Module 7: Robot vision I

Lecture 25: Robot vision, image processing, image acquisition camera

Objectives

In this course you will learn the following

- Robot Vision
- Image Processing
- Image Acquisition
- Charge-coupled Device
- Image
- Lighting
- The Eye

Robot Vision

- Internal and External State Sensors
- Machine Vision
- Image – 2D representation of 3D world. Extraction of ‘useful information’ of real world

Image Processing

- Image Acquisition (sensing)
- Preprocessing (Reduction in noise enhancement)
- Segmentation (separating regions)
- Description (characteristic features)
- Recognition (identify regions)
- Interpretation (Assign meaning)
Image Acquisition

- Traditionally Vidicon Cameras

- Photosensitive layer behaves as Capacitor

- Scanning Pattern 525 lines out of which 480 contain image 30 times in a second

- 262.5 lines, 60 fps

- 559 lines Interlaced 512 belong to image

Charge-coupled Device

- Gate is more positive than substrate

- Potential well – electrons accumulate

- Line scan and Area scan cameras
Figure 25.2 Principle of CCD

Analog Signal Frame grabber

Figure 25.3 Process flow of image signals.

Image

- Sample analog video signal. A/D conversion

- Spatial discretization – due to discrete line (scan) or sampling time of A/D converter

- Discretization in brightness (due to finite number of bits of digital value)
Lighting

- Diffused Light

- Backlight – silhouette (binary)

- Directional lighting

- Structured lighting
- 6-7 million core receptors

- Bright light vision

- Rod receptors in most retina

- 75-150 million dim light gray image

**Recap**

In this course you have learnt the following

- Robot Vision

- Image Processing

- Image Acquisition

- Charge-coupled Device

- Image

**Lighting**

- The Eye

Congratulations, you have finished Lecture 25. To view the next lecture select it from the left hand side menu of the page.