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Input and Output

Chapter 6

Computing Essentials 2023
O'Leary

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Learning Objectives

1. Define input.
2. Describe keyboard entry, including types and features of keyboards.
3. Identify different pointing devices, including game controllers and styluses.
4. Describe scanning devices, including optical scanners, RFID readers, and recognition devices.
5. Recognize image capturing and audio-input devices.
6. Define output.
7. Identify different monitor features and types, including flat-panels and e-books.
8. Define printing features and types, including inkjet and cloud printers.
9. Recognize different audio and video devices, including portable media devices.
10. Define combination input and output devices, including multifunctional devices, VR head-mounted displays and controllers, drones, and robots.
11. Explain ergonomics and ways to minimize physical damage.

Introduction

Have you ever wondered how information gets into your computer and comes out in a form you can use?

- Input devices convert what we understand into what the system unit can process
- Output devices convert what the system unit has processed into a form that we can understand

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What is Input?

Any data or instructions entered into a computer

Input devices translate data into a form that the system unit can process

Some hardware input devices include:

- Keyboards
- Mice
- Pointing
- Scanning
- Image capturing
- Audio-input

Keyboard Entry

Traditional Keyboard

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Laptop Keyboard

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Virtual Keyboard

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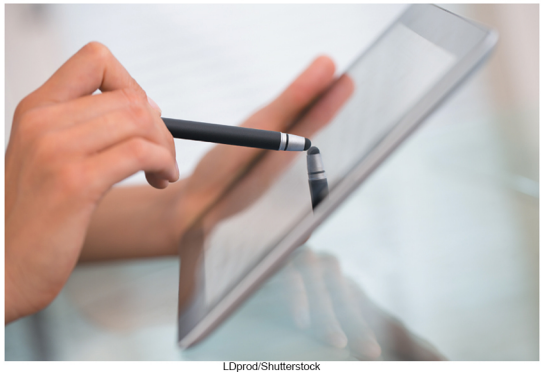
Pointing Devices

Provide an intuitive interface by accepting pointing gestures and converting them into machine-readable input

Wide variety of devices such as:

- Mouse
- Touch screen
- Game controller



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Mouse Types

Optical mouse

- Has no moving parts
- Emits and senses light to detect mouse movement
- Can be used on any surface

Wireless mouse

- Battery operated
- Uses radio waves or infrared light waves

Touch pads

- Controls pointer by moving and tapping your fingers on the surface of the pad

Touch Screen

Can be touched with more than one finger

Stylus is a pen-like device

- Used on tablets
- Uses handwriting recognition software

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Gaming Controllers

Provide input to computer games

- Joysticks use pressure and direction of the stick
- Gaming mice are similar to a mouse but high precision
- Gamepads use both hands
- Motion sensing device control games by user movement

Scanning Devices

Scanners convert scanned data into a form the system unit can process

Optical scanners

- Flatbed scanners
- Document scanners
- Portable scanners
- 3D scanners

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Card Readers

Interpret encoded information that is stored on debit, credit and identification cards

Magnetic card reader

- Information read from strip when swiped through reader

Chip card reader

- Information read from a chip when inserted or held near the reader
- Smart cards hold additional security information

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Bar Code Readers

Contain photo-electric cells that scan or read bar codes or the zebra striped marks printed on product containers

UPCs and MaxiCode readers

- UPC are heavily used in grocery stores for automated checkout and inventory control
- MaxiCode used by shipping companies for routing packages

Cell phones with app can also scan codes

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RFID Readers

Radio-frequency identification

Tiny chips embedded in most anything contain electronically stored information that can be read using an **RFID reader** located several yards away.

- Tracking pets
- Update and control inventories
- Read passports

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Character & Mark Recognition Readers

Recognize special characters and marks

Character and mark recognition devices

- Magnetic-ink character recognition (MICR)
  - Used by banks to read encoded characters on checks
- Optical-character recognition (OCR)
  - Reads preprinted characters such as wand scanners
- Optical-mark recognition (OMR)
  - Sense the presence of absence of marks used for test scoring

Image Capturing Devices

Create or capture original images

Digital Camera

- Capture images digitally and store in memory

Webcams

- Capture images and send to a computer for broadcast over the Internet

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Audio-Input Devices

Voice recognition systems

- Use a microphone, sound card, and special software
- Users can operate computers and create documents using voice commands
- Included in many smart phones
  - Siri in iPhones
  - Cortana in Windows devices
  - Alexa in Amazon devices
  - Google Assistant in Android devices

Output

Processed data or information

Types of output

- Text
- Graphics/photos
- Audio & video

Output devices

- Monitors
- Printers
- Audio-output devices

Monitors

Known as screens or display screens, and present visual images of text and graphics

Features:

- Clarity
- Resolution/pixels
- Dot pitch
- Contrast ratios
- Active display area, or size
- Aspect ratio

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Monitor Types

Flat-panel monitors

- Require less power to operate
- Portable and thin
- Most are backlit

Three types:

- Liquid Crystal Display (LCD)
  - Older monitors
- Light Emitting Diode (LED)
  - More advanced backlighting
- Organic Light Emitting Diode (OLED)
  - Thin layer organic compound that produces light

E-book Readers

An e-book is a traditional books printed in electronic form

E-book readers are dedicated mobile devices for storing and displaying e-books

Use e-ink technology

- Produce images that reflect light
  - Kindle
  - Kobo

Other Monitor Types

Digital/interactive whiteboards

- Connects to a computer or project
- Controlled using a special pen or even your finger
- Classrooms and corporate boardrooms

Flexible Screens

- Allow a digital device to display on a non flat surface, including wrapped edges, curved monitors and foldable screens

Digital Projector

- Project the images from a traditional monitor onto a screen or wall

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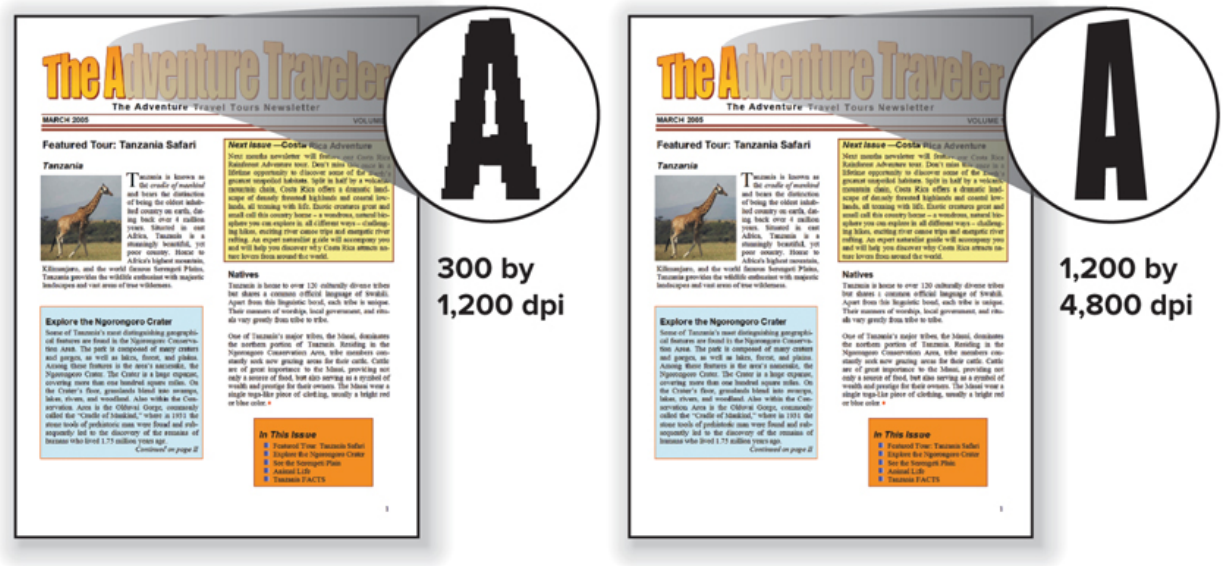
Printers

Translates information that has been processed by the system unit

Features

- Resolution
- Color
- Speed
- Memory
- Duplex printing
- Connectivity



Printer Types

Ink-jet printers spray ink at a high speed

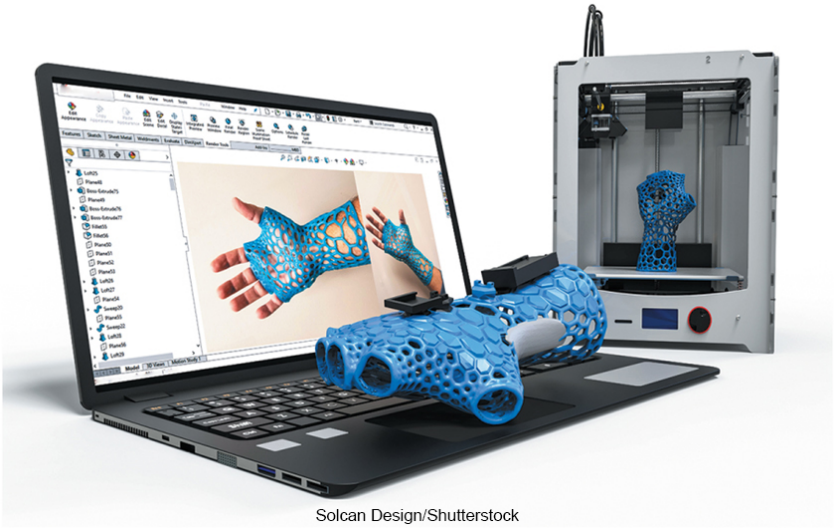
- Reliable, quite and inexpensive

Laser printers uses a laser light beam to produce images

- Fast, excellent quality
- Personal or shared

3D Printers create 3-D shapes with a thin layer of material repeatedly until created

- Additive manufacturing



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Other Printers

Cloud printers

- Connect to the Internet to provide services to others on the Internet
- Thermal printers
- Plotters

Audio and Video Devices

Translates audio information from the computer into sounds that people can understand

- Speakers and headphones

Bluetooth Technology

- Wireless technology
- Used to connect to speakers and headphones

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Combination Input and Output Devices

Headsets

- Combine a microphone and headphones

Multifunctional devices (MFD)

- Cost efficient but lower quality
- All-in-one printers are a good example

Virtual Reality (VR)

- Artificial or simulated reality

Virtual head-mounted displays and controllers

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Drones

Drones

or

unmanned aerial vehicles (UAV)

- Take input from a controller and the output device is the drone
- Very cost effective now

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Robots

- Use cameras, microphones, and other sensors as inputs to perform an expanding range of capabilities

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Making IT Work for You ~ Headphones

Style
Connection
Special Features

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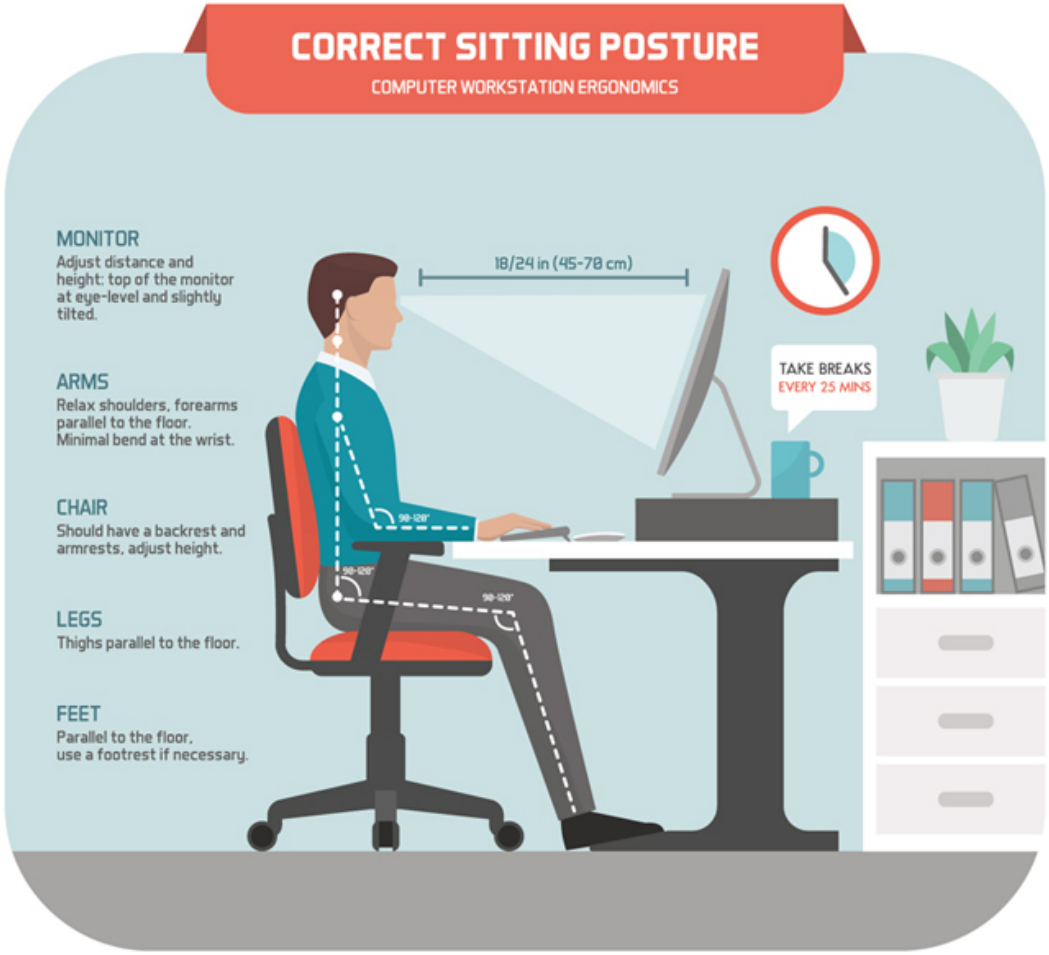
Ergonomics

Study of human factors related to things people use

Fit the task to the user to avoid:

- Eyestrain and headache
- Back and neck pain
- Repetitive strain injury
  - Carpal tunnel syndrome



Ergonomic Challenged Devices

Portable devices are not set up for ergonomics

- Cell phones
  - Pain in base of thumbs from being used to type on small screen keyboard
- Tablets
  - Tablet hunch is caused by the user's head being improperly aligned to the viewing surface
- Laptops
  - Because the keyboard and monitor are connected, they cannot be set up ergonomically

Careers in IT

Technical writers prepare instruction manuals, technical reports, and other scientific or technical documents

Typically requires an associate's or bachelor's degree in:

- Communications
- Journalism or
- English
- Specialization or familiarization with a technical field

Technical writers can expect to earn $43,000 to $88,000 annually

A Look to the Future

Internet of Things

Smartwatch

- Can monitor and share your location
- Chips embedded in most items, including clothing

Smart grocery cart

- Use grocery list to guide shopper through store and update total as items are put in the cart and process final bill

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Open Ended Questions

1. Define input and input devices.
2. Describe the different types of keyboard, pointing, scanning, image capturing, and audio-input devices.
3. Describe input and output devices.
4. Describe the features and different types of monitors and printers.
5. Describe audio output devices including Bluetooth technology.
6. Discuss combination input and output devices, including multifunctional devices, headsets, drones, robots, and virtual-mounted displays and controllers.
7. Define ergonomics, describe ways to minimize physical discomfort, and discuss design issues with portable computers.

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