

Robotics End Effectors

Introduction

- A end effector is a device attached to the wrist of manipulator for the purpose of handling materials, parts, tools to perform specific task.
- Allows robot to interact with environment.

Effector and Actuator

- Actuators and effectors are not the same thing.
- An *effector* is any device that affects the environment.
- Effectors include legs, wheels, arms, fingers and wings.
- An *actuator* is the actual mechanism that enables the effector to execute an action.
- Actuators typically include electric motors, hydraulic motors etc.
- The terms effector and actuator are often used interchangeably to mean "whatever makes the robot take an action."

Ways of using Effectors

Two basic ways of using effectors:

- to move the robot around => locomotion
- to move other object around => manipulation

These divide robotics into two mostly separate categories:

- mobile robotics
- manipulator robotics

Ways of using Effectors

- In contrast to locomotion, where the body of the robot is moved to get to a particular position and orientation, a manipulator moves itself typically to get the *end effector* (e.g., the hand, the finger, the fingertip) to the desired 3D position and orientation.

TYPES OF END EFFECTOR

- Gripper
 - To grasp and hold objects.
- Tools
 - To perform specific task for example welding, spray gun etc.

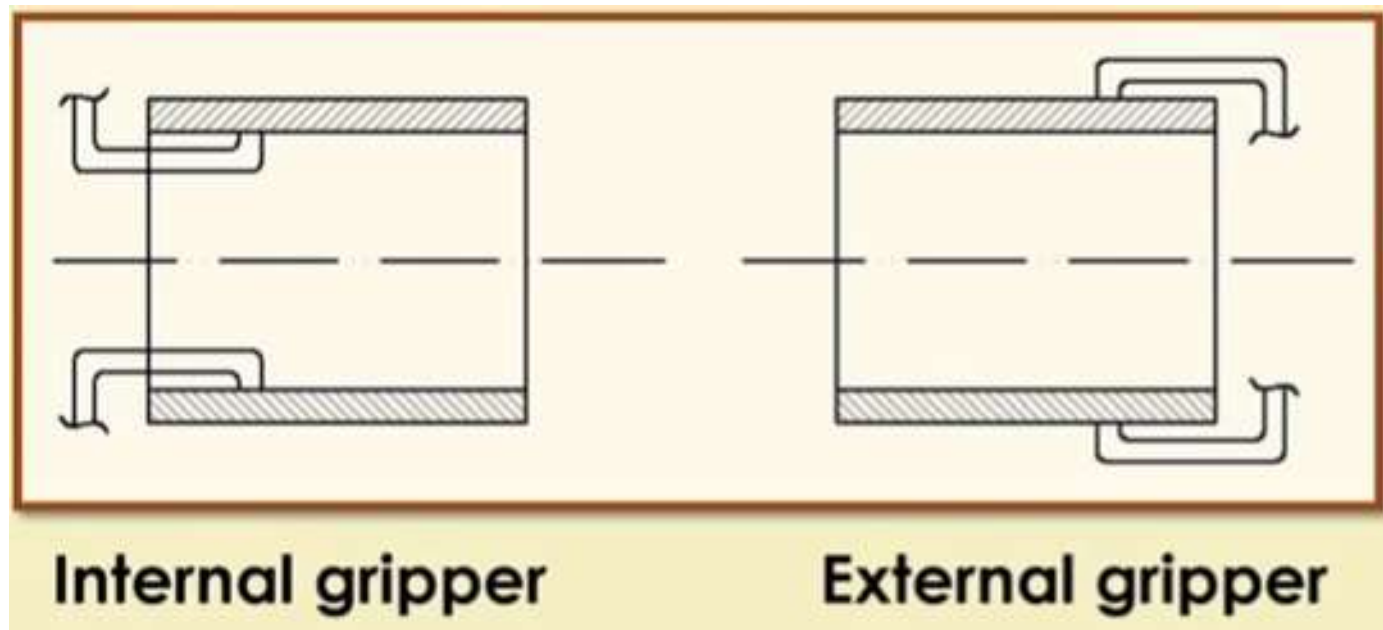
Classification of Grippers

- Single Gripper and Double Grippers.
- Internal and External Gripper.
- Soft Gripper and Hard Gripper.
- Active Gripper and Passive Gripper

Single Gripper and Double Gripper

- Single Gripper
 - Only one gripper is mounted on the wrist.
- Double Gripper
 - Two independent gripper is mounted on the wrist.
 - Can be used for loading and unloading applications.

Internal VS External Gripper



Soft Gripper and Hard Gripper.

- Hard Gripper: Point Contact between finger and object
- Soft Gripper: Area (Surface) Contact between finger and object.

Active Gripper and Passive Gripper

- Active Gripper: Gripper Equipped with Sensors.
- Passive Gripper: Gripper Without Sensor.

Tools as End Effectors

- A tool attached to the robot wrist.
- Examples:
 - Spot Welding Tools.
 - Spray Painting Nozzle.
 - Drilling
 - Grinding.