Unit = 4

INPUT AND OUTPUT DEVICES:-

A computer interacts with the external environment via I/O devices attached to it. Input device is used for proving data and input to the computer and output device provides output to the user after processing input data. The I/O devices that are attached externally to the computer are called peripheral devices. Different kinds of input and output devices are used for different kinds of input and output requirements.

Definition of I/O devices:-

The hardware devices that allow data to be input into computer are called input devices. For example:- Keyboard, mouse, scanners, cameras etc.

The devices that are used to get ouput or result after processing input data are called output devices. For example:- Monitor, Printer, speaker etc.

Input/Output (I/O) unit:-

The input unit is responsible for providing input to the computer. The input unit gets the data and programs for various input devices and makes them available for processing to other units of computer. The input data is provided through input devices such as keyboard, mouse, trackball and joystick. Input data can also be provided by scanning images, voice recording, video recording etc.

Input unit transforms the input data in computer acceptable form using input interface for the input device and provides the transformed input data for processing.

The output unit is responsible for providing result to the user. The output unit gets processed data from the computer and sends it to output devices like screen, printer, speaker etc. The output unit transforms the output information to human readable form using different output devices.

Besides input and output devices some devices provide input as well as get output from compute. like, disk drive, floppy disk drive, USB drive, CD drive, DVD drive etc. These are used by both input and output unit.

A. INPUT DEVICES :-

Input devices are mainly of two kinds - Human data entry devices (like keyboard, mouse, trackball, joystick, digitizing tablet, light pen, touch screen) and Source data entry devices (like speech recognization, digital camera, scanner, OCR, OMR, MICR, baracode reader).

Pointing devices → Pick devices

OCR, OMR, MICR → optical scanners.

1. Human Data Entry Devices:

Input devices that require data to be entered manually to the computer are identified as human entry devices. The data may be entered by typing or by pointing a device to particular location.

@ **Keyboard** → Keyboard is a common input device. It is provided along the computer and easy to use. It is used for entering the text data.

features

When data is being typed, the display monitor displays the typed data. Cursor moves with each typed character.

description

The modern keyboards are QWERTY keyboard and standard keyboard contains 101 keys. The keybard has 5 sections - typing keys, Numeric keys, Function keys, Control keys and special -purpose keys.

working ↓ Same for others

When a key is pressed, keyboard controller stores the code of pressed key and informs computer software. The computer software matches code with keys and recognizes the pressed key and displays it.

Pointing Devices

Pointing devices are used for providing the input to computer by moving the device to a point to a location on computer monitor. Following are some pointing devices:-

(6) Mouse → It is most common pointing device. The data is entered by pointing the mouse to a location on the computer screen. The mouse is used to position the cursor on screen, move an already open object, open an object etc. It is used extensively while working with graphics elements such as line curves, shapes etc.

Mouse is a hand-held device having two or three buttons on its upper surface and a small wheel between the buttons. The wheel wheel is used for the up and down movement for eg. Scrolling a long document.

The mouse can be used for pointing to a location or object on computer screen. Left click is used to select menu item and right click displays a menu. Double click means pressing left button of mouse twice successively. It is used to start or open a program.

(7) Track ball → Trackball is a device that is variant of mouse but has the functionality of mouse. It is easy to use and takes less space than a mouse. Trackball is generally built in laptops since there is no space for the mouse to move in the laptop.

In trackball instead of moving the whole device we rotate the ball with a finger. The trackball device remains stationary. The cursor on the computer screen moves in the direction in which the ball is moved. Trackball works in the same way as a physical mouse.

(d) Joystick:- It is a device which is commonly used for playing video games. It is a stick with its base attached to a flexible rubber sheath inside a ~~co~~ plastic cover. It is mainly used to control the speed of the cursor and is thus popular in games involving speed like racing and flying games. It contains circuit that detects the movement of stick and sends information to computer.

(e) Digitizing tablet:-

It is a input device mainly used to input drawings, sketches etc. Digitizing tablet is used for Computer Aided Design (CAD) for the design of buildings, designing of maps etc.

It consist of two parts - electronic tablet and pen. The pen is moved on electronic tablet for drawings which is provided as input to computer. Location of digitzing tablet corresponds to a specific location on screen.

The tablect contains circuit that can detect the movement of pen on the tablet, converts the movements into digital signals and send them to the computer.

Pick devices

(e) Pick devices are used for providing input to computer by ~~pointing~~ directly pointing to a location on the monitor. The input data is not typed i.e. the data is enetered by pointing pick device directly on computer screen.

(f) Light Pen → It is pen-like input device used to select objects directly on the computer screen. It is used for making figures and drawings by moving the pen on screen.

The pen contains a photocell in a small tube. When the pen is moved on the screen, light from the screen at the location of pen causes the photocell to respond. The electronic response is transmitted to the computer that can identify the position on screen at which the light pen is pointing.

(g) Touch screen → It is a input device that accepts input when the user places a fingertip on the computer screen. Touch screens are generally used in mobile phones, Automated Teller Machine (ATM), supermarkets. etc.

Touch screen consists of a clear glass panel with sensors that is placed over the view ared of screen.

Touch screens have infrared beam wave, when a fingertrip is touched on the screen, the wave is interrupted and the location is recorded. The recorded location is sent to the computer ~~via the~~ in the form that the computer can understand.

2. Source Data Entry Devices:

Source data entry devices are used for audio input, video input and to enter the source document directly to computer. Source data entry devices do not require data to be typed-in, keyed-in or pointed to particular location.

(A) Audio Input device:-

Audio input can be provided to the computer using human voice or speech. It can be used for making telephone calls, to record voice, to create audio files, to translate spoken words into text etc.

Audio input device like microphone is used to input a person's voice into the computer. Translating spoken words into text is also known as speech recognization or voice recognization.

The computer can be operated using voice commands. The computer has to be trained to recognize the voice of user using the speech patterns and pronounciation of words.

(B) Video Input device:-

Video input is provided to the computer using video camera and digital camera. Webcam is common video camera device. It is placed on the computer above the screen to caphure images of the user.

Digital camera works like video camera but can capture still images. The digital camera digitizes images and stores them on a memory card. The information from digital camera can be brought into computer and stored.

Optical Input Devices

The input devices that allow computers to use light as a source of input are called optical input devices. Scanner, Magnetic Ink Recognization (MICR), optical mark recognization (OMR), Optical character Recognization (OCR) and Baracode Reader are its examples.

(c) **Scanner:-** The input device that accepts paper document as input is called scanner. Scanner is used to input data directly into computer from the source document without copying and typing the data. The input data to be scanned may be a picture, text or mark on a paper. It is an optical device so it uses light as an input source to convert an image into ~~electrical~~ electronic form that is stored on computer. Hand-held scanner and flat-bed scanner are two common types of scanners.

(d) **Optical Character Recognization (OCR):-**

OCR is a technique for the scanning of a printed page, translating it and then using the OCR software to recognize the image as ASCII text that is editable.

To edit the scanned text, we need OCR software. To recognize the words and letters of text, the OCR software compares the pattern on the scanned image with the patterns stored inside the computer.

(e) Magnetic Ink Character Recognization (MICR) :-
It is used in banks to process large volume of cheques. The numbers printed at the bottom of cheque are magnetized. MICR uses magnetic ink character reader for character recognization. The readers are generally used in banks to process cheques. The reading speed of MICR is faster than OCR.

(f) Optical Mark Recognization :- (OMR)
It is used to detect marks on paper. The marks are recognized by their darkness. It uses optical mark reader to read the marks. It detects the presence of mark on the paper and the pattern of mark is stored in the computer.

(g) Barcode Reader :- Barcodes are adjcent vertical lines of different width that are machine readable. Goods available at supermarkets, books etc use baracode identification. ~~They en~~ Barcode Readers are fast and accurate. They are used to determine the item being sold, number of each item, price of item etc. when we provide information of baracodes to computer.

B. Output Devices:

Output devices are mainly of two kinds.
1) Hard Copy Devices (Printer, Plotter).
2) Soft Copy Devices (Monitor, Projector, Speaker)

1. Hard Copy Output Devices:-

The output obtained in a tangible form on a paper or any surface is called hard copy output. The hard copy can be stored permanentally and is portable.

@ Printer:-

The device that prints the output from the computer onto a paper is called printer. Printers are generally used to print textual information, but nowdays printers also print graphical information. The print quality is determined by the resolution of printer. Printers are classified into two ~~catorog~~ categories impact and non-impact printer.

Impact printers → Impact printers use the typewriter. Impact printers can print a character or an entire line at a time. These are low-cost printers and used for bulk printing. Dot matrix printers, drum printers etc are the examples of impact printers.

Non-impact printers → Non-impact printers do not hit or impact a ribbon to print but impact printers do. These printers are faster and quieter than impact printers. They produce high quality output. Ink-jet printers and laser printers are the examples of non-impact printers.

(b) Plotter:-

A plotter is used to draw graphs, maps, blueprints of ships, bulldings etc. Plotters use different colors of pen for drawing. Plotters draw continious and accurate lines. It is a slow output device and is expensive. Plotters are of two types - drum plotter and flatbed plotter. Plotters are mainly used for drawings in AUTOCAD, CAD and CAM applications.

2. Soft Copy Output Devices:-

The output obtained in an intangible form on a visual display, audio unit or video unit is called soft copy output device.

(c) Monitor → It is a common output device. A monitor is of two kinds - monochrome display monitor and color display monitor. An image on the monitor is created by a configuration of dots, also known as pixels. The clarity of image on the computer screen depends on following three factors:-

i) Resolution of Screen → It is the number of pixels in horizontal and vertical direction.

ii) Dot Pitch → It is the diagonal distance between two colored pixels on a display screen.

iii) Refresh Rate → It is the number of times per second the pixels are recharged.

Monitors may be Cathode Ray Tube (CRT), Liquid Crystal Display (LCD) or Light Emitting Diode (LED). Nowdays, LCD and LED monitors are generally used.

(d) Projectors / ~~Visual display Terminal (VDT)~~ :-

It is an output device that displays information from the computer onto a large white screen. It is mainly used to display visual output to a large gathering of people required for the purpose of teaching, traning, meetings, conference presentations etc.

(e) Speakers:-

It is an output device which provides audio as output to the users. The signals are sent to the speakers via the sound card that translates the digital sound back into analog signals. It is used everywhere in electronic devices like computers, for customer service in airlines, railways, banks etc.

I/O Port

We need ports to connect peripheral devices. The I/O ports are the external interfaces that are used to connect input and output devices to computer. Some of the input/output ports are as follows:-

(a) Parallel Port → A parallel port is an interface for connecting eight or more data wires. The data flows through 8 wires simultaneously. It is used to connect printer to the computer. It can transmit 8 bits of data in parallel as a result they provide high speed data transmission.

(b) Serial Port → It is used to connect external modems, plotters, barcode reader etc. It consist of single wire and transmits one bit of data as a result it provide slow data transmission.

(c) USB port → It is common and popular port nowdays. Normally two to four ports are provided on a PC. USB allows different devices to connect to the computer. It can support upto 127 devices with single port.

(d) Firewire → It is used to connect audio and video multimedia devices like video camera. It is expensive technology and has data transfer rate of upto 400MB/sec.

Working of I/O system:-

The working of I/O system combines I/O hardware and I/O software. The I/O hardware includes ports, buses and device ~~dr~~ controllers for different devices. I/O software is device driver software. The working of I/O system is as follows:-

i) I/O Devices → I/O Devices are attached to computer via ports of computer. There are many standard ports available on the backside of computer like serial port, USB port etc. If one or more devices use a common set of wires, it is called a bus.

ii) Device Controller → It operates on a bus, a port or a device. It controls the signals on the wires of port or bus. The controllers have one or more registers for data and control signals.

iii) Device Driver → It is a software via which the operating system communicates with device controllers. Each device has its own device driver which is specific to the device.

iv) Application Programs → Application programs use an I/O device by issuing commands and exchanging data with the device driver. The device driver does all the things that are required for the correct device operation.