

ROBOT VISION:

Robot vision is used in the robots for viewing and recognizing an object with the help of a computer. This system is also known as artificial vision or computer vision. The robotic vision process includes three important tasks, namely:

1. Sensing & Digitizing Image Data
2. Image Processing & Analysis
3. Applications

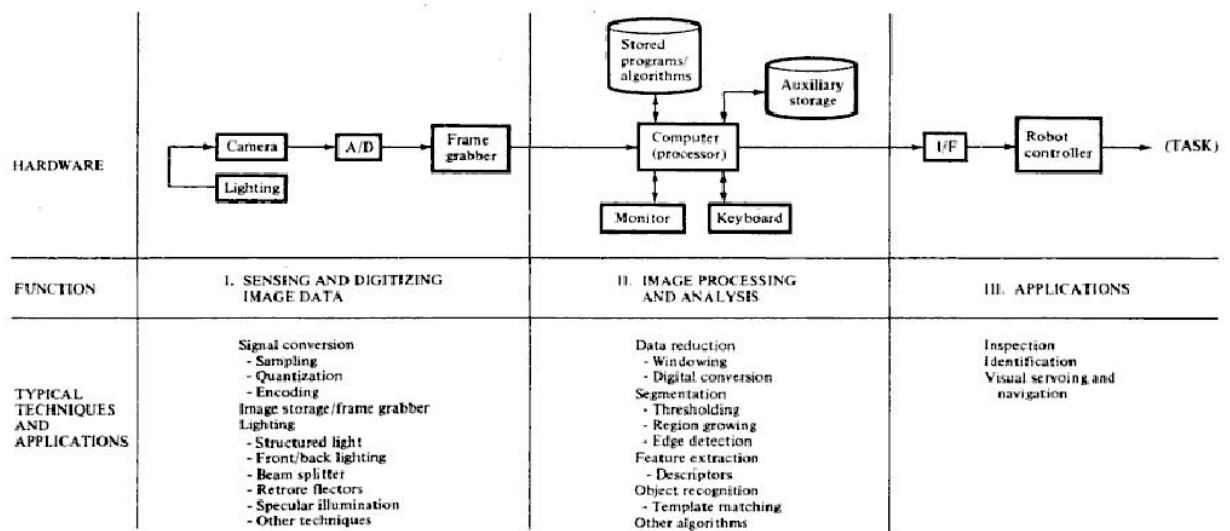


Figure 7-1. Functions of a machine vision system.

Sensing & Digitizing Image Data

A camera is used in the sensing and digitizing tasks for viewing the images. It will make use of special lighting methods for gaining better picture contrast. These images are changed into the digital form, and it is known as the frame of the vision data. A frame grabber is incorporated for taking digitized image continuously at 30 frames per second. Every frame is divided as a matrix.

Image processing

To use the stored data computer must be programmed to operate on the digitally stored image.

Consider a vision system having a pixel density of 350 pixels per line and 280 lines (98,000 picture elements) and a 6-bit register for each picture element to represent various grey levels. This would require a total of $98,000 \times 6 = 588,000$ bits for each 130s. This is a large amount of data that is to be processed in a short period of time.

Applications in Industrial Context

Inspection

This technique includes Quality control

- checking for surface defects,
- discover of flaws in labelling
- weld quality, cracks, paint defects.
- Verification of presence of components in part assembly (aligned, correctly assembled).
 - measurement for Dimensional accuracy (size, shape tolerances).
- Checking for presence of holes in parts and other features

Identification

- It includes whether a part is to be accepted or rejected
- Part sorting (different types of parts on a conveyor)
- Locating parts in bins/conveyor for pick & place.
- Determining orientation of a part for gripping.
- This find application in sorting palletizing and depalletizing.

Visual Servoing / Visual Surveying / Navigation

- It direct the action of robot
- Controls positioning of end effector relative to objects using vision (e.g. aligning tool to part).

- Tracking moving parts on conveyors.
- Used in Surveying environments, mapping, obstacle detection.
- Used in arc welding.