

Input Devices 2: Others

Joystick

- A joystick is a lever that moves in all directions and controls the movement of a pointer or some other display symbol.
- Joysticks are used mostly for computer games, but they are also used occasionally for **CAD/CAM** systems and other applications.
- It often has one or more pushbuttons, called switches, whose position can also be read by the computer.



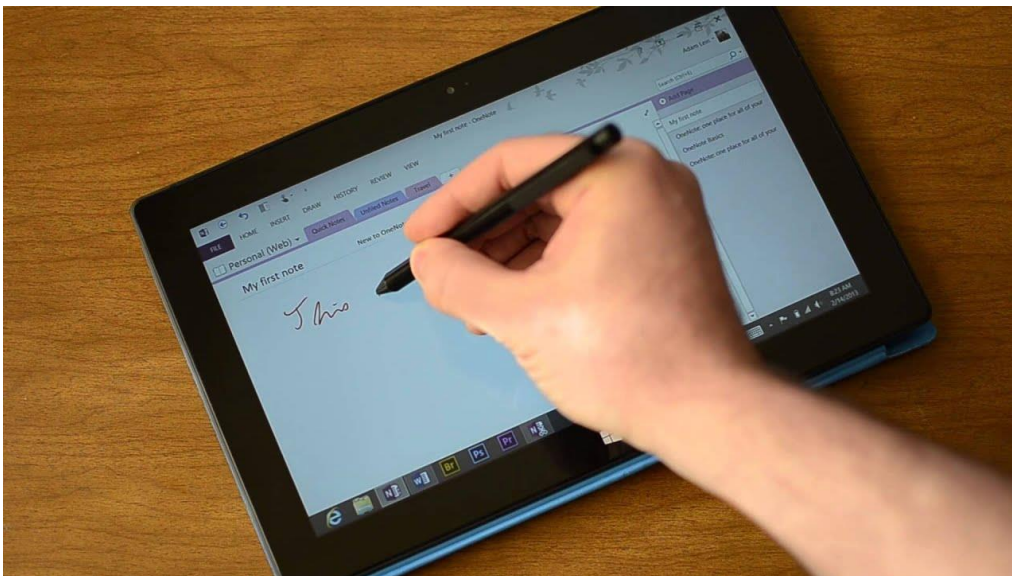
Paddle



- It is a **game controller** with a round wheel and one or more fire buttons.
- It is used in games and the wheel is used to change the position of the player.
- Paddles first appeared in 1972.

Handwritten recognition

- There are different techniques that are used so that a computer can understand what is written by hand.
- One technique is that software analyses a picture containing handwriting and makes the best guess of what is written (very bad handwriting can make it difficult for the software to recognize it). This technique is sometimes used in post offices to recognize names and addresses where the software attempts to recognize scanned text.
- Another technique is to have a program following the handwriting while text is being written e.g. a tablet or smartphone that transcribes in real time handwriting to typed text. The program will follow the pen movements on the screen. The pen movements are added clues.



Digitizing Tablet



Digitizer Tablet PC's



- Enables the user to enter drawings and sketches into a computer.
- A digitizing tablet consists of an electronic tablet and a cursor or pen. A **cursor** (also called a **puck**) is similar to a mouse, except that it has a window with cross hairs for pinpoint placement, and it can have as many as 16 buttons.
- A pen (also called a **stylus**) looks like a simple ballpoint pen but uses an electronic head instead of ink.
- The tablet contains electronics that enable it to detect movement of the cursor or pen and translate the movements into digital signals that it sends to the computer.
- Devices like the digitizing tablet that use a pen or stylus to enter data fall under the umbrella of **pen computing**.

Digital Camera

- A digital camera (or **digicam** for short) is a camera that takes video or still photographs, or both, digitally by recording images via an electronic image sensor.



- Many devices include digital cameras built into or integrated into them e.g. mobile phones.
- Other devices are: PDAs and laptops.
- Digital cameras can do things film cameras cannot:
 - displaying images on a screen immediately after they are recorded,
 - storing thousands of images on a single small memory device,
 - recording video with sound,
 - deleting images to free storage space
- Useful terms:
 - Pixel: it is a very small square. A photo will consist of a rectangle of pixels. The more pixels your photo has the sharper it is. The more pixels the more you can enlarge your photo or crop a part of it and still it will be sharp.
 - Megapixel: one million pixels. 5 megapixels is enough to make a sharp 8-by-10-inch print and 8 megapixels is enough to make a sharp 11-by-14-inch print.
 - JPEG: All digital cameras take JPEG images by default, which compresses your photos and compromises the details in each shot.
 - RAW: Shooting in RAW preserves all of the data in your images without compression. However RAW files can be two or three times larger than JPEG files.
 - GB: Gigabytes is the unit for the amount of memory in cards that hold photos e.g. 32 GB.

Webcam



- A webcam is a video camera which feeds its images in real time to a computer or computer network, often via **USB**, **Ethernet** or **Wi-Fi**.
- Can be used for:
 - Videophones or videoconference stations.
 - Security surveillance.

MICR

- **Magnetic Ink Character Recognition**, or **MICR**, is a character recognition technology.
- It is adopted mainly by the banking industry to facilitate the processing of cheques.
- In addition to their unique fonts, MICR characters are printed with a magnetic ink or toner, usually containing iron oxide.
- Magnetic printing is used so that the characters can be reliably read into a system, even when they have been overprinted with other marks such as cancellation stamps.



OMR

- **Optical Mark Recognition** (also called **Optical Mark Reading**) is the process of capturing human-marked data from document forms such as surveys and tests.
- Often uses a dedicated scanner but can also be done on a PC system with scanner.



OCR



Hand-held OCR

- **Optical character recognition** is the translation of images of handwritten, typewritten or printed text into machine-editable text.

Barcode

- A barcode reader (or barcode scanner) is an electronic device for reading printed barcodes.
- The main advantage of using a barcode system is that any price change only needs to be made to the database and not every single product package.

- Barcodes are also used on books to show the book's ISBN number. They are also used on library tickets so that when your ticket is scanned, the database brings up your account and any books which you still have out on loan are displayed.



Magnetic Stripe Card

- A card capable of storing data by modifying the magnetism on a band of magnetic material on the card.
- Magnetic stripe cards are commonly used in credit cards, identity cards, and transportation tickets.



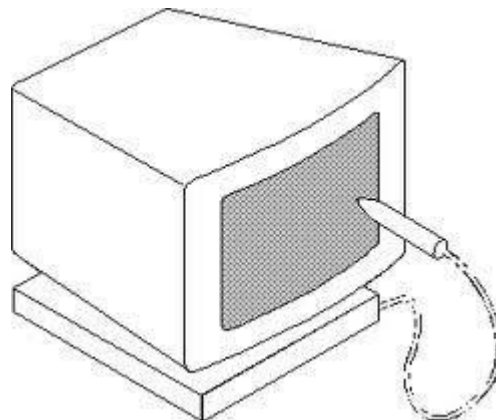
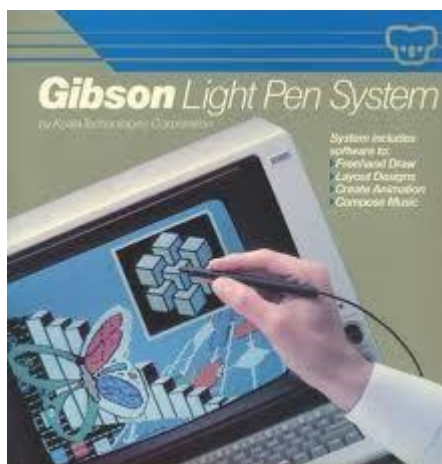
A card with a magnetic stripe

Gesture recognition

- Inputting by means of human gestures.
- Gestures commonly originate from the face or hand.
- The technology requires:
 - Cameras, and
 - Computer vision algorithms.



Light Pen

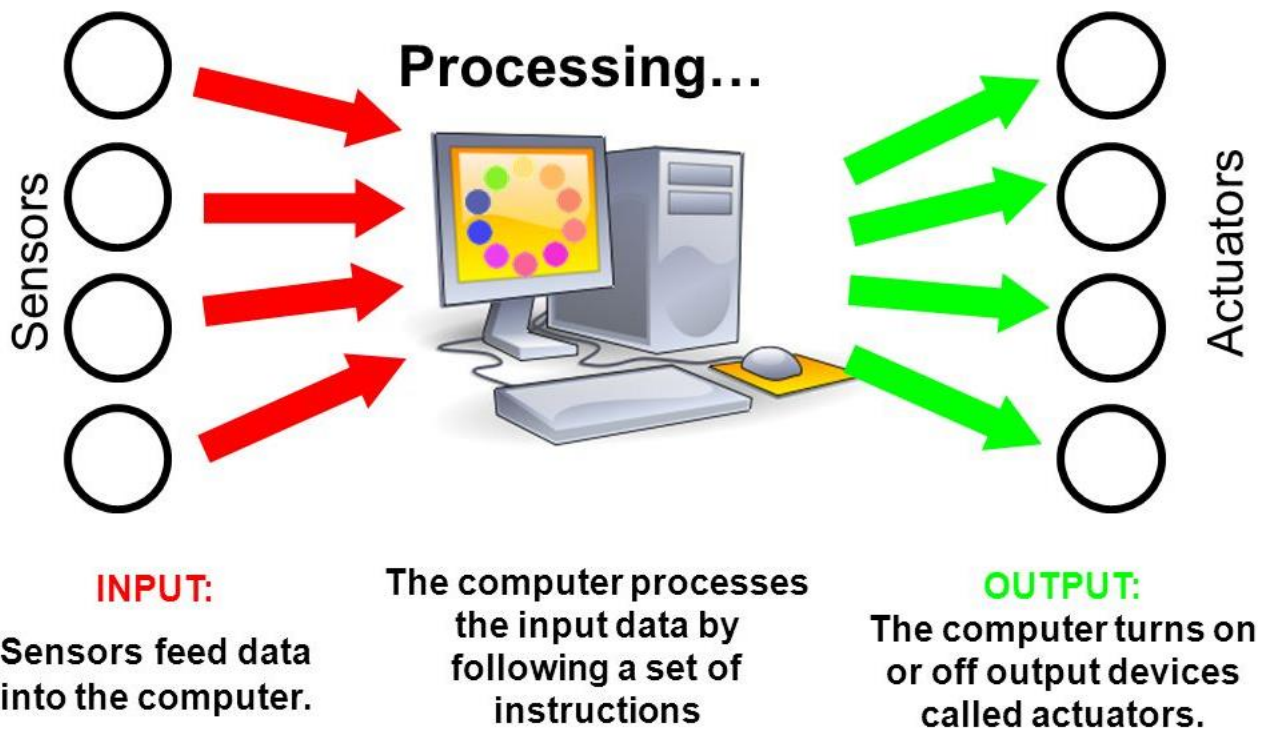


- A light-sensitive stylus wired to a video terminal used to draw pictures or select menu options.
- The user brings the pen to the desired point on screen and presses the pen button to make contact.

Sensors

- Sensors record data about the physical environment around them, then send the data to a computer.
- Advantages of using computer sensors. They are:
 - Reliable
 - Accurate
 - Never get tired

- Types of sensors:
 - Magnetic Field Sensor
- Motion (infra-red) Sensor
 - Detects movement / heat from objects.
- Temperature Sensor
- Sound Sensor
- Moisture / Humidity Sensor
- Pressure Sensor
- Gas Sensor
- Light Sensor
- pH Sensor
 - Measures how acidic or alkaline a material is.



Advantages and Disadvantages

Device	Advantage	Disadvantage
Joystick	Enables simulation of real-life situations e.g. pilot.	Limited use (e.g. cannot be used to enter text or to draw).

Paddle	Gives you the feel of knobs on old machinery.	As with Joysticks it has limited use.
Handwritten recognition	Very convenient on small screens.	Some programs are trained to recognize one type of handwriting only.
Digitizing tablet	Easy to undo mistakes when drawing.	Expensive.
Digital camera	Can take both photos and video.	Sometimes the automatic setting does not give perfect results.
Webcam	Helps in making a chat more real as one can see the face.	Very often they do not have very high resolution.
MICR	Ink can be read by both humans and machines.	Its hardware and software are very expensive.
OMR	Very fast to read several documents.	Forms have to be neatly marked.
OCR	Documents do not have to be retyped.	Poor quality documents cannot be copied.
Barcode reader	Very fast and accurate.	Sometimes the reader is unable to read after various attempts.
Magnetic stripe card	Easy to use.	Easily stolen or lost.
Gesture recognition	No need to touch screen so it keeps it clean.	Not very precise.
Light pen	Can be used both for drawing and writing.	Can be tiring on the arm.
Sensors	They can transmit continuous input without getting tired.	They need checking and maintenance.

Questions:

- 1) Joysticks are used, amongst other things with CAD/CAM systems. What are CAD/CAM systems?

- 2) Computer adventure games require input devices to move a person on the screen, move a car left or right etc. Name two input devices that are made to perform such tasks.
- 3) Handwritten recognition is not easy. Why? Name two applications for the use of handwritten recognition.
- 4) What is pen computing? Name two devices that make use of a pen or a stylus.
- 5) Name three features of a digital camera.
- 6) A digital camera has a memory of 16GB. Each pixel takes 3 bytes. How many 5-megapixel photos can stay in memory?
- 7) Mention two uses of the webcam.
- 8) Name two differences between MICR and OMR.
- 9) What are the sensors of the OCR sensing: magnetism, light or dampness?
- 10) For each of the following technologies name two environments where they can be used:
 - a. Barcode technology.
 - b. Magnetic stripe card.
 - c. Gesture recognition.
 - d. Light pen
- 11) Name three kinds of sensors.
- 12) What are actuators?