Discovering Computers
Tools, Apps, Devices, and the Impact of Technology

Chapter

Input and Output

Objectives Overview

Differentiate among various types of keyboards: standard, compact, on-screen, virtual, ergonomic, gaming, and wireless

Describe characteristics of various pointing devices: mouse, touchpad, and trackball

Describe various uses of touch screens

Describe various types of pen input: stylus, digital pen, and graphics tablet

Describe various uses of motion input, voice input, and video input

Objectives Overview

Differentiate among various scanners and reading devices

Explain the characteristics of various displays

Summarize the various types of printers

Identify the purpose and features of speakers, headphones and earbuds, data projectors, interactive whiteboards, and force-feedback game controllers and tactile output

Identify various assistive technology input and output methods

What Is Input?

- **Input** is any data and instructions entered into the memory of a computer

Figure 7-1

What Is Input?

- Commonly used input methods include:

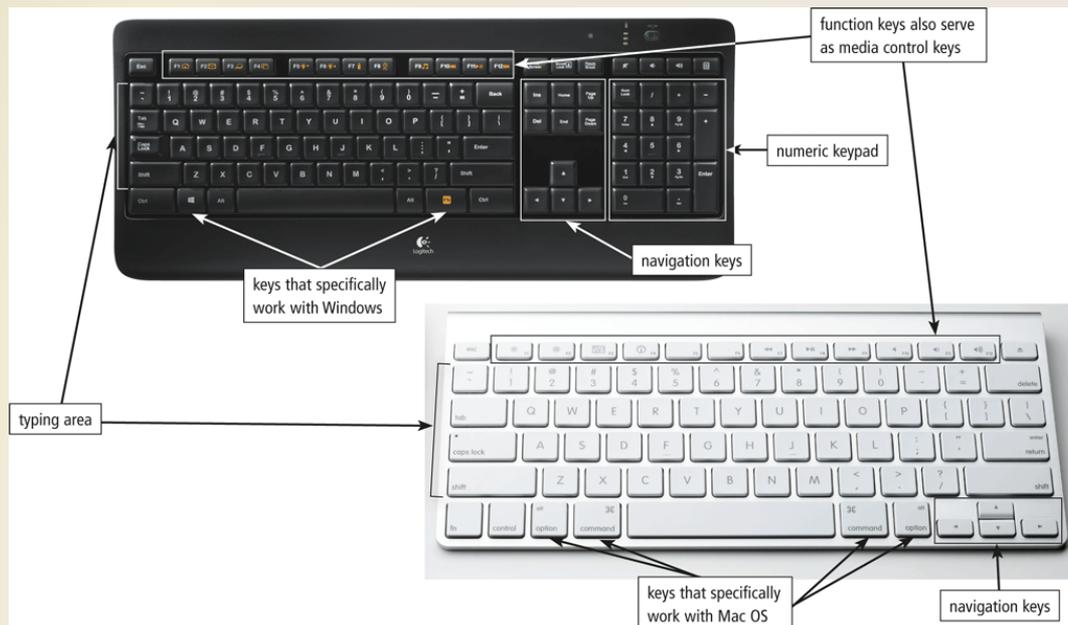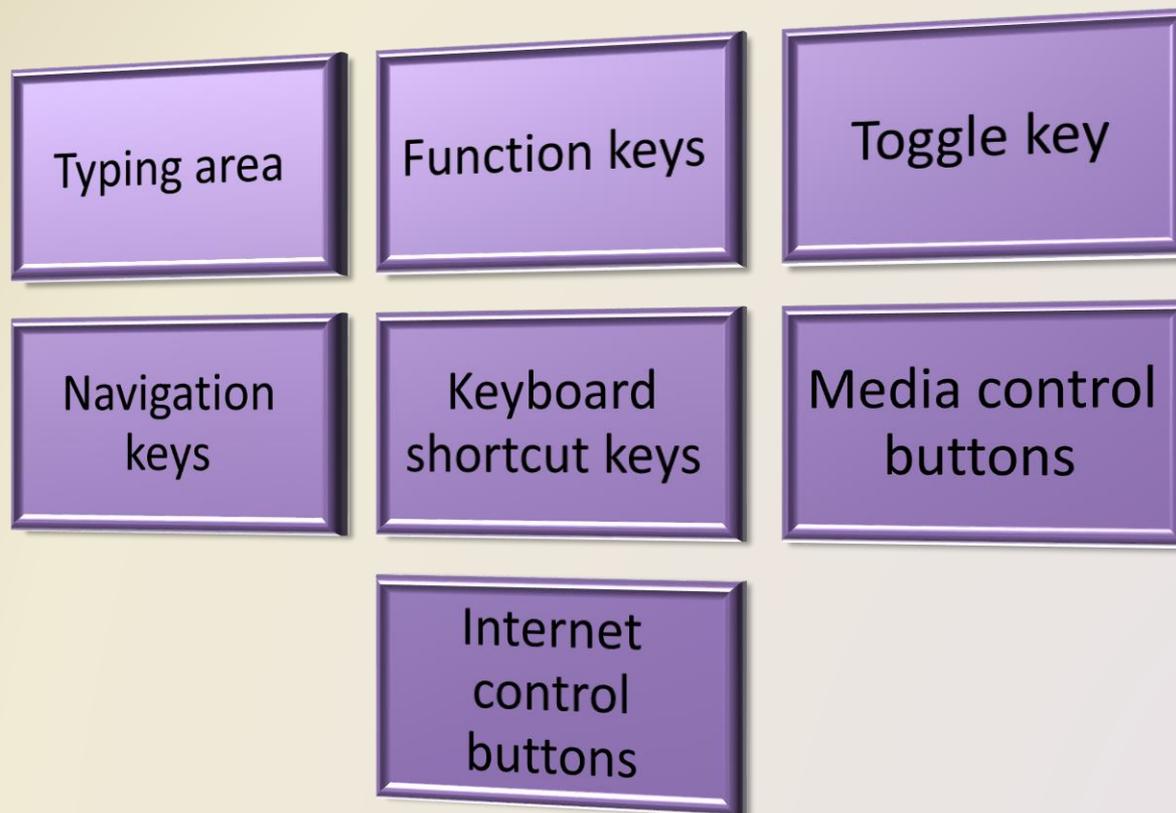| Keyboard	Pointing devices	Touch screens	Pen input
Motion input	Voice input	Video input	Scanners and reading devices

Keyboards

- A **keyboard** is an input device that contains keys users press to enter data and instructions into a computer or mobile device

function keys also serve as media control keys

numeric keypad

navigation keys

keys that specifically work with Windows

typing area

keys that specifically work with Mac OS

navigation keys

Keyboards

• Most desktop computer keyboards have…

Typing area

Function keys

Toggle key

Navigation keys

Keyboard shortcut keys

Media control buttons

Internet control buttons

Keyboards

- There are a variety of keyboard options for computers and mobile devices

built-in laptop
keyboard

clip-on tablet
keyboard

on-screen
keyboards

Keyboards

- An ergonomic keyboard has a design that reduces the chance of repetitive strain injuries of wrist and hand

- Ergonomics incorporates comfort, efficiency, and safety in the design of the workplace

Pointing Devices

A **pointer** is a small symbol on the screen whose location and shape change as a user moves a pointing device

Pointing Devices

- A **mouse** is a pointing device that fits under the palm of your hand comfortably
  - Optical mouse, laser mouse, and touch mouse

optical mouse
wheel button
right button
left button
thumb buttons
touch mouse

11
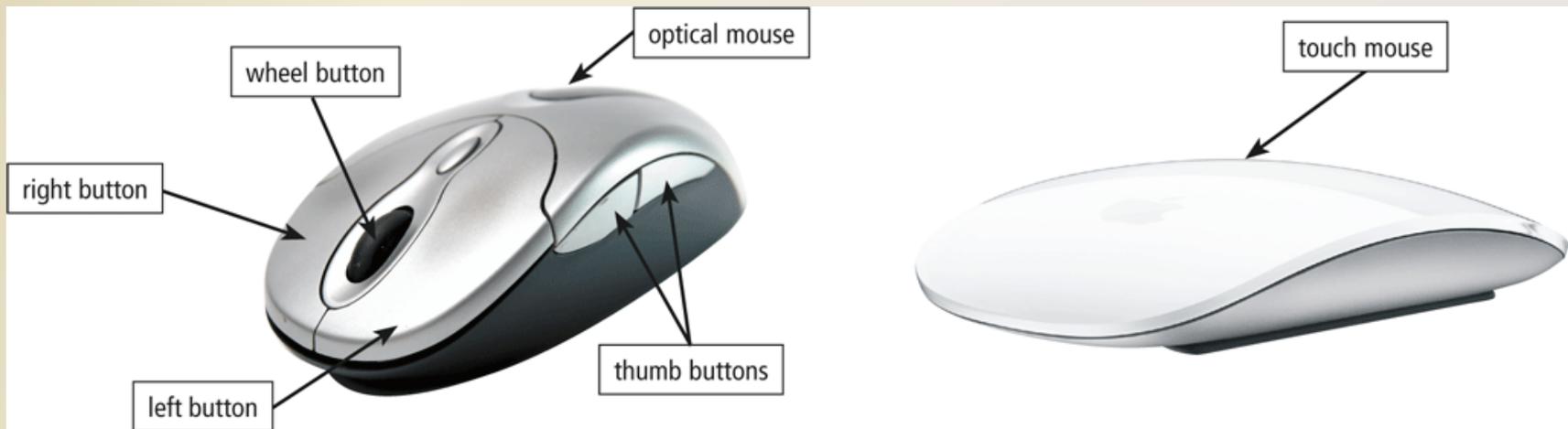
Pointing Devices

Touchpad

- A **touchpad** is a small, flat, rectangular pointing device that is sensitive to pressure and motion

Trackball

- A **trackball** is a stationary pointing device with a ball on its top or side

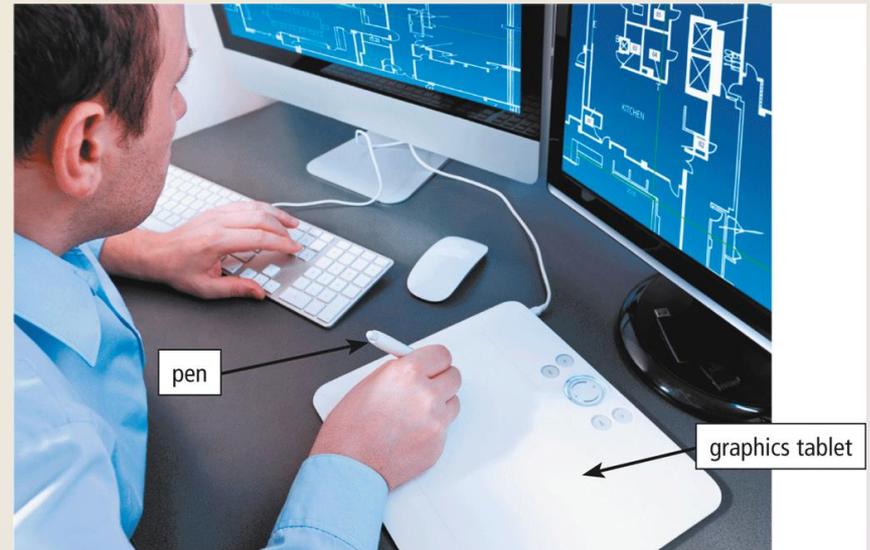# Touch Screens

- A **touch screen** is a touch-sensitive display

Pen Input

- With **pen input**, you touch a **stylus** or **digital pen** on a flat surface to write, draw, or make selections
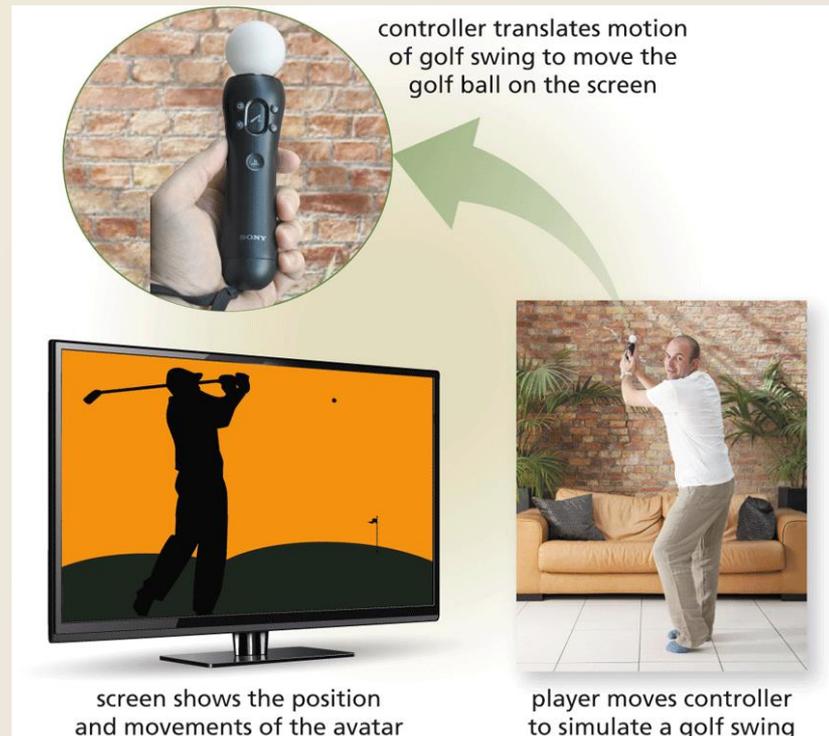
14

Pen Input

- A **graphics tablet**, also called a digitizer, is an electronic plastic board that detects and converts movements of a style or digital pen into signals that are sent to the computer

15

Motion, Voice, and Video Input

- With motion input, sometimes called gesture recognition, users can guide on-screen elements using air gestures

controller translates motion of golf swing to move the golf ball on the screen

screen shows the position and movements of the avatar

player moves controller to simulate a golf swing

Motion, Voice, and Video Input

- Voice input is the process of entering input by speaking into a microphone

- **Voice recognition**, also called speech recognition, is the computer or mobile device's capability of distinguishing spoken words

Motion, Voice, and Video Input

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

- Music production software allows users to record, compose, mix, and edit music and sounds

Motion, Voice, and Video Input

- Video input is the process of capturing full-motion images and storing them on a computer or mobile device's storage medium

Record video on a **digital video (DV) camera**

Transfer video to a computer or mobile device

Motion, Voice, and Video Input

- A **webcam** is a type of DV camera that enables a user to:

Capture video and still images

Send email messages with video attachments

Broadcast live images or video over the Internet

Conduct videoconferences

Make **video calls**

Motion, Voice, and Video Input

- A **videoconference** is a meeting between two or more geographically separated people

Scanners and Reading Devices

- A **scanner** is a light-sensing input device that reads printed text and graphics and then translates the results into a form the computer can process
  - A flatbed scanner works in a manner similar to a copy machine except it creates a file of the document in memory instead of a paper copy

Scanners and Reading Devices

How a Flatbed Scanner Works

Step 1
Place the document to be scanned face down on the glass window. Using buttons on the scanner or the scanner program, start the scanning process.
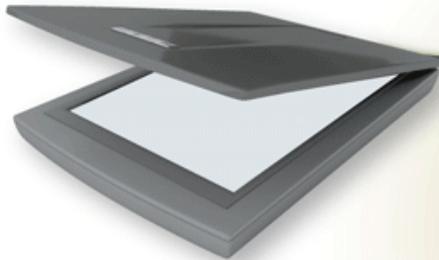
Step 2
The scanner converts the document content to digital information, which is transmitted through the cable to the computer's memory and saved on the computer's hard drive.

Step 3
Once in the computer, users can display the image, print it, send it in an email message, include it in a document, or place it on a webpage.

Scanners and Reading Devices

- An optical reader is a device that uses a light source to read characters, marks, and codes and then converts them into digital data that a computer can process
  - Optical character recognition (OCR)
  - Optical mark recognition (OMR)

Scanners and Reading Devices

- A **bar code reader**, also called a bar code scanner uses laser beams to read **bar codes**

- A **QR code** stores information in both a vertical and horizontal direction

25

Scanners and Reading Devices

- **RFID** (radio frequency identification) uses radio signals to communicate with a tag placed in or attached to an object
- An **RFID reader** reads information on the tag via radio waves
- RFID can track:

| Tracking times of runners in a marathon | Tracking location of people and other items | Checking lift tickets of skiers | Managing inventory | Gauging temperature and pressure of tires on a vehicle |

| Checking out library books | Providing access to rooms or buildings | Managing purchases | Tracking payment as vehicles pass through booths on tollway systems |

Scanners and Reading Devices

- **Magstripe readers** read the magnetic stripe on the back of cards such as:
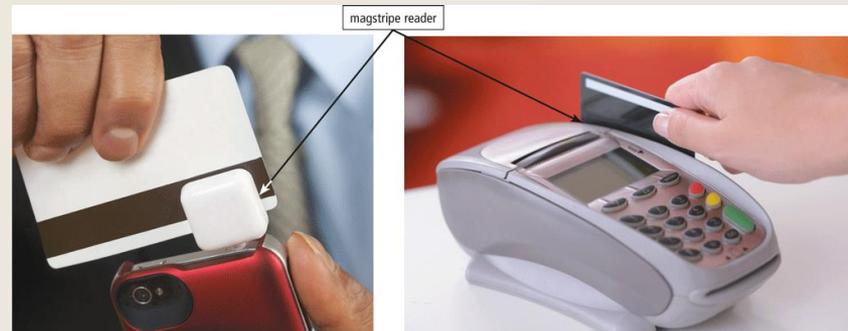
Credit cards

Entertainment cards

Bank cards

Identification cards

Other similar cards

magstripe reader

Scanners and Reading Devices

- MICR (magnetic ink character recognition) devices read text printed with magnetized ink

- An MICR reader converts MICR characters into a form the computer can process

- Banking industry uses MICR for check processing

28

Scanners and Reading Devices

- A data collection device obtains data directly at the location where the transaction or event takes place

What Is Output?

- **Output** is data that has been processed into a useful form

Displays

- A **display** visually conveys text, graphics, and video information

- A **monitor** is a display that is packaged as a separate peripheral device

  - **LCD** monitor

monitor display

laptop display

digital camera display

navigation system display

handheld game device display

smartphone display

Displays

- The quality of a display depends primarily on its:

Resolution

Response time

Brightness

Dot pitch

Contrast ratio

Displays

- Today's monitors use a digital signal to produce a picture

- To display the highest quality images, the monitor should plug into:

  - A DVI port

  - An HDMI port

  - A DisplayPort

Displays

- Home users sometimes use a digital television (DTV) as a display

- **HDTV** is the most advanced form of digital television

- A Smart TV is an Internet-enabled HDTV

Printers

- A **printer** produces text and graphics on a physical medium

- Before purchasing a printer, ask yourself a series of questions

1. What is my budget?
2. How fast must my printer print?
3. Do I need a color printer?
4. What is the cost per page for printing?
5. Do I need multiple copies of documents?
6. Will I print graphics?
7. Do I want to print photos?
8. Do I want to print directly from a memory card?
9. What types of paper does the printer use?
10. What sizes of paper does the printer accept?
11. Do I want to print on both sides of the paper?
12. How much paper can the printer tray hold?
13. Will the printer work with my computer and software?
14. How much do supplies such as ink, toner, and paper cost?
15. Can the printer print on envelopes?
16. How many envelopes can the printer print at a time?
17. How much do I print now, and how much will I be printing in a year or two?
18. Will the printer be connected to a network?
19. Do I want wireless printing capability?

Pages 344 - 345
Figure 7-26

Printers

- A **nonimpact printer** forms characters and graphics on a piece of paper without actually contacting the paper

Ink-jet printers	Photo printers	Laser printers	All-in-one printers	Thermal printers
Mobile printers	Label printers	Plotters	Large-format printers	

Printers

- An **ink-jet printer** forms characters and graphics by spraying tiny drops of liquid ink onto a piece of paper
  - Color or black-and-white
  - Speed is measured by the number of pages per minute (ppm) it can print
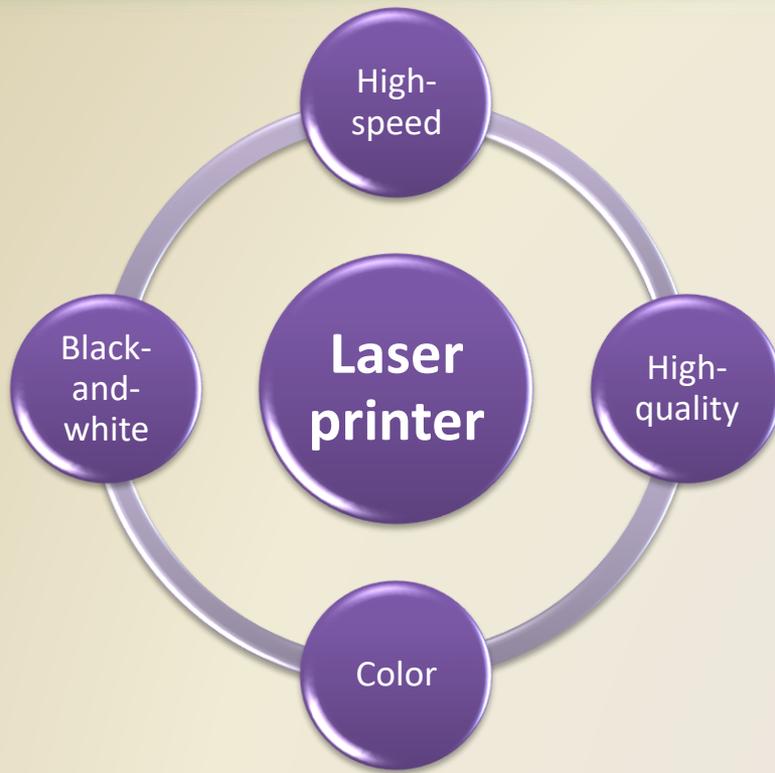
Printers

A **photo printer** produces lab-quality photos

- Many use ink-jet technology
- PictBridge allows you to print photos directly from a digital camera
- Print from a memory card

Printers

Printers

High-speed

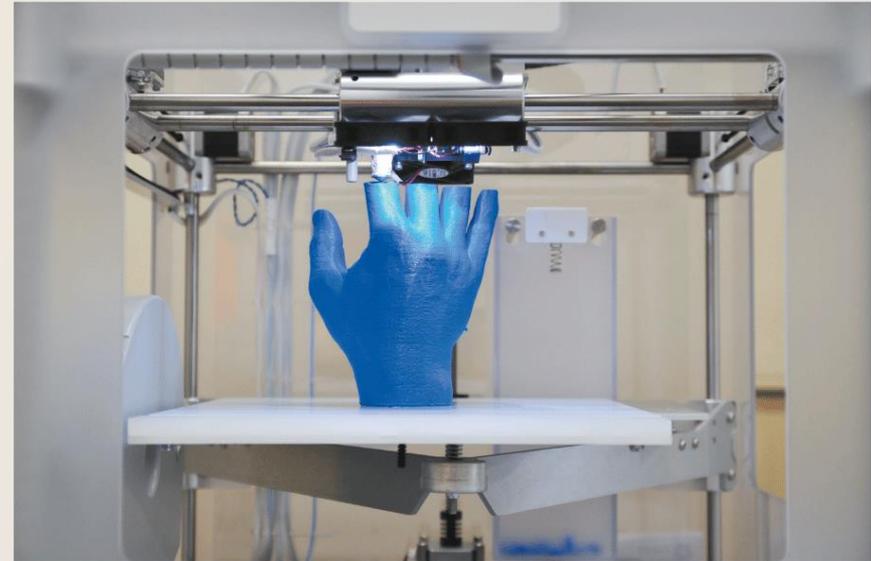Black-and-white

Laser printer

High-quality

Color

Printers

- An **all-in-one printer** is a single device that prints, scans, copies, and in some cases, faxes
  - Also called a multifunction printer

41

Printers

- A **3-D printer** uses a process called additive manufacturing to create an object by adding material to a three-dimensional object, one horizontal layer at a time

Printers

- A **thermal printer** generates images by pushing electrically heated pins against the heat-sensitive paper

Dye-sublimation printer

43

Printers

- A **mobile printer** is a small, lightweight, battery-powered printer that allows a mobile user to print from a mobile device

Page 350
Figure 7-35

44

Printers

- A **label printer** is a small printer that prints on an adhesive-type material that can be placed on a variety of items
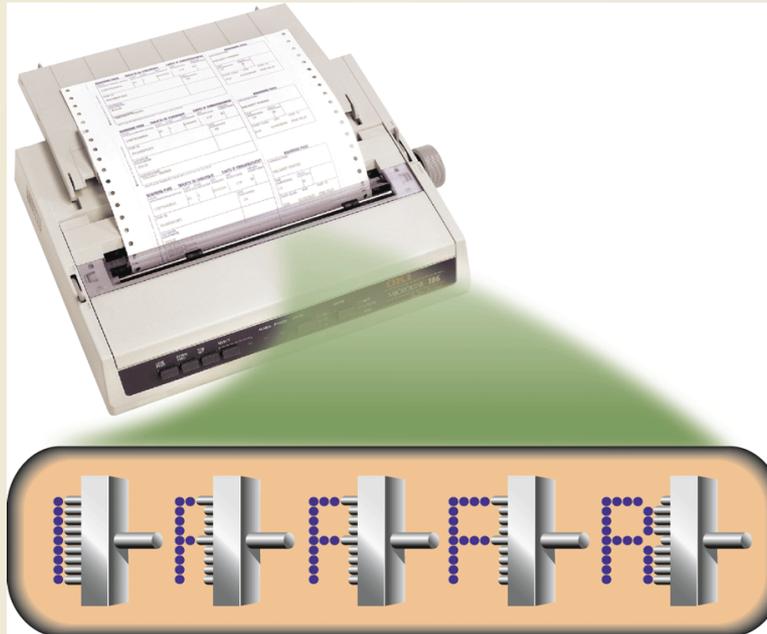
Printers

- **Plotters** are used to produce high-quality drawings

- **Large-format printers** create photo-realistic quality color prints

Printers

- **Impact printers** form characters and graphics on a piece of paper by striking a mechanism against an inked ribbon that physically contacts the paper

Other Output Devices

- Many users attach surround sound **speakers** or speaker systems to their computers, game consoles, and mobile devices to generate higher-quality sounds

center speaker

subwoofer

satellite speakers

satellite speakers

Other Output Devices

- **Headphones** are speakers that cover or are placed outside of the ear

- **Earbuds** (also called earphones) rest inside the ear canal

headphones

Other Output Devices

- A **data projector** is a device that projects the text and images displaying on a computer or mobile device screen on a larger screen so that an audience can see the image clearly

data projector

50

Other Output Devices

- An **interactive whiteboard** is a touch-sensitive device, resembling a dry-erase board, that displays the image on a connected computer screen

Other Output Devices

- Joysticks, wheels, gamepads, and motion-sensing game controllers can be considered output devices when they include force feedback

  - Technology that sends resistance to the device in response to actions of the user

52

Assistive Technology Input and Output

Head-mounted pointer

camera/receiver

reflective tracking surface attached to brim of hat

Braille printer

Summary

Variety of options for input and output

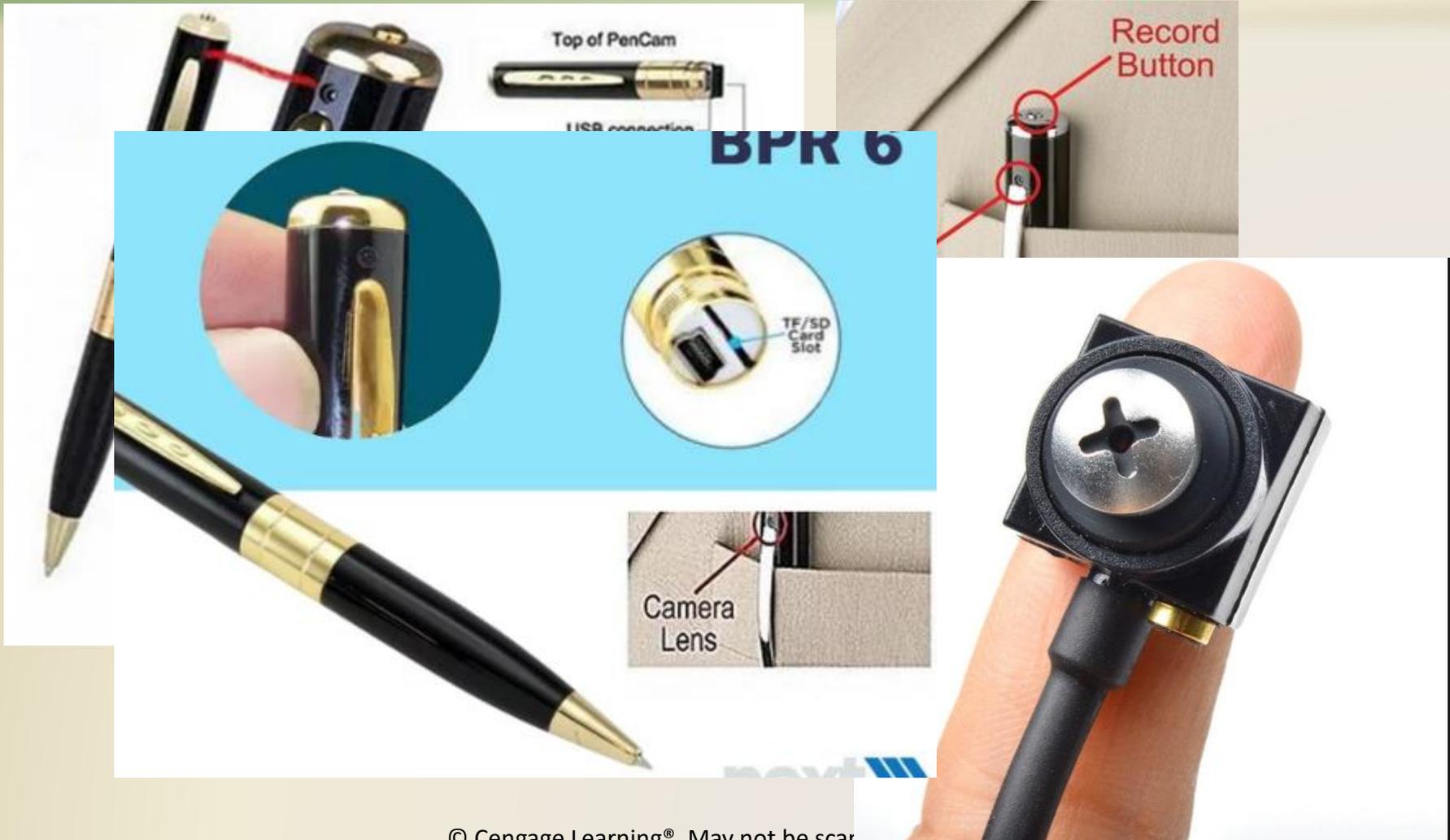Several assistive technology options for input and output

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Chapter

Input and Output

Chapter 7 Complete

Top of PenCam

USB connection

BPR 6

Record Button

TF/SD Card Slot

Camera Lens