Peripherals & Interfacing

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Lecture-1: Input Device: Keyboard

What is Computer Keyboard?

A **computer keyboard** is a peripheral partially modeled after the typewriter keyboard. Keyboards are designed for the input of text and characters and also to control the operation of a computer.

A typical keyboard has four basic types of keys:

- Typing keys
- Numeric keypad
- Function keys
- Control keys

Types of computer keyboard

How it Woks?

The following briefly describes a "dome-switch" keyboard the most common type in use today

1. When a key is pressed, it pushes down on a rubber dome sitting beneath the key. A conductive contact on the underside of the dome touches (and hence connects) a pair of conductive lines on the circuit below.
2. This bridges the gap between them and allows current to flow (i.e. the circuit goes from open to closed), changing the signal strength.
3. A scanning signal is emitted by the chip along the pairs of lines to all the keys. When the signal in one pair becomes different, the chip generates a "make code" corresponding to the key connected to that pair of lines.

4. The code generated is sent to the computer either via a keyboard cable (using on-off electrical pulses to represent bits) or over a wireless connection. It may be repeated.
5. A chip inside the computer receives the signal bits and decodes them into the appropriate keypress. The computer then decides what to do on the basis of the key pressed (e.g. display a character on the screen, or perform some action).

What is a Hall effect keyboard?

Hall Effect keyboard switches have **a magnet that emits an electromagnetic force to displace electrons in a Hall Effect sensor**.

❖ *What is the best for you? Why?*

Now the question is what keyboard you should use to speed up your typing? As USB is a universal connection, you may use the same keyboard everywhere. But a USB keyboard may not operate BIOS properly. As per my personal choice, I prefer PS/2 over USB, as it works on every platform.

Lecture-2: Input Device: Mouse

What is Computer Mouse

Definition – Mouse is a pointing input **device of computer**. Mouse help to control cursor that is visible on the computer screen while moving the mouse on flat surface place. Its name was originated by its shape that look as mouse, because it has elliptical shaped with mouse tail. Mouse reduces usability of a keyboard.

List of Content

- **Mouse History**

Optical mouse was designed by Lisa M. Williams and Robert S. Cherry in 1980, in this computer mouse removed the rubber ball and use new technique optical LED. After availing this new trending mouse to reducing component costs, and enhanced the microcontroller processing power.

The first wireless mouse was introduced by David Liddle and Donald Massaro in 1984 with Metaphor computer; they were former Xerox PARC engineers. In this mouse used the infer-red (IR) signals for transmitting entire data to computer. But in this technology, had been created one problem that must be clear path between the wireless mouse and computer, and for overcome this problem had been altered the IR signals by radio frequency.

Types of Mouse

Mouse is very important **part of computer**. Today, in the market have to various **different types of computer mouse** are available, and every mouse have own functionality so every user can be used all **types of computer mouse** according their usage.

- Mechanical Mouse
- Optical Mouse
- Infrared Frequency Cordless Mouse
- Traceball Mouse
- Stylus Mouse
- 3-D Mouse
- Specialty Mouse – like Devices
- Laser Mouse
- Foot Mouse
- IntelliMouse

- J-Mouse
- Joystick
- Touchpad (Glidepoint)
- Trackball
- Track Point Mouse
- Inertial and Gyroscopic mice
- Tactile mice
- Pucks
  Ergonomic mice
- Gaming mice

1. Mechanical Mouse:

Another name of **mechanical mouse** is ball mouse. Mechanical mouse is a **computer input terminal** that contains the metal or rubber ball in the back surface side. When we move the mouse then mouse's ball roll and sensors that are embedded inside identify the motion and move on screen's surface portion at the same directions. Today, **mechanical mouse** has been replaced in the Optical mouse. **These types of mouse** have to need cable (wire) to making connection **in computer.**

2. Optical Mouse:

In the **optical mouse** use advance technology such as LED (light-emitting diode), optical sensor, and other DSP (digital signal processing) instead of the rubber ball mechanical mouse. In the **optical mouse**, detect the movement by the sensors when reflected light. No need the cleaning to optical mouse because it has not contained any moving components.

How does Mouse Works in Computer?

Here, we will discuss about core **working principle of mechanical and optical mouse**. Such as

Mechanical Mouse Working:

Here, we will spread light on some **mechanical mouse working principles** are:

- Mouse has to contain the rubber ball that is touch with desktop and rolls while moving the mouse.

- Two rollers are existed in the mouse, this touch with ball. One roller is placed that detect the **motion** in X directions; other suited 90 degrees that identify the Y direction's motion. When roller touch ball then that is able to detect both X and Y motion.

- Every roller is associated with a shaft, and shaft allows spinning disk on its hole. Both shaft and disk spin while rolling the roller.

- **Infrared LED and an infrared sensor** are embedded on the mouse's circuit board. LED spreads the beam of light, and disk breaks them. In entire process infrared sensors identify all pulses that are coming from disk after splitting. The pulse' rate depend on the speed of mouse and it traveling distance.

- **Processor** access all pulses that are coming from infrared sensors and convert them into binary form such as 0 an 1 because computer only can understand binary language , and finally send to computer with the help of mouse 'cord.

Optical Mouse Working:

Optical Mouse Working Principle – Optical mouse is totally different to mechanical ball mouse, because in optical mouse are operations are performed by LED (light emitting diode) and photo detector. Both are placed near each other. Work of photo detector is gather all beam of light and bounced off on the surface area. In photo detector, lens are embedded those collect all beams and forward to CMOS (Complementary Metal Oxide Semiconductor) sensor. Photo detector is a high speed camera and able to transfer 1500+ images in per second towards to CMOS sensor with the help of their lens.

The CMOS sensor gets all pictures with the help of digital signal processor which is also known as optical navigation engine. Optical navigation engine works as brain of mouse because it able to compute all pictures among of other different images. These images contain all information of motion, and send to computer. Finally computer can control all motion of pointer on the behalf of those coordinates.

Now, finally you have understood that **optical mouse** how to work smoothly.

What is DPI?

DPI stands for dots per inch, which most commonly measures the output resolution of a printer. It refers to the literal ink density on a piece of paper, but is also somewhat confusingly used to designate the pixel density of an image, too, even though that's a different medium.

What is CPI?

CPI stands for counts per inch, which generally refers to the sensitivity of a mouse. The higher the CPI, the more sensitive it is to your movements.

What are Bluetooth mice?

A bluetooth mouse is **a computer mouse that uses radio waves to communicate wirelessly with a computer**. Bluetooth mice are mobile, have a great range, and can be used with many different devices

Lecture-3: Monitor

What is Computer monitor?

A computer monitor is **an electronic device that shows pictures for computers**. Monitors often look similar to televisions.

The main difference between a monitor and a television is that a monitor does not have a television tuner to change channels. Monitors often have higher display resolution than televisions.

What is aspect ratio?

Aspect ratio is an image projection attribute that describes the proportional relationship between the width of an image and its height. For example, movies, which are usually shot with a wide-angle lens, have an aspect ratio that is typically 16:9, which means that the width of the image area is almost twice its height.

What is viewable area?

In computer monitor terminology, the viewable area is **the diagonal measurement of a CRT screen**, starting from where the glass becomes visible from behind the bezel.

What is VGA?

VGA(Video Graphics Array) is an analog interface between a PC and monitor that was widely used prior to DVI, HDMI and DisplayPort.

What is DVI?

DVI(Digital Visual Interface) is a video display interface developed by the Digital Display Working Group.
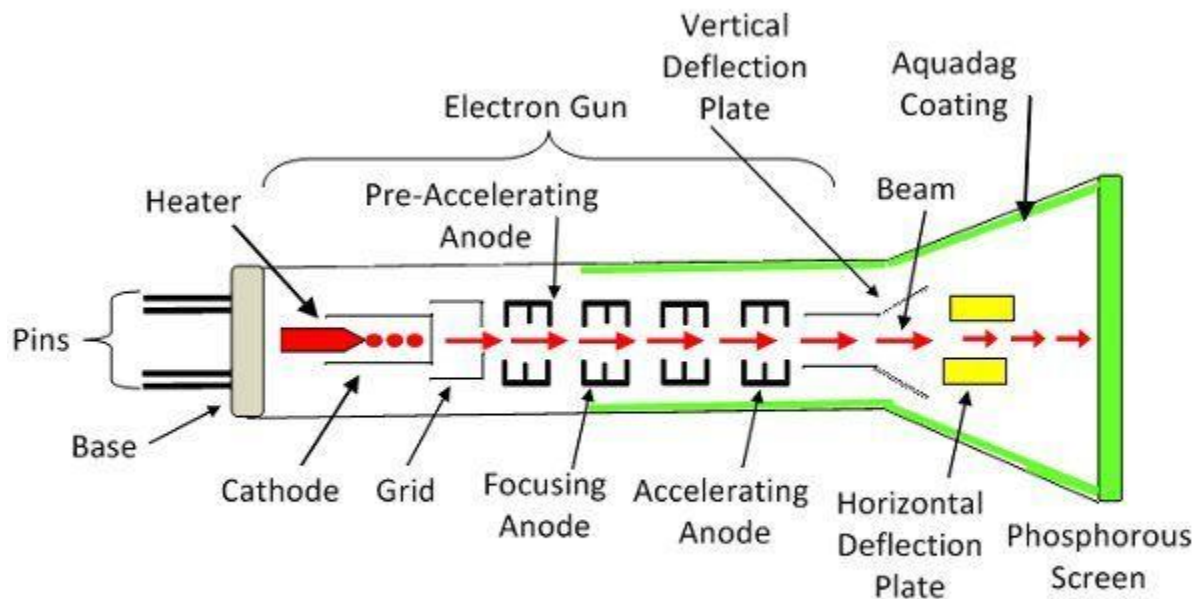
What is Cathode Ray Tube (CRT) ?

 Cathode ray tube, **CRT is the heart of CRO** which generates images when electron beam from the back of the tube strikes the fluorescent screen with sufficient energy.

Working principle of CRT

The working of CRT depends on the movement of electrons beams. The electron guns generate sharply focused electrons which are accelerated at

high voltage. This high-velocity electron beam when strikes on the fluorescent screen creates luminous spot

Cathode Ray Tube

After exiting from the electron gun, the beam passes through the pairs of electrostatic deflection plate. These plates deflected the beams when the voltage applied across it. The one pair of plate moves the beam upward and the second pair of plate moves the beam from one side to another. The horizontal and vertical movement of the electron are independent of each other, and hence the electron beam positioned anywhere on the screen.

The working parts of a CRT are enclosed in a vacuum glass envelope so that the emitted electron can easily move freely from one end of the tube to the other.

Advantages of CRT :

- Less expensive than other display technology
- Fast response time

- It can operate at any resolution, geometry and also for aspect ratio without the need for rescaling the image
- Highest pixel resolutions generally available
- They produce more colors
- CRT also suitable for use even in dim or dark light
- Produce a very dark black and grayscale and are the reference standard for all professional calibrations
- Easily increases the monitor's brightness by reflecting the light
- Fast response times and no motion artifacts
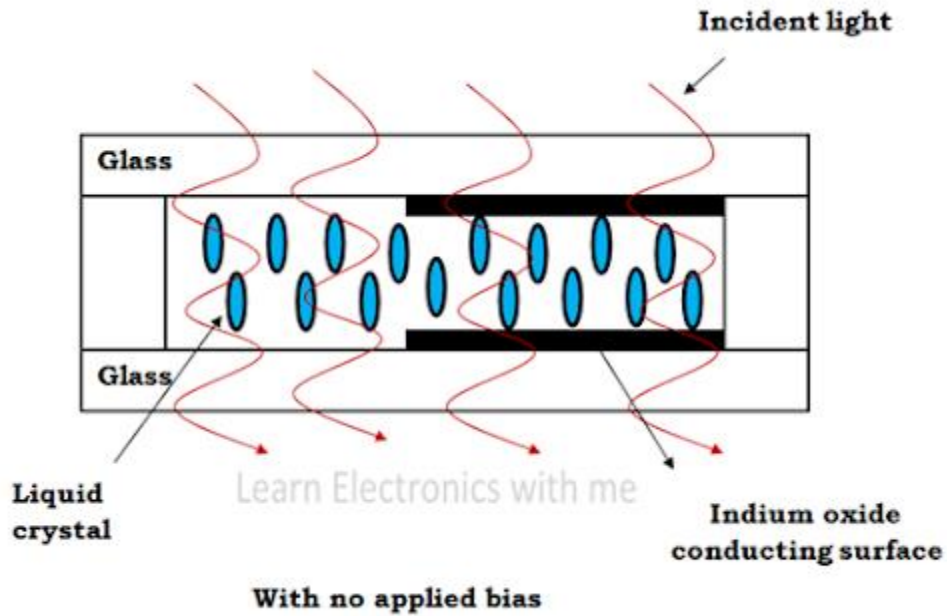
Disadvantages of CRT :
- Big back and take up space on a desk
- Not suitable for very brightly environment because less bright than LCD
- They are large, heavy and bulky
- Consume a lot of electricity and also produce a lot of heat
- Geometrical error at edges
- Flickering at 50-80 Hz
- Harmful DC and AC electric and magnetic fields

What is Liquid Crystal Display:

Liquid Crystal Display (LCD) is an flat display screen used in electronic devices such as laptop, computer, TV, cellphones and portable video games.

Working of Liquid Crystal Display

The basic working principle of LCD is blocking of light. It does not produce light on its own. So external light source is used. When the external light passes from one polarizer to the next polarizer, external supply is given to the liquid crystal ,the polarized light aligns itself so that the image is produced in the screen.

Incident light

Glass

Glass

Liquid crystal

Learn Electronics with me

Indium oxide conducting surface

With no applied bias

Working of LCD

The indium oxide conducting surface is a transparent layer which is placed on both the sides of the sealed thick layer of liquid crystal . When no external bias is applied the molecular arrangement is not disturbed.
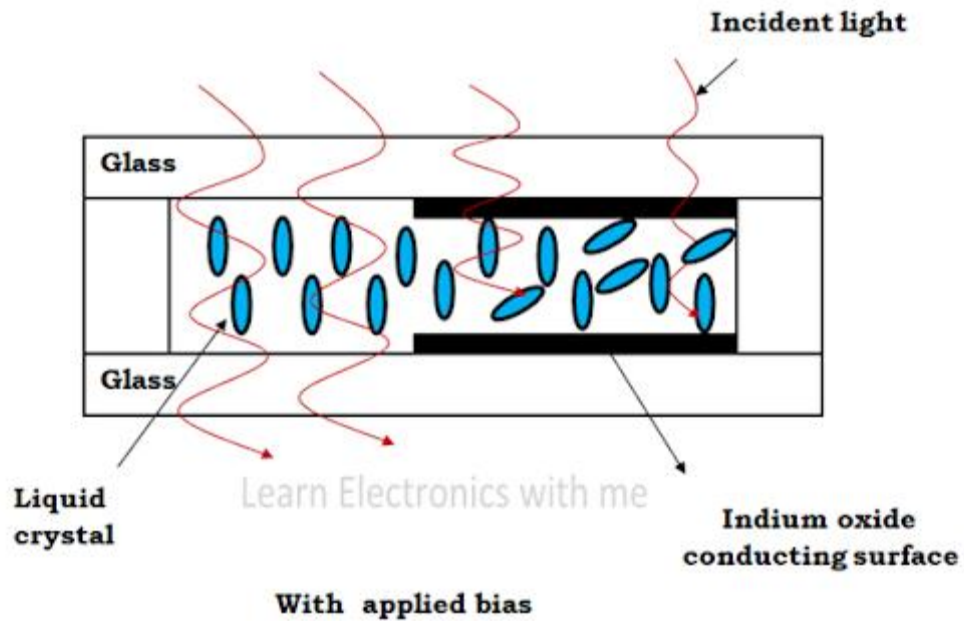
Working of LCD

When the external bias is applied the molecular arrangement is disturbed and it and that area looks dark and the other area looks clear.

How LCDs Work?

The principle behind the LCDs is that when an electrical current is applied to the liquid crystal molecule, the molecule tends to untwist. This causes the angle of light which is passing through the molecule of the polarized glass and also causes a change in the angle of the top polarizing filter. As a result, a little light is allowed to pass the polarized glass through a particular area of the LCD.

Thus that particular area will become dark compared to others. The LCD works on the principle of blocking light. While constructing the LCDs, a reflected mirror is arranged at the back. An electrode plane is made of indium-tin-oxide which is kept on top and a polarized glass with a polarizing film is also added on the bottom of the device. The complete region of the LCD has to be enclosed by a common electrode and above it should be the liquid crystal matter.

(working principle jeta valo lage seta porba)

There are some advantages of liquid crystal display (LCD) which are given below,

- The LCD can be made in large sizes of over 60 inch or 150 cm diagonal.
- It has no geometric distortion.
- It is very compact, thin, and light CRT displays.
- It does not affect by the magnetic fields.
- Due to low power consumption, small heat emitted during operation.
- It is much thinner than a CRT (cathode ray tube) monitor.
- LCDs are of low cost
- Provides excellent contrast
- LCD's are thinner and lighter when compared to cathode ray tube and LED
- It is thin and compact
- Low power consumption
- Less heat is emitted during operation
- Low cost

There are some disadvantages of liquid crystal display (LCD) which are given below,

- In high temperature environments there is loss of contrast.
- It is relatively bright but not suitable for very brightly environments.
- It consumed a lot of electricity which produce a lot of heat.
- It has individual liquid crystals which cannot complete all block of the backlight.
- From the viewing angle, the color and contrast not consistent.
- Low reliability
- Speed is very low
- Speed of operation is low
- Lifespan is less
- Restricted viewing angles

Applications:

- Used in digital wrist watch
- Display images in digital cameras
- Used in numerical counters
- Display screen in calculators
- Mainly used in television
- Used in mobile screens
- Used in video players
- Used in image sensing circuits

Difference between CRT & LCD:

S.NO	CRT	LCD
1.	CRT stands for Cathode Ray Tube.	While LCD stands for Liquid Crystal Display.

S.NO	CRT	LCD
2.	CRT consumes more power.	While it consumes less power.
3.	The cost of CRT is less than LCD.	While it is costlier than CRT.
4.	CRT is faster than LCD in terms of response.	While it is slower than CRT in terms of response.
5.	CRT is larger than LCD in terms of size.	While it is small in terms of size.
6.	It has not image confinement.	While it has good image confinement.
7.	CRT's resolution is lower than LCD.	While LCD's resolution is more than CRT.
8.	It is used only in personal computers.	While it is used in personal computers as well as in laptops and cellular phones.

Lecture-4: Printer

What is Computer printer?

A printer is an output device that generates text and graphics on a physical medium like paper. Printers may be divided into impact printers and non-impact printers.

An impact printer forms characters and images on a piece of paper by hitting an ink ribbon mechanism that contacts the paper physically.

A non-impact printer forms characters and graphics on a piece of paper without hitting the paper.

Impact printers

An impact printer makes contact with the paper. It usually forms the print image by pressing an inked ribbon against the paper using a hammer or pins .Some of the **examples of the Impact Printers** are Dot-matrix printers, Daisy-wheel printers, and line printers.

Dot-Matrix Printers

It prints characters as combination of dots. Dot matrix printers are the most popular among serial printers. These have a matrix of pins on the print head of the printer which form the character. There is a carbon between the pins & the paper

Advantages:
● Low initial unit costs
● Low running costs
● Low maintenance costs
● Able to perform in hot and dirty conditions

Disadvantages:
● Low resolution printed output
● Noisy

Ink-jet printers

It prints characters by spraying patterns of ink on the paper from a nozzle or jet. It prints from nozzles having very fine holes, from which a specially made ink is pumped out to create various letters and shapes. The ink comes out of the nozzle in a form of vapors. After passing through a reflecting plate, it forms the desired letter/shape at the desired place.

How does an inkjet printer work?

In a thermal **inkjet printer**, tiny resistors create heat, and this heat vaporizes **ink** to create a bubble. As the bubble expands, some of the **ink** is pushed out of a nozzle onto the paper. When the bubble "pops" (collapses), a vacuum is created. This pulls more **ink** into the **print** head from the **cartridge**

Advantages of inkjet printers:

1) Low cost

2) High quality of output, capable of printing fine and smooth details

3) Capable of printing in vivid color, good for printing pictures

4) Easy to use

5) Reasonably fast

6) Quieter than dot matrix printer

7) No warm up time

Disadvantages of inkjet printers:

1) Print head is less durable, prone to clogging and damage

2)   Expensive replacement ink cartridges

3)   Not good for high volume printing

4)   Printing speed is not as fast as laser printers

5)   Ink bleeding, ink carried sideways causing blurred effects on some papers

6)   Aqueous ink is sensitive to water, even a small drop of water can cause blurring

7)   Cannot use highlighter marker on inkjet printouts

Laser printers:

Laser Printer is a type of printer that utilizes a laser beam to produce an image on a drum. A laser printer works like a photocopy machine. Laser printers use buffers that store an entire page at a time. When a whole page is loaded, it will be printed. The speed of laser printers is high and they print quietly without producing much noise..

How does it work?

1. The laser scanner creates the image.
2. The image is beamed through the glass copier window into the copier mechanism underneath.
3. The image is reflected by a mirror.
4. A lens focuses the image.
5. A second mirror reflects the image again.
6. The image is transferred onto the photocopier belt.
7. A developer unit converts the image into printable form.
8. The printable image is transferred to the paper.
9. The fuser permanently seals the image onto the page, which emerges into the collecting rack at top of the machine.

OR,

How Laser Printers Work

1. The printers laser beams your print onto a metal cylinder called a drum.
2. Using static electricity, the drum attracts powdered toner from its cartridge to the drum.
3. The drum rolls the toner onto the paper in the form of your print.
4. The toner is melted onto the paper by heat from a fuser as it passes underneath.
5. Your print comes out of the printer.

(Jeta valo lage seta porba)

The Seven Laser Printing Steps

- Step 1: Sending. To begin the laser printer process, the document is broken down into digital data and sent from the respective computer to the printer. ...
- Step 2: Cleaning. ...
- Step 3: Conditioning. ...
- Step 4: Exposing. ...
- Step 5: Developing. ...
- Step 6: Transferring. ...
- Step 7: Fusing.
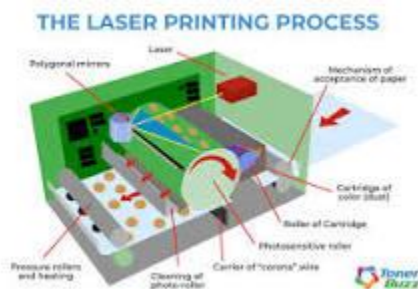
- Advantages:
  - ● More cost effective than inkjet printers

- ● Increases productivity
- ● High print speed
- ● Higher paper capacity
- ● Often expandable with Paper Trays, finishers etc.
- ● Grows with your business
- They are also capable to produce color prints.

- Disadvantages:
  - ● May require short 'warm-up times'
  - ● Larger footprint
  - ● High voltage usage leads to small carbon emissions

Lecture-5: Scanner

What is scanner?

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

What are the types of Computer Scanners?

Scanners can broadly be classified into several types. They are:

- **Drum Scanner**
- **Flatbed Scanner**
- **Hand scanners**
- **Sheet-fed scanners**
- **Digital camera scanners**

Drum Scanners

A drum scanner acts essentially as a precision digital camera, **used to scan reflective and transparent materials at an extremely high resolution**. It captures the image with analog light, producing the most detail possible in each color channel and then converts it to a digital file.

How Does A Drum Scanner Work?

The drum scanner works by attaching the original image to a transparent revolving drum or cylinder.

The film is wet mounted and then inserted into the scanner. The drum spins at a very high speed while light from scanner illuminates each part of the film pixel by pixel, storing the particular color and grayscale information as digital data.

The result is an incredibly detailed image and a high-resolution picture with a great dynamic range.
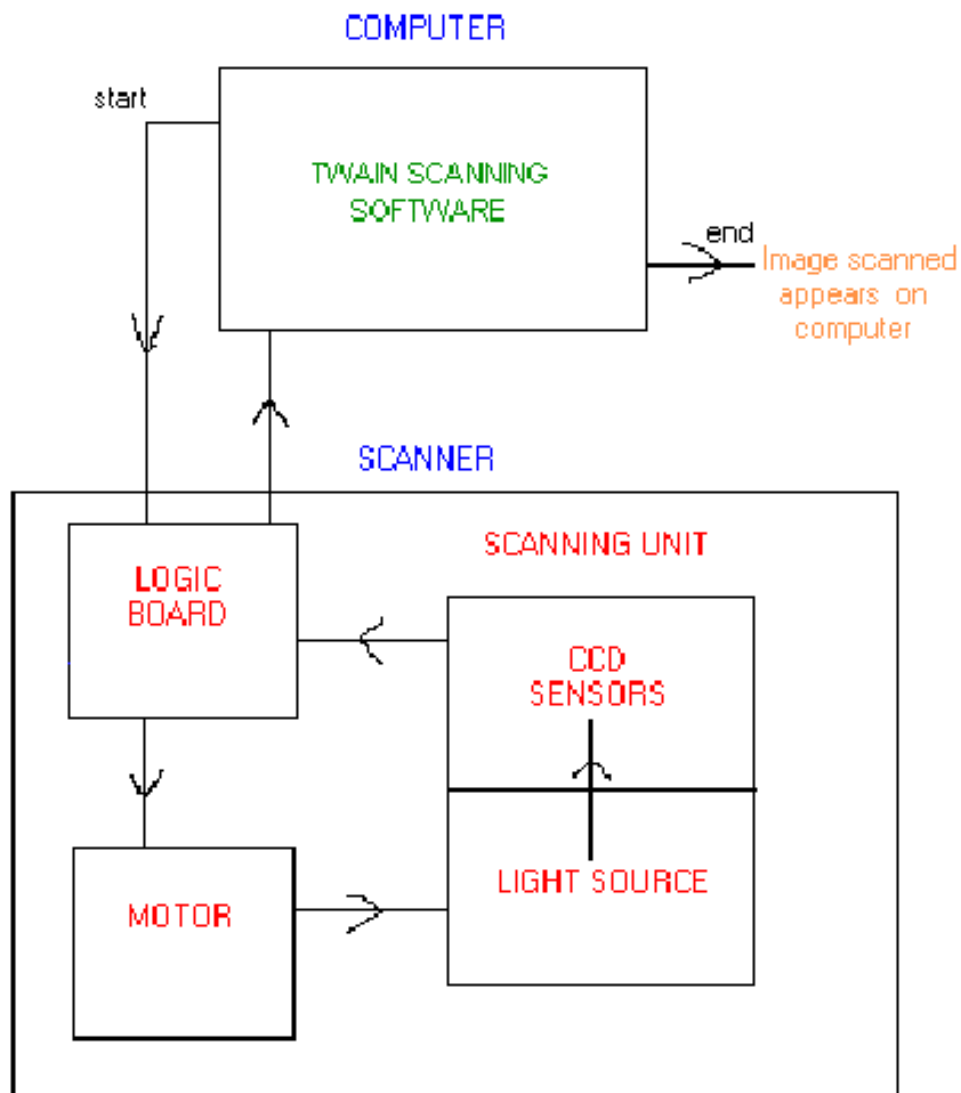
Digital camera scanners:

Digital camera scanners are based on the concept of reprographic cameras. Due to increasing resolution and new features such as anti-shake digital cameras have become an attractive alternative to regular scanners.

The Scanning Process

1. The image to be scanned is placed on top of the scanner's glass plate

2. The computer sends instructions to the logic board about how far the motor is to run and how fast

3. The logic board instructions place the scanning unit into an appropriate position to begin scanning

4. The scanning unit moves across the image to be scanned at a speed designated by the logic board instruction

5. As the scanning unit moves across the image a light source shines on the image

6. The light strikes the image reflects and is then reflected by a series of mirrors to the scanner lens

7. The light passes through the scanner lens and reaches the CCD sensors

8. CCD sensors measure the amount of light reflected through the image and converts the light to an analog voltage

9. The analog voltage is changed to digital values by an ADC – analog to digital converter

A Flow Chart of How a Scanner Works :

COMPUTER

start

TWAIN SCANNING
SOFTWARE

end
Image scanned
appears on
computer

SCANNER

SCANNING UNIT

LOGIC
BOARD

CCD
SENSORS

MOTOR

LIGHT SOURCE

Lecture-6

Input Devices (Barcode Reader)

Barcode reader (also known as Barcode Scanner) is an electronic devise that can read outprinted barcodes to a computer. I It consists of a light source, a lens and a light sensor translating optical impulses into electrical ones.
Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating for optical impulses into electrical signals.

An example of a barcode reader is **a supermarket barcode scanner that reads and logs the price of a product**.

How do Barcode Readers Work ?


www.explainthatstuff.com
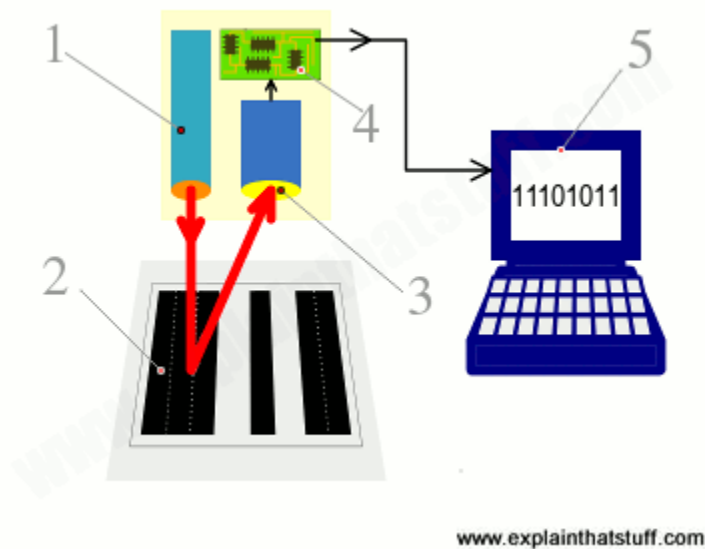
1. Scanning head shines LED or laser light onto barcode.
2. Light reflects back off barcode into a light-detecting electronic component called a Photoelectric cell. White areas of the barcode reflect most light; black areas reflect least.
3. As the scanner moves past the barcode, the cell generates a pattern of on-off pulses that correspond to the black and white stripes. So for the code shown here ("black black black white black white black black"), the cell would be "off off off on off on off off."

4. An electronic circuit attached to the scanner converts these on-of pulses into binary digits (zeros and ones).
5. The binary digits are sent to a computer attached to the scanner, which detects the code as 11101011

What are Barcode Readers used For?

We all go to supermarkets and at the end where there are billing counters the workers use Barcode readers to see what all produts we have bought . After that the summarise the amount and give us the bill. But it is also used to check for the stock in the market. When the scan all the items then they upload it on the main computer. This is very useful for keeping track of your products . For example if you are taking a round and checking the stock you find tha there are very less Coffee Cans .Now there are 2 theories either they have been sold out or stolen . To be sure you can compare the billing data with the stock data to be sure what has happened to the stock.

How do barcode reader represent numbers 0-9
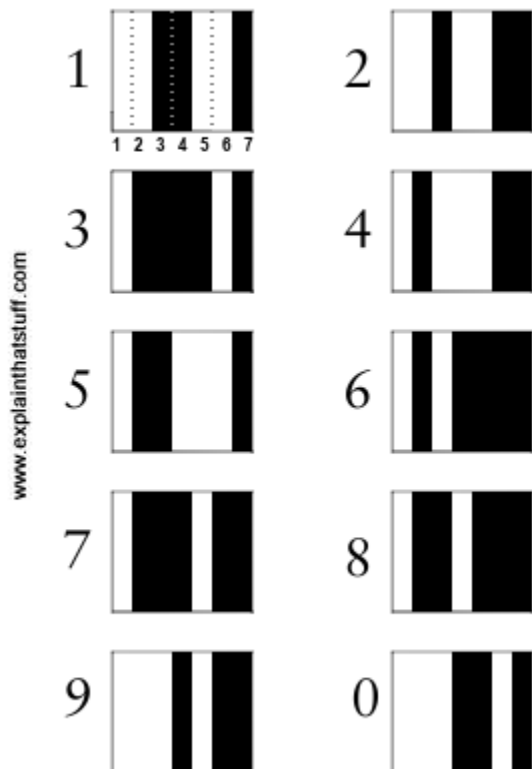
When are UPC codes used?

The barcodes UPC-A and UPC-E are used by producers and suppliers primarily in the grocery trade. They are also used in retail, manufacturing, warehouse, construction and pharmaceuticals.

How is UPC used?

UPC-A is used on the U.S. and Canadian markets to label consumer packaging that should pass through a check-out point and that is identified with a [GTIN-12.](#)

UPC-E is used in the same markets to label small consumer packaging that has limited space for a barcode, and is identified with a GTIN-12.

The main difference between a UPC-A symbol and a UPC-E symbol is the size.

However, if you export products to the United States and Canada, you should label them with [EAN-13 or EAN-8,](#)because stores there should be able to scan these barcodes.

UPC Advantages

• One of the oldest barcode types, extremely portable.
• It contains only numerals; simple and easy to encode and decode.
• The self-checking mechanism through checksum digit.

How UPC Codes Work

The UPC symbol consists of two parts: a machine-readable bar code and a 12-digit human-readable number.

> **EAN-8/EAN-13 with supplemental (ISBN Version):**

- ■ EAN or European Article Numbering system (also called JAN in Japan) is a European version of UPC. It uses the same size requirements and a similar encoding scheme as for UPC codes.

- EAN-8 encodes 8 numeric digits consisting of two country code digits, five data digits and one check digit. B-Coder will accept up to 7 numeric digits for EAN-8. B-Coder will automatically calculate the check digit for you. If you enter less than 7 digits or if you enter any digits other than 0 to 9, B-Coder will display a warning message

EAN-8:   EAN bar code numbers are assigned to specific products and manufacturers by an organization called ICOF located in Brussels, Belgium.

EAN-13:
- EAN -13 is the European version of UPC-A. The difference between EAN-13 and UPC-A is that EAN-13 encodes a 13th digit into the parity pattern of the left six digits of a UPC-A symbol. This 13th digit, combined with the 12th digit, usually represent a country code.

The Check Digit:
   The last digit of the UPC code is called a **check digit**. This digit lets the scanner determine if it scanned the number correctly or not. Here is how the check digit is calculated for the other 11 digits, using the code 63938200039

1. Add together the value of all of the digits in odd positions (digits 1, 3, 5, 7, 9 and 11).
   6 + 9 + 8 + 0 + 0 + 9 = 32
2. Multiply that number by 3.
   32 * 3 = 96
3. **Add together the value of all of the digits in even positions (digits 2, 4, 6, 8 and 10).**
   3 + 3 + 2 + 0 + 3 = 11
4. **Add this sum to the value in step 2.**
   96 + 11 = 107
5. **Take the number in Step 4. To create the check digit, determine the number that, when added to the number in step 4, is a multiple of 10.**
        107 + 3 = 110 The check digit is therefore 3.

How to Decode a UPC :

(Mam er ppt file)

Lecture-5: OMR+MICR

What is OMR?

Optical mark recognition is the process of capturing human-marked data from document forms such as surveys and tests. They are used to read questionnaires, multiple choice examination paper in the form of shaded areas.

What are the advantages and disadvantages of OMR?

Advantages:1.There is a large number of document to justify designing and printing them.2.The user can only make marks and cannot write any information.

Disadvantages:1.Document for mark reader are complicated to design.2.input of the data to computer is slow.3.it is difficult for a computer to check marked data.4.the person putting the marks on the document has to follow the instruction.

Application:

- Data compilation
- Consumer surveys
- Time sheet / inventory counts
- In the process of institutional research
- Community surveys
- Product evaluation
- Test assessment
- Membership subscripting forms
- Evaluation / Feedback
- Lotteries / Voting

What is MICR?

MICR stands for Magnetic Ink Character Recognition.It is a characters recognition technology that can read human unreadable characters that are printed using a special magnetic ink. It is mostly used in banks to facilitate the processing of cheques.

Advantages of MICR are as follows:

The major advantages of MICR is accuracy and its speed.

1. It decreases the margin of errors. 2. Provides high security.

Disadvantages of MICR are as follows:

1. Time consuming standards. 2. The number of characters that can be recorded with present techniques is very limited.

Application:

❑ MICR technology is used by banks.
❑ Numbers and characters found on the bottom of checks (usually containing the check number, sort number, and account number) are printed using Magnetic Ink.
❑ To print Magnetic Ink, you need a laser printer that accepts MICR toner.
❑ MICR provides a secure, high-speed method of scanning and processing information.

Lecture-8

Input Device: Touch Screen

A **touch screen** is a display device that allows the user to interact with a computer by using their finger or stylus. They're a useful alternative to a mouse or keyboard for navigating a GUI (graphical user interface).

Components and working of touch screen:

A basic touch screen is having a touch sensor, a controller, and a software driver as three main components. The touch screen is needed to be combined with a display and a PC to make a touch screen system.

Touch sensor:

The sensor generally has an electrical current or signal going through it and touching the screen causes a change in the signal. This change is used to determine the location of the touch of the screen.

Controller:

A controller will be connected between the touch sensor and PC. It takes information from the sensor and translates it for the understanding of PC. The controller determines what type of connection is needed.

Software driver:

It allows computers and touch screens to work together. It tells OS how to interact with the touch event information that is sent from the controller.

Types of Touch Screen Technology:

There are four main touch screen technologies: Resistive, Capacitive, Surface Acoustical wave (SAW), and infrared (IR).

Resistive:

A resistive touch screen panel is consists of several layers but the important layers are two thin, metallic, electrically conductive layers separated by narrow gap.Resistive touch screen panels are more affordable but offering only 75% of the light monitor and the layer can be damaged by sharp objects. The resistive touch screen is further divided into 4-, 5-, 6-, 7-, 8- wired resistive touch screen. The construction design of all these modules is similar but there is a major distinction in each of its methods to determine the coordinates of the touch.

Few points regarding Resistive Touch screen :-

- Low activation pressure required.
- Transmissivity is < 82% which means distortion to graphics due to coatings.
- It requires periodic recalibration due to wearing of coatings
- Display size 19″
- Integrated in component only and any pointing device can be used
- Polyester top sheets affects the optics and is susceptible to damage

Capacitive:

A capacitive touch screen panel is coated with a material that stores electrical charges. The capacitive systems can transmit up to 90% of the light from the monitor. It is divided into two categories. In Surface-capacitive technology, only one side of the insulator is coated with a conducting layer.

Infrared:

An infrared touch screen technology, an array of X and Y axis is fitted with pairs of IR LEDs and photodetectors. Photodetectors will detect any image in the pattern of light emitted by the Leds whenever the user touches the screen.

Surface Acoustic wave:

The surface acoustic wave technology contains two transducers placed along the X-axis and Y-axis of the monitor's glass plate along with some reflectors. When the screen is touched, the waves are absorbed and a touch is detected at that point. These reflectors reflect all electrical signals sent from one transducer to another. This technology provides excellent throughput and quality.