Input Devices

Tuesday, 23 March 2021 10:30 AM

What is an input device?

- peripheral devices to provide data to computer
- devices to provide control signals to computer
- devices allow us to enter raw data for processing.

Devices in syllabus:

- Mouse
- Trackball
- Keyboard / Concept keyboards
- Microphone
- Digital Camera
- 2D Scanners
- 3D Scanners
- Interactive Whiteboards
- Touchscreens
- Barcode readers
- QR Code readers

MOUSE:

An input device that allows you to control the coordinates and movement of the onscreen cursor/pointer by simply moving the mouse across a flat surface.

There are optical mice and analogue mice.
They can be wired or wireless.

Typical applications:

- Used in everyday life computing to control the pointer in GUI.

Benefits:

- Simple & easy to use
- Efficient way to navigate.

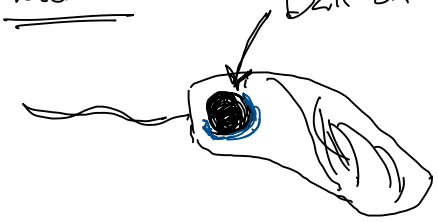
Drawbacks:

- Requires a flat surface to operate
- Requires space.
- Human injuries like RSI.

Mouse Operations Steps:

1. Laser is beamed towards the surface.
2. It reflects back to the camera.
3. Camera takes the image
4. Image is transferred to the Digital Signal Processor
5. DSP determines the change in coordinates.
6. Calculated coordinates are transferred to the O/S.
7. O/S shows the pointer at the new location.

Track Ball:



- An input device to control onscreen cursor / pointer
- Device is stationary while the user moves the ball within its socket.

Applications:

- Computer Aided Design (CAD)
- where space is limited.
- people with limited motor skills.

Benefits:

- Need little desk space
- Finer control
- Can be embedded within keyboard.

Drawbacks:

- User might need time to get used to.

Keyboard:

Input devices that allow the entry of data and commands by pressing keys over the keyboard.

These are commonplace input devices, often used alongside mouse.

They can be wired or wireless.

Applications:

In everyday life they are used in every computer app in business or at home, from gaming to banking.

Benefits:

- Intuitive
- Easy to use
- Potentialy very fast to get used to and enter data fast.

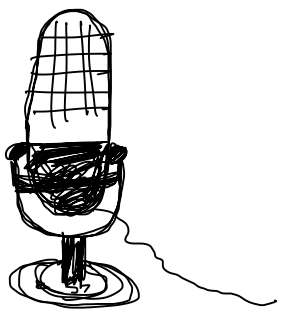
Drawbacks:

- It becomes slow once it the person is not trained to enter data.
- Spell mistakes can be there.
- Human injury. (Neck and wrist)

Keyboard operations:

1. User presses a key
2. It completes a circuit
3. Current flows to the Digital Signal Processor.
4. DSP matches the data with a preset list
5. Pressed key is determined
6. Control signal or ASCII value of the pressed key is sent to the operating system.
7. OS shows/does according to the key pressed.

Microphone:



- Input devices that take analogue sound wave and convert them to electrical signals.
- They play an important role in speech recognition

Uses:

- Mobile phone
- Tablets, Laptop
- VOIP. Using IP networks to make phone calls.
- Voice recognition systems.

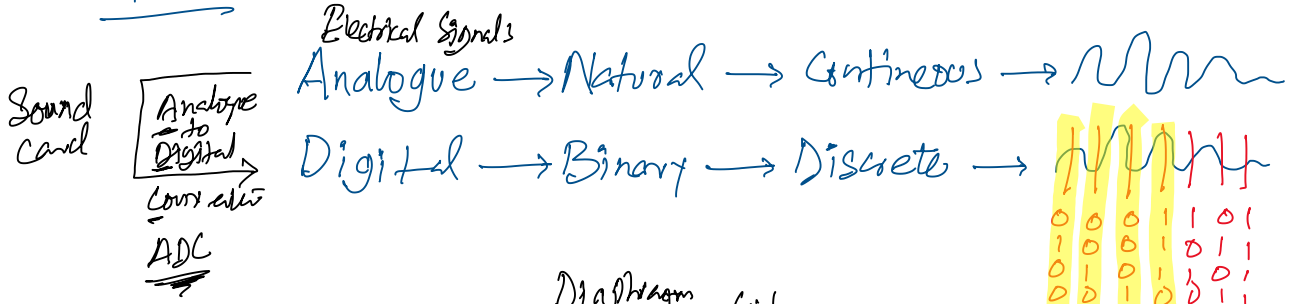
Benefits:

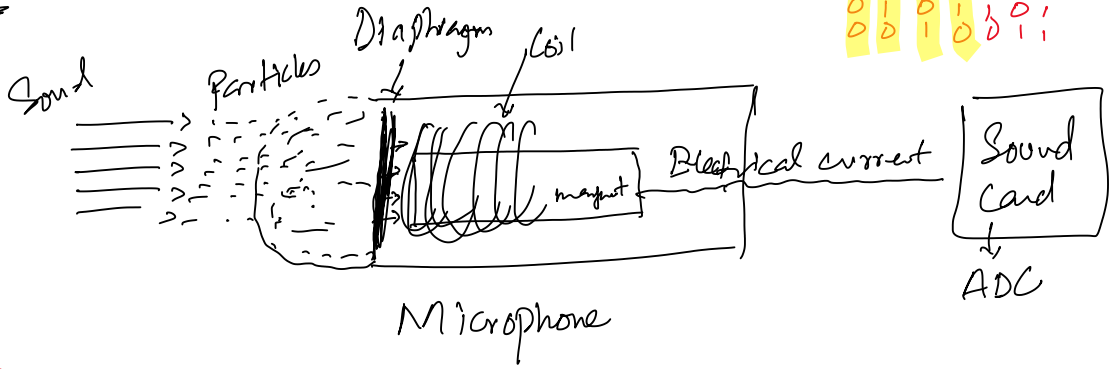
- Special people can use to give instructions to computers.
- Enables us to produce speech recognition software.
- Allows voice calls over digital devices. VoIP.

Drawback:

- Speech recognition might be imperfect sometimes.

Sideline





Operation:

1. Sound is produced.
2. Brings change in air particles
3. particles hit the diaphragm on the top of mic.
4. Under diaphragm there is coil and magnet.
5. Continuous vibrations over the diaphragm produce electrical current b/c of magnet & coil.
6. Electric current reaches to

ADC (Sound card) and gets converted to the binary form. (Digitisation).

Digital Cameras:

- Input devices that capture images digitally.
- They use image sensor chip to capture images.
- Images recorded on the memory cards.
- They have LCD as well to preview & review images.

Applications:

- professional photography, using DSLRs
- Amateur photography.
- Speed Cameras ....

Benefits:

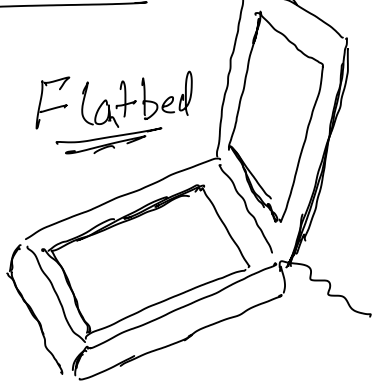
- Images can be reviewed immediately.
- Images can be copied or edited.
- Image can be automatically shared.

Drawbacks:

- Sometimes the performance is not satisfactory.
- Large memory is required for better quality images.
- Expensive accessories.

2D Scanners:

- 2D Scanner perform the task to



turn 2D document [illegible]
digital file/form.

- There are two forms, i.e. flatbed & handheld.
- Its efficiency is enhanced using OMR and OCR software.

Applications:

- Converting a hardcopy doc into an electronic or digital form.
- Digital form can be shared.
- Reading passports at airports.

Benefits:

- Produce high quality digital copies.
- Digital copies can be shared, edited electronically.

Drawbacks:

- Scanned docs might take alot of storage.

3D - Scanners: It is an input device that scans/creates a 3D model of the object scanned.

Scanning may be achieved using Laser, Light, radio waves or X-rays.

Applications:

- Security screening to check weapons or restricted objects.
- Creating a 3D model ready for 3D printing

- Biometric
- Turning real people into gaming characters.

Benefits:

- It can scan through clothing or other materials.
- It helps creating accurate 3D computer models.

Drawback:

- Repeated exposure to x-rays is/can be harmful.

Interactive whiteboard:

- They were developed before touchscreens became affordable,
- These use sensors at corners to sense the writing movements. Touch sensitive surface.
- It combines with multimedia projector for the virtual projection of writing.
- It uses dummy markers, pens or fingers to write.
- Images can be saved for later use.

Applications:

- Class boards
- Busines (conference rooms).

Benefits:

- Large in size so many ppl/students can watch it.
- Also can be used as output device for presentations

and teacher/presenter can annotate over the screen.
- Versatile.

Drawbacks:

- Expensive as you need a dedicated computer, multimedia and board that also require dummy markers, pens etc.
- less precision / Screen resolution is low.
- less visible in bright lights.

Touchscreens: - It is an electronic visual display that also incorporates an input device that respond to touch. It allows users to select options/objects from a screen just by touching them.

- There are 3 main types:
  1) Capacitive
  2) Resistive
  3) Infrared

Applications:

- Smartphones, tabs and Laptops etc.
- Ticket/ATM/Information kiosks.

Benefits:

- It saves space as it behaves both as input and output devices.
- Very simple and intuitive to be used.
- precision.
- multitouch.

Drawback:

- Sometimes less visible in sunlight.
- Can get easily damaged.

Capacitive touchscreens:

- Electrical current is sent from the corners of the screen that creates a layer of electrostatic field.
- When someone touches the screen current starts getting distorted as it is being drawn by the finger.
- This allows the location of the touch to be calculated.

Benefits	Drawbacks
- Good visibility in sunlight - Very durable - Allow multitouch	- Glass screen can be shattered. - Can't be used wearing standard gloves.

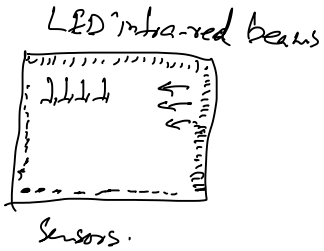
Resistive touchscreens:

- It uses multiple layers of materials that transmits electrical currents.
- When the top layer is pushed using finger, it is pushed into lower layer and circuit gets completed and the electrical current changes.
- This allows the location to be found.

Benefits	Drawbacks.
- Inexpensive - Stylus, finger, gloved finger, pen; means	- poor visibility in sunlight - vulnerable to scratches - Wears out with time. - No multitouch.

all can be used

Infra-red touchscreen:



- Infra-red touchscreens use a pattern of LED infra-red beams to form an invisible grid on screen.
- Sensors detect where the screen is touched by detecting a break in the infra-red beams.
- This allows to calculate the position of touch.

Benefits	Draw Backs
- Durable - Multitouch - Stylus, fingers, gloved fingers or pens can be used	- Expensive to manufacture - Glass can be shattered. - Sensitive to dust or dirt.

Barcode Readers:

- A barcode is a machine readable code represented by an image consisting of black and white lines. Each line in the barcode relates to 0 – 9 digits.
- Black and white surfaces reflect light differently, as black absorbs more light than white.
- Sensors are used to capture the amount of light reflected and the different reflections are converted to their respective binary values.
- This is how barcode scanner is able to identify the corresponding digits from the lines.
- Scanning a barcode is easier and faster than typing a number using manual keyboard.

- A Barcode is used to identify items, it doesn't store any further information. This is achieved by looking into a connected database.
- When used in retail/super markets, we don't require to trust our minds to remember the numbers or quantities of items or prices of the products.
- It helps to generate accurate bills and keep stock updated.
- This system help to identify re-ording items on time.
- Updates can be made; like price change and barcode remains the same.

Applications:

- Tracking or identifying items in warehouses, factories and shops/markets.
- Retail checkouts.
- At airport for ticket and passport scaning.
- Book Library items.

Benefits:

- Quickly identify item.
- Additional information can be fetched.
- Automatic stock control.

Drawback:

- Difficult to use if damaged.
- Related database/commerce/sales system is required to be installed.
- Hardware is required to be purchased and connected.

QR Code Reader:

- It is a computer generated pattern capable of holding a modest amount of data.
- This data is accessed when QR code is read by QR scanner.
- We often see a smartphone is used as QR code input device.
- Mostly QR codes are used to save URL addresses, contact information, website addresses, product details etc.

Applications:

- Packaging
- Promotional material.
- Warehouses.

Benefits:

- We don't need a database as added data is saved in QR code.
- Simple to store data and retrieve
- Can be used to store variety of data.

Drawbacks:

- Can't be used with frequently changing items.
- We always need a smartphone to read it.

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