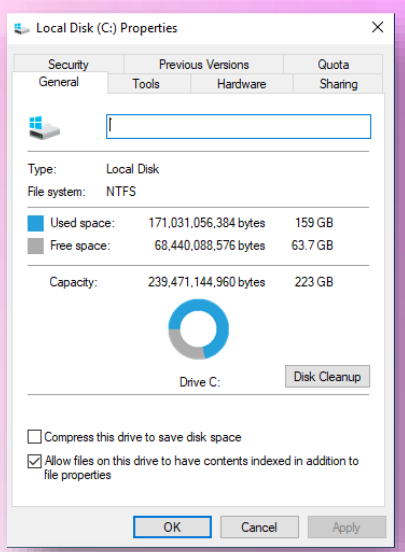


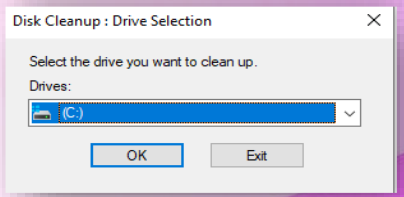
Issue: The computer is slow.

1) **Restart** your computer

2) **Verify** that there is at least **200-500 MB** of free **hard** drive space.
   - **Empty** your **recycle bin**
   - **Check** your **mail files,** remove any large **attachments** and delete **unused** mail.
   - **Images** and **videos** take up a lot of space, so consider **moving** those to an external drive.
   - **Perform** a **disk cleanup,** to do so:
     - ✓ **Open** Computer window "**This PC**" , and **R-Click** on selected drive and choose "**Properties**" then hit "**disk cleaner**".
     - ✓ **OR** write "**disk cleaner**" in **search** field in **Taskbar**

Once the **Disk Cleanup** finishes running, **click** on "**Clean up System Files**"; this will **delete** any unnecessary **system-related files** from your **local disk (C:)**





Issue: The computer is slow.(Cont..)

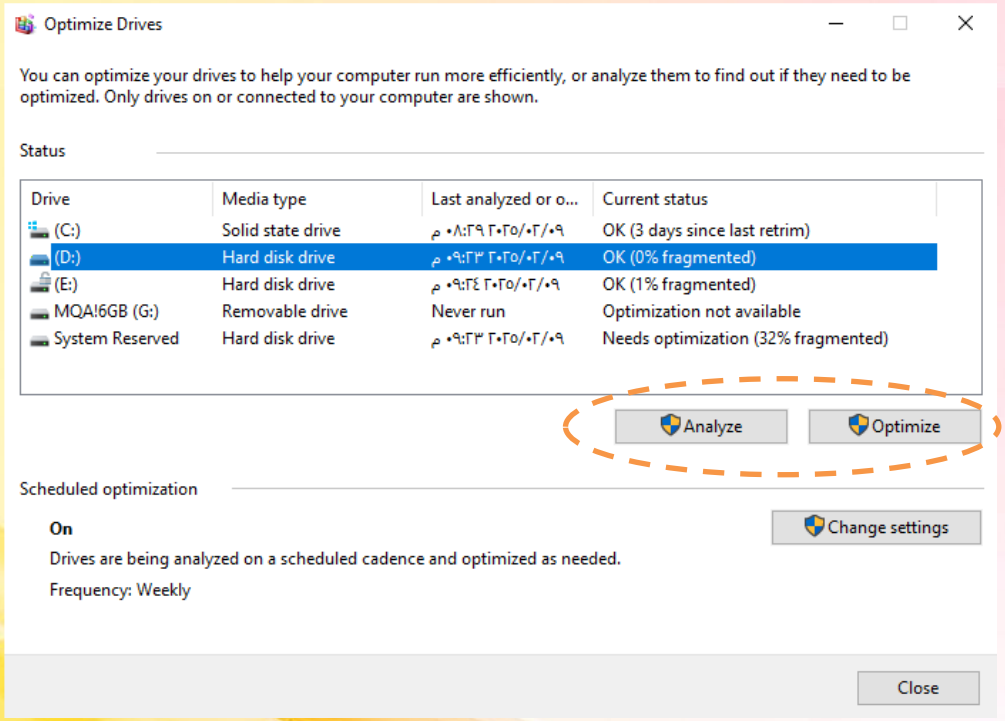
3) **Information** in computer files **changes** often, **resulting** in **gaps** or **spaces** within the file. This takes up **more** space on the computer and can cause the computer to **slow down**. To **reclaim** these gaps in space. To do so:

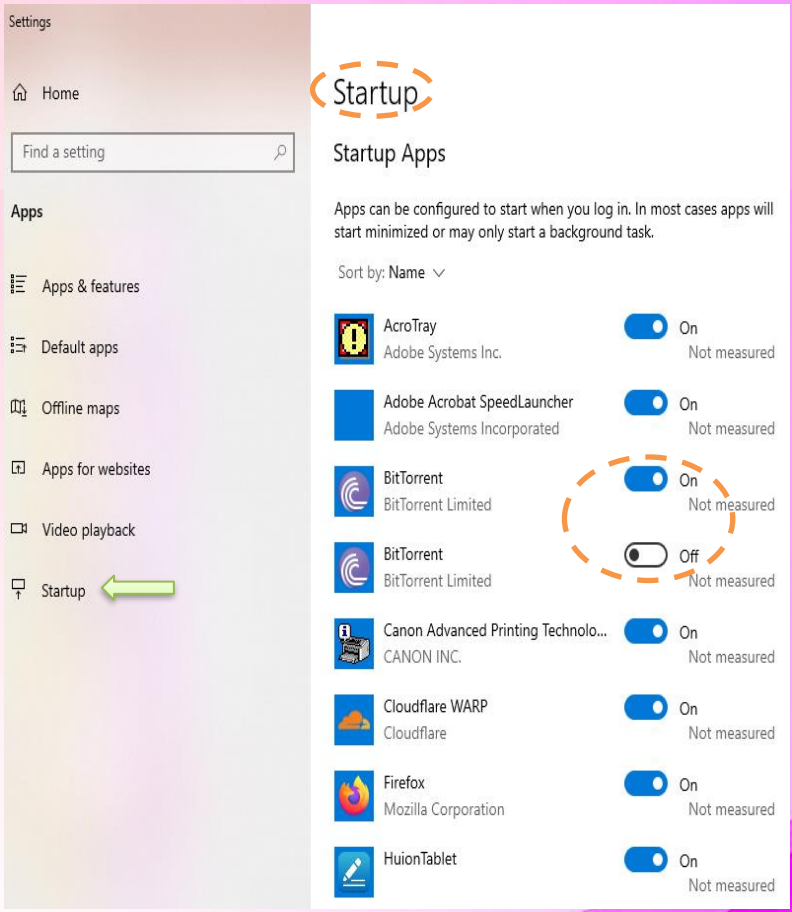
   - ✓ run "**defragment and optimize"** by **writing** it in **search** field in **Taskbar**
   - ✓ Once the window opens **select** the drive and hit "**Analyze**", when finished hit "**Optimize**"

4) **Old** or **unused** programs that aren't being used may still have components **running** behind the scenes when you start your computer

   - ✓ **Remove unused** shortcuts from Windows "**startup App"** by **writing** it in **search** field in **Taskbar,** then **select** applications to make them **(On | Off)**

5) **Run** a **virus scan** to remove potential **viruses** that can **slow** down your computer.


Optimize Drives
You can optimize your drives to help your computer run more efficiently, or analyze them to find out if they need to be optimized. Only drives on or connected to your computer are shown.
Status
Drive
Media type
Last analyzed or o...
Current status
(C:)
Solid state drive
م ٠٨:٢٩ ٢٠٢٥/٠٢/٠٩
OK (3 days since last retrim)
(D:)
Hard disk drive
م ٠٩:٢٣ ٢٠٢٥/٠٢/٠٩
OK (0% fragmented)
(E:)
Hard disk drive
م ٠٩:٢٤ ٢٠٢٥/٠٢/٠٩
OK (1% fragmented)
MQA!6GB (G:)
Removable drive
Never run
Optimization not available
System Reserved
Hard disk drive
م ٠٩:٢٣ ٢٠٢٥/٠٢/٠٩
Needs optimization (32% fragmented)
Analyze
Optimize
Scheduled optimization
On
Change settings
Drives are being analyzed on a scheduled cadence and optimized as needed.
Frequency: Weekly
Close


Settings
Home
Find a setting
Apps
Apps & features
Default apps
Offline maps
Apps for websites
Video playback
Startup
Startup
Startup Apps
Apps can be configured to start when you log in. In most cases apps will start minimized or may only start a background task.
Sort by: Name
AcroTray
Adobe Systems Inc.
On
Not measured
Adobe Acrobat SpeedLauncher
Adobe Systems Incorporated
On
Not measured
BitTorrent
BitTorrent Limited
On
Not measured
BitTorrent
BitTorrent Limited
Off
Not measured
Canon Advanced Printing Technolo...
CANON INC.
On
Not measured
Cloudflare WARP
Cloudflare
On
Not measured
Firefox
Mozilla Corporation
On
Not measured
HuionTablet
On
Not measured

Issue: The Screen Is Blank

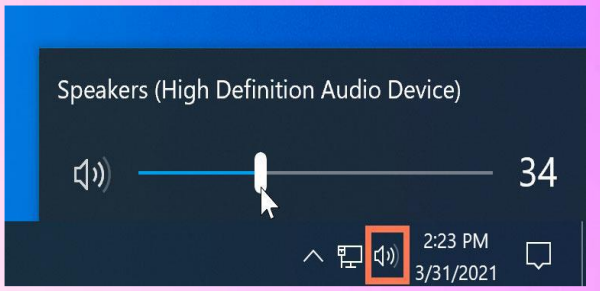
1) The **computer** may just be in **Sleep mode**. Simply **click** the mouse or *press* any key on the keyboard to **wake** it.
2) **Make** sure the **monitor** is **plugged** in and **turned on**.
3) For **desktop** computer, make sure the monitor **cable** is properly connected to the computer **case** and the **monitor**.

Issue: No Sound Hearing

1) **Check** the **volume level**. Click the **audio** button in the bottom-right corner of the screen to make sure the sound is **turned on** and the volume is **up**.

2) For **external speakers**, **check** the **cables**. Make sure are **plugged** in, **turned on**, and **connected** to the correct audio **port** or a **USB** port. If your computer has **color-coded** ports, the audio output port will usually be **green**.

3) **Connect** **headphones** to the computer to determine if you can **hear** sound from the headphones.



Issue: The browser's homepage suddenly changed.

- This is a common **symptom** that a virus or browser hijacker may have infected the computer.

1) Try re-setting the **home page** to the default

2) If the home page still **reverts** back to the "**new**" page, do an Internet **search** using **keywords** that include the name of the "**new**" homepage and the word "**virus**." If there is a virus, this search may **reveal** more information on the virus and how it can be safely **removed**.

3) Run a **virus scan**

Solving More Difficult Problems

- ✓ If you **still** haven't found a solution to your problem, you may need to **ask** someone else for help. As an easy starting point, we'd recommend **searching** the **Web**. It's possible that **other users** have had **similar** problems, and solutions to these problems are often **posted online**. Also, if you have a friend or family member who knows a lot about computers, they may be able to help you.





Lecture IV: Introduction to Artificial Intelligent (AI)

Mohammed Q. Ali

What is AI?

- **Artificial intelligence (AI)** : Is a term that refers to the **capability** of **machines** or **computer** programs to **perform tasks** that typically require human intelligence, such as **learning**, **problem-solving**, and **decision-making**.
- **AI** can be broadly categorized into **three** types:
  - ✓ **Narrow AI (Weak AI):** is designed to perform **specific** tasks or **solve** specific problems, such as image **recognition**, language **translation** and **virtual** assistants (like **Siri** or **Alexa**). It **relies** on machine learning **algorithms** that are trained on large datasets to **recognize** *patterns* and make **predictions** based on those *patterns*.
  - ✓ **General AI (Strong AI or):** aims to **replicate** human intelligence in a **broad** range of domains, such as **reasoning**, **perception**, and **creativity**. While **narrow AI** has made significant progress in recent years, **general AI** remains a long-term goal.
  - ✓ **Superintelligent AI:** is **theoretical** and refers to AI that **surpasses** human intelligence in every field: **creativity**, **decision-making**, **reasoning**, and more.

Artificial Narrow Intelligence (ANI)



Stage-1

Machine Learning

- Specialises in one area and solves one problem


Siri


Alexa


Cortana

Artificial General Intelligence (AGI)



Stage-2

Machine Intelligence

- Refers to a computer that is as smart as a human across the board

Artificial Super Intelligence (ASI)



Stage-3

Machine Consciousness

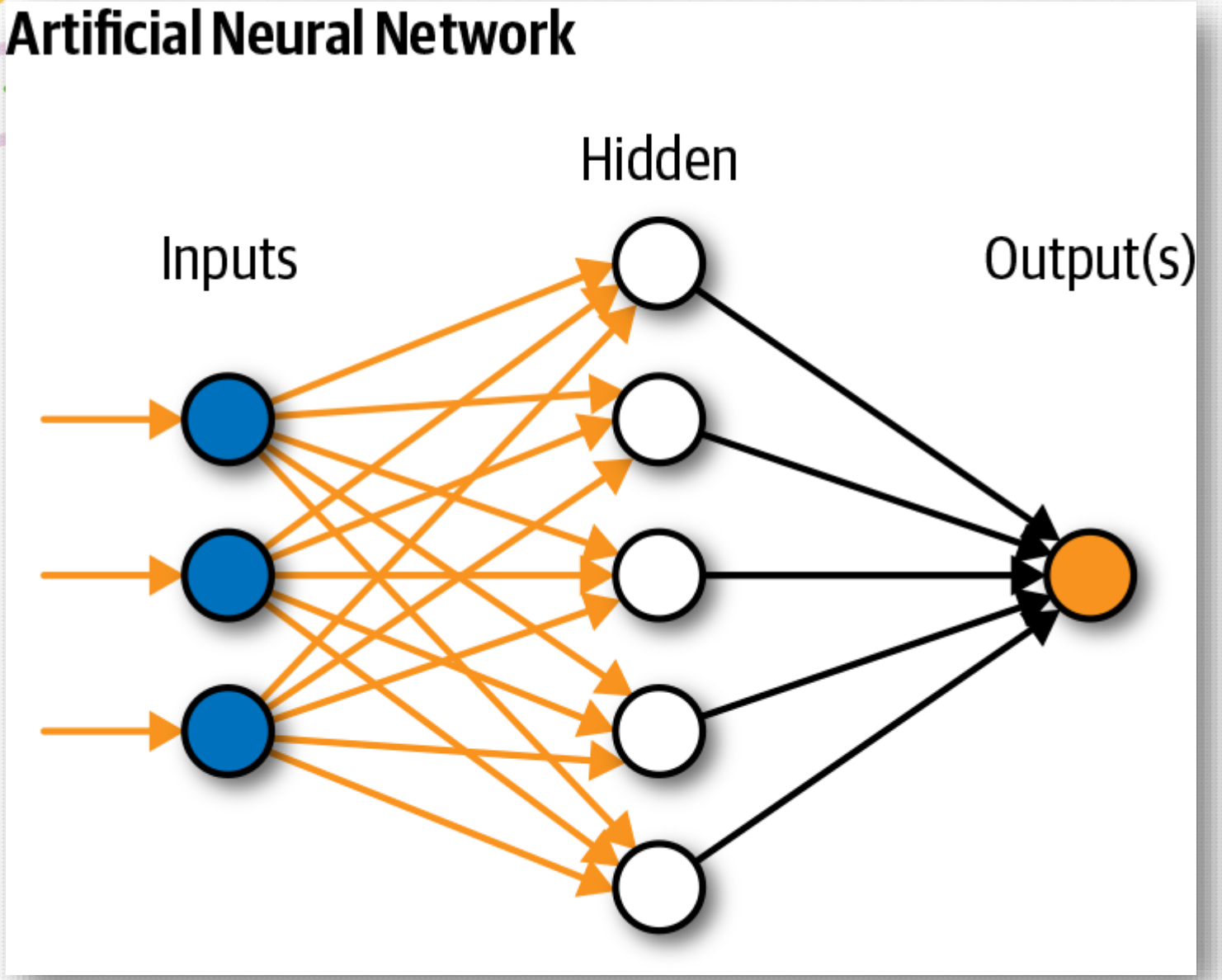
- An intellect that is much smarter than the best human brains in practically every field

What is AI (cont..)

- **AI** works by **processing** large amounts of data, **identifying** patterns and **relationships**, and using that information to make **decisions** or take **actions**. This process is made possible by **algorithms** that are designed to learn from the data they are fed.
- One of the most common types of **AI algorithms** is **neural networks**, which are modeled after the structure and function of the **human brain**.
- These **networks** consist of **layers** of interconnected **nodes** that **process** information and **pass** it on to the next layer, allowing the algorithm to identify patterns and relationships in the data.

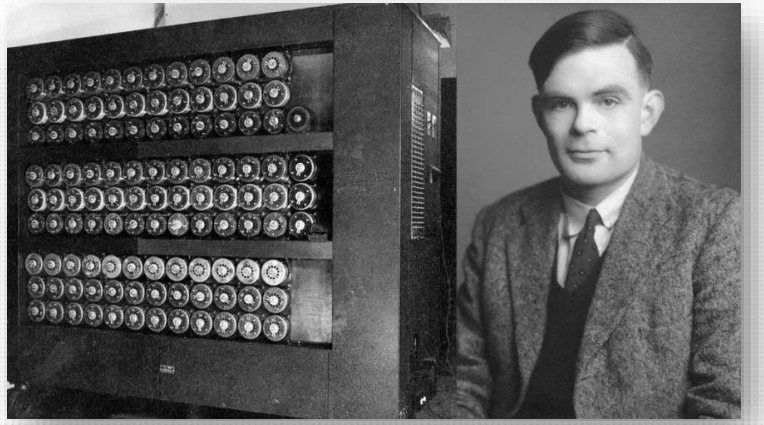


Artificial Neural Network



History of AI

- The history of AI and examine how this exciting field has evolved over time.
  - The **origins** of AI can be traced back to the **1950s**, when researchers began to explore the possibility of creating **machines** that could **think** and **reason** like **humans**. the early development of **AI** was the *mathematician* and *logician* **ALAN TURING**, introduced the "**Turing Machine**" used to measure its to *exhibit* **intelligent** behavior that was **indistinguishable** from that of a **human**.
  - In **1955**. The **Logic Theorist**, a program developed by **Allen Newell** and **J.C. Shaw** that could prove mathematical theorems.
  - In **1957**. This program was able to **solve** a range of problems by **searching** through a set of rules and making logical **deductions**.



History of AI (cont..)

- The **1960s** saw a **surge** of interest in **AI**, with researchers working to develop more advanced systems and applications. One notable example was the development of the first **expert system**, called **"Dendral"**, by Edward **Feigenbaum** and Joshua **Lederberg.**

- In **1965**. This system was designed to identify the **molecular** structure of **organic** compounds, and it proved to be **highly** successful in its field.

- The **1970s** and **1980s** saw further advances in **AI**, with researchers developing new **algorithms** and **techniques** for **machine learning**, **natural** language processing, and computer **vision**. One of the key breakthroughs during this period was the development of the first **neural network**, which was inspired by the structure of the human **brain**.

- Another important development was the creation of rule-based **expert systems**, which allowed computers to make **decisions** based on a set of **predefined** rules.

History of AI (cont..)

- In the **1990s** and **2000s**, **AI** continued to evolve rapidly, with researchers developing new techniques for **deep learning**, **natural** language processing, and **image recognition**.

- One of the most significant breakthroughs during this period was the development of the first **autonomous** vehicles, which used a combination of **sensors**, **machine learning algorithms**, and **computer vision** to navigate roads and highways.

- **Today**, AI is a rapidly growing field that is **transforming** the way we live and work. From **virtual** assistants like **Siri** and **Alexa** to **self-driving** cars and sophisticated **medical imaging** systems.

- **AI** is playing an increasingly important role in our daily lives. Some of the most exciting developments in AI today include the development of advanced **robots**, the creation of AI-powered **medical diagnosis tools**, and the use of machine learning algorithms to **analyze** large amounts of data and **identify** patterns.

AI Techniques and Approaches

- **AI** techniques and approaches can be broadly **categorized** into several key areas, each with its own **methods**, **algorithms**, and **applications**. Here's an overview of the major techniques and approaches used in **AI**:

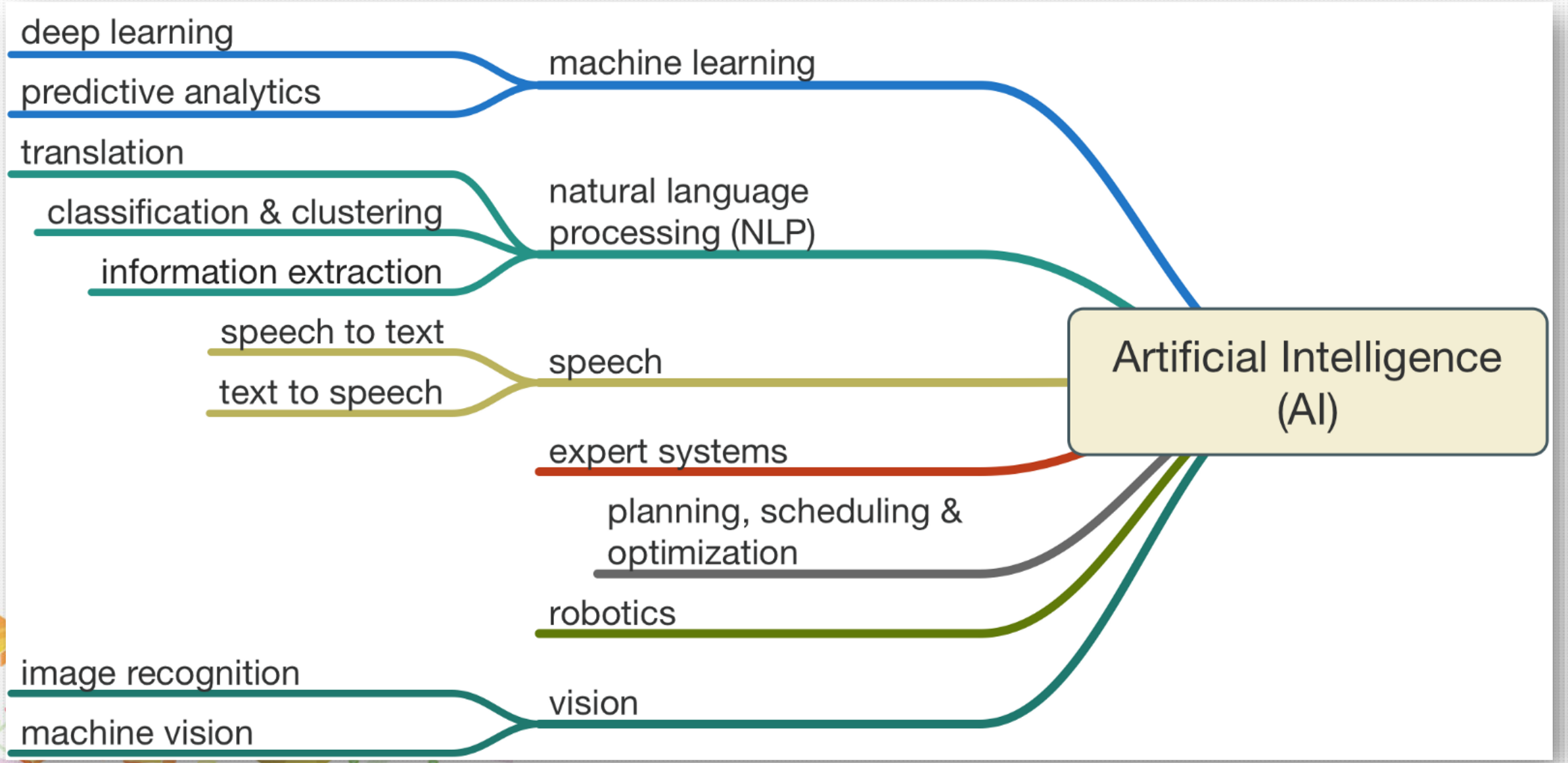
1) **Machine Learning (ML)**: is a **subset** of **artificial intelligence** (**AI**) that involves the use of **algorithms** and **statistical** models to enable machines to **learn** from data and improve their performance on specific tasks. The field with numerous applications across various **industries**, including **healthcare**, **finance**, **transportation**, and more.

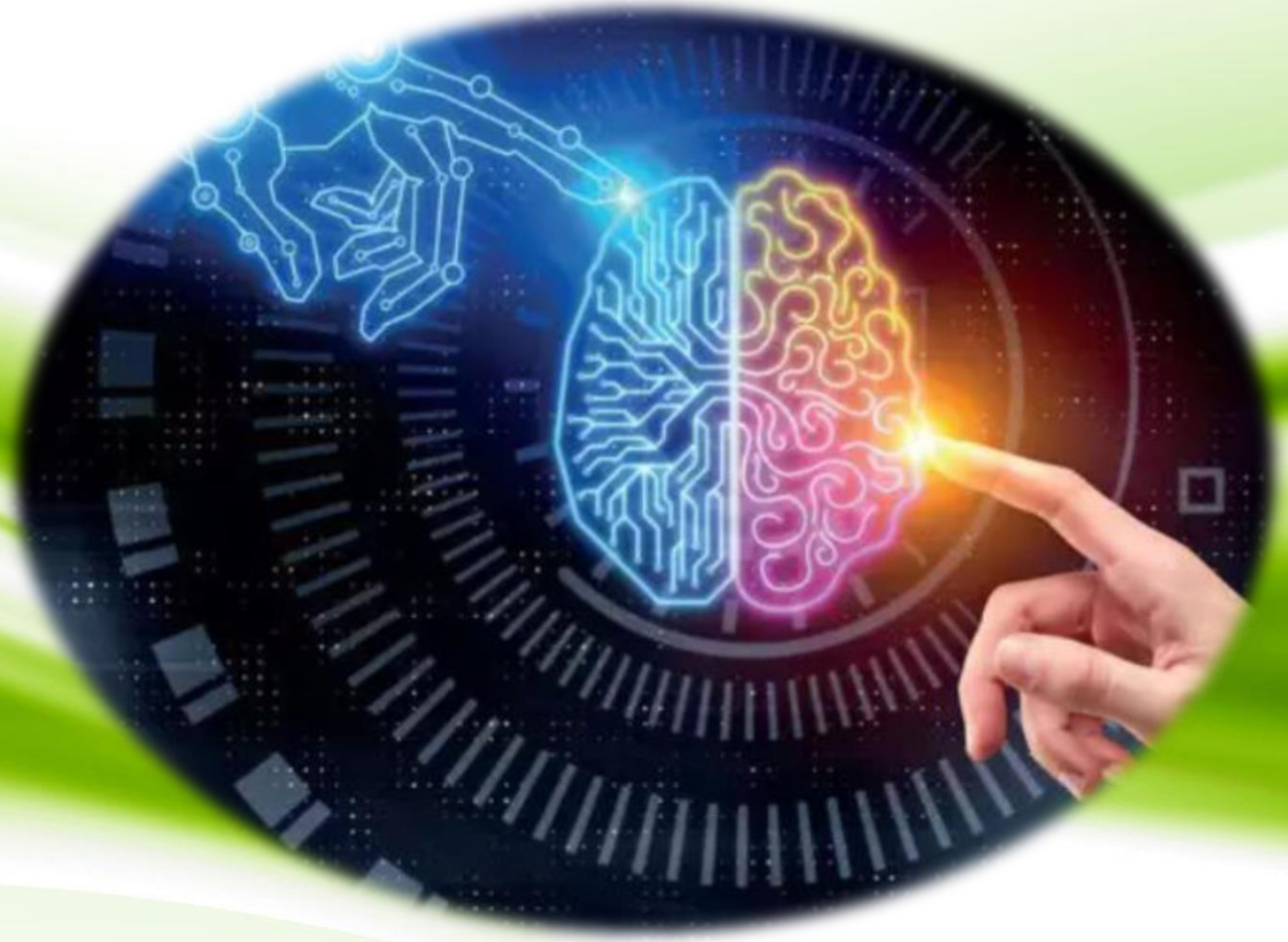
2) **Deep Learning (DL):** is a **subset** of **machine learning** that involves the use of artificial **neural networks** to enable machines to **learn** from data and perform **complex** tasks. Field that has **revolutionized** many **industries**, including **healthcare**, **finance**, and **transportation**.

3) **Natural Language Processing (NLP):** **NLP** focuses on the **interaction** between **computers** and **human languages**, enabling machines to **understand**, **interpret**, and **generate** text and speech.

AI Techniques and Approaches (cont..)

4) **Computer Vision:** enables **computers** to **interpret** and make **decisions** based on visual data (**images** and **videos**).
5) **Expert Systems:** These are **AI** programs designed to **solve** complex problems by **mimicking** the decision-making abilities of **human** experts. They use **rule-based** systems, knowledge **databases**, and inference **engines** to make **decisions**.
6) **Fuzzy Logic:** used to handle **uncertainty** and **imprecision** in data. Unlike traditional **binary** logic, which deals with true or false values, **fuzzy logic** allows for degrees of **truth**.
7) **Robotics:** **AI** techniques are applied to the development of **robots** that can **perceive** their environment, make **decisions**, and take **actions**.
8) **Knowledge Representation and Reasoning (KR&R):**This area **focuses** on how to represent **knowledge** about the **world** in a form that a computer can use to **solve** complex problems.
9) **Planning and Scheduling:** These **AI** techniques **focus** on automatically deciding the **sequence** of **actions** to achieve a **goal**.


Artificial Intelligence (AI)
machine learning
deep learning
predictive analytics
natural language processing (NLP)
translation
classification & clustering
information extraction
speech
speech to text
text to speech
expert systems
planning, scheduling & optimization
robotics
vision
image recognition
machine vision



Lecture V: [Key characteristics, Benefits, challenges and Ethical considerations] of AI

Mohammed Q. Ali

fppt.com

Key characteristics of AI

- **The key characteristics** of Artificial Intelligence (AI) refer to the **qualities** that define intelligent systems and **differentiate** them from traditional software or simple machines. Here are some of the most important characteristics of AI:

- **Learning Ability:** AI systems are capable of **learning** from data and experiences, improving their **performance** over time. This is the core of **machine learning** and **deep learning**.

Example: A recommendation system that improves its **suggestions** as it learns user preferences.

- **Adaptability:** AI systems can adjust to **new situations** and **changing** environments. They are able to modify their behavior based on **new** data or **unexpected** inputs.

Example: **Self-driving** cars that adjust their navigation based on traffic or road conditions.

- **Problem-Solving:** AI is capable of **analyzing** a problem, **breaking** it down into smaller parts, and finding solutions. It uses **algorithms**, **heuristics**, and **learned knowledge** to solve complex tasks.

Example: AI in **chess**, where the system **analyzes** potential moves and chooses the best course of action.

fppt.com

Key characteristics of AI (cont..)

- **Reasoning and Decision Making:** AI can **process** information and draw **conclusions** based on that data. This characteristic enables AI to make **decisions**, **plan actions**, and infer **conclusions** from given inputs.

Example: AI used in **medical diagnosis** to **analyze** symptoms and recommend possible diagnoses.

- **Natural Language Processing (NLP):** AI can **understand** and **generate** human language, enabling more natural **interactions** between humans and machines. It can process and **interpret** written or spoken language, uses applications like **chatbots**, **virtual assistants**, and language **translation**.

Example: Virtual assistants like **Siri**, **Alexa**, or **Google Assist**ant.

- **Perception:** AI can **interpret** sensory input, such as **images**, **sounds**, or other data from the environment. This enables AI systems to "**see**," "**hear**," or otherwise sense the world around them, just like humans.

Example: **Image** recognition in security systems or **voice** recognition in digital assistants.

fppt.com

Key characteristics of AI (cont..)

- **Autonomy:** AI systems can perform tasks **without** human **intervention** or minimal human oversight.

Example: **Autonomous vehicles** that drive themselves without human input.

- **Creativity:** AI has the ability to generate **new** and **novel** ideas or solutions. This can involve generating **art**, **music**, or even developing new solutions to problems in innovative ways.

Example: AI creating **original art** or **music**, or generating **novel solutions** in scientific research.

- **Robustness and Fault Tolerance:** AI systems are designed to **handle errors** and unexpected inputs gracefully, ensuring they can continue to operate.

Example: Autonomous **drones** or **robots** that can navigate obstacles and recover from errors.

- **Generalization:** AI systems can generalize from specific examples or training data to handle a wide range of **scenarios**.

Example: A **spam** filter trained on a set of **emails** can generalize to correctly classify new, unseen emails as spam or not.

fppt.com

Benefits of AI

- **Artificial Intelligence** (AI) offers a wide range of **benefits** across various sectors, revolutionizing how we **live**, **work**, and **interact**. Here are some key benefits of AI:

☞ **Automation of Repetitive Tasks:** AI can automate **mundane**, **repetitive tasks, freeing up** human workers to focus on more creative and strategic activities.

Examples: Manufacturing **assembly lines**, **data entry**, customer service **chatbots**.

☞ **Improved Efficiency and Productivity:** AI systems can **process** and **analyze** vast amounts of data **quickly**, leading to **faster** decision-making and **improved** operational efficiency.

Examples: Supply **chain optimization**, predictive **maintenance** in industries.

☞ **Enhanced Decision-Making:** AI can **analyze** complex data sets to provide **insights** and **recommendations**, **helping** businesses and **individuals** make better-informed decisions.

Examples: Financial **forecasting**, **medical diagnosis**, and personalized **marketing**.

fppt.com

Benefits of AI (cont..)

- **Personalization:** AI enables highly **personalized** experiences by analyzing user **behavior** and preferences.

Examples: Personalized recommendations on streaming platforms (**Netflix**, **Spotify**), targeted **advertising**, and customized **shopping** experiences.

- **Advancements in Healthcare**: AI is transforming **healthcare** by improving **diagnostics**, treatment plans, and **patient care**.

Examples: Early **disease detection**, **robotic surgeries**, **drug discovery**, and personalized medicine.

- **Cost Savings:** By **automating** processes and improving efficiency, AI can significantly **reduce** operational **costs** for businesses.

Examples: Reduced **labor** costs, **minimized** errors, and **optimized** resource allocation.

Improved Customer Experience: AI-powered tools like **chatbots** and **virtual assistants** provide **24/7** customer support, **resolving** queries quickly and improving customer **satisfaction**.

Examples: AI **chatbots**, voice assistants like **Siri** and **Alexa**.

fppt.com

Benefits of AI (cont..)

- **Enhanced Safety and Security:** AI can improve **safety** and **security** by monitoring and detecting **anomalies** in real-time.

Examples: Fraud detection in **banking**, **cybersecurity**, and **surveillance** systems.

- **Education and Learning:** AI can personalize **learning** experiences, making **education** more effective and accessible.

Examples: Adaptive learning **platforms**, AI **tutors**, and automated **grading** systems.

- **Job Creation:** While AI automates some **jobs**, it also creates new **opportunities** in AI development, maintenance, and other **emerging fields.**

Examples: AI **engineers**, data **scientists**, and AI **ethicists**.

- **Improved Quality of Life:** AI-powered **technologies** can simplify **daily tasks** and improve overall quality of life.

Examples: **Smart home** devices, **virtual assistants**, and **health monitoring** apps.

- **Accelerated Scientific Research:** AI can **analyze** complex data and **simulate** experiments, speeding up **scientific** discoveries.

fppt.com

AI challenges and Ethical considerations

- ✓ **Artificial intelligence** (AI) is rapidly **transforming** many aspects of our lives, from how we work and communicate to how we access healthcare and education.
- ✓ **AI** offers **tremendous** potential **benefits**, it also presents significant **challenges** and **ethical** **considerations** that we must address to ensure its responsible development and use.

fppt.com

AI challenges

- **Bias and discrimination**: AI systems are **trained** on vast amounts of data, and if this data **reflects** existing **societal biases**, the AI system may **perpetuate** or even **amplify** these biases. This can lead to **discriminatory** outcomes in areas such as **hiring**, **lending**, and **criminal** justice.
- **Job displacement**: As AI becomes more **sophisticated**, it is capable of automating tasks that were **previously** done by humans. This could lead to widespread **job displacement** and **exacerbate** existing **inequalities**.
- **Privacy concerns**: AI systems often rely on the collection and analysis of personal data, raising concerns about **privacy** and **surveillance**.
- **Lack of transparency and explain ability**: Many AI systems, particularly those based on **deep learning**, are complex and opaque. This can make it difficult to understand how they **arrive** at their **decisions**, which can raise concerns about **accountability** and **fairness**.
- **Security risks**: AI systems can be vulnerable to **hacking** and **manipulation**, which could have serious **consequences**, especially in critical areas such as **healthcare** and **transportation**.

fppt.com

AI Ethical Considerations

- **Fairness and non-discrimination**: AI systems should be **designed** and **used** in a way that is **fair** and does not **discriminate** against any group of people.
- **Transparency and explain ability**: AI systems should be as **transparent** and **explainable** as possible, so that people can **understand** how they work and why they make certain decisions.
- **Accountability**: There should be **clear** lines of **accountability** for the **decisions** and **actions** of AI systems.
- **Privacy:** AI systems should be **designed** and used in a way that **respects** people's **privacy**.
- **Human control**: Humans should **maintain control** over AI systems, and AI systems should not be **allowed** to make **decisions** that have significant **consequences** for people *without* **human oversight**.

fppt.com

CONCLUTION

- ✓ To ensure that AI is used for the **benefit** of humanity. This requires a multi-faceted approach involving **researchers**, **policymakers**, **businesses**, and the **public**. We need to develop **technical** solutions to **mitigate** bias and improve **transparency**, establish **ethical guidelines** and **regulations**, and **foster** public **dialogue** about the **implications** of AI.
- ✓ It is important to remember that AI is a **tool**, and like any tool, it can be used for **good** or for **bad**. It is up to us to ensure that AI is used in a way that **aligns** with our **values** and **promotes** the well-being of all.

fppt.com

Lecture VI: Artificial Intelligence in Modern Smartphones

Mohammed Q. Ali



Introduction

- AI-driven mobile technologies refer to the **integration** of artificial intelligence (AI) into mobile devices and applications to **enhance** their capabilities, **improve** user experiences, and enable more intelligent and personalized interactions.
- These technologies use **machine learning** algorithms, **natural language processing** (**NLP**), **computer vision**, and other AI techniques to **automate** tasks, **predict** user behavior, and provide **insights** in real time.

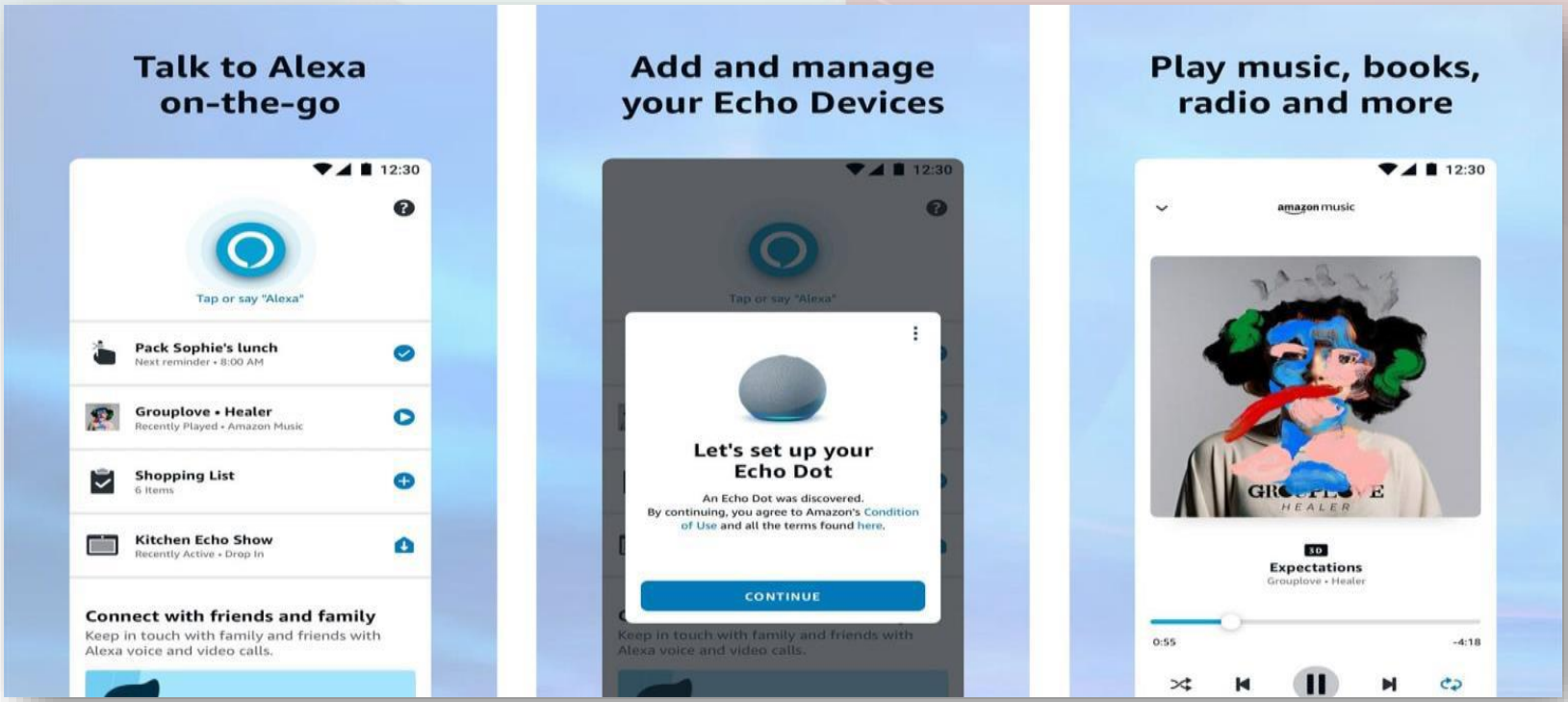
AI in Mobile Technologies

- Here are some examples of how AI is applied in mobile technologies:

1) Personal Assistants (like Siri, Google Assistant, Alexa)

AI enables **voice recognition**, **natural language processing**, and **machine learning**, allowing users to **interact** with their devices through **voice** commands. These assistants can set reminders, answer questions, and perform tasks based on user preferences.

AI in Mobile Technologies



AI in Mobile Technologies

2) Camera and Image Recognition:

AI in mobile cameras helps with features like **automatic** scene detection, image **enhancement**, and **facial** recognition.

For example, AI can **identify** objects in photos, **adjust** lighting and **settings** automatically, and enhance the **quality** of photos taken in low light conditions and focus.

3) Predictive Text and Smart Keyboards:

AI-driven **predictive** text algorithms **anticipate** what a user is **typing**, making it **faster** to compose messages. These keyboards also learn from the user's typing **habits** and provide personalized **suggestions**.

AI in Mobile Technologies

4) Mobile Gaming and Augmented Reality (AR):

AI is used to **create** more immersive and interactive gaming experiences, such as **NPC** (non-playable character) behaviors that adapt to a player's actions. AI also powers AR (**Augmented reality**) apps, which overlay virtual objects onto the real world, making them more **interactive** and **context-aware**.

5) Health and Fitness Apps:

AI can **monitor** a user's **physical activity**, **analyze** health data, and provide personalized **recommendations** for improving **fitness**. Apps use AI to track **sleep** patterns, **heart** rate, and **steps**, and then offer **insights** based on the data.

AI in Mobile Technologies

6) Battery Optimization:

AI-powered **battery management systems** can **optimize** how the mobile device uses power. By analyzing **usage** patterns, AI can automatically **adjust** settings like screen **brightness**, **background** apps, and performance **modes** to extend battery life.

7) Mobile Security (Face/Touch ID, Fraud Detection):

AI is used to **improve** security on mobile devices through **biometric** authentication like **facial recognition** and **fingerprint** scanning. AI can also detect **suspicious** activity or potential **fraud** by **analyzing** patterns and **behaviors** in apps and transactions.

AI in Mobile Technologies

8) Smart Recommendations:

Apps like **e-commerce** platforms, **streaming** services (**Spotify, Netflix**), and **news** apps use AI to **analyze** user **behavior** and **make** personalized recommendations for **products**, **music**, **shows**, or **articles**.

9) Chatbots and Customer Support:

Many apps use AI-powered **chatbots** to provide 24/7 customer service. These chatbots can **understand** and **respond** to user queries, offer **solutions**, and handle routine requests..

- AI-driven mobile technologies continue to evolve, making mobile devices **smarter**, more **efficient**, and more **user-friendly**. They create an **ecosystem** where mobile devices can **learn** from their users and **adapt** to their needs.

Future Trends of Artificial Intelligence in Mobile Phones

1) 5G and AI Synergy

Faster AI Processing: With the advent of **5G**, mobile devices will have significantly faster internet speeds, enabling more intensive AI tasks to be processed in real-time with **minimal latency**. This will enhance everything from **cloud gaming** to **live streaming** AI-powered video analysis.

5G's low latency and **high bandwidth** will allow mobile phones to seamlessly run AI-powered apps that require constant, real-time data streaming, such as **autonomous vehicles** or **AR** experiences

Future Trends of Artificial Intelligence in Mobile Phones

2) Augmented Reality

Augmented reality (AR) is poised to become even more **immersive** with the help of AI. Mobile apps that use AR will be able to **recognize** surroundings and adapt to user **behavior** in real-time, **creating** personalized and interactive experiences. Whether it's **gaming**, **shopping**, or **education**, AI-enhanced AR is set to **blend** the **digital** and **physical** worlds in ways that feel natural and engaging.

Future Trends of Artificial Intelligence in Mobile Phones

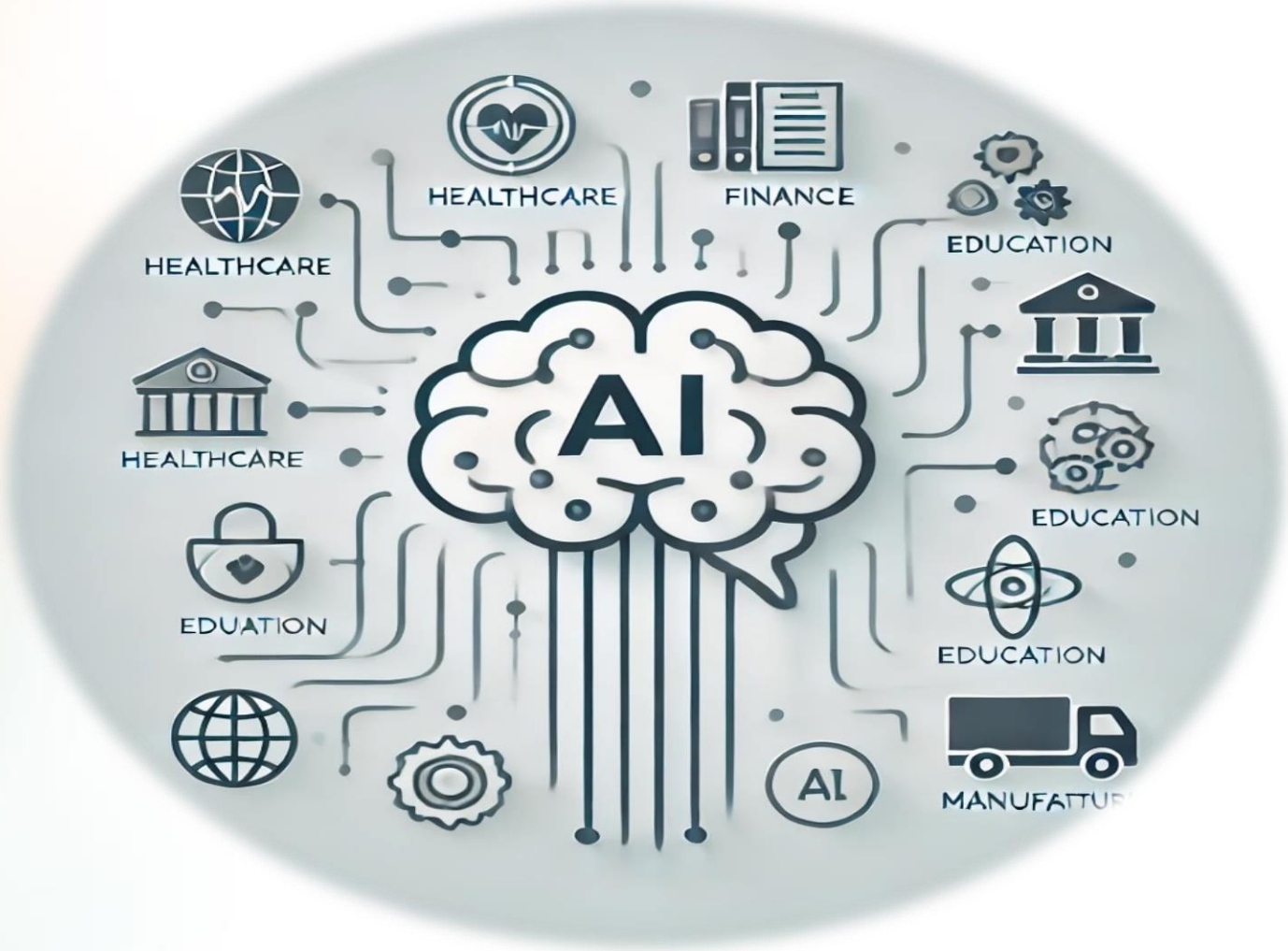
3) Healthcare and Mobile Apps

Mobile healthcare apps are using AI in healthcare for its predictive power to **monitor** vital signs like **heart rate** and sleep patterns. By continuously analyzing this data, these apps can **alert** users to potential health **risks** early, allowing them to take preventive action. **Incorporating** AI to create apps that offer personalized health **insights**, **individualized** health **recommendations**.

Future Trends of Artificial Intelligence in Mobile Phones

4) AI-Enhanced Wearables

Wearables like **smartwatches** are becoming **smarter** with AI integration. By **analyzing** user data, AI-powered wearables can provide **insights** into **fitness**, **health**, and daily **productivity**. These devices sync seamlessly with mobile phones, allowing users to **manage** tasks, **monitor** their health, and **organize** their schedules more effectively, all with minimal input.



Lecture VII: Applications and Tools in AI

Mohammed Q. Ali

Introduction

❑ AI is making a significant impact across a wide range of **industries**, **education**, and **healthcare**.

❑ AI is revolutionizing multiple industries, and **transportation**, **marketing**, and **advertising** are no exception.

❑ AI has transformative applications in **finance**, **robotics**, and **automation** technology. These sectors are leveraging AI to optimize operations, improve efficiency, and provide innovative solutions.

Below is a breakdown of AI applications and tools in these industries.

AI in Industries

Applications

- **Predictive Maintenance:** AI predicts when machines or equipment will **fail**, allowing for timely **maintenance** and **reducing** downtime.

- **Supply Chain Optimization**: AI improves demand **forecasting**, **inventory** management, and **logistics** to optimize supply chains.

- **Quality Control**: AI analyzes products for **defects** during the manufacturing process to ensure consistent quality.

AI in Industries

Tools

- ✓ **IBM Watson IoT**: AI-powered tool for predictive maintenance and asset management in industries.
- ✓ **Siemens MindSphere**: Industrial **IoT** platform powered by AI for optimizing production and supply chain operations.
- ✓ **GE Predix**: AI platform for industrial analytics, used to optimize maintenance and operations.


IoT Industry Solutions
Third Party Apps
IBM IoT Foundation
Predictive
Cognitive
Real-time
Contextual
Analytics
Proactive Protection
Risk Management
Connect
Attach: MQTT, HTTPS
Collect & Organize
Device Management
Secure Connectivity
Visualization
Information Management
Storage & Archive
Metadata Management
Reporting
Parsing and Transformation
Manage unstructured data
Bluemix Open Standards Based Services
Full Development Lifecycle
DevOps Services
IBM Security
openstack
docker
CLOUD FOUNDRY
Flexible Deployment


Energy Management
Smart Cities
Digital Factory
IoT
Wind Power
Process Industries and Drives
MindSphere
Power and Gas, Power Generation Services
Healthcare
Mobility
Building Technologies

PREDIX

AI in Education

Applications

- **Personalized Learning**: AI adapts learning materials to suit the needs and **learning styles** of individual students, enhancing **engagement** and **retention**.

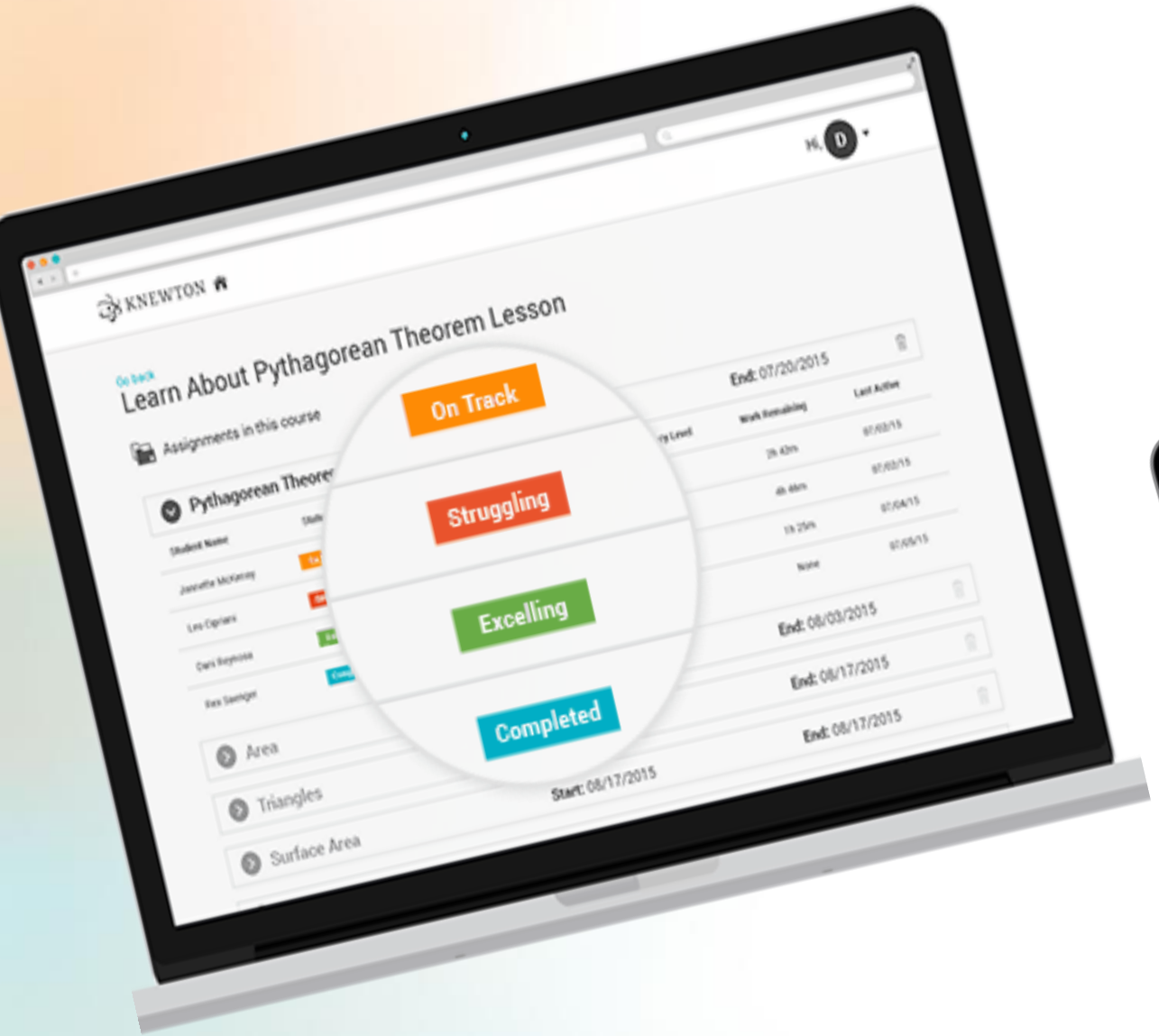
- **Automated Grading**: AI automates **grading** of assignments and exams, **saving** time for teachers and providing instant **feedback** to students.

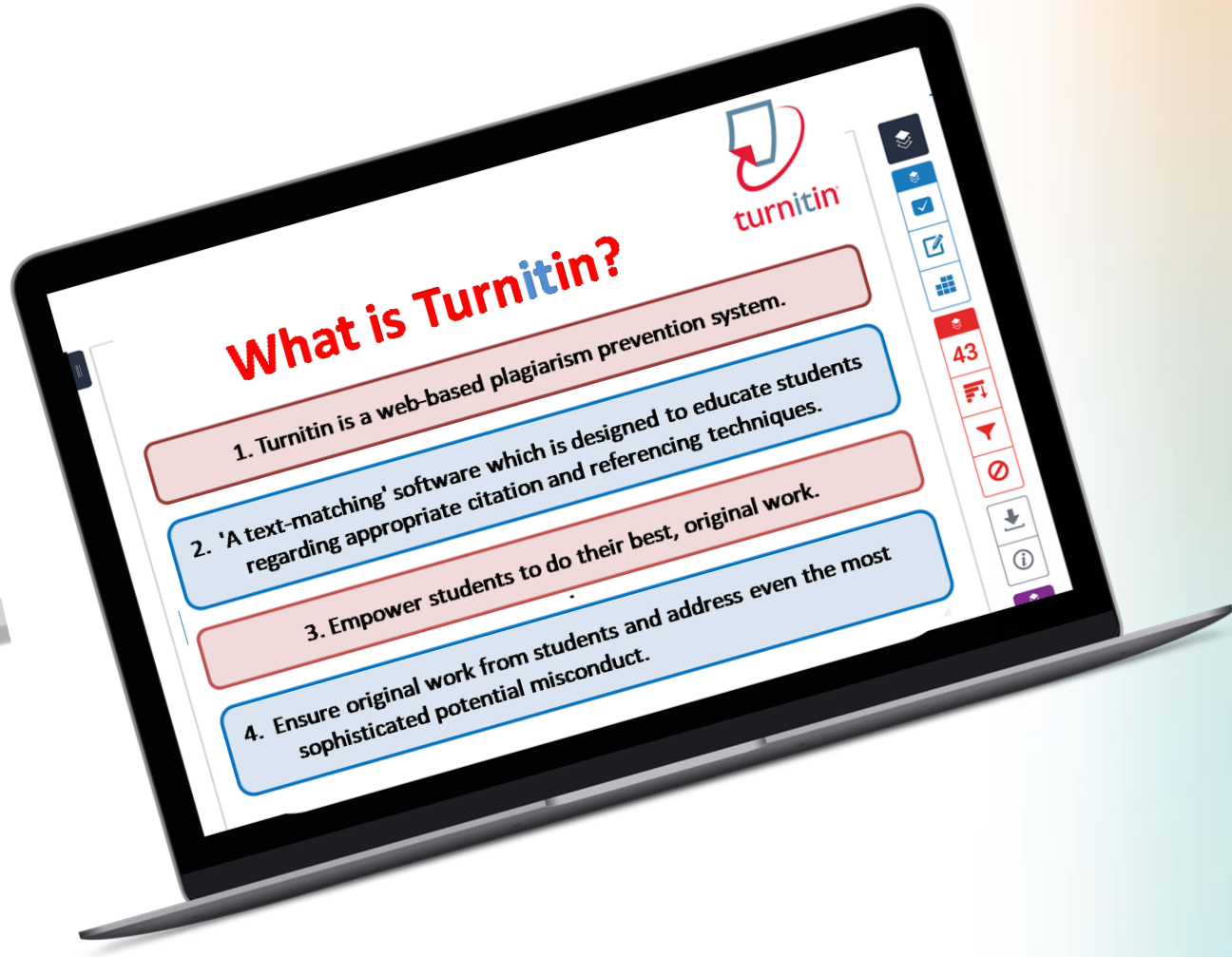
- **Chatbots for Student Support**: AI-powered chatbots **answer** students' **questions**, provide **course** information, and guide them through administrative tasks.

AI in Education

Tools

- ✓ **Knewton**: AI-powered **personalized learning** platform that adapts **lessons** for students.
- ✓ **Turnitin**: AI tool for **plagiarism detection** and automated **grading**.
- ✓ **Pounce (Georgia State University)**: AI **chatbot** that helps students with **course-related** queries and **administrative** tasks.


KNEWTON
Learn About Pythagorean Theorem Lesson
Assignments in this course
On Track
Struggling
Excelling
Completed
Area
Triangles
Surface Area


What is Turnitin?
turnitin
1. Turnitin is a web-based plagiarism prevention system.
2. 'A text-matching' software which is designed to educate students regarding appropriate citation and referencing techniques.
3. Empower students to do their best, original work.
4. Ensure original work from students and address even the most sophisticated potential misconduct.

AI in Healthcare

Applications

☞ **Medical Imaging**: AI analyzes medical images (e.g., **X-rays**, **MRIs**, **CT** scans) to detect diseases such as **cancer**, often with greater accuracy than humans.

☞ **Drug Discovery**: AI accelerates drug development by predicting **molecular** behavior and identifying promising drug **candidates**.

☞ **Virtual Health Assistants**: AI-powered assistants help patients **track** their health, provide medical **advice**, and remind them to take **medications**.

☞ **Personalized Treatment Plans**: AI analyzes patient data to **suggest** customized treatment options **tailored** to individual needs and conditions.

AI in Healthcare

Tools

- ✓ **DeepMind**: AI for medical **image analysis** and diagnosis, particularly in ophthalmology.
- ✓ **Insilico Medicine**: AI-driven platform for **drug discovery** and development.
- ✓ **Babylon Health**: AI-powered **virtual healthcare assistant** for consultations and health management.
- ✓ **IBM Watson Health**: AI tool for **analyzing medical data** to recommend personalized treatment plans.


Insilico
Medicine
英科智能
BIOLOGY
CHEMISTRY
DIGITAL
MEDICINE


Babylon Health
AI
AI-powered
Virtual health
assistants

AI in Transportation

Applications

- **Autonomous Vehicles**: AI enables self-driving **cars**, **trucks**, and **drones** to navigate roads safely and efficiently without **human intervention**.

- **Traffic Management & Optimization**: AI analyzes **traffic patterns** in real time to optimize traffic **lights** and **routing**, reducing **congestion**.

- **Predictive Maintenance**: AI predicts potential **failures** in vehicles and infrastructure, allowing for **preventive** maintenance to **reduce time**.

- **Route Planning & Fleet Management**: AI optimizes delivery **routes** for logistics **companies** and public **transportation fleets** to reduce **fuel consumption** and delivery times.

AI in Transportation

Tools

- ✓ **Waymo**: **Google's** self-driving car technology powered by AI.
- ✓ **Tesla Autopilot**: AI-based system for **autonomous driving**.
- ✓ **Uber AI**: AI-powered **routing** and **traffic** management for **ride-sharing** services.


WAYMO
REAL-TIME TRAFFIC ME
AI
AUTOMOUS VEHICLES
AI
WAYMO


TESLA AUTOPILOT
47


UBER
UBER

AI in Marketing

Applications

- **Customer Segmentation & Personalization**: AI analyzes customer data to **segment** audiences and **personalize** marketing campaigns to increase **engagement** and **conversion** rates.

- **Chatbots & Virtual Assistants**: AI chatbots provide **real-time** customer support, handle **inquiries**, and **assist** with sales, **improving** customer experience.

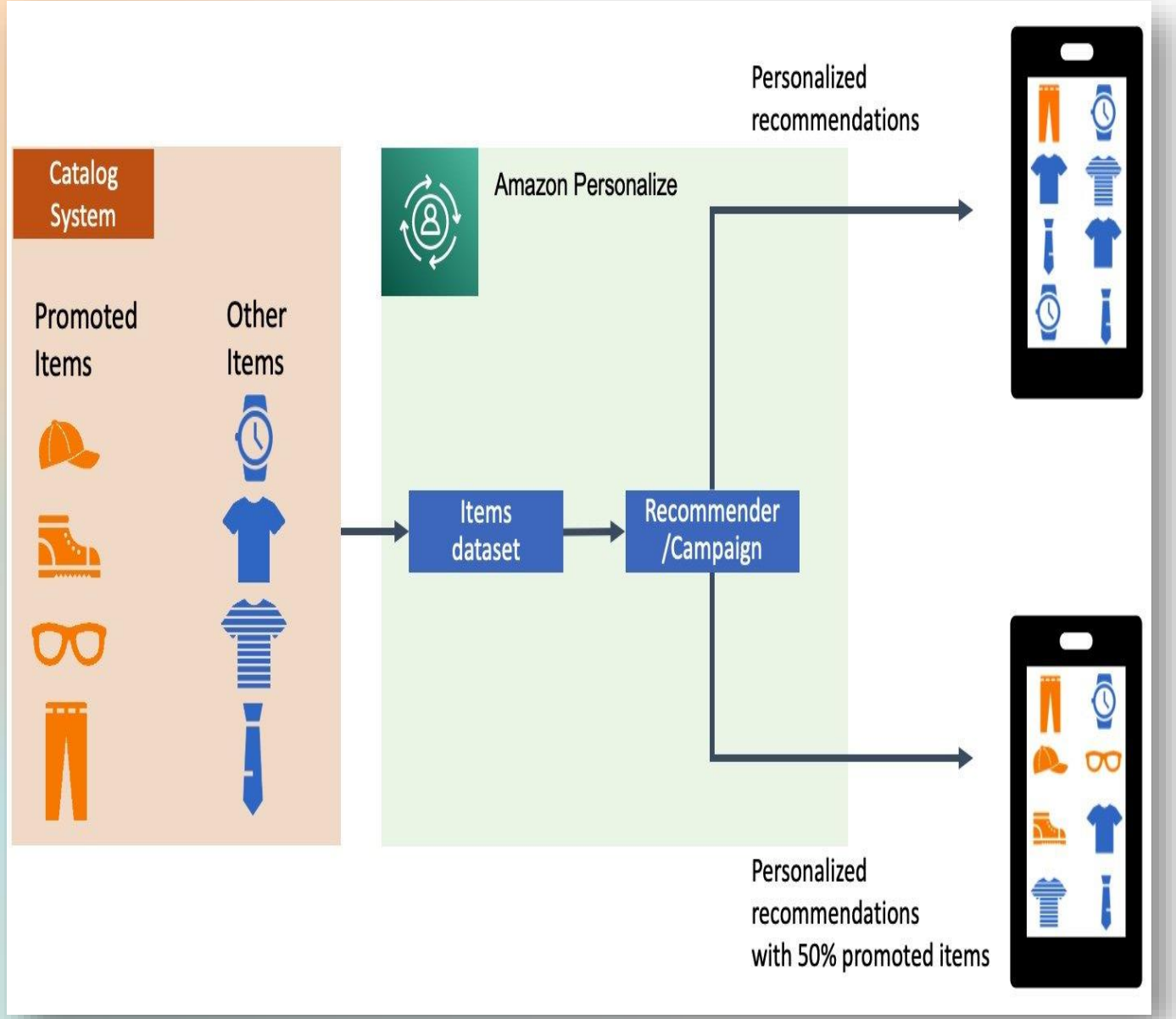
- **Content Generation**: AI tools can **create** personalized **content** for **emails**, **advertisements**, and social media **posts** based on user **preferences**.

- **Predictive Analytics**: AI models predict consumer **behavior** and **optimize** marketing strategies by **analyzing** past interactions and trends.

AI in Marketing

Tools

- ✓ **HubSpot**: AI-powered **marketing** platform for **inbound** marketing and **predictive analytics**.
- ✓ **Amazon Personalize**: AI tool for **creating** personalized **recommendation s** for customers.
- ✓ **Copy.ai**: AI tool for **generating** marketing **copy**.
- ✓ **Sephora Virtual Artist**: AI-driven chatbot for product **recommendations** in **beauty**.



What can you create with CopyAI?

Digital Ad Copy

- Facebook Ads
- Google Ads
- Linkedin Ads

Social Media Content

- Captions
- Instagram Posts
- Brainstorm Topics

Website Copy

- Hero Text
- Subheaders
- Meta Descriptions

eCommerce Copy

- Product Descriptions
- Product Benefits
- Microcopy

Blog Content

- Blog Titles, Ideas, Outlines
- Blog Intros
- Bullet Points to Full Blog

Sales Copy

- Pain-Agitate-Solution
- Before-After-Bridge
- Attention-Interest-Desire-Action

AI in Advertising

Applications

- **Programmatic Advertising**: AI **automates** the buying and placement of ads in real-time by **analyzing** **audience** data, **behavior**, and **engagement** patterns.

- **Ad Optimization**: AI helps **improve** the effectiveness of ads by **adjusting** targeting, **bidding** strategies, and ads **creatives** based on performance data.

- **Audience Targeting**: AI **identifies** and **targets** the right audience **segments**, **enhancing** ads **relevance** and improving return on investment (**ROI**).

- **Visual Recognition for Ads**: AI-powered **image recognition** helps advertisers create visually **engaging** and **contextually** relevant ads by analyzing visual content.

AI in Advertising

Tools

- ✓ **Google Ads**: AI-powered **programmatic** advertising platform for targeting and optimization.
- ✓ **Facebook Ads**: AI-driven advertising platform that **optimizes** ad **campaigns** in real-time.
- ✓ **Spotify Ads**: AI-based platform for **targeting** ads based on user listening **habits**.
- ✓ **Pinterest Ads**: AI-powered **visual recognition tools** for more relevant ad targeting.

AI in Finance

Applications

- **Fraud Detection**: AI analyzes **transaction patterns** to **detect** and **prevent** fraud in real-time.
- **Algorithmic Trading**: AI algorithms **analyze** market data and **execute** trades at high speed to optimize returns.
- **Credit Scoring**: AI **assesses creditworthiness** using financial and non-traditional data such as **social** and **behavioral** data.
- **Customer Service (Chatbots & Virtual Assistants):** AI chatbots **handle** customer **queries**, **transactions**, and provide financial **advice**.
- **Portfolio Management**: AI customizes **investment portfolios** based on user preferences and market conditions.

AI in Finance

Tools

- ✓ **Kensho**: AI tool for financial **forecasting** and analysis.
- ✓ **Upstart**: AI platform for **assessing creditworthiness** and approving loans.
- ✓ **Erica (Bank of America)**: **Virtual assistant** for customer service and banking **advice**.

Consumers



Upstart.com

- Upstart marketing
- Bank-branded offers



Bank sourced

- White-labeled

Upstart platform

Configurable

Cloud apps

Shared AI models

Loan funding



Bank retained

- All loans bank originated
- Retain what they choose



Institutional investors

- Approximately 100 institutions
- Diverse funding options

AI in Robotics

Applications

- **Autonomous Robots**: AI-powered robots make **decisions** and **operate** independently in **dynamic environments**.

- **Industrial Robotics**: AI-driven robots **assist** with tasks like **assembly**, **packaging**, and quality **control** in manufacturing settings.

- **Medical Robotics**: AI enhances the **precision** and **capabilities** of robots used in **surgeries**.

- **Robotic Process Automation (RPA):** AI **automates repetitive** tasks like **data entry** and **transaction** processing across **industries**.

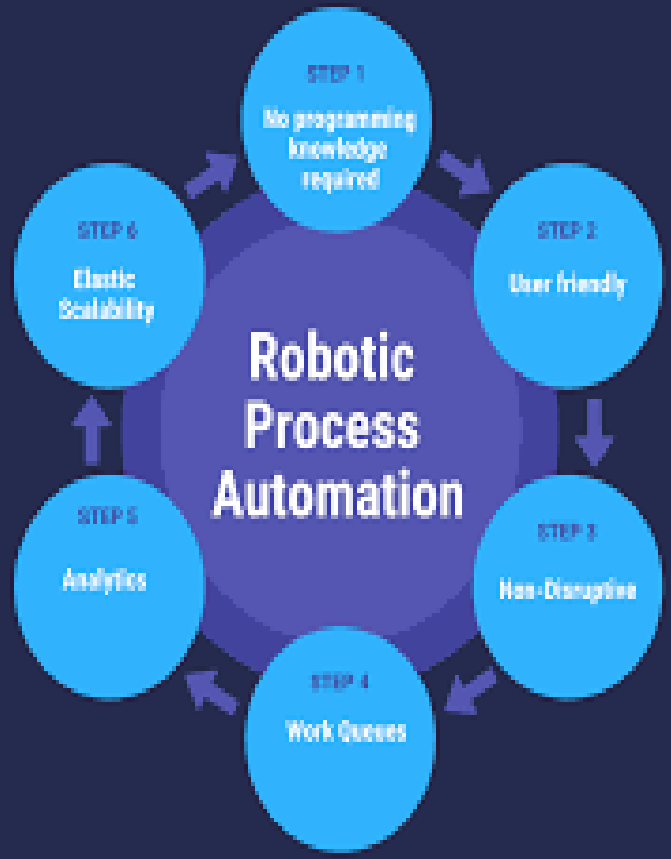
- **Swarm Robotics**: AI **enables multiple robots** to work **together** on tasks such as **warehouse** management and **agricultural** tasks.

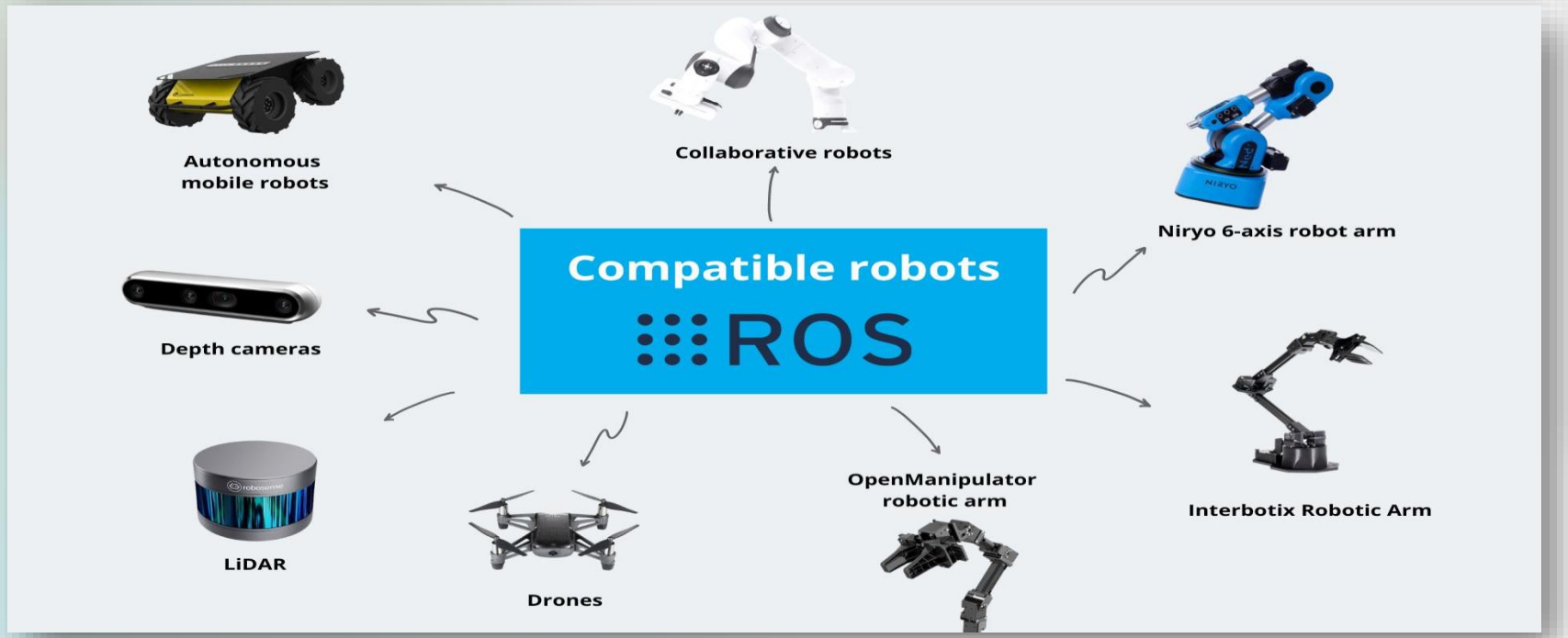
AI in Robotics

Tools

- ✓ **Fanuc & KUKA**: Industrial **robots** for manufacturing **automation**.
- ✓ **ROS (Robot Operating System)**: **Open-source platform** for **developing** AI-powered robotic systems.
- ✓ **UiPath**: **R**obotic **P**rocess **A**utomation (**RPA**) platform for automating **business** processes with AI.


FANUC
ABB
YASKAWA
KUKA


Robotic Process Automation
STEP 1
No programming knowledge required
STEP 2
User friendly
STEP 3
Non-Disruptive
STEP 4
Work Queues
STEP 5
Analytics
STEP 6
Elastic Scalability


Compatible robots
ROS
Autonomous mobile robots
Collaborative robots
Niryo 6-axis robot arm
Depth cameras
LiDAR
Drones
OpenManipulator robotic arm
Interbotix Robotic Arm

AI in Automation Technology

Applications

- **Process Automation**: AI automates tasks like **data entry**, **document processing**, and **transactions** to improve efficiency.

- **Smart Manufacturing**: AI **optimizes** **production processes**, resource **management**, and predictive **maintenance**.

- **Intelligent Workflow Automation**: AI **manages** and **automates** workflows, **reducing** human involvement in tasks such as **approvals** and **scheduling**.

- **Customer Service Automation (Chatbots & Virtual Agents):** AI automates customer support **interactions**, **resolving** **queries** and **directing** complex **issues** to human agents.

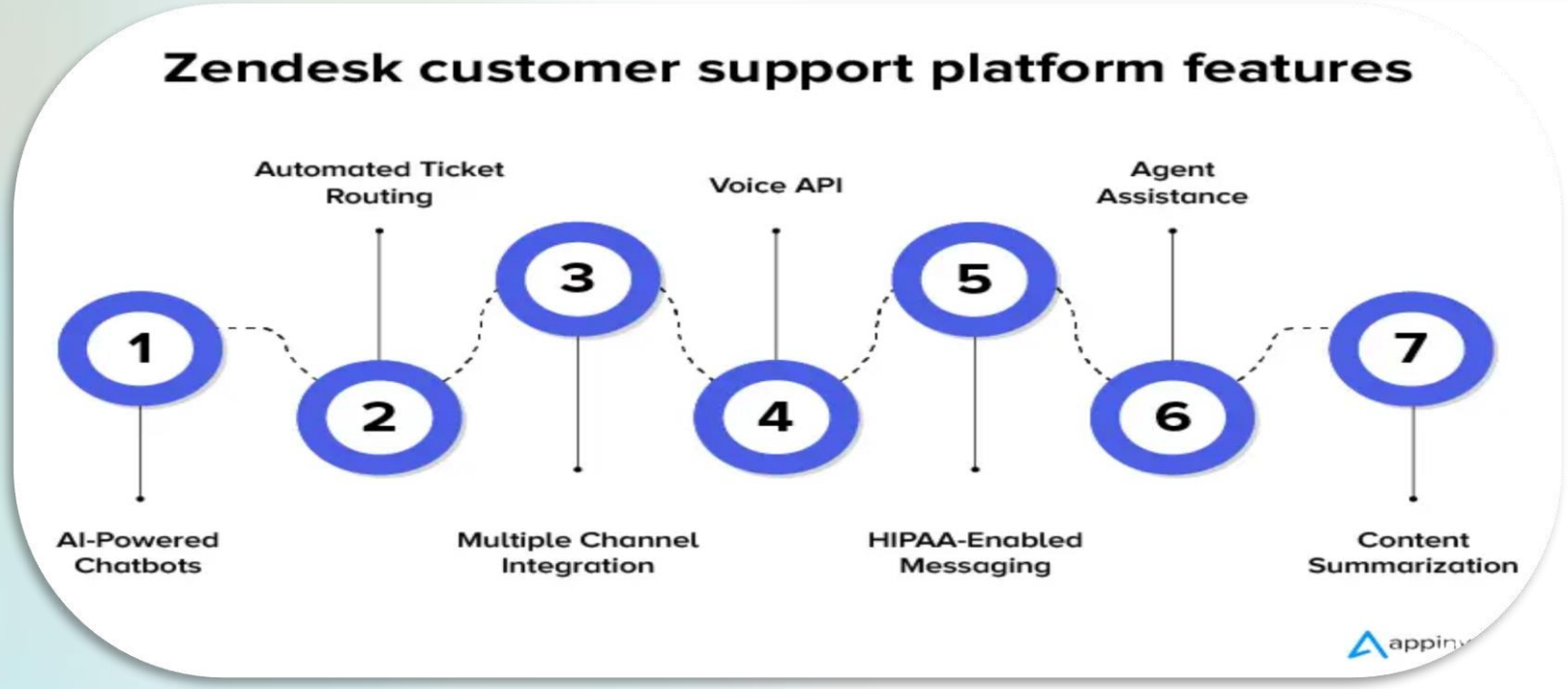
- **Supply Chain Automation**: AI optimizes **inventory** management, **order fulfillment**, and **logistics**

AI in Automation Technology

Tools

- ✓ **Automation Anywhere**: Tool for automating **business processes** across **industries**.
- ✓ **Blue Prism**: Robotic Process Automation platform that uses AI for **workflow optimization**.
- ✓ **Zendesk AI**: AI-driven tool for **automating customer service** and **support**.


Intelligent Execution Technology
High Security
On-premises or in the Cloud
Microsoft SQL Server
Scalability
Analytics and Reporting
blueprism
Work Queues


Zendesk customer support platform features
Automated Ticket Routing
Voice API
Agent Assistance
1
2
3
4
5
6
7
AI-Powered Chatbots
Multiple Channel Integration
HIPAA-Enabled Messaging
Content Summarization



Lecture VIII: [AI and Society, Ethics in AI and Future of AI]

Mohammed Q. Ali

AI and Society

- AI is transforming society by automating tasks, improving efficiency, and creating new opportunities in fields like healthcare, education, and entertainment. However, it also raises concerns about job displacement, privacy, and inequality.

- AI can reinforce biases if **not** designed carefully, leading to **fairness** and discrimination issues. It also **reshapes** human interaction, influencing how we communicate and consume information.

AI and Society

AI is transforming society in several key ways:

- **Labor Market Changes:** Automation driven by AI has already begun to **replace** jobs in sectors like **manufacturing**, **logistics**, and **customer service**. This shift raises questions about how society can **manage** retraining and **ensure** that workers are not left behind.
- **Social Inequality:** The benefits of AI are often concentrated in the hands of a few tech companies and countries. AI **algorithms** can perpetuate or even **amplify** biases in areas like **hiring**, **lending**, and **law enforcement**, leading to concerns over **fairness** and **discrimination**.
- **Privacy and Surveillance:** AI's ability to process vast amounts of data has raised concerns about individual privacy. Surveillance systems powered by AI are becoming more widespread, which could lead to **invasive** practices by governments or private companies.

AI and Society

- **Human-AI Interaction:** AI is also affecting social interactions, particularly through **virtual assistants**, social **media** algorithms, and **recommendation** engines. While these tools improve **convenience**, they also raise **ethical** concerns about **manipulation**, **mental health**, and the potential for reinforcing **echo chambers**.



AI and International Relations

- AI is a **key** factor in the global power dynamic, with countries competing for technological **supremacy**.

- **Nations** that lead in AI development gain **strategic**, **economic**, and **military** advantages. The use of AI in **cybersecurity**, **warfare** (**autonomous weapons**), and **surveillance** has implications for global **stability**.

- Additionally, international cooperation on AI **ethics** and **regulation** is crucial to prevent **misuse** and ensure **global alignment** on standards.

AI and International Relations

AI is reshaping global power dynamics and the way countries interact:

- **Economic Power:** Nations that lead in AI development (e.g., the **US**, **China**, and increasingly the **EU**) are **gaining** significant economic and strategic advantages. AI can enhance **military** capabilities, improve **industries**, and enable new technological breakthroughs that can shape the global balance of power.

- **Geopolitical Competition:** Countries are in a race to dominate AI technologies, with implications for **cybersecurity**, **military** strategy, and economic **dominance**. For instance, AI-powered **weaponry**, including autonomous **drones** and **cyber-attacks**, could lead to new forms of **warfare** or even AI-driven arms races.

AI and International Relations

- **Regulation and Ethics:** International debates about how to regulate AI are **intensifying**. The lack of global consensus on AI ethics and regulation can create **tensions** between **nations**. For example, countries with more liberal data practices may **clash** with those that have **strict** data privacy laws.
- **AI Diplomacy:** International cooperation in AI research and development could be a platform for diplomacy. **Collaborative** frameworks for the ethical use of AI could help countries address shared challenges, such as **climate change**, **global** health, and **cybersecurity**.



AI and the Future of Humanity

- AI has the potential to enhance human **capabilities**, **solve** global challenges like **climate change** and **healthcare**, and improve overall quality of life. However, it also poses existential risks, especially as AI could **surpass** human control in the future.

- The **future** of humanity will depend on how we **manage** AI's development and ensure it **aligns** with human values and safety.

AI and the Future of Humanity

The impact of AI on the future of humanity is vast, touching everything from ethics to existential risks:

- **Augmenting Human Capabilities:** AI has the potential to enhance human intelligence and physical capabilities, especially through **robotics** and **biotechnology**. If harnessed ethically, AI could help **solve** pressing issues like **aging**, **disease**, and **cognitive** limitations.
- **Ethical Dilemmas:** As AI becomes more advanced, questions about its **autonomy** and **decision-making** capabilities arise. For example, in scenarios like **self-driving** cars, how should AI make **decisions** in **life-and-death** situations?

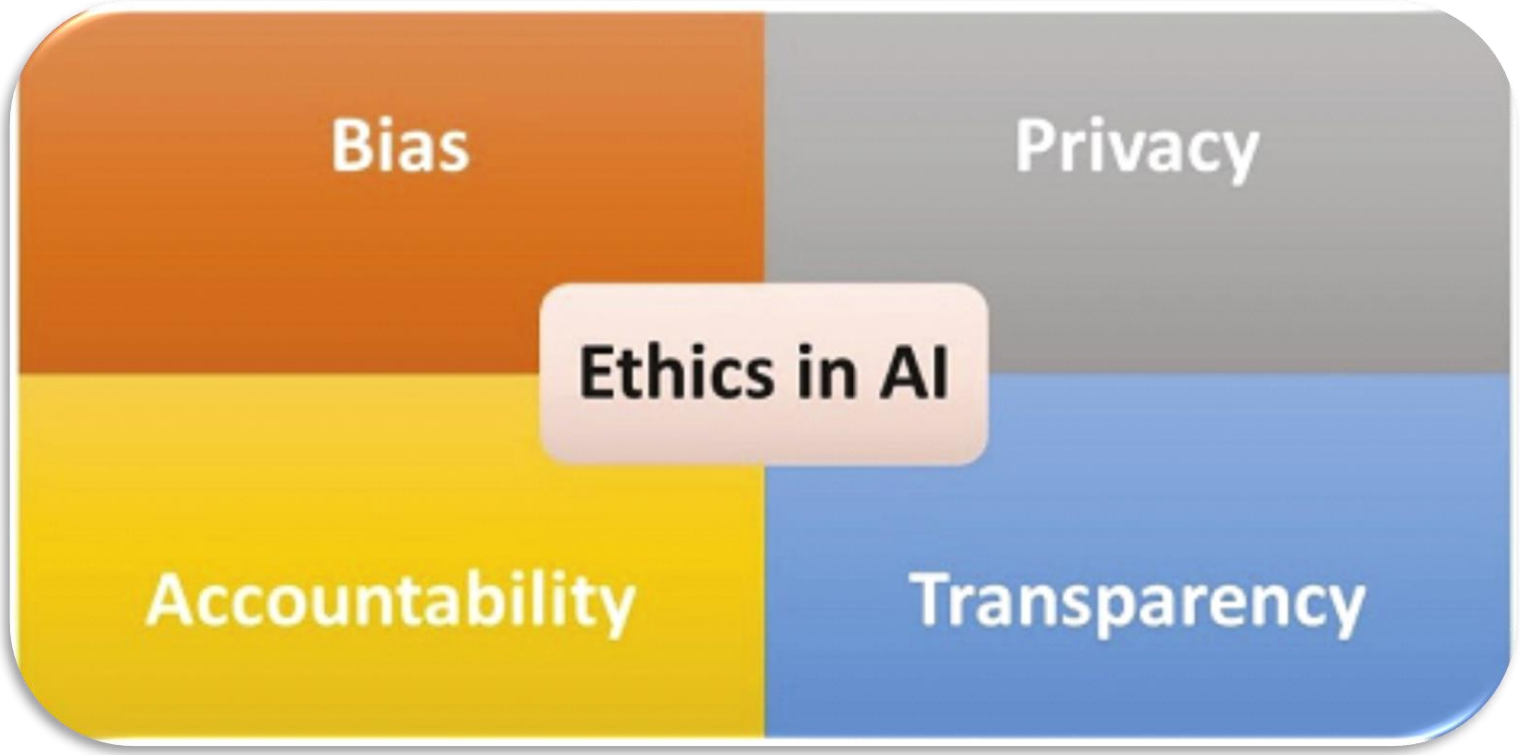
AI and the Future of Humanity

- **Existential Risk**: One of the most debated concerns is the possibility of a **superintelligent** AI **surpassing** human control. To prevent such risks, many experts **argue** for the development of robust **safety** mechanisms and **regulatory** frameworks for advanced AI systems.
- **Redefining Humanity**: With the rise of AI and machine learning, there's the potential for humans to question what it means to be human. Could AI create a new type of sentient being? How would this impact our **cultural**, **philosophical**, and **religious** understandings of **life**, **consciousness**, and **rights**?



Ethics in AI

Ethics in AI refers to the **principles** and **guidelines** that govern the development, deployment, and use of artificial intelligence systems in ways that are **fair**, **responsible**, and **beneficial** to society. Key ethical considerations in AI include:



Ethics in AI

- **Bias and Fairness**: AI systems can unintentionally reinforce existing **biases** in data, leading to **unfair** outcomes, especially in areas like **hiring**, **lending**, and **law enforcement**.Ensuring AI is **unbiased** and equitable is a core ethical challenge.

- **Transparency and Accountability**: AI algorithms can be **complex** and **opaque**, making it difficult to understand how decisions are made. It's important for AI systems to be **transparent**, and for developers to be held **accountable** for the outcomes of their systems.

- **Privacy and Data Protection**: AI often requires large amounts of personal data to function effectively. Ethical AI requires that data is **collected** and used with **proper consent**, and that privacy is respected and protected.

- **Autonomy and Control**: As AI systems become more **autonomous**, there are **concerns** about **losing** human **control** over decision-making, particularly in areas like **military** use, **healthcare**, and **transportation**.

Ethics in AI

- **Impact on Jobs and Inequality**: AI-driven **automation** could **displace** jobs, leading to **economic** inequality. Ethical considerations include ensuring **fair** **opportunities** for retraining and **mitigating** harm to **vulnerable** groups.

- **AI and Human Rights**: AI systems should **respect** fundamental human **rights**, including **freedom** of expression, **equality**, and access to **justice**. There is also the issue of AI potentially **infringing** on rights through **surveillance** or manipulation.

- **Long-term Safety**: With the rise of **superintelligent** AI, there are concerns about **existential** risks. Ethical AI development focuses on **ensuring** AI systems are **aligned** with human values and are **safe** from unintended harmful **behaviors**.

- **In short**, AI ethics **seeks** to ensure that AI technology is developed and used in ways that **promote** the common good, **protect** human rights, and **minimize** harm.

The Future of AI

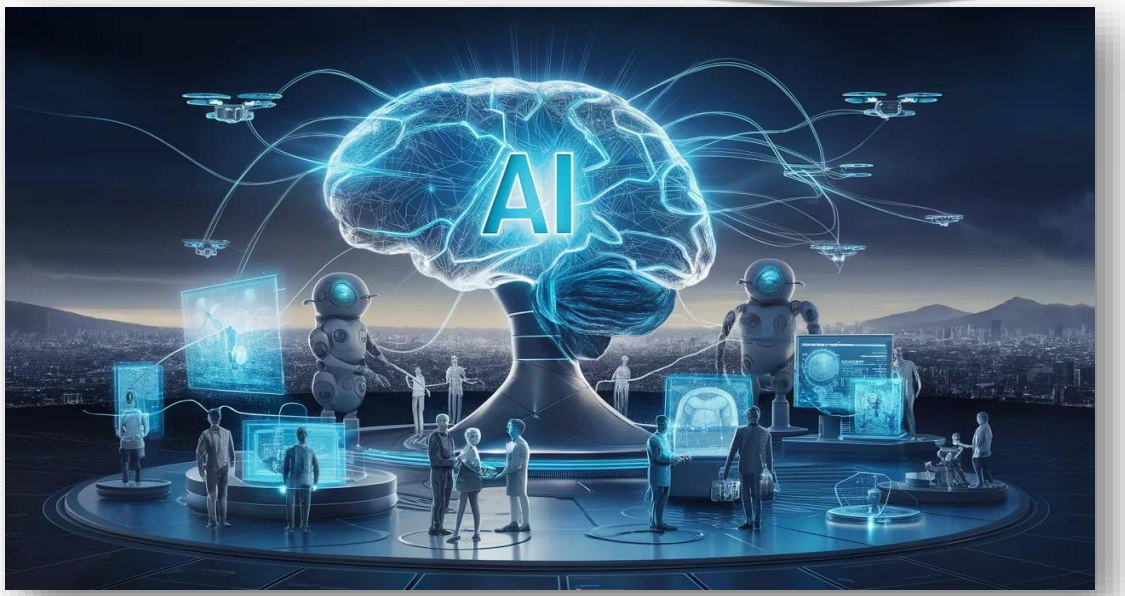
- The future of AI holds immense potential but also significant challenges. Here's a brief overview:

- **Advancements in AI**: AI is expected to continue evolving rapidly, with **improvements** in **natural language processing**, **computer vision**, **robotics**, and **autonomous** systems. AI systems that can better **understand** **context**, **think** more like humans, and **collaborate** with people in more **intuitive** ways.
- **AI in Everyday Life**: AI will become even more **integrated** into daily life, from personal **assistants** to **smart homes** and healthcare systems. It could revolutionize fields like **education**, **medicine**, and **entertainment**, improving efficiency and accessibility.
- **Automation and Jobs**: Automation powered by AI will likely **transform** the **job** market, creating new **roles** while displacing others. Society will need to adapt with **retraining** programs, social **safety** nets, and **policies** to address these changes.

The Future of AI

- **Ethical and Safety Challenges**: As AI becomes more powerful, concerns around **fairness**, **transparency**, **accountability**, and **privacy** will grow. Ensuring AI aligns with **human values** and is safe will be critical to avoid **risks** like **bias**, **misuse**, or unintended **consequences**.

- **Superintelligent AI**: In the long-term, there's the potential for AI to reach **superintelligence**, **surpassing** human abilities. This **raises** existential **questions** about **control**, **governance**, and the **alignment** of AI with human well-being.



The future of AI promises significant **advancements**, but it also requires **careful** planning to ensure its benefits are maximized and risks minimized.