Monitors and Sound Systems

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:

- **Monitors**

- **PC Projectors**

- **Sound Systems**
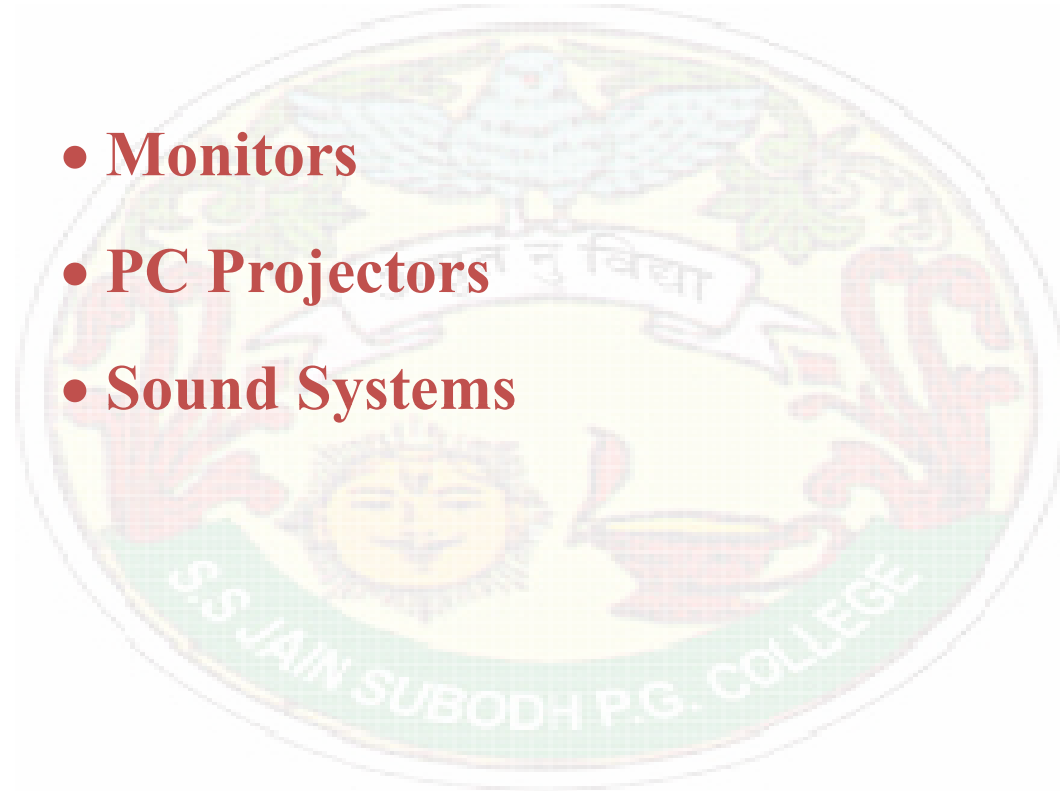
Monitors

- Categories of Monitors

- CRT (Cathode Ray Tube) Monitors

- Flat-Panel Monitors

- Comparing Monitors

- Video Controllers

Monitors - <u>Categories of Monitors</u>

Monitors are categorized by the technology they use:

- **Cathode ray tube (CRT) monitors**

- **Flat-panel displays**

And by the way they display colors:

- **Monochrome – One color on a black background**

- **Grayscale – Shades of gray on a white or off-white background**

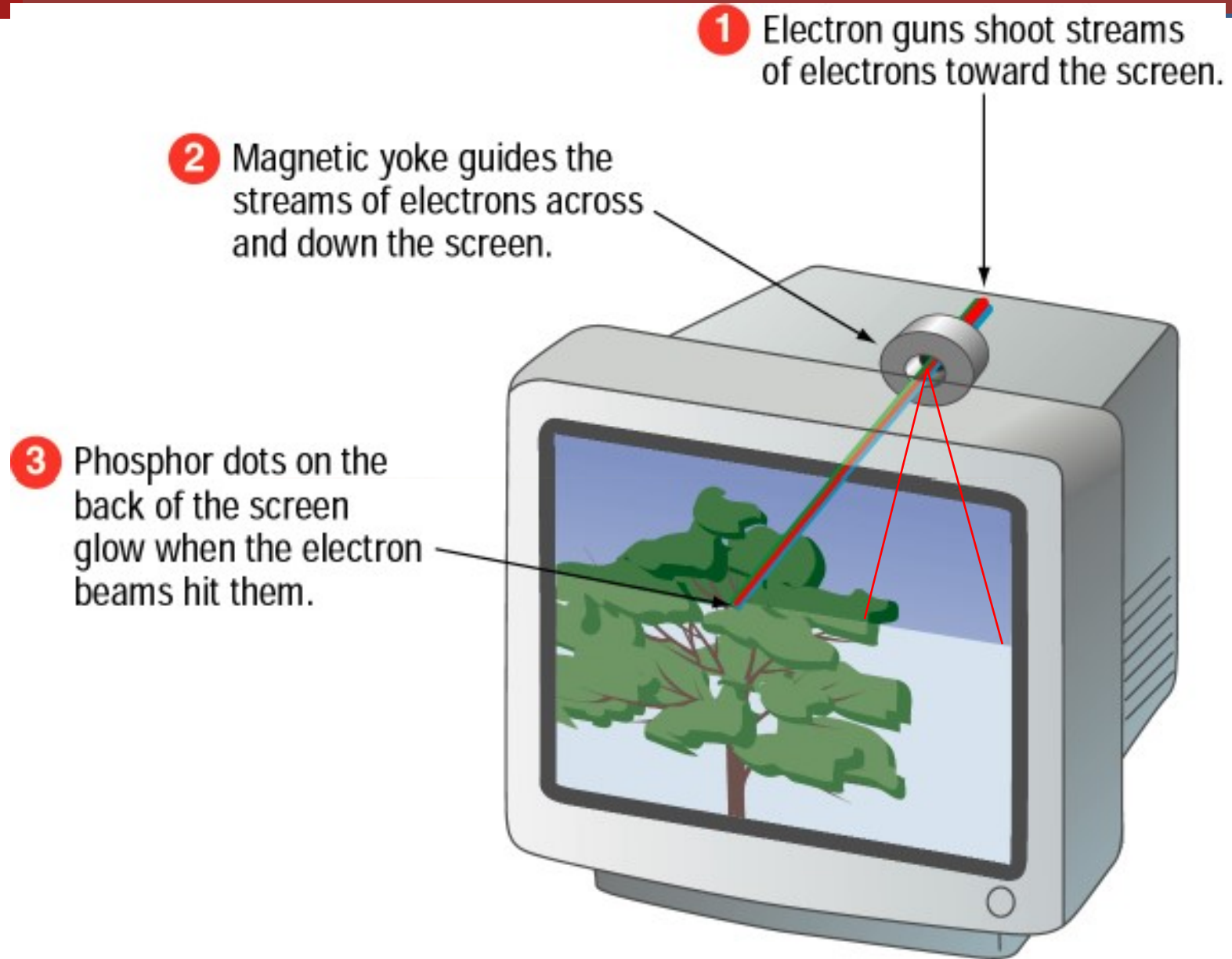- **Color – From 16 to 16 million unique colors**

Monitors - <u>CRT Monitors</u>

- In CRT monitors, electrons are fired at phosphor dots on the screen.

- The dots are grouped into pixels, which glow when struck by electrons.

- In color CRTs, each pixel contains a red, green, and blue dot. These glow at varying intensities to produce color images.

1 Electron guns shoot streams of electrons toward the screen.

2 Magnetic yoke guides the streams of electrons across and down the screen.

3 Phosphor dots on the back of the screen glow when the electron beams hit them.

Monitors - <u>Flat-Panel Monitors</u>

- **Most flat-panel monitors use liquid crystal display (LCD) technology.**

- **Passive matrix LCD uses a transistor for each row and column of pixels: less expensive, narrow viewing angle, submarining (animated graphics blurry)**

- **Active matrix LCD uses a transistor for each pixel on the screen: expensive, wider viewing angle, faster refresh**

- **Thin-film transistor (TFT) displays use multiple transistors for each pixel.**

Flat-panel monitors take up less desk space; less radiation

Monitors - Comparing Monitors

When comparing monitors, consider four features:

- Size

- Resolution

- Refresh rate

- Dot pitch

Comparing Monitors - <u>Size</u>

- A monitor's size is the diagonal measurement of its face, in inches.

- For years, 15" monitors (13"viewing area) were standard.

- Today, 17" monitors (15" viewing area) are common.

- Larger monitors are available, but can be expensive.

The diagonal size (often 15")

Comparing Monitors - <u>Resolution</u>

- Resolution is the number of pixels on the screen, expressed as a matrix (such as 600x800).

- A 17" monitor offers resolutions from 640x480 up to 1280x1024.

- The Video Graphics Array (VGA) standard is 640x480. Super VGA (SVGA) monitors provide resolutions of 800x600, 1024x768 or higher.

Resolution (image sharpness) is important.

**(Especially for graphics, page layout, and CAD (Computer Aided Design))**

Comparing Monitors - Refresh Rate

- Refresh rate is the number of times each second that the electron guns scan the screen's pixels.

- Refresh rate is measured in Hertz (Hz), or cycles per second.

- Look for a refresh rate of 72 Hz or higher. A slower rate may cause eyestrain.

1 The electron gun scans from left to right,
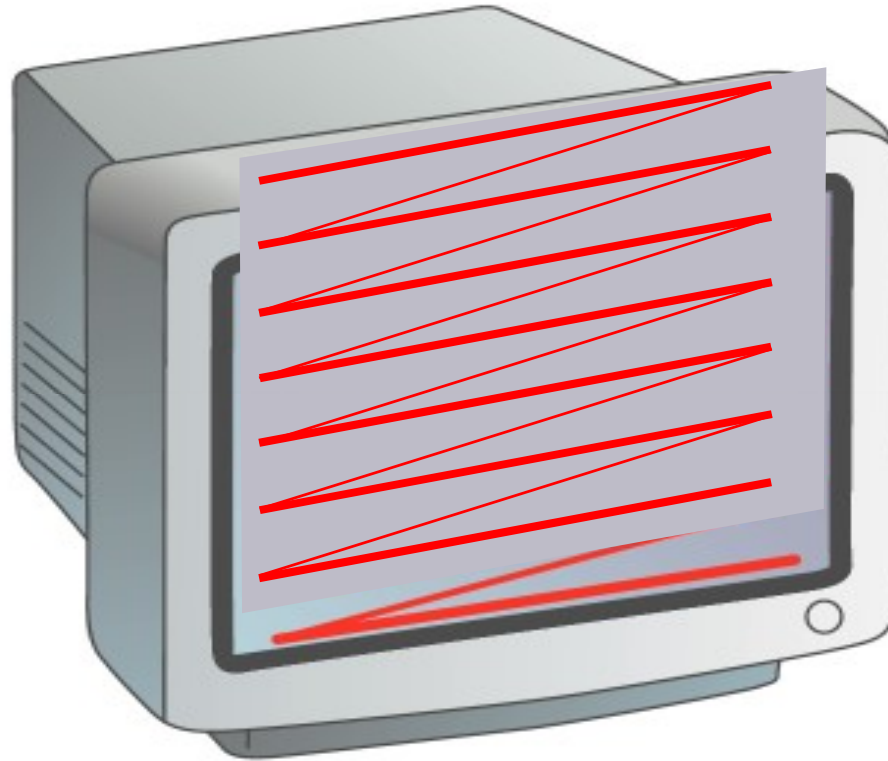
2 and from top to bottom,

**3** refreshing every phosphor dot in a zig-zag pattern.

Fast scanning = Quick refresh (less flicker)

Comparing Monitors - Dot Pitch

- Dot pitch is the distance between the phosphor dots that make up a single pixel.

- In color monitors, three dots (red, green, and blue) comprise each pixel.

- Look for a dot pitch no greater than .28 millimeter.

Phosphor dots

Distance = dot pitch about .28 millimeter

1 pixel
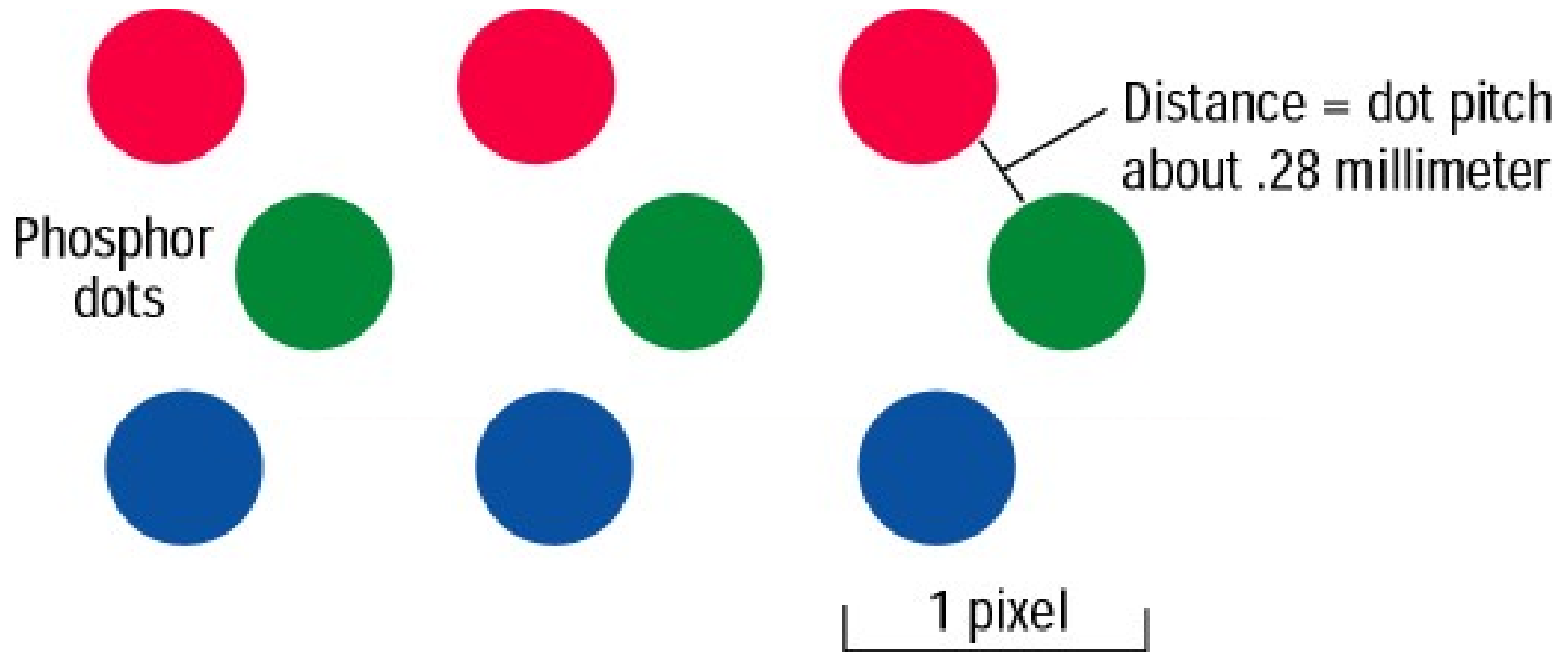
Fine dot pitch = Crisp displays

B + G

R + B

R + B + G

R + G
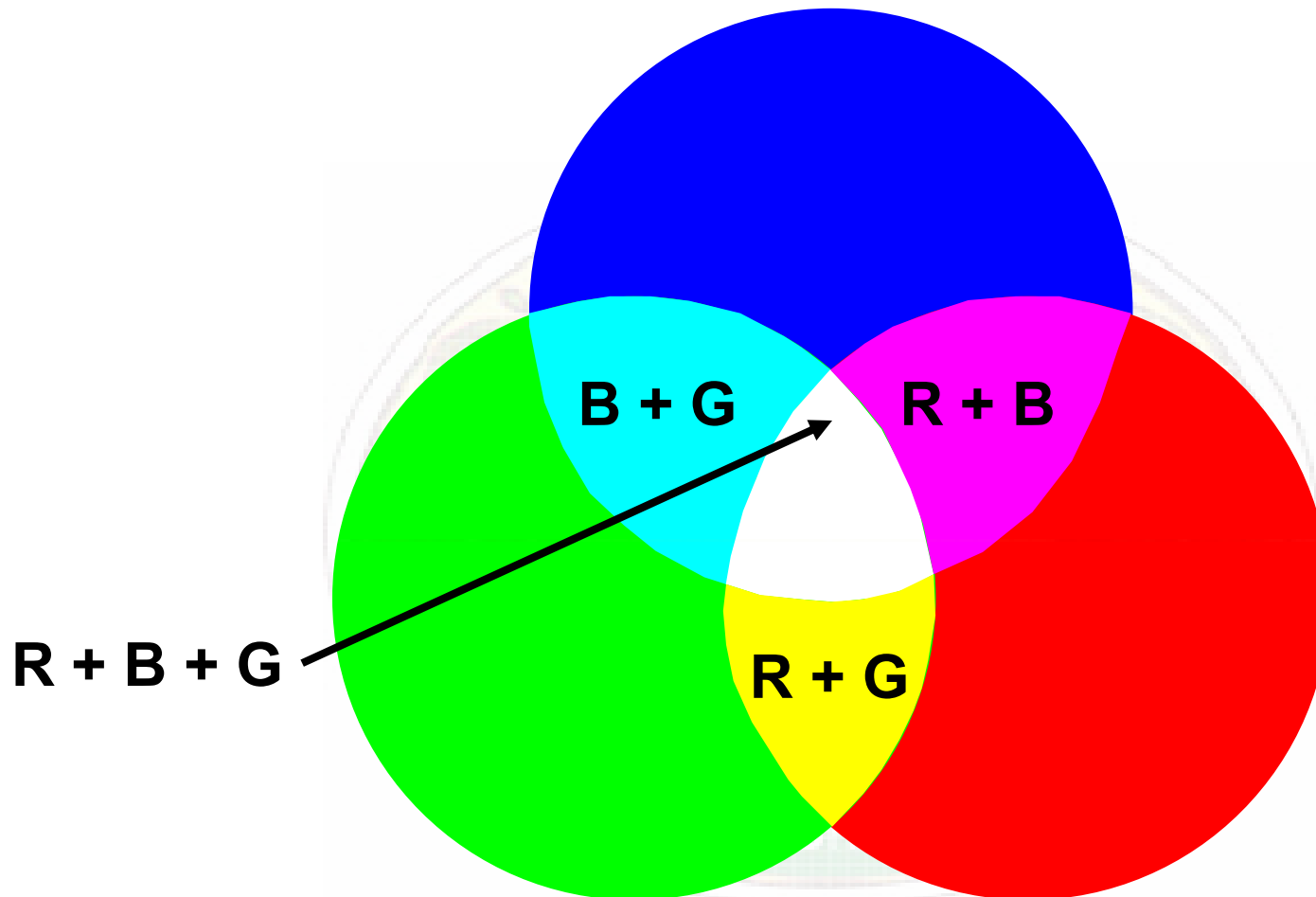
Phosphor Dot Color Mixing
R: Red, G: Green, B: Blue
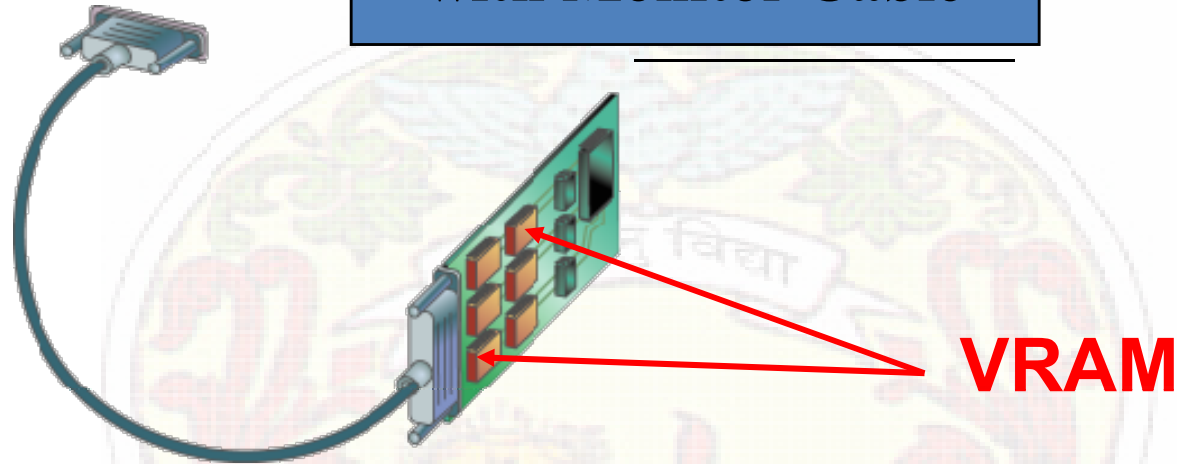
Monitors - <u>Video Controllers</u>

- The video controller is an interface between the monitor and the CPU (Central Processing Unit).

- The video controller determines many aspects of a monitor's performance, such as resolution or the number of colors displayed.

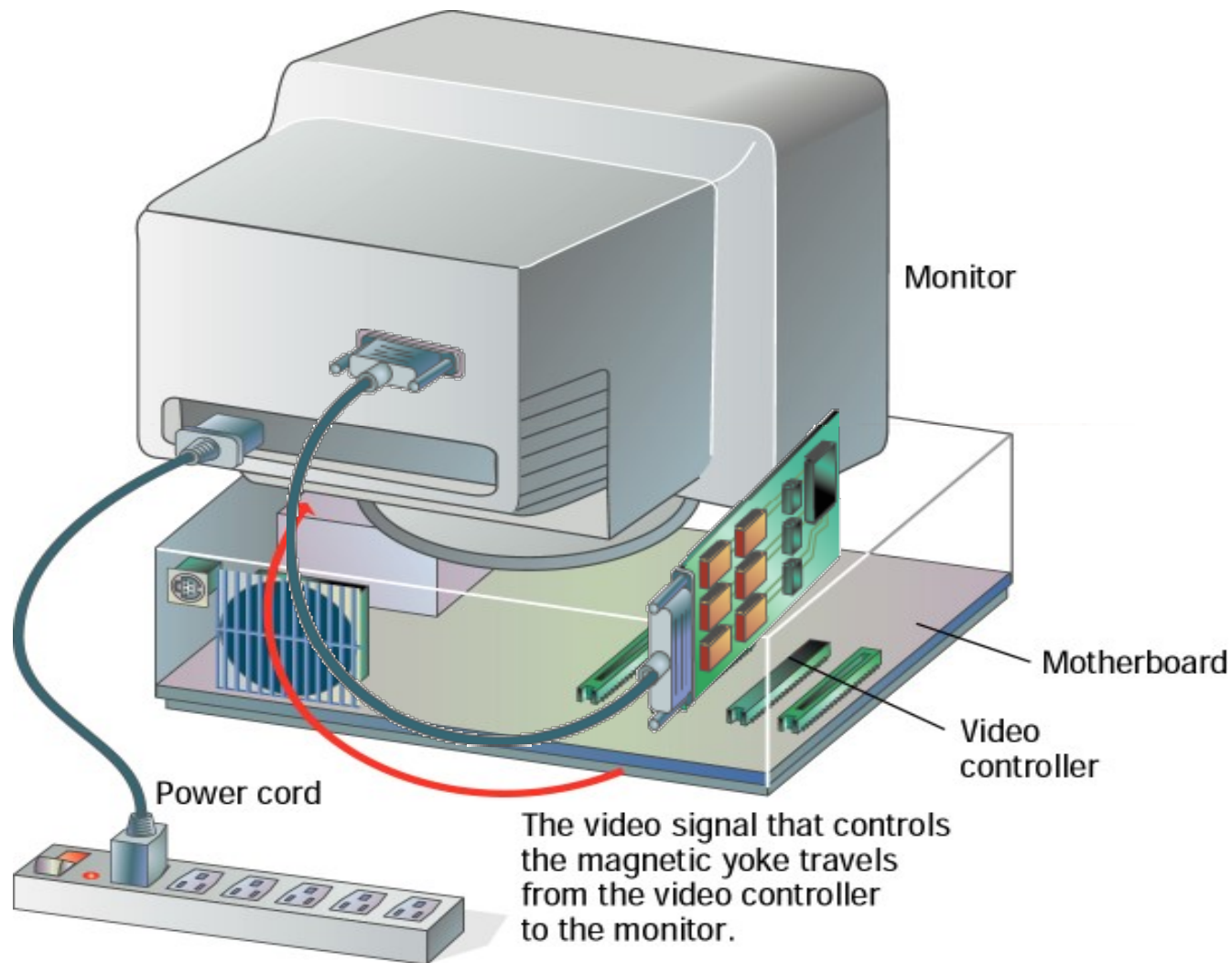- The video controller contains its own on-board processor and memory, called video RAM (VRAM).

**Video Control Board
with Monitor Cable**

VRAM

**Graphic intensive applications such
as games require plenty of VRAM.**

Monitor

Motherboard

Video controller

Power cord

The video signal that controls
the magnetic yoke travels
from the video controller
to the monitor.

PC Projectors

- A PC projector connects to a PC and is used to project images on a large screen.

- Many PC projectors provide the same resolutions and color levels as high-quality monitors.

- Digital light processing (DLP) projectors use a microchip containing tiny mirrors to produce very sharp, bright images.
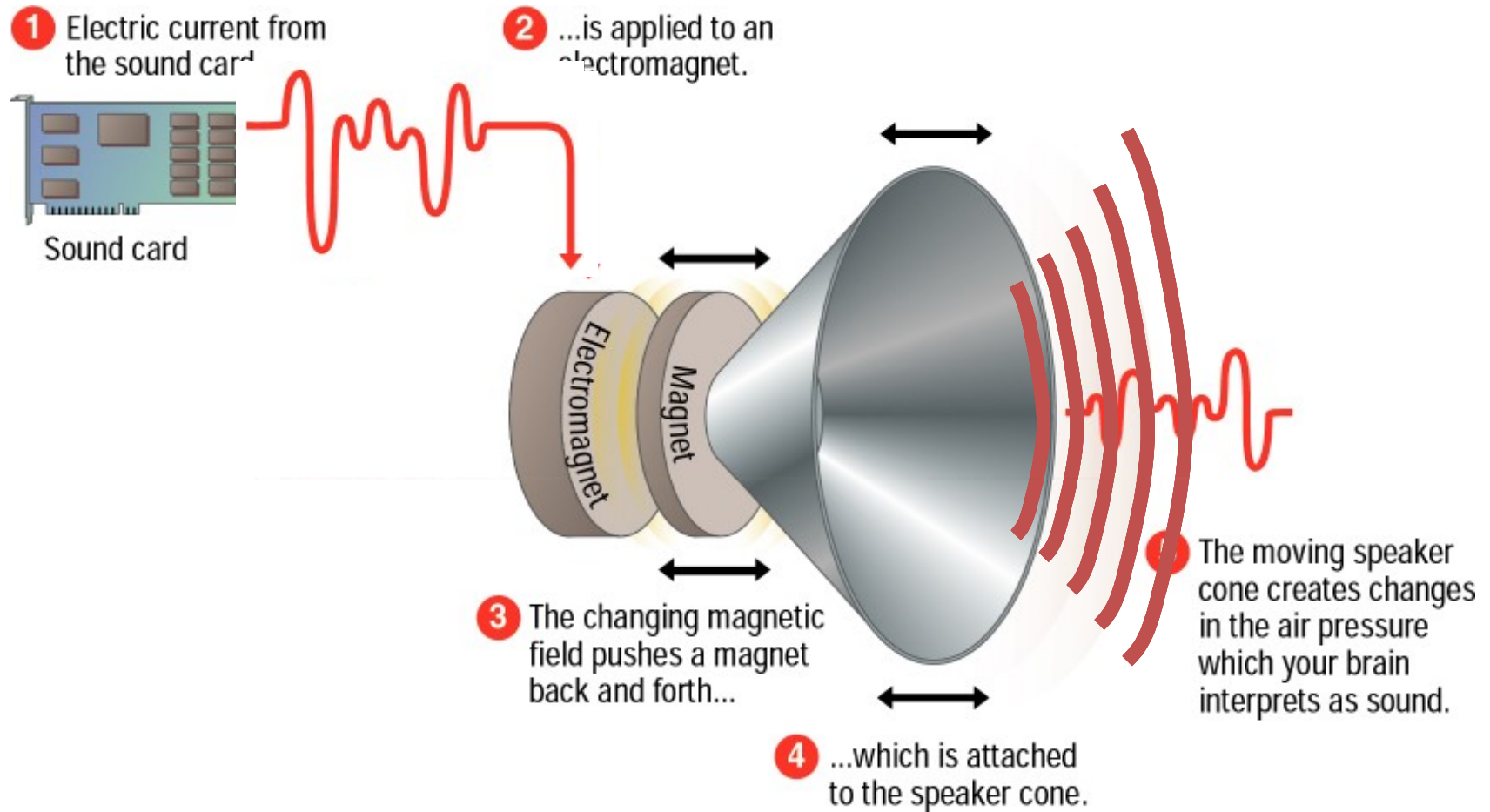
Projected Screen

Sound Systems

- Multimedia PCs come with a sound card, speakers, and a CD-ROM (Compact Disk-Read-Only Memory) or DVD (Digital Versatile Disk) drive.

- A sound card translates digital signals into analog ones that drive the speakers.

- With the right software, you can use your PC to edit sounds and create special sound effects.

① Electric current from the sound card...

② ...is applied to an electromagnet.

Sound card

Electromagnet

Magnet

③ The changing magnetic field pushes a magnet back and forth...

④ ...which is attached to the speaker cone.

The moving speaker cone creates changes in the air pressure which your brain interprets as sound.

Sound Card