

# Introduction to Information Technology IT111

Dr. Eng. Youssef Ntefeh

## Lecture 4 - The System Unit: Input and Output



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY

# 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.

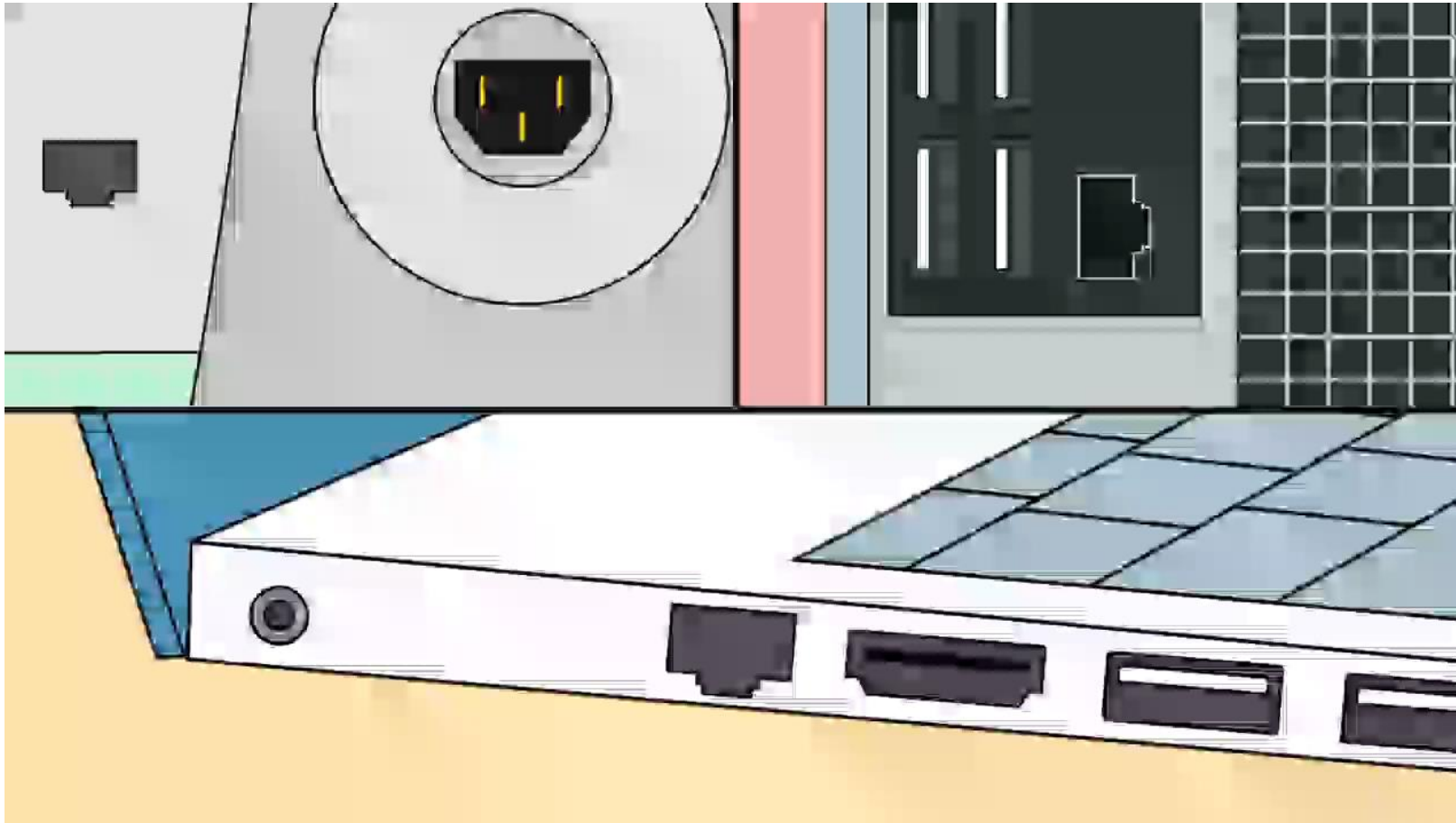
# Overview

- 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



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY





# Ports and Connectors



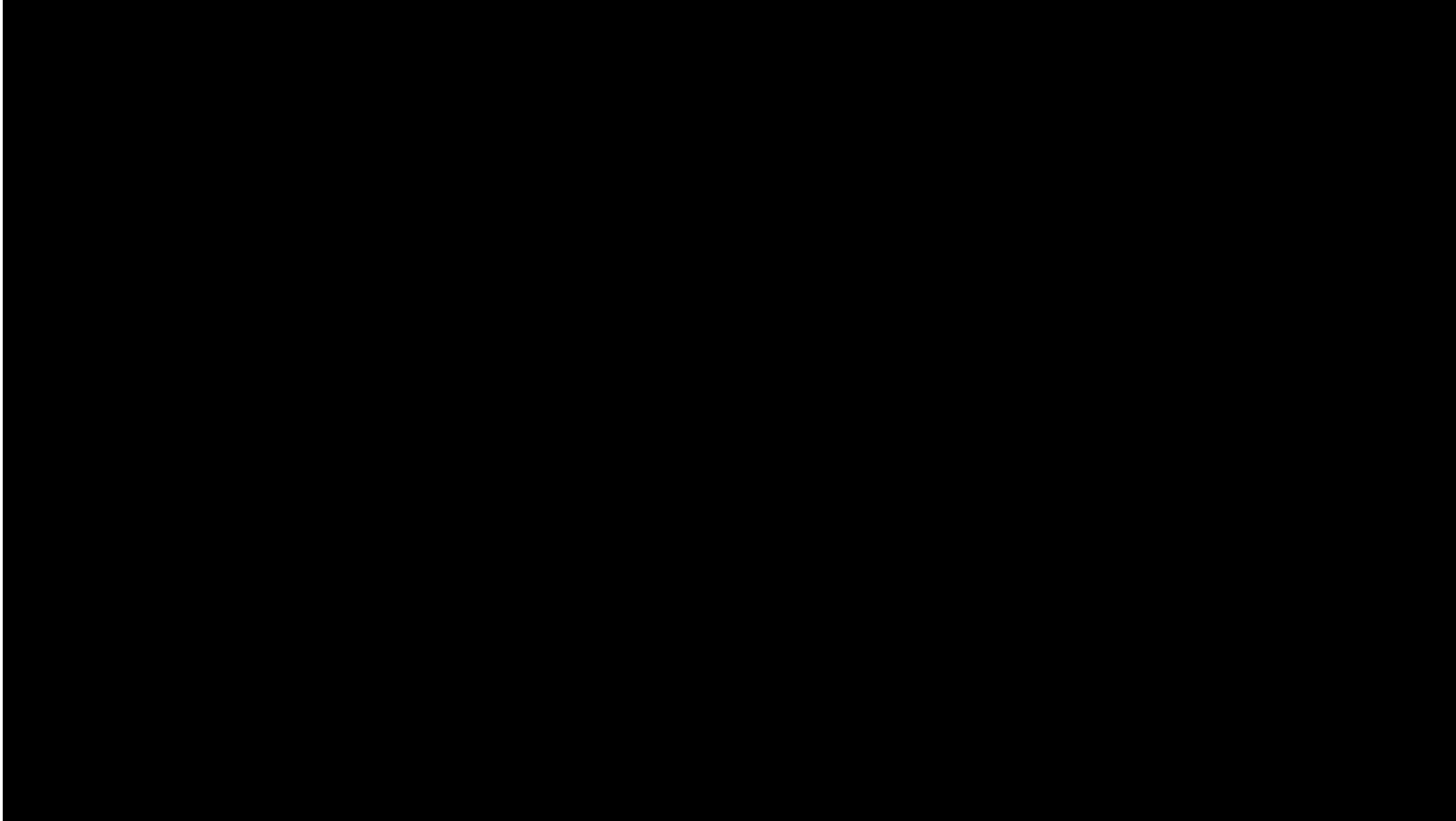
جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY

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

# USB



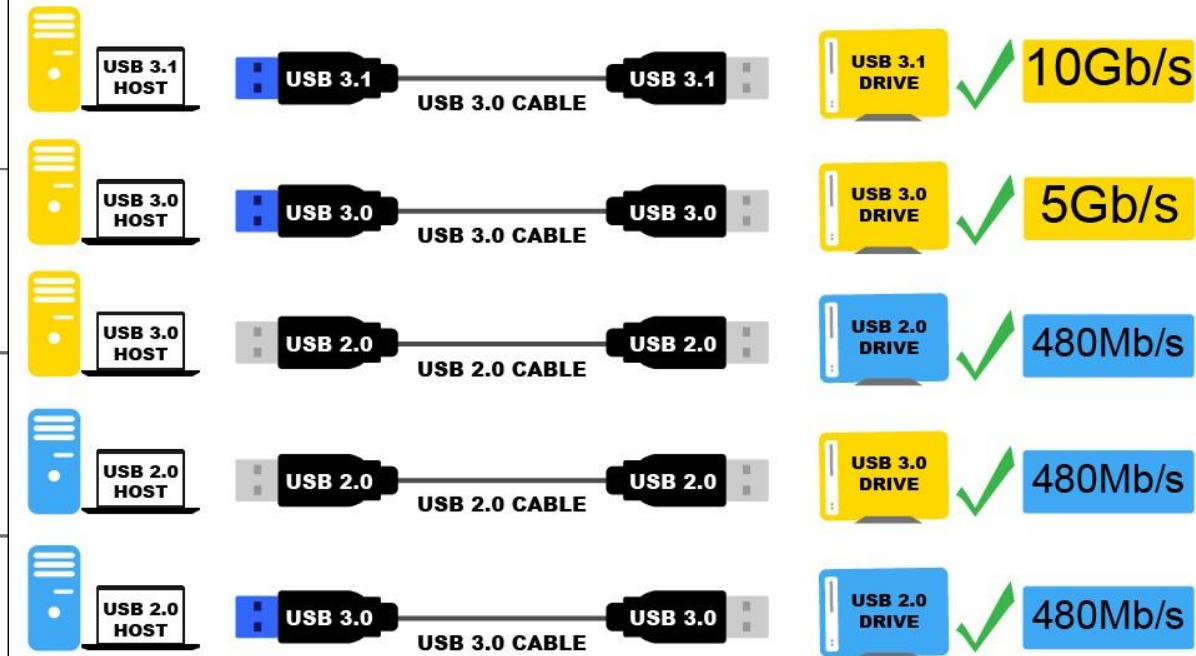
جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



| 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          |



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



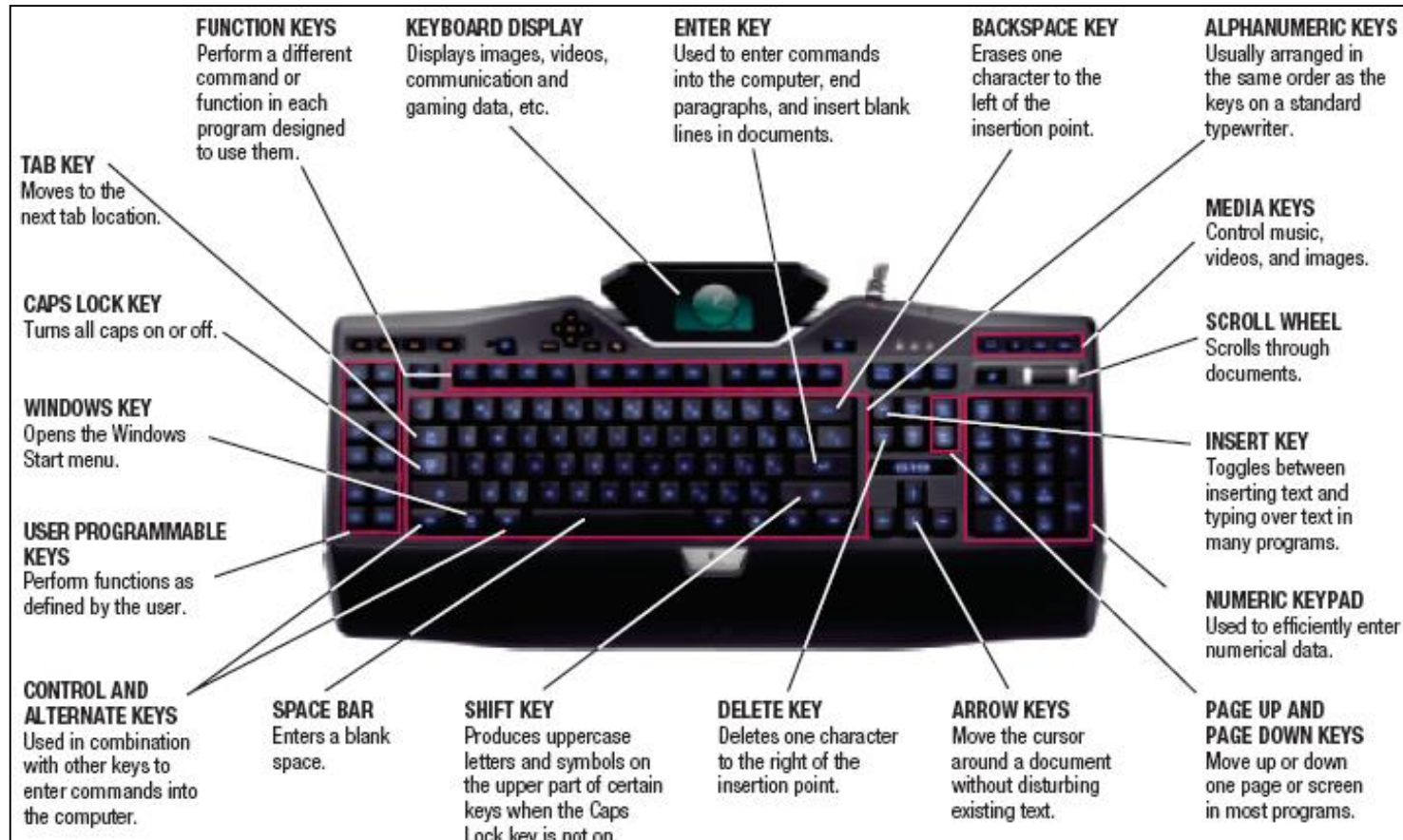
# Keyboards

- 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



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



# 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

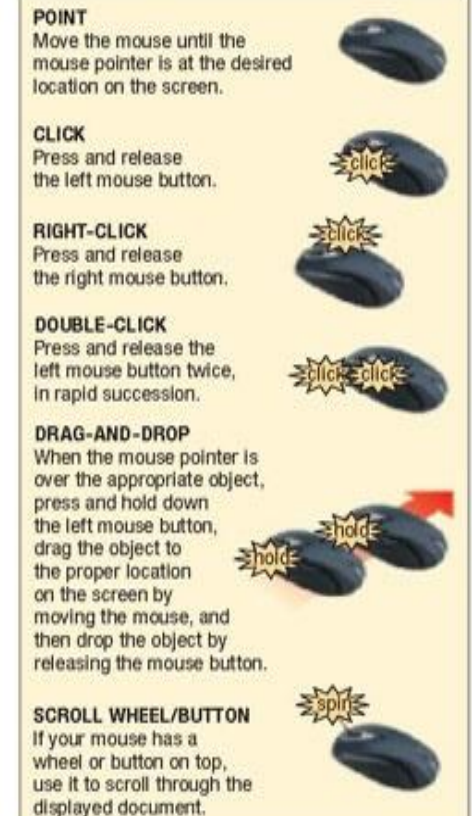
- Pointing devices: Used to select and manipulate objects.
  - Used to input data.
  - Used to issue commands to the computer.
- Common types of pointing devices:
  - Mouse.
  - Pen/stylus.
  - Touch screen.

# Mice



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY

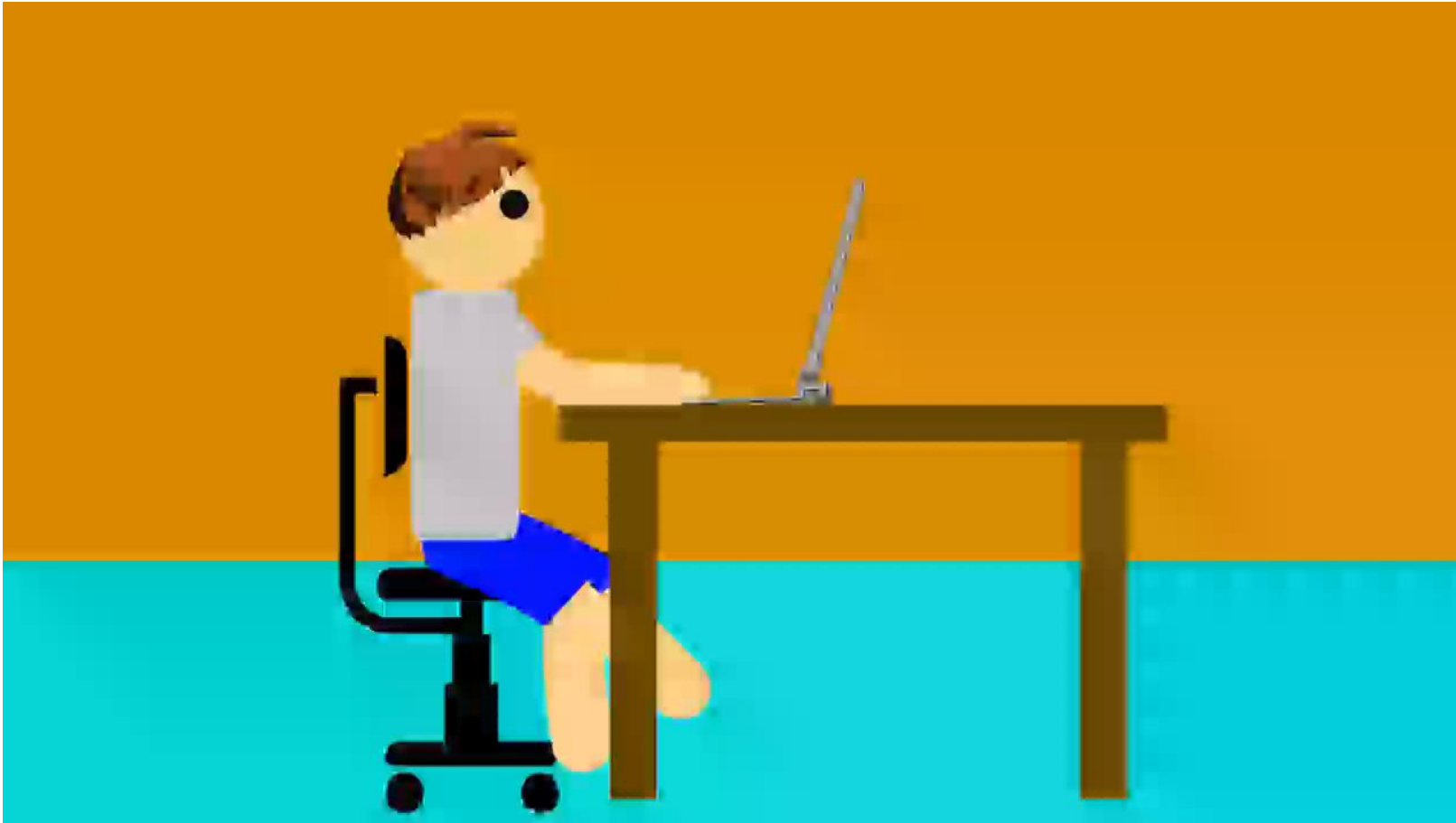
- Mouse: A common pointing device that the user slides along a flat surface to move a pointer around the screen and clicks its buttons to make selections.
  - Older mechanical mice use a ball.
  - Optical or laser mice track with light.
  - Can be wireless.



# How Mouse works



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



# Pens/Styluses

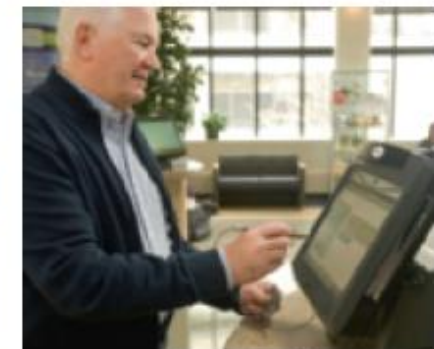
- Stylus: Pen-like device used to draw or write electronically on the screen.
- Also called digital pen, electronic pen, tablet pen.
- Commonly used with pen-based computers.
  - Used to issue commands and input data.
  - If handwriting recognition is used, written text can be converted to editable typed 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



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



# Scanners, Readers, and Digital Cameras



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



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.

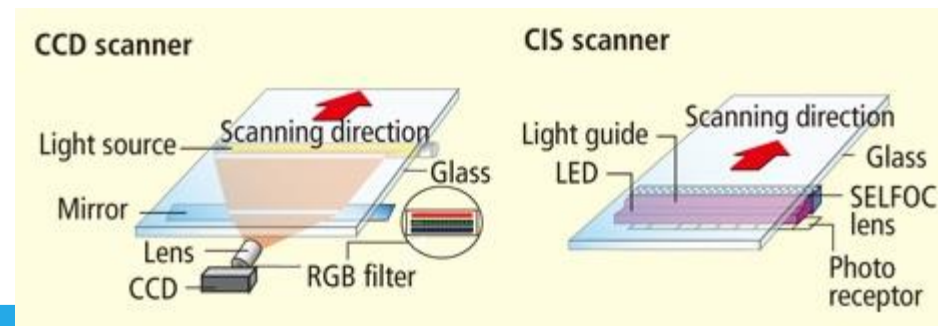


## INTEGRATED SCANNERS

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

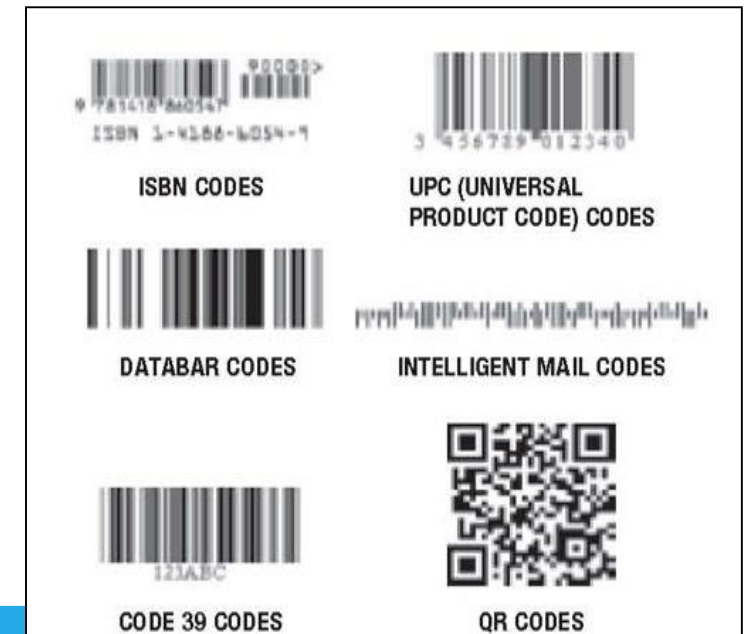


جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



# Barcode Readers

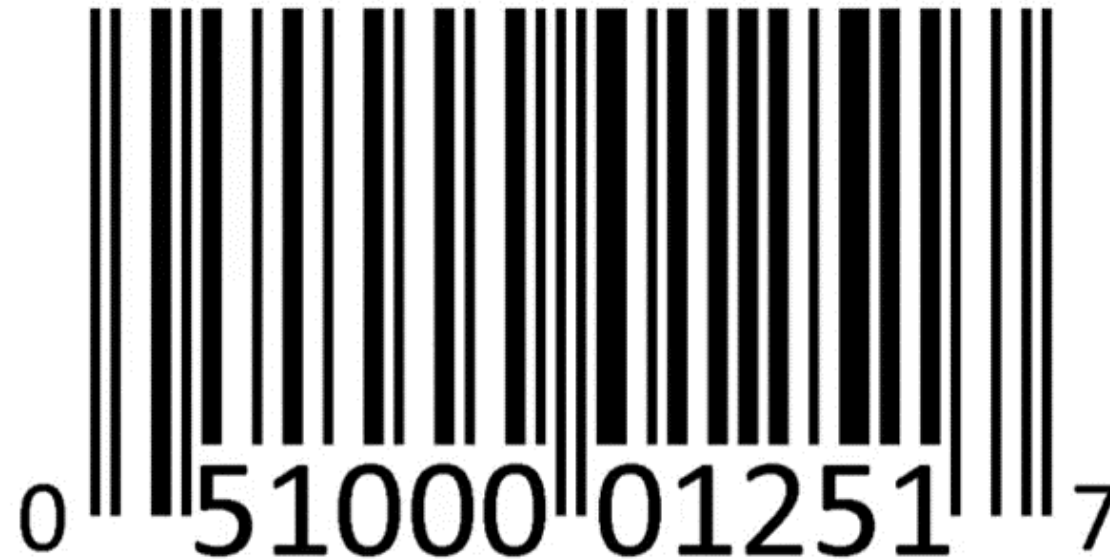
- Barcode readers: Input devices that read barcodes.
- Barcode: Machine-readable code that represents data as a set of bars.
  - Common types:
    - Universal Product Code (UPC).
    - ISBN.
    - Code 39.
    - Intelligent mail code.
    - 2D (QR) – hold more data.



# How barcode read



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



# 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.

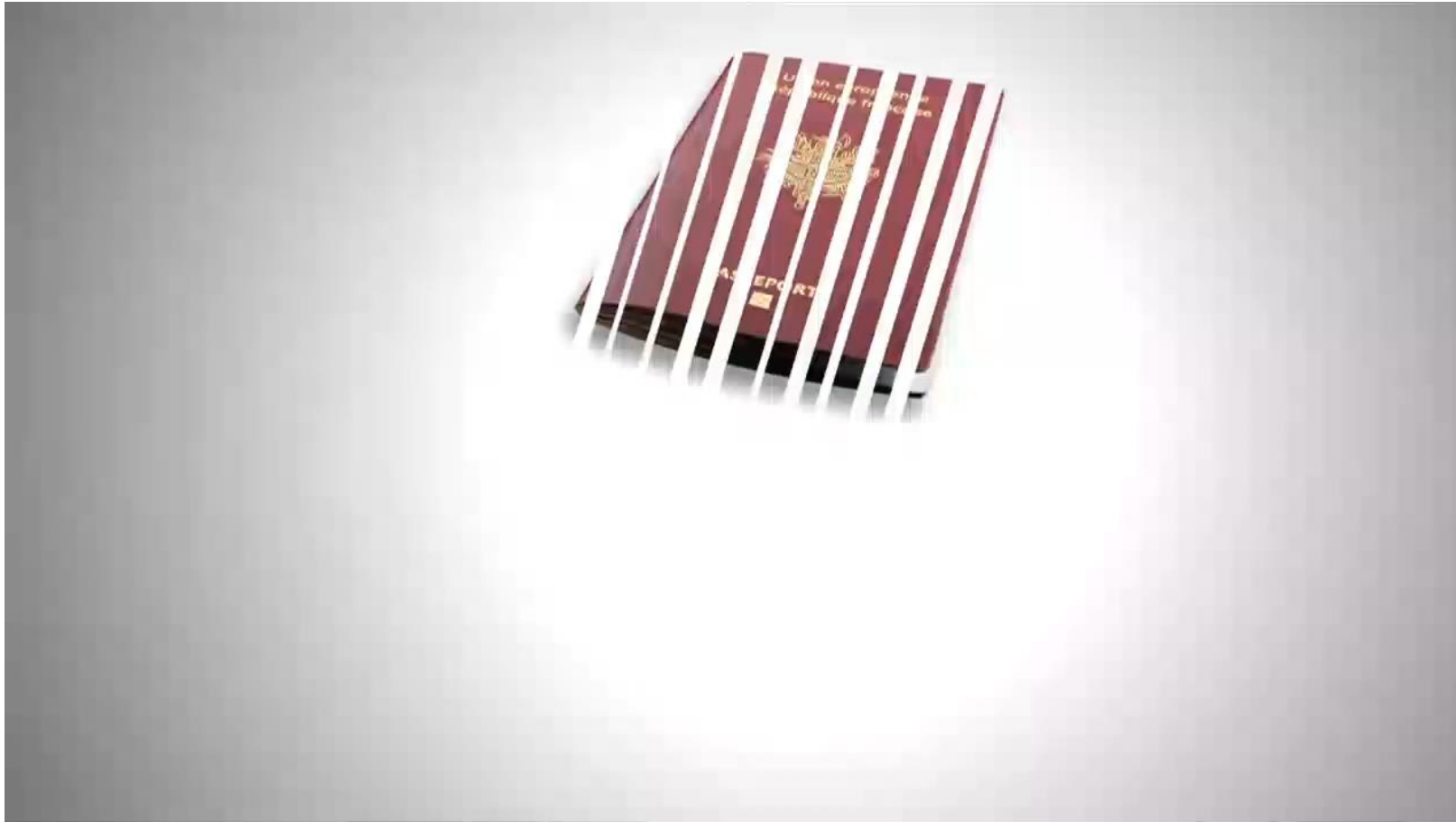


**BUILT-IN FINGERPRINT READERS**  
Typically used to control access to the device into which the reader is built, such as to the external hard drive shown here.

# Biometric



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



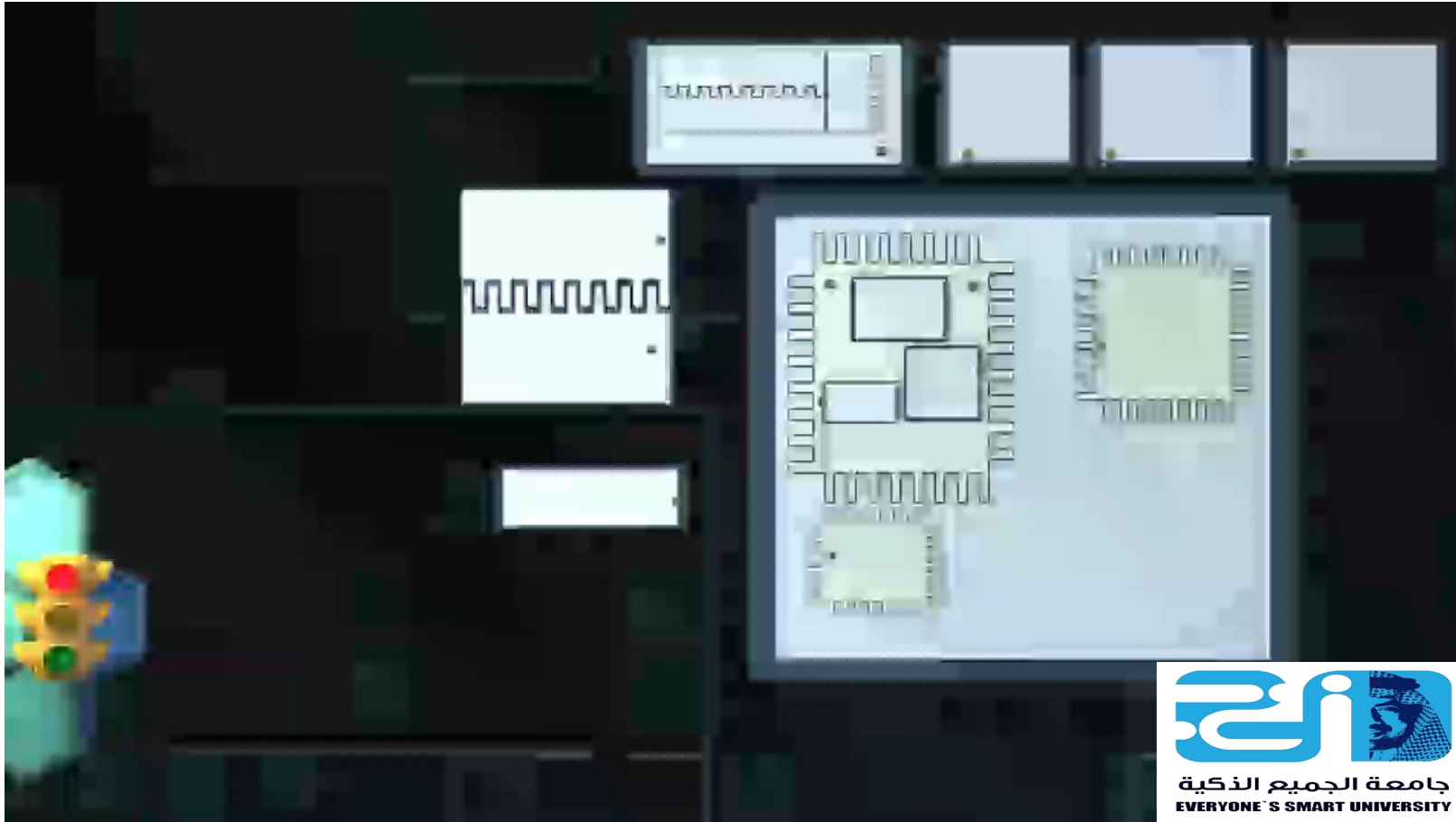
# Digital Cameras

- 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?



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY

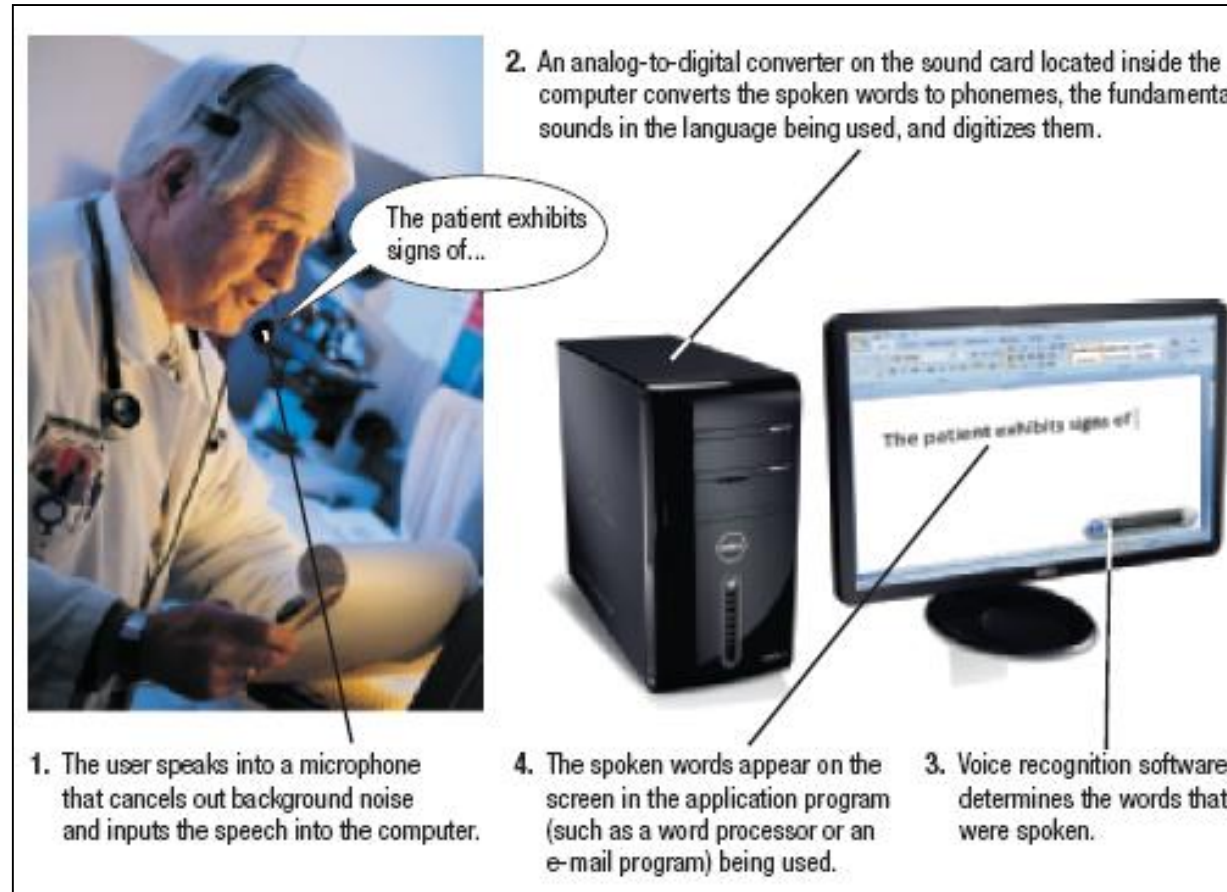
# Audio Input

- 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



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



# 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

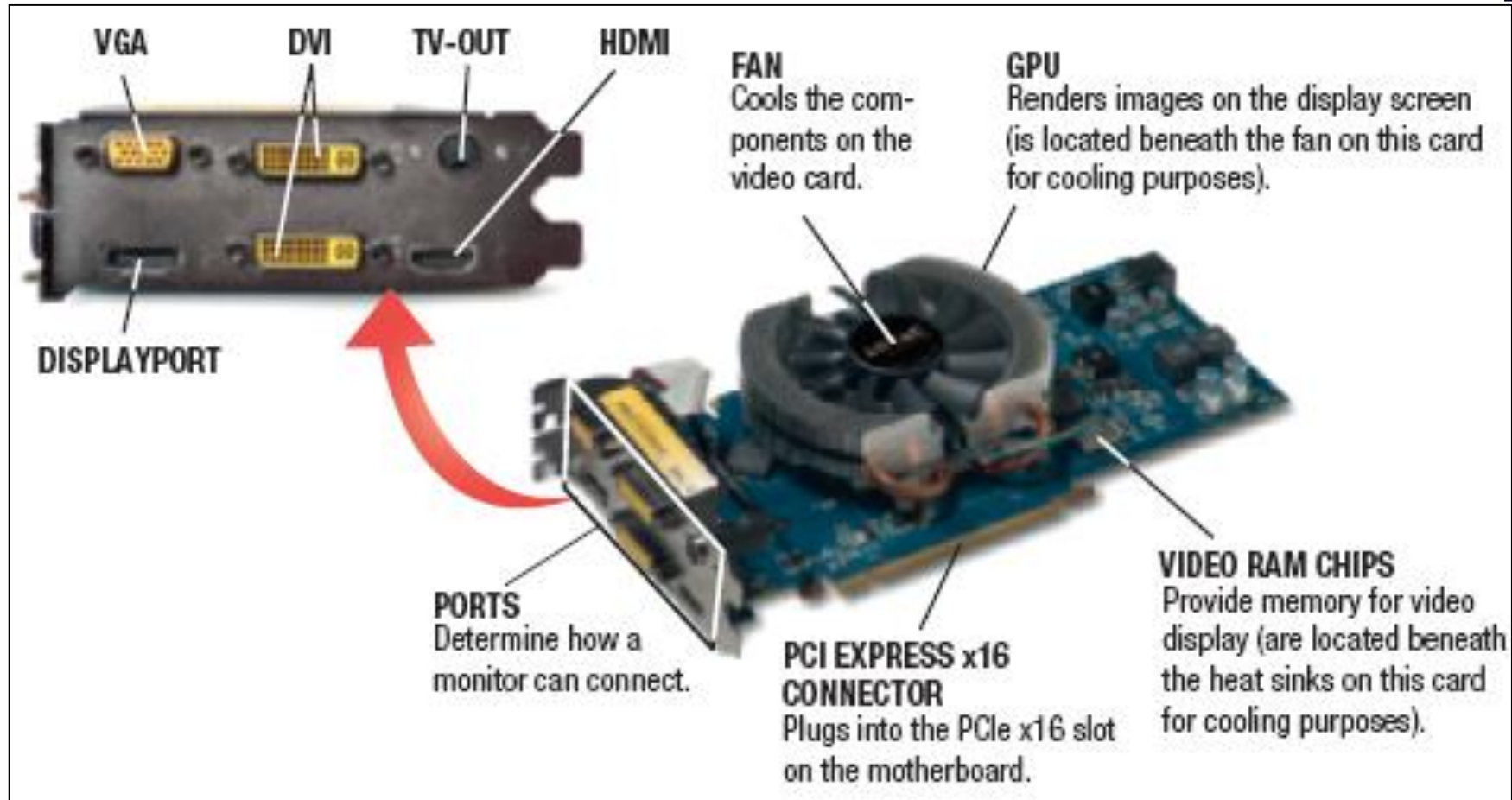


جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



RESOLUTION

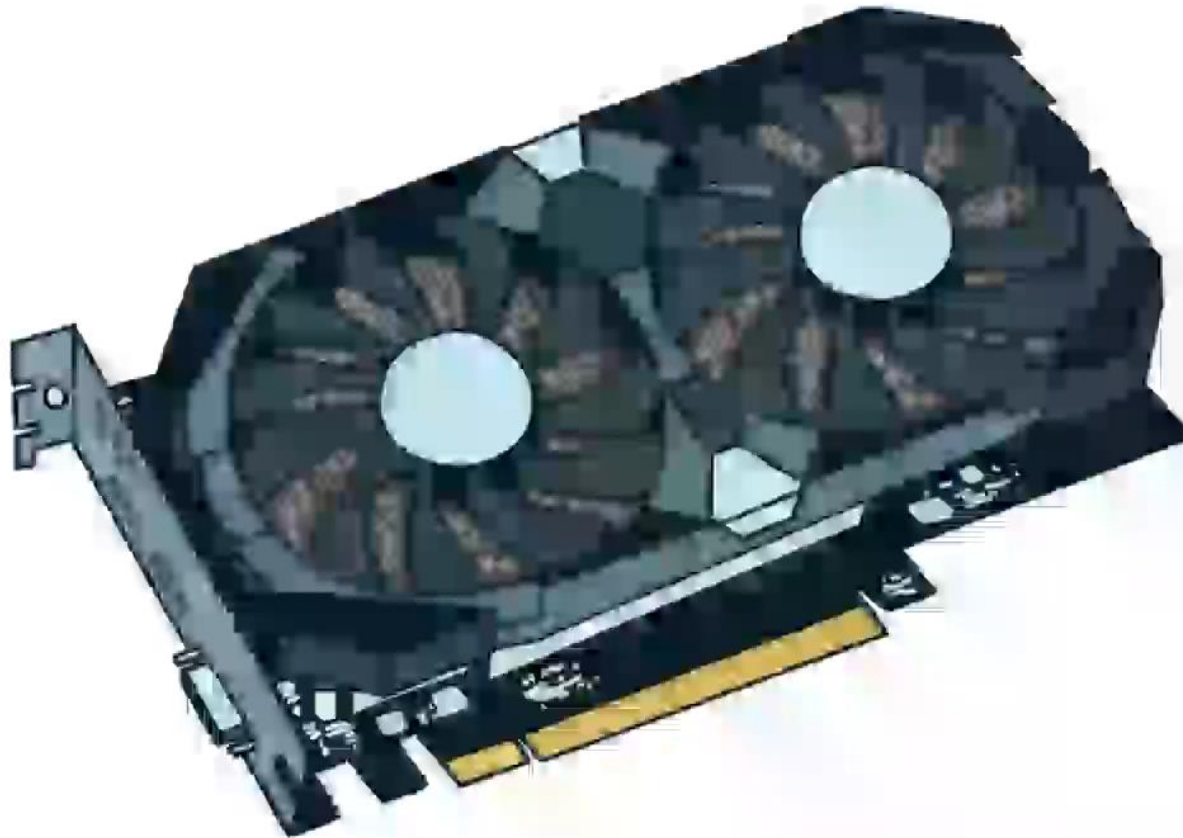
# Video Adapters



# Graphics Card



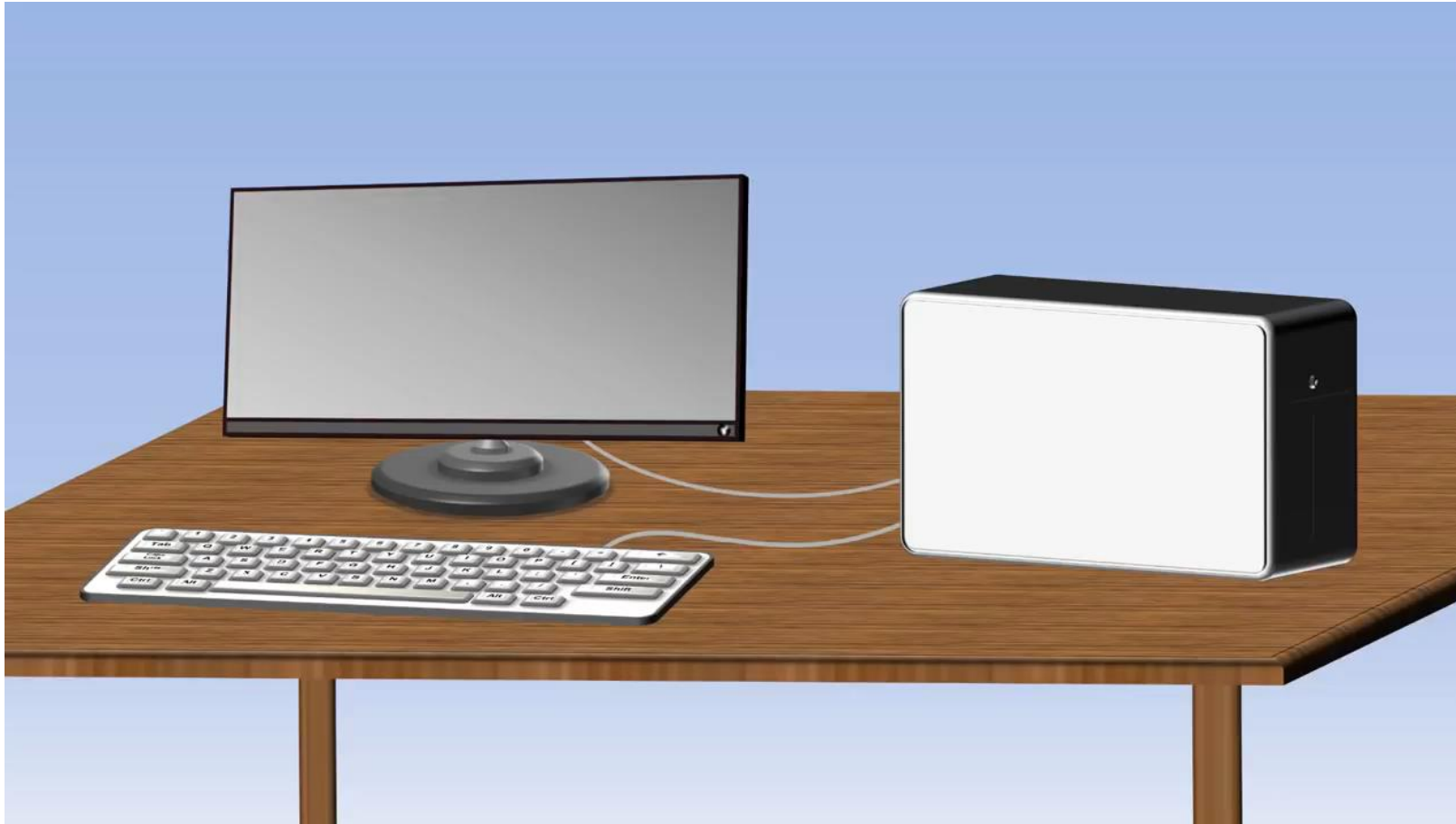
جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



# LCD



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



# LCD vs. LED



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY

# 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.



# Printers

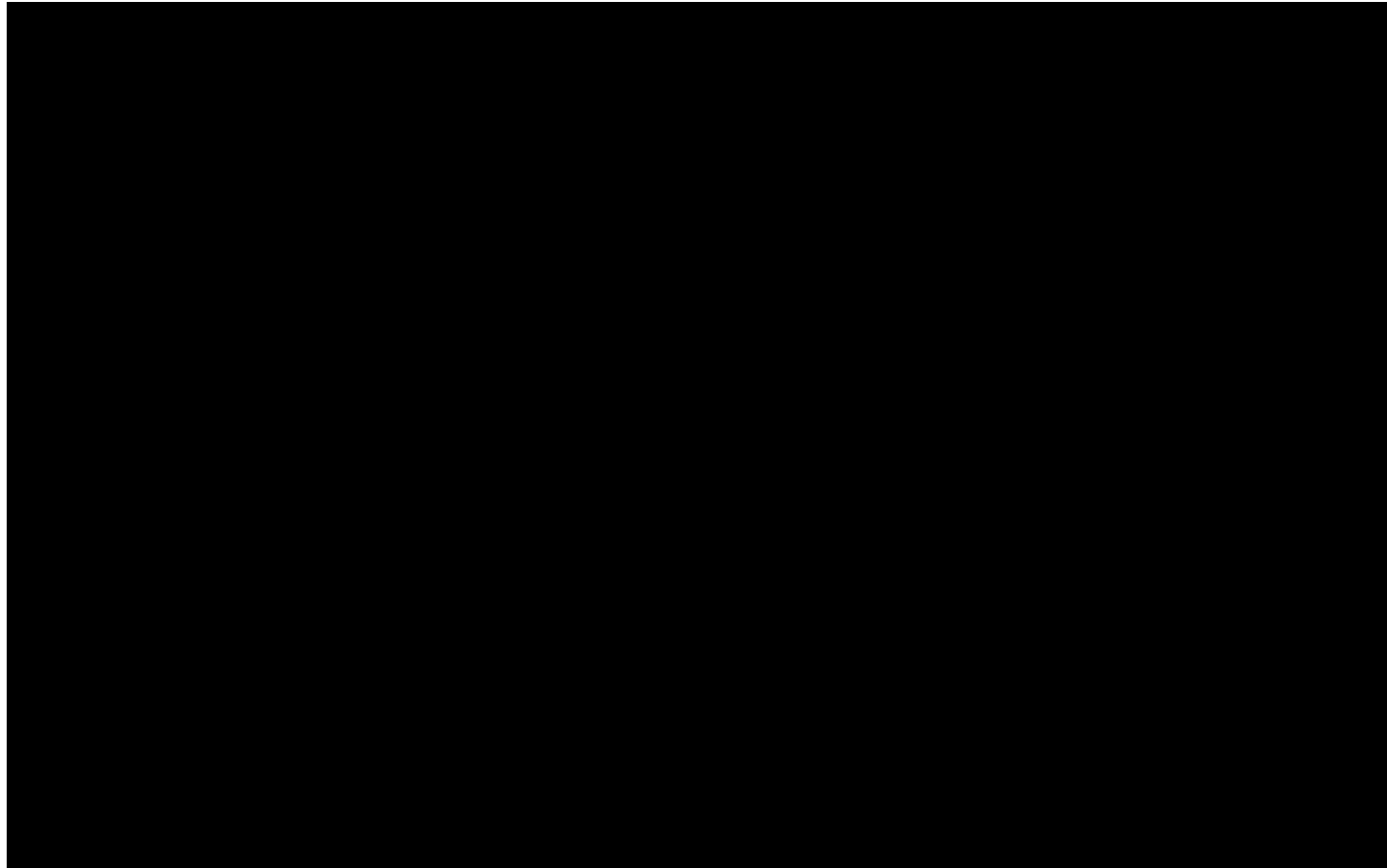
- Printers: Produce hard copy.
- Printer characteristics:
  - Printing technology used.
    - Impact vs. nonimpact.
  - Color vs. black and white.
  - Personal vs. network printers.
  - Print resolution (measured in dpi).
  - Print speed (measured in pages per minute (PPM)).
  - Connection (USB, Ethernet,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



# Types of Printers



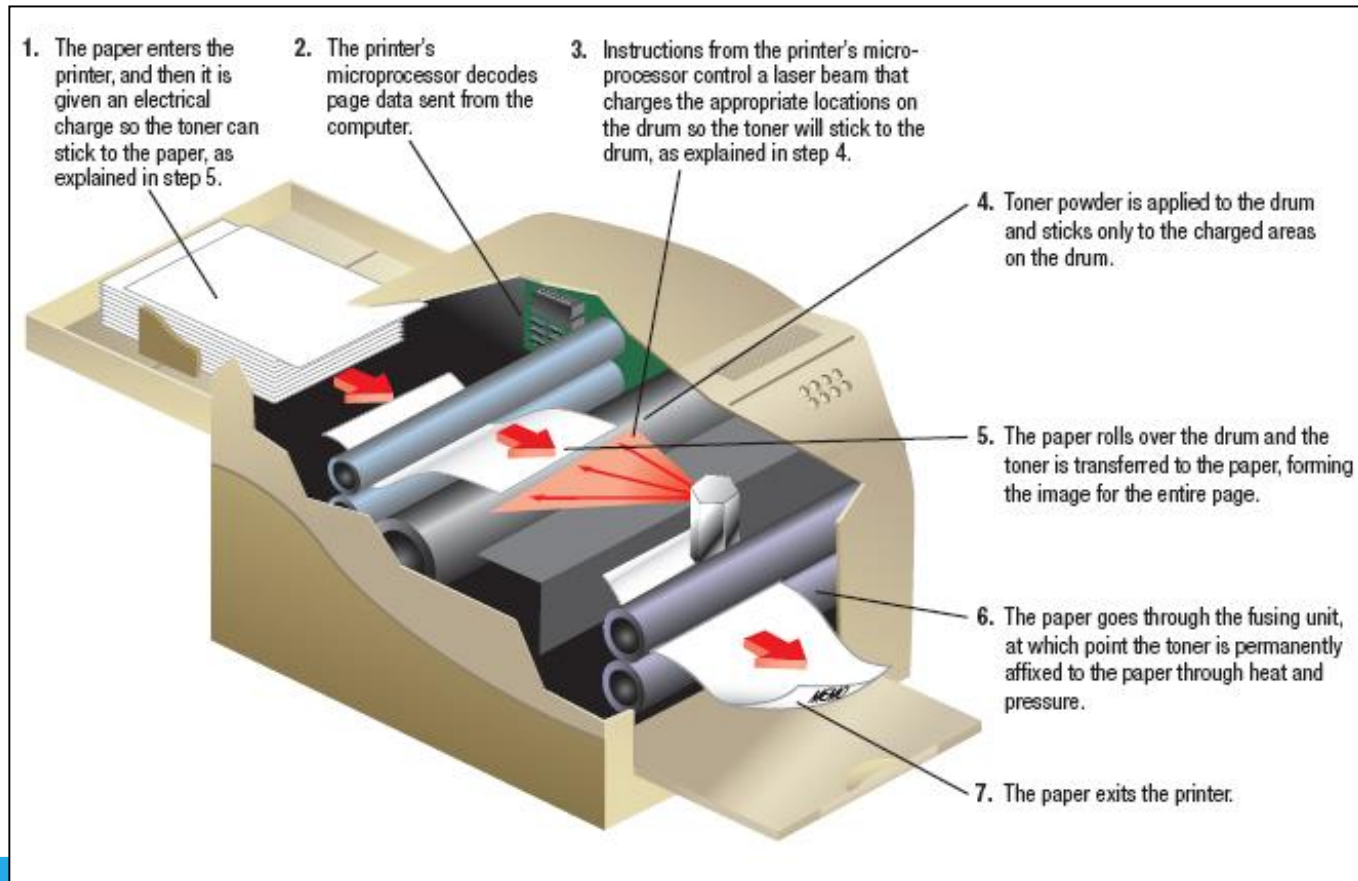
جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY



# 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.

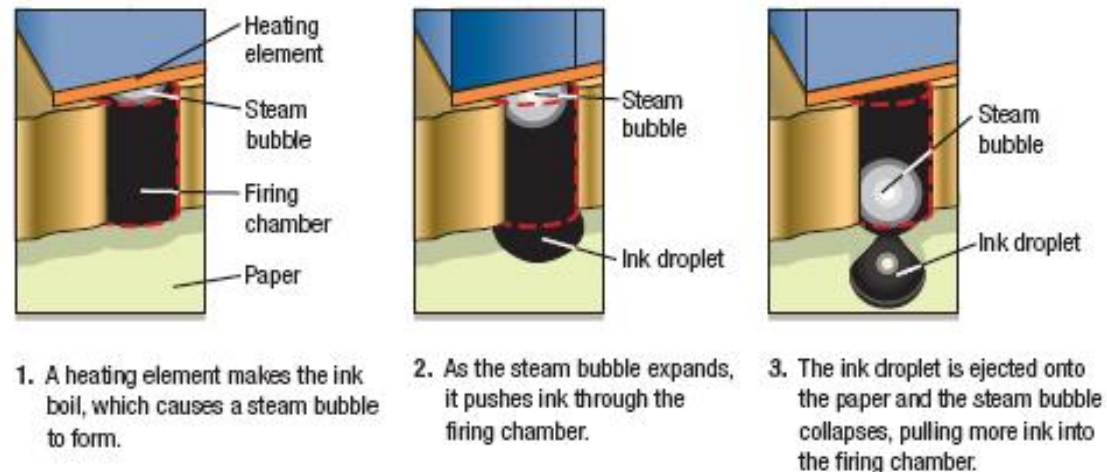
# Laser Printers



# 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



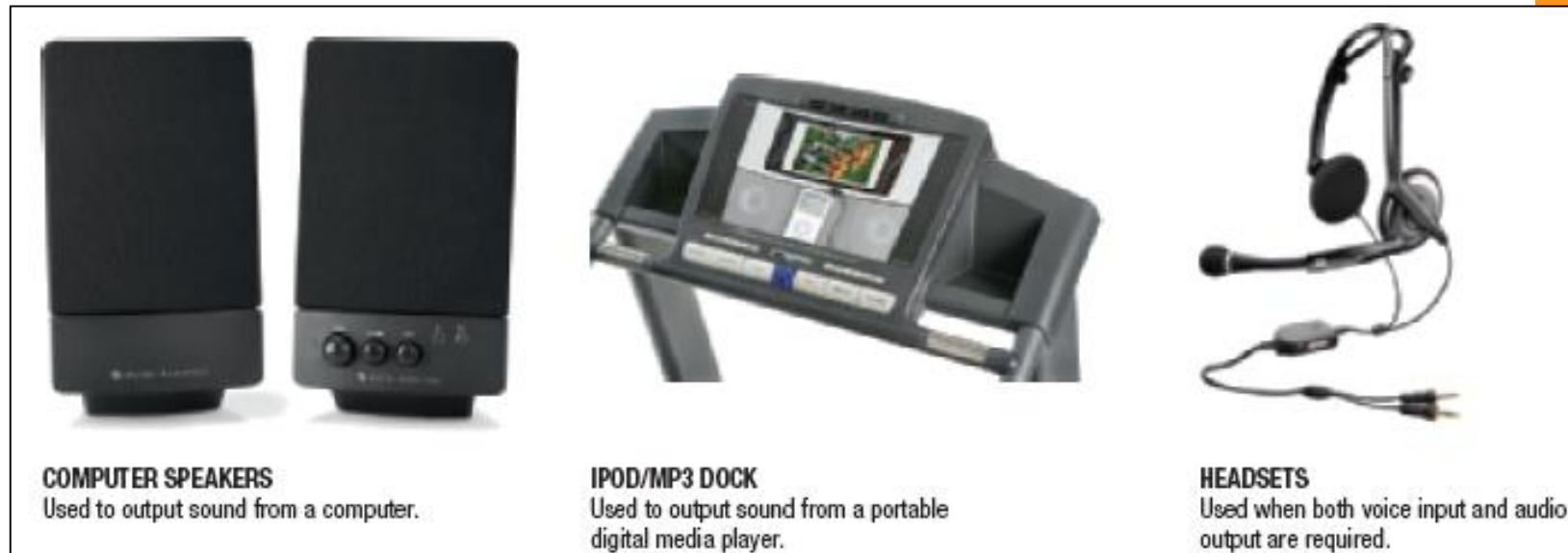
جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY

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



# Audio Output

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



# Summary

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

# Reference



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY

