Human Vision System

Tue, July 7 (Week 3)
Human Vision System for AR Headsets

Overall Goal: Make a display that adds light in a way that fools human vision.
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Specific Targets:

- Color Perception
  - RGB in 3 dimensional space, not frequencies

- Depth Perception
  - Binocular Disparity, Focal Length, with Motion Parallax and etc.
Color Perception

Color in the nature: the frequency of electromagnetic wave (light)
Color Perception

Color we see: activation of RGB cones
Color Perception

RGB framework only works for humans, not others (e.g., dogs)

Fig. 1.2.3D
These photos depict the colors that humans with normal color vision see versus what a dog is likely to see. Photo courtesy of Dr. Cynthia Cook of Veterinary Vision, Inc. Animal Eye Specialists (www.veterinaryvision.com)
Depth Perception

Binocular Disparity

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Depth Perception

Focal Length: the target distance
Depth Perception

Larger the error (focal length - actual distance), larger the circle of confusion.
Motion Parallax
Relative Size
**Perspective**

**Fig. 8.50**: Once the box horizon and vanishing point positions are fixed, the rest of the processes remain as usual.

- Transfer the coordinates from the side section drawing onto both sides of the box in order to draw the line that determines both points of the vanishing point and the vanishing order, as in Fig. 8.50 below, as well as the position and size of each telephone pole.

- A solid box line exists to work out the final panel.
Field of Vision

Figure 4. Human field of vision. Diagram showing symbol recognition
Example of Another Species: Birds
Selective Attention
Selective Attention

It is very inefficient and also impossible for humans to look at and understand the whole scene.