



LAGOS STATE
UNIVERSITY

COS/CSC 101/111
LECTURE 3

INTRODUCTION TO COMPUTING

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Course Overview

- ***Introduction to & History of Computer***
- ***Basic Computer Configuration***
- Hardware (Input, Storage and Output Devices)
- Software (Operating System, Application Software, etc.)
- Internet
- Using personal computers as effective problem-solving tools for the present and future.
- Computer application areas and technological trends.

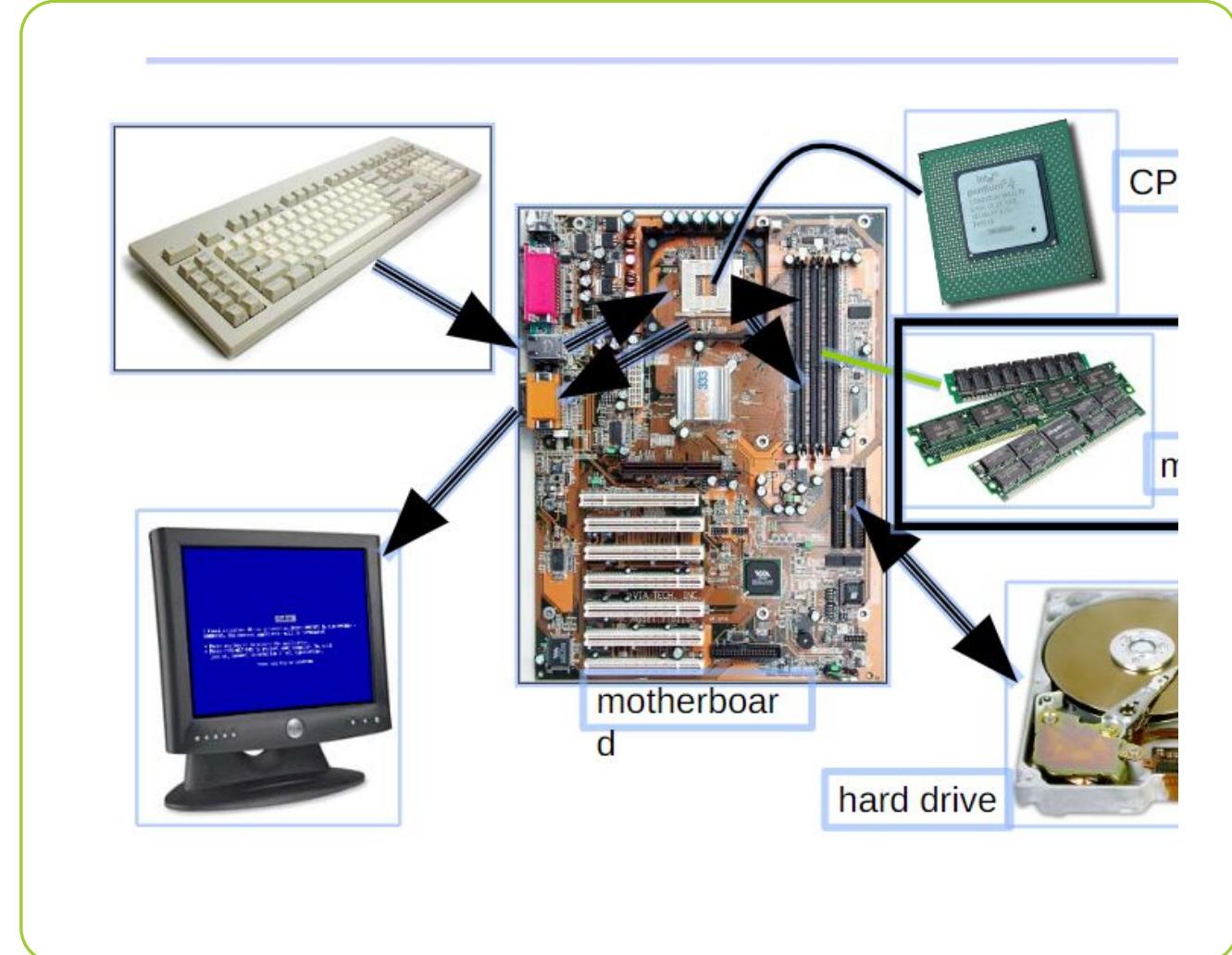
Hardware

- The hardware refers to the physical components or functional units of a computer which make up the computer configuration
- The design and construction of the hardware of a particular computer is referred to as its **architecture** or **configuration**
- The hardware components provide the physical interface to a computer system
- The hardware is divided into three areas or separate units for its operation:
 - Central Processing Unit (CPU) or Processor
 - Main Memory
 - Peripheral Units or Electrical Gadgets

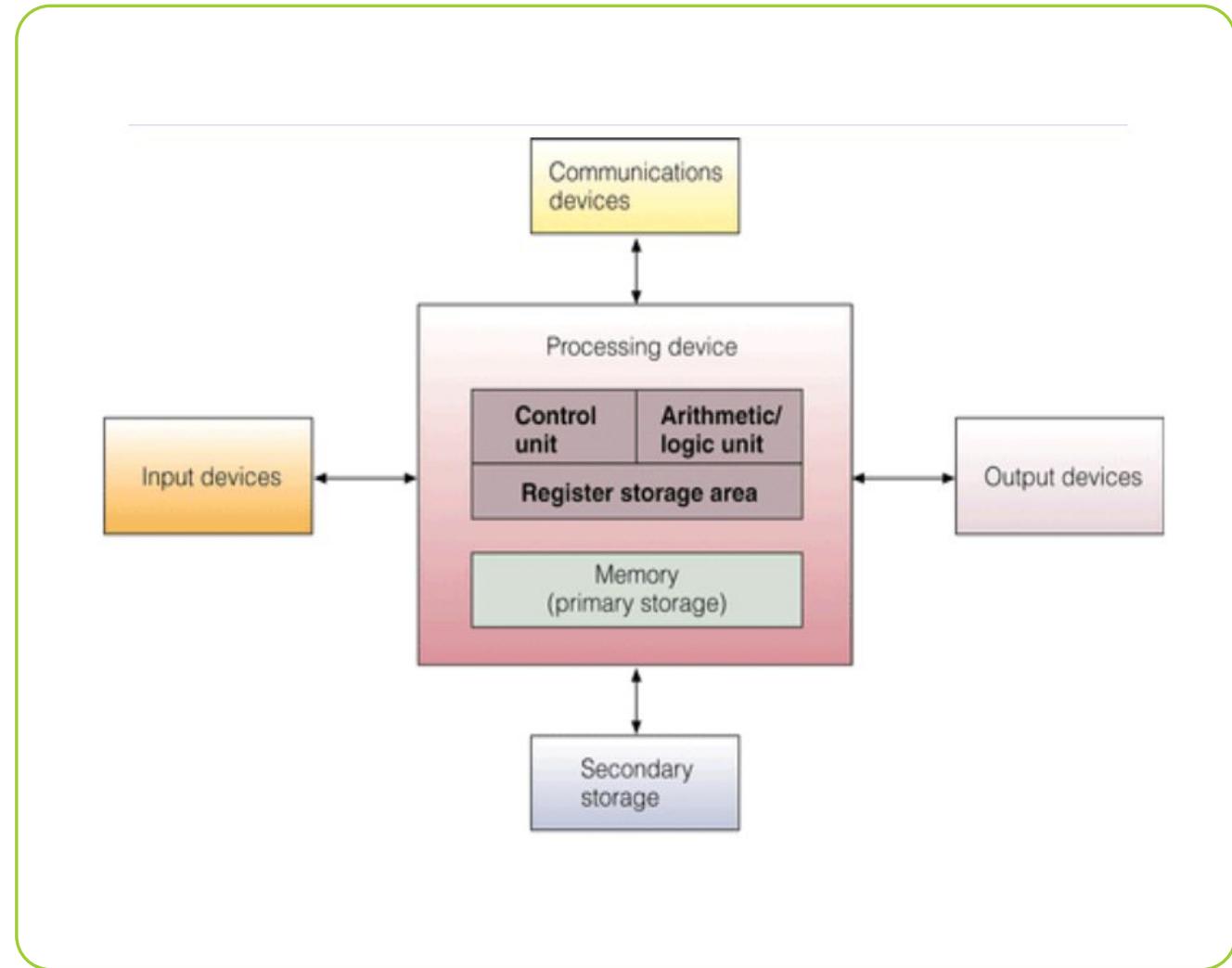
Functional Units of a computer

- The physical parts that make up a computer consists mainly of four basic units, these parts are known as hardware, namely:
 - Input unit,
 - Storage unit,
 - Central Processing Unit (CPU) or Processor
 - Output unit.
- Any hardware device connected to the computer or any part of the computer outside the CPU and the working memory is known as a **Peripherals**
- Central Processing unit further includes Arithmetic logic unit and control unit, as shown in the Figure

Functional Units of a computer



Hardware Components



Functional Units of a computer

- A computer performs five major operations or functions irrespective of its size and make. These are
 - 1. it accepts data or instructions as input,
 - 2. it stores data and instruction
 - 3. it processes data as per the instructions,
 - 4. it controls all operations inside a computer, and
 - 5. it gives results in the form of output.

Input Devices

- *Input Devices*
- *Examples of Input Device*
- *Keyboard*
- *Pointing Devices*
- *Graphic and Video Input Devices*
- *Audio Input Devices*

Input Devices

- ❑ Any peripheral (piece of computer hardware equipment) used to provide data and control signals to a computer.
- ❑ Allows the user to put data into the computer.
- ❑ Without any input devices, a computer would only be a display device and not allow users to interact with it.

Examples of Input Device

- Keyboard
- Mouse
- Touchscreen
- Graphic tablet
- Microphone
- Scanner

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.
- Keyboards allow a computer user to input letters, numbers, and other symbols into a computer
- Uses an arrangement of buttons or keys.
- Requires pressing and holding several keys simultaneously or in sequence.

Keyboard



Typewriter keys

Function keys

Enter keys

System keys

Numeric keypad

Other

Application key

Cursor control keys

12

Types of Keyboard

- Standard
- Laptop
- Gaming and Multimedia
- Thumb-sized
- Virtual
- Foldable

Standard

- 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.



Laptop Keyboard

- 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.



Gaming and Multimedia Keyboard

- 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.



Thumb-sized keyboard

- 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.



Virtual Keyboard

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



Foldable Keyboard

- Foldable keyboards are extremely good for travelling.
- Simply roll them up and then unroll them when you need them again.



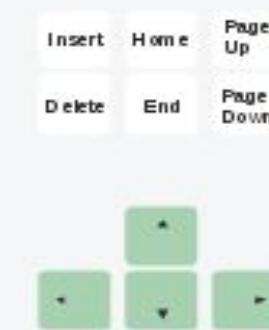
Keyboard Layouts

- QWERTY
- QWERTZ
- AZERTY
- DVORAK

Keyboard Layouts

QWERTY

- Most Common layout



Keyboard Layouts

QWERTZ

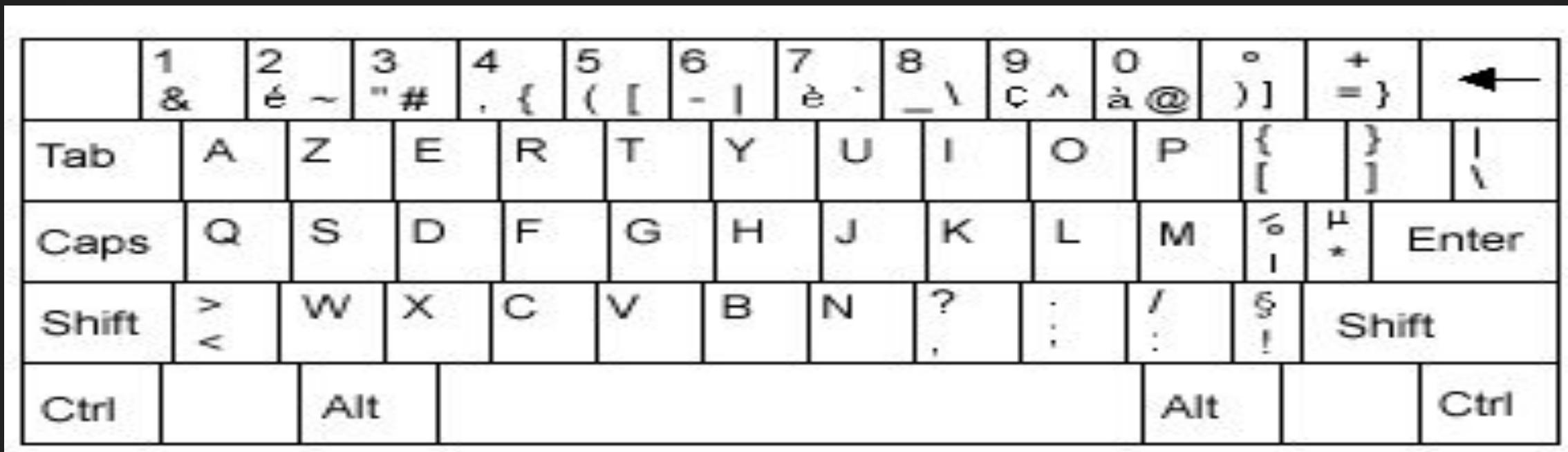
- Used in Germany, Hungary and Czech Republic



Keyboard Layouts

AZERTY

- It is used by most French speakers based in Europe



Keyboard Layouts

DVORAK

- Alternative for QWERTY
- Dvorak layout uses less finger motion, increases typing rate, and reduces errors compared to the standard QWERTY



Key Types

<i>Key Type</i>	<i>Example</i>
Alphanumeric	A-Z, 0-9
Punctuation	. , ! “ ?
Modifiers	Shift, Space Bar, Enter, Ctrl, Alt
Navigation	Arrows, Home, Page Up
System Command	PrtScn, Esc, F1, Start

Function keys

- The Function keys or F1 through F12 keys are used in programs as shortcut keys to perform frequently performed tasks.
- For example, the F1 key is the key to open the online help for most programs.

Control Keys

- The Control keys are what give you additional control of a document.

Keypad

- Although not available on all computer keyboards, especially laptops; the keypad gives the user a quick access to numbers and math functions such as plus, divide, times, and subtract.

Arrow keys

- The arrow keys are four directional arrow keys that allow the user to move their cursor and position on a page.

Keyboard Shortcut Keys

Shortcut Keys	Description
Alt + F	File menu options in current program.
Alt + E	Edit options in current program
F1	Universal Help in almost every Windows program.
Ctrl + A	Select all text.
Ctrl + X	Cut selected item.
Shift + Del	Cut selected item.
Ctrl + C	Copy selected item.
Ctrl + Ins	Copy selected item
Ctrl + V	Paste
Shift + Ins	Paste
Ctrl + P	Print the current page or document.
Home	Goes to beginning of current line.
Ctrl + Home	Goes to beginning of document.
End	Goes to end of current line.
Ctrl + End	Goes to end of document.
Shift + Home	Highlights from current position to beginning of line.
Shift + End	Highlights from current position to end of line.
Ctrl + Left arrow	Moves one word to the left at a time.
Ctrl + Right arrow	Moves one word to the right at a time.

Pointing Devices

- A **pointing device** is a hardware input device that allows the user to move the mouse pointer to select items on a display screen.
- Types of pointing device:
 - Based on rolling a ball
 - Based on touching a surface
 - Based on moving stick

Pointing Devices

Based on rolling a ball

- Example:
 - Mouse
 - Trackball

Mouse

- A device that controls the movement of the cursor or pointer 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.



Type of Mouse

Pointing Devices

- **Mechanical:** Has a rubber or metal ball on its underside that can roll in all directions.
- **Optical:** Uses a laser to detect the mouse's movement.



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



Based on touching a surface

- Example:
 - Touchpad
 - Graphic tablet
 - Touch screen
 - Light pen
 - Stylus

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.



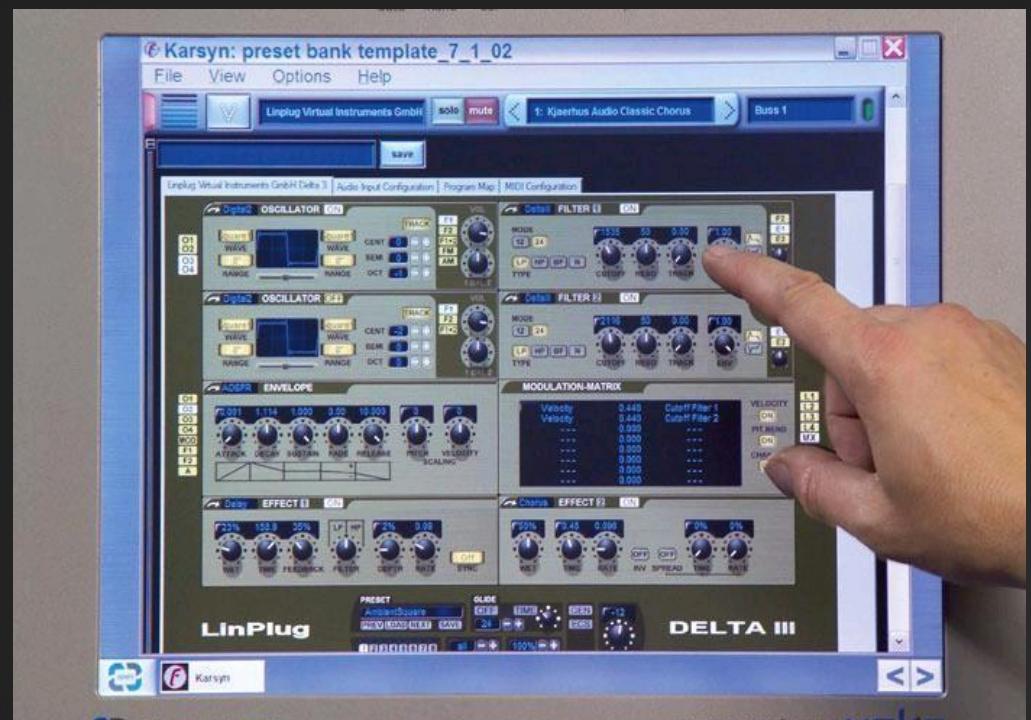
Graphic Tablet

- 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.



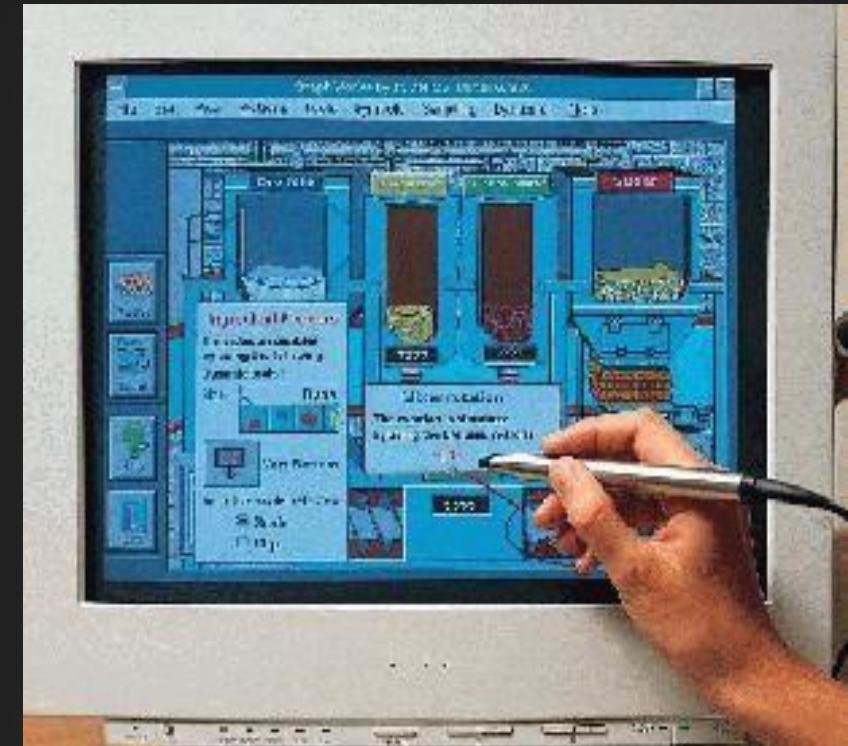
Touchscreen

- A **touchscreen** is an electronic visual display that can detect the presence and location of a touch within the display area.
- The term generally refers to touching the display of the device with a finger or hand.



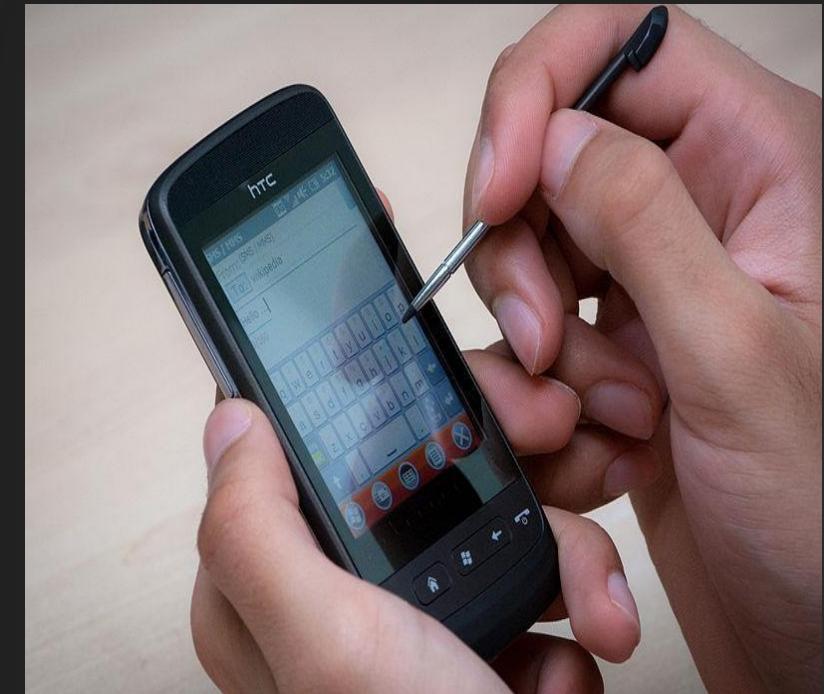
Light Pen

- 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.



Stylus

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



Pointing Device

Based on moving stick

- Example:
 - Joystick
 - Gamepad

Joystick

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



Input Devices

- A **gamepad**, **game controller**, **joypad**, or **video game controller** is a peripheral device designed to be connected to a computer or console gaming system.
- It has multiple buttons and may have one or two mini joysticks.



Imaging and Video Input Devices

- Used to digitize images or video from the outside world into the computer.
- Example:
 - Digital camera
 - Webcam
 - Optical scanner
 - 3D scanner
 - Fingerprint scanner
 - Barcode reader

Digital Camera

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



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.



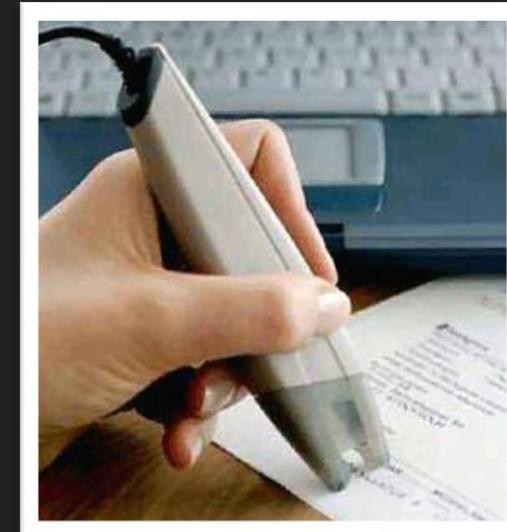
Optical Scanner

- An **optical scanner** is a hardware input device that allows a user to take an image or text and convert it into a digital file, allowing the computer to read or display the scanned object.
- Two types of scanner:
 - Flatbed
 - Hand-held

Image Scanner



Flatbed Scanner



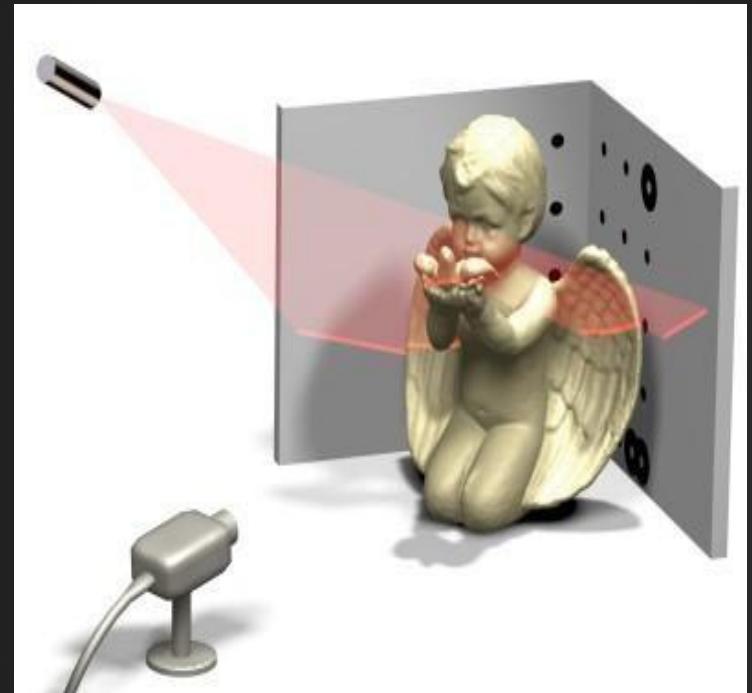
Hand-held Scanner

Image Scanners

Flatbed Scanner	Handheld Scanner
Flatbed scanners look similar to a small photocopier with the remaining flat and stationary scanning	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.

3D Scanner

- A 3D scanner is a device that analyzes a real-world object or environment to collect data on its shape and possibly its appearance (i.e. color).
- The collected data can then be used to construct digital, three dimensional models.



LiDAR Scanning



Fingerprint Scanner

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



Barcode Reader

- A **barcode reader or scanner** is a hardware device capable of reading a barcode and printing out the details of the product or logging that product into a database.



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
 - MIDI keyboard

Input Devices

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



MIDI Keyboard

- A **MIDI (Musical Instruments Digital Interface) keyboard** is typically a piano-style user interface keyboard device used for sending MIDI signals to a computer.
- MIDI information is sent to a computer that capable of reproducing an array of digital sounds or samples that resemble traditional analog musical instruments.



Output Devices

- *Output Devices*
- *Examples of Output Device*
- **Printer**
- **Monitor**
- **Speakers**
- **Projector**

Output Devices

- Any peripheral that receives or displays output from a computer.
- Computer hardware equipment used to communicate the results of data processing carried out by a computer to the outside world.

Examples of Output Device

- Monitor
- Printer
- Speakers
- Projector

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.

Monochrome Monitor

Monochrome Monitor

- 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 colour monitors became popular.
- They are still widely used in applications such as computerized cash register systems



Monochrome Monitor

- Monochrome monitors actually display two colours, one for the background and one for the foreground.
- The colours can be black and white, green and black, or amber and black.



Colour monitor

- Colour monitors can display anywhere from 16 to over 1 million different colours.
- Colour monitors are sometimes called RGB monitors because they accept three separate signals -- red, green, and blue.



Types of CMonitor

- Cathode Ray Tube (CRT)
- Liquid Crystal Display (LCD)
- Light-emitting Diode (LED)

Cathode Ray Tube (CRT)

- Large
- Heavy
- Produce heat
- Not expensive



Liquid Crystal Display (LCD)

- Less space
- Lighter
- Low power consumption
- Expensive
- Limited viewing angle



Light-emitting Diode (LED)

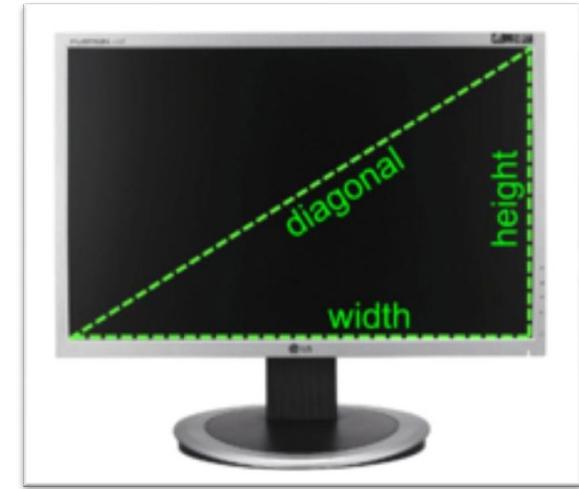
- Less space
- Lighter
- Very expensive
- Provide higher contrast and better viewing angles than LCD monitor



Monitor Features

Screen Size

- The actual amount of screen space that is available to display a picture, video or working space
- Desktop screens are usually 14 - 25 inches by diagonal measurement.



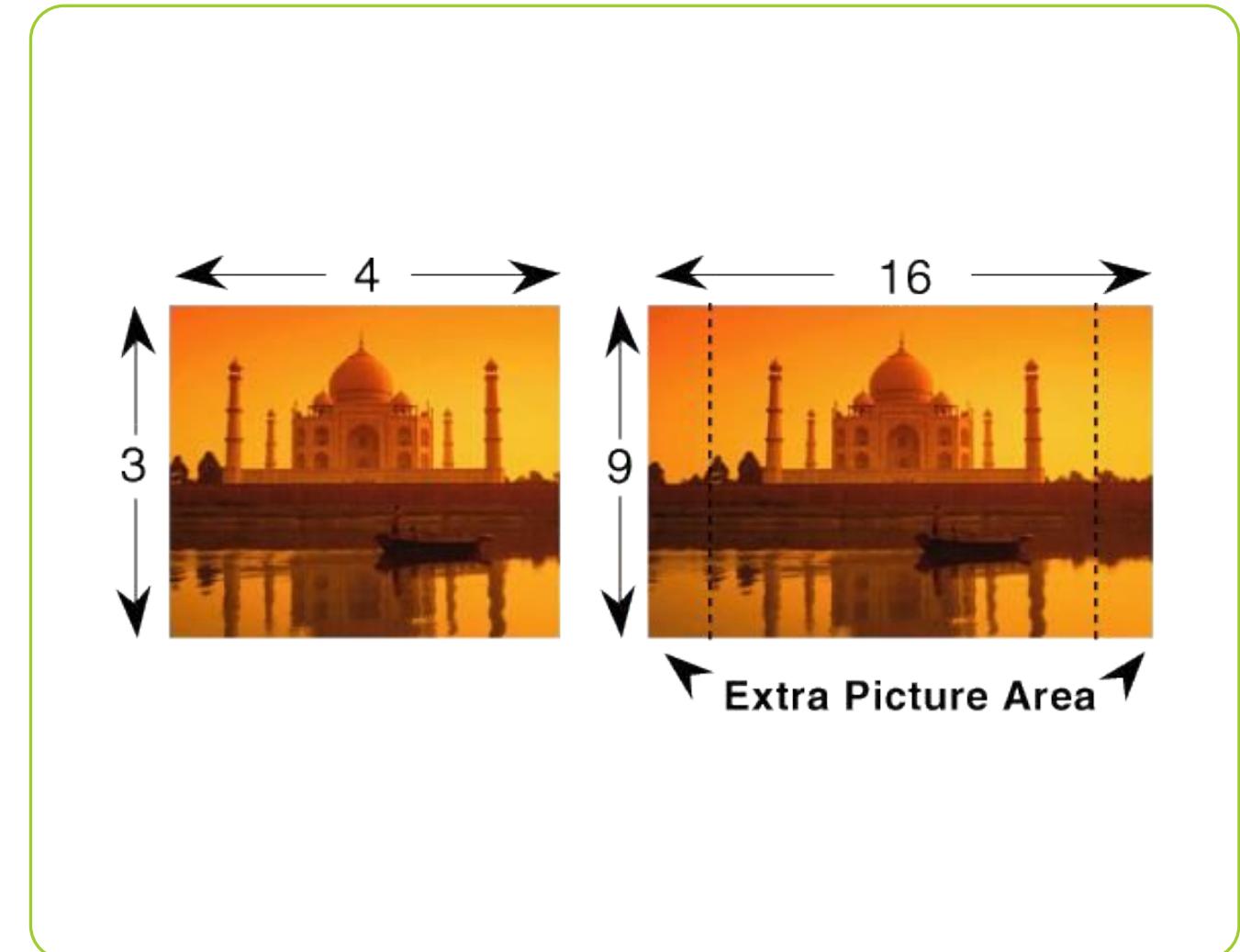
Monitor Features

Aspect Ratio

- The aspect ratio of a display is the fractional relation of the width of the display area compared to its height.
- Two common aspect ratio:
 - – 4:3
 - – 16:9

Monitor Features

Aspect Ratio



Monitor Features

Display Resolution

- The resolution of a monitor indicates how densely packed the pixels are.
- In general, the more pixels (often expressed in dots per inch), the sharper the image.
- Most modern monitors can display 1024 by 768 pixels, the SVGA standard.
- Some high-end models can display 1280 by 1024, or even 1600 by 1200

Monitor Features

Display Resolution



Monitor Features

Refresh Rate

- The refresh rate is the number of times in a second that a monitor draws the data.
- The *refresh rate* for a monitor is measured in hertz (Hz)
- The standard refresh rate is 75Hz, this means that the monitor redraws the display 75 times per second.
- A flickering monitor can contribute to eyestrain and headaches.
- The faster the refresh rate, the less the monitor flickers.

Monitor Features

Colour Depth

- Colour depth describes how many colours that can be displayed on a monitor's screen.
- Common colour depths used by monitor:
 - 4-bit (EGA) = 16 colours
 - 8-bit (VGA) = 256 colours
 - 16-bit (High Colour) = 65,536 colours
 - 24-bit (True Colour) = 16 million colours

Monitor Features

Color Depth



EGA Monitor



VGA Monitor

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.

Types of Printer

Printers can be categorized into:

- Impact Printer
- Non-Impact Printer

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

Disadvantages

- Noisy
- Print quality lower in some types
- Poor graphics or none at all
- Slow

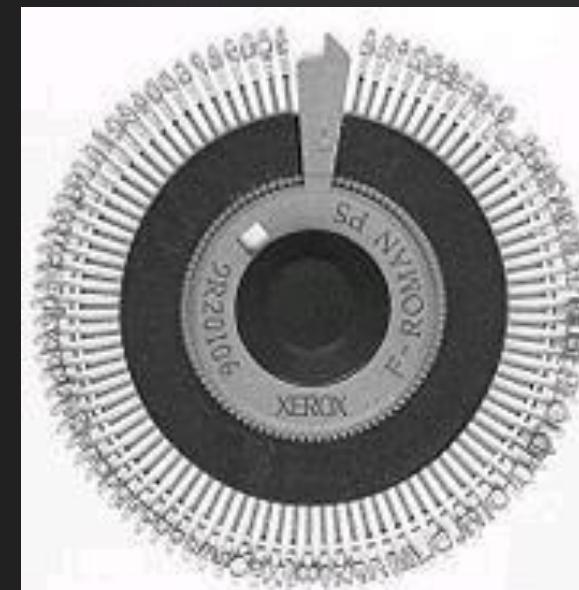
Impact Printer

Daisy-wheel

- Similar to a ball-head typewriter, this type of printer has a plastic or metal wheel on which the shape of each character stands out in relief.
- A hammer presses the wheel against a ribbon, which in turn makes an ink stain in the shape of the character on the paper.
- Daisy-wheel printers produce letter-quality print but cannot print graphics.

Impact Printer

Daisy-wheel



Impact Printer

Dot-Matrix

- Creates characters by striking pins against an ink ribbon.
- Each pin makes a dot, and combinations of dots form characters and illustrations.



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

Disadvantages

- More expensive
- Occupies a lot of space
- The cost of maintaining it is high

Non-Impact Printer

Laser Printer (Toner-based)

- A laser printer rapidly produces high quality text and graphics.
- Laser printers are often used in corporate, school, and other environments that require print jobs to be completed quickly and in large quantities.



Non-Impact Printer

Multifunction Printer (Toner-based)

- An **MFP** is an office machine which incorporates the functionality of multiple devices in one.
- A typical MFP may act as a combination of some or all of the following devices:
 - Printer
 - Scanner
 - Photocopier
 - Fax



Non-Impact Printer

Ink-jet Printer

- Inkjet printer operates by propelling variably-sized droplets of liquid or molten material (ink) onto almost any sized page.
- They are the most common type of computer printer used by consumers.



Non-Impact Printer

Thermal Printer (Inkless)

- Thermal printers work by selectively heating regions of special heat-sensitive paper.
- These printers are commonly used in calculators and fax machines; and although they are inexpensive and print relatively fast, they produce low resolution print jobs.



Printing Speed

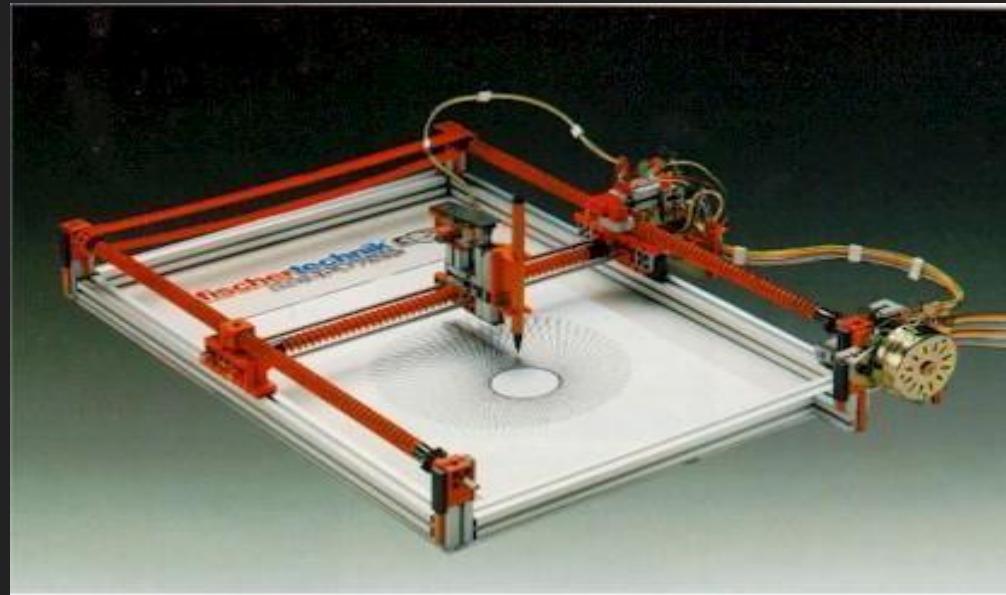
The printing speed is measured in:

- **cps** (characters per second)
- **lpm** (lines per minute)
- **ppm** (pages per minute)

Plotter

- The **plotter** is a computer printer for printing vector graphics
- Plotters are used in applications such as computer- aided design such as diagrams, layouts, specification sheets and banners
- 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

Plotter



Speakers

- 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



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.



Projector

- 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.



Types of projector

- Cathode Ray Tube (CRT) projector
- Liquid Crystal Display (LCD) projector
- Digital Light Processing (DLP) projector