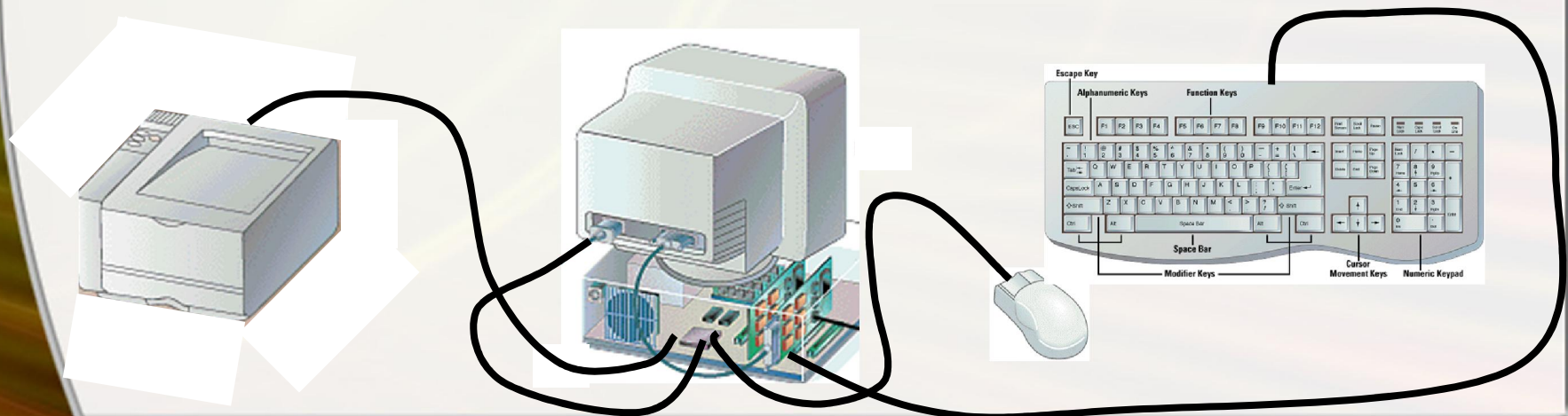# *Video and Sound*

Monitors

- Most common output device
- Connects to the video card
- Categorized by color output
  - Monochrome
    - One color with black background
  - Grayscale
    - Varying degrees of gray
  - Color
    - Display 4 to 16 million colors

Monitors

- Cathode Ray Tube (CRT)
  - Most common type of monitor
  - Electrons fired from the back
  - Electrons excite phosphor to glow
  - Phosphor is arranged in dots called pixels
  - Dot mask ensures proper pixel is lit

Monitors

- CRT color
  - Phosphor dots arranged in triads
  - Red, green, and blue dots
  - Three colors blend to make colors
  - Varying the intensity creates new colors

Monitors

- CRT drawbacks
  - Very large
  - Very heavy
  - Use a lot of electricity

Monitors

- Liquid Crystal Display (LCD)
  - Commonly found on laptops
  - Desktop versions exist
  - Solve the problems of CRT
  - Fluorescent lights provide illumination

Monitors

- Passive matrix LCD
  - Pixels arranged in a grid
  - Pixels are activated indirectly
    - Row and column are activated
  - Animation can be blurry

Monitors

- Active matrix LCD
  - Each pixel is activated directly
  - Pixels have 4 transistors
    - One each for red, green, blue
    - One for opaqueness
  - Transistors arranged in a thin film
  - Animation is crisp and clean

Monitors

- Drawbacks to LCD
  - More expensive than CRT
  - Must sit directly in front of screen
  - Can be more fragile than CRT

Monitors

- Paper-white displays
  - High contrast between fore and background
- Electro-luminescent displays (ELD)
  - Similar to LCD
  - Uses phosphor to produce light
- Plasma monitor
  - Gas is excited to produce light

Monitors and Video Cards

- Monitors impacts user effectiveness
- Monitors should have
  - Crisp text
  - Clear graphics
  - Adjustable controls
  - Clear edges

Monitors and Video Cards

- Size of monitor
  - Measured in inches
  - Measured diagonally
  - Actual size
    - Distance from corner to corner
  - Viewable size
    - Useable portion of the screen

Monitors and Video Cards

- Resolution
  - Number of pixels on the screen
  - Higher number creates sharper images
  - Higher number creates smaller images

Monitors and Video Cards

- Refresh rate
  - Number of time the screen is redrawn
  - Modern equipment sets this automatically
  - Improper settings can cause eyestrain

Monitors and Video Cards

- Dot pitch
  - Distance between the same color dots
  - Ranges between .15 mm and .40 mm
  - Smaller creates a finer picture
  - Should be less than .22

Video Cards

- Device between the CPU and monitor
- Better cards result in better output
- Removes burden of drawing from CPU
- Have their own processor and RAM
- Modern cards have up to 512 MB RAM
- Capable of rendering 3D images

Ergonomics and Monitors

- Electronic magnetic fields (EMF)
  - Generated by all electronic devices
  - EMF may be detrimental to health
  - Steps to avoid
    - Keep the computer at arms length
    - Take frequent breaks
    - Use an LCD monitor

Data Projectors

- Replaced overhead and slide projectors
- Project image onto wall or screen
- LCD projectors
  - Most common type of projector
  - Small LCD screen
  - Very bright light
  - Require a darkened room

Data Projectors

- Digital Light Projectors
  - A series of mirrors control the display
  - May be used in a lighted room

Sound Systems

- Integral part of the computer experience
- Capable of recording and playback

Sound Systems

- Sound card
  - Device between the CPU and speakers
  - Converts digital sounds to analog
  - Can be connected to several devices
  - Modern cards support Dolby Surround Sound

Sound Systems

- Headphones and headsets
  - Replacement for speakers and microphones
  - Offer privacy
  - Does not annoy other people
  - Outside noise is not a factor
  - Headsets have speakers and a microphone