Course: BCA Sub: Introduction to Computer SEM - I

Chapter – 6 Input and Output Devices

Input Devices

Input Devices are used to input data, information and instructions into the RAM. Input devices are the electronic or electromechanical equipment that provides a means of communicating with the computer system for the input of data. As previously stated, the process- ing unit requires this data in the appropriately formatted electronic signals. The input device that most users are familiar with is the keyboard. This converts a key press in a particular position on the board into an electronic signal sequence that can be interpreted by the processing unit as representing a particular character.

Input devices are necessary to convert our information or data in to a form which can be understood by the computer. A good input device should provide timely, accurate and useful data to the main memory of the computer for processing followings are the most useful input devices.

We may classify these devices into the following two broad categories:

Basic Input Devices

1. Keyboard
2. Mouse

Special Input Devices/ Other Pointing Devices

1. Trackball
2. Touch Screen
3. Joystick
4. Light Pen
5. Digitizer
6. Voice-input Devices
7. Scanner

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We are discussing below the structure and function of the common input devices of these two categories in details.

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Basic Input Devices

The input devices, which have now days become essential to operate a PC, may be called as **Basic Input Devices**. These devices are always required for basic input operations. These devices include Keyboard and Mouse.

1. Keyboard

Keyboard (similar to a typewriter) is the main input device of a computer.

It contains 3 types of keys - alphanumeric keys, special keys and function keys.

Alphanumeric keys are used to type all alphabets, numbers and special symbols like $, %, @, A etc. Special keys such as <Shift>,<Ctrl>,<Alt>,<Home>,<Scroll Lock> etc are used for special functions.

Keyboard

Function keys such as <Fl>, <F2>, <F3> etc. used to give special commands depending upon the software used.

We can understand the function of each and every key actually by working on a PC. When any key is pressed, an electronic signal is produced. This signal is detected b a keyboard encoder that sends a binary code corresponding to the key pressed to the CPL.

There are many types of keyboards but 101 Keys Keyboard is the most popular one.

Mouse

A Mouse

Mouse (similar to a mouse) is another important input device. It is a pointing device used to move cursor, draw sketches/ diagrams, selecting a text/object/menu item etc. on monitor screen while working on windows (graphics based environment of a computer). Mouse is a small, palm size box containing 3 buttons and a ball underneath, which senses the movement of the mouse and sends the corresponding signals to CPU on pressing the buttons.

Special Input Devices / Other Pointing Devices

The input devices, which are not essential to operate a PC, are called as Special Input Devices. These devices are used for various special purposes and are generally not required for basic input operations. These devices include Trackball, Light Pen, Touch Screen, Joystick, Digitizer, Scanner, OMR, OCR, Bar Code Reader, MICR and Voice Input Devices.

Replacements for a mouse are

- Trackballs
- touch pads
- Joysticks

Vary with respect to text recognition

1. Trackball

A trackball looks like a mouse, as the roller is on the top with selection buttons on the side. It is also a pointing device used to move the cursor and works like a mouse. For moving the cursor in a particular direction, the user spins the ball in that direction. It is sometimes considered better than a mouse, because it requires little arm movement and less desktop space. It is generally used with Portable computers.

A trackball has been described as an upside down mouse. It is a small ball with buttons around it that is either part of the keyboard or attached to the keyboard. Moving the ball moves the pointer on the computer screen. The buttons are used to do the same things as the buttons on a mouse. A trackball is used instead of a mouse in notebook and laptop computers.

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2. Touch Screen

Some special VDU devices have touch sensitive screens. These screens are sensitive to human fingers and act as tactile input devices. Using touch screen, the user can point to a selection on the screen instead of pressing keys. Touch screen helps the user in getting the information quickly. It is mainly used in hotels or airports to convey information to visitors.

Touch Screen

3. Joystick

Joystick is also a pointing device, which is used to move cursor position on a monitor screen. Joystick 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.

These are used mainly in computer games. Moving the joystick will move the car person / object on the screen.

4. Light Pen

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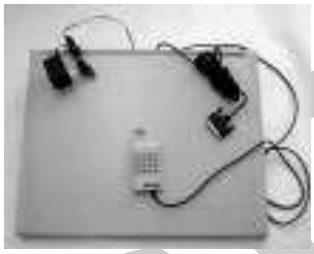
Light pen (similar to a pen) is a pointing device, which is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube. When its tip is moved over the monitor screen and pen button is pressed, its photocell-sensing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



A Light Pen

5. Digitizer

Digitizer is used to create drawings and pictures using a digitizer tablet by a process called digitizing, Digitizing is a process by which graphic representations are converted into digital data. The digitizer consists of 3 main parts - a flat surface called tablet, a small hand held mouse-like device called puck and a special pen like device called stylus. The puck is used to input existing drawings into the computer. The stylus is used to trace existing drawings placed on the tablet. It is also used to draw new drawings on a piece of paper placed on the tablet. The user makes contact to the tablet with stylus. As the stylus is connected to the tablet by a wire, the traced image is stored in RAM and displayed on the monitor.

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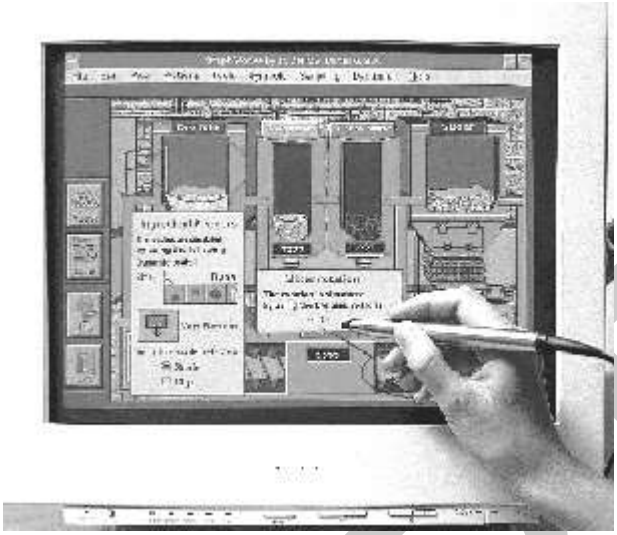

A Digitizer

6. Voice-input Devices

Voice-Input Devices are the latest input devices that can recognize the human voice. They seem to be very useful but are not popular due to storage of limited vocabularies and variations in the way of pronouncing words by different persons.

7. Scanner

Scanner is widely used in Desktop Publishing (DTP) applica- tions. It is used for digitizing images such as photographs, forms, documents etc. into computer memory. There are many types of scanners, which *can* also read text by converting them to digital code. The scanners are very useful for converting the typed pages into word-processing files. Graphic scanners convert a printed image into video image without

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converting it to digital code.

A Scanner

A device that can read text or illustrations printed on paper and translate the information into a form the computer can use. A scanner works by digitizing an image — dividing it into a grid of boxes and representing each box with either a zero or a one, depending on whether the box is filled in. (For color and gray scaling, the same principle applies, but each box is then represented by up to 24 bits.) The resulting matrix of bits, called a bit map, can then be stored in a file, displayed on a screen, and manipulated by programs.

Optical scanners do not distinguish text from illustrations; they represent all images as bit maps. Therefore, you cannot directly edit text that has been scanned. To edit text read by an optical character recognition (OC*R)* system to translate the image into ASCII characters. Most optical scanners sold today come with OCR packages.

Scanners differ from one another in the following respects:

Scanning Technology:

Most scanners use charge-coupled device (CCD) arrays, which consist of tightly packed rows of light receptors that can detect variations in light intensity and frequency. The quality of the CCD array is probably the single most important factor affecting the quality of the scanner. Industry-strength drum scanners use a different technology that relies on a photo multiplier tube (PMT), but this type of scanner is much more expensive than the more common CCD -based scanners.

Resolution

The denser the bit map, the higher the resolution. Typically, scanners support resolutions of from 72 to 600 dpi.

Bit depth: The number of bits used to represent each pixel. The greater the bit depth, the more colors or grayscales can be represented. For example, a 24-bit color scanner can represent 2 to the 24th power (16.7 million) colors. Note, however, that a large color range is useless if the CCD arrays are capable of detecting only a small number of distinct colors.

Size and Shape: Some scanners are small hand-held devices that you move across the paper. These hand-held scanners are often called *half-page* scanners because they can only scan 2 to 5 inches at a time. Hand-held scanners are adequate for small pictures and photos, but they are difficult to use if you need to scan an entire page of text or graphics.

Larger scanners include machines into which you can feed sheets of paper. These are called sheet-fed scanners. Sheet-fed scanners are excellent for loose sheets of paper, but they are unable to handle bound documents.

A second type of large scanner, called a flatbed scanner, is like a photocopy machine. It consists of a board on which you lay books,

magazines, and other documents that you want to scan. Overhead scanners (also called copy board scanners) look somewhat like overhead projectors. You place documents face- up on a scanning bed, and a small overhead tower moves across the page.

This is used to put both text (writing) and graphics (pictures) into the computer. It digitizes the text and images i.e. it converts them into a form that can be used in the computer. This process is known as optical character recognition (O.C.R). Before the text can be used on the computer, it has to be converted into characters by optical recognition software.

a. Text and code scanners

- Bar-code readers
- Magnetic ink character recognition such as on bank checks.
- Optical mark recognition
- Optical character recognition

More general form of reading characters out of handwriting or print

Expensive and error-prone

b. Image scanners

- Most widely used digitization device
- You can try to run OCR once you have the image
- Resolution measured in dots per inch. dpi

More dpi: crisper image

Fewer dpi: smaller file

The common optical scanner devices are:

1. Optical Mark Reader (OMR)
2. Bar Code Reader
3. Optical Character Reader (OCR)
4. Magnetic Ink Character Recognition (MICR)

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1. Optical Mark Reader (OMR)

A Optical Mark Reader

2. Bar Code Reader

Bar Code Reader is an optical scanner used for reading bar- coded data (data in form of light and dark lines). The bar-coded data consists of a number of bars of varying thickness and spacing between them. The bar code reader reads the bar coded data and converts it into electrical pulses, which are then processed by the computer. Bar-coded data is generally used in labeling goods, numbering the books or encoding ID or A/c numbers.

A Bar Code Reader

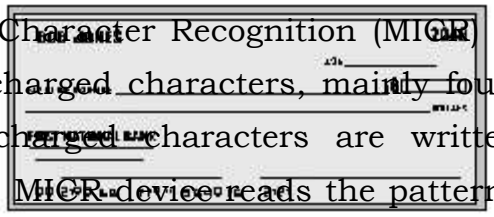
3. Optical Character Reader (OCR)

Optical Character Reader (OCR) is an optical scanner, which is capable of detecting alphanumeric characters typed or printed on paper using an OCR font. The text, which is to be scanned, is illuminated by a low-frequency light source. The dark areas on the text absorb the light while light areas reflect it. The photocells of OCR device receive this reflected light and provide binary data corresponding to dark and light

areas. OCR devices are used for large volume applications like reading of passenger tickets, computer printed bills of credit card companies and reading of ZIP codes in postal services

An Optical Character Reader

4. Magnetic Ink Character Recognition (MICR)



Magnetic Ink Character Recognition (MICR) is used to recog- nize the magnetically charged characters, mainly found on bank cheques. The magnetically charged characters are written by special ink called magnetic ink. MICR device reads the patterns of these characters and compares them with special patterns stored in memory. Using MICR device, a large volume of cheques can be processed in a day. MICR is widely used by the banking industry for the processing of cheques

This is widely used by banks to process large volumes of cheques and drafts. Cheques are put inside the MICR. As they enter the reading unit the cheques pass through the magnetic field which causes the read head to recognise the character of the cheques.

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