

Computer Graphics

LECTURE 05

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Last Class

- ▶ Overview of Graphic Systems
 - ▶ Vector Displays
 - ▶ Movie Standards
 - ▶ LCD's

Today's Agenda

- ▶ Overview of Graphic Systems
 - ▶ LED Display
 - ▶ Plasma TV
 - ▶ Hardcopy Devices
 - ▶ Input Devices
- ▶ Human Visual System
- ▶ Ray Tracing

LED Display

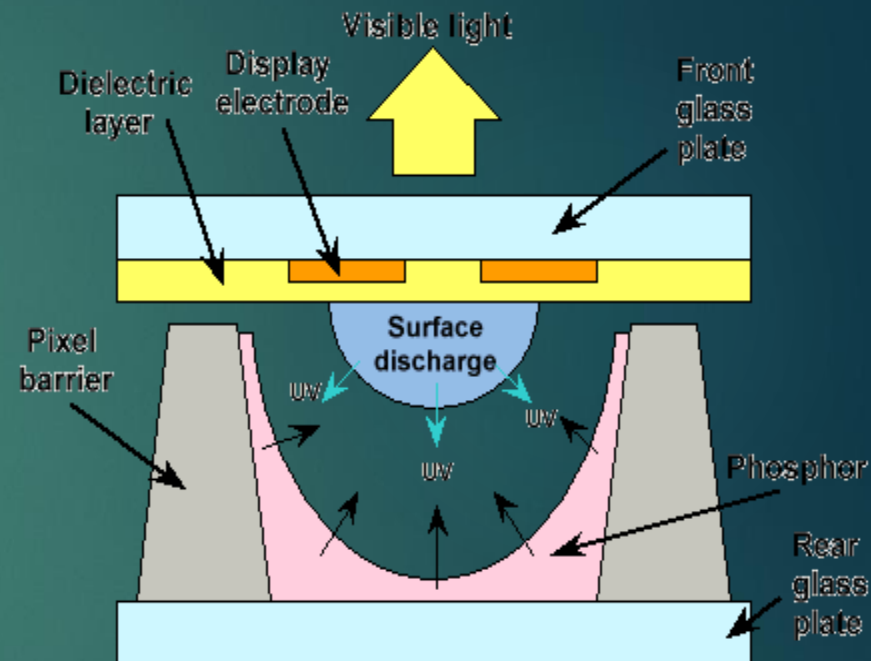
- ▶ LED actually stands for Light Emitting Diode.
- ▶ LED displays use the same technology for display but it uses LED's for back light while LCD displays generally use Cold Cathode Fluorescent technology

Comparison (Wikipedia)

- ▶ Produce images with greater dynamic contrast
- ▶ Can be extremely slim (some screens are less than 0.5 inch (0.92 cm) thin in edge-lit panels)
- ▶ Offer a wider color gamut (when RGB-LED backlighting is used)
- ▶ Produce less environmental pollution on disposal
- ▶ Are more expensive
- ▶ Have longer lifespans and are more reliable
- ▶ Have (typically) 20- to 30-percent lower power consumption
- ▶ Run significantly cooler
- ▶ Allow a wider dimming range
- ▶ Are significantly lighter

Plasma Panel

- ▶ Plasma display panels
 - ▶ Similar in principle to fluorescent light tubes
 - ▶ Small gas-filled capsules are excited by electric field, emits UV light
 - ▶ UV excites phosphor
 - ▶ Phosphor relaxes, emits some other color



Plasma Panel (Pros and cons)

- ▶ Plasma panels are fairly bright and offer large viewing angle.
- ▶ Good for Large format display
- ▶ Plasma panels, however, are expensive, have large pixel size ($\sim 1\text{mm}$ as compared to $\sim 0.2\text{mm}$). Phosphor depletes with time and are less bright than CRT

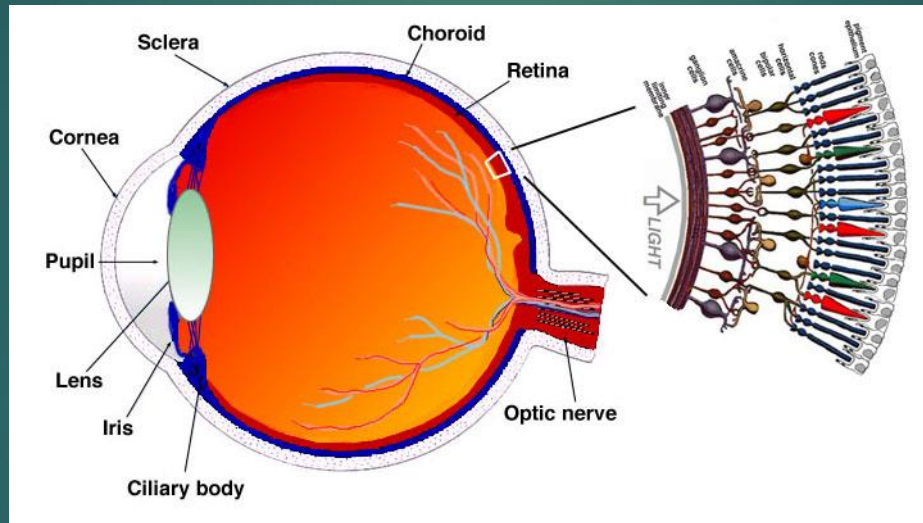
Hardcopy Devices

- ▶ Inkjet Printer
- ▶ Laser Printer
- ▶ Film Recorder
- ▶ Electrostatic Printer and
- ▶ Pen Plotter

Input Devices

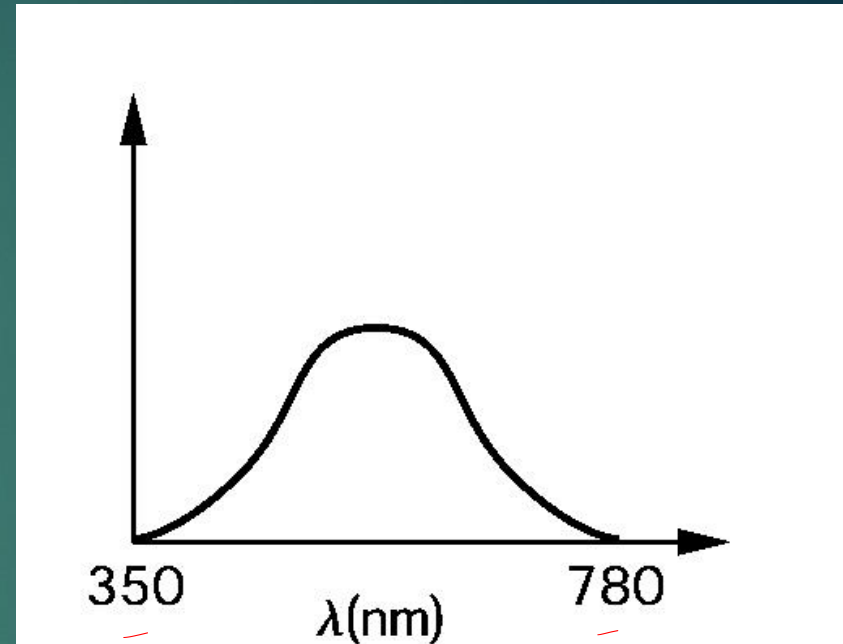
- **Locator Devices:**
 - ▶ to indicate a position and/or orientation
 - ▶ to select a displayed entity
 - ▶ Tablet, Mouse, Trackball, Joystick, Touch Panel, Light Pen
- **Keyboard devices:**
 - ▶ to input a character string
 - ▶ Alphanumeric keyboard (coded - get single ASCII character)
- **Valuator Devices:**
 - ▶ to input a single value in the space of real numbers
 - ▶ Rotary dials (Bounded or Unbounded), Linear sliders
- **Choice Devices:**
 - ▶ to select from a set of possible actions or choices
 - ▶ Function keys

Human Visual System (HVS)



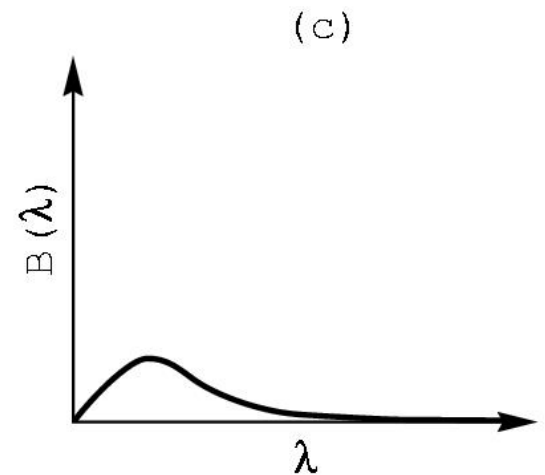
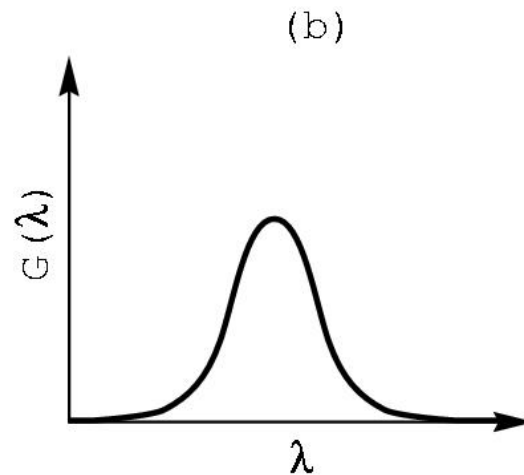
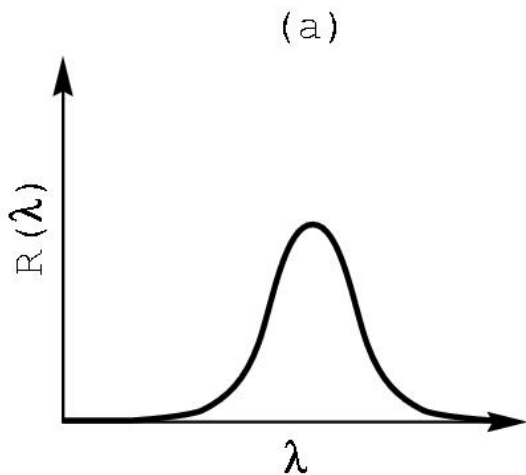
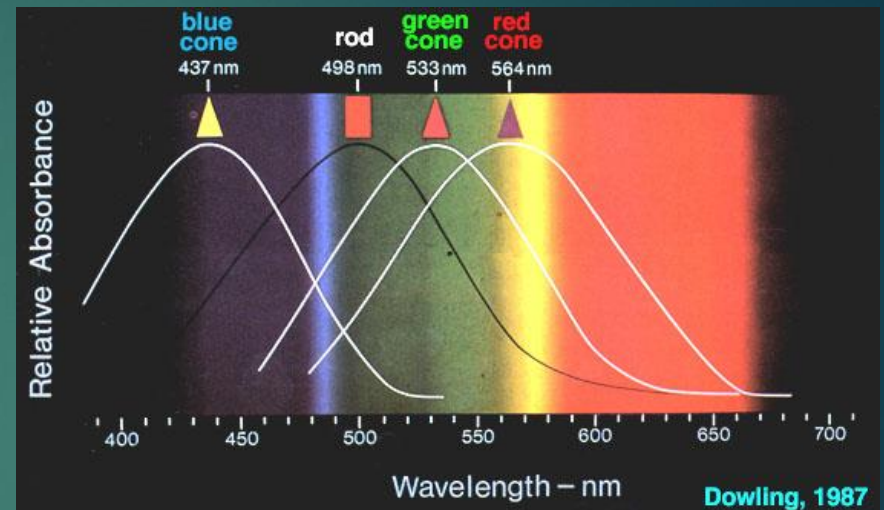
Human Visual System (HVS)

- ▶ Rods and cones are energized by electromagnetic energy in the range 350-780 nm
- ▶ Sizes of rods and cones determines the resolution of HVS – our visual acuity
- ▶ The sensors in the human eye do not react uniformly to the light energy at different wavelengths
- ▶ Different HVS response for single frequency light – red/green/blue
- ▶ Relative brightness response at different frequencies
- ▶ The shown curve is known as Commission Internationale de L'Eclairage (CIE) standard
- ▶ The curve matches the sensitivity of the monochromatic sensors used in black & white films and video camera
- ▶ Most sensitive to GREEN colors



Human Visual System (HVS)

- ▶ HVS has three types of cones
 - ▶ Blue
 - ▶ Green
 - ▶ Yellow



Summary

- ▶ Overview of Graphic Systems
 - ▶ LED Display
 - ▶ Plasma TV
 - ▶ Hardcopy Devices
 - ▶ Input Devices
- ▶ Human Visual System

References



- ▶ Fundamentals of Computer Graphics Third Edition by Peter Shirley and Steve Marschner
- ▶ Interactive Computer Graphics, A Top-down Approach with OpenGL (Third Edition) by Edward Angel.