

Introduction to Information Technology

Lecture 4

IT 111

The System Unit: Input and Output

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Learning Objectives

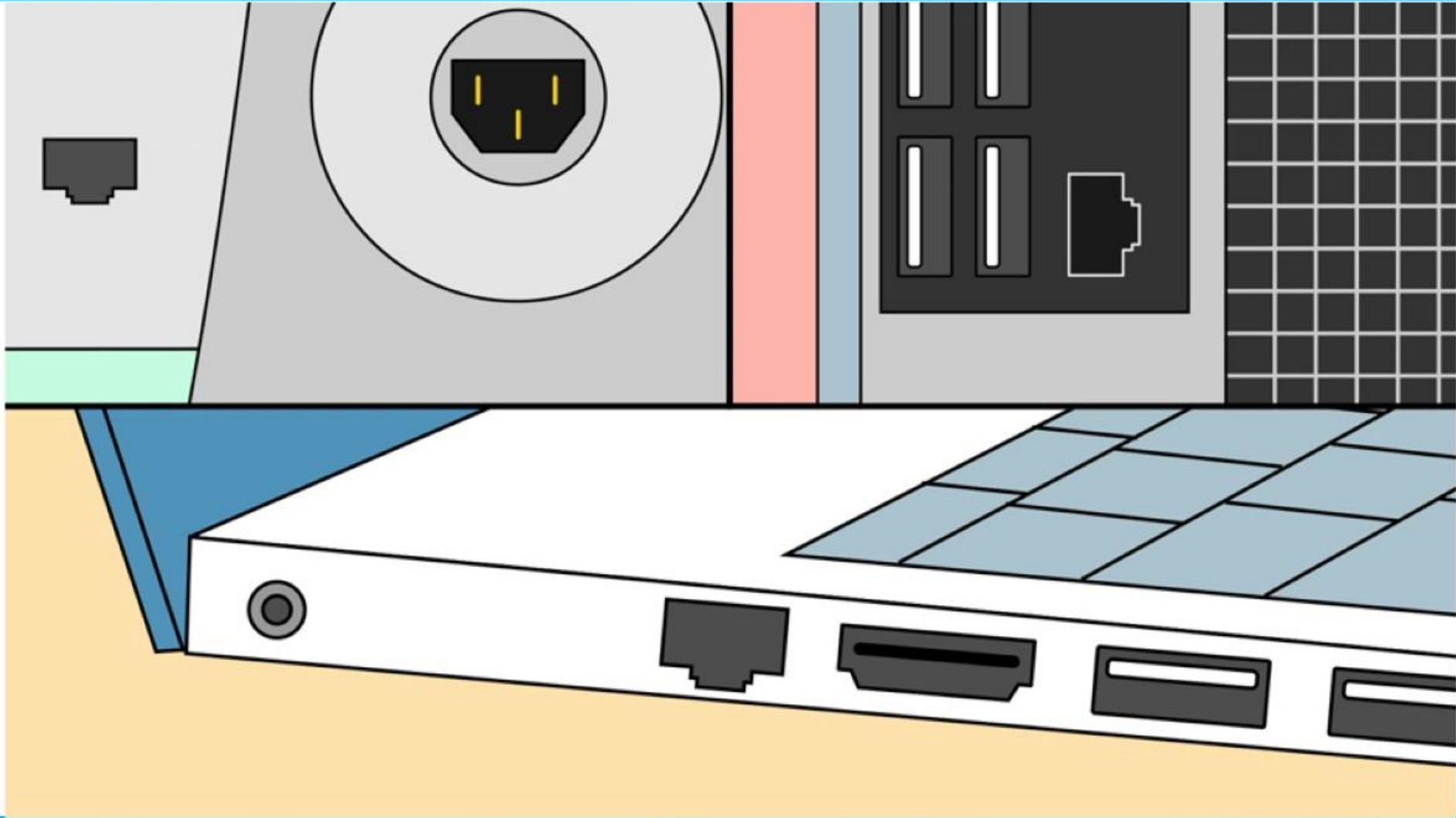
1. List different types of ports.
2. Explain the purpose of a computer keyboard and the types of keyboards widely used today.
3. List several different pointing devices and describe their functions.
4. Describe the purposes of scanners and readers and list some types of scanners and readers in use today.
5. Explain what digital cameras are and how they are used today.

Learning Objectives

6. Understand the devices that can be used for audio input.
7. Describe the characteristics of a display device and explain some of the technologies used to display images.
8. List several types of printers and explain their function.
9. Identify the hardware devices typically used for audio output.

- This lecture covers:
 - Different types of keyboards and pointing devices.
 - Types of scanners, readers, and digital cameras.
 - Audio input devices.
 - Types of display devices and how they work.
 - Types of printers and how they work.
 - Audio output.

Ports and Connectors

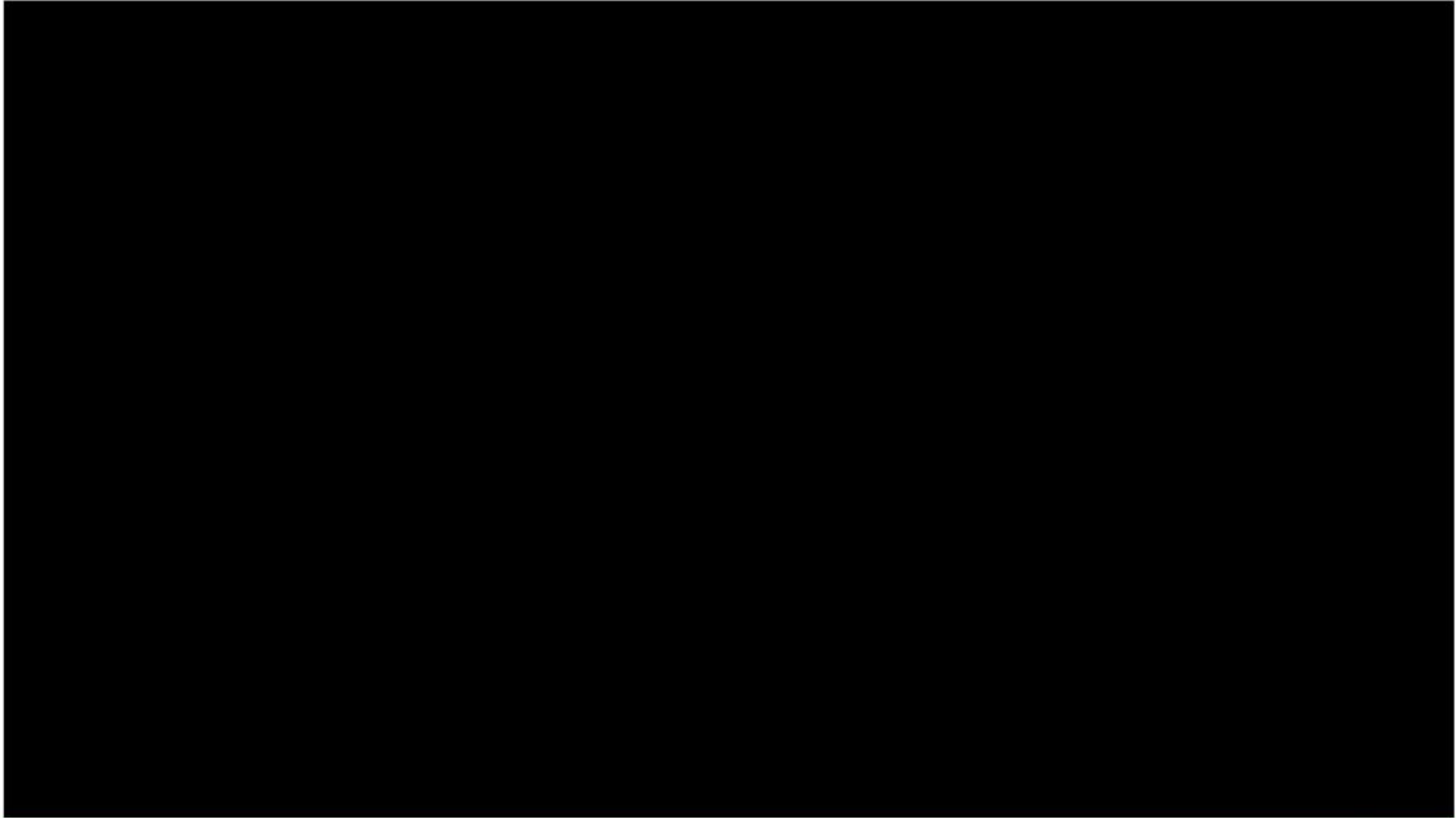


Ports and Connectors

Port: A connector on the exterior of a computer's system unit to which a device may be attached



USB



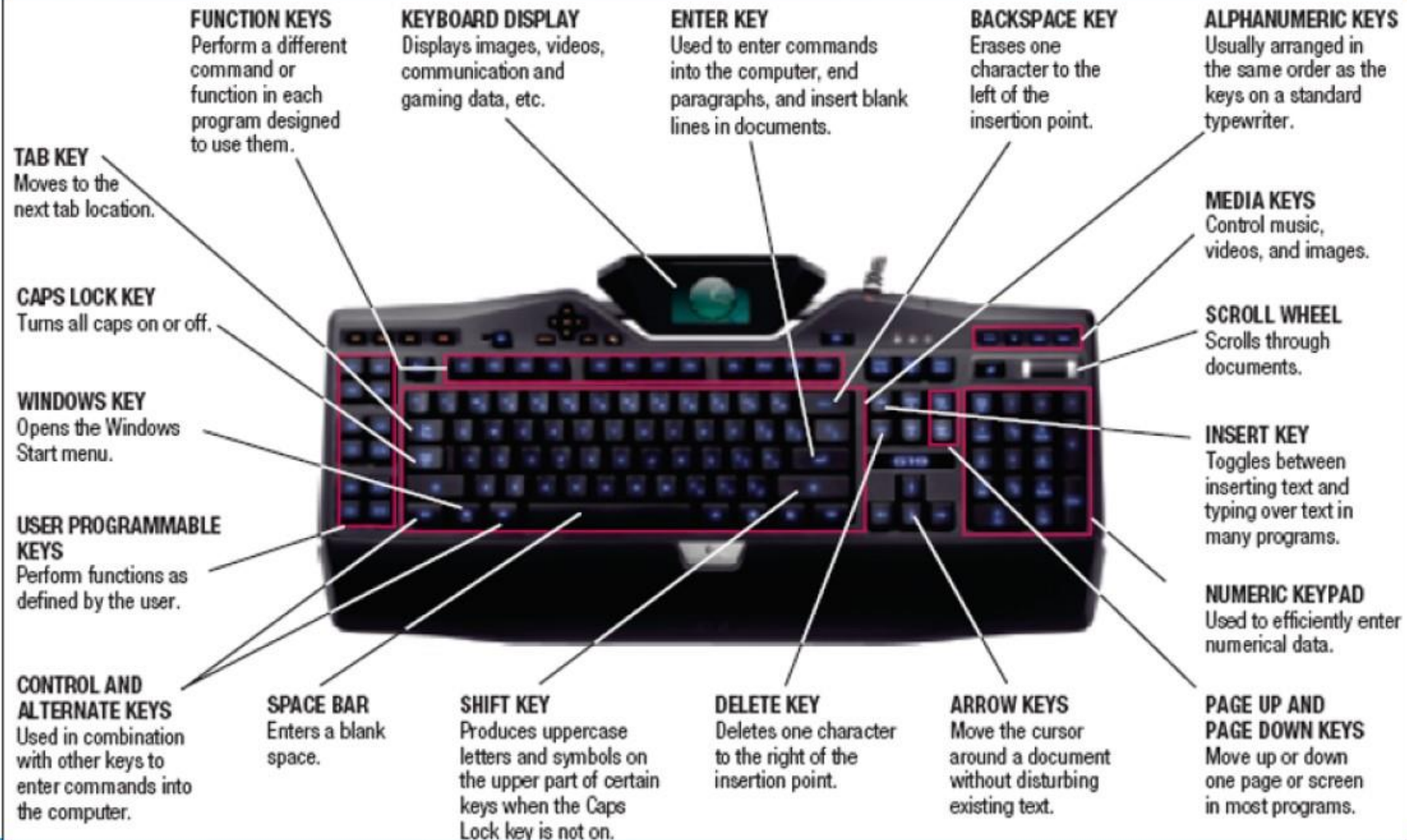
Receptacles Types		USB 2.0	USB 3.1 Gen1	USB 3.1 Gen2
Type-C				
Type-B	Standard			N/A
	Mini		N/A	N/A
	Micro			
Type-A	Standard			
	Mini		N/A	N/A
	Micro		N/A	N/A



Keyboards

- Keyboard: An input device used to enter characters at the location marked by the insertion point or cursor.
 - Can be wired or wireless.
- Most computers today are designed to be used with a keyboard.
- Typically contains:
 - Standard alphanumeric keys.
 - Numeric keypad.
 - Function keys.
 - Delete and Backspace keys.
 - Control and Alternate keys.
 - Arrow directional keys and special keys.

Keyboards



Keyboards

- Portable computers and mobile devices often use:
 - Built in or slide-out keyboard.
 - Pen or touch input (on-screen keyboard).
 - Voice input.

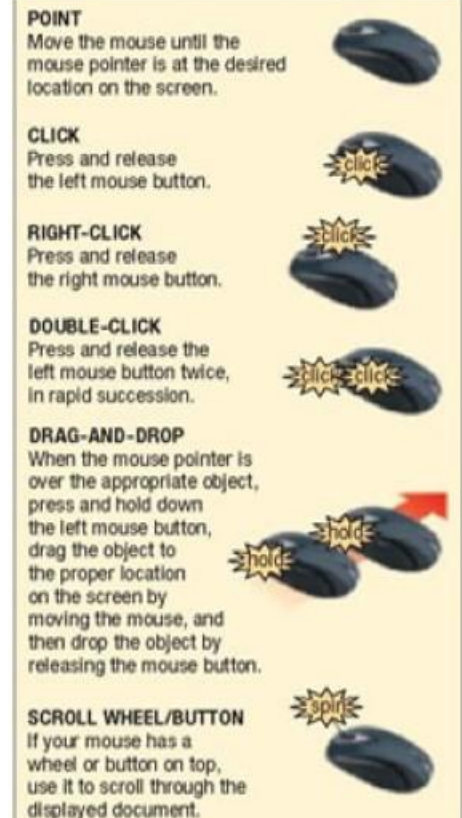


Pointing Devices

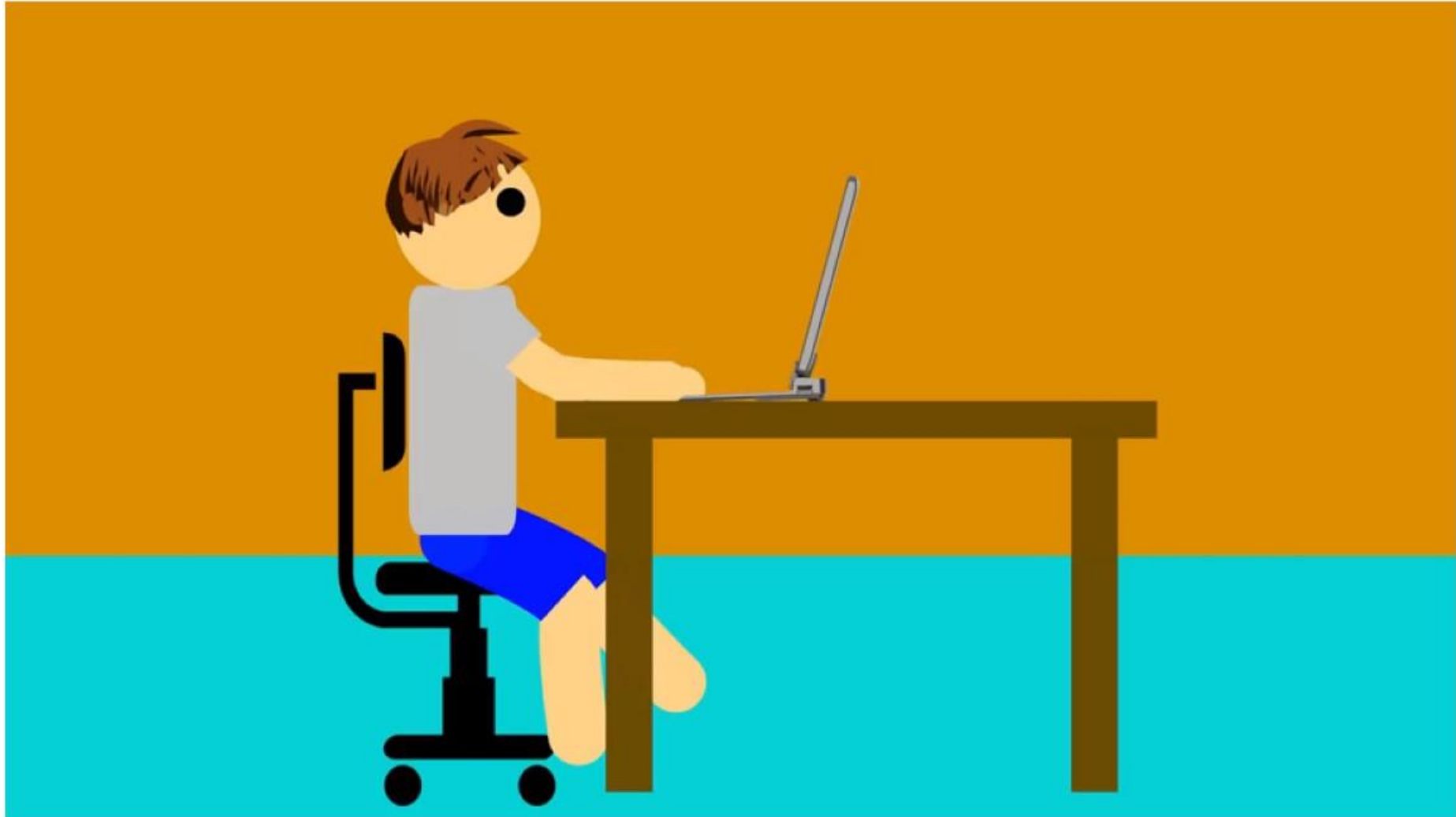
- Pointing devices: Used to select and manipulate objects.
 - Used to input data.
 - Used to issue commands to the computer.
- Common types of pointing devices:
 - Mouse.
 - Pen/stylus.
 - Touch screen.

Mice

- Mouse: A common pointing device that the user slides along a flat surface to move a pointer around the screen and clicks its buttons to make selections.
 - Older mechanical mice use a ball.
 - Optical or laser mice track with light.
 - Can be wireless.



How Mouse works



Pens/Styluses

- Stylus: Pen-like device used to draw or write electronically on the screen.
- Also called digital pen, electronic pen, tablet pen.
- Commonly used with pen-based computers.
 - Used to issue commands and input data.
 - If handwriting recognition is used, written text can be converted to editable typed text.
- Other uses for pens/styluses:
 - Digital writing systems .
 - Graphics tablets.
 - Signature capture devices.



DIGITAL WRITING SYSTEMS

Record all input written on the paper and transfer it wirelessly to a computer upon demand.



GRAPHICS/PEN TABLETS

Transfer all input written or drawn on the tablet to the computer in real time and allow the use of pen flicks and other pen navigation tools.



SIGNATURE CAPTURE DEVICES

Record signatures for purchases, deliveries, and other applications that require recorded authorization.

Touch Screens

- Touch screen: Display device that is touched with the finger to select commands or otherwise provide input to the computer.
- Used with:
 - Desktop and portable computers.
 - Mobile phones and mobile devices.
- Can be multi-touch.

Capacitive touchscreen



Scanners, Readers, and Digital Cameras



RECORDING DATA DIRECTLY INTO A COMPUTER



**CAPTURING DATA FROM ITS SOURCE
DOCUMENT**

Scanners

- Scanner (optical scanner): Input device that captures an image of an object and transfers them to a computer in digital form.
 - Can scan photos, documents, drawings, (flat objects).
 - Data is typically input as a single image.
- Types of scanners:
 - Flatbed.
 - Portable.
 - 3D.
 - Integrated (ATMs, etc.)



FLATBED SCANNERS

Used to input photos, sketches, slides, book pages, and other relatively flat documents into the computer.



PORTABLE SCANNERS

Used to capture small amounts of text; the text is typically transferred to a computer at a later time.

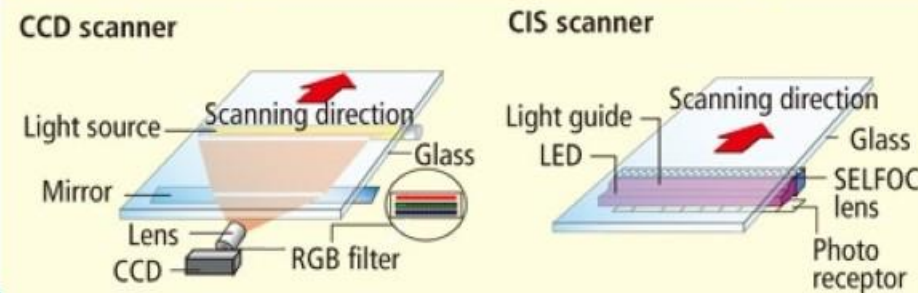


INTEGRATED SCANNERS

Built into other devices, such as into the ATM machine shown here to capture images of deposited checks.

Scanners

- Scanners operate by shining light at the object or document being digitized and directing the reflected light (usually through a series of mirrors and lenses) onto a photosensitive element. In most scanners, the sensing medium is an electronic, light-sensing integrated circuit known as a charged coupled device (CCD).
- CIS (Contact Image Sensor) is a newer technology that allows scanners to be smaller and lighter, but sacrifices dynamic range, depth-of-field, and resolution.
- Drum scanners produce very high-quality images, but have limited application in library and archives scanning.

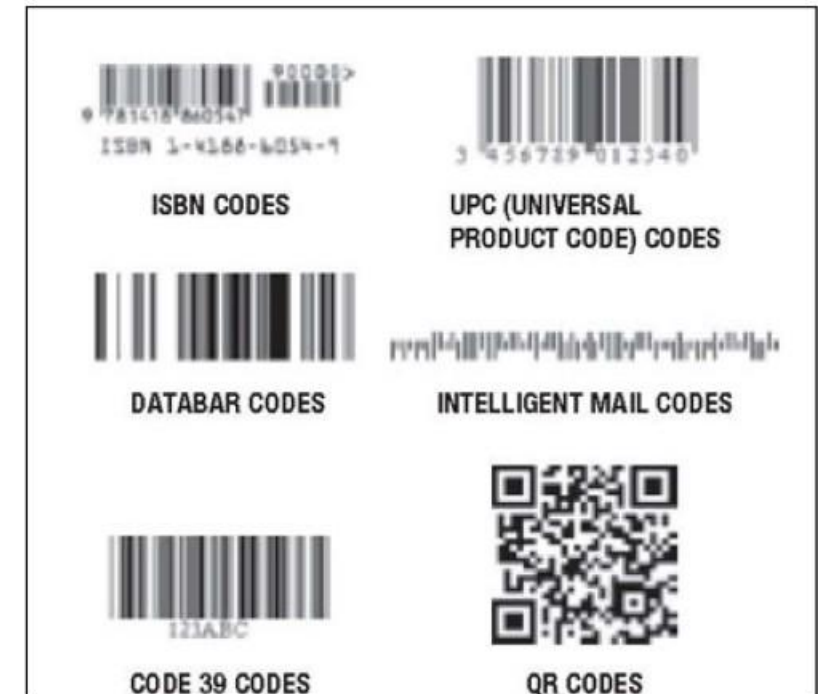


Drum Scanning



Barcode Readers

- Barcode readers: Input devices that read barcodes.
- Barcode: Machine-readable code that represents data as a set of bars.
 - Common types:
 - Universal Product Code (UPC).
 - ISBN.
 - Code 39.
 - Intelligent mail code.
 - 2D (QR) – hold more data.



How barcode read



Biometric Readers

- Biometric data: Based on unique physiological characteristics or personal trait.
 - Fingerprint.
 - Hand or face geometry.
 - Iris of the eye.
 - Voice or signature.
- Biometric readers: Used to input biometric data.
 - Can be stand-alone or built into another piece of hardware.
 - Used to allow access only by authorized individuals.
 - Most often used for access control and to verify transactions.

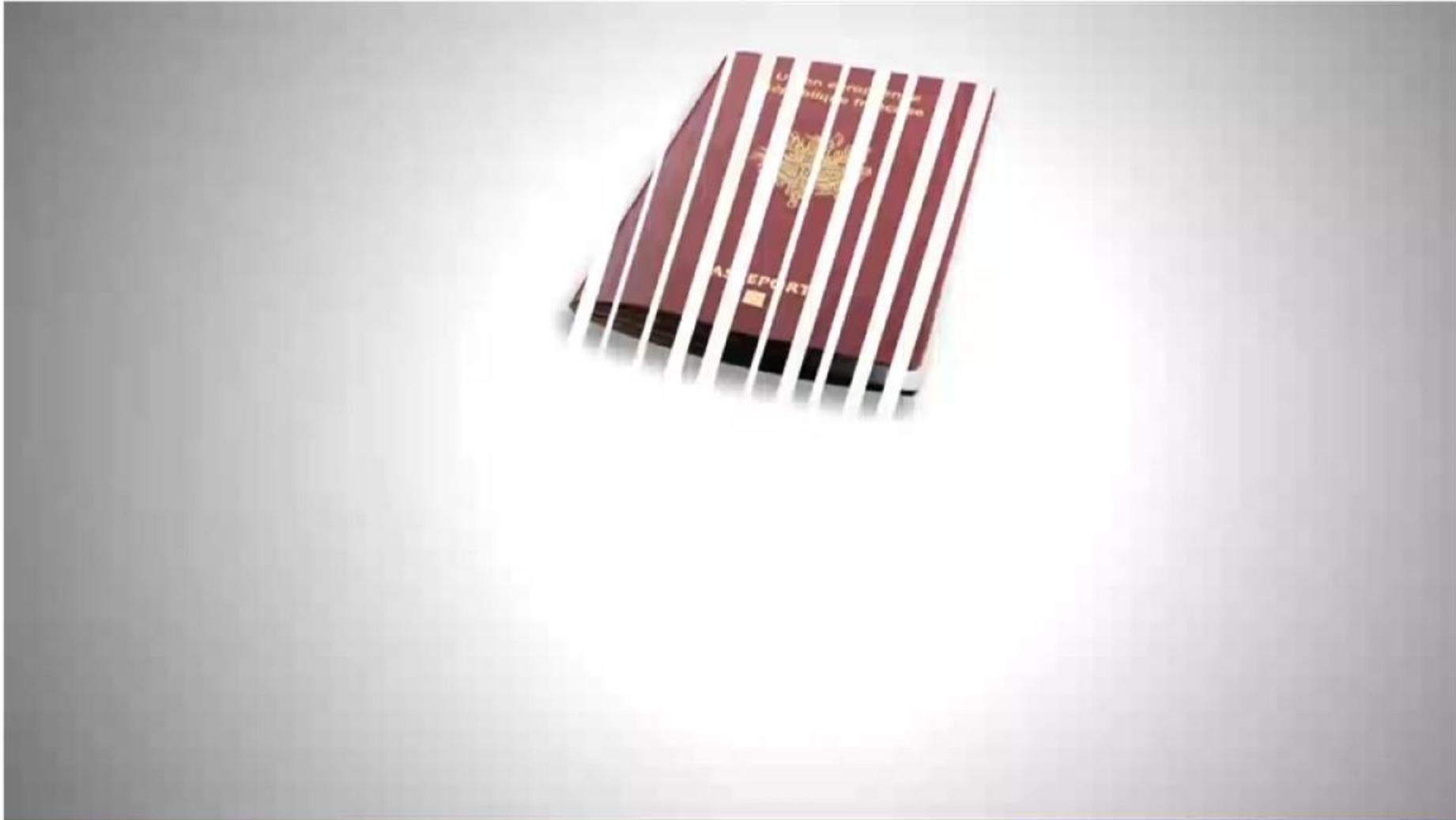


STAND-ALONE FINGERPRINT READERS
Often used to control access to facilities or computer systems, such as to the notebook computer shown here.



BUILT-IN FINGERPRINT READERS
Typically used to control access to the device into which the reader is built, such as to the external hard drive shown here.

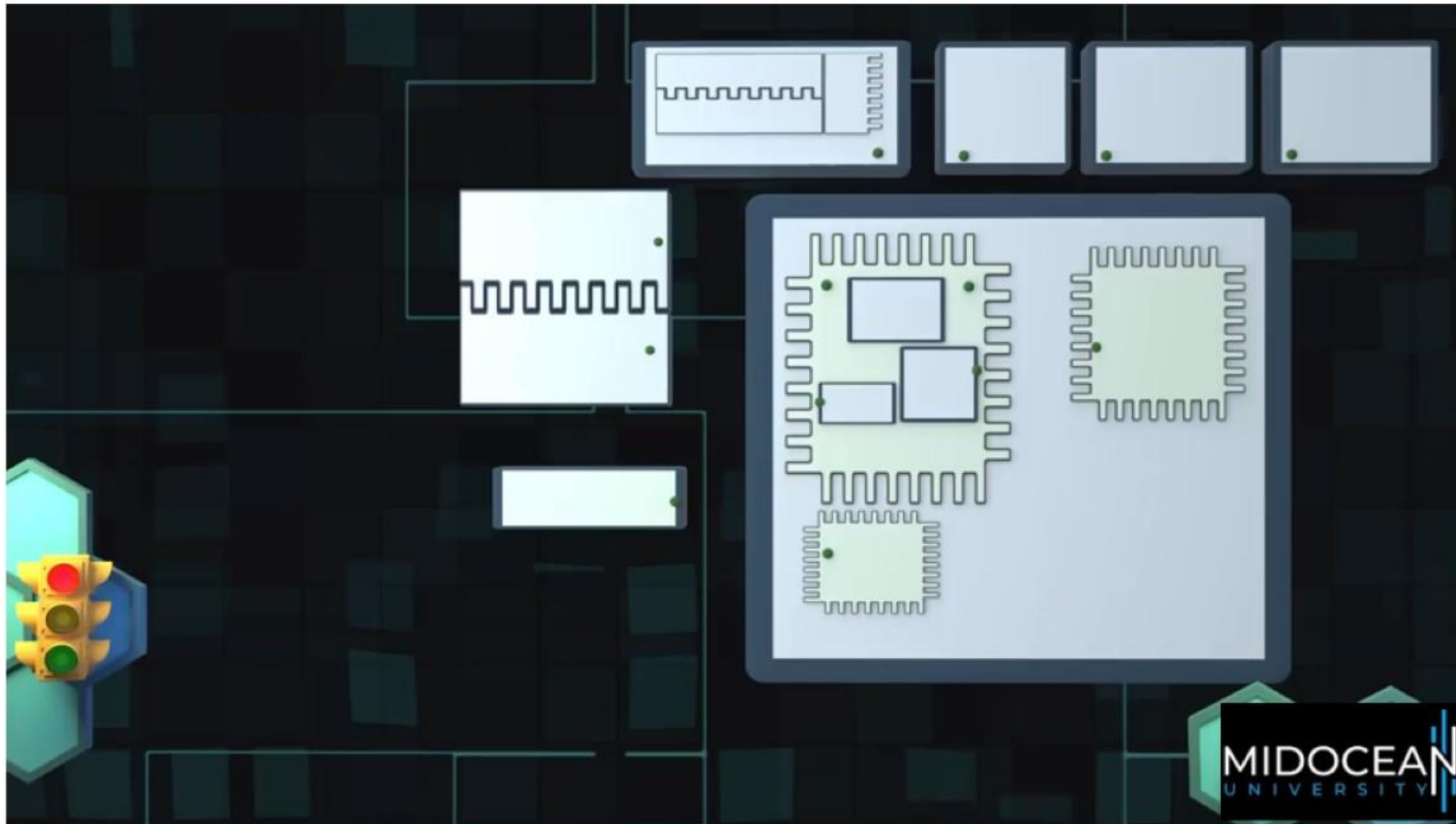
Biometric



Digital Cameras

- Digital cameras: Record images on digital storage medium rather than film.
 - Can either be still cameras or video cameras.
 - Integrated into many portable computers and mobile phones.
- Digital still cameras:
 - Available in a wide variety of sizes and capabilities.
 - Primary appeal is images immediately available.
 - Camera quality is measured in megapixels.
 - Typically use flash memory for storage.
 - Camera phones can be used to read barcodes, for mobile deposit, etc.

HOW DOES A CAMERA WORK?



Audio Input

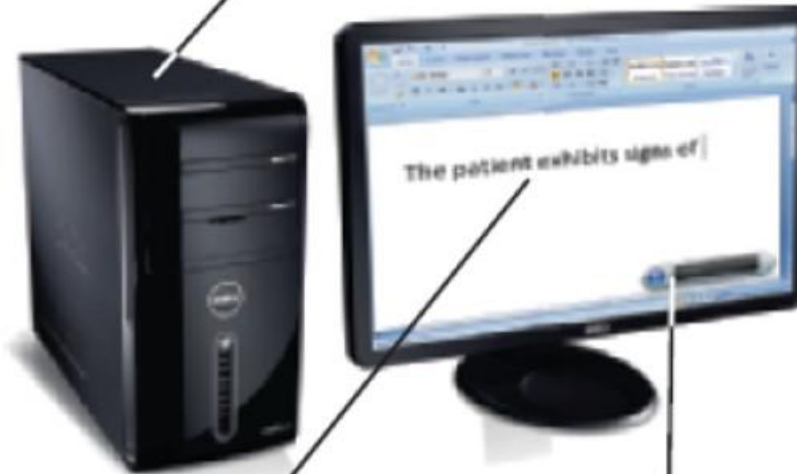
- Audio input: The process of entering audio data into the computer
- Voice input: Inputting spoken words and converting them to digital form.
 - Via microphone or headset.
 - To provide spoken instructions to computer (speech recognition systems).
- Music input systems are used to input music.
 - Microphones.

Voice Input Systems



1. The user speaks into a microphone that cancels out background noise and inputs the speech into the computer.

2. An analog-to-digital converter on the sound card located inside the computer converts the spoken words to phonemes, the fundamental sounds in the language being used, and digitizes them.



4. The spoken words appear on the screen in the application program (such as a word processor or an e-mail program) being used.

3. Voice recognition software determines the words that were spoken.

Display Devices

- Display device: Presents output visually
 - Monitor: Display device for a desktop computer.
 - Display screen: Screen built into a variety of devices:
 - Notebook and other portable computers.
 - Mobile phones and mobile devices.
 - Handheld gaming devices, home entertainment devices.
 - Digital photo frames, e-book readers.
 - Digital signage systems, digital billboards.

Display Device Characteristics

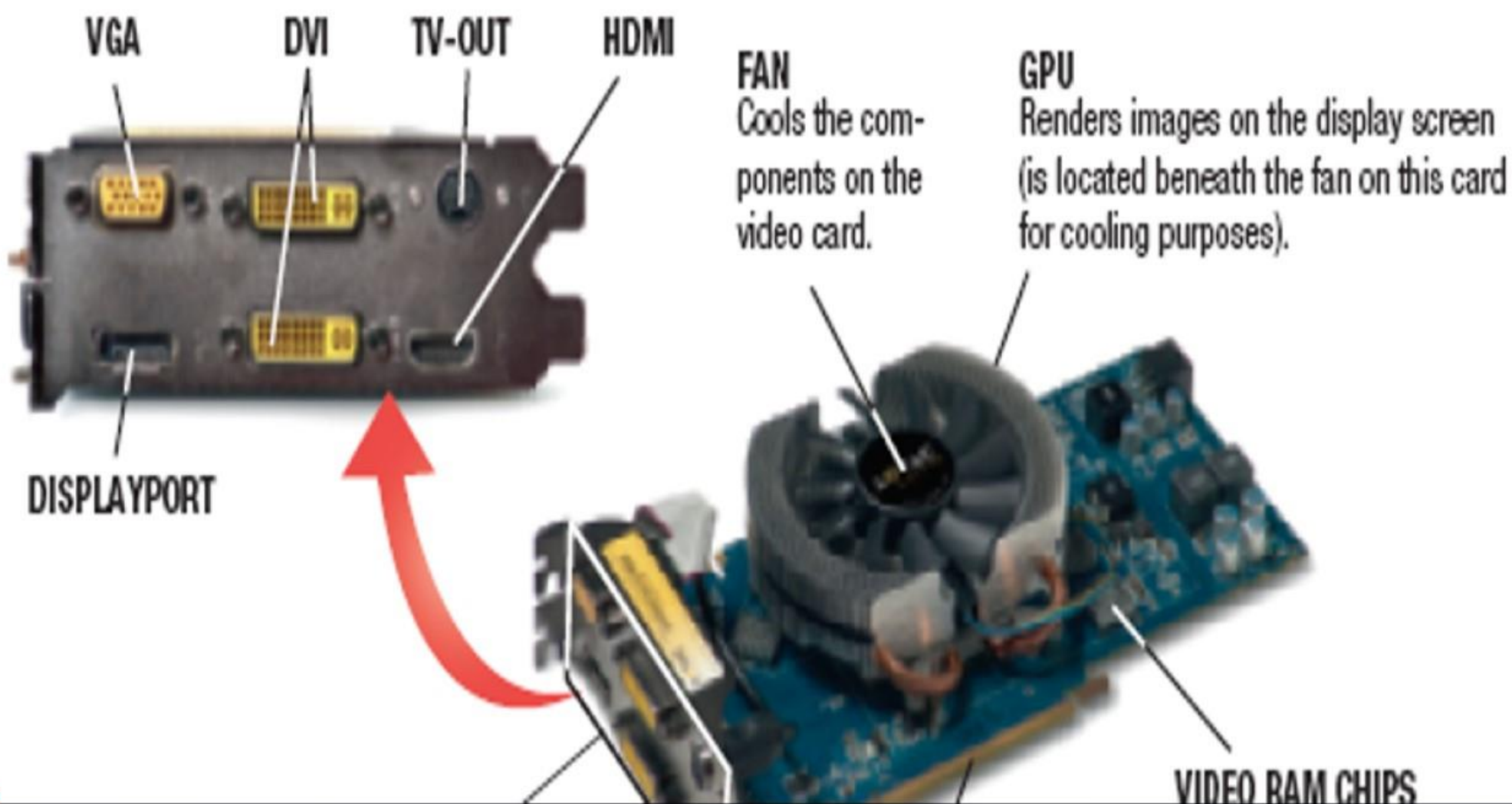
- Color vs. monochrome.
- CRT vs. flat-panel displays.
- Size and aspect ratio.
- Screen resolution.
- Video adapters, interfaces, and ports.
- 2D vs. 3D.
- Touch and gesture capabilities.

Screen Resolution Explained

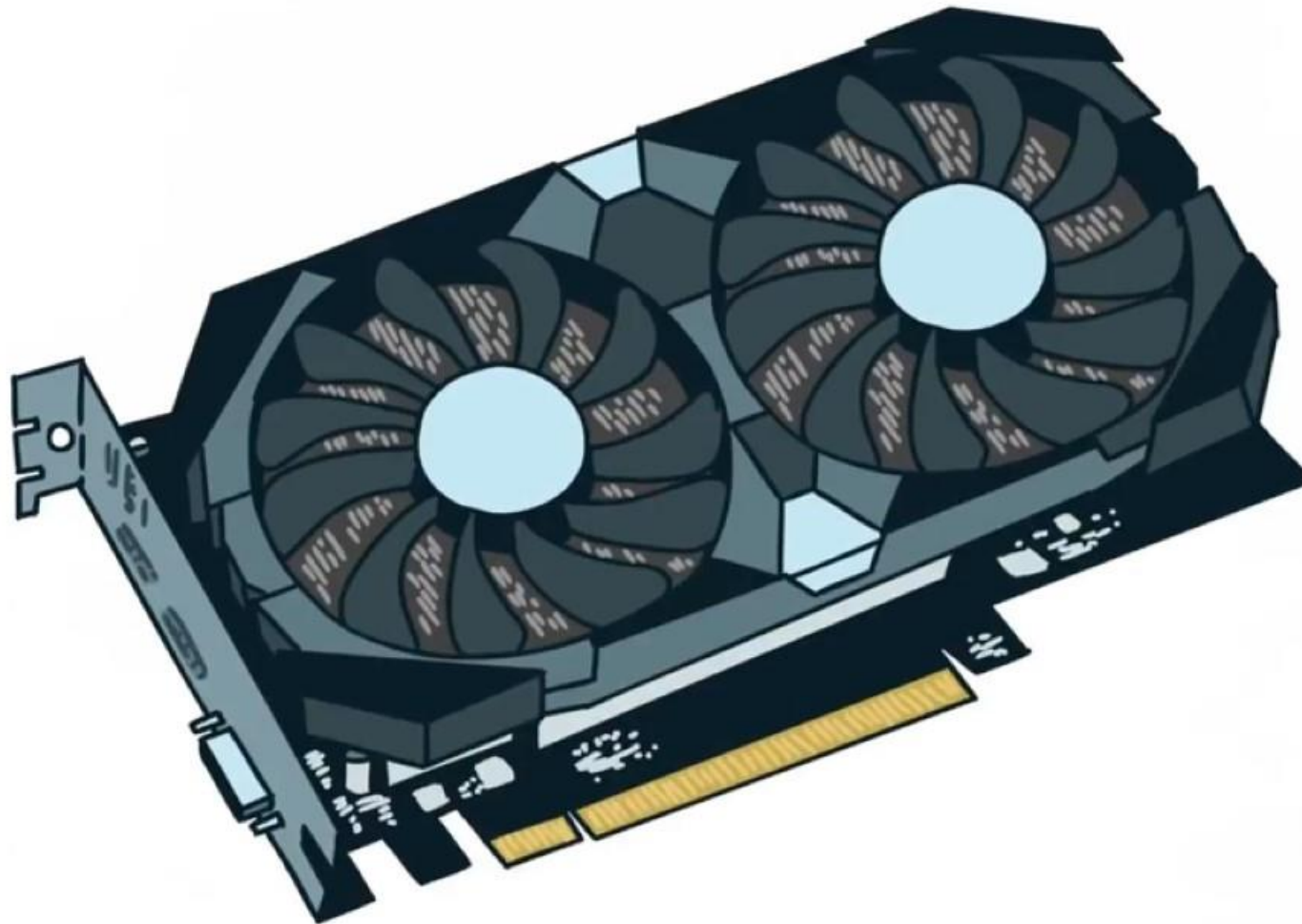


RESOLUTION

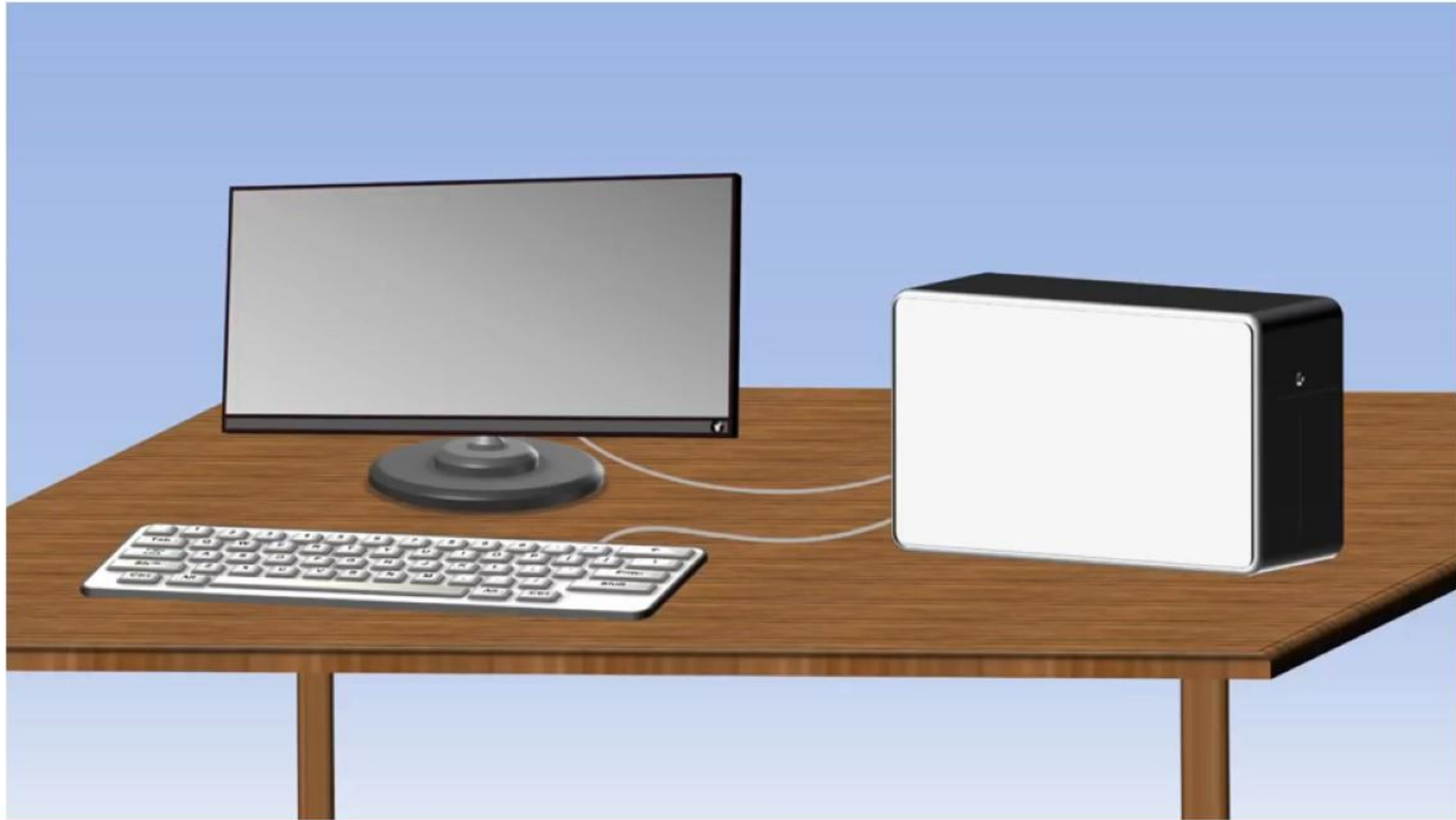
Video Adapters



Graphics Card



LCD



LCD vs. LED

Data and Multimedia Projectors

- Data projector: Display device that projects all computer output to a wall or projection screen.
 - Found in classrooms, conference rooms.
 - Can be wireless or integrated into devices.
 - Integrated – tiny projectors built into mobile phones, portable devices.
 - Hologram projectors used to display 3D images.



CONVENTIONAL DATA PROJECTORS
Frequently used for both business and classroom presentations.



INTEGRATED AND PORTABLE PROJECTORS
Images displayed on the device (such as the mobile phone shown here) are projected onto any surface.



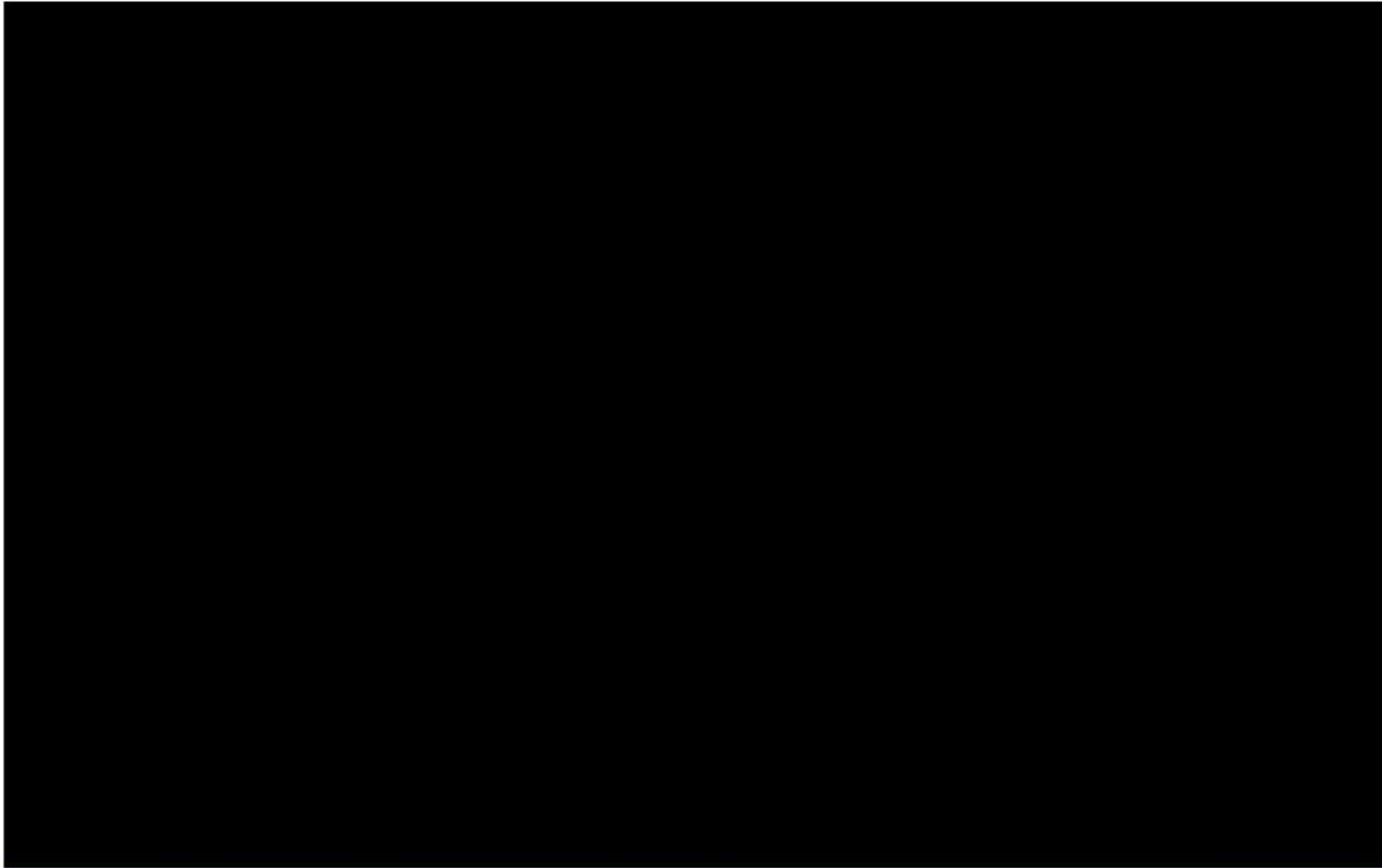
HOLOGRAPHIC PROJECTORS
Project 3D images of objects or individuals.

Printers

- Printers: Produce hard copy.
- Printer characteristics:
 - Printing technology used.
 - Impact vs. nonimpact.
 - Color vs. black and white.
 - Personal vs. network printers.
 - Print resolution (measured in dpi).
 - Print speed (measured in pages per minute (PPM)).
 - Connection (USB, Ethernet, Wi-Fi, etc.)
 - Multifunction capabilities.



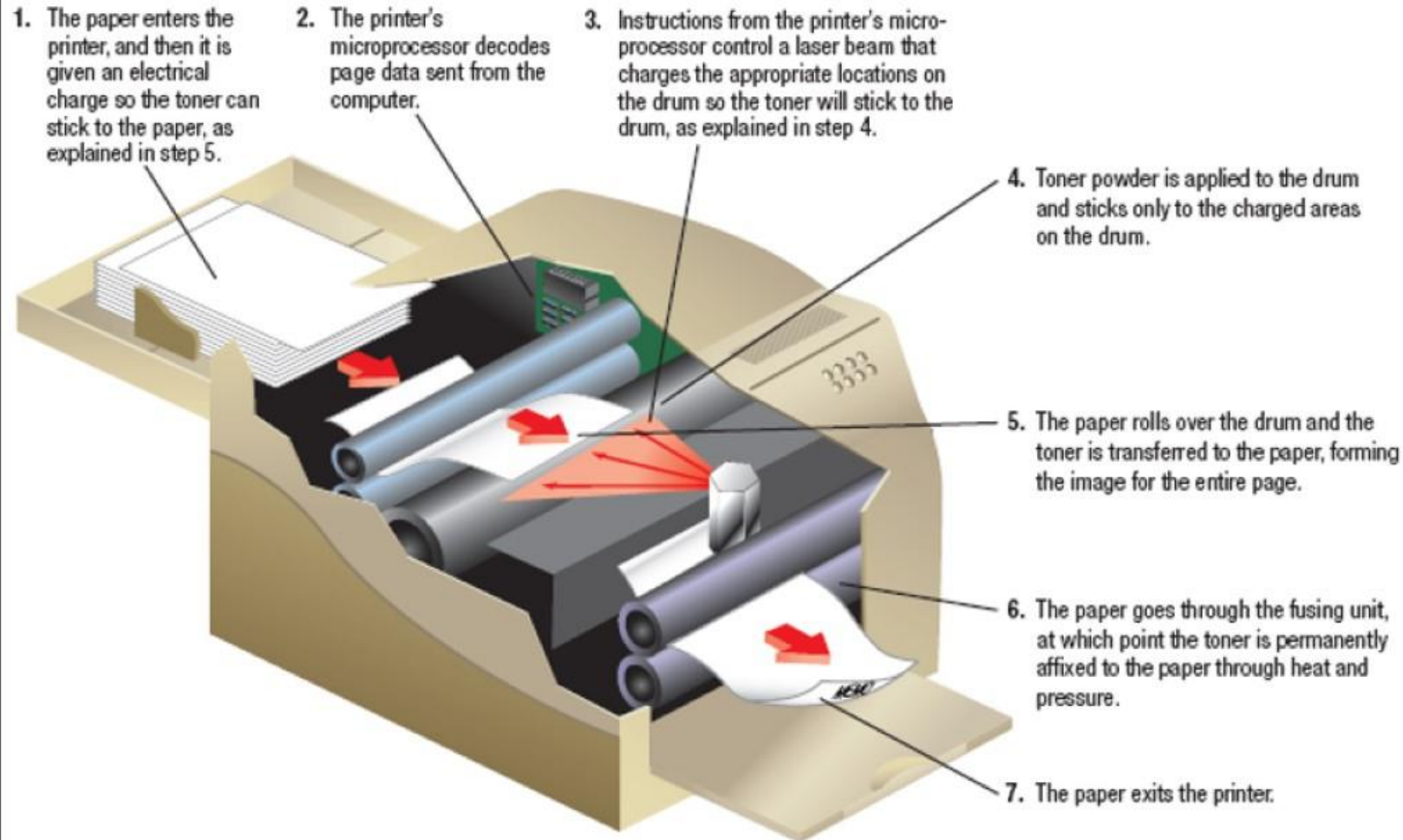
Types of Printers



Laser Printers

- Laser printer: Uses toner powder and technology similar to that of a photocopier to produce images on paper.
 - The standard for business documents.
 - Print one entire page at a time.
 - Generally faster and have better quality than ink-jet printers.
 - Can be black and white or color.
 - Common print resolution for laser printers is between 600 and 2,400 dpi.
 - Use toner cartridges.

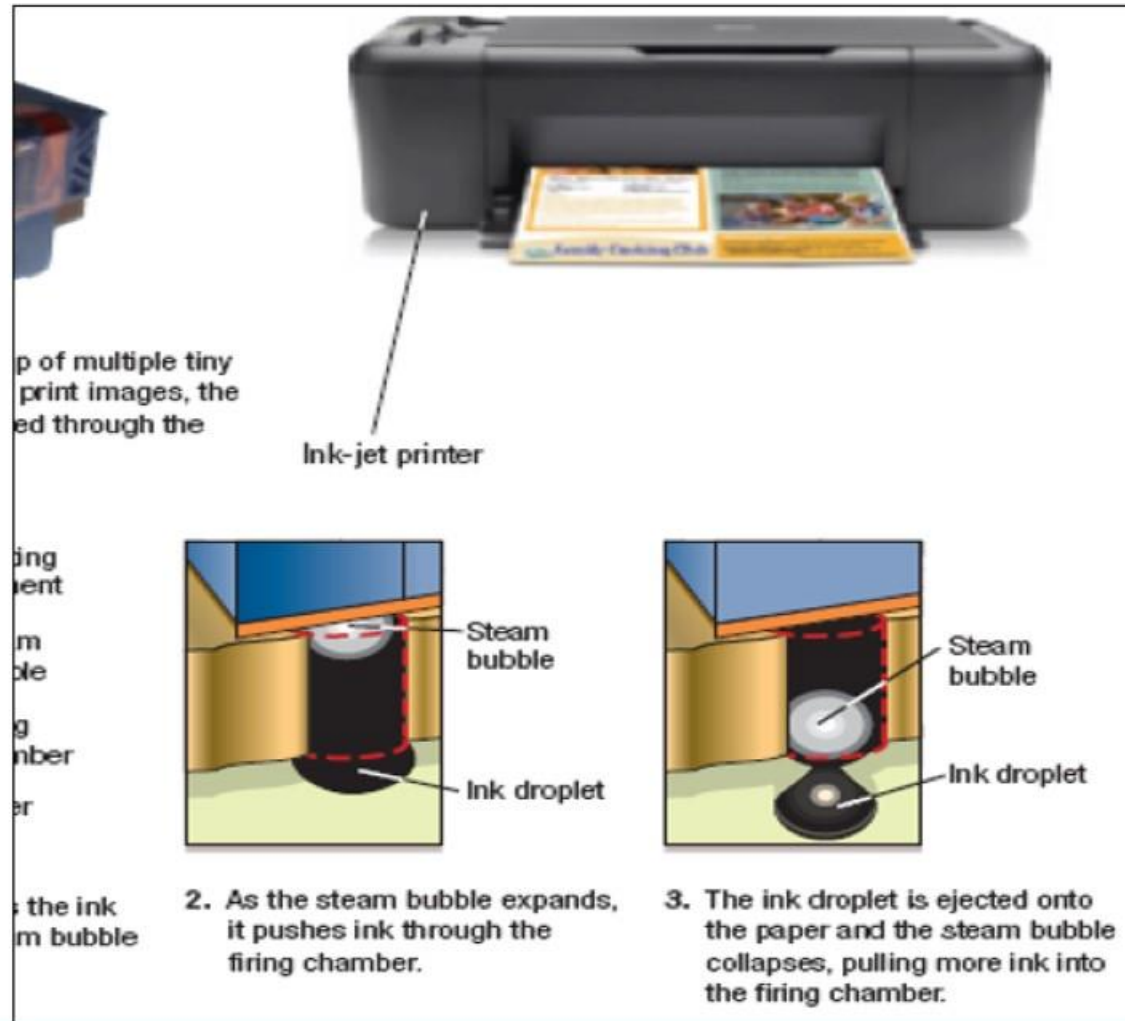
Laser Printers



Ink-Jet Printers

- Ink-jet printer: Sprays droplets of ink to produce images on paper.
 - Usually print in color.
 - Often the choice for home use.
 - Print fairly slowly, one line at a time.
 - Quality not quite as good as a laser printer.
 - Use ink-jet cartridges.
- Newer printers with full width printheads are much faster.
- Potential applications for the future.
 - Dispensing liquid metal, aromas, computer chips and other circuitry, “printing” human tissue.

Ink-Jet Printers



Special-Purpose Printers

- Photo printers.
- Barcode, label, and postage printers.
- Portable printers.
- Plotters and wide-format ink-jet printers.
- 3-D printers.



PHOTO PRINTERS

Used to print digital photographs in a variety of sizes.



BARCODE PRINTERS

Used to print barcoded labels. This printer can also program RFID tags, when they are embedded inside the barcoded labels.



PORTABLE AND INTEGRATED PRINTERS

This printer uses no ink and is integrated into the digital camera to print digital photographs.



WIDE-FORMAT PRINTERS

Used for printouts that are too big for a standard-sized printer.



3D PRINTERS

Used to print items (such as plastic parts or models) in 3D.

Audio Output

- Audio output: Output in the form of voice, music, and other audible sounds.
 - Speakers.
 - Headphones and headsets.
 - Earphones and earbuds.



COMPUTER SPEAKERS
Used to output sound from a computer.



IPOD/MP3 DOCK
Used to output sound from a portable digital media player.



HEADSETS
Used when both voice input and audio output are required.

Summary

- Keyboards.
- Pointing and Touch Devices.
- Scanners, Readers, and Digital Cameras.
- Audio Input.
- Display Devices.
- Printers.
- Audio Output.

Reference

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