**Robot Configurations**

➢ A robot manipulator can be divided into two sections: a **body and arm assembly** and a **wrist assembly.**

➢ At the end of the manipulator's wrist is a device related to the task that must be accomplished by the robot. The device called an **end effector** is usually either
  (1) a gripper for holding a work part
  (2) a tool for performing some process.

➢ The body and arm of the robot is used to position the end effector and the robot's wrist is used to orient the end effector.
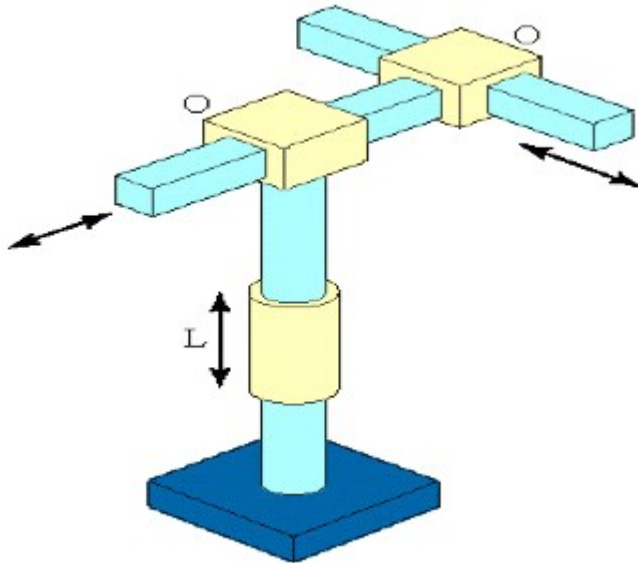
## Body and Arm Configurations

**Cartesian coordinate robot –** Other names for this configuration include rectilinear robot and x – y – z robot. As shown in Figure, it is composed of three sliding joints, two of which are orthogonal.
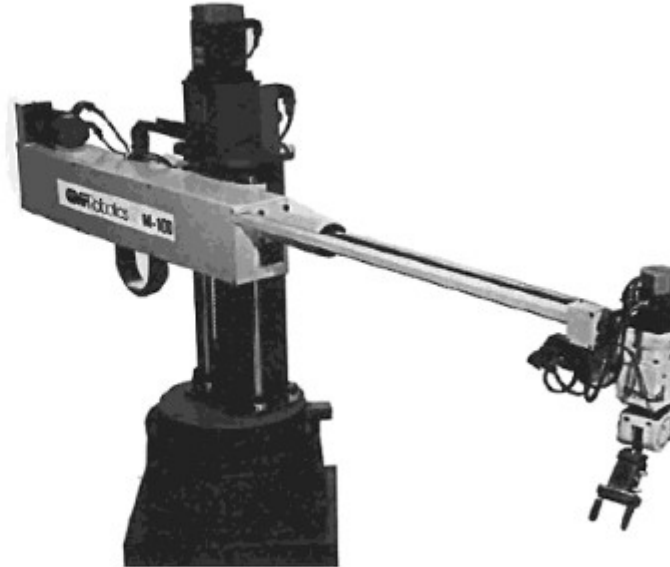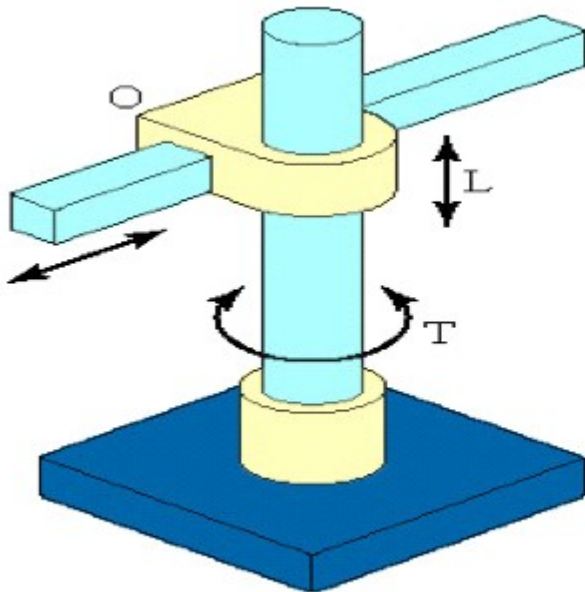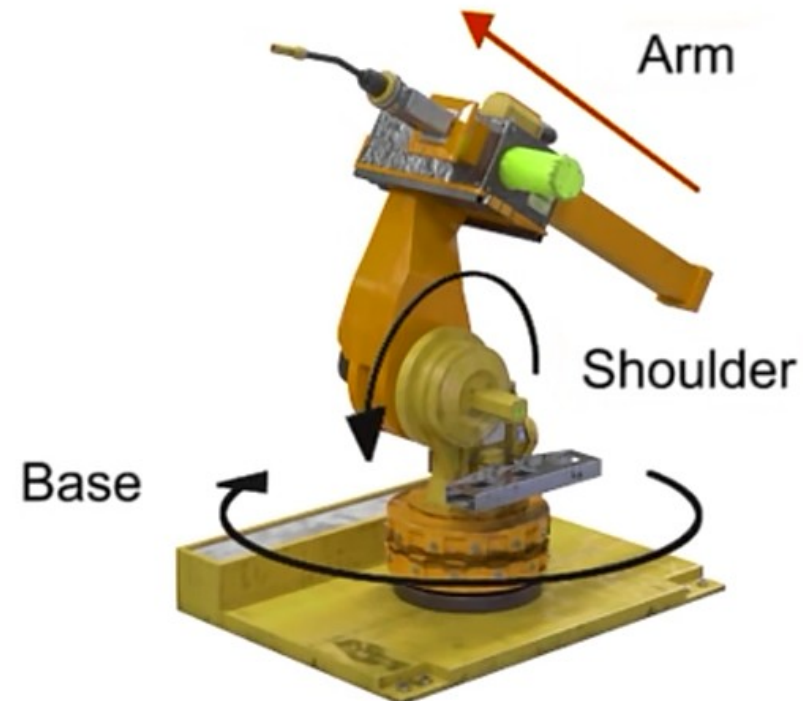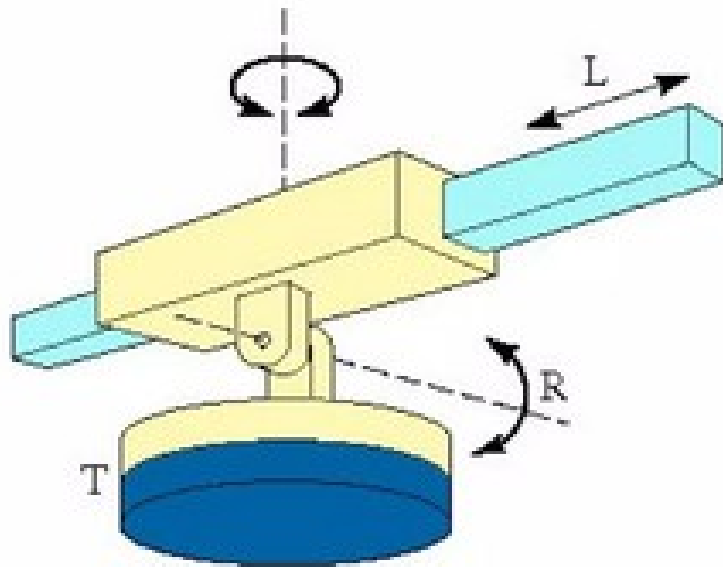
**Body and Arm Configurations**

**Cylindrical configuration –** This robot configuration consists of a vertical column, relative to which an arm assembly is moved up or down. The arm can be moved in and out relative to the axis of the column. The column can be rotated about it's axis.

**Body and Arm Configurations**

**Polar configuration –** This configuration consists of a sliding arm (L joint) actuated relative to the body, that can rotate about both a vertical axis (T joint) and a horizontal axis (R joint).
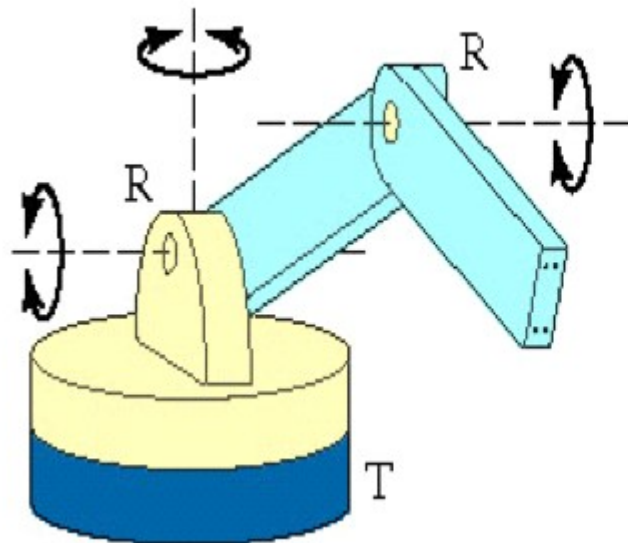
## Body and Arm Configurations

**Jointed arm robot –** This robot manipulator has the general configuration of a human arm. The jointed arm consists of a vertical column that swivels about the base using a T joint. At the top of the column is a shoulder joint (shown as an R joint in the figure), whose output link connects to an elbow joint (another R joint).
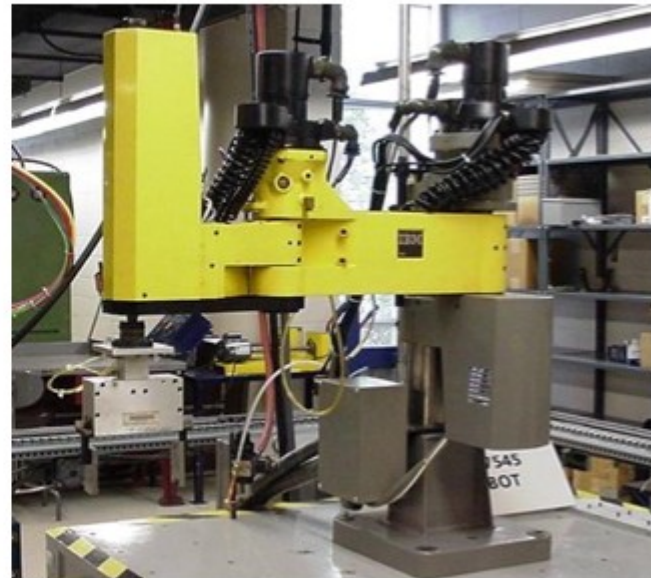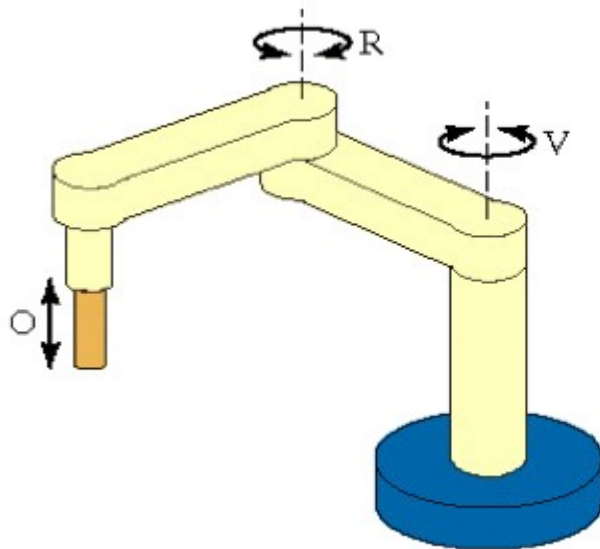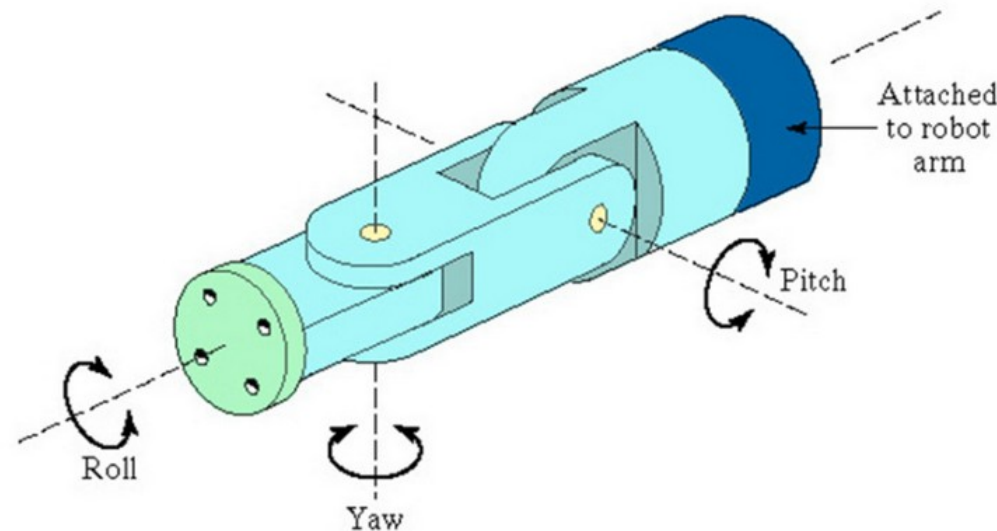
## Body and Arm Configurations

**SCARA –** **SCARA is an acronym for Selective Compliance Assembly Robot Arm.** This configuration is similar to the jointed arm robot except that the shoulder and elbow rotational axes are vertical, which means that the arm is very rigid in the vertical direction, but compliant in the horizontal direction. This permits the robot to perform insertion tasks (for assembly) in a vertical direction, where some side to side alignment may be needed to mate the two parts properly.

## Wrist Configurations

➤ The robot's wrist is used to establish the orientation of the end effector.

➤ The three joints are defined as:

1) **Roll**, using a T joint to accomplish rotation about the robot's arm axis
2) **Pitch**, which involves up and down rotation, typically using a R joint
3) **Yaw**, which involves right and left rotation, also accomplished by means of a R - joint.

## Applications

➤ Material handling applications –
   1) Material transfer
   2) Machine loading and/or unloading

➤ Processing Operations – Spot welding, Continuous arc welding, Spray painting etc.

➤ Assembly and Inspection