



COMPUTER SCIENCE • STUDENT ORIENTATION

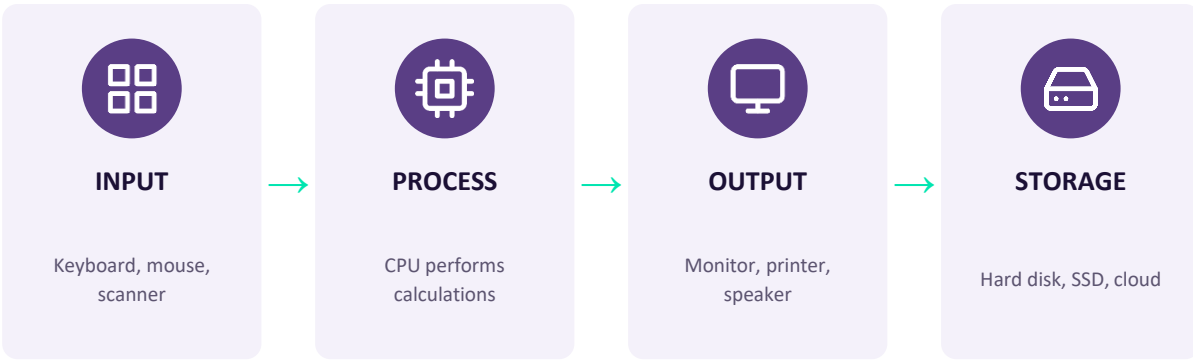
Artificial Intelligence & Robotics Awareness Program for School

From the parts inside your PC to AI, Data Science, IoT and Blockchain — a complete introduction to modern computing and staying safe online.

- Hardware & Generations
- Operating Systems & Networks
- AI, Data & Emerging Tech
- Cyber Safety Essentials

Introduction to Computers & Its Parts

A computer is an electronic device that takes input, processes data using a set of instructions, and produces output. It works on the simple cycle: Input → Process → Output → Storage.



Main Hardware Components

**CPU (Processor)**

The 'brain' — executes instructions and performs calculations.

**RAM (Memory)**

Temporary, high-speed storage the CPU uses while running programs.

**Storage (HDD/SSD)**

Permanently stores the operating system, files and programs.

**Monitor**

Output device that displays text, images and video.

**Keyboard**

Primary input device for typing text and commands.

**Mouse**

Pointing device used to select and interact with items.

COMPUTER GENERATIONS TIMELINE

01

FIRST GENERATION – VACUUM TUBES



- **Period:** 1940–1956
- **Technology:** Vacuum Tubes
- **Characteristics:** Very large, expensive, high power consumption, heat generated, unreliable
- **Example:** ENIAC, UNIVAC I

01

1940–1956

02

SECOND GENERATION – TRANSISTORS



- **Period:** 1956–1963
- **Technology:** Transistors
- **Characteristics:** Smaller, faster, more reliable, less heat, lower power consumption
- **Example:** IBM 1401, IBM 7090

02

1956–1963

03

THIRD GENERATION – INTEGRATED CIRCUITS



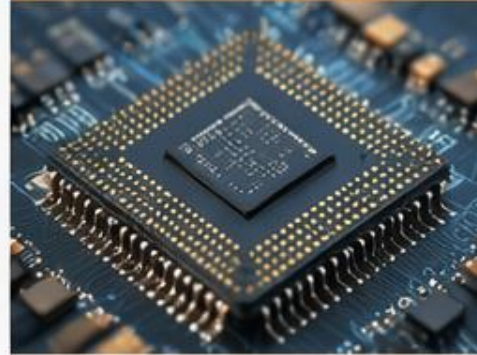
- **Period:** 1964–1971
- **Technology:** Integrated Circuits
- **Characteristics:** Smaller size, higher reliability, faster performance, lower cost
- **Example:** IBM System/360, PDP-8

03

1964–1971

04

FOURTH GENERATION – MICROPROCESSORS



- **Period:** 1971–2010
- **Technology:** Microprocessors
- **Characteristics:** Very small, very fast, high capacity, cost-effective, personal computers emerge
- **Example:** Intel 4004, IBM PC, Apple Macintosh

04

1971–2010

05

FIFTH GENERATION – ARTIFICIAL INTELLIGENCE



- **Period:** 2010–Present and Beyond
- **Technology:** Artificial Intelligence, Machine Learning, Big Data, Cloud Computing
- **Characteristics:** Intelligent systems, learning ability, automation, data-driven decisions
- **Example:** AI Assistants, Autonomous Systems, Smart Applications.

05

2010–PRESENT
AND BEYOND

Types of Operating Systems

An Operating System (OS) manages hardware and software resources, letting users and applications interact with the computer.



Batch OS

Jobs collected in batches and processed one after another with no direct user interaction.



Time-Sharing OS

CPU time is shared among many users at once, giving each a quick turn.



Distributed OS

Manages a group of independent computers, making them appear as one system.



Real-Time OS

Processes input and gives a response within a strict, guaranteed time limit.



Mobile OS

Designed for phones and tablets — e.g. Android and iOS.



Multi-tasking OS

Allows several programs to run seemingly at the same time, e.g. Windows.

Types of Networking & Wi-Fi

A computer network connects devices so they can share data and resources. Networks are classified mainly by the geographic area they cover.



LAN

Local Area Network

Connects devices within a single building, e.g. a school computer lab.



MAN

Metropolitan Area Network

Spans a city or large campus, linking multiple LANs together.



WAN

Wide Area Network

Covers large distances — the Internet is the biggest example of a WAN.



PAN

Personal Area Network

Very short range, connecting personal devices like a phone and earbuds.



What is Wi-Fi?

Wi-Fi is a wireless networking technology that uses radio waves to let devices connect to a LAN or the Internet without cables, through a device called a router.

Range

~30–45 m indoors

Speed

Up to several Gbps

Security

Protected by WPA3 encryption

Cyber Security

Cyber Security is the practice of protecting computers, networks and data from unauthorized access, damage or theft.

Common Threats



Malware & Viruses

Malicious software designed to damage or gain unauthorized access to a system.



Phishing

Fake emails or messages that trick people into revealing personal information.



Ransomware

Locks or encrypts a victim's files until a ransom is paid.



Hacking

Unauthorized access to a system to steal or manipulate data.

Core Goals: The CIA Triad



Confidentiality

Only authorized people can access data.



Integrity

Data stays accurate and unaltered.



Availability

Data and systems are accessible when needed.

How to Stay Safe on the Internet

Simple habits keep your identity, devices and data protected while browsing, gaming, or using social media.



Use Strong Passwords

Mix letters, numbers & symbols. Never reuse the same password twice.



Enable Two-Factor Auth

Add a second verification step so a stolen password isn't enough.



Don't Trust Every Link

Avoid clicking suspicious links or attachments from unknown senders.



Guard Personal Info

Never share your address, phone number or passwords with strangers online.



Check Website Safety

Look for 'https://' and a padlock icon before entering any data.



Keep Software Updated

Updates patch security holes that hackers try to exploit.

Artificial Intelligence & Data Science

Two of today's most important technology fields — teaching machines to think, and turning raw data into insight.



Artificial Intelligence

The ability of a computer system to perform tasks that normally need human intelligence — like understanding language, recognizing images, and making decisions.

- Machine Learning: systems learn patterns from data
- Used in voice assistants, recommendations & chatbots
- Powers self-driving cars & facial recognition



Data Science

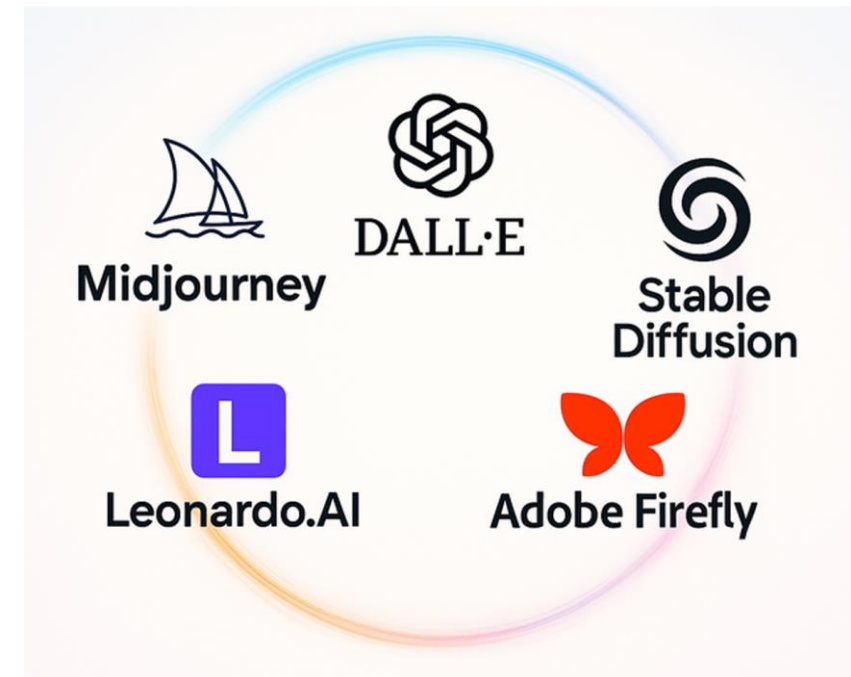
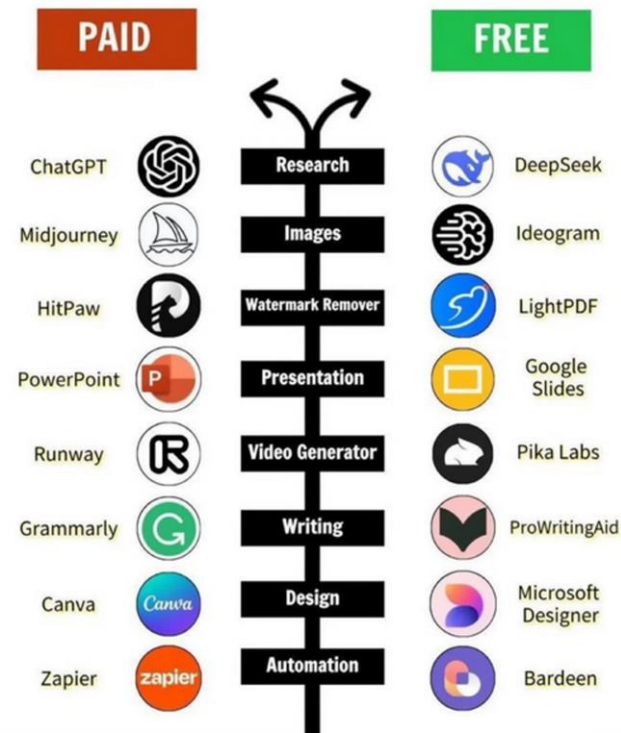
The field of collecting, cleaning and analyzing large amounts of data to find patterns and support better decisions.

- Combines statistics, programming & domain knowledge
- Turns raw numbers into charts, trends & predictions
- Used in business, healthcare, sports & finance

AI often relies on Data Science to learn — more quality data leads to smarter models.

Types of Artificial Intelligence

- Narrow AI – Designed for a specific task, such as a chatbot or image recognition system.
- General AI – A theoretical AI capable of performing a wide range of human-like intellectual tasks.
- Reactive AI – Responds to current inputs without storing long-term experiences.
- Generative AI – Creates new content such as text, images, audio, video and code.



Types of Servers

- Web Server – Delivers websites and web pages.
- File Server – Stores and shares files.
- Database Server – Stores and manages structured data.
- Email Server – Sends, receives and stores email.
- Application Server – Runs applications and business services.
- Cloud / Virtual Server – Server resources provided over the internet.

What are Robotics and Embedded Systems?

- Robotics is the field of designing, building and programming robots.
- A robot may use sensors, motors, controllers and software to perform tasks.
- An embedded system is a specialized computer built inside a device to perform a specific function.
- Examples: Arduino-based projects, smart TVs, washing machines, cars and medical devices.

What is Cybersecurity?

- Cybersecurity is the practice of protecting computers, networks, software and data from digital threats.
- Its main goals are Confidentiality, Integrity and Availability (CIA).
- Good cybersecurity requires technology, strong passwords, user awareness and safe online behaviour.



Types of Cyberattacks

- Phishing – Fake messages or websites designed to steal information.
- Malware – Harmful software such as viruses, worms and spyware.
- Ransomware – Encrypts or blocks data and demands payment.
- Password Attacks – Attempts to steal or guess login credentials.
- Social Engineering – Manipulating people into revealing sensitive information.

Email IDs, Domain Names & Online Identification

- Email format: username@example.com
- Domain name: A human-readable internet address such as example.com.
- Top-Level Domains (TLDs): .com, .org, .edu, .gov, .in
- Website URL: https://www.example.com
- Always check the sender address and domain carefully before clicking links or sharing information.

How to Identify Suspicious Emails

- Check the complete sender email address, not just the display name.
- Look for spelling mistakes, unusual domains and suspicious attachments.
- Be careful with urgent requests for passwords, OTPs or money.
- Hover over links when possible to check the actual destination.
- Use strong passwords and multi-factor authentication (MFA).

Artificial Intelligence in Education

- AI can support both students and teachers by making learning more interactive and personalized.
- AI tools can provide explanations, practice questions, language support and feedback.
- Teachers can use AI to assist with lesson preparation and educational content creation.

Benefits of AI in Education

- Personalized learning based on student needs and pace.
- 24/7 learning support through intelligent tutoring systems.
- Faster feedback and practice assistance.
- Support for accessibility, translation and language learning.
- Automation of repetitive tasks, giving teachers more time for teaching.
- Important: Students should use AI ethically and verify information.

Internet of Things & Blockchain

Two technologies reshaping how devices connect and how information is trusted and stored.



Internet of Things (IoT)

A network of everyday physical objects — fitted with sensors and software — that connect to the Internet to collect and exchange data.

- Smart home devices (lights, thermostats, locks)
- Fitness trackers & smartwatches
- Connected cars and smart city sensors



Blockchain Technology

A digital, shared ledger that records transactions in linked 'blocks'. Once added, records are extremely difficult to alter — making the data trustworthy.

- Powers cryptocurrencies like Bitcoin
- Secures supply chains & digital records
- No single authority controls the ledger

Websites & Key Takeaways

A website is a collection of related web pages, identified by a URL and hosted on a web server, that users access through a browser using the HTTP/HTTPS protocol.



Computers

Input → Process → Output → Storage



5 Generations

Vacuum tubes to AI-driven systems



Operating Systems

Manage hardware & software resources



Networks & Wi-Fi

LAN, MAN, WAN & wireless access



Cyber Security

Protects data with the CIA triad



AI & Data Science

Smart systems built on quality data



IoT & Blockchain

Connected devices & trusted digital ledgers



Stay Safe Online

Strong passwords, 2FA & HTTPS checks

Thank You — Stay Curious, Stay Safe Online