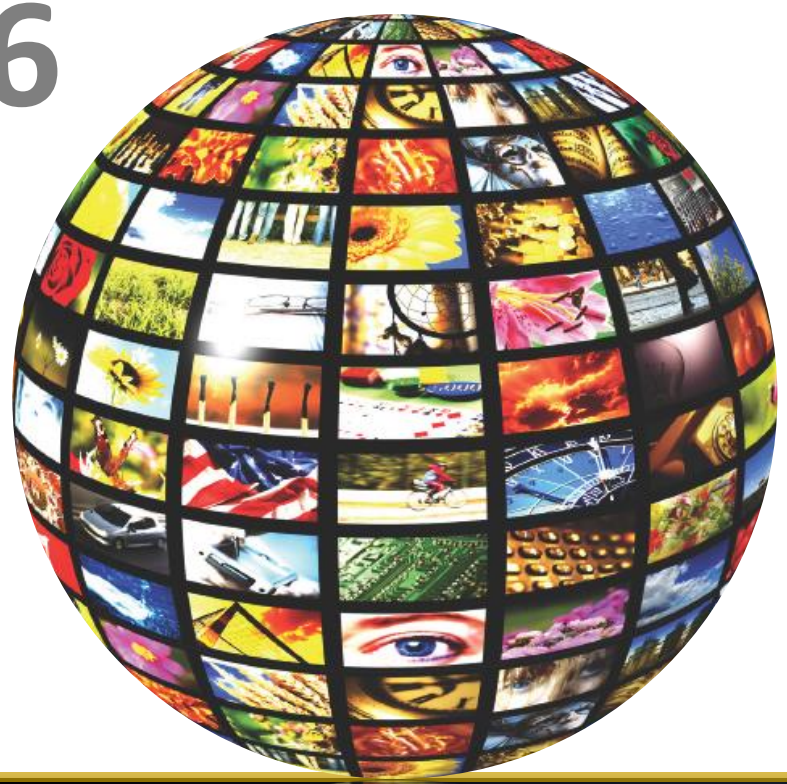
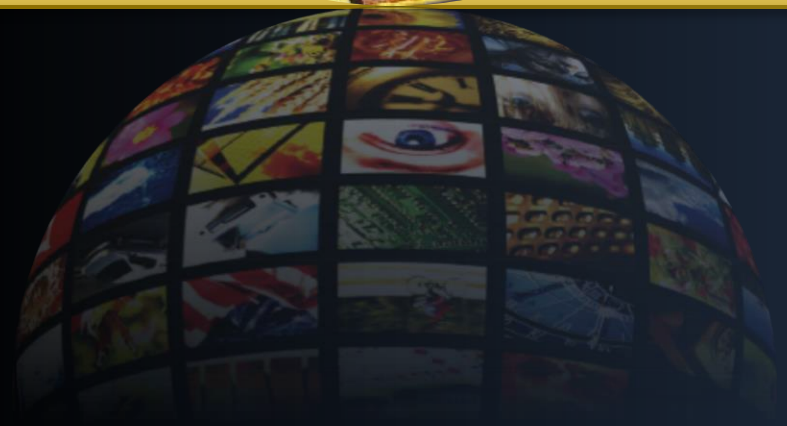
Chapter 6



Input and Output



Chapter 6

Learning Outcomes

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 devices 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, telephones, drones, robots, and VR headgear and gloves.
11. Explain ergonomics and ways to minimize physical damage.

Introduction

- Have you ever wondered how information gets into your computer or 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

What is Input?

- Any data or instructions used by 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

- Keyboards
  - Traditional keyboards
  - Laptop keyboards
  - Virtual keyboards
  - Thumb keyboards

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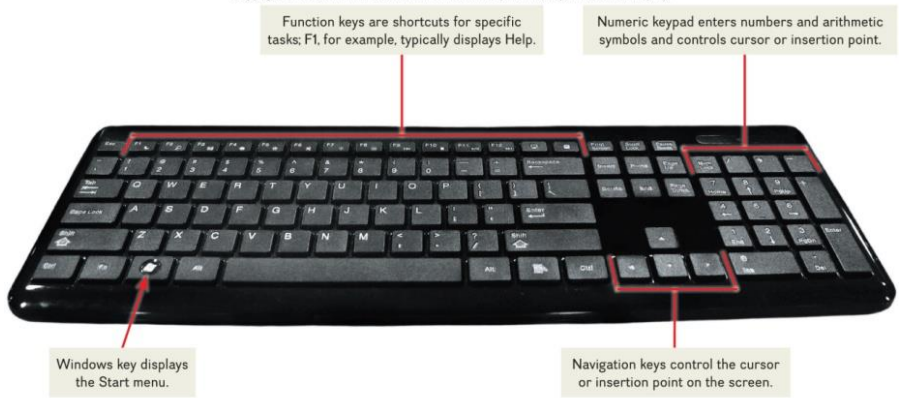

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Pointing Devices

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
  - Stylus

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
- Common on mobile devices
  - Apple iPhone
  - Notebook computers
  - Desktop monitors
- 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
- Game pads 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

Courtesy of Canon-Europe

Card Readers

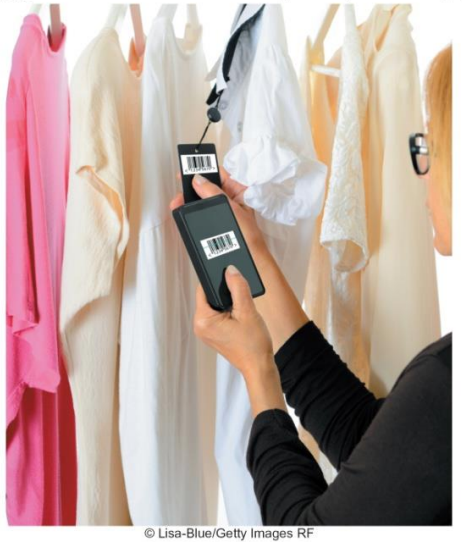
Interpret encoded information that is stored on debit, credit and identification cards

- Magnetic card reader
  - Information read from strip when swiped through reader
  - Smart cards hold additional security information

Bar Code Readers

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

- Wand readers
  - Hand –held readers
- 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



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

Paul J. Richards/AFP/Getty Images/Newscom

Character and Mark Recognition Readers

Recognize special characters and markts

- 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
- Web Cams
  - Capture images and send to a computer

Courtesy of Canon Europe

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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 phones
    - Google Now in Google phones

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

- Output referred to as soft copy
- Features
  - Clarity
  - Resolution/pixels
  - Dot pitch
  - Contrast ratios
  - Size
  - Aspect ratio

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

Curved Monitors

Has a concave screen that provides better viewing angles near the edges of the screen

- Used by high-end gamers
- Used for smart watch displays

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
    - Nook

Other Monitor Types

- Other monitors
  - Digital/interactive whiteboards
    - Connects to a computer or project
    - Controlled using a special pen or even your finger
      - Classrooms and corporate boardrooms
  - Ultra High-definition television (UHDTV)
    - Digital output delivering a much clearer and more detailed image that regular HDTV
  - Digital Projector
    - Project the images from a traditional monitor onto a screen or wall

Gerald Martineau/The Washington Post/Getty Images

Making IT Work for You ~ Using E-Books

- Enjoy reading on the go
- Many feature subscriptions to newspapers and magazines

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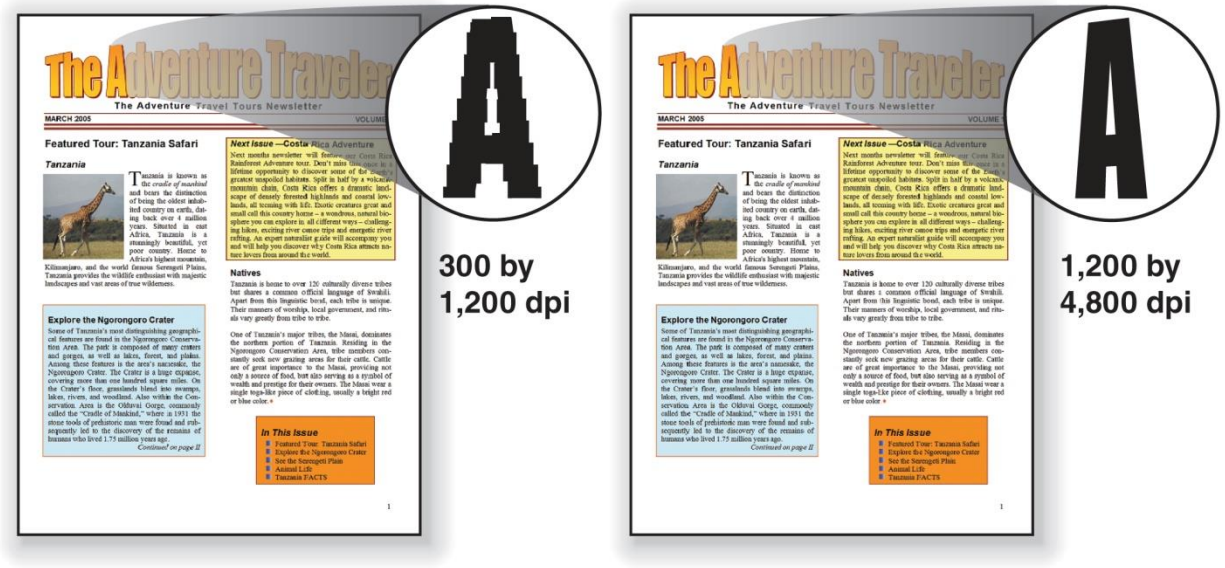
Printers

- Translates information that has been processed by the system unit
- Output referred to as hard copy
- Features
  - Resolution
  - Color
  - Speed
  - Memory
  - Duplex printing



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

Other Printers

- Cloud printers
  - Connected 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 headsets

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
- Telephones
  - Known as Telephony and Internet Telephony
  - Voice-over IP (VoIP)
    - Hangouts
    - Face Time
    - Skype

Drones and Robots

Drones or unarmed aerial vehicles

- Take input from a controller and send back video and sound to the user
- Very cost effective now

Robots

- Use microphones, cameras and other sensors as input
- Output is dependent on the use for the robot
  - Assists in surgery

Virtual Reality

- Created in 3D through computers for a virtual experience
  - Headgear with gloves have sensors to collect data that work with software

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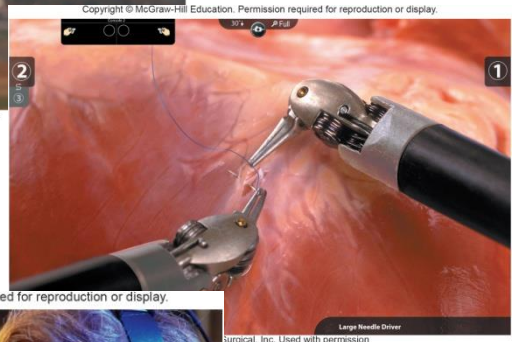

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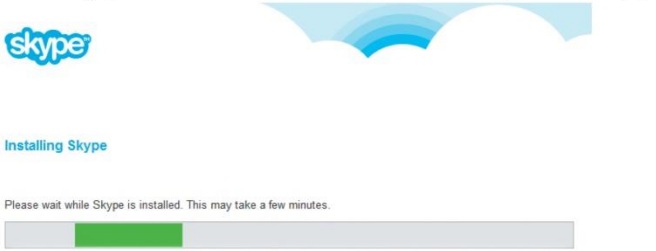
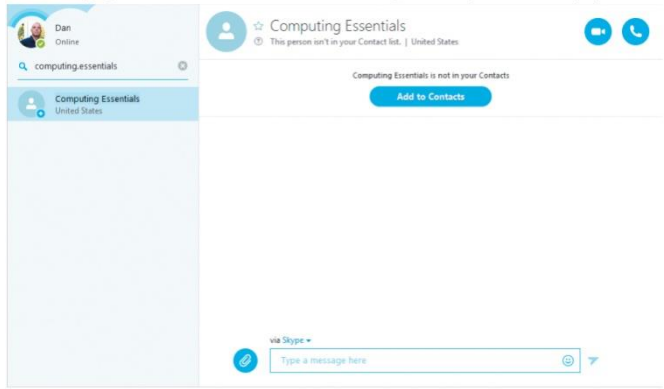
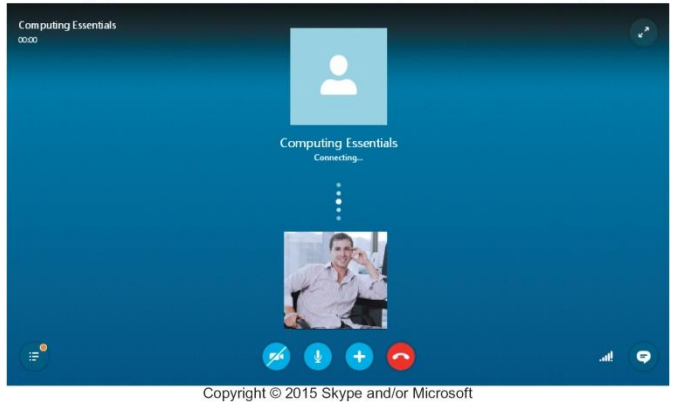
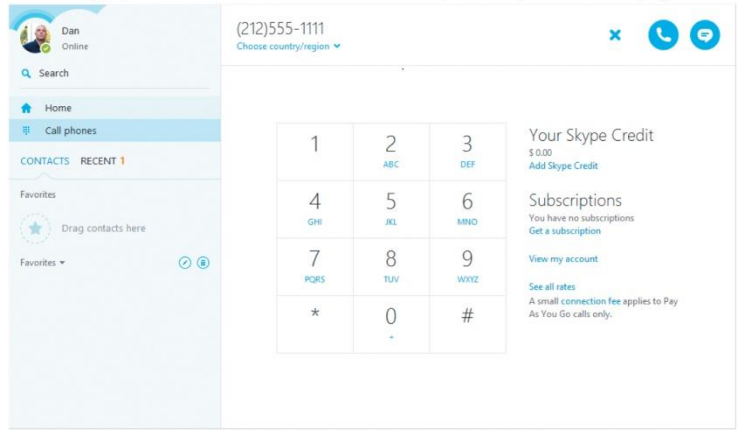
Making IT Work for You ~ Skype

- Communications tool using VoIP
- www.skype.com



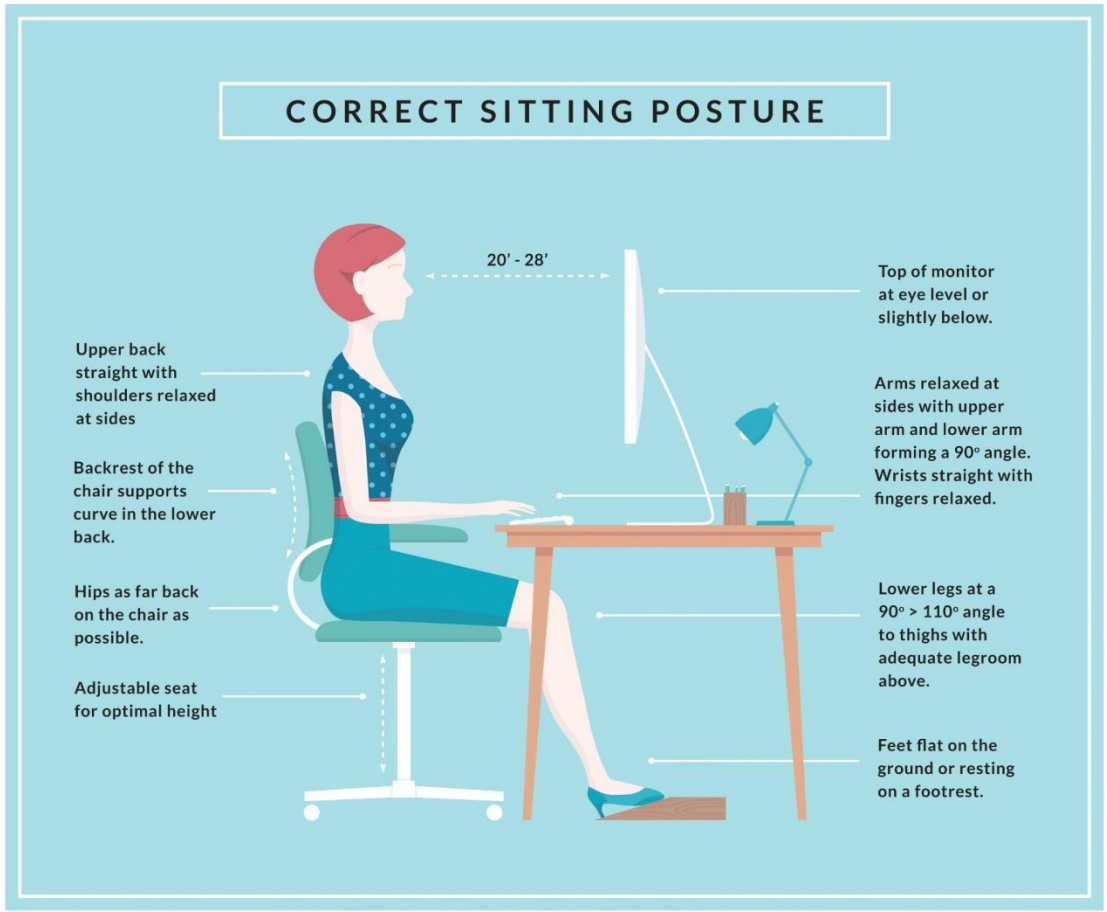






Ergonomics

- 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



Ergonomic Challenged Devices

Portable devices are not set up for ergonomics

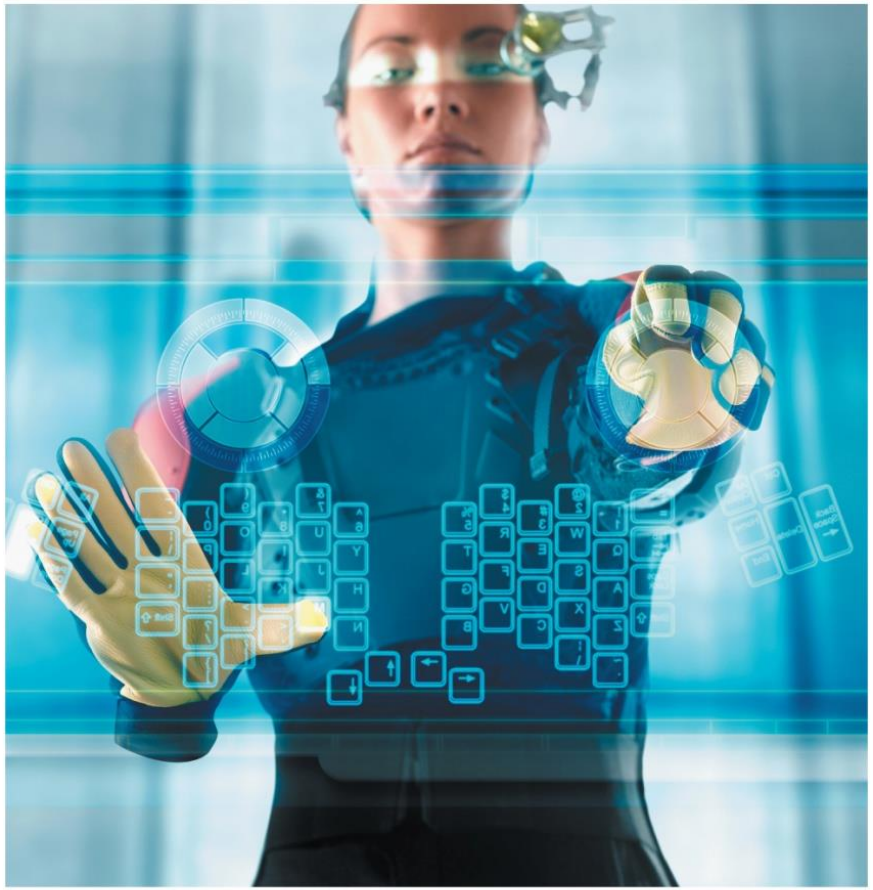
- Laptops
  - Because the keyboard and monitor are connected, they cannot be set up ergonomically
- Tablets
  - Tablet hunch is caused by the users head being improperly aligned to the viewing surface
- Smartphones
  - Blackberry thumb results from using thumbs to type on a tiny keyboard

Careers In IT

- Technical writers prepare instruction manuals, technical reports, and other scientific or technical documents
- Typically requires an associates or bachelors degree in:
  - Communications
  - Journalism or
  - English
  - Specialization or familiarization with a technical field
- Technical writers can expect to earn $44,000 to $58,000 annually

A Look to the Future
Augmented Reality Displays

- With wearable augmented reality displays, data from your computer and the Internet will be instantly viewable
- Funding for development from the government has begun to assist soldiers and pilots.
- Google has developed a prototype, "Project Glass", that is being tested



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Open-Ended Questions (Page 1 of 2)

1. Define input and input devices.

2. Describe the different types of keyboard, pointing, scanning, image capturing, and audio-input devices.

3. Describe output and output devices.

4. Describe the features and different types of monitors and printers.

Open-Ended Questions (Page 2 of 2)

5. Describe audio output devices including Bluetooth technology.

6. Discuss combination input and output devices, including multifunctional devices, headsets, telephones, drones, robots, and virtual reality headgear and gloves.

7. Define ergonomics, describe ways to minimize physical discomfort, and discuss design issues with portable computers.