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S2 Copy the notes and leave out the pictures

COMPUTER HARDWARE

INPUT HARDWARE

S2 COMPUTER NOTES

TOPIC TWO:
Computer Hardware

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Topic Summary

- Unit One: Input Devices
- Unit Two: Processing Devices
- Unit Three: Storage Devices
- Unit Four: Output Devices
- Unit Five: Communication Devices


portable
media player
(output device)
system unit
(processor, memory,
and storage devices)
screen
Web cam
(input device)
printer
(output device)
monitor
(output device)
speakers
(output device)
CD/DVD drive
(storage device)
hard disk drive
(storage device)
keyboard
(input device)
mouse
(input device)
microphone
(input device)
digital camera
(input device)
scanner
(input device)
card reader/writer
(storage device)
USB flash drive
(storage device)
external hard disk
(storage device)
modem
(communications device)
memory cards

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COMPUTER HARDWARE

Unit One: Input Devices

Unit Introduction

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- Input devices that 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.

- According to the type of data they input, they can be grouped into the following :

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

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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

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- **Definition:** A keyboard is a computer hardware primary input device, consisting of a set of keys (buttons) used to enter characters,numbers,symbols into the 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)

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- **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)

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Advantages of Keyboard

- Keyboards are very common (since they are supplied with computers)
- A skilled typist can enter data very quickly.
- Keyboards require very little training to use.
- Specialist keyboards are available. e.g Gaming

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.
- Its easy to make mistakes when entering in data

2. Voice Recognition Equipment

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- Voice Recognition Equipment /Speech recognition is a computer software or hardware that 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.

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 10010111010110101100001101

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

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

2. Voice Recognition Equipment (cont)

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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)*

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- ***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.**

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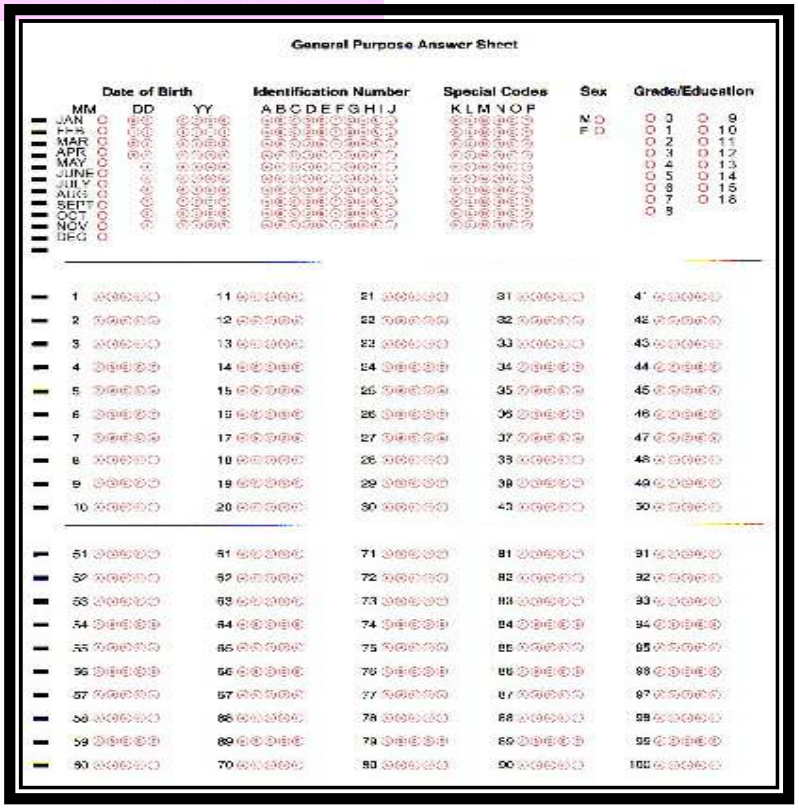
3. OMR and Barcode readers



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

Barcode readers

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- 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.

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Barcode readers

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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)

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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 cheques.(it identifies marks which are not read by our bare eyes)
- Each check is inserted into an MICR reader, which sends the check information to a computer for processing.

5. MICR readers

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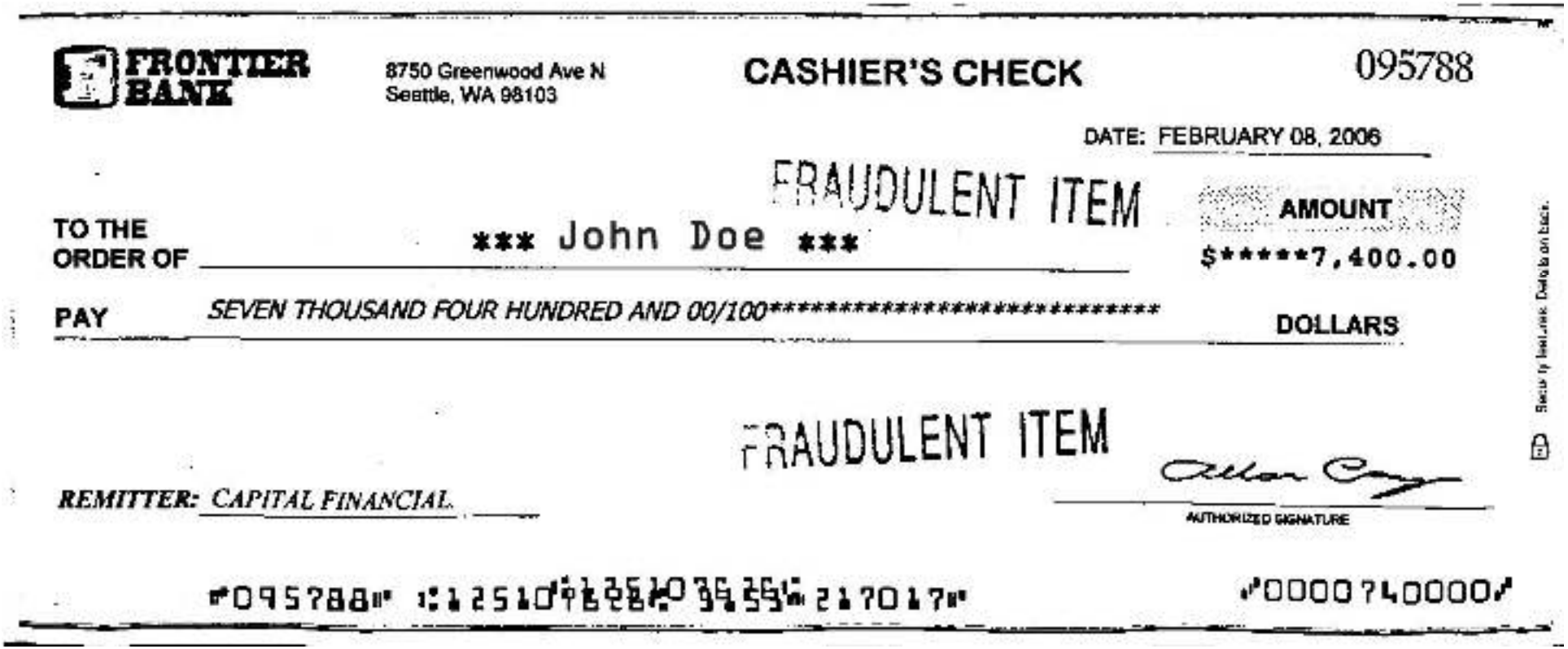

FRONTIER BANK
8750 Greenwood Ave N
Seattle, WA 98103

CASHIER'S CHECK

095788

DATE: FEBRUARY 08, 2006

FRAUDULENT ITEM

TO THE ORDER OF *** John Doe ***

AMOUNT
$******7,400.00

PAY SEVEN THOUSAND FOUR HUNDRED AND 00/100********** DOLLARS

FRAUDULENT ITEM

REMITTER: CAPITAL FINANCIAL

AUTHORIZED SIGNATURE

⑈095788⑈ ⑆125108⑆ 35 ⑈217017⑈ ⑈0000740000⑈

6. RFID readers

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- 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

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RFID readers

Objects (RFID Tag) ↔ Smart Phone (RFID Reader) ↔ Server/Cloud (Database)

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7. Magnetic Strip Card Readers

- Magnetic strip card readers is a hardware device capable of storing data by modifying the magnetism of tiny iron-based magnetic particles on a band of magnetic material on the card.
- Exposure to a magnet or magnetic field can erase the information and contents of a card's magnetic stripe.

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7. Magnetic Strip Card Readers

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b) Pointing Devices

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

- There are many examples of pointing devices such as:

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.

1. The Mouse

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- Mouse – A mouse is a Computer hardware input pointing hand held device that lets you point to and make selections of items on your screen.
- In a PC mouse there are mostly 2-3 buttons.
- A ball under the mouse senses movement.
- An optical mouse uses a light-emitting diode and photodiodes to detect movement relative to the underlying surface.

2. Stylus pen & digitizing tablet

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- **Stylus pen-** is a small pen-shaped instrument whose tip position on a touch screen can be detected by the screen.
- A **digitizing tablet** is an input device that enables you to enter drawings and sketches into a computer using a stylus pen.
- **The pen can be used as a standard mouse (without wires connected to it) or also as a free flowing drawing device.**

Stylus pen & digitizing tablet (illustration)

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3. Cordless Mouse

- Cordless Mouse – refers to a computer input pointing hardware devices connected to the computer using infrared(Not physically connected with a wire) used to manipulate data on the computer's screen.
- 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

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4. Trackball

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- **Trackball -** is a Computer hardware pointing input device consisting of a ball held by a socket containing sensors to detect a rotation of the ball about two axes—like an upside-down mouse with an exposed protruding ball.
- It is the same principle as the mouse except that the rollers are reversed and the ball is on top.

- This ball does not need as much attention as the normal mouse because the only thing that touches it is your hand as the normal mouse touches a surface.

Trackball

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5. Touchpad

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- **Touchpad -** is a Computer hardware input pointing device with a tactile sensor, a specialized surface that can translate the motion and position of a user's fingers to a relative position on the operating system that is made output to the screen.

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Touch Pad (Illustration)

6. Light pen

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- **Light pen-** is a light-sensitive computer hardware input pointing device, basically a stylus, that is used to select text, draw pictures and interact with user interface elements on a computer screen 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.
- A light pen can work with any CRT-based display, but not with LCD screens, projectors and other display devices

Light pen (Illustration)

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8. Touch Screens

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- A touch screen is a Computer input and output device normally layered on the top of an electronic visual display of an information processing system.
- A user can give input or control the information processing system through simple or multi-touch gestures by touching the screen with a special stylus or one or more fingers.
- With some smart phones, portable media players, and other personal mobile devices, you can touch the screen to perform tasks such as dialing telephone numbers, entering text, and making on-screen selections. Kiosks, which are freestanding computers, usually have touch screens. Many ATMs also have touch screens.

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Examples of touch Screens

9. Track Point

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- **A Track Point** is a small joystick used as a pointing device typically mounted centrally in a computer keyboard. Like other pointing devices such as mice, touch pads or trackballs, operating system software translates manipulation of the device into movements of the pointer or cursor on the monitor.

- **The Track Point is operated by pushing in the general direction the user wants the cursor to move. Increasing pressure causes faster movement.**

9.Track Point

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c) Imaging Devices

- Imaging input devices are computer hardware input devices that (input) enter 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

1. Image scanner

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- A scanner is a computer hardware/software input light-sensing device that converts hardcopy documents, drawings, or pictures to an electronic version (softcopy), which can then be stored on a disk.
- The electronic version of scanned material is in the form of rows and columns of dots called a *bitmap*
- Each dot on a bitmap consists of one or more bits of data.

Common types of scanners include:

- Flatbed scanner
- Pen or handheld scanner
- Sheet bed scanner
- Drum scanner.

Image scanner ILLUSTRATIONS

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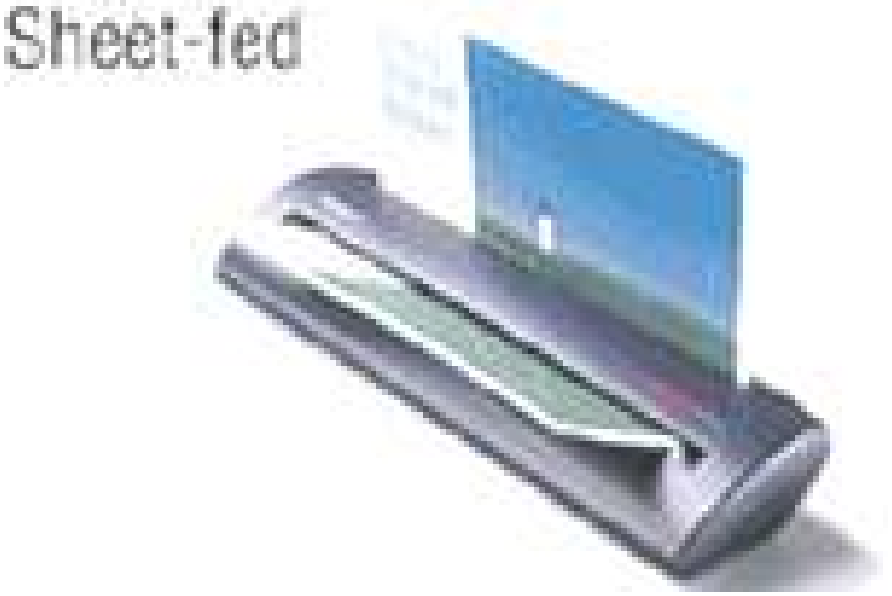

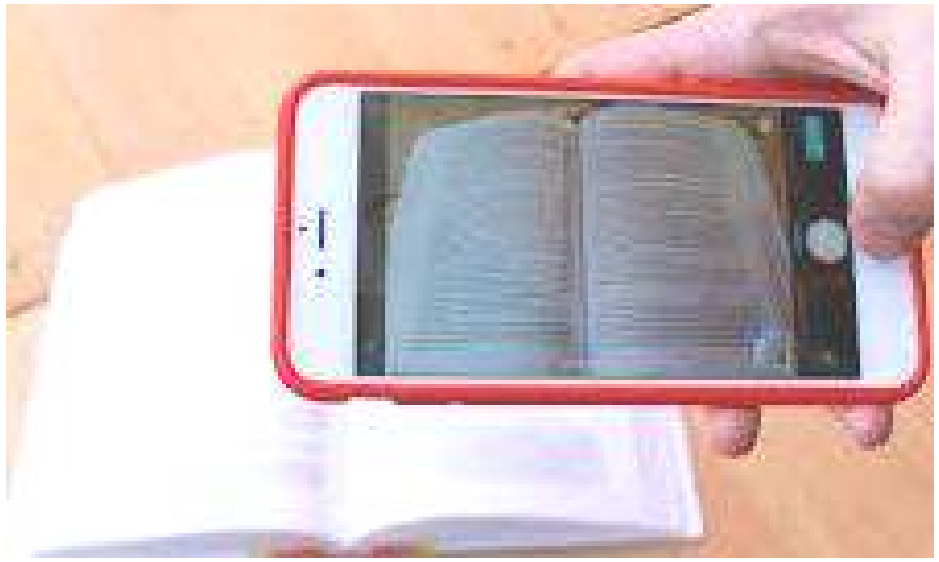

2.Digital Camera

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- A digital camera is a hardware input that captures photographs in digital memory.

- When you take pictures, the images are electronically stored in the camera. Later, you transfer a copy of the stored pictures to your computer or printer by connecting a cable between the digital camera and your computer.

Digital Camera(illustration)

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3.Digital video (DV) camera

- A digital video (DV) camera, by contrast records video as digital signals instead of analog signals. To transfer recorded images to the computer hard disk, users connect DV cameras directly to a port on the system unit. After saving the video on a storage medium, you can play it or edit it and burn it to a DVD using software programs on the computer.

Digital video (DV) camera (Illustration)

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3.Camcorder

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- This is computer hardware input imaging portable electronic recording device capable of recording live-motion video.

4.Web cam

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- **A *Web cam*** is a computer hardware input imaging device small digital video camera directly or indirectly connected to a computer or a computer network.

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**

Web Cam Illustration

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Illustration: Web cams enable video conferencing

(d) Gaming input Devices

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- **Gaming** is a computer input device used for video games or entertainment systems to provide input to a video game, typically to control an object or character in the game.

Examples Include:

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

1.Gaming keyboard

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- **Gaming keyboards** is a computer hardware input small, auxiliary keyboard designed only for gaming. It has a limited number of the original keys from a standard keyboard, and they are arranged in a more ergonomic fashion to facilitate quick and efficient gaming key presses.

- The keys on gaming keyboards light up so that the keys are visible in all lighting conditions.

Gaming Keyboards (Illustration)

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2.Gaming wheels

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- A gaming wheel is a computer hardware input gaming device used to control racing video games, racing simulators, and driving simulators.
- Most gaming wheels also include foot pedals for acceleration and braking actions. Gaming wheels include buttons, called triggers that you press to initiate certain events.

Gaming wheels illustration

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3. Joystick

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- Joystick is a computer hardware input gaming device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling.
- Joysticks are often used to control video games, and usually have one or more push-buttons whose state can also be read by the computer.

Joystick illustrations

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4.Gamepad

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- A gamepad is a Computer hardware input gaming device used with video games or entertainment systems to provide input to a video game, typically to control an object or character in the game.
- On the gamepad, users press buttons with their thumbs or move sticks in various directions to trigger events. Gamepads communicate with a game console or a personal computer via wired or wireless technology.

Game pad (Illustration)

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5.Dance pad

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- **A dance pad is a computer hardware gaming input** plastic or metal pad used for playing dancing video games.
- **These games test the user's ability to step on the correct panel at the correct time, following a pattern that is matching with the beat of a song.**

Gaming Pad illustration

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6.Motion sensing game controllers

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- These are Computer hardware gaming devices that allow the user to guide on screen elements by moving a handheld input device in predetermined directions through the air. Examples include the power glove, play station move gadgets, among others.

Motion Sensing Game Controllers

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e) Audio input Devices

- Audio input are computer hardware input audio devices used to capture sound into the computer such as speech, music, and sound effects.
- To enter sound into a computer, it must have a sound card/adaptor.
- Audio input devices are plugged into a port on the sound card.

Examples of audio input devices include

- Microphones,
- Tape players,
- CD/DVD players,
- MIDI devices
- Dictaphone,E.t.c

1.Sound Card

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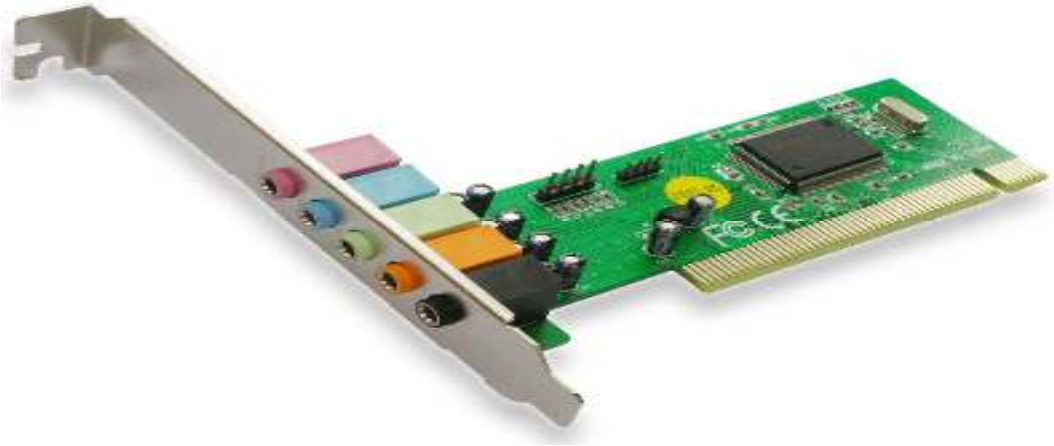
- A sound card is an external expansion card that provides input and output of audio signals to and from a computer under the control of computer programs. Without a sound card, Audio input and output is not possible.



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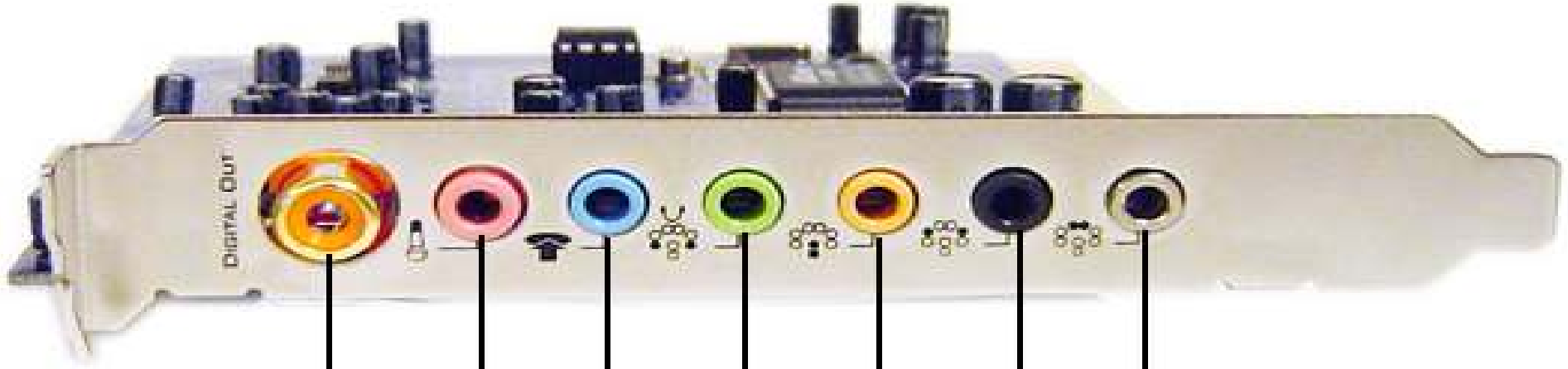
Sound Card illustration



Digital Out

Microphone In

Analog Line In

Front Left / Right
& Headphones

Center / Subwoofer

Surround Left / Right

Surround Back Left / Right

2.Microphones

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- A microphone is an instrument for converting sound waves into electrical energy variations, which may then input into the computer for processing, recording or audio playback.
- Microphones are connected to the sound card in the system unit.

3.MIDI devices

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- 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.

Music Instrument digital (MIDI) illustrations

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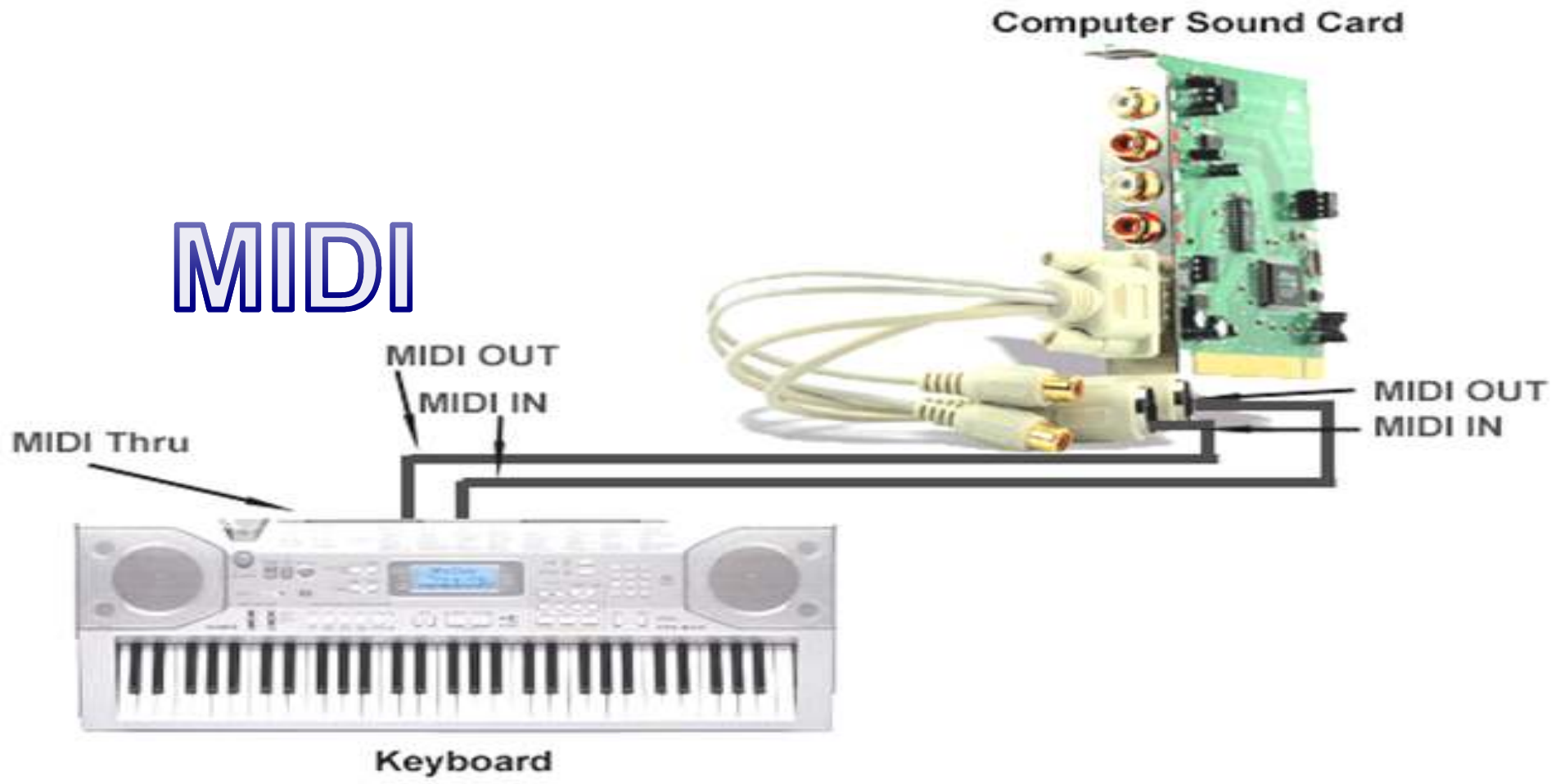

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Dictaphone

- 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.

Biometric input Devices

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- A biometric device is a computer hardware input Biometric security identification & authentication device which uses automated methods of verifying or recognizing or translates a biological personal characteristic into a digital code that is stored or compared with a digital code stored in the computer.

- These characteristics include fingerprints, facial images, iris and voice recognition . Common biometric devices include:
- Fingerprint scanner
- Face Recognition systems
- Hand geometry systems
- Signature verification systems
- Iris Recognition systems

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1.Fingerprint scanner

- A fingerprint scanner is a computer hardware input Biometric device that captures curves and indentations of a fingerprint.

  Some grocery and retail stores now use fingerprint readers as a means of payment, where the customer's fingerprint is linked to a an account or credit card.

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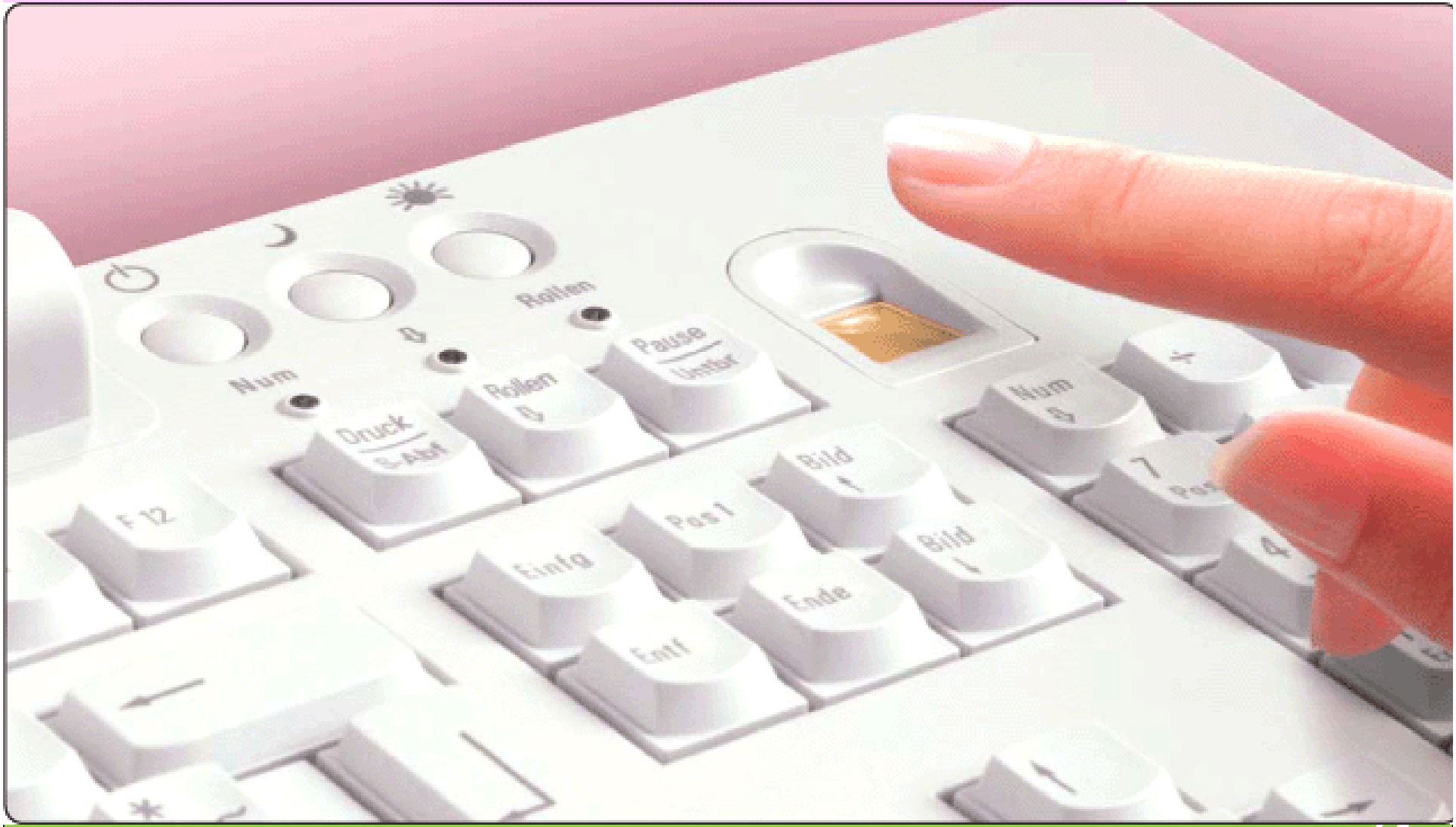
Fingerprint scanner



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2.Face Recognition systems

- A face recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source.

  There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from given image with faces within a database.

3.Hand geometry system

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- Biometric devices is a Computer hardware input biometric device that identifies users by the shape of their hands.

Hand geometry readers measure a user's hand along many dimensions and compare those measurements to measurements stored in a file.

Hand geometry System illustrustion

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4. Signature verification systems

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- A signature verification system is a Computer hardware input biometric device used by banks, intelligence agencies and high-profile institutions to validate the identity of an individual.

  Signature verification is often used to compare signatures in bank offices and other branch capture.

Signature Verification illustration

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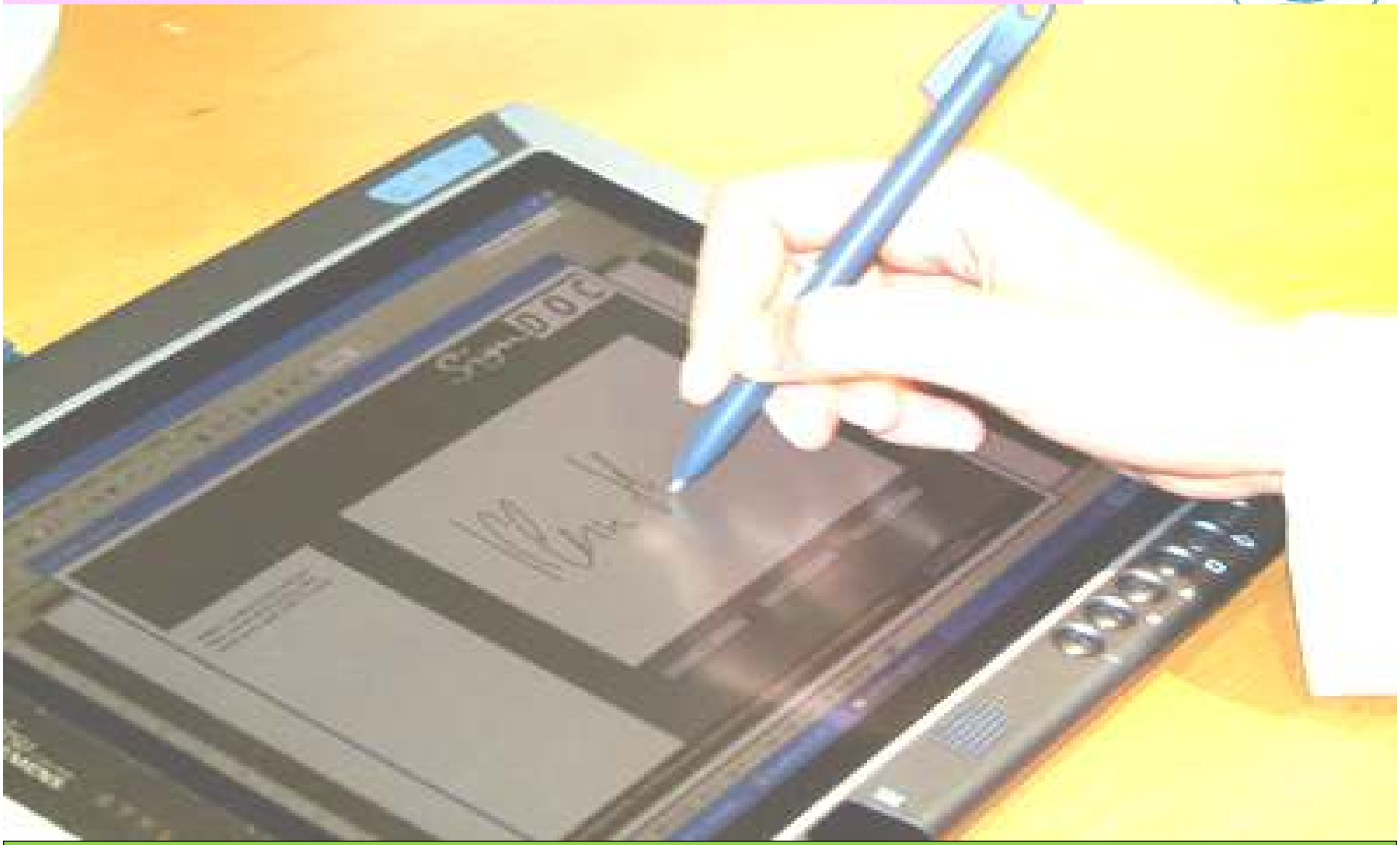

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5.Iris recognition system

- Iris recognition is a computer input hardware biometric device used for identifying people based on unique patterns within the ring-shaped region surrounding the pupil of the eye(Iris).

- The iris usually has a brown, blue, gray, or greenish color, with complex patterns that are visible upon close inspection. They are used by government security organizations, the military, and financial institutions that deal with highly sensitive data.

Iris Recognition system illustration

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g) Other Specialized input devices

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

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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

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Sensors

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- Chemical responses to the physical environment or movement can be converted to electrical signals by devices known as sensors, which input them it to the computer for processing.
- Various sensors can be used to measure heat, light, pressure, acidity, oxygen concentration, water flow, etc.

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END

INQUIRES

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