

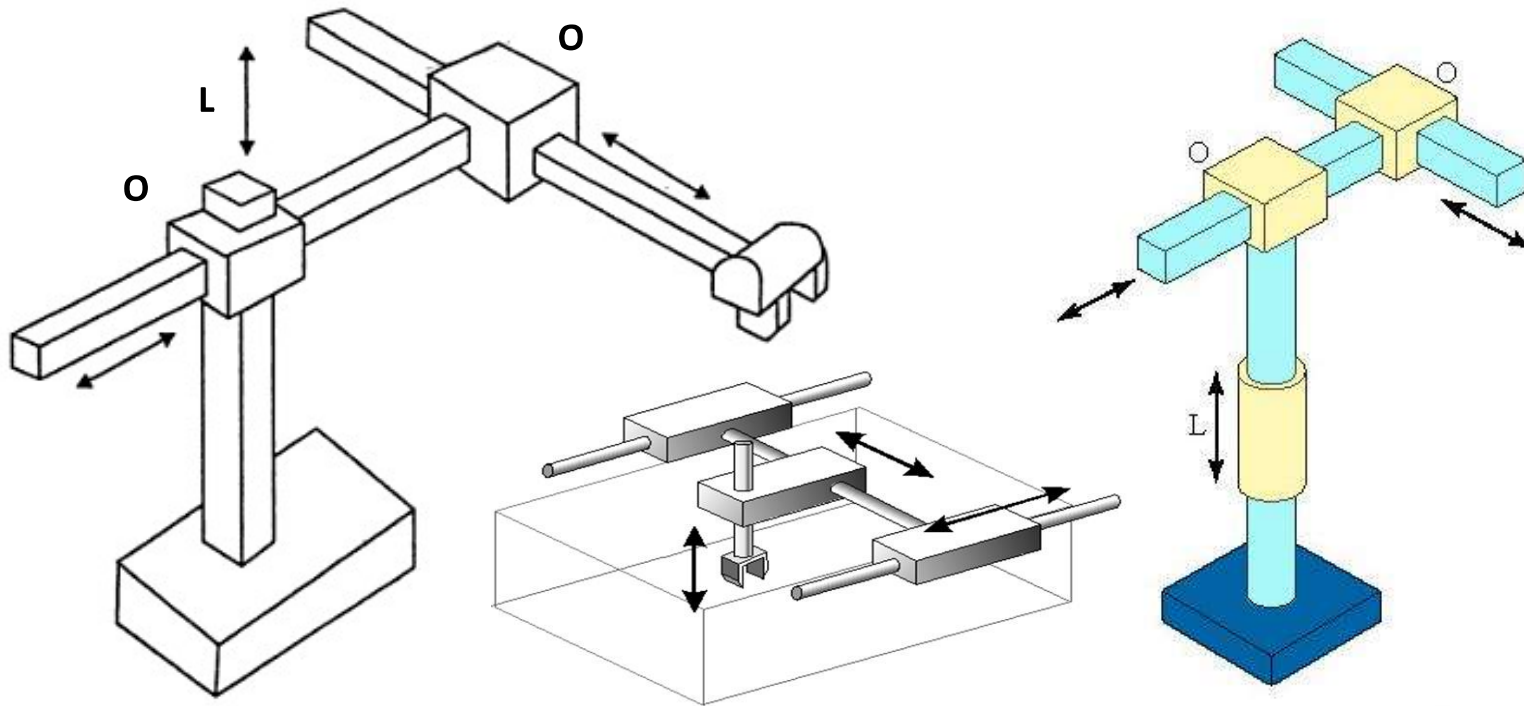
Basic Configurations of ROBOT

- ❑ **Work envelope** or **work volume** of a robot can be defined as the space within the end effector of the robot can operate or reach.
- ❑ Based on the coordinate system of motion of the manipulator and end effector, there are four basic configurations of robots:
 - 1) Cartesian Configuration Robots (LOO)
 - 2) Cylindrical Configuration Robots (TLO)
 - 3) Polar (Spherical) Configuration Robots (TRL)
 - 4) Jointed-Arm (Articulated) Configuration Robots
 - 1) Revolute Robots (TRR)
 - 2) SCARA Robots (VRO)

Basic Configurations of ROBOT

Cartesian Configuration Robots: (LOO)

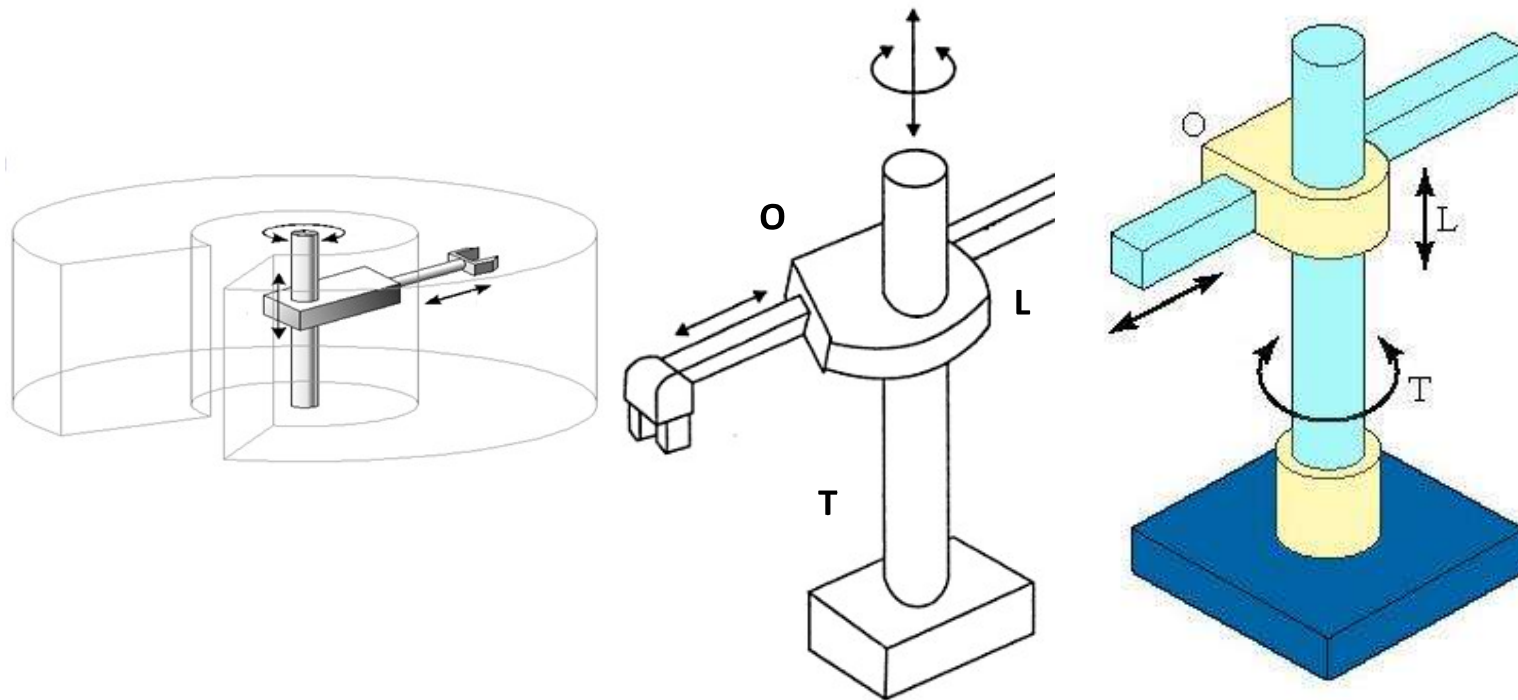
- Provides three linear motions along three mutually perpendicular axes: X, Y, and Z. However, there is no rotary motion.
- Configuration provides rectangular work envelope.
- Used for assembly, palletizing and machine tool loading.



Basic Configurations of ROBOT

Cylindrical Configuration Robots: (TLO)

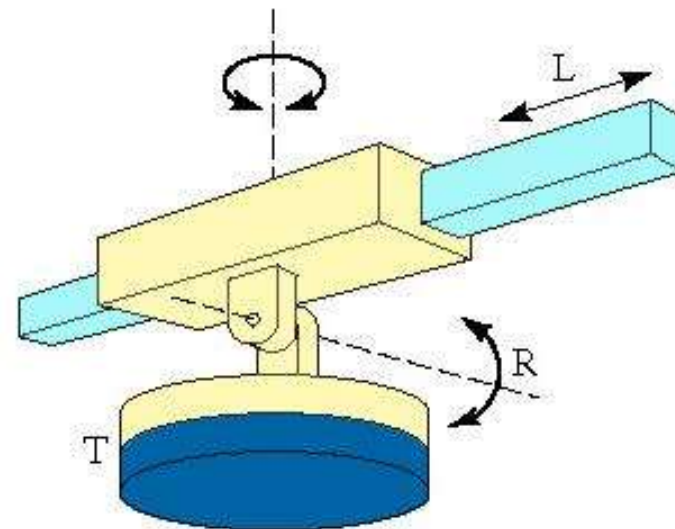
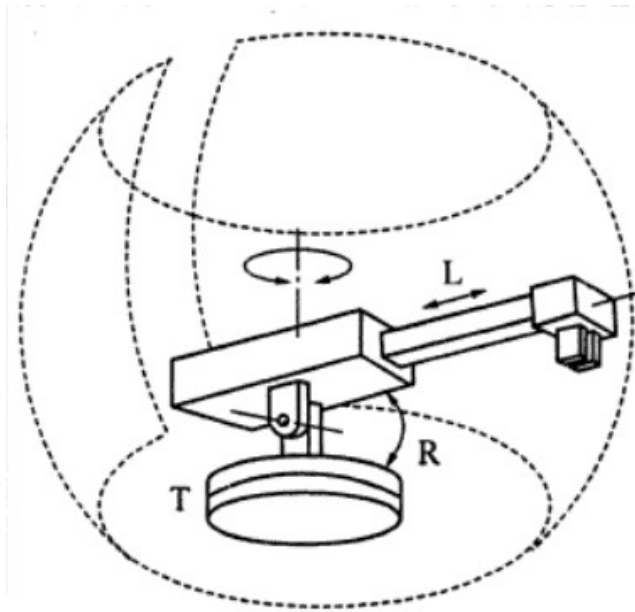
- Provides two linear and one rotary motions.
- Configuration provides cylindrical work envelope, has good work area to floor area ratio.
- Used for loading and unloading on machine tools.



Basic Configurations of ROBOT

Polar (Spherical) Configuration Robots: (TRL)

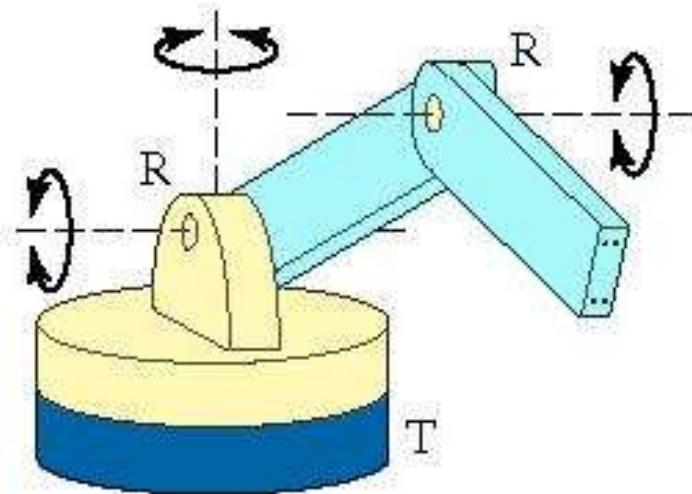
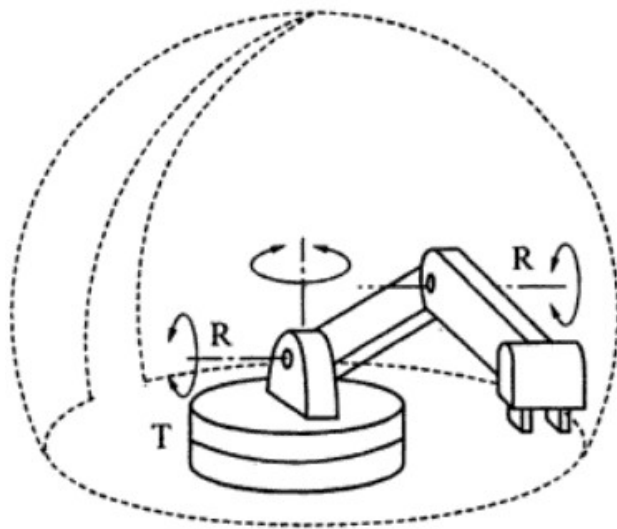
- Provides one linear and two rotary motions.
- Configuration provides spherical work envelope.
- Used for spot welding and manipulation (Handling) of heavy loads.



Basic Configurations of ROBOT

Revolute Robots: (TRR)

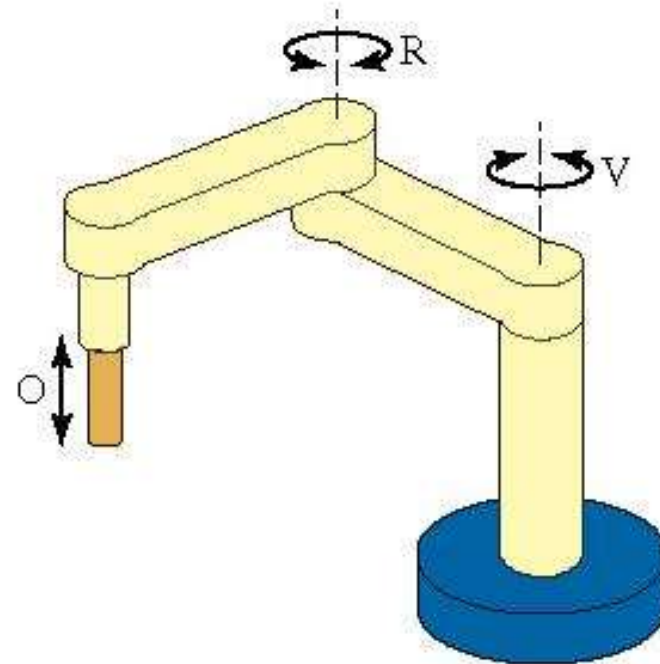
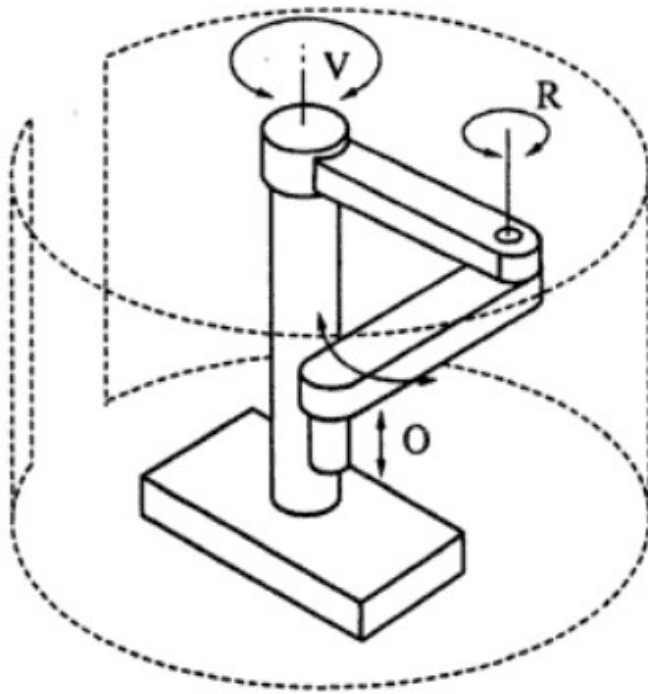
- Provides three rotary motions about three mutually perpendicular axes.
- Configuration is similar to that of human arm.
- Consists of two straight links, corresponding to the human forearm and upper arm, connected by a rotary joint.
- Provides spherical work envelope, has excellent work areas to floor area ratio.
- Used to spray painting, seam welding, spot welding, assembly, heavy material handling, etc.



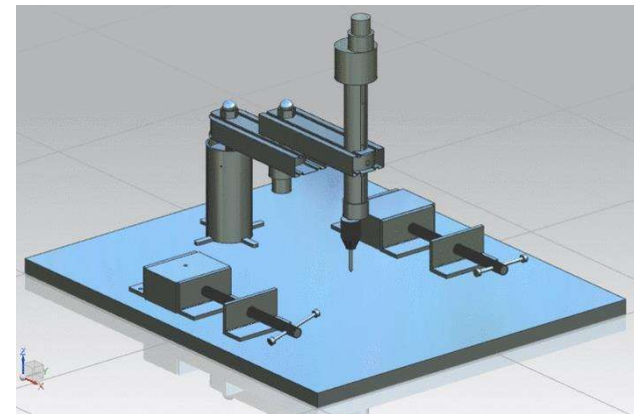
Basic Configurations of ROBOT

SCARA (Selective Compliance Assembly Arm) Robots: (VRO)

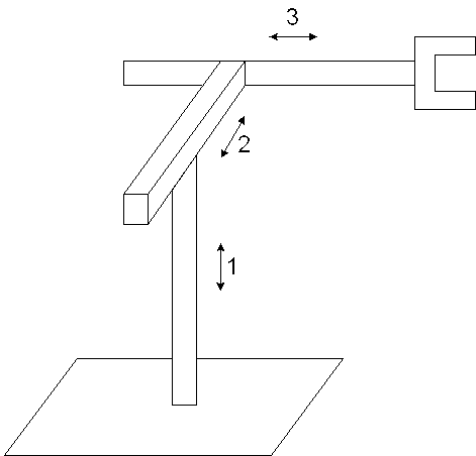
- Provides one linear and two rotary motions.
- Provides cylindrical work envelope with high speed drive motors.
- Used for assembly operations.



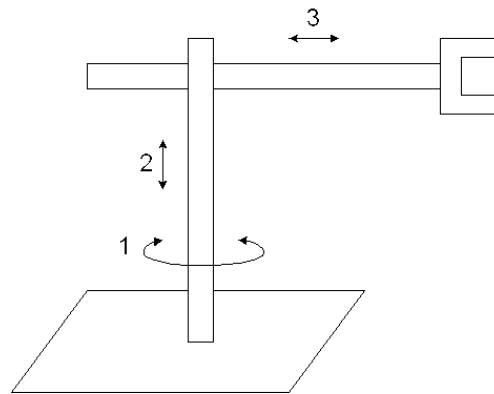
SCARA ROBOT



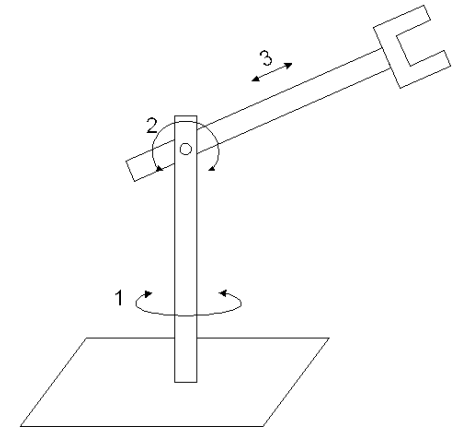
Basic Configurations of ROBOT



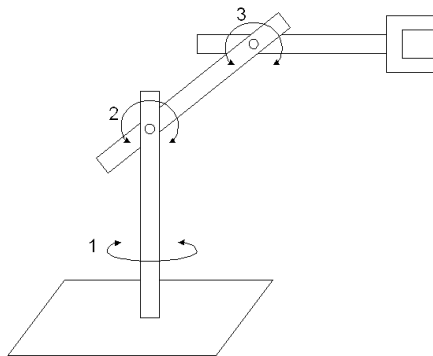
Cartesian: LOO



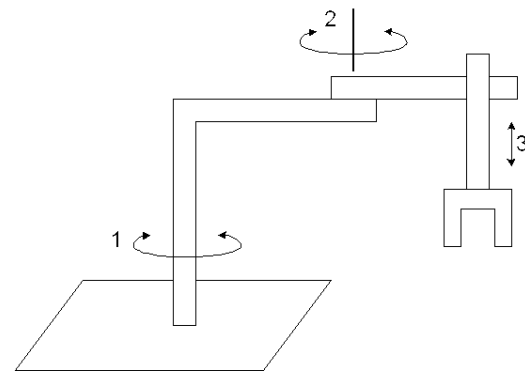
Cylindrical: TLO



Spherical (Polar): TRL

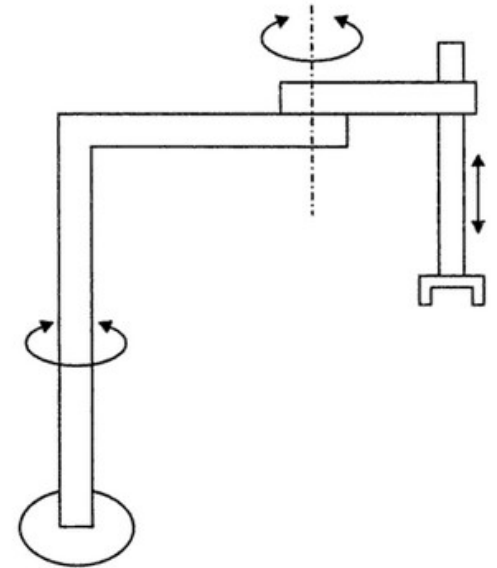
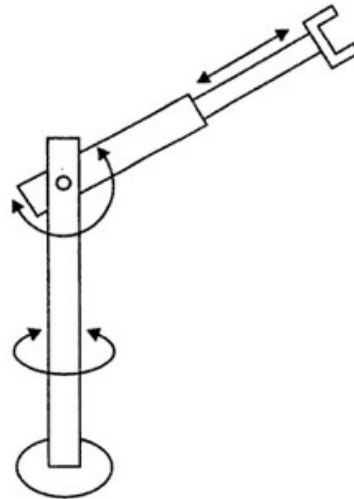
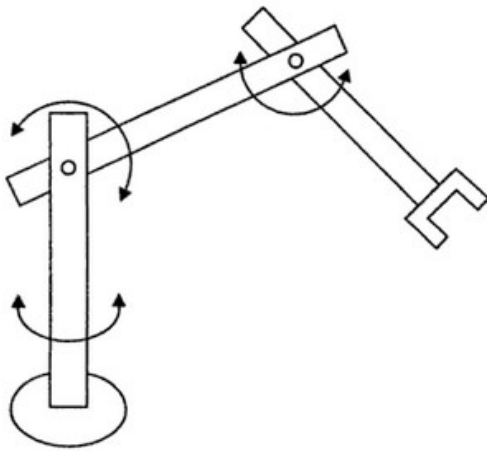
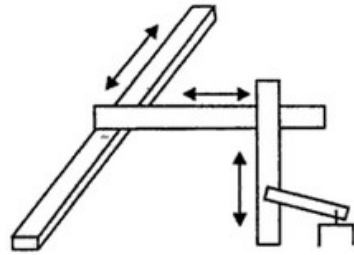
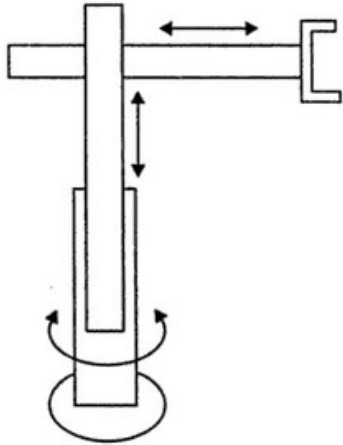


Revolute: TRR



SCARA: VRO

Basic Configurations of ROBOT



Basic Configurations of ROBOT

Configurations	Manipulator	Motions	Work Envelope	Application
Cartesian	LOO	3 Linear	Rectangular	Assembly, Palletizing Machine Tool Loading
Cylindrical	TLO	2 Linear , 1 Rotary	Cylindrical	Loading & Unloading on Machine Tools
Spherical (Polar)	TRL	1 Linear , 2 Rotary	Spherical	Spot Welding , Handling of Heavy Loads.
Revolute	TRR	3 Rotary	Spherical	Spray Painting, Seam Welding, Spot Welding, Assembly, Heavy Material Handling
SCARA	VRO	1 Linear, 2 Rotary	Cylindrical	Assembly Operations

L = Linear; **O** = Orthogonal; **R** = Rotational; **T** = Twisting; **V** = Revolving

