Input / Output Devices

RENETHA J.B.

Input-Output Unit

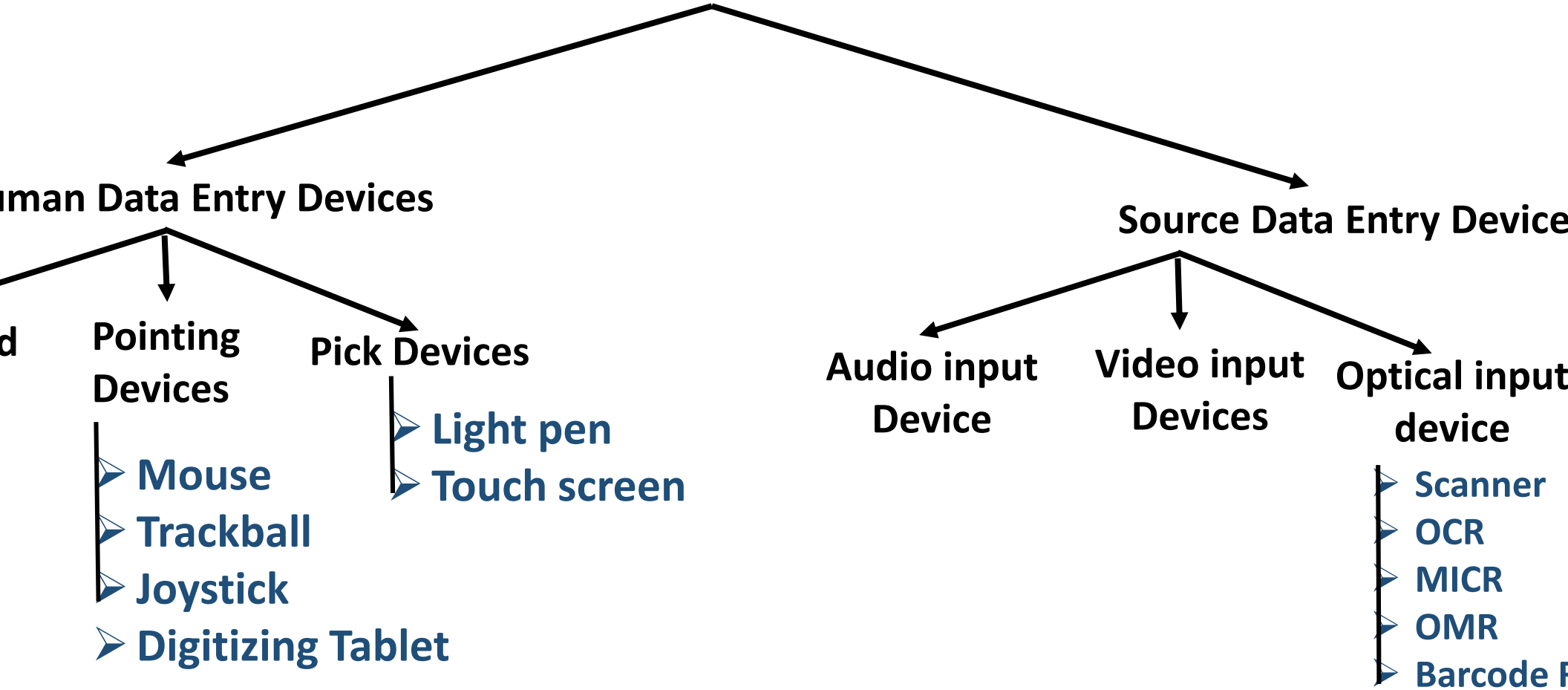
INPUT UNIT

- ***Gets data and programs*** from various inputs devices and makes them available for processing to other units of the computer
- The input data is provided through **input devices** such as – *keyboard, mouse, trackball, and joystick*. Also by *scanning images, voice recording, video recording* etc.
- Irrespective of the kind of data, all input devices must **translate** the *input data into a form* ***understandable*** *by the computer*

OUTPUT UNIT

- Gets **processed data** from computer and sends **to output devices** to make the, available to the user
- Eg. *Display screen, printer, plotter, speaker*

INPUT DEVICES



nput Devices

Human data entry devices

- Are input devices that **require data to be entered manually** to the computer
- The data may be entered *by typing or keying in*, or *by pointing a device* to a particular location.

Source data entry devices

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

Keyboard

Features

- Common input device, easy to use, used for **entering text data**, ***cursor moves with each typed character***
- QWERTY keyboard is most common

Description

- Has 5 sections:
  - Typing keys (1,2,3…A, B , C..)
  - Numeric keypad (on right side)
  - Function keys (F1,F2… on top)
  - Control keys (ctrl, alt etc.)
  - Special purpose keys (Enter, shift, spacebar)

Working - Keyboard

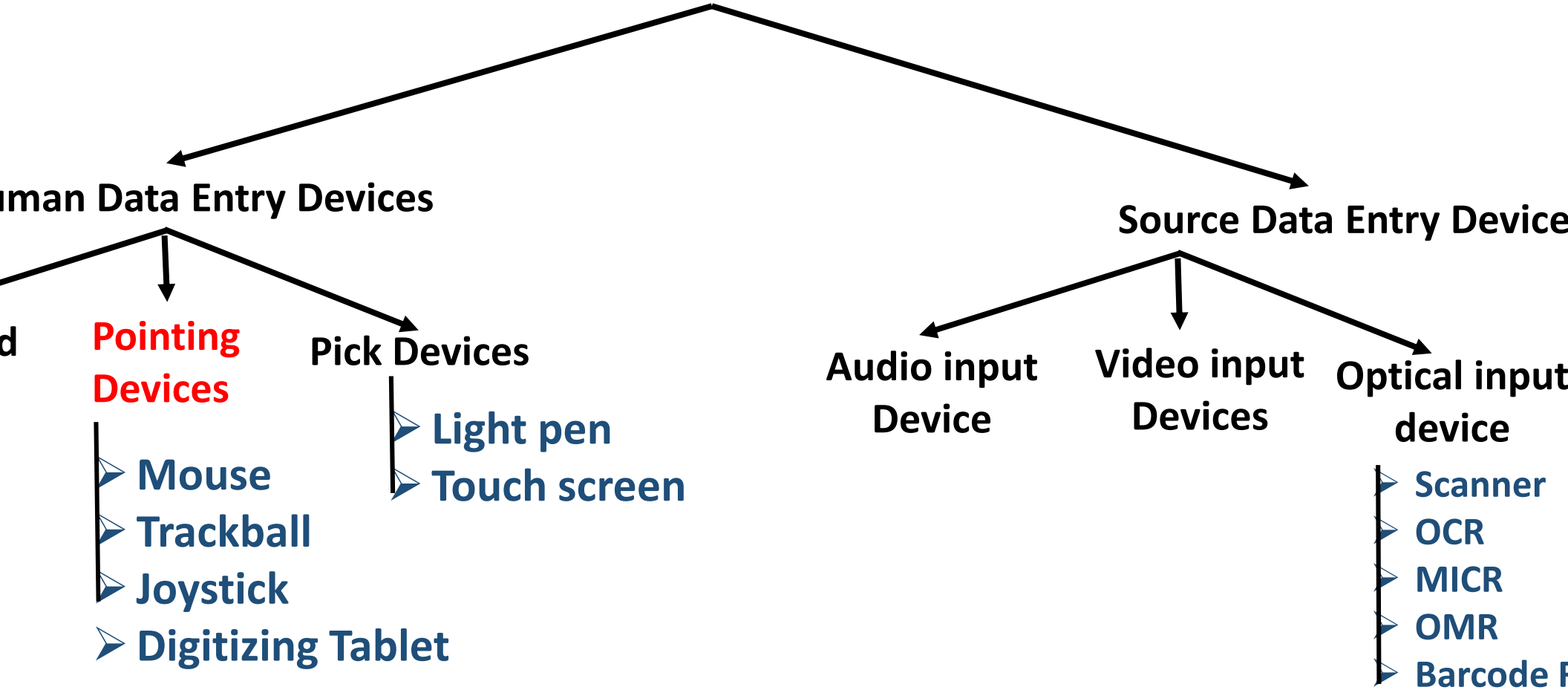
When a key is pressed, the keyboard interacts with a keyboard controller and keyboard buffer

Keyboard controller ***stores*** the code of pressed key ***in keyboard buffe*** and inform the computer software that an action has happened on the keyboard.

Computer software checks and reads the keyboard buffer and passe the code of pressed character to the system software.

Due to a time gap between pressing of the key and reading by systen software, keyboard buffer is designed to store many keystroke together

INPUT DEVICES



Mouse

Mouse is a small hand-held device having 2 or 3 buttons on its upper side and also a small wheel (used for scrolling)

2 Types:

- **Physical**
- **Optical**

Physical mouse: Has *a* ***rubber ball*** on the bottom that protrudes when the mouse is moved. It require a smooth, dust free surface

Optical mouse: Uses *Light* ***Emitting Diode (LED)*** and a **sensor** to detect the movement of mouse

- Introduced by Microsoft in 1999

Working - Mouse

Physical Mouse:

- **Rollers and sensors** are used to sense the **direction and rate of movement**.
- When the **rubber ball** of the mouse moves, **rollers** ***sense the horizontal an*** ***vertical movement*** **and sensors** ***sense the speed*****.**
- This information is passed to computer via mouse chord

Optical mouse:

- When moved, a **beam of light** is *reflected from its underside*.
- This **pulses of light** determine the **direction and rate of movement**
- This information is passed to computer via mouse chord

Trackball

Features:

- Variant of mouse, easy to use, **takes less space than mouse**, it is built in laptops since there is no space to move mouse.
- Various sizes: small and big

Description:

- Looks like an upside down mouse
- To move the cursor, trackball require the ball to be **rotated** manually with a finger
- The trackball device remains **stationary**
- The cursor on screen moves in the direction of trackball
- Trackball buttons are used similar to mouse button

Working:

- Similar to physical mouse

Joystick

- Commonly used **for playing video games**
- Mainly used to **control the speed of the cursor** (popular in gam involving racing and flying)
- The ***direction of push*** of the stick and ***amount of deflecti*** determines the *change in position and change in speed.*

Digitizing tablet

Features:

- Used to **input drawings, sketches** etc.
- Used in CAD (Computer Aided Design) of buildings, automobiles etc.

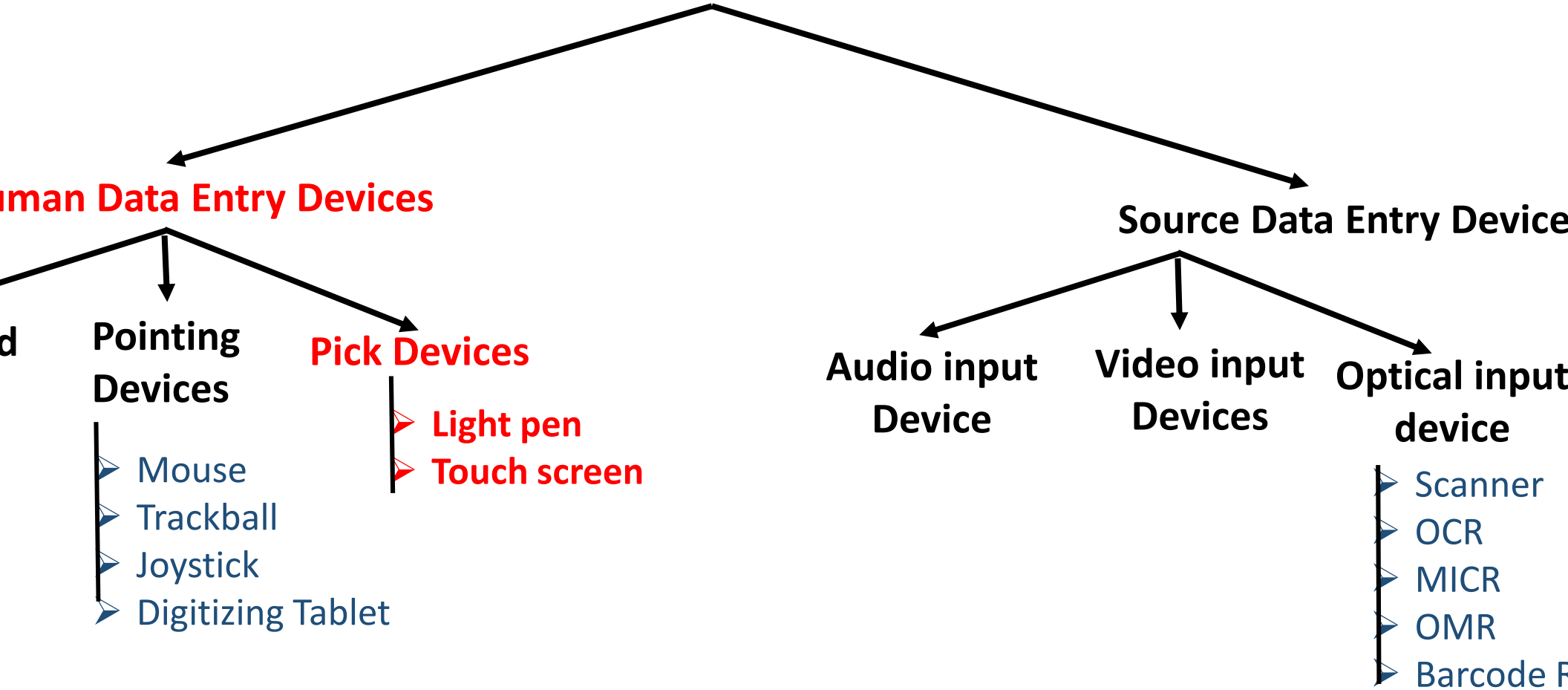
Description:

- 2 Parts:
  - **Electronic tablet** (flat bed tablet)
  - **Pen** (had an electronic head)
- Each *position on the tablet* corresponds to *fixed position on screen*

Working:

- Tablet contains a circuit that can detect movement of the pen on the tablet **convert movements into digital signals** and send the digital signal t computer

INPUT DEVICES



Light pen

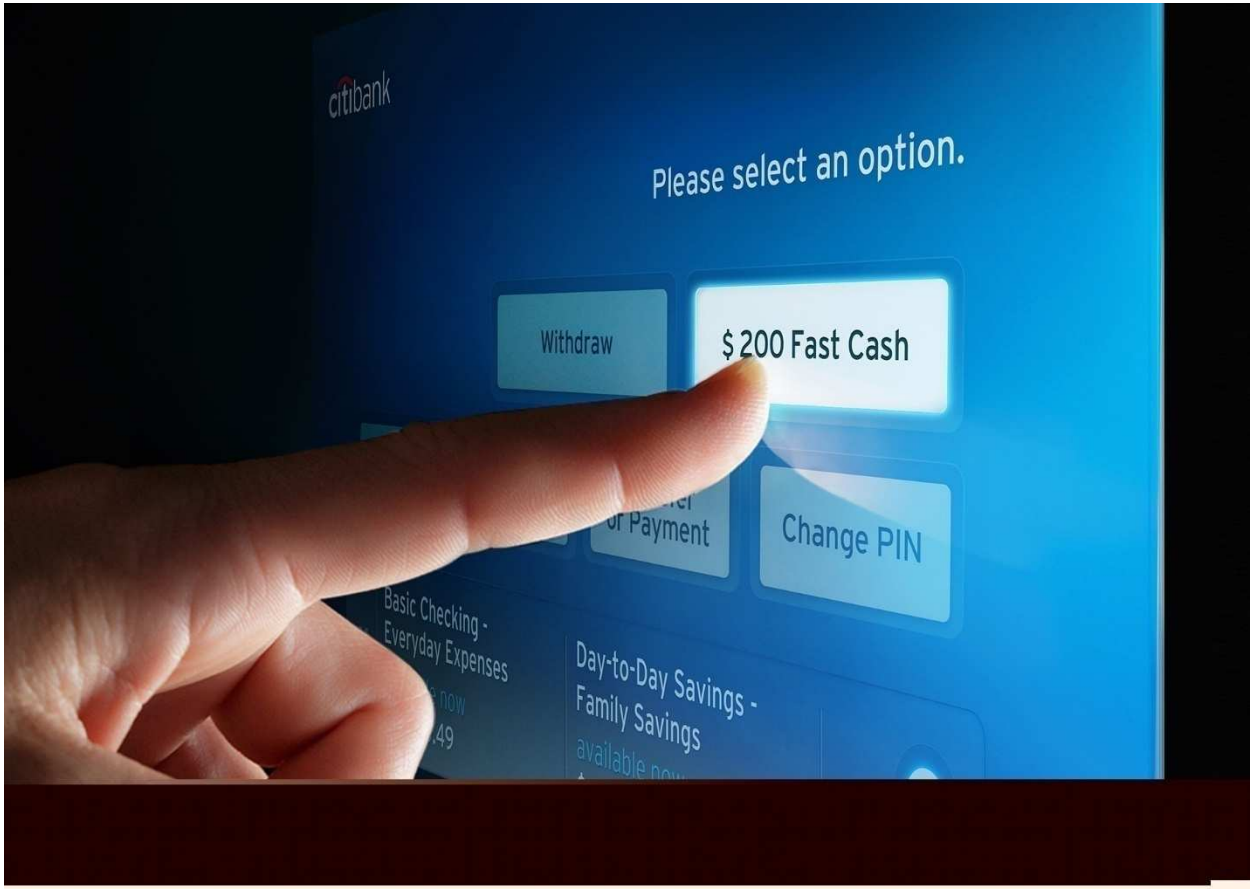
Features:

- **Light sensitive** pen like input device used to **select objects directly on th computer screen**
- Used for making *drawing, graphics and for menu selection*
- Figures and drawings can be made by moving the pen on computer screen

Working:

- Consists of a **photocell** in a small tube.
- When moved on the screen, light from the screen at the location of pen causes the photocell to respond
- This electric response is transmitted to the computer to find the position o the screen where light pen is pointed

ouch screen

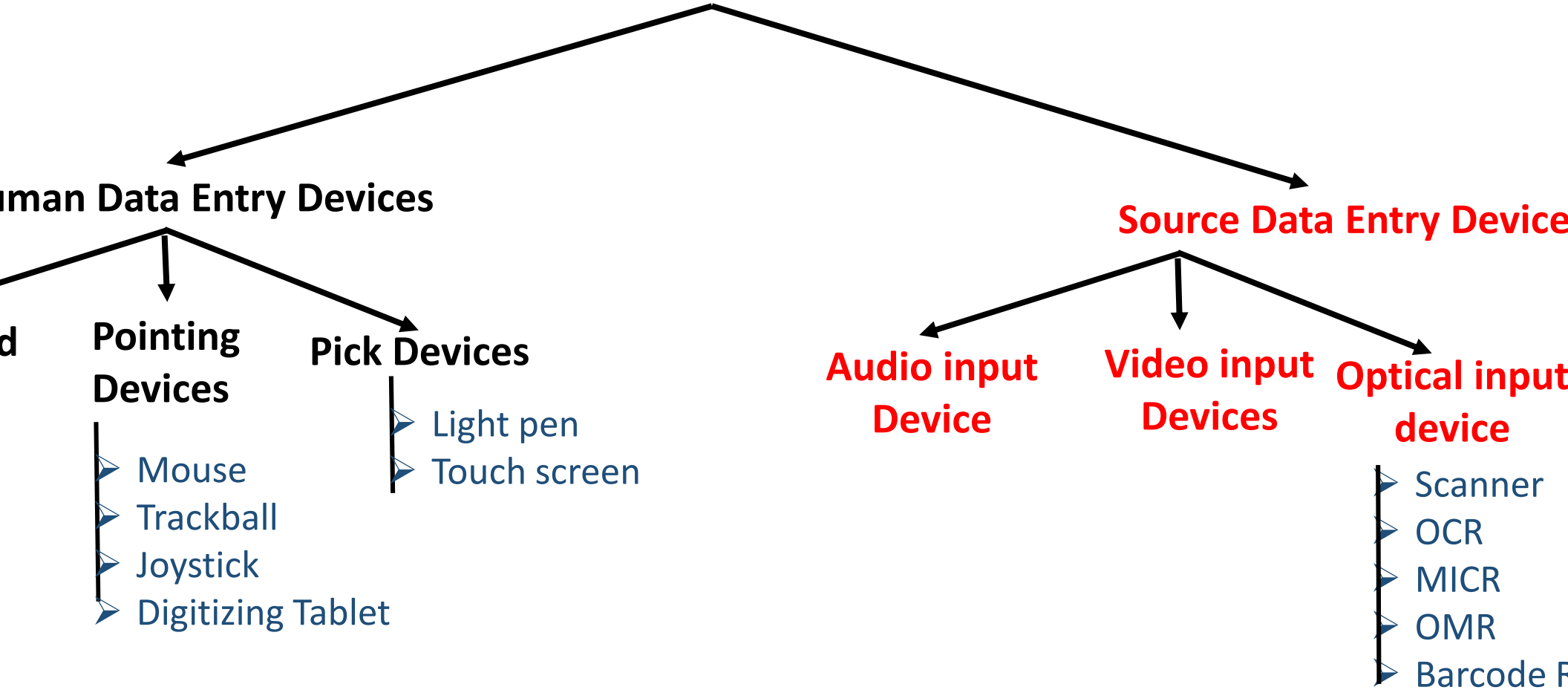


Touch screens have an **infrared beam** that criss-cross the surface of screen

When touched, the beam is *broken*, and the location is recorded.

The recorded location is sent to computer via the controller of the touch screen.

INPUT DEVICES



Audio Input Device

Used for making telephone calls, for audio/video conferencing, to record voice, to create audio files etc.

Use of **microphones** – to input voice data

Sound card – translates analog *audio signals to digital c*odes and vice versa

Translating spoken words to text – speech recognition/Voice recognition

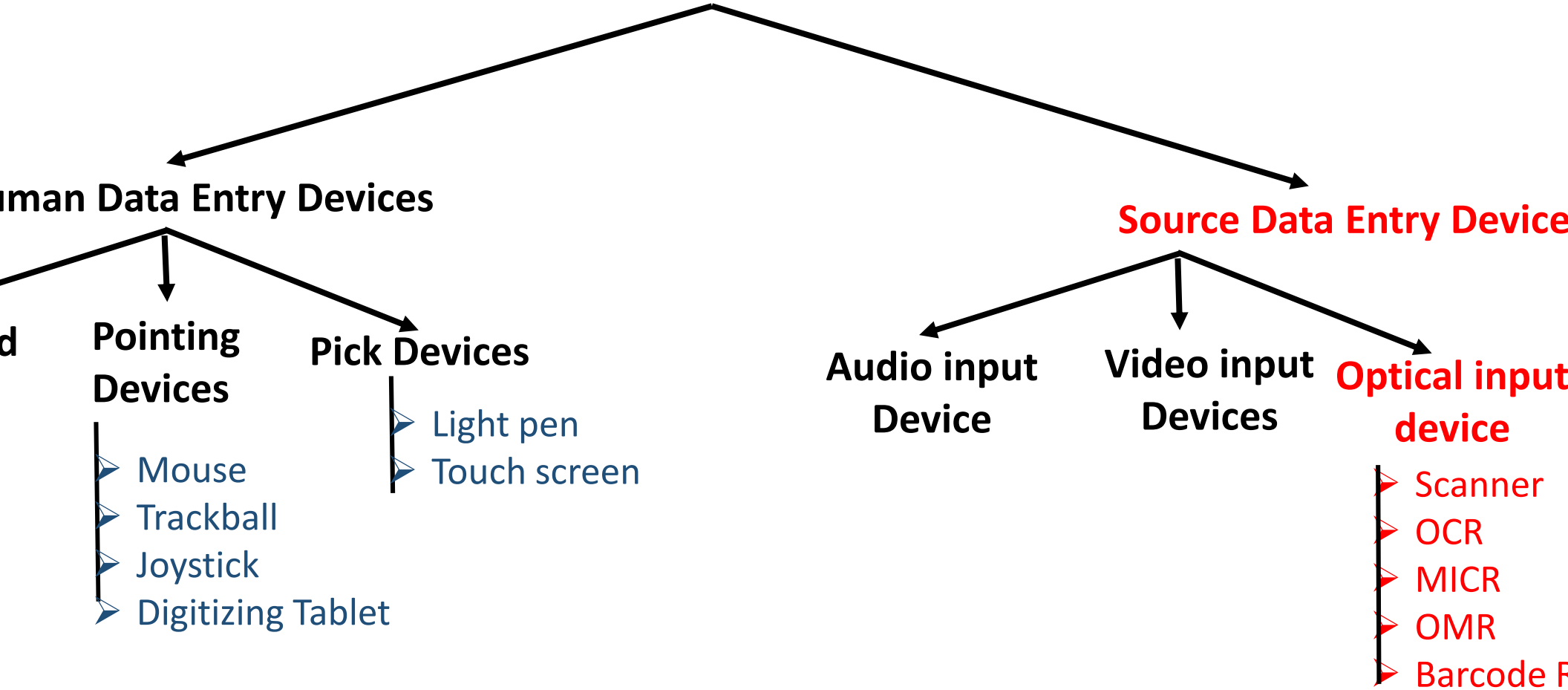
Video Input Device

Video inputs are provided using **Video camera** and **digital camera**

Webcam is a common video camera device

A *video capture card* allows the user to connect video input devices

INPUT DEVICES



Optical input device

Scanner

- Hand held scanner
- Flat bed scanner

Figure Flat bed scanner

Optical input device

Optical Character Recognition (OCR)

- OCR is a technique for ***scanning a printed page***, ***translating it***, and then ***using the OCR software to recognize the image as text*** that is *editable*.
- OCR uses Optical Character Reader for recognition
- To edit scanned text, we need OCR software

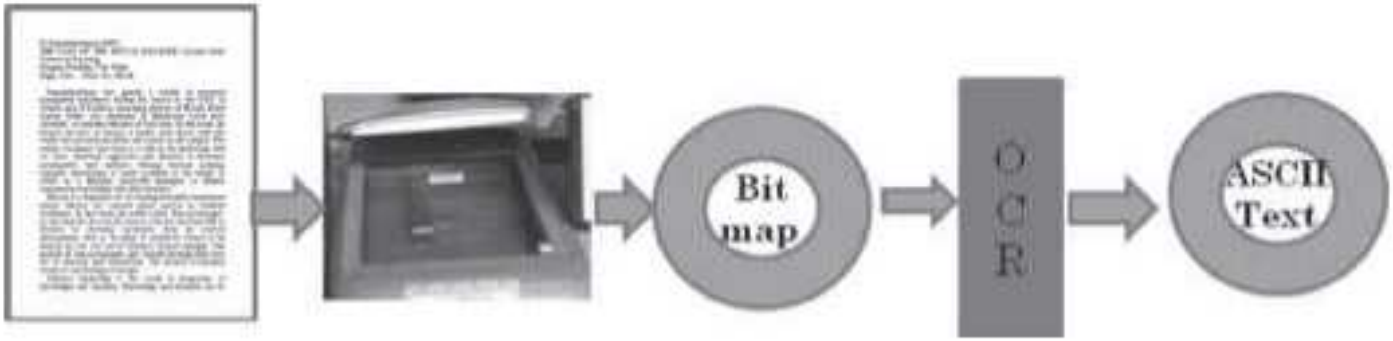
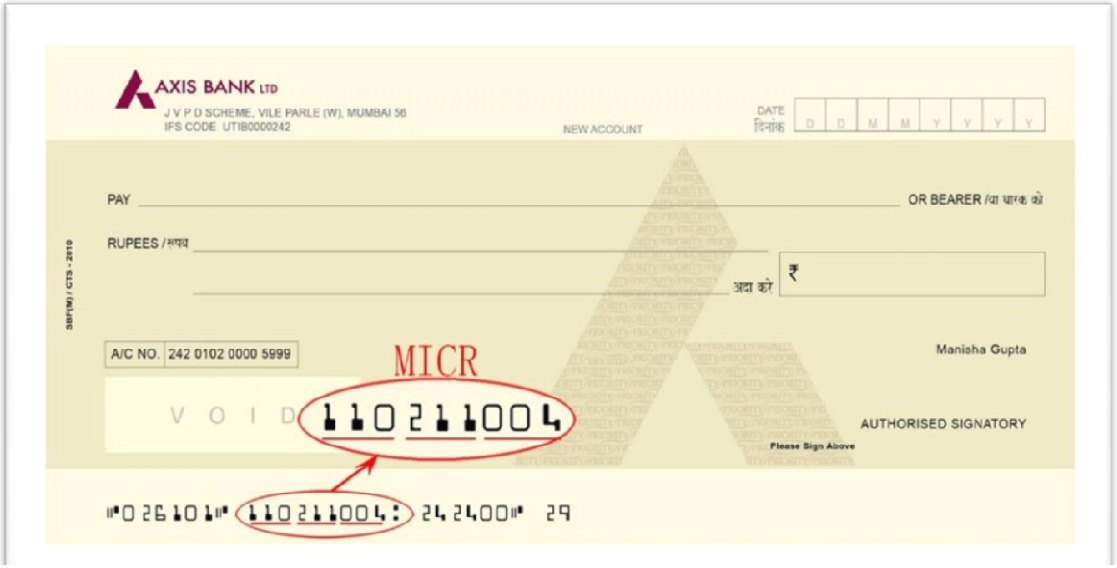


Figure OCR system

Optical input device

Magnetic Ink Character Recognition (MICR)

- Used in banks to ***process*** large volumes of ***cheques***
- It is used for **recognizing** the ***magnetic encoding numbers*** printed at t ***bottom*** of the cheque
- MICR uses a Magnetic ink character reader to recognize the character
- Reading speed of MICR is faster than OCR
- The numbers in the bottom of the cheque include
  - bank number,
  - branch number
  - and cheque number



Optical input device

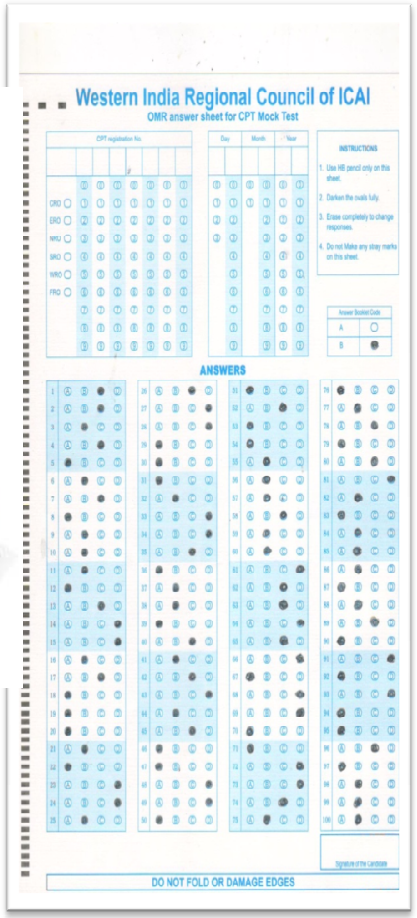
l Mark Recognition (OMR)

sed to **detect marks** on a ***paper***

ses optical mark reader to read marks

MR reader ***scans the forms***, and **determines marks that are positioned correctly** Darker than the surrounding paper) and ***passes this information correctly to omputer for processing.***

uses **a beam of light** that is *reflected* on the paper *with marks*



le Reader

arcodes are *adjacent vertical lines of different width* that are machine readable

st and accurate

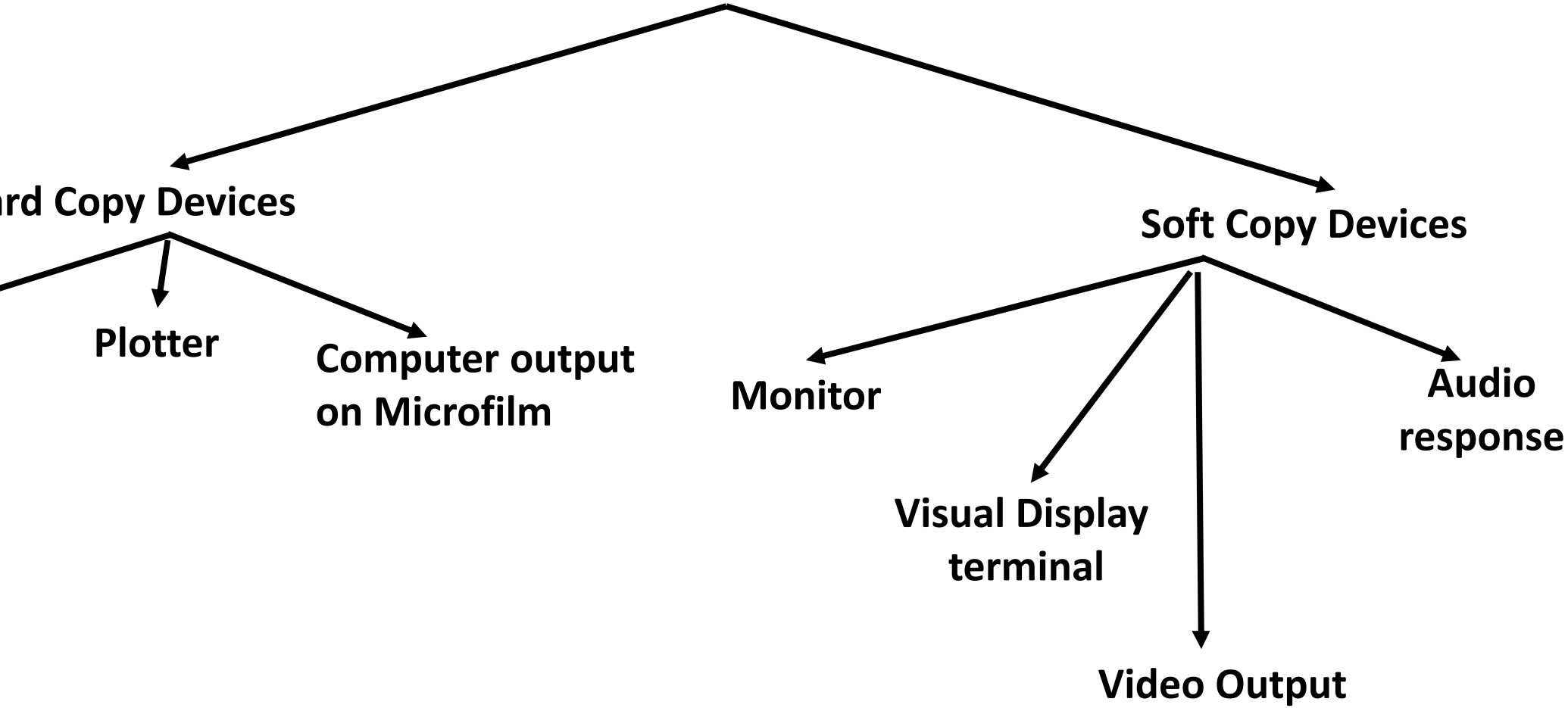
sed in supermarkets, bookstalls etc.

ses barcode for identification.

arcodes are read **using reflective light** barcode readers.

his information is input to the computer which interprets the code using the **spacing and thickness** of bars.

OUTPUT DEVICES



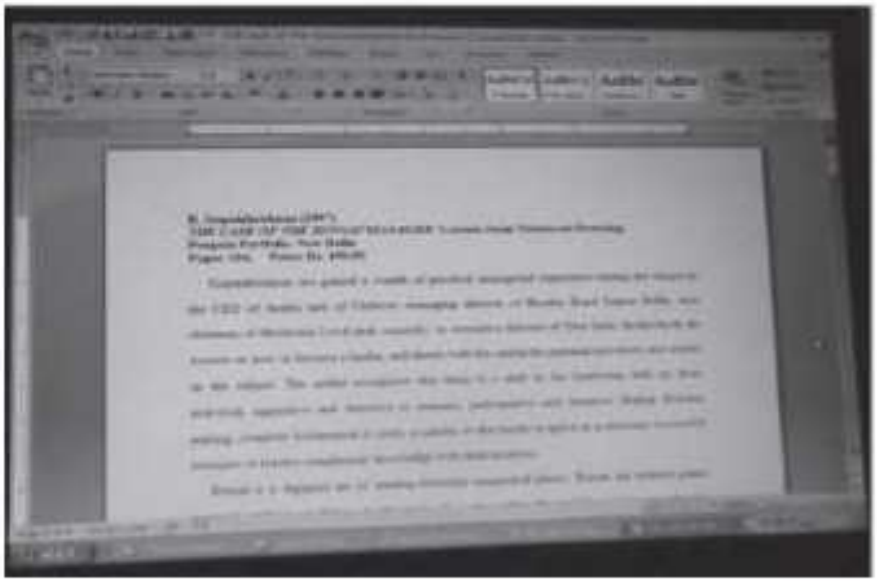


Figure Soft copy output, Hard copy output

Hard Copy 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 **permanently and is portable**.

The hard copy output can be ***read or used without a computer***.

The devices that generate hard copy output are called hard copy devices.

- Printer, plotter and microfiche are common hard copy output devices.

Printer

A printer prints the output information from the computer onto a paper.

Printers are generally used to **print textual information**, **graphical information etc**

Printers are classified into two categories—

- **Impact printer**
  - use the ***typewriter approach*** of physically striking a typeface against the paper and **inked ribbon.**
  - slow
  - E.g. ***Dot matrix printers, daisy wheel printers , drum printers***

- **Non-impact printer.**
  - They *do not hit or impact a ribbon* to print.
  - They use *electro-static chemicals and ink-jet technologies*.
  - fast
  - E.g. ***Inkjet printer, Laser printer***

Impact printer- Dot Matrix Printers

Dot matrix printer print *one character at a time.*

Dot matrix printers can print alphanumeric characters, special characters, charts and graphs.

They can print only in ***black and white***.

Some dot matrix printers can print in both directions - left to right and right to left.

Dot matrix printers are commonly used for printing in applications lik*payroll and accounting*.

Impact printer- Daisy Wheel Printers

Daisy wheel printers print **one character at a time.**

They ***produce letter quality document*** which is better than a document printed by a dot matrix printer.

These printers are ***slow***,

can only **print text** (not graphics),

are costly in comparison to dot matrix printers.

Daisy wheel printers are used where ***high quality printing*** is needed and ***no graphics*** is needed.

Impact printer- Drum Printers

Drum printers are **line printers.**

They are expensive and faster than character printers but produce a ***low quality output***.

They can print 200–2500 lines per minute.

Non Impact printer-

Ink-jet Printers

- **spray ink drops** directly on the paper ***like a jet***
- Their resolution is more than 500 dpi.
- They produce **high quality graphics** and **text**.
- Ink-jet printers are commonly found in homes and offices.

Laser Printers

- provide **highest** **quality** of text and graphics printing.
- Laser printers ***process and store the entire page*** before printing and are also known as **page printers.**
- The laser printer can print 5–24 pages of text per minute and their resolution ranges from 400 to 1200 dpi.

Plotters

A plotter is used for **vector graphics** output to draw ***graphs, maps blueprints of ships, buildings, etc.***

Plotters use **pens** of ***different colors*** (cyan, magenta, yellow and black) for drawing.

Plotters draw, ***continuous and accurate lines***

- in printers a line is drawn as closely spaced dots.

Plotter is a **slow output device**

and is expensive.

Plotters are of two kinds—

- **drum plotter**
- **flatbed plotter.**

Figure Plotter

Plotters(contd..)

In a drum plotter,

- *pens* mounted on the carriage are stationary and ***move only horizontally***;
- *for* ***vertical movement***, the ***drum*** on which the paper is fixed ***moves clockwis and anti-clockwise***.

In a flatbed plotter,

- the paper is fixed on a flat bed.
- The paper is stationary and the ***pens*** mounted on the carriage ***mov horizontally and vertically*** to draw lines.

Plotters are mainly used for drawings in AUTOCAD, Computer Aide Design (CAD) and Computer Aided Manufacturing (CAM applications.

Computer Output on Microfil

A microfilm is in ***roll format***

Microfilm is used to ***record computer output directly*** from the computer tape or cartridge.

Computer Output on Microfilm (COM) is a ***high speed and low cost process.***

It can produce data in microfilm form at a much faster speed from that of a paper printer.

- COM is used for storing output in banking and insurance applications, medica X rays, etc.

Soft Copy Devices

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

The soft copy allows corrections to be made, can be stored, and, can be sent to other users.

The soft copy output *requires a computer* to be read or used.

The devices that generate soft copy output are called soft copy devices.

- Visual output devices like computer monitor, visual display terminal, video system and audio response system are common soft copy output devices.

Monitor

The monitor is provided along with the computer, to **view** th displayed output.

A monitor is of two kinds

- **monochrome** display monitor
  - uses only one color to display text
- **color** display monitor.
  - can display 256 colors at one time

The **clarity** of image on the computer screen depends o three factors- **Resolution of Screen, Dot Pitch, Refresh Rate**

Visual Display Terminal

A **monitor and keyboard *together*** are known as Visual Display Terminal (VDT).

A keyboard is used to input data and monitor is used to display the output from the computer.

Computer terminals are categorized as **dumb**, **smart** and **intelligent** terminals.

Dumb terminals

- ***do not have processing*** and programming capabilities.

Smart terminals

- have built-in processing capability but ***do not have*** its own ***storage*** capacity.

Intelligent terminals

- have both built-in processing and storage capacity.

Video Output

Screen image **projector** or data **projector** is an output device tha
displays information from the computer onto a large **white screen**.

The projector is mainly used to display visual output to a larg
gathering of people required

- for the purposes of teaching, training, meetings, conference presentations, etc.

Audio Response

A **complete sound system** consists of **sound card, microphone speaker** and **the appropriate software.**

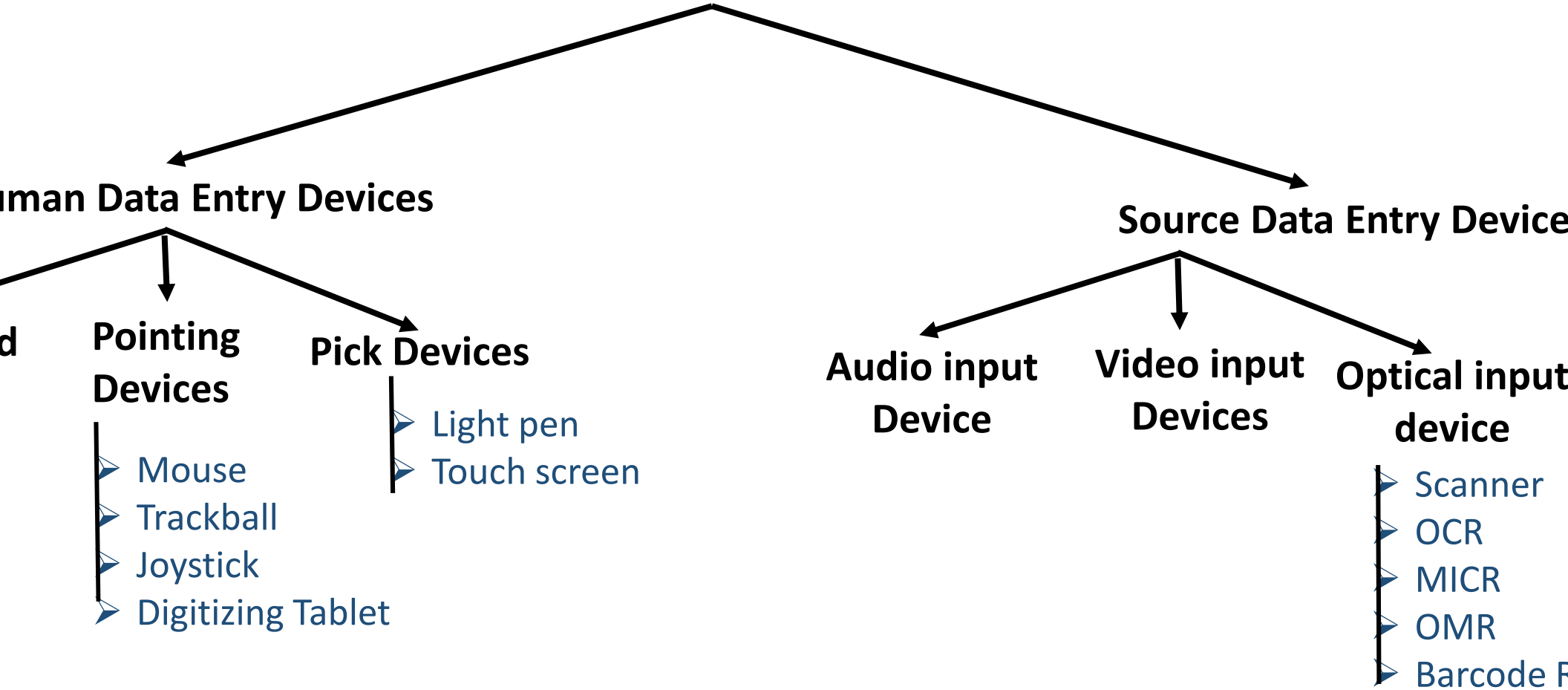
In addition to **recording** and **playing** the sound, the software allow **editing** of sound, like ***cutting***, ***copy***, ***amplification*** and ***creation*** o vibrant sound ***effects***.

Audio response ***provides audio output*** from the computer.

Audio output device E.g. ***speakers, headset or headphone***

Audio response is used by ***visually impaired to read*** information fron the screen. For ***speech impaired people***, audio response helps them t ***communicate*** with other people.

INPUT DEVICES



OUTPUT DEVICES