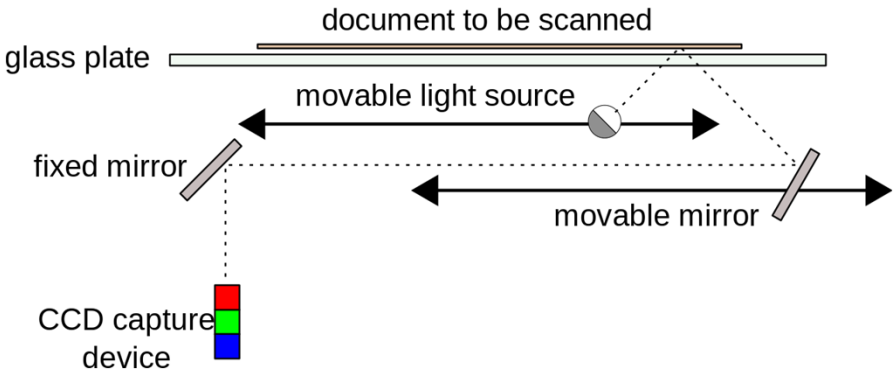
# INPUT DEVICES

- 2D scanners
  - to import printed document into computers in digital format
- how does it work?
  - Light illuminate the document
  - Scan head moves across the document
  - The image is sent to CCD using series of mirrors
  - The software translate data from CCD to computer data

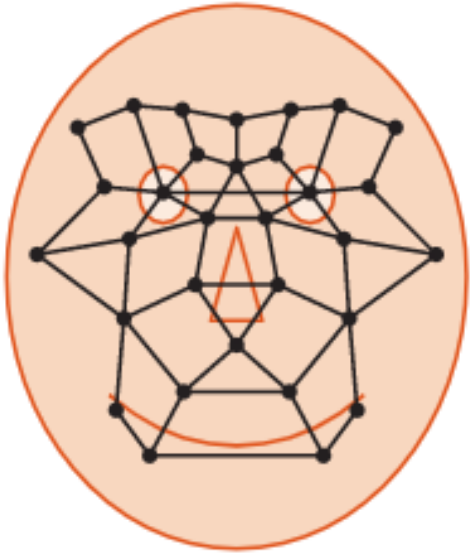



# INPUT DEVICES

- 3D scanner
  - To import a solid object to computers as a digital model
  - To be used in CAD (Computer Aided Design) and 3D printer
- How does it work?
  - It scans a solid object with laser
  - The result is three coordinates of  the object
  - 3D model is created in a program using the coordinates

# INPUT DEVICES

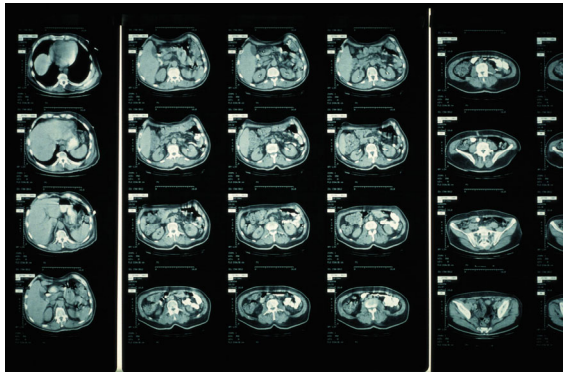
- Face recognition application
  - The application can be used to identify a person
  - Mobile phone, airport
  - It scans a face and compare the key data with the database
- The face in Figure 3.30 shows several of the positions used by the face recognition software. Each position is checked when the software tries to compare two facial images. Data, such as:
  - distance between the eyes
  - width of the nose
  - shape of the cheek bones
  - length of the jaw line
  - shape of the eyebrows

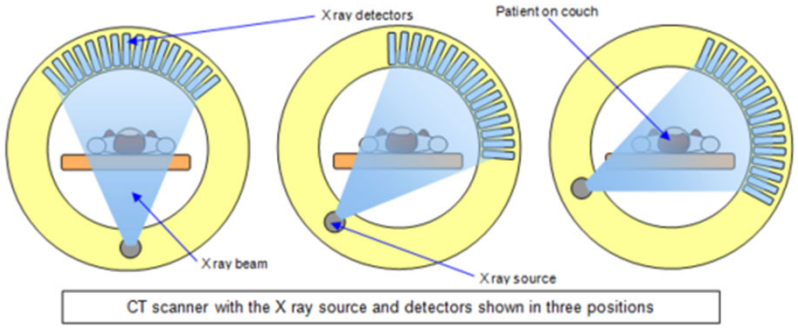


▲ **Figure 3.30** Face recognition

# INPUT DEVICES

- Application of 3D scanning – computed tomographic (CT) scanners
  - It is use in tomography technology; it builds up an image of the solid object through a series of very thin slices
  - Each slide is built by use of X-rays, radio frequencies or gamma imaging
  - https://youtu.be/ZQ9ZxYPw15Q

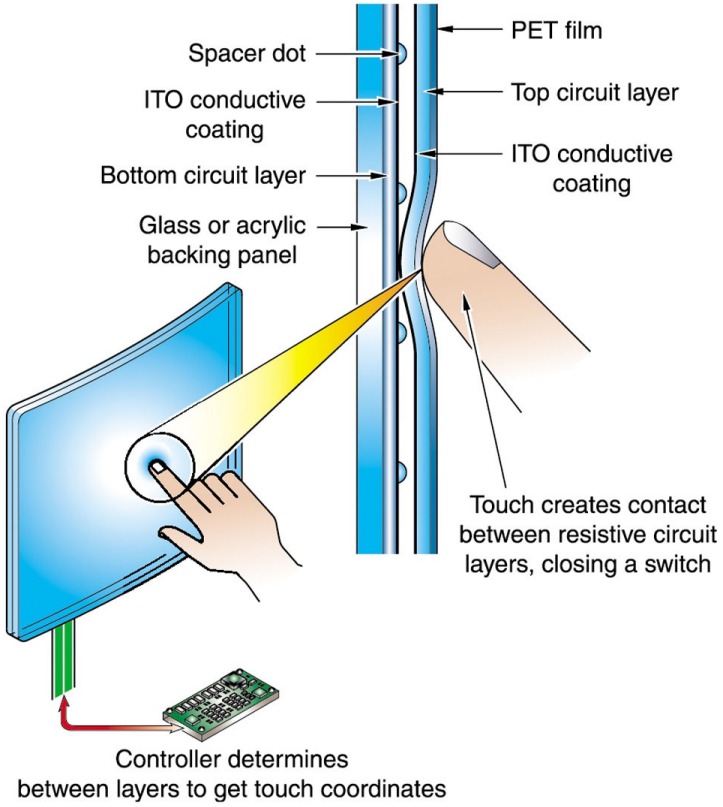





CT scanner with the X ray source and detectors shown in three positions

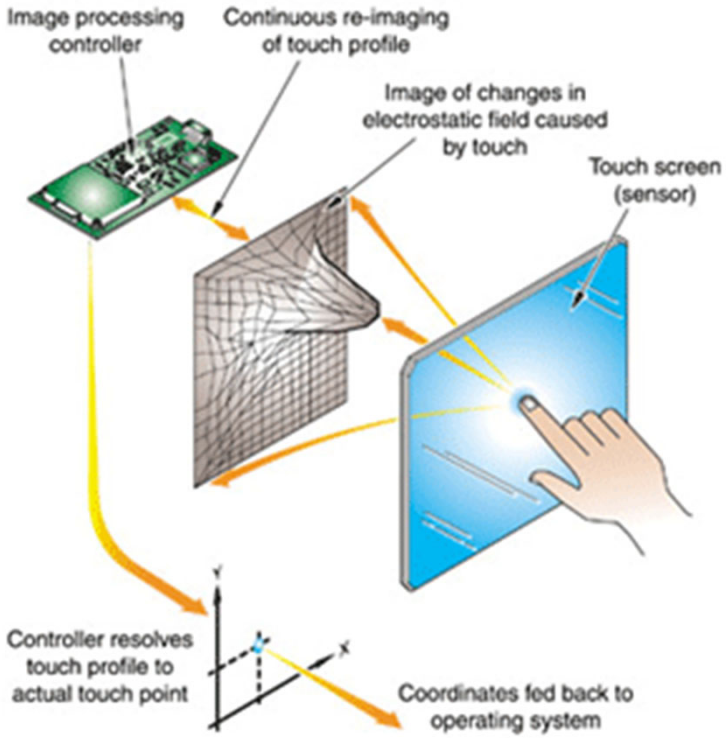
# INPUT DEVICES

- Touch screen
  - It is both input or out put devices
- Resistive touch screen
  - How does it work
    - There are top layer and bottom layer of the screen
    - When a user touches the screen, the top layer is pushed to touch the bottom layer
    - The electric circuit is created
    - The location is identified
  - Advantages
    - Cheap
    - Can be used when wear gloves
  - Disadvantages
    - Poor visibility in strong light
    - Not allow multi-touch



# INPUT DEVICES

- Capacitive touch screen
  - How does it work?
    - The screen is conductive layer
    - The electrical field is created on the screen
    - When a user touches the screen, electric pass to the user's finger, the electrical field is changed and detected by sensors in the screen's border
    - The location is identified
  - Advantages
    - Allow multi-touch
    - Good visibility in strong light
  - Disadvantages
    - Can not be used when wearing gloves



# INPUT DEVICES

- Infrared touch screen
  - How does it work
    - The invisible infrared gridlines are created on the screen
    - The infrared in sent across the border and there are sensors at the border to detect the infrared laser
    - When a user touches the screen, it breaks the beam
    - The location is identified with the coordinates
  - Advantages
    - Allow multi-touch
    - Can be used when wearing gloves
  - Disadvantages
    - More expensive than capacitive