Chapter Two Hardware

For first stage
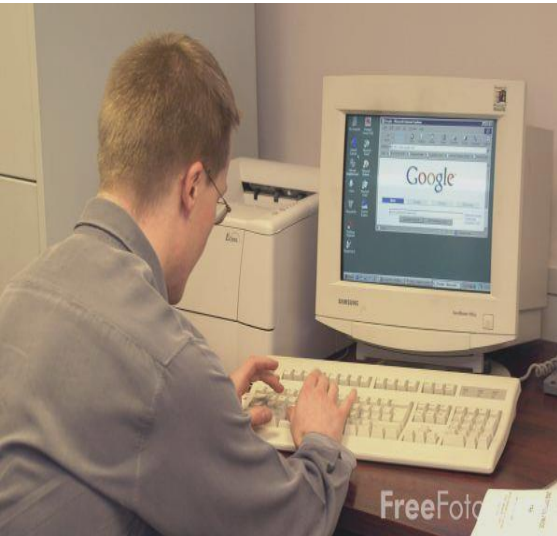
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Outline

- Introduction
- Hardware
- Central Processing Unit (CPU)
  - ✓ Control Unit
  - ✓ Arithmetic and logic Unit(ALU)
  - ✓ Registers
- System Board
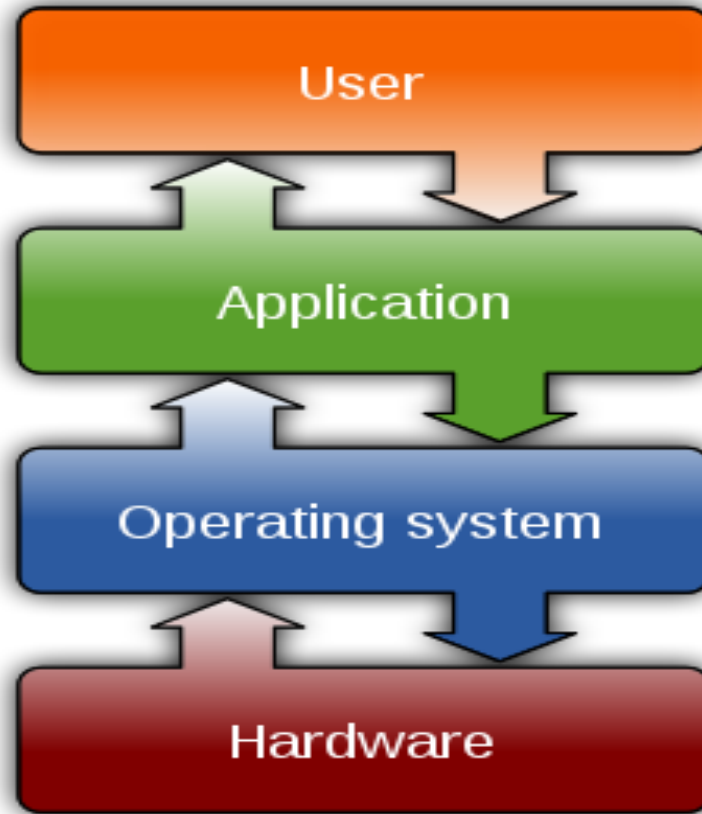- Input Device
- Output Devices

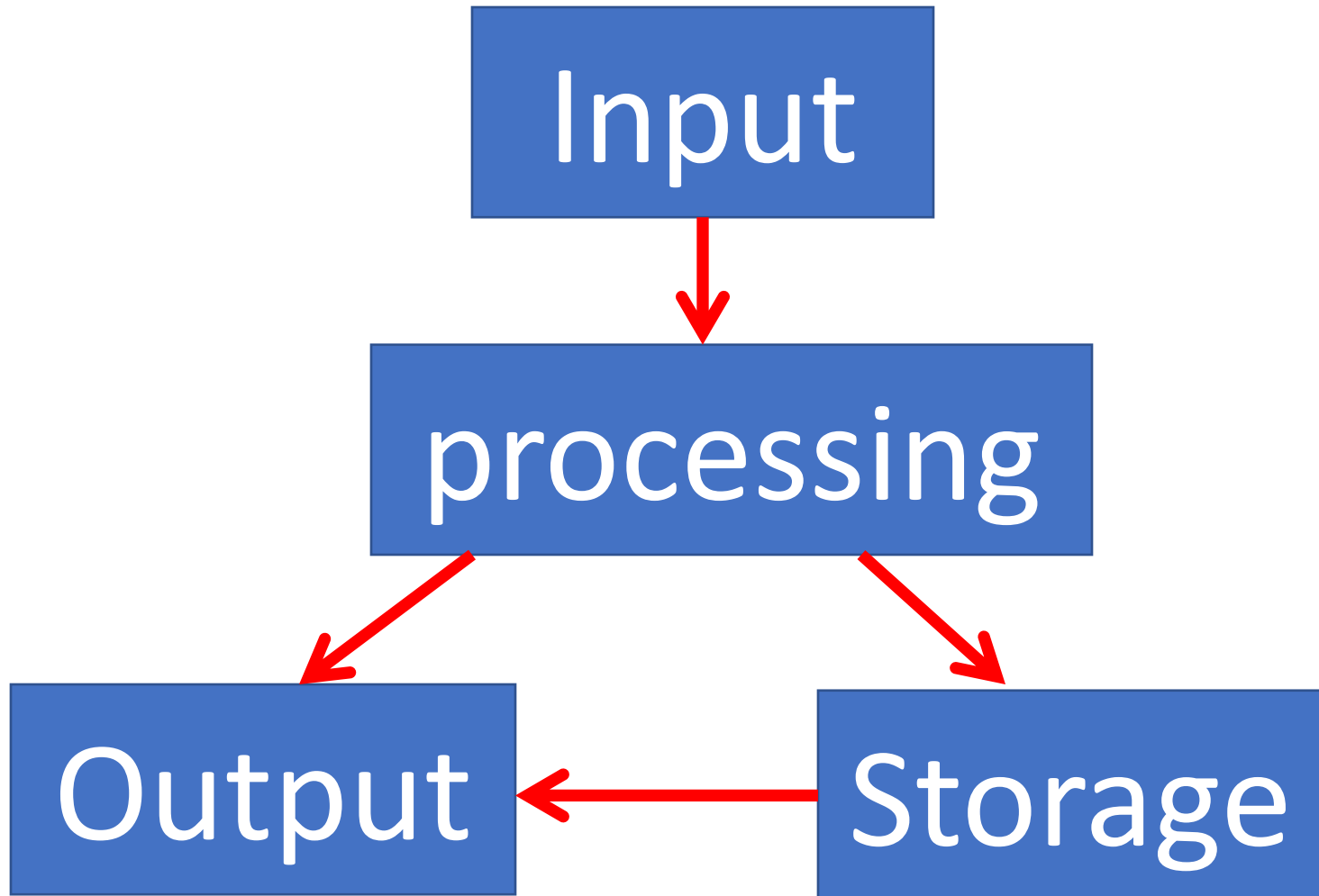# Introduction

❑ **Computer**

Electronic device that can be:

- Received input data

- Processed data

- Display output information

Introduction

Introduction

Introduction

❑ **Computer system contains :**

- Hardware

- Software

- Users

Introduction

❑ **Hardware:**

• Computer hardware refers to the physical parts of a computer and related devices.

Introduction

❑ **Hardware:**

- **Internal hardware** (system unit)

  ✓ central processing unit

  ✓ primary memory

  ✓ The system board

- **External hardware** (peripherals)

  ✓ monitors, keyboard, mouse, printers.

Hardware

❑ System Case
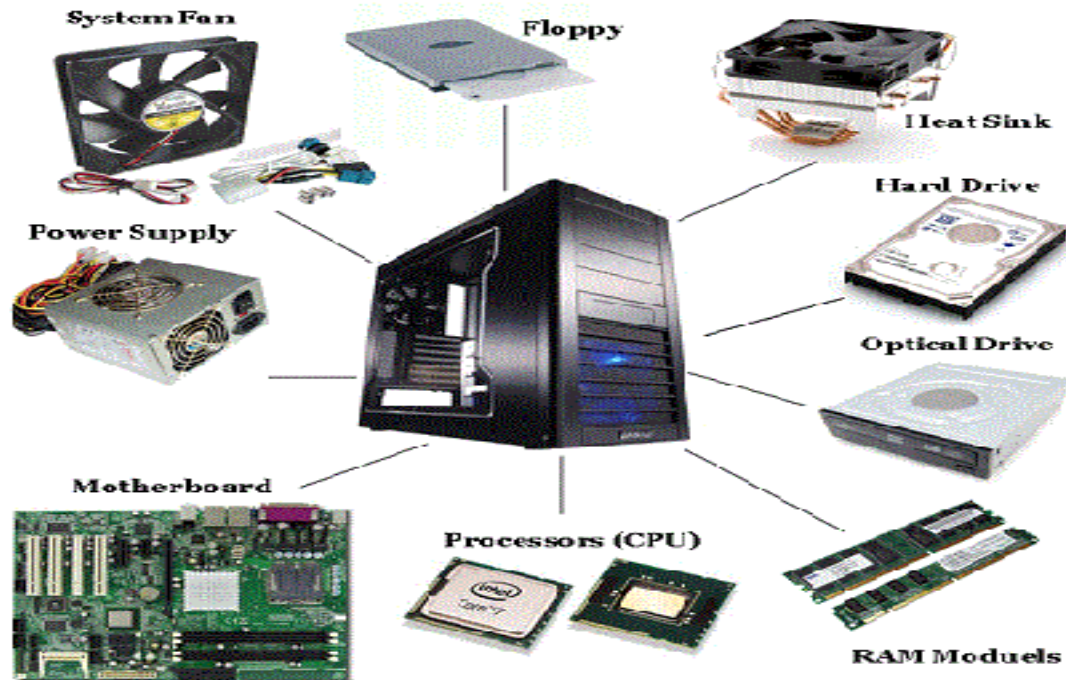
Fig (1) The components of system case

Hardware

❑ **Central Processing Unit (CPU)**

Fig (2) CPU

Hardware

❑ **CPU**

- an important part in a PC .

- Performs all calculations

- Determines fast of your computer.

- The position is on "mother Board "

- The CPU is measured by Megahertz (MHz)   or Gigahertz (GHz)

Central Processing Unit

❑ **CPU consists of :**

✓ **Control Unit**

✓ **Arithmetic and logic Unit**

✓ **Registers**

Central Processing Unit

❑ **Control Unit**

• directs the flow of data and instructions within the processor and electronic memory.

❑ **Arithmetic and logic Unit**

• contains programmed transistors that perform mathematical and logical .

calculations on the data .

❑ **Registers**

- The registers are special transistors that store data and instructions as they are being manipulated by the control unit and ALU .

System Board

❑ **System Board**

The system board (also called the motherboard) is the main circuit board, or the electrical foundation of the computer. In addition to CPU, RAM, and ROM chips, the system board contains the following:

System Board

- Expansion slots to add memory and hardware devices

- Special purpose chips that convert analog signals to digital format

- Video card to control the display monitor

System Board
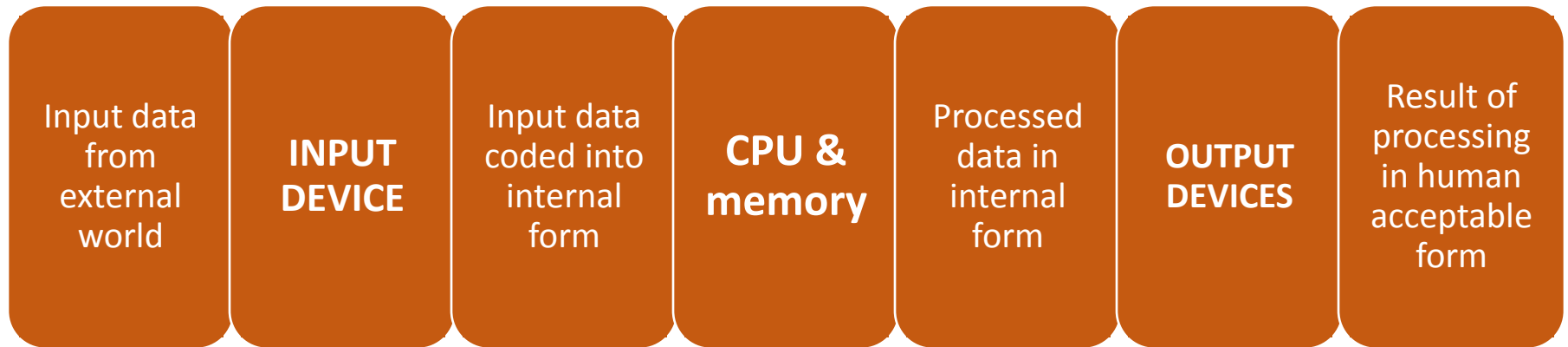

Fig (3) Motherboard

- Power supply

- I/O interface ports to capture and send data to peripheral devices

Input Devices and Output Devices

❑ A computer system needs to communicate with its external environment its user). The Input/output devices provide this capability to a computer system. They are also known as peripheral devices, because they surround a computer's CPU and memory.

Input Devices and Output Devices

Input data from external world	**INPUT DEVICE**	Input data coded into internal form	**CPU & memory**	Processed data in internal form	**OUTPUT DEVICES**	Result of processing in human acceptable form

Input Devices

❑ **Input Devices**

• It is an electromechanical device that can be used to enter data and instructions to the computer .

Input Devices

❏ **Examples of Input Devices :**

• **Keyboard**

• One of the primary input devices used with a computer.

• The keyboard looks very similar to the keyboards of electric typewriters, with some additional keys.

Input Devices

- Keyboards allow a computer user to input letters, numbers, and other symbols into a computer

- Uses an arrangement of buttons or keys.

- Example of specialized keys are so – called Function Keys labeled F1, F2 , F3 , F4 ………

Input Devices

❑ **Key Type**

Key Type	Example
Alphanumeric	A-Z, 0-9
Punctuation	. , ! " ?
Modifiers	Shift, SpaceBar, Enter, Ctrl, Alt
Navigation	Arrows, Home, Page Up
System Command	PrtScn, Esc, F1, Start

Input Devices

Input Devices

❑ Types of Keyboard
1- Standard

Input Devices

- Desktop computer keyboards, such as the 101-key US traditional keyboards or the 104-key Windows keyboards, include alphabetic characters, punctuation symbols, numbers and a variety of function keys.

Input Devices

2) Laptop Keyboard

Input Devices

- The laptop computer keyboard is a small version of the typical QWERTY keyboard.

- A typical laptop has the same keyboard type as a normal keyboard, except for the fact that most laptop keyboards condense the symbols into fewer buttons to accommodate less space.

Input Devices

3) Gaming and Multimedia Keyboard

Input Devices

- The gaming keyboards are designed for the convenience of the gamers and these types of keyboards provide the required controls on the keyboards like back lighting.

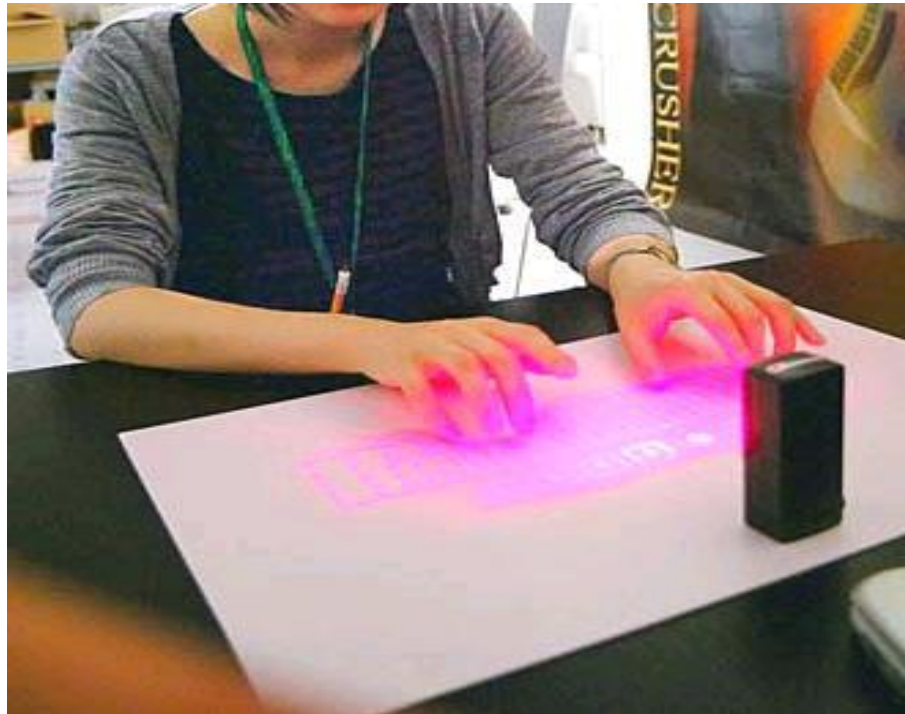# Input Devices

4) Thumb-sized keyboard

Input Devices

- Smaller external keyboards have been introduced for devices without a built-in keyboard, such as PDAs, and smartphones.

- Small keyboards are also useful where there is a limited workspace.

Input Devices

5) Virtual Keyboard

Input Devices

- The virtual keyboards are not actually physical keyboards, but they are simulated using a software.

Input Devices

6) Foldable Keyboard

Input Devices

- Foldable keyboards are extremely good for travelling.

- Simply roll them up and then unroll them when you need them again

Input Devices

❑   **Pointing Devices**

•   **A pointing device** is a hardware input device that allows the user to move the pointer to select items on a display screen.

Input Devices

❑ **Types of pointing device:**

✓ Based on rolling a ball

✓ Based on touching a surface

✓ Based on moving stick

Pointing Devices

1) Based on rolling a ball

Example:

– Mouse

– Trackball

Input Devices

- **Mouse**

- Mouse can be used to control and manipulate cursor movement on a display screen .

- The mouse is important for graphical user interfaces because user can simply point to options and objects and click a mouse button.

Input Devices

❑ **Types of Mouse**

1- Mechanical Mouse

2- Optical Mouse

3- Wireless Mouse

Input Devices

Mechanical Mouse

Has a rubber or metal

 ball on its underside that

can roll in all directions.

Input Devices

Optical Mouse

Uses a laser to detect

the mouse's movement.

Input Devices

Wireless Mouse

transmits infrared or

radio signals to a receiver.

Input Devices

Trackball

• A trackball is a mouse lying on its back.

• To move the pointer, you rotate the ball with your thumb, your fingers, or the palm of your hand

• It does not require much space to use it .

Input Devices

2) Based on touching a surface

Example:

– Touchpad

– Graphic tablet

– Touch screen

– Light pen

– Stylus

Input Devices

- **Touchpad**

A small, touch-sensitive pad used as a pointing device on some portable computers.

•By moving a finger or other object along the pad, you can move the pointer on the display screen.
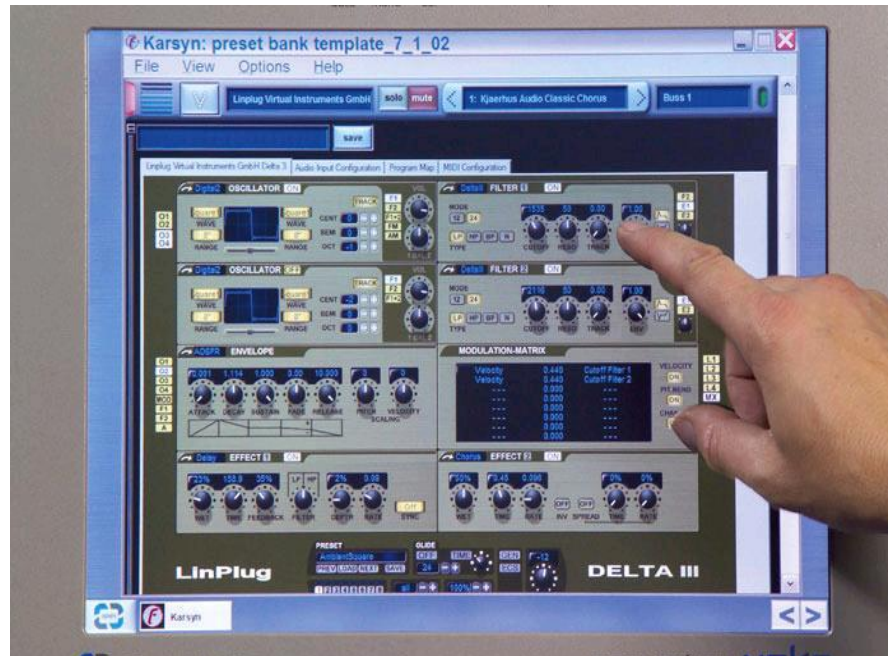
Input Devices

- **Graphic Tablet**

A graphics tablet (or digitizer, digitizing tablet, graphics pad, drawing tablet) is a computer input device that allows one to hand-draw images and graphics, similar to the way one draws images with a pencil and paper.
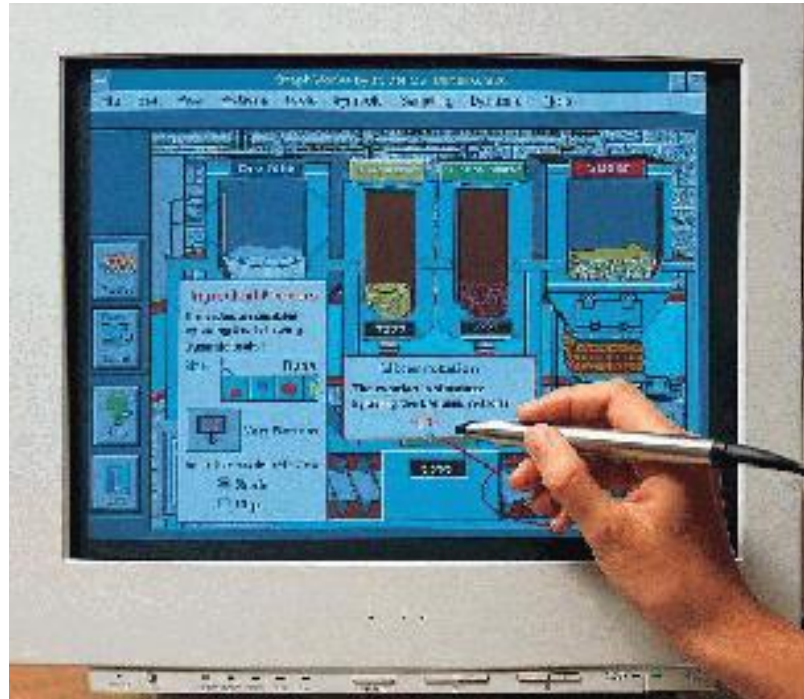
Input Devices

- **Touchscreen**

Input Devices

A **touchscreen** is an electronic visual display that can detect the presence and location of a touch within the display area.

Input Devices

- **Light Pen**

Input Devices

A **light pen** is a computer input device in the form of a light-sensitive wand used in conjunction with a computer's CRT display.

•It allows the user to point to displayed objects or draw on the screen in a similar way to a **touchscreen** but with greater positional accuracy.

Input Devices

- **Stylus**

A stylus is a small pen-shaped instrument that is used to input commands to a computer screen, mobile device or graphics tablet.

Input Devices

3) Based on moving stick

Example:

– Joystick

– Gamepad

Input Devices

- **Joystick**

Input Devices

- A joystick allows an individual to move an object in a game such as navigating a plane in a flight simulator.

- It can include buttons to perform some actions , and used for playing games on the computer.

Input Devices

- **gamepad** is a peripheral device designed to be connected to a computer or console gaming system.

Input Devices

- It has multiple buttons and may have one or two mini joysticks .

Input Devices

Imaging and Video Input Devices

- Used to digitize images or video from the outside world into the computer.

Example:

– Digital camera

– Webcam

– Optical scanner

– Finger print

– Barcode reader

Input Devices

- ## **Digital Camera**

- A camera that stores the pictures or video it takes in electronic format instead of to film.

Input Devices

- Digital cameras have become the camera solution for most users today as the quality of the picture they take has greatly improved and as the price has decreased

Input Devices

- **Webcam**

A webcam is a hardware camera connected to a computer that allows anyone connected to the Internet to view either still pictures or motion video of a user or other object.

Input Devices

- **Optical Scanners**

Input Devices

- Scanner is an input device, which works more like a photocopy machine. It is used when some information is available on paper and it is to be transferred to the hard disk of the computer for further manipulation.

Input Devices

- Scanner captures images from the source which are then converted into a digital form that can be stored on the disk. These images can be edited before they are printed.

Input Devices

- **Two types of scanner**

- **Flatbed**

- Flatbed scanners look similar to a small photocopier with the document remaining flat and stationary during the scanning .

Input Devices

- **Hand-held Scanner**

Hand-held scanners are used for entering text and images that are less than a page wide. Hand-held scanners are adequate for small pictures and photos but are difficult for entire pages.

Input Devices

- **Fingerprint Scanner**

A **fingerprint scanner** or **fingerprint reader** is a hardware device that verifies a user or enters password information by scanning their finger.

Input Devices

- **Barcode Reader**

A **barcode reader** is a hardware

device capable of reading a

barcode and printing out the

details of the product or logging

that product into a database.

Input Devices

- **Audio Input Devices**

 Audio input devices allow a user to send audio signals to a computer for processing, recording, or carrying out commands.

Example:

–Microphone

Input Devices

- **Microphone**

A **microphone** is a hardware peripheral that allows computer users to input audio into their computers.

Output Devices

❑ **What is Output?**

Output is data that has been processed into a useful form.

❑ **Types of Output**

1) Hard copy

Printed on paper or other permanent media.

2) Soft copy

Displayed on screen or by other non-permanent means.

Output Devices

❑ **Output Devices**

An **output device** is any piece of computer hardware equipment used to communicate the results of data processing carried out by an information processing system (such as a computer) to the outside world.

Output Devices

❑ **Examples of Output Devices :**

- **Printer**

- **Monitor**

- **Speakers**

- **Projector**

Output Devices

❏ **Monitor**

- The device which displays computer output.

- The monitor displays the video and graphics information generated by the computer through the video card.

- Monitors are very similar to televisions but usually display information at a much higher resolution.

Output Devices

1) Monochrome Monitor

Output Devices

- A **monochrome monitor** is a type of CRT computer display which was very common in the early days of computing, from the 1960s through the 1980s, before color monitors became popular.

- They are still widely used in applications such as **computerized cash register systems**

Output Devices

- Monochrome monitors actually display two colors, one for the background and one for the foreground.

- The colors can be black and white, green and black, or amber and black.

Output Devices

2) Color Monitor

Output Devices

- Color monitors can display anywhere from 16 to over 1 million different colors.

- Color monitors are sometimes called RGB monitors because they accept three separate signals --red, green, and blue.

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Output Devices

❑ **Types of Monitor**

- Cathode Ray Tube (CRT)

- Liquid Crystal Display (LCD)

- Light-emitting Diode (LED)

Output Devices

Cathode Ray Tube (CRT)

- Large

- Heavy

- Produce heat

- Not expensive

Output Devices

Liquid Crystal Display (LCD)

- Less space

- Lighter

- Low power consumption

- Expensive

- Limited viewing angle

Output Devices

Light-emitting Diode (LED)

- Less space

- Lighter

- Very expensive

- Provide higher contrast and better viewing angles than LCD monitor

Output Devices

❑ **Monitor Features**

1- Screen Size

2- aspect Rate

3- Display Resolution

4- Refresh Rate

5- Color Depth

Output Devices

❑ **Printer**

- Printer is an external hardware device responsible for taking computer data and generating a hard copy of that data.

- Printers are one of the most used peripherals on computers and are commonly used to print text, images, and photos.

Output Devices

❑ **Types of Printer**

Printers can be categorized into:

- Impact Printer

- Non-Impact Printer

Output Devices

❑ **Impact Printer**

• It strikes paper and ribbon together to form a character, like a typewriter.

❑ **Advantages**

• Less expensive

• Can make multiple copies with multipart paper

Output Devices

❑ **Disadvantages**

- Noisy

- Print quality lower in some types

- Poor graphics or none at all

- Slow

- **Example** : Daisy-wheel and Dot-Matrix .

Output Devices

❑ **Non-Impact Printer**

- It uses ink spray, toner powder or inkless

❑ **Advantages**

- Quiet

- Can handle graphics and often a wider variety of fonts than impact printers

- Fast

Output Devices

❑ **Disadvantages**

- More expensive

- Occupies a lot of space

- The cost of maintaining it is high

- **Example :** Laser Printer , Multifunction Printer , Ink-jet Printer and Thermal Printer (Inkless) .
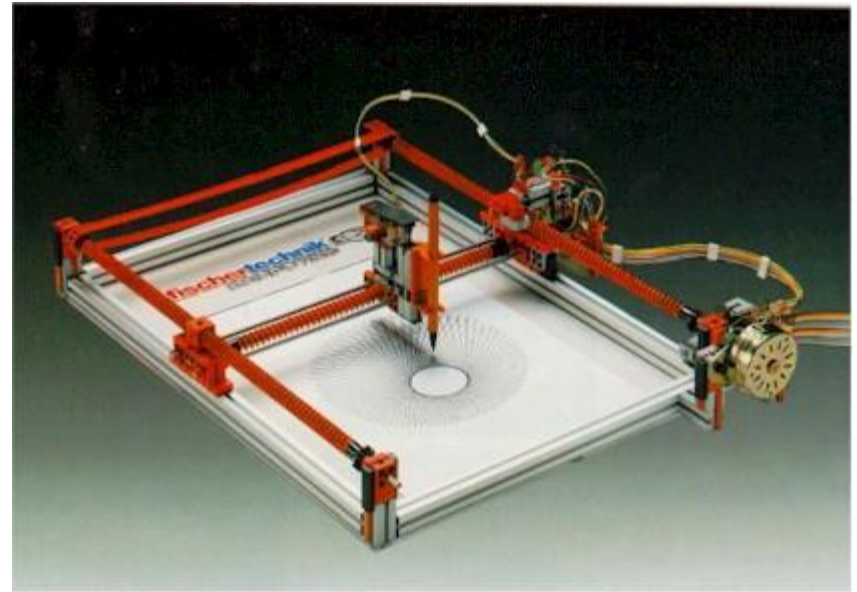
Output Devices

❑ **Printing Speed**

The printing speed is measured in:

- **cps** (characters per second)

- **lpm** (lines per minute)

- **ppm** (pages per minute)

Output Devices

❑ **Plotter**

Output Devices

- The **plotter** is a computer printer for printing vector graphics

- Plotters are used in applications such as computer-aided design ,diagrams, layouts, specification sheets and banners

Output Devices

- The plotter is capable of producing color drawings in a matter of minutes

- Plotters differ from printers in that they draw lines using a pen

- Plotters are considerably more expensive than printers

Output Devices

❑ **Speaker**

A hardware device connected to a computer's sound card that outputs sounds generated by the computer.

•Speakers can be used for various sounds meant to alert the user, as well as music and spoken text

Output Devices

❑ **Headphones**

- Headphones give sound output from the computer.

- They are similar to speakers, except they are worn on the ears so only one person can hear the output at a time.

Output Devices

❑ **Projector**

Output Devices

- An output device that can take the display of a computer screen and project a large version of it onto a flat surface.

- Projectors are often used in meetings and presentations so that everyone in the room can view the presentation.

Output Devices

❑ **Types of projector**

- Cathode Ray Tube (CRT) projector

- Liquid Crystal Display (LCD) projector

- Digital Light Processing (DLP) projector

Thanks for your attention