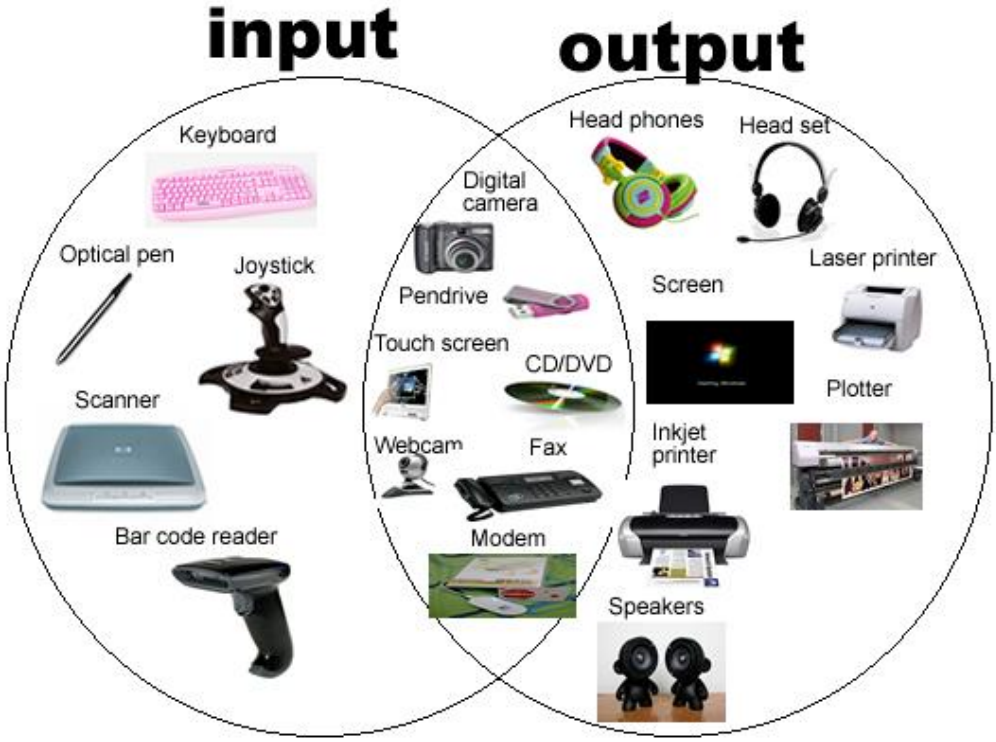
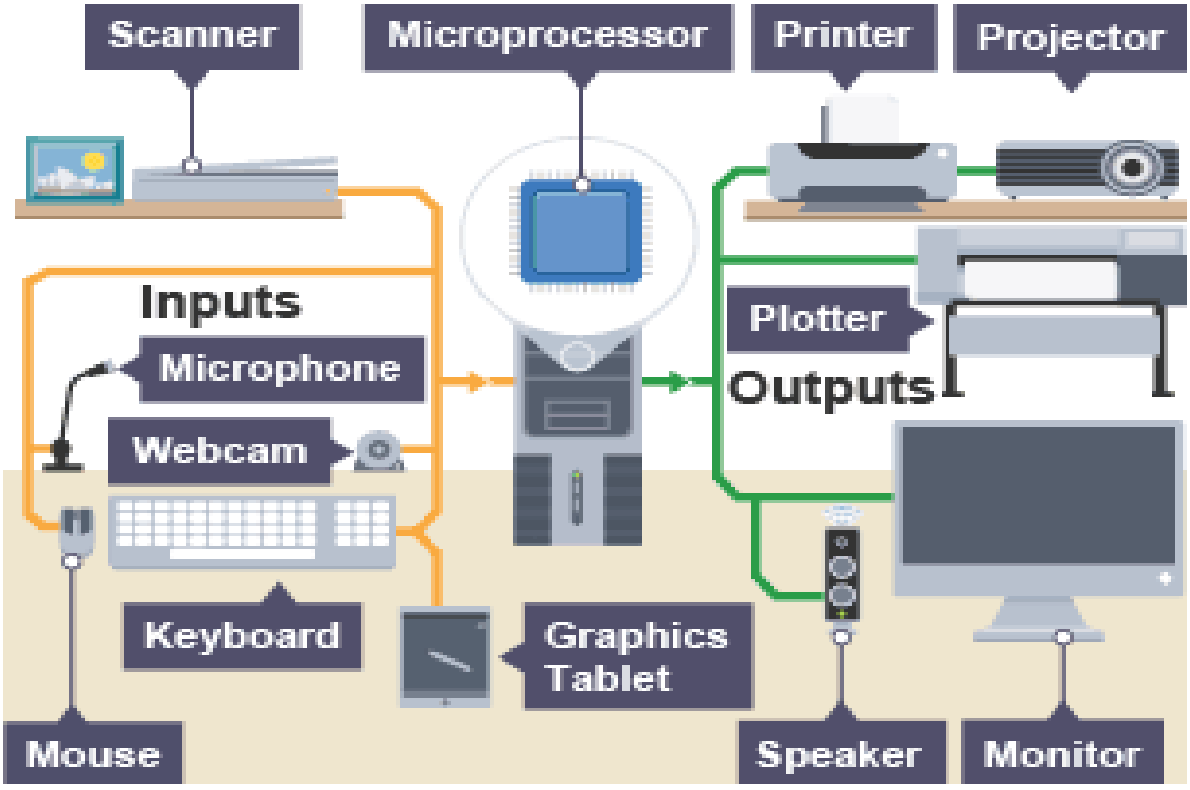

input
output
Keyboard
Optical pen
Joystick
Scanner
Bar code reader
Digital camera
Pendrive
Touch screen
CD/DVD
Webcam
Fax
Modem
Head phones
Head set
Laser printer
Screen
Plotter
Inkjet printer
Speakers


Scanner
Microprocessor
Printer
Projector
Inputs
Microphone
Webcam
Keyboard
Graphics Tablet
Mouse
Plotter
Outputs
Speaker
Monitor

Input Device

An **input device** is a hardware component used to enter data, instructions, or signals into a computer system for processing.

- **Examples:** Keyboard, mouse, microphone, scanner, joystick, barcode reader.
- **Key Point:** Input devices act as a **bridge between the user and the computer**, allowing humans to communicate with machines.

1. Manual Input Devices

- **Definition:** Devices that require human effort or physical interaction to enter data into a computer.
- **Examples:** Keyboard, mouse, joystick, microphone, graphic tablet.
- **Key Point:** The user must **manually provide input** each time.

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2. Automated Input Devices

- **Definition:** Devices that capture data automatically from a source without continuous human intervention.
- **Examples:** Barcode reader, scanner, biometric devices, sensors, digital cameras.
- **Key Point:** These devices **collect or detect data automatically**, reducing manual effort.

Manual input devices

The most common **manual** input devices are the keyboard and mouse. Other manual input devices include:

Keyboard (Input Device)

- **Definition:** A keyboard is a **manual input device** used to enter data, text, numbers, and commands into a computer by pressing keys.
- **Working:** Each key press sends a unique digital signal (known as a scan code) to the computer, which interprets it as a character or command.
- **Types:**
    - **Standard QWERTY keyboard**
    - **Multimedia keyboard**
    - **Wireless/USB keyboards**

    - **Virtual/on-screen keyboard**
- **Uses:** Typing documents, entering commands, programming, gaming, and shortcuts for system control

Mouse

- **Definition:** A mouse is a **manual pointing device** used to control the movement of a pointer (cursor) on the computer screen.
- **Working:** The mouse detects motion (mechanical, optical, or laser) and sends signals to the computer, which moves the cursor accordingly. Clicking buttons or using the scroll wheel sends commands.
- **Types:**
    - **Mechanical mouse** (with a ball)
    - **Optical/laser mouse**
    - **Wireless/Bluetooth mouse**
    - **Touchpad/trackpad** (laptop alternative)
- **Uses:**
    - Selecting and opening files/folders
    - Dragging and dropping items
    - Drawing and designing in graphics software
    - Playing games
    - Scrolling through documents or web pages

Trackpad

- **Definition:** A **trackpad** (also called a **touchpad**) is a **manual input device** that allows users to control the cursor on a screen by moving their finger across a flat, touch-sensitive surface.
- **Working:** It senses the motion and position of the user's finger(s) and translates it into cursor movement. Tapping, swiping, or using multiple fingers performs actions like clicking, scrolling, and zooming.

- **Uses:**
    - Replaces a mouse on laptops and some keyboards
    - Navigating menus, files, and applications
    - Performing multi-touch gestures (zoom, rotate, swipe)
- **Advantages:** Portable, built-in on laptops, supports gestures.
- **Limitations:** Less precise than a mouse, smaller surface area.

TrackPoint

Definition: A **TrackPoint** is a small joystick-like **pointing device** embedded in the middle of a laptop keyboard (usually between the G, H, and B keys). It allows the user to move the cursor by applying pressure with a finger.

- **Working:** The harder you push in a certain direction, the faster the cursor moves. It does not require finger movement across a surface (like a trackpad).
- **Uses:**
    - Navigating the cursor without moving hands away from the keyboard
    - Useful in laptops where space is limited
    - Preferred by some professionals for precision work
- **Advantages:**
    - Saves time (hands remain on the keyboard)
    - Very durable, no moving parts
    - Works well in tight spaces where a mouse or trackpad is difficult to use
- **Limitations:**
    - Takes practice to get used to
    - Less common on modern laptops (mostly seen in Lenovo ThinkPads, some older IBM models)

Trackball

	Used as an alternative to a mouse. To operate it the user rotates the ball which moves the pointer on screen. They are particularly easy to use for those with limited movement in their hands and are often used in Computer Aided Design (CAD) for their increased precision over a mouse.

Microphone

	Microphones are used to input sound. In computing they can be used with voice recognition *software* and a word processing *application* to enter text. Webcams commonly have microphones built-in too.

- **Definition:** A microphone is an **input device** that converts sound waves (like voice, music, or noise) into electrical signals, which are then processed by a computer.
- **Use:** Recording audio, making calls, video conferencing, voice commands.
- **Type:** Manual input device (requires the user to speak).

Voice Recognition

- **Definition:** Voice recognition is a technology that identifies and distinguishes a **specific person's voice**.

- **Focus:** *Who is speaking* (the identity).
- **Uses:** Security systems (voice-based authentication), smart locks, banking verification.
- **Example:** Unlocking a smartphone using your voice.

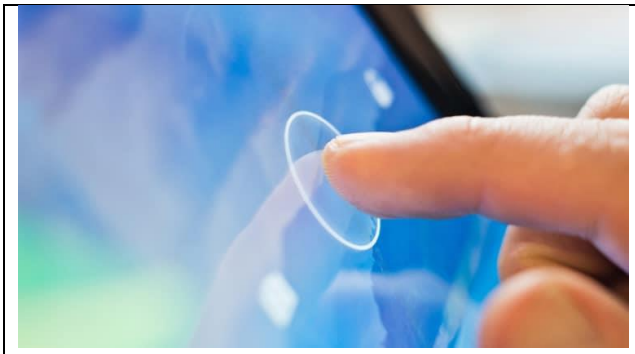
Speech Recognition

- **Definition:** Speech recognition is a technology that converts **spoken words into text or commands**.
- **Focus:** *What is being said* (the content).
- **Uses:** Virtual assistants (Siri, Alexa, Google Assistant), dictation software, hands-free control.
- **Example:** Saying “Open Google” and the computer follows the command.

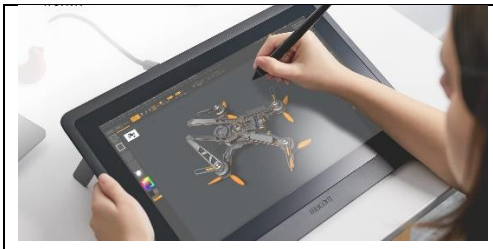
✅ **In short:**

- The **microphone** captures sound.
- **Voice recognition** checks *who* is speaking.
- **Speech recognition** understands *what* is being spoken.

Touch screen

	A touch-sensitive visual display unit (VDU) or screen has a grid of light beams or fine wires criss-crossing the screen that are used to detect touch. Many mobile phones use touch screens and do away with the keypad entirely. They're often used on cash machines and in shopping centres too. Touch screens are robust, easy to operate and easy to reprogram. Touch screen is also an output device.

Graphics tablet

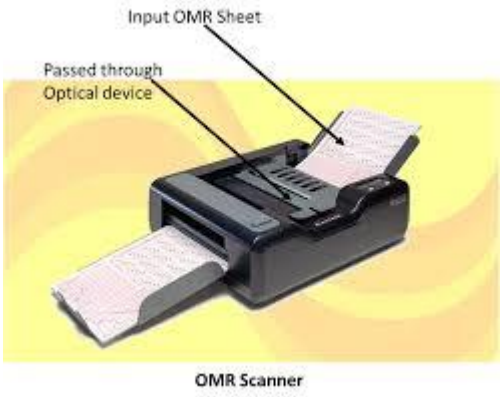
	A graphics tablet consists of a flat pad (the tablet) on which the user draws with a special pen. As the user draws on the pad the image is created on the screen. Using a graphics tablet a designer can produce very accurate on-screen drawings as if they were drawing on paper.

Automatic input devices

Magnetic strip (or stripe) reader

	Magnetic stripes are built into many plastic cards such as debit or credit cards and personal identity cards. The magnetic strip on the back of the card can hold the personal details of the card owner and, with the necessary PIN, will allow access to secure information, eg bank account details. Data stored on the strip is scanned and input into a computer system by a magnetic stripe reader.

Optical Mark Reader (OMR)

	An OMR reads marks made by pencil on a printed form into the computer. OMR systems are suited to reading pre-printed forms and check boxes such as lottery number selection sheets and multiple choice exam papers.

Scanner

	Documents, photographs, or other real-world objects into digital files that can be stored and manipulated on a computer or mobile device. It works by shining a light beam onto the object and using an optical sensor to measure the reflected light, thereby capturing the image in a digital format.

How a Scanner Works

1. **1. Digitization:**

A scanner converts physical documents or images into a digital format (a "soft copy").

2. **2. Light and Reflection:**

It uses a light source and an optical sensor to capture the image. The light illuminates the object, and the sensor measures how much light is reflected back at different points to determine the image's brightness and detail.

3. **3. Digital File:**

The captured data is then transformed into a digital file (e.g., a TIFF or JPEG) that can be stored on a computer or other devices.

Key Functions & Uses

- **Digitizing Documents:** Transforming paper documents into digital files for easy storage, editing, and sharing.
- **Archiving:** Creating digital backups of important documents and photos.
- **Sharing:** Sending digital copies of documents to others.
- **Copying:** Creating duplicates of physical documents.
- **Optical Character Recognition (OCR):** Software can be used to recognize and extract text from scanned images, allowing it to be edited in a word processor.

Types of Scanners

- **Flatbed Scanners:** A common type with a glass surface where documents are placed face-down for scanning.
- **Sheet-fed Scanners:** Designed to scan loose pages, which are fed through rollers.
- **Handheld Scanners:** Portable devices that can be manually moved across an object to scan it.
- **Drum Scanners:** High-resolution scanners used for professional applications to scan film and artwork.
- **Bar Code Scanners:** Specifically designed to read barcodes and other codes from products or documents.

Types of scanners (Differences):

2D Scanner

- **Definition:** A 2D scanner is a device that captures flat images, such as text, photos, or drawings, and converts them into a digital format.
- **Purpose:** Mainly used for scanning documents and pictures.
- **Example:** Flatbed scanner, handheld scanner.

3D Scanner

- **Definition:** A 3D scanner is a device that captures the three-dimensional shape and appearance of real-world objects, converting them into a digital 3D model.
- **Purpose:** Used for creating digital models in engineering, medical imaging, virtual reality, and animation.
- **Technologies Used:** Laser scanning, structured light, photogrammetry.

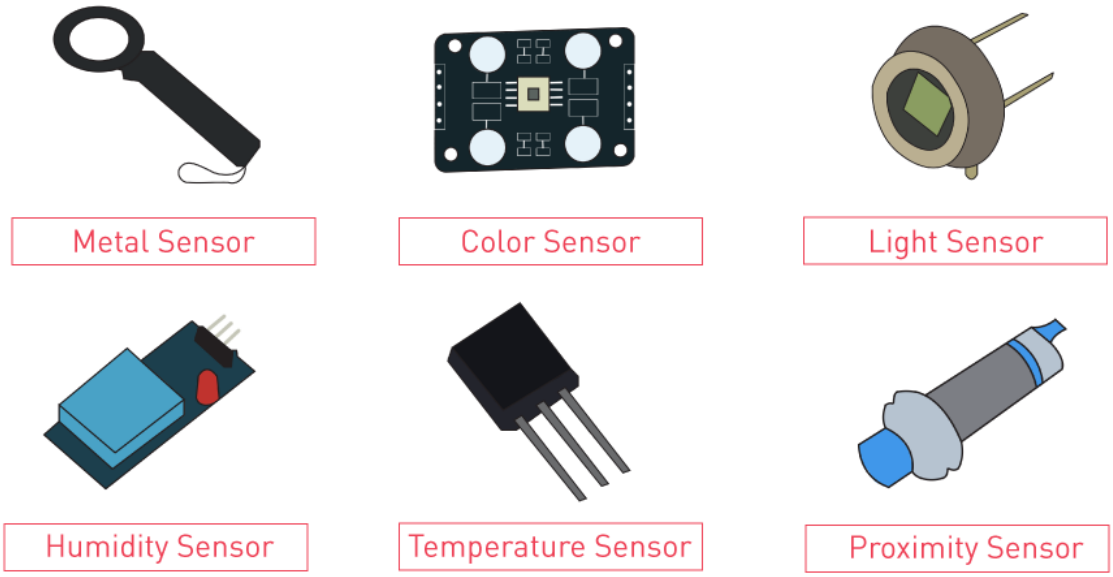
Key Difference:

- 2D scanner → flat images only (length × width).
- 3D scanner → full shape and depth (length × width × height).

	A **3D scanner** is a device that captures the shape and look of real objects and turns them into digital models. It uses methods like lasers, light patterns, or photos from different angles to collect details about an object's size, shape, and surface. The data is then processed into a digital format (like a 3D model) that can be used for designing, editing, testing, or creating copies of the object. XRAY, CTScane, MRI

Sensor

A **sensor** is a device that **converts** a **real-world property** (e.g. temperature) into **data** that a computer can **process**.



Examples of sensors and the properties they detect are...

Sensor	**What it Detects**
Temperature	Temperature

Light	Light / dark
Pressure	Pressure (e.g. someone standing on it)
Moisture	Dampness / dryness
Water-level	How full / empty a container is
Movement	Movement nearby
Proximity	How close / far something is
Switch or **button**	If something is touching / pressing it

A sensor measures specific property data and sends a signal to the computer. Usually this is an **analogue** signal, so it needs to be converted into **digital** data for the computer to process. This is done using by an **Analogue-to-Digital Converter** (ADC).

Sensors are used extensively in **monitoring / measuring / data logging systems**, and also in **computer control systems**.

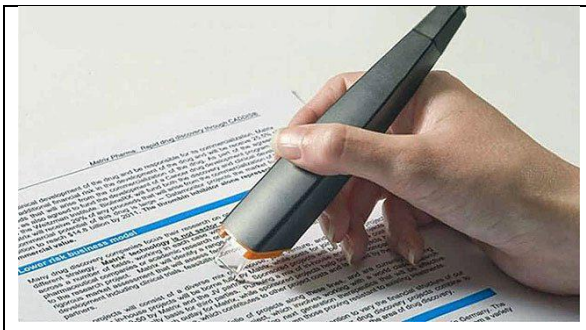
MICR

The term "magnetic ink character recognition," or "MICR," refers to a technology that is employed in the process of determining the authenticity of paper documents, particularly checks.
When certain characters are printed on the original documents, a special link that is sensitive to magnetic fields is used. This link is used in the printing process.
The magnetic characters can act as a storage medium for information. The use of MICR has the potential to improve security and lessen the financial impact of certain types of criminal activity.

Light pen

	A light pen is a pen-shaped input device containing a light sensor that allows users to interact with a screen by pointing at it, similar to a mouse or stylus. It works by detecting the light emitted from a screen, such as a Cathode Ray Tube (CRT), and sending the precise X and Y coordinates of the light-sensing moment to the computer's CPU. Users can then make selections, draw, or activate commands by touching the pen to the screen

OCR

	It is a device that detects alphanumeric characters printed or written on paper. The text that is to be scanned is illuminated by a low-frequency light source. The light is not reflected from the areas that are bright but is instead absorbed by the areas that are dark. The photocells take in the light that is reflected back to them.

OBR

	It is short for optical bar code reader, a device that can read data that is encoded using bar codes. Tags can be read by using this device, which examines a series of vertical bars with varying widths in search of particular data. A light pen or scanner that is connected to a computer is typically used for reading bar codes.

Some devices act as both input and output:

- Touchscreen - fingers control a device through selecting icons. Screen also outputs images. Used for tablets, smartphones and some supermarket self-scan checkouts.

- Interactive whiteboard - a touch-sensitive surface linked to a computer and a projector.
- Games controller - feedback gives outputs that the user can sense based on inputs, eg a rumbling sensation to reflect an explosion or collision onscreen.
- Haptic glove - wearable technology that gives designers touch feedback based on virtual surfaces and objects

A games controller, a mobile phone and a haptic glove