



# **SNS COLLEGE OF TECHNOLOGY**

**(An Autonomous Institution)**  
**Coimbatore-35**



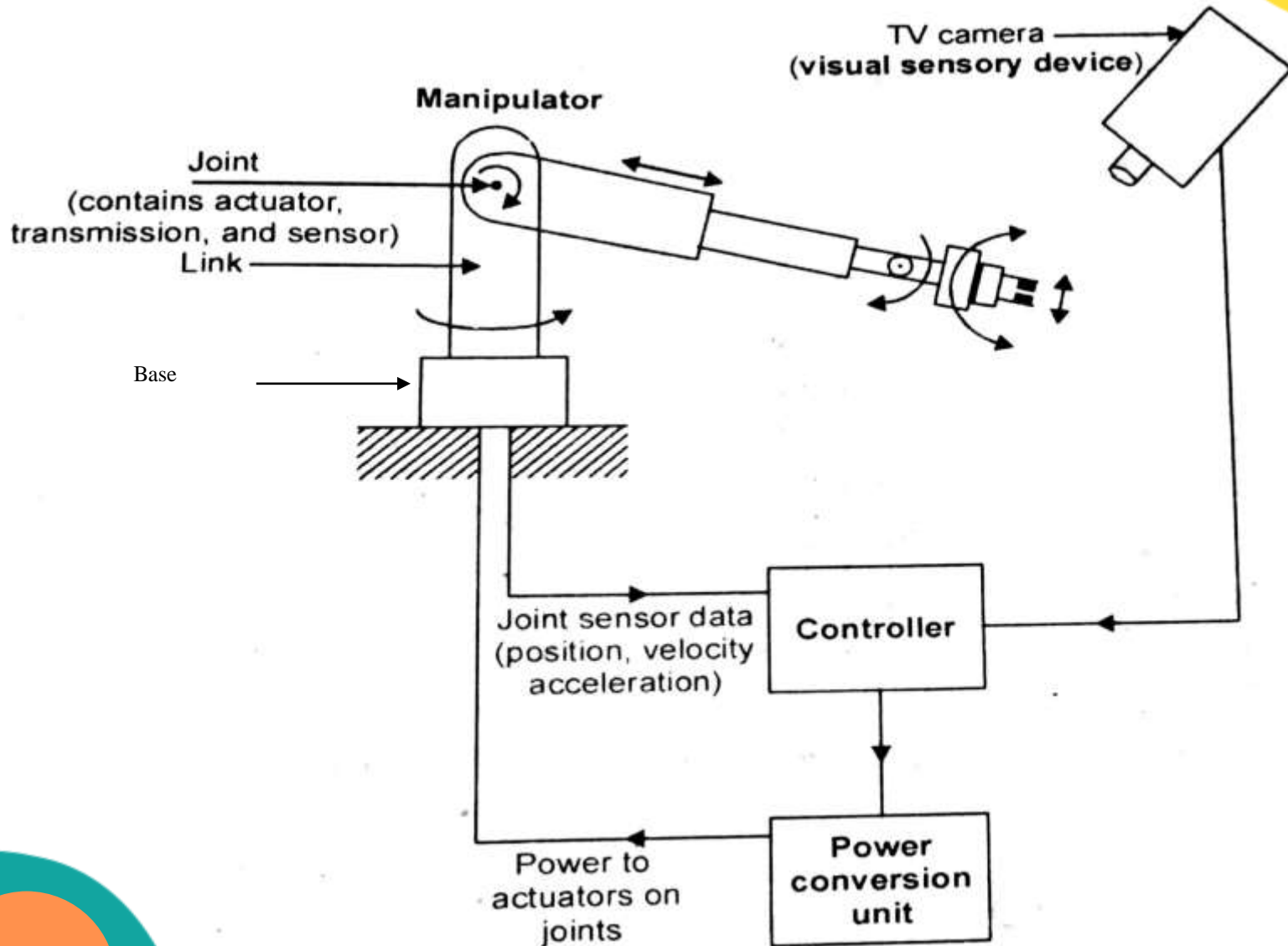
## **Department of Biomedical Engineering**

Course Name: **ROBOTICS AND AUTOMATION IN  
MEDICINE**

**III Year : VI Semester**

## **OVERVIEW OF ROBOT SUBSYSTEM**

# Robot Anatomy



# Robot Anatomy

The **base** of the robot can be made either ***fixed or movable***, depending on the application it is going to be used for.

## Manipulator:

- The combination of ***body, arm and wrist*** assembly is called the manipulator.
- To the fixed or mobile base, the body of the robot is attached.
- To the body of the robot, the arm is attached.
- At the end of the arm of the robot, there is the wrist assembly.
- The wrist has many components that allow it to be oriented in a variety of positions.
- A series of joints provides movements between the various components of body, arm and wrist.

# Robot Anatomy

## End – effector:

- The end – effector is mounted on the wrist of the robot manipulator arm.
- The end – effector generally handles objects, makes connection to other machines or performs the required tasks.
- The end – effector can be ***gripper*** (just grasp and hold an object) or can be a ***tool*** (to perform a task)
- Some examples of end – effectors are Welding torch, paint spraying gun, glue – laying device and a part handler.



# Robot Anatomy



## Actuators / Drives:

- Actuators are the *muscles* of the manipulators.
- Actuators ***provide the movement*** of body, arm and wrist.
- The actuators determine the ***speed of operation, load carrying capacity and dynamic performance*** of a robot.
- The ***nature of applications*** for which a robot can be used is decided by the drive system to some extent.
- Common types of actuator are stepper motors, servo motors, pneumatic cylinders and hydraulic cylinders.



# Robot Anatomy



## Controller:

- The controller ***controls the motions*** of the actuators.
- The controller acts on data it receives from the computer and coordinates the motions with the sensory feedback information.
- The velocity and force exerted by the robot are also controlled by the controller.
- For example let us assume that a robot must pick an object, for which the joint should be at angle of  $30^\circ$ . If the joint is already not at this angle, then the controller will send a signal to the actuator, causing the joint to move.



# Robot Anatomy



## Sensors:

- Sensors are used to collect information about the ***internal state*** of the robot or to ***communicate with the outside environment***.
- The sensors integrated into the robot send information about each joint or link (Joint angles, position information) to the controller, which in turn determines the signal to the actuator.
- To communicate with the outside environment, the robots are equipped with sensory devices such as vision systems, touch and tactile sensors, speech synthesizers etc.



# Robot Anatomy



## Interfaces:

- Interfaces are required for the robot to interact with the outside world.
- The interfaces act as link between the robot and external world.
- The interface can be either between a robot and a computer or can be between a robot and other machine.





**THANK YOU**

**19BME307 / R&A/Unit 1/B.Divya/AP/BME**