



## Input and Output Devices

To solve a given task, computer needs to interact with its user. Computer requires data and instructions to be provided by user. On the other hand, users also require results from the computer. When data and instructions are given to a computer, it is considered as input. When computer provides results, it is known as output. The devices that allow such input and output are known as input/output devices (in short I/O devices) or peripherals. Input/output devices are means of communication between the user and computer.

### Input Devices

An input device is a device that provides input to the computer. The most common input devices are keyboard and mouse. Every key you press on the keyboard and every movement or click you make with the mouse sends a specific input signal to the computer. Besides keyboard and mouse, several input devices are available. Following is the list of different input devices used with computers:

- Keyboard
- Point and draw devices
- Scanning devices
- Electronic card based devices
- Speech recognition devices
- Vision based devices

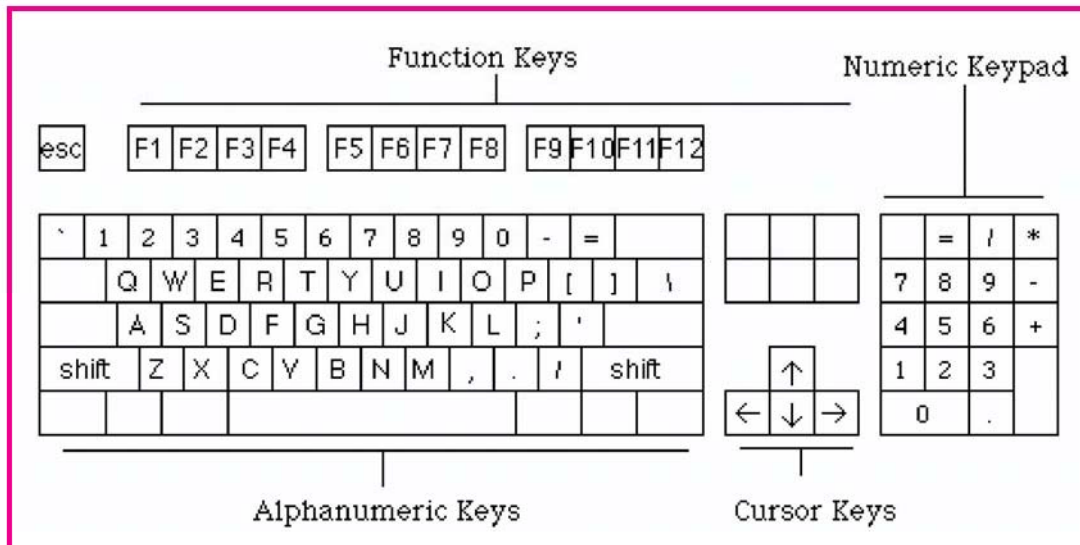
Let us now discuss about each of these input devices in brief.

### Keyboard

Keyboard is the most popular and commonly used input device. A keyboard allows entering alphabets, digits and symbols into the computer. Figure 3.1 shows a typical keyboard. Keyboard generally has more than 100 keys. Keyboard is also known as the text based input device. A Keyboard generally contains keys as follows:

- English alphabets (a...z)
- Digits (0...9), mathematical operators (+, -, \*, etc), punctuation marks and signs
- Function keys (F1, F2...F12) for various functions
- Enter (or return) key used for execution of an instructions
- Spacebar (to enter a space)
- Backspace (to move cursor one position back)
- Delete (to delete a character or an object at the right side of cursor position)
- Shift (to type capital letters and the special characters located on the upper-side of a key)
- Caps Lock (to toggle between the capital lock features)
- Tab (to move the cursor to the next tab position – for indentation)
- Control (to be used in conjunction with other keys to provide additional functionality)
- Alt (used in combination with other keys to perform specific tasks)
- Esc (to cancel or abort executing)

- Cursor Movement Keys (to move cursor in the direction indicated by the arrow - up, down, left, and right)



**Figure 3.1 : Keyboard**

### Point and Draw Devices

Instead of typing, directly some items can be selected from computer screen - for example “print” or “close” button. This can be done using point and draw devices such as mouse. This type of interface is called graphical user interface. Not only to select, but drawing of line, curve and shapes is also possible with such devices. Other example of point and draw devices are joystick, light pen, touch pad or track ball and touch screen.

### Mouse

Mouse is a small device used to point a particular place on the screen and select in order to perform one or more actions. Figure 3.2 shows a typical mouse. It can be used to select menu commands, resize windows, selecting actions from screen icons, etc. The most conventional kind of mouse has two or three buttons on its top. These buttons are used for different actions.



**Figure 3.2 : Mouse**

Typical mouse actions are as follows :

- Left Click: Used to select an item.
- Double Click: Used to start a program or open a file or trigger an action.
- Right Click: Usually used to display a set of commands and available options.
- Drag and Drop: It allows you to select and move an item from one location to another.
- Scroll: Many applications provide scrollbars on right side of screen if the page length is more than the monitor / screen length. Instead of using page down key or arrow keys, one can use scroll key of a mouse to scroll up or down. If the scroll key is not available, one can click on the scroll bar on the application screen with the left button of the mouse.

## Joystick

The joystick is a vertical stick which moves the graphic cursor in a direction of the stick when the stick is moved. It has a button on top that is used to select the option pointed by the cursor. Joystick is used as an input device primarily used with video games, training simulators and controlling robots. Image of joystick is shown in figure 3.3.



**Figure 3.3 : Joystick**

## Scanning Devices

Scanning devices directly “look” at the input and enters the collected data into the computers. There is no need to enter

anything from keyboard or select anything from the screen. Only “scan” command is to be given and the data entry is done directly. It saves time and reduces typing errors. Photos, maps and high quality documents can be directly scanned to the computer.



**Figure 3.4 : Image Scanner**

The image scanner shown in figure 3.4 is just like copier machine in which the document needs to be placed and photo of the document will be stored in a computer memory in digital form. The document is now converted into an electronic image. This image can be sent to other computer, copied, and printed.

You might have seen scanner in shopkeeper’s hand which reads barcode in a shop. This type of scanner is known as handheld scanner. See figure 3.5 for the image of barcode scanner. Barcode is made up of parallel strings of different thickness. There is a standard coding system called Universal Product Code (UPC). Scanners read this barcode printed in UPC format and convert it into appropriate values.



**Figure 3.5 : Barcode Scanner**

Some scanners have facility to recognize character from the image. That is, from the scanned image of a character, computer can identify the character. This is done by matching image of a scanned character with the stored image of the character. With this facility the document image can be converted into a document which can be further modified (editable document). This type of scanner is known as optical character reader.

Q No.	a	b	c	d
1	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
2	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
.....				.....

**Figure 3.6 : Sample OMR Sheet**

Some scanners identify marks done by special type of pen or pencil. This type of scanner is known as optical mark reader. Figure 3.6 demonstrates an OMR sheet that consists of answers marked on the sheet for a multiple choice question paper.

### Magnetic Ink Character Recognition (MICR)

Magnetic ink character recognition is a technology that is prevalent in banking industry. It is used for faster processing of cheques. This technology allows reading of information such as account numbers directly from the printed documents. MICR codes can be easily read and understood by humans, while barcodes though easily read cannot be easily understood by humans. Here, the content is written using special magnetic ink (prepared from iron oxide).

### Electronic Card Reader

Electronic card reader reads content from small plastic cards called electronic card. The data is read from the card and transferred to the computer. Bank ATM (Automatic Teller Machine) cards and credit cards are such small plastic cards that contain information about the card holder. The information about the current transaction (say current bill/purchase) is added from the card reader device. Figure 3.7 shows an example of electronic card reader.



**Figure 3.7 : Electronic Card Reader**

### Speech and Vision Devices

Beside these popular input devices, speech and vision input devices system is also popular. Speech input is used for long dictation of text for correspondence as well as to develop fully automated system that operates on speech. Instead of entering commands by typing, selecting or scanning, direct voice commands can be given. Consider you have fully electronic house that opens doors for you when you say “khul ja sim sim”!

Vision input is used for robots performing risky tasks like driving plane and performing surgery. Such input mechanism is very useful for people who are differently abled and generally finds difficulties in operating typical computer systems. Camera is also used as input device, like in laptops for automatic authentication of user through facial recognition. It is also used for deciphering QR code or reading bar code.

### Output Devices

Computer calculated results must be provided to its users. The devices that provide output to the users are called output devices. Commonly used output devices are monitor and printer. Following list presents different output devices:

- Monitor
- Printer
- Projector
- Plotter
- Voice response

The output devices need to be connected with computer (with or without wires) in order to present the output to the users.

### Monitor

Monitors are commonly used output devices. The output is presented on computer visual (television like) screen. This output is just for viewing purpose and hard copy (print on paper) cannot be taken. That is why it is called soft copy output. The Cathode Ray Tube (CRT) monitors and flat monitors are used to display information. Figure 3.8 shows typical monitors. At present, flat monitors are very popular because they are thinner in size and lighter in weight. Flat monitors use technology of Liquid Crystal Display (LCD) and Light Emitting Diodes (LED).



**Figure 3.8 : CRT and LCD Monitor**

### Printers

Printer provides hard copy output (output on paper). There are varieties of printers that print content in different way. Some printers print content character by character hence called character printer or dot matrix printer. These printers are cheaper and slow. Other printers print line by line and are called line printers. Another category of printers print content by spraying small drops of ink; such printers are called inkjet printers. Inkjet printers are slower and costlier than the dot matrix printers. Similarly there are printers available that create the image of whole page and print the full page at a time using laser technology. This type of printers is called laser printer. Laser printers are fastest and costly in comparison with other printers. Figure 3.9 shows a typical laser printer.



**Figure 3.9 : Typical Laser Printer**

### Projector

You might have seen your teacher projecting teaching material on wall of your classroom or white board/curtain. Output of computer is projected on a bigger flat surface like wall or screen through an output device called projector. Teaching material with text, image, sound, graph and animation can be prepared and projected on the surface for better viewing. Such projectors are very useful for learning, demonstrating and presenting content. Software that helps in preparing such content for presentation are available.

## Voice Response

Stored voice and converted voice (from given text) can be presented to users who do not want to see or read output on monitor, projector or printer. Video games, automatic answering machines, alarms and signals, etc. are the applications that need voice output.

### Summary

In this chapter we learnt about different input and output devices. Beside the most popular input devices such as mouse and keyboard, some latest devices joy stick, card readers, scanners were also looked at. We also learnt about output devices like monitor, printer, projector and voice response systems.

### EXERCISE

1. List popular input devices. Explain structure of a typical keyboard.
2. What is a point and draw device ? Give an example of it.
3. What are the typical mouse actions ? List and explain in brief.
4. List popular output device. Explain various types of printers.
5. Which different types of monitors do you know ? List all with one line description of each.
6. **Choose the most appropriate option from those given below :**
  - (1) Which of the following refers to data and instructions that are given to computer ?  
(a) Input (b) Output  
(c) Both input and output (d) Processing
  - (2) Which of the following is the other name of Input / Output devices ?  
(a) Properties (b) Peripherals  
(c) Parts (d) None of these
  - (3) A keyboard is considered as which of the following device ?  
(a) An input (b) An output  
(c) Both input and output (d) Processing
  - (4) A keyboard works on which of the following concepts ?  
(a) Point and draw (b) Text entry  
(c) Visual (d) Virtual
  - (5) A mouse can also be used as which of the following device ?  
(a) An input (b) An output  
(c) Processing (d) Any of these
  - (6) Which of the following refers to the mouse ?  
(a) Point and draw device (b) Text based device  
(c) Visual device (d) Virtual device

- (7) Which of the following is a standard coding system for product price and other information related to the product ?
- (a) Universal product code                      (b) Uniform print code  
(c) Universal print code                      (d) Uniform product code
- (8) Which of the following is the process of recognizing characters written with special magnetic ink ?
- (a) Multipurpose ink character recognition  
(b) Magnetic ink character recognition  
(c) Multifold character recognition  
(d) Multifold ink character recognition
- (9) Which of the following technologies do flat monitors use ?
- (a) CRT    (b) LCD  
(c) LED    (d) Both b and c

