TOPIC 2: COMPUTER HARDWARE

Unit One: Input Devices

TOPIC TWO:
Computer Hardware

Categories of hardware
Input Devices
Processing Devices
Storage Devices
Output Devices
Communication devices

printer
(output device)

portable media player
(output device)

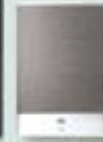**system unit**
(processor, memory, and storage devices)

screen

Web cam
(input device)

monitor
(output device)

speakers
(output device)

CD/DVD drive
(storage device)

hard disk drive
(storage device)

scanner
(input device)

digital camera
(input device)

microphone
(input device)

keyboard
(input device)

mouse
(input device)

card reader/writer
(storage device)

USB flash drive
(storage device)

modem
(communications device)

external hard disk
(storage device)

memory cards

INPUT DEVICES

Input devices are used to enter data or commands in a form that the computer can use. They send the data or commands to the processing unit.

Categories of input devices

a) Text input devices
b) Pointing input Devices
c) Imaging input Devices
d) Gaming input Devices
e) Audio input Devices
f) Biometric input Devices and
g) Other Specialized input devices

a) Text input devices

Text is a general word for all characters such as letters, numerical digits, symbols and marks that combine to form words, sentences, paragraphs and so on.

There is a variety of devices that help us to input text into a computer.

Text input devices include:

1. The keyboard,
2. Voice Recognition Equipment
3. OMR and Barcode readers
4. OCR and Optical readers
5. MICR readers
6. RFID readers
7. Magnetic Strip Card Readers, etc.

1. The Keyboard

Definition: A keyboard is an input device, consisting of a set of keys (buttons) used to operate a computer. Each press of a key corresponds to a single written character of text, but to produce some symbols, it requires pressing and holding several keys simultaneously.

Usually a standard keyboard has between 80 to 110 keys.

A keyboard is the main and most reliable computer input device

The QWERTY is referred to as the "Universal" keyboard.

The name "QWERTY" comes from the first six letters in the top alphabet row (the one just below the numbers).

There are other setups also available such as Dvorak, ABCDE, GKOS, QWERTZ and AZERTY

Keypads, Keyers and chorded keyboards have fewer keys, specially designed for devices such a pocket sized computers.

The Keyboard (cont)

Christopher Latham Sholes was an American newspaper publisher
In 1866, he invented the first practical typewriter and the QWERTY keyboard still in use today.
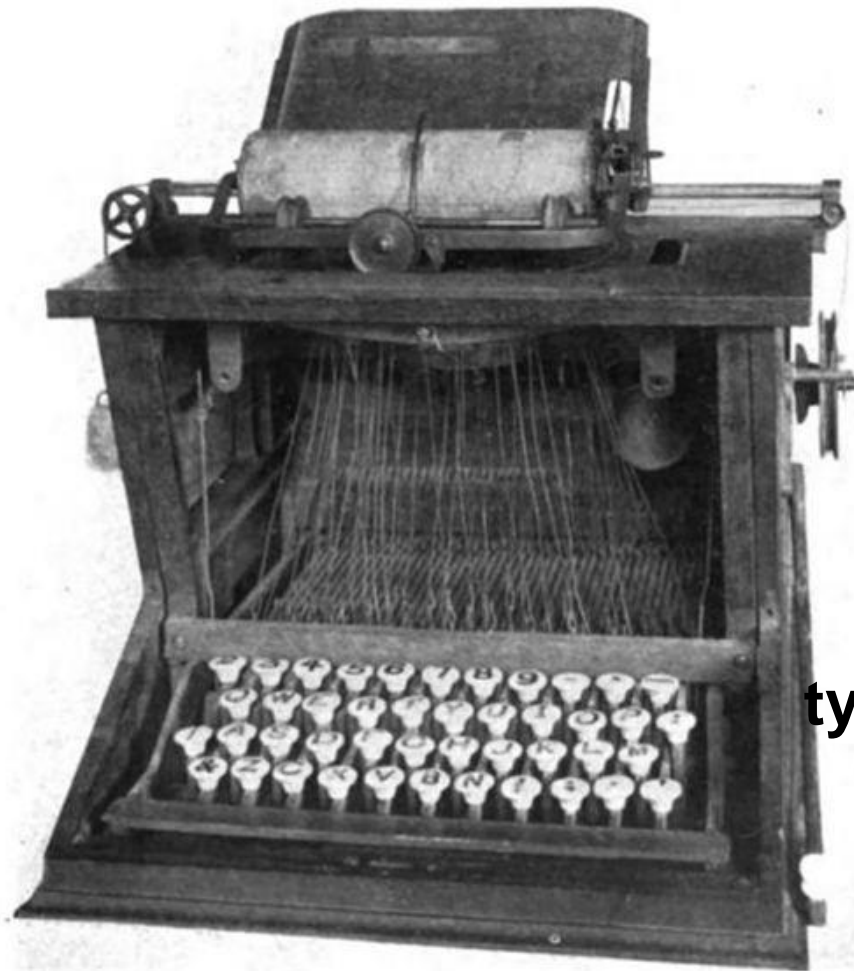
The Sholes typewriter. (1866)

The Keyboard (cont)

Advantages of Keyboard

Keyboards are very common (commonly supplied with computers)

Entering data and commands with keyboard is faster as compared to the mouse

Keyboards are more reliable

Demerits of Keyboard

It takes a lot of time to practice in order to type quickly

Keys can easily become faulty due to dust.

Some keyboards keys are very hard to press, causing fingers to hurt.

2. Voice Recognition Equipment

Voice Recognition Equipment (a.k.a Speech recognition) converts spoken words to text. Computers with Speech recognition do not actually understand speech, but they are programmed to recognize a vocabulary of words, which can range from two words to millions of words.

Advantages

No typing of data is necessary.
Voice recognition can be used by people whose hands are disabled.
Dictating text is faster than typing.
Voice Recognition systems are also ideal for the blind .

HOW SPEECH RECOGNITION WORKS

Step 1:
A user dictates text into a microphone.

You're right!

Step 2:
An *analog-to-digital converter* (*ADC*) translates sound waves into digital measurements the computer can process. Measurements include pitch, volume, silences, and phonemes. Phonemes are sound units such as aw and guh.

ADC 100101110101101101100001101

Step 4:
To narrow a list down, the software presents the user with a list of choices or uses a natural language component to predict the most likely match. The user may correct any wrong selection made by the software.

Natural Language Engine

...Your write
...You're right
...Your right

You're right!

Step 3:
The software compares the spoken measurements with those in its database to find a match or list of possible matches.

Matches

your, you're
right, write

2. Voice Recognition Equipment (cont)

Demerits of text input by speech Recognition

Error rate is high, depending on user's accent.
Words with the same pronunciations (Homophones) like see and sea can not be distinguished
Speech Recognition does cant work in noisy environment
The Voice Recognition software must be trained to recognize more words.
It requires the user to speak in a writing style, i.e. even pronouncing the marks such as comma.

3. *Optical mark recognition (OMR)*

Optical mark recognition (OMR) devices read hand-drawn marks such as small circles or rectangles
A person places these marks on a form, such as a test, survey, or questionnaire answer sheet.
 The OMR device first reads a master document, such as an answer key sheet for a test, to record correct answers based on patterns of light;
the remaining documents then are passed through the OMR device and their patterns of light are matched against the master document.

2. OMR and Barcode readers

OMR test form, with registration marks and drop-out colors, designed to be scanned by dedicated OMR device

Barcode readers

A *bar code reader, is an optical* reader that uses laser beams to read bar codes that are printed on items usually in super markets.

A bar code is an identification code that normally consists of a set of vertical lines and spaces of different widths.

The bar code represents some data that identifies the item and the manufacturer.

Optical character recognition (OCR)

Optical character recognition (OCR) is a technology that involves reading typewritten, computer-printed, or handwritten characters from ordinary documents and translating the images into a form that the computer can understand.

OCR devices include a small optical scanner for reading characters and sophisticated software (OCR software) for analyzing what is read.

Optical character recognition (OCR)

01R   Meter # 9876543   Account # 0123456789

PIE&G

Current Due Date/Amount Due   07/24/98   31.54
Total   31.54

2-4295

PO Box 308
Onaway MI 49765-0308-08

Please read this meter on the same day of each month and report it by the due date on this bill.

Indicate date of reading.

Amount Enclosed $_____

JUL   1998   00123456789

Omega Systems of North America
128 West Main St.
Dryden, NY 13053

Presque Isle Electric & Gas Co-op.
PO Box 308
Onaway MI 49765-0308

00123456789000032150000 3154

Presque Isle Electric & Gas Co-op ● P.O. Box 308 ● Onaway, MI 49765
Day or Night: (517) 733-8515 or 800-423-6634   Office Hours: 8:00 am to 4:30 pm Monday - Friday

Account #	Billing Period	Used this month last year	Bill Type:	Rate Schedule:
0123456789	05/24/98 TO 06/24/98	309	REGULAR BILL	RESIDENTIAL

Meter Number	Previous Reading	Present Reading	Multiplier	KWH	PSCR/KW
9876543	31182	31460	1.00	278	0.0026200

PRIOR BALANCE   37.89

PAYMENT(S) JUN 98   37.89CR

CURRENT CHARGES
ENERGY   278   KWH @.081050   22.53
SERVICE CHARGE   7.35
PSCR ADJ   0.73
TAX   0.93

To pay by VISA or MasterCard, please call
(517) 733-8515 or 800-423-6634

THE ANNUAL COMPANY READINGS FOR ALPENA, ALCONA, & P.I. COUNTY
WERE USED FOR JUNE BILLING.

Map Location	Current Amount Due 07/24/98	Amount After Due Date	Total Due
HK 1007C	31.54	32.15	31.54

* Register any inquiry or complaint about this bill prior to due date. * Payments received after due date may not show on this billing.
* Current rate schedules, explanation of the power supply cost recovery adjustment, and sample billing calculations will be mailed upon request. * This bill includes sales tax where applicable. * A late payment charge may be applied to delinquent accounts. * Current bills may be paid at any pay station between the 5th and 15th of each month. Contact our office or check a current issue of County Lines for a current list of pay stations.
THE ANNUAL PIE&G READINGS FOR ALPENA, ALCONA AND PRESQUE ISLE COUNTY WERE USED FOR THE JUNE 1998 BILLING.

5. MICR readers

A *magnetic-ink character recognition (MICR) reader is used to read text printed with magnetized ink.*

MICR readers are mainly used by the banking industry for processing checks

Each check is inserted into an MICR reader, which sends the check information to a computer for processing.

5. MICR readers

6. RFID readers

Radio-frequency identification (RFID) is a technology that uses radio waves to transfer data from an electronic tag, attached to an object, through a reader for the purpose of identifying and tracking the object.

RFID can work over a long distance.

An RFID tag can be affixed to cars, computer equipment, books, mobile phones, etc

7. Magnetic Strip Card Readers

A *magnetic stripe card reader reads the magnetic stripe on the back of credit* cards, bank ATM cards, and other similar cards.
Exposure to a magnet or magnetic field can erase the information and contents of a card's magnetic stripe.

7. Magnetic Strip Card Readers

b) Pointing Devices

A pointing device is an input device, which allows users to move a pointer and make selections on the computer screen.

EXAMPLES OF POINTING DEVICES
1. Mouse
2. Stylus pen & digitizing tablet
3. Cordless Mouse
4. Trackball
5. Touchpad
6. Light pen
7. Touch Screen
8. A Track Point
   ◦ Etc.

The Mouse

A mouse is a pointing device which allows users to move the cursor and make selections on the computer screen. A pointing device is any piece of hardware that is used to allow a user to input spatial data to a computer.

Just as you would use your hands to interact with objects in the physical world, you can use your mouse to interact with items on your computer screen.

You can move objects, open them, change them, throw them away, and perform other actions.

You can do all that by Pointing, clicking, and dragging Clicking (single-clicking) Double-clicking Right-clicking and dragging with your mouse.

Basic parts of a Mouse

A mouse typically has two buttons: a primary button (usually the left button) and a secondary button (usually the right button). You will use the primary button most often. Most mice also include a scroll wheel between the two buttons.

① Primary button ② Scroll wheel ③ Secondary button
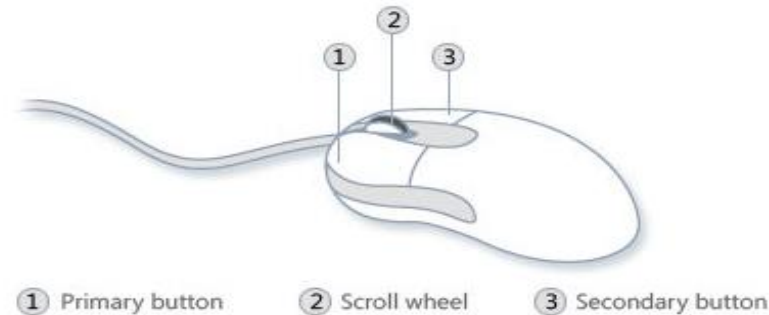
Parts of a mouse

Holding and moving the mouse

Place your mouse beside your keyboard on a clean, smooth surface, such as a mouse pad.
Hold the mouse gently, with your index finger resting on the primary button and your thumb resting on the side.
To move the mouse, slide it slowly in any direction. Don't twist it—keep the front of the mouse aimed away from you. As you move the mouse, a pointer on your screen moves in the same direction.
If you run out of room to move your mouse on your desk or mouse pad, just pick up the mouse and bring it back closer to you.
Hold the mouse lightly, keeping your wrist straight.

Mouse Pad

A mousepad or mouse mat is a surface for placing and moving a computer mouse. A mousepad improves the usability of the mouse It enables higher speed, more precision, and comfort for the user, compared to using a mouse directly on a table.

A secondary benefit was keeping the desk or table surface from being scratched, and reducing debris under the mouse

Pointing

Pointing to an item on the screen means moving your mouse so the pointer appears to be touching the item. When you point to something, a screen tip often appears that describes the item.

For example, when you point to the Recycle Bin on the desktop, a screen tip appears with this information: "Contains the files and folders that you have deleted." The pointer can change depending on what you're pointing to. For example, when you point to a link in your [web browser](), the pointer changes from an arrow to a hand with a pointing finger [HYPERLINK]()

Clicking (single-clicking)

To click an item, point to the item on the screen, and then press and release the primary button (usually the left button).
Clicking is most often used to select (mark) an item or to execute a command with a command button.
Clicking is also called single-clicking or left-clicking.

Double-clicking

To double-click an item, point to the item on the screen, and then click twice quickly. If the two clicks are spaced too far apart, they might be interpreted as two individual clicks rather than as one double-click.

Double-clicking is most often used to open items on your desktop. For example, you can start a program or open a folder by double-clicking its icon on the desktop.

Right-clicking

To right-click an item, point to the item on the screen, and then press and release the secondary button (usually the right button).
Right-clicking an item usually displays a pop up menu with a list of things you can do with the item.
For example, when you right-click the Recycle Bin on your desktop, Windows displays a menu allowing you to open it, empty it, delete it, or see its properties.
If you're ever unsure of what to do with something, right-click it.

Dragging

You can move items around your screen by dragging them.

To drag an object, point to the object on the screen, press and hold the primary button, move the object to a new location, and then release the primary button.

Dragging (sometimes called dragging and dropping) is most often used to move files and folders to a different location and to move windows and icons around on your screen.

Scrolling

If your mouse has a scroll wheel, you can use it to scroll through documents and windows instead of using scroll bars.

To scroll down, roll the wheel backward (toward you).

To scroll up, roll the wheel forward (away from you).

The scroll wheel helps you move up or down through documents, windows and webpages more easily.

On some mice, the scroll wheel can be pressed to act as a third button. Advanced mice might have additional buttons that can perform other functions.

Tips for using your mouse safely

Always ensure a clean, smooth surface, such as a mouse pad

Place your mouse at elbow level. Your upper arms should fall relaxed at your sides.

Don't squeeze or grip your mouse tightly. Hold it lightly.

Move the mouse by pivoting your arm at your elbow.

Avoid bending your wrist up, down, or to the sides.

Use a light touch when clicking a mouse button.

Keep your fingers relaxed. Don't allow them to hover above the buttons.

When you don't need to use the mouse, don't hold it.

Take short breaks from computer use every 15 to 20 minutes.

1. Mouse actions

Pointing means moving your mouse so the pointer appears to be touching the item. When you point to something, a screen tip often appears that describes the item.

Clicking ie Single Clicking or left clicking .This means pointing to the item on the screen, and then press and release the primary button (usually the left button) in order to select an item or to execute a command

Double Clicking means to point to the item on the screen, and then click twice quickly or rapidly often used to open files and folders on your screen

Right Clicking means to point to the item on the screen, and then press and release the secondary button (usually the right button).Right-clicking an item usually displays a popup menu with a list of command options you can chose from.

Dragging means to point to the object on the screen, press and hold the primary button, move the object to a new location, and then release the primary button. Most often used to move files and folders to a different location and to move windows and icons around on your screen

3. Types of mice

Mechanical mouse: Has a rubber or metal ball on its underside that can roll in all directions to move the cursor accordingly.

Optical mouse: Uses a laser to detect the mouse's movement. They respond more quickly and precisely than mechanical, but they are also more expensive.

Cordless Mouse. This is a mouse with no connector that uses Bluetooth technology to remotely connect with the system unit. It works in conjunction with a Bluetooth dongle connected on the system unit.

3. Types of mice

The cordless mouse is a lot better than a normal mouse. It reduces the amount of work space needed to move the mouse around.
This mouse runs on a battery. When you move the mouse it sends an infrared beam to a sensor which interprets it causing the pointer to move.

Cordless Mouse

Stylus pen & digitizing tablet (illustration)

2. Stylus pen & digitizing tablet

Stylus pen- The pen lets you draw on what is called a digitizing tablet that mirrors the surface area of the computer screen.
The pen is useful for drawing since drawing graphics with a mouse tends to be somewhat difficult.

4. Trackball

Trackball - The trackball is an upside-down mouse that remains stationary on your desk. It is the same principle as the mouse.

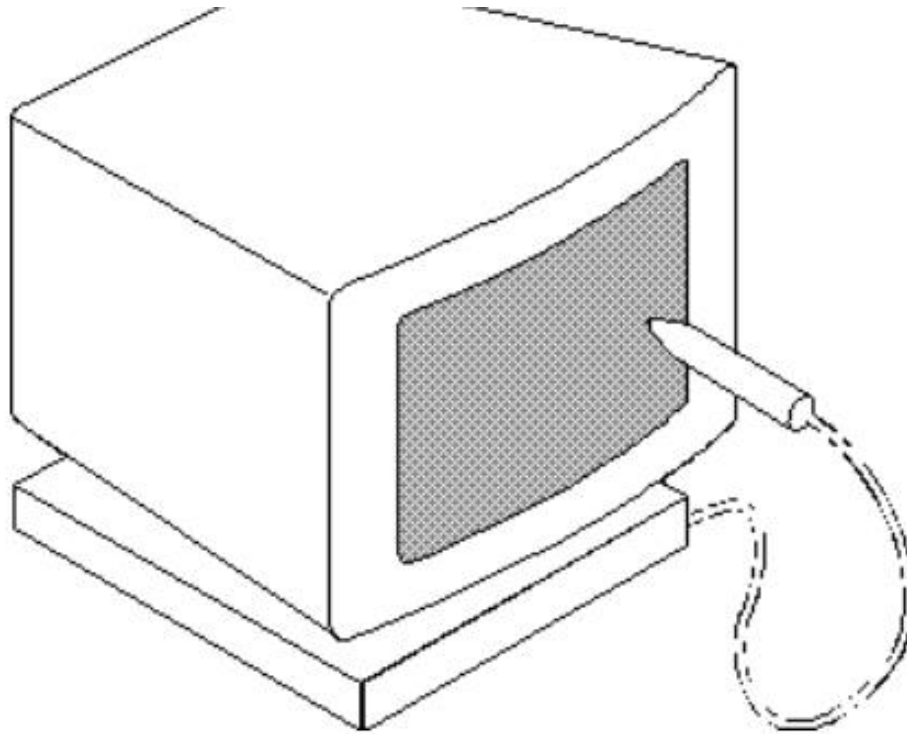# 5. Touchpad

Touchpad - The touchpad has sensors that sense your touch. Common on laptop computers

Light pen (Illustration)

7. Light pen

Light pen- is a form of a light-sensitive stick used in conjunction with a computer's CRT TV set or monitor. It allows the user to point to displayed objects, or draw on the screen, in a similar way to a touch screen but with greater positional accuracy.

8. Touch Screens

A touch screen is a touch-sensitive input and display device. Users can interact with these devices by touching areas of the screen.

9. Track Point

A Track Point, also called a pointing stick, is a cursor control device located in the middle of the keyboard between the G, H, and B keys of old fashion keyboards.

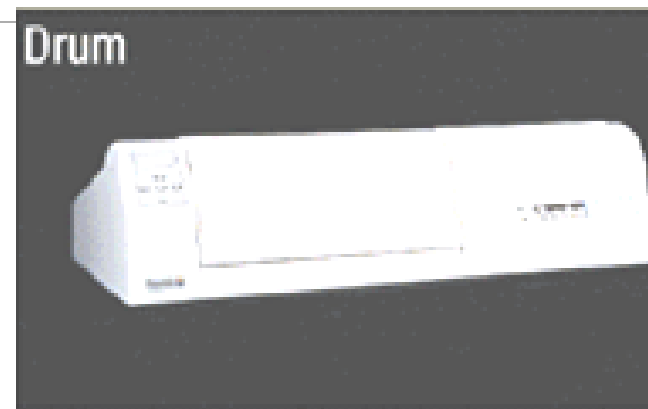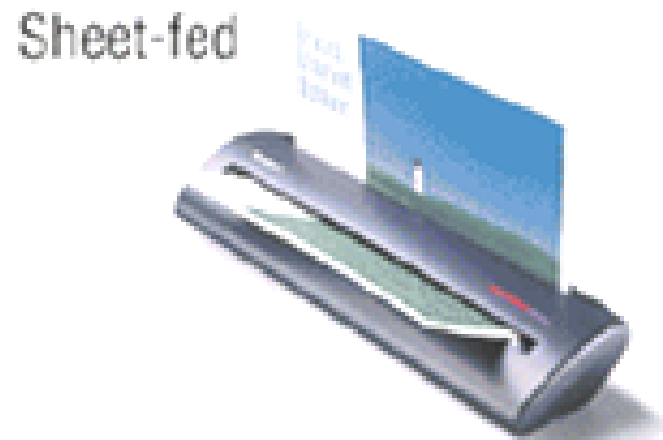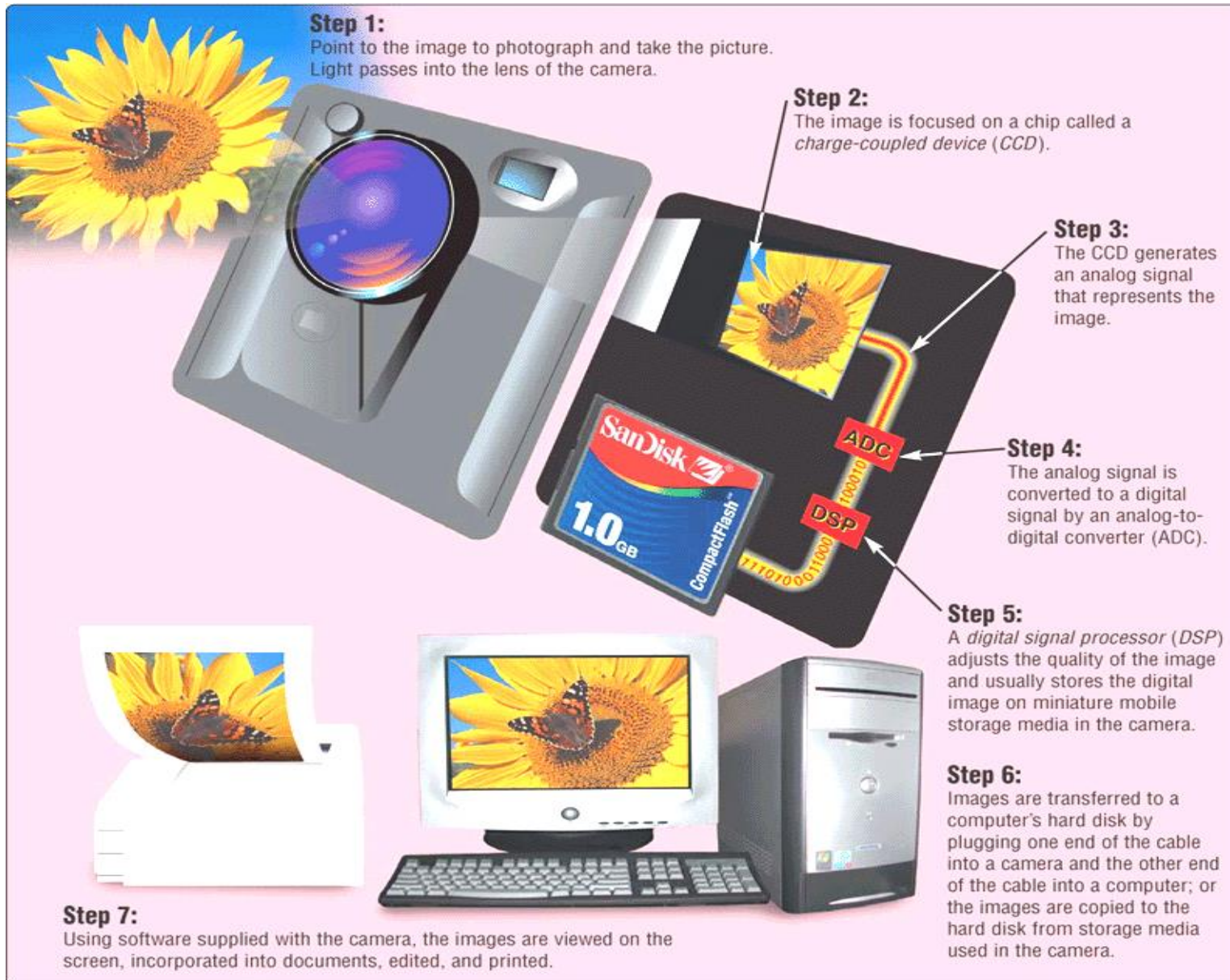# c) Imaging Devices

Imaging input Devices are devices that input images such as still photos, motion pictures, graphics, video etc. into the computer for processing.

Common Imaging devices include:

1. **Image scanner**
2. **Digital Camera**
3. **Digital video (DV) camera**
4. **Camcorder**
5. **Web cam**

Image scanner ILLUSTRATIONS

Flatbed

Pen or handheld

Sheet-fed

Drum

Step 1:
Point to the image to photograph and take the picture.
Light passes into the lens of the camera.

Step 2:
The image is focused on a chip called a
charge-coupled device (*CCD*).

Step 3:
The CCD generates
an analog signal
that represents the
image.

ADC

DSP

Step 4:
The analog signal is
converted to a digital
signal by an analog-to-
digital converter (ADC).

Step 5:
A *digital signal processor* (*DSP*)
adjusts the quality of the image
and usually stores the digital
image on miniature mobile
storage media in the camera.

Step 6:
Images are transferred to a
computer's hard disk by
plugging one end of the cable
into a camera and the other end
of the cable into a computer; or
the images are copied to the
hard disk from storage media
used in the camera.

Step 7:
Using software supplied with the camera, the images are viewed on the
screen, incorporated into documents, edited, and printed.

SanDisk

1.0 GB
CompactFlash

Digital video (DV) camera (Illustration)
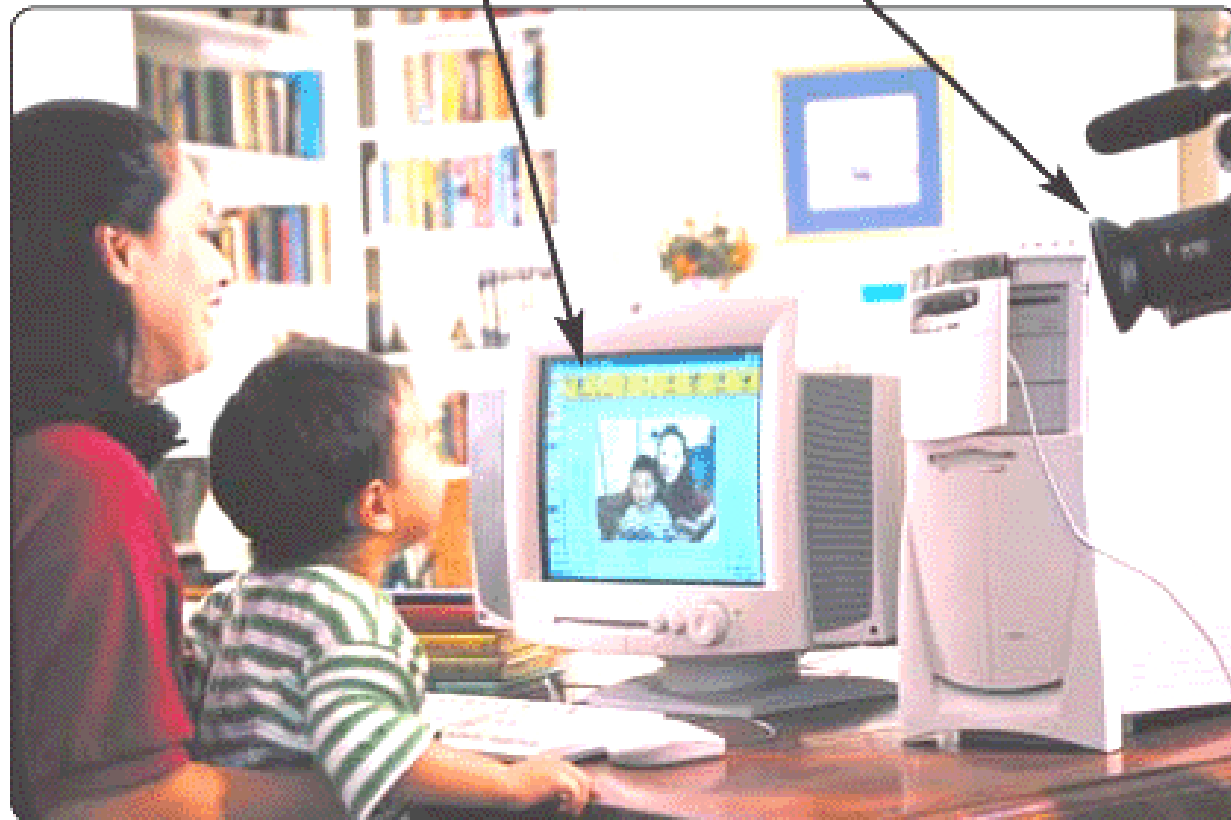
Camcorder

This is a light weight video camera that records data in digital form onto a storage device such as a videotape.

OPEN   **CLOSED**

Web cam

A *Web cam, also called a PC video camera, is a* type of digital video camera that usually sits on top of the monitor. Some laptop computers have built-in Web cams.

Webcams enable users to:
capture video and still images,
send e-mail messages with video attachments,
add live images to instant messages,
broadcast live images over the Internet,
and make video telephone calls

Illustration: Web cams enable video conferencing

Gaming input Devices

Gaming input devices are devices specifically designed to be used for playing computer games.

Examples Include:
1. *Gaming keyboard*
2. *Gaming* wheels
3. Joysticks
4. Game pad
5. Light guns
6. Dance pad
7. Motion sensing game controllers

Gaming Keyboards (Illustration)

Joystick

Game pad (Illustration)

Light Guns
(Illustration)

Motion Sensing Game Controllers

e) Audio input Devices

Audio input is the process of entering any sound into the computer such as speech, music, and sound effects.

To enter sound into a computer, it must have a sound card.

Audio input devices are plugged into a port on the sound card.

Examples of audio input devices include Microphones, MIDI devices, Dictaphone,E.t.c

Microphones

MIDI devices

MIDI (musical instrument digital interface) is the standard that defines how digital musical devices represent sound electronically.

MIDI devices such as electronic pianos allow users to record and edit music

For example, you can set the beat speed, and add notes, to produce sound.

Computer Sound Card

MIDI OUT

MIDI IN

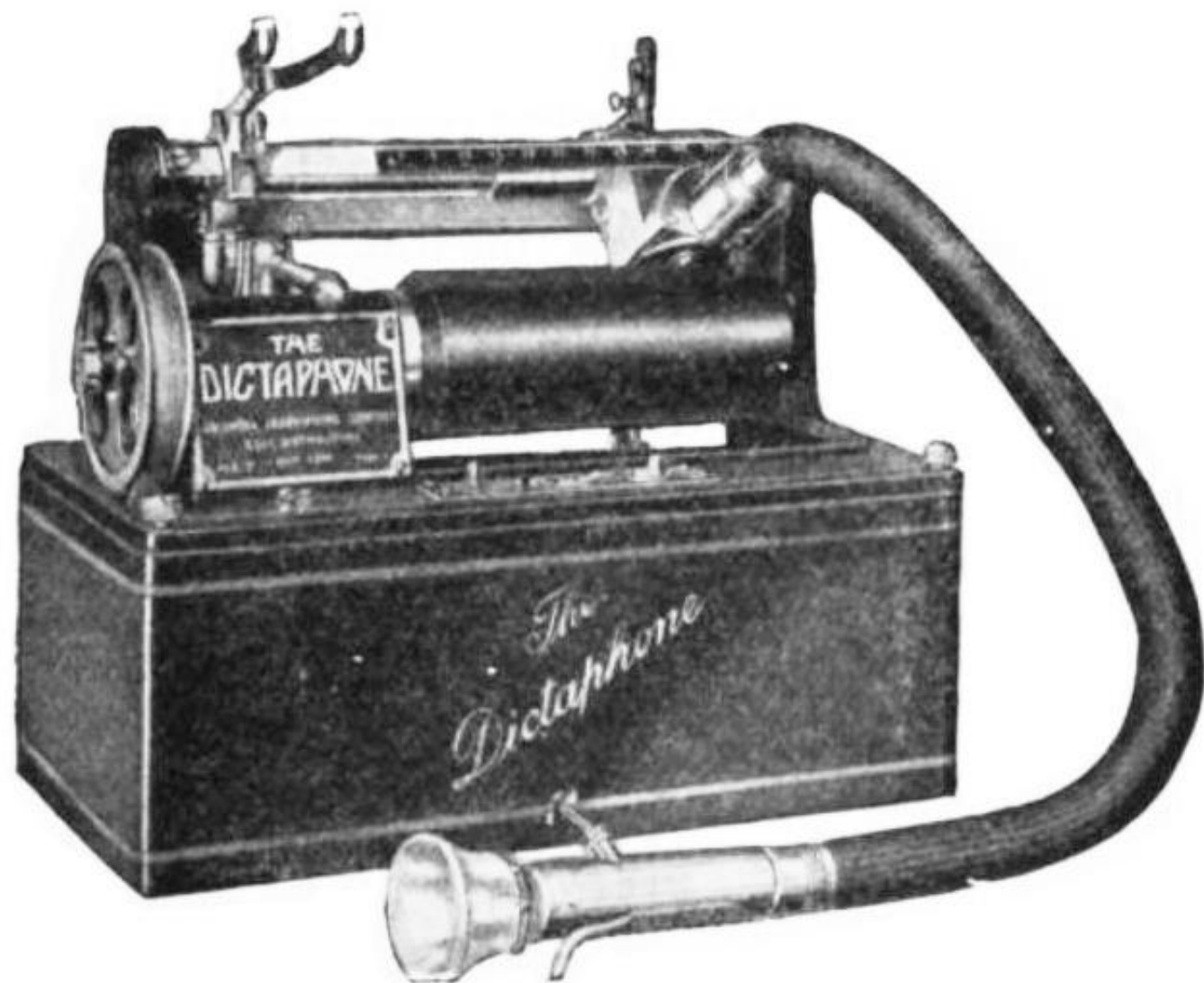MIDI Thru

MIDI OUT

MIDI IN

Keyboard
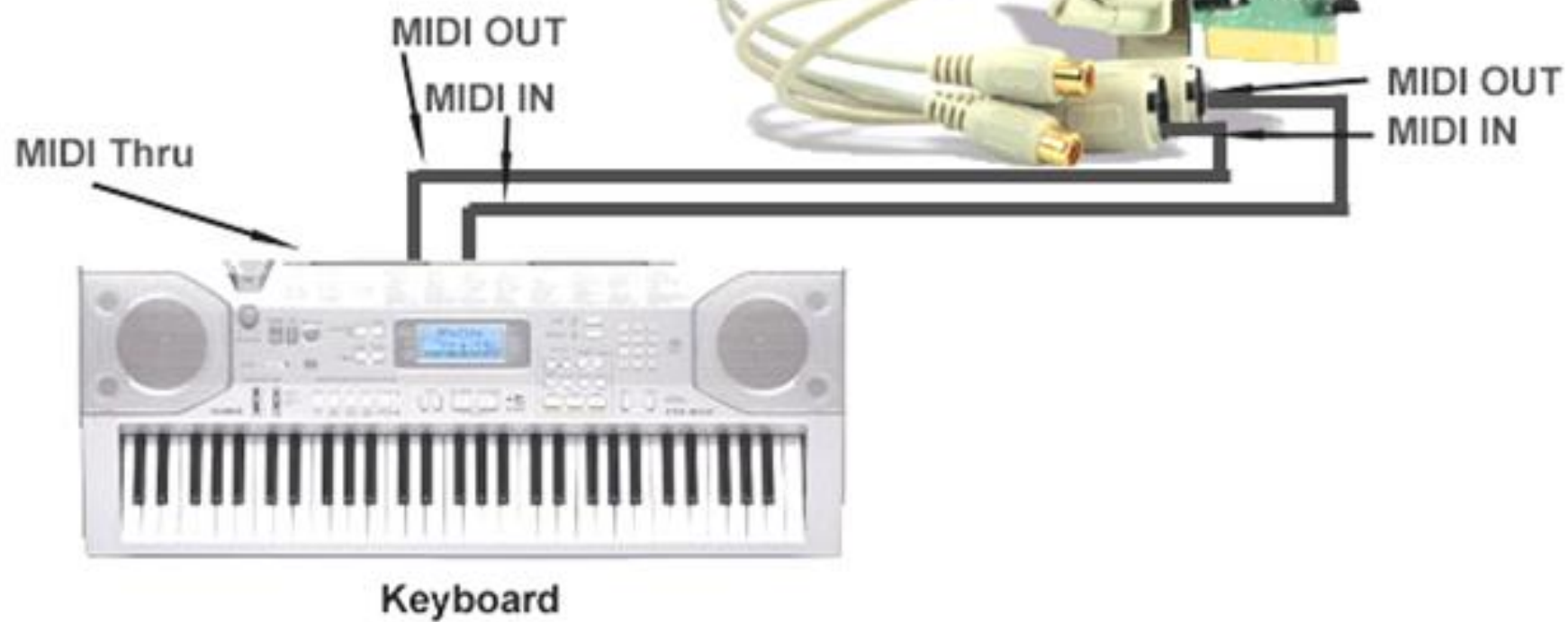
Dictaphone

This the earliest device most commonly used to record speech for later playback or to be typed into print.

It was established by Alexander Graham Bell in Washington, D.C. in 1881.

DICTATE TO THE DICTAPHONE

DICTAPHONE CYLINDER

Biometric input Devices

A *biometric device translates a biological personal characteristic into a digital code that is stored or compared with a digital code stored in the* computer.

Examples of biometrics

Fingerprint scanner. A fingerprint scanner captures curves and indentations of a fingerprint.

Face Recognition systems. Captures a live face image and compares it with a pre stored image to determine if the person is the expected user. Some big organisations use face recognition systems to secure access to rooms

Hand geometry systems. Measures the shape and size of a person's hand using a *hand geometry system.*

Signature verification systems. A signature verification system recognizes the shape of your handwritten signature, as well as measures the pressure exerted and the motion used to write the signature.

Iris Recognition systems. These are devices that use *iris recognition technology* to read patterns in the iris of the eye. These patterns are as unique as a fingerprint.

Fingerprint scanner

g) Other Specialized input devices

There are many other special input devices that are used for doing special customized tasks. Some of them include:
Remote Control
Sensors
Etc.

Remote Control

Remote control devices emit a beam of infrared light, which carries data signals.

Remote control is commonly used with TVs but many laptop computers being produced come with remotes and a form of input device, which allow you to operate the laptop from a distance.

Remote Control

END OF UNIT