Basic concepts of Image Acquisition with

* Images are generated by the combination of an "illumination" source & the reflection or absorption of energy from the source.

* Depending on the source — illumination energy is
  - reflected from or
  - transmitted through objects.

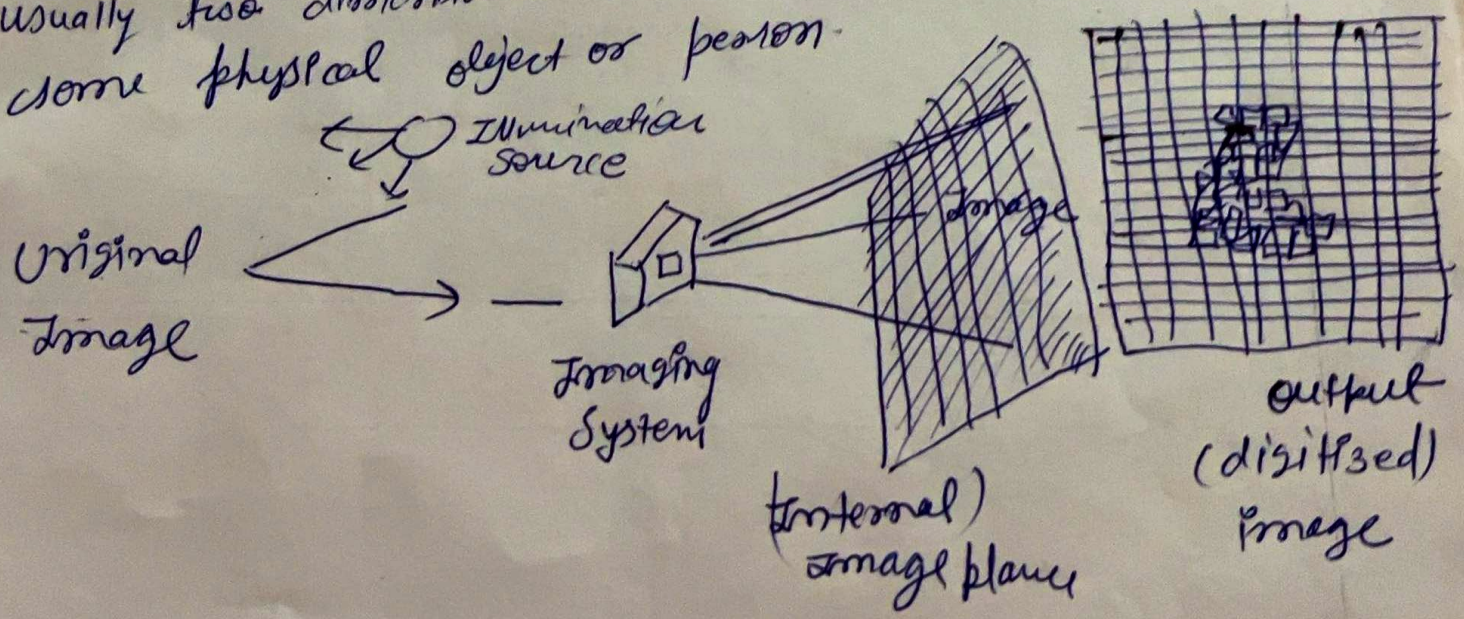
> Example in first — Light reflected from a planer surface
>
> Example in second category — when X-ray pass through a patient's body for generating a diagnostic X-ray film.

* The three principles sensor arrangements used to transform illumination energy into digital image.
  - Single imaging sensor
  - Line sensor
  - Array sensor

Unit-1

Image Acquisition –

- The process of capturing real-world images and storing them in computer
- Requires – Image sensors that convert photons to electrons.
- Digital Image formation – An image is an artifact usually two dimensional that has similar appearance to some physical object or person.



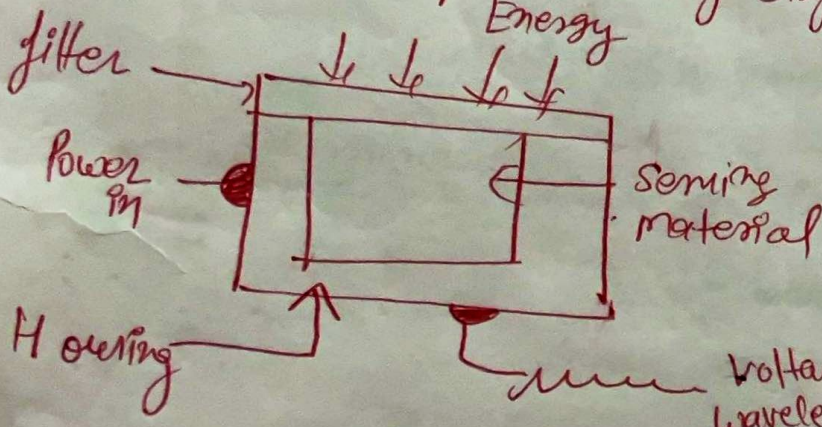
An example of the digital image acquisition process (a) Energy (illumination) source (b) An element of a scene. (c) Imaging System (d) Projection of the scene onto the image plane (e) Digitized image.

What is Image Acquisition?

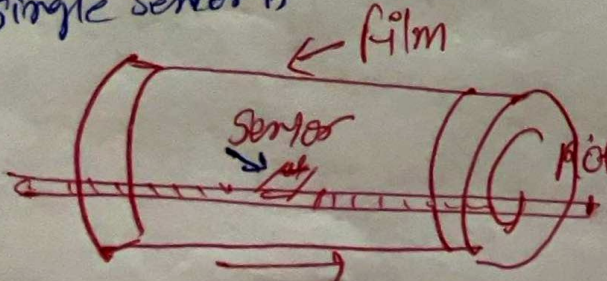
→ In Image processing, it is defined as the action of retrieving an image from some source, usually a hardware-based source for processing. It is first steps in the workflow sequence because, without an image no processing is possible. The image that is acquired is completely unprocessed.

→ Incoming energy is transformed into a voltage by the combination of input electric power and sensor material energy being detected.

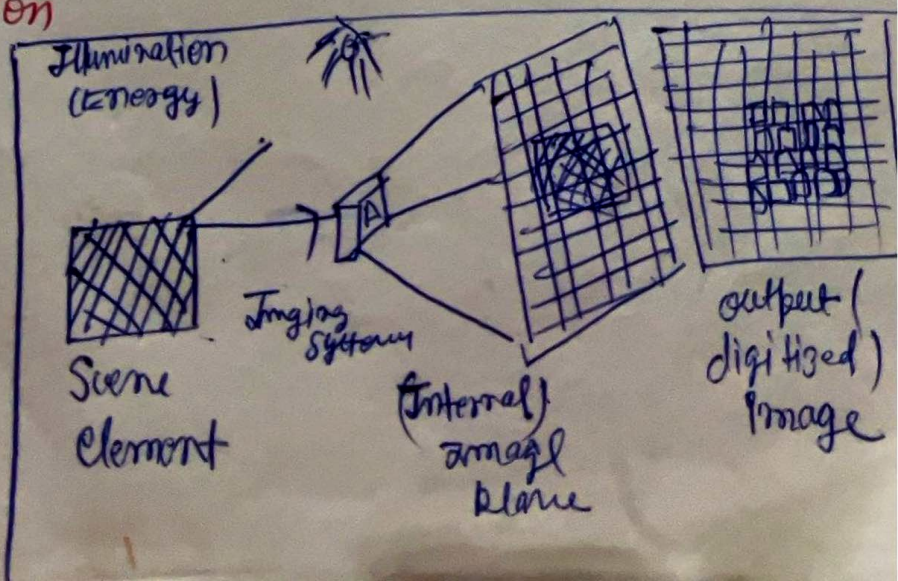
(1) Image Acquisition using Single Sensor



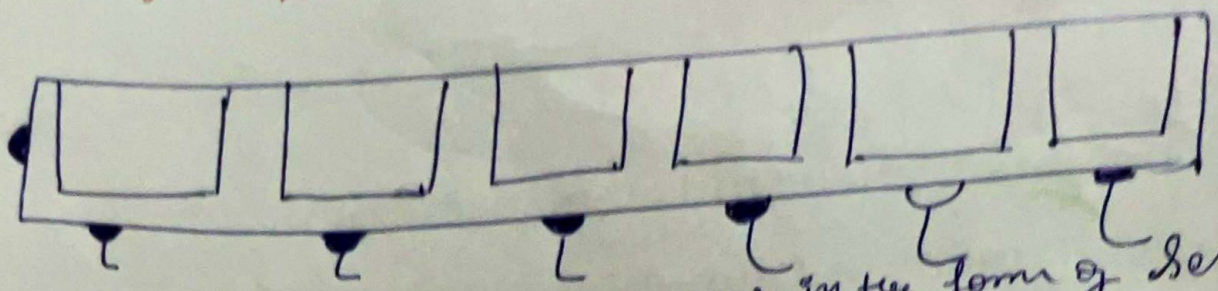
Example of single sensor is photodiode



→ Require two direction.

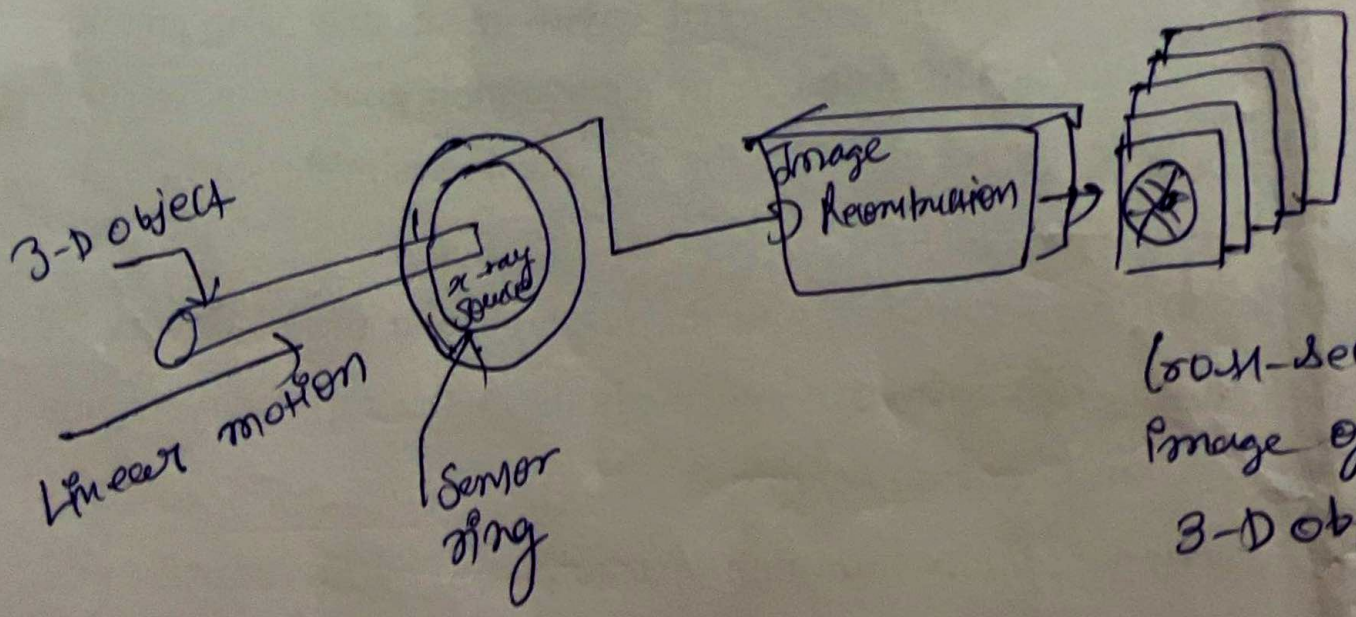


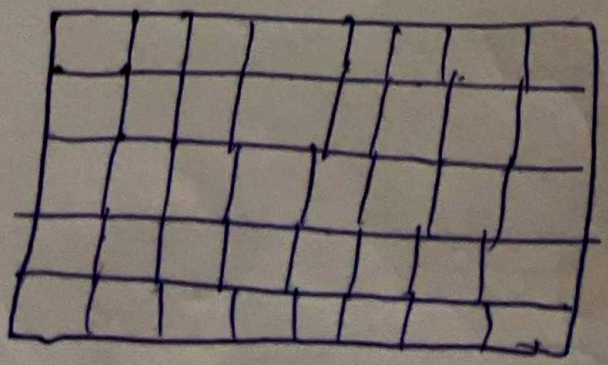
(2) Image Acquisition using Sensor Strips



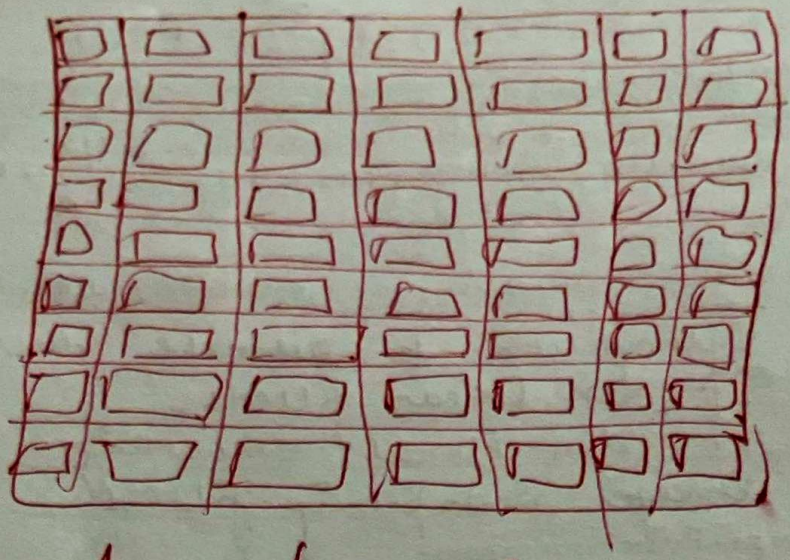
→ In line arrangement of sensors in the form of Sensor ~~strips~~ Strips. Strip provides imaging elements in one direction.

→ motion perpendicular to strip provides imaging in the other direction. Sensor strips mounted in a ring configuration are used in medical and industrial imaging to obtain cross-sectional image of 3-D objects.





(2) Image Acquisition using a array Sensor



Array processor

→ Motion is not required for array sensors.
→ It covers huge area of an object and sesors the energy without motion.
→ Need to bring object just front of it and it recognizes and makes very comfortably.