Input Devices

Following are few of the important input devices which are used in a computer:
- Keyboard
- Mouse
- Joy Stick
- Light pen
- Track Ball
- Scanner
- Graphic Tablet
- Microphone
- Magnetic Ink Card Reader(MICR)
- Optical Character Reader(OCR)
- Bar Code Reader
- Optical Mark Reader(OMR)

Keyboard

Keyboard is the most common and very popular input device which helps in inputting data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions.

Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.

Mouse

Mouse is most popular pointing device. It is a very famous cursor-control device having a small palm size box with a round ball at its base which senses the movement of mouse and sends corresponding signals to CPU when the mouse buttons are pressed.

Generally, it has two buttons called left and right button and a wheel is present between the buttons. Mouse can be used to control the position of cursor on screen, but it cannot be used to enter text into the computer.

Advantages
- Easy to use
- Not very expensive
- Moves the cursor faster than the arrow keys of keyboard.

Joystick

Joystick is also a pointing device which is used to move cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions.

The function of joystick is similar to that of a mouse. It is mainly used in Computer Aided Designing(CAD) and playing computer games.

Light Pen

Light pen is a pointing device which is similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube. When the tip of a light pen is moved over the monitor screen and pen button is pressed, its photocell sensing element detects the screen location and sends the corresponding signal to the CPU.

Track Ball

Track ball is an input device that is mostly used in notebook or laptop computer, instead of a mouse. This is a ball which is half inserted and by moving fingers on ball, pointer can be moved. Since the whole device is not moved, a track ball requires less space than a mouse. A track ball comes in various shapes like a ball, a button and a square.

Scanner

Scanner is an input device which works more like a photocopy machine. It is used when some information is available on a paper and it is to be transferred to the hard disc of the computer for further manipulation. Scanner captures images from the source which are then converted into the digital form that can be stored on the disc. These images can be edited before they are printed.

Digitizer

Digitizer is an input device which converts analog information into digital form. Digitizer can convert a signal from the television or camera into a series of numbers that could be stored in a computer. They can be used by the computer to create a picture of whatever the camera had been pointed at. Digitizer is also known as Tablet or Graphics Tablet because it converts graphics and pictorial data into binary inputs. A graphic tablet as digitizer is used for doing fine works of drawing and image manipulation applications.

Microphone

Microphone is an input device to input sound that is then stored in digital form. The microphone is used for various applications like adding sound to a multimedia presentation or for mixing music.

Magnetic Ink Card Reader(MICR)

MICR input device is generally used in banks because of a large number of cheques to be processed every day. The bank's code number and cheque number are printed on the cheques with a special type of ink that contains particles of magnetic material that are machine readable. This reading process is called Magnetic Ink Character Recognition (MICR). The main advantages of MICR is that it is fast and less error prone.

Optical Character Reader(OCR)

OCR is an input device used to read a printed text. OCR scans text optically character by character, converts them into a machine readable code and stores the text on the system memory.

Bar Code Readers

Bar Code Reader is a device used for reading bar coded data (data in form of light and dark lines). Bar coded data is generally used in labelling goods, numbering the books etc. It may be a hand held scanner or may be embedded in a stationary scanner. Bar Code Reader scans a bar code image, converts it into an alphanumeric value which is then fed to the computer to which bar code reader is connected.

Optical Mark Reader(OMR)

OMR is a special type of optical scanner used to recognize the type of mark made by pen or pencil. It is used where one out of a few alternatives is to be selected and marked. It is specially used for checking the answer sheets of examinations having multiple choice questions.

Output Devices

Following are few of the important output devices which are used in a computer.
☐ Monitors
☐ Graphic Plotter
☐ Printer

Monitors

Monitors, commonly called as Visual Display Unit (VDU), are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels.

There are two kinds of viewing screen used for monitors.
☐ Cathode-Ray Tube (CRT)
☐ Flat- Panel Display

Cathode-Ray Tube (CRT) Monitor

The CRT display is made up of small picture elements called pixels. The smaller the pixels, the better the image clarity, or resolution. It takes more than one illuminated pixel to form whole character, such as the letter 'e' in the word help.
A finite number of characters can be displayed on a screen at once. The screen can be divided into a series of character boxes - fixed location on the screen where a standard character can be placed. Most screens are capable of displaying 80 characters of data horizontally and 25 lines vertically. There are some disadvantages of CRT
☐ Large in Size
☐ High power consumption

Flat-Panel Display Monitor

The flat-panel display refers to a class of video devices that have reduced volume, weight and power requirement in comparison to the CRT. You can hang them on walls or wear them on your wrists. Current uses of flat-panel displays include calculators, videogames, monitors, laptop computer, graphics display.

The flat-panel display is divided into two categories
☐ **Emissive Displays** - The emissive displays are devices that convert electrical energy into light. Example are plasma panel and LED(Light-Emitting Diodes).
☐ **Non-Emissive Displays** - The Non-emissive displays use optical effects to convert sunlight or light from some other source into graphics patterns. Example is LCD(Liquid-Crystal Device)

Printers

Printer is an output device, which is used to print information on paper.

There are two types of printers
☐ Impact Printers
☐ Non-Impact Printers

Impact Printers

The impact printers print the characters by striking them on the ribbon which is then pressed on the paper.

Characteristics of Impact Printers are the following
☐ Very low consumable costs
☐ Very noisy
☐ Useful for bulk printing due to low cost
☐ There is physical contact with the paper to produce an image

These printers are of two types
☐ Character printers
☐ Line printers

Character Printers
Character printers are the printers which print one character at a time.

These are further divided into two types
☐ Dot Matrix Printer(DMP)
☐ Daisy Wheel

Dot Matrix Printer
In the market one of the most popular printers is Dot Matrix Printer. These printers are popular because of their ease of printing and economical price. Each character printed is in form of pattern of dots and head consists of a Matrix of Pins of size (5*7, 7*9, 9*7 or 9*9) which come out to form a character that is why it is called Dot Matrix Printer.

Advantages
☐ Inexpensive
☐ Widely Used
☐ Other language characters can be printed

Disadvantages
☐ Slow Speed
☐ Poor Quality

Daisy Wheel
Head is lying on a wheel and pins corresponding to characters are like petals of Daisy (flower name) that is why it is called Daisy Wheel Printer. These printers are generally used for word-processing in offices which require a few letters to be sent here and there with very nice quality.

Advantages
☐ More reliable than DMP
☐ Better quality
☐ The fonts of character can be easily changed

Disadvantages
☐ Slower than DMP
☐ Noisy
☐ More expensive than DMP

Line Printers
Line printers are the printers which print one line at a time.

These are of further two types
☐ Drum Printer
☐ Chain Printer

Drum Printer

This printer is like a drum in shape so it is called drum printer. The surface of drum is divided into number of tracks. Total tracks are equal to size of paper i.e. for a paper width of 132 characters, drum will have 132 tracks. A character set is embossed on track. The different character sets available in the market are 48 character set, 64 and 96 characters set. One rotation of drum prints one line. Drum printers are fast in speed and can print 300 to 2000 lines per minute.

Advantages

☐ Very high speed

Disadvantages

☐ Very expensive
☐ Characters' fonts cannot be changed

Chain Printer

In this printer, chain of character sets are used so it is called Chain Printer. A standard character set may have 48, 64, or 96 characters.

Advantages
☐ Character fonts can easily be changed.
☐ Different languages can be used with the same printer.

Disadvantages
☐ Noisy

Non-impact Printers
Non-impact printers print the characters without using ribbon. These printers print a complete page at a time so they are also called as Page Printers.

These printers are of two types
☐ Laser Printers
☐ Inkjet Printers

Characteristics of Non-impact Printers
☐ Faster than impact printers.
☐ They are not noisy.
☐ High quality.
☐ Support many fonts and different character size.

Laser Printers
These are non-impact page printers. They use laser lights to produce the dots needed to form the characters to be printed on a page.

Advantages
☐ Very high speed
☐ Very high quality output
☐ Give good graphics quality
☐ Support many fonts and different character size

Disadvantages
☐ Expensive.
☐ Cannot be used to produce multiple copies of a document in a single printing.

Inkjet Printers
Inkjet printers are non-impact character printers based on a relatively new technology. They print characters by spraying small drops of ink onto paper. Inkjet printers produce high quality output with presentable features.
They make less noise because no hammering is done and these have many styles of printing modes available. Colour printing is also possible. Some models of Inkjet printers can produce multiple copies of printing also.

Advantages
☐ High quality printing
☐ More reliable

Disadvantages
☐ Expensive as cost per page is high
☐ Slow as compared to laser printer

Computer Software & Hardware

In computing terms, hardware and software represent the two fundamental elements of a computer. Hardware includes everything with a "hard" physical presence -- your computer tower or laptop and its component electronics. Conversely, the programs on your computer, which exist as digital data rather than physical objects, are called software. In order to operate, computers require both hardware and software.

Computer Hardware

Although computers contain thousands of individual capacitors, resistors and other electrical components, these parts are built together to form a relatively small number of devices that make up a computer's hardware. Basic components include a hard drive for storing data, a processor for performing operations, memory for holding active data, and a motherboard to tie the parts together. Hardware can also include external peripherals, such as the keyboard, printer and scanner.

Computer Software

The term "software" is usually synonymous with "computer program" and "application." Internet Explorer, Microsoft Word and Photoshop are all examples of software. A computer's software also includes its operating system, such as Windows or Mac OS X. Operating systems act as a base, providing an interface in which all other software runs. Note that not all data on a computer is software, however: documents, music, pictures, videos and other files require a particular type of software to open, but are not software themselves.

Memory

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in computer where data is to be processed and instructions required for processing are stored. The memory is divided into large number of small parts called cells. Each location or cell has a unique address which varies from zero to memory size minus one. For example, if computer has 64k words, then this memory unit has 64 * 1024=65536 memory locations. The address of these locations varies from 0 to 65535.

Memory is primarily of three types
☐ Cache Memory
☐ Primary Memory/Main Memory
☐ Secondary Memory

Cache Memory
Cache memory is a very high speed semiconductor memory which can speed up CPU. It acts as a buffer between the CPU and main memory. It is used to hold those parts of data and program which are most frequently used by CPU. The parts of data and programs are transferred from disk to cache memory by operating system, from where CPU can access them.

The advantages of cache memory are as follows: -
☐ Cache memory is faster than main memory.
☐ It consumes less access time as compared to main memory.
☐ It stores the program that can be executed within a short period of time.
☐ It stores data for temporary use.

The disadvantages of cache memory are as follows
☐Cache memory has limited capacity.
☐ It is very expensive.

Primary Memory (Main Memory)
Primary memory holds only those data and instructions on which computer is currently working. It has limited capacity and data is lost when power is switched off. It is generally made up of semiconductor device. These memories are not as fast as registers. The data and instruction required to be processed reside in main memory. It is divided into two subcategories RAM and ROM.

Characteristics of Main Memory
☐ These are semiconductor memories.
☐ It is known as main memory.
☐ Usually volatile memory.
☐ Data is lost in case power is switched off.
☐ It is working memory of the computer.
☐ Faster than secondary memories.
☐ A computer cannot run without primary memory.

Secondary Memory
This type of memory is also known as external memory or non-volatile. It is slower than main memory. These are used for storing data/Information permanently. CPU directly does not access these memories instead they are accessed via input-output routines. Contents of

secondary memories are first transferred to main memory, and then CPU can access it. For example: disk, CD-ROM, DVD etc.

Characteristic of Secondary Memory
- These are magnetic and optical memories.
- It is known as backup memory.
- It is non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of data in a computer.
- Computer may run without secondary memory.
- Slower than primary memories.