COMPUTER HARDWARE

Computer hardware refers to the physical parts of a computer that can be seen and touched.

All computer hardware is divided into four broad categories according to their function on a computer.

These include:

- Input devices
- Output devices
- Storage devices
- Processing devices/ processor components

Peripherals refer to any external device connected to the system unit.

INPUT DEVICES

Input is any data or instructions you enter into the memory of a computer with a special writing device.

The two types of input are:

- Data
- Commands

Input devices are hardware components that allow a user to enter data and instructions into a computer.
According to the type of data they input, they can be grouped into the following;

- Text input devices
- Pointing devices
- Imaging input devices
- Gaming input devices
- Audio input devices
- Biometric input devices
- And other specialized input devices.

TEXT INPUT DEVICES include;

- The Key board
- Voice Recognition Equipment
- OMR
- Barcode readers
- OCR and optical readers
- MICR readers
- Magnetic Strip card Readers,etc

1. KEY BOARD

The keyboard is an Input device, consisting of a set of keys used to operate a computer.

It is the most common tool used for entering data and commands into a computer.

It consists of a set of typewriter-like keys that enables you to enter data into a computer.

Computer keyboards are similar to electric-typewriter keyboards but contain additional keys. The keys on computer keyboards are often classified as follows:

The standard layout of letters, numbers, and punctuation is known as a QWERTY keyboard because the first six keys on the top row of letters spell QWERTY.

The QWERTY keyboard was designed in the 1800s for mechanical typewriters and was actually designed to slow typists down to avoid jamming the keys.

Another keyboard design, which has letters positioned for speed typing, is the Dvorak keyboard.

There is no standard computer keyboard, although many manufacturers imitate the keyboards of PCs.

There are actually three different PC keyboards: the original PC keyboard, with 84 keys; the AT keyboard, also with 84 keys; and the enhanced keyboard, with 101 keys.

The three differ somewhat in the placement of function keys, the Control key, the Return key, and the Shift keys.

The major divisions of the keyboard include:

- Typewriter area
- Function key area
- Numerical key part inclusive of the cursor control keys.

Advantages of using a keyboard

- Keyboards are more reliable and produce fewer errors than other input methods.
- Entering data and instructions with keyboards is generally faster than with pointing devices.
- It is not necessary to buy additional equipment because most computer systems are normally supplied with keyboards.

Disadvantages of using a keyboard

- It takes a lot of time to practice in order to type quickly and accurately.
- Keys can easily become faulty due to dust.
- It has many keys which can confuse the computer beginners.

2. VOICE RECOGNITION EQUIPMENT (VRQs)

VRQs convert spoken words to text.
They provide the computer with the capability to distinguish spoken words.

Note that voice recognition implies only that the computer can take dictation, not that it understands what is being said.

Advantages

- No typing of data is necessary.
- The system can be used remotely by telephone or by people whose hands are occupied or disabled.
- Are ideal for blind or visually impaired user.

Disadvantages

- Limitation on the size of the computer vocabulary
- Pronunciation differences amongindividuals leads to high error rate.
- It requires the user to speak in a writing style ie even pronouncing the marks such as comma.
- Speech recognition does not work in noisy environment.
- Words with the same pronunciations like sea and see cannot be distinguished.

3. OPTICAL MARK RECOGNITION (OMR)

These are scanning devices that read pencil marks and convert them into computer usable form before entering them into the computer. The most common of these devices is the JAB forms, lottery tickets, enrolment forms, answer sheets, questionnaires.

4. BAR CODE READERS

A barcode reader is an optical reader that uses laser beams to read bar codes that are printed on items usually in supermarkets.
They are photoelectric scanners that translate vertical zebra stripped marks seen on most manufactured retail products into digital form before passing them into the computer for processing.

A barcode reader, also called a price scanner or point-of-sale scanner, is a hand-held or stationary input device used to capture and read information contained in a bar code .

A bar code is an identification code that normally consists of a set of vertical lines and spaces of different widths. The bar code represents some data that identifies the item and the manufacturer.

Advantages

- The process of data entry is fast and accurate
- Bar codes can be printed by normal printing methods
- No need to write down or key in the name of the item or its actual price
- They enable the quick entry of pricing and stock information.

- It reduces the time the customers spent in queues.

Disadvantages

- Only numbers can be coded
- Bar codes cannot be read directly by people
- A bar code reader may misread a bar code if there is any dirt or mark on the code
- A bar code can be linked to the wrong price at the cash register.
- Some items may not be priced which misleads the customers.

5. OPTICAL CHARACTER RECOGNITION (OCR)

These devices read special pre- printed charactersor handwritten characters and convert them in a form which can be understood by the computer.

Optical character recognition involves reading text from paper and translating the images into a form that the computer can manipulate.

6. MAGNETIC INK CHARACTER RECOGNITION (MICR)

Magnetic Ink Character Recognition is a character recognition system that uses special ink and characters.
MICR reader is used to read text printed with magnetized ink.

MICR technology is used by banks.

Numbers and characters found on the bottom of cheques (usually containing the cheque number, sort number, and account number) are printed using Magnetic Ink.

7. MAGNETIC STRIPES READERS

These are used to read information contained in the magnetic stripes on cards for example credit cards, bank ATM cards and other similar cards.
Exposure to a magnet or magnetic field can erase the information and contents of a card's magnetic stripe.

POINTING DEVICES INCLUDE;

- Mouse
- Stylus pen and digitizing/ graphic tablet
- Trackball
- Touchpad
- Light pen
- Touch screen
- Pointing stick

1. MOUSE

A mouse is a device that controls the movement of the cursor or pointer on a display screen.
The mouse is important for graphical user interfaces because you can simply point to options and objects and click a mouse button. The mouse is also useful for graphics programs that allow you to draw pictures by using the mouse like a pen, pencil, or paintbrush.

Types of computer mice

a) Mechanical mouse

This has a rubber or metal ball on its underside that can roll in all directions. Mechanical sensors within the mouse detect the direction the ball is rolling and move the screen pointer accordingly.

b) Optical mouse

This uses a laser to detect the mouse's movement.

You must move the mouse along a special mat with a grid so that the optical mechanism has a frame of reference.

c) Cordless mouse

This is not physically connected at all.
Instead it relies on infrared or radio waves to communicate with thecomputer.

COMMON MOUSE OPERATIONS

- **Pointing** is to position the cursor or mouse pointer on an item.

- **Clicking** is pressing and releasing the left mouse button once. This selects/ highlights an object / an item in windows but when using a browser, clicking once on a hyperlink will transport you to another location on the web page.

- **Double clicking** is pressing and releasing the right mouse button twice in quick succession. This opens files and applications in windows.

- **Right clicking** is pressing and releasing the right mouse button once. This displays a short cut menu of a task, which gives a list of options related to an item in question. Clicking away from the menu closes it.

- **Dragging** is pointing to an item, pressing and holding down the left mouse button while moving an item to a new location and releasing the button. This allows one to move objects or text in applications from one location to another.

Advantages of using a computer mouse

- It does not take time to master the techniques of using the mouse.
- Cursor movements across the screen are done quickly.
- It can be used to draw shapes under graphics and drawing programs.
- It fits comfortably below the palm and its wheel below fastens movements.
- The mouse is easy to use even for beginners
- It can be operated by one hand

Disadvantages of using a computer mouse

- Requires empty desk space to move it about
- You need to move a hand from the key board to move the pointer or execute a command given
- Its must be cleaned regularly to remove dust and dirt from the ball mechanism
- It is not easy and convenient to input text with a mouse
- Issuing commands by using a mouse is slower than by using a keyboard
- A mouse is not accurate enough when it comes to drawings that require high precision
- It needs some practice in order to control a mouse properly
- It needs a flat surface to operate.

2. STYLUS/ GRAPHICS TABLETS

A graphics tablet (or 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.
These tablets may also be used to capture data of handwritten signatures.
It is mainly used in map making and architectural drawings, to accurately trace outlines on a map.

3. TOUCH SCREEN

This is a type of display screen that has a touch-sensitive transparent panel covering the screen.
Instead of using a pointing device such as a mouse or light pen, you can use your finger to point directly to objects on the screen.
It is commonly used by security systems and can read finger prints of individuals.

4. JOY STICK

This is a lever that moves in all directions and controls the movement of a pointer or some other display symbol. A joystick is similar to a mouse, except that with a mouse the cursor stops moving as soon as you stop moving the mouse. It is also a gaming device.

5. LIGHT PEN

This is an input device that utilizes a light-sensitive detector to select objects on a display screen. A light pen is similar to a mouse, except that with a light pen you can move the pointer and select objects on the display screen by directly pointing to the objects with the pen

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

6. TRACK BALL

This is a pointing device.

Essentially, 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.

There are usually one to three buttons next to the ball, which you use just like mouse buttons.

The advantage of trackballs over mice is that the trackball is stationary so it does not require much space to use it.

7. TOUCH PAD

Data input device sensitive to pressure and motion.

A touch pad is a device for pointing (controlling input positioning) on a computer display screen.

It is an alternative to the mouse.

Originally incorporated in laptop computers, touch pads are also being made for use with desktop computers.

A touch pad works by sensing the user's finger movement and downward pressure.

8. POINTING STICK / track point

Pointing stick devices move the on-screen pointer by sensing the direction and pressure applied to a small eraser shaped device. This is a cursor control device located in the middle of the

keyboard between the G, H and B keys.

Most pointing sticks are pressure-sensitive, so the pointer moves faster when more pressure is applied.

IMAGING INPUT DEVICES

These are devices that input images such as still photos, motion pictures, graphics, video etc into the computer for processing.

IMAGING DEVICES include;

- Scanner
- Digital camera
- Digital Video camera
- Camcorder
- Web cam

1. **SCANNER**

This device converts images of text, drawings and photos into a digital form for processing.

A scanner is a device that captures images from photographic prints, posters, magazine pages, and similar sources for computer editing and display.

Common types of scanners include;

- Flatbed scanner
- Pen or handheld scanner
- Sheet bed scanner
- Drum scanner

2. **DIGITAL CAMERAS**

A digital camera is an electronic device used to capture and store photographs electronically in a digital format, instead of using photographic film like conventional cameras, or recording images in an analog format to magnetic tape like many video cameras.

Advantages of a digital camera

- You can instantly see the picture you just took.
- You can delete unwanted pictures
- You will not have to buy films again
- They have many advanced features in a small form factor
- You don't have to print every picture
- You have complete control of the final print after editing on the computer
- There is no risk of negatives getting lost or scratched
- They can store hundreds of pictures
- Photographic images can be digitized directly without using a scanner

Disadvantages of a digital camera

- Generally higher cost per print although getting cheaper
- More sensitive to shocks and dropping
- Lower quality than film although the gap is closing
- Generally have poor low-light focusing ability
- Digital cameras are normally more expensive than ordinary film cameras

3. **WEB CAM / PC VIDEO CAMERA**

A Web Cam is a type of digital Video camera that usually sits on top of the monitor. Some laptop computers have built- in Web Cams.

Web Cams can do the following;

- Capture Video and still images.
- Send e-mail messages with video attachments.
- Add live images to instant messages.
- Broadcast live images over the internet.
- Make telephone calls.

4. **DIGITAL VIDEO (DV) CAMERA.**

A digital video (DV) camera, by contrast records video as digital signals instead of analog signals.

5. **PC CAMERA**

This is a kind of Digital Video camera that allows home users to record, edit and capture video and still images and to make phone calls on the Internet

6. **CAMCORDER**

This is a light weight easily portable video camera that records data in digital form onto a storage device such as a hard disk or a videotape. A sound card is a must for sound to be entered into a computer.

AUDIO INPUT DEVICES

Audio Input is the process of entering any sound into the computer such as speech, music and sound effects. Examples include;

- Microphones
- Tape players
- CD/DVD players,
- MIDI devices
- Dictaphone etc

1. MICROPHONE

This is an input device that allows a user to speak to a computer to enter data and instructions into the computer.Microphones use a sensor that converts sound into an electrical signal.

2. MIDI devices

MIDI (Musical Instrument Digital Interface)is the standard that defines how digital musical devices represent sound electronically. MIDI devices such as electronic pianos allow users to record and edit music eg you can set the beat speed, and add notes, to produce sound.

3. Dictaphone

This is the earliest device commonly used to record speech for later playback or to be typed into print. It was established by Alexander Graham Bell in Washington, D.C in 1881.

GAMING INPUT DEVICES

These are devices specifically designed to be used for playing computer games .Examples include;

- Gaming key board
- Joysticks and wheels
- Gamepad
- Light guns
- Dance pad
- Motion sensing game controllers etc

BIOMETRIC INPUT DEVICES

A Biometric device translates a biological personal characteristic into a digital code that is stored in the computer. Examples include;

- Fingerprint scanner
- Face recognition systems
- Hand geometry systems
- Signature verification systems
- Iris Recognition systems

OTHER SPECIALISED INPUT DEVICES INCLUDE;

- **SENSOR AND REMOTE SENSOR**

Remote Control Devices emit a beam of infrared light, which carries data signals.

Sensors. This is an input device that can chemically detect external changes in an environment.

Various sensors can be used to measure heat, light, pressure, water flow etc