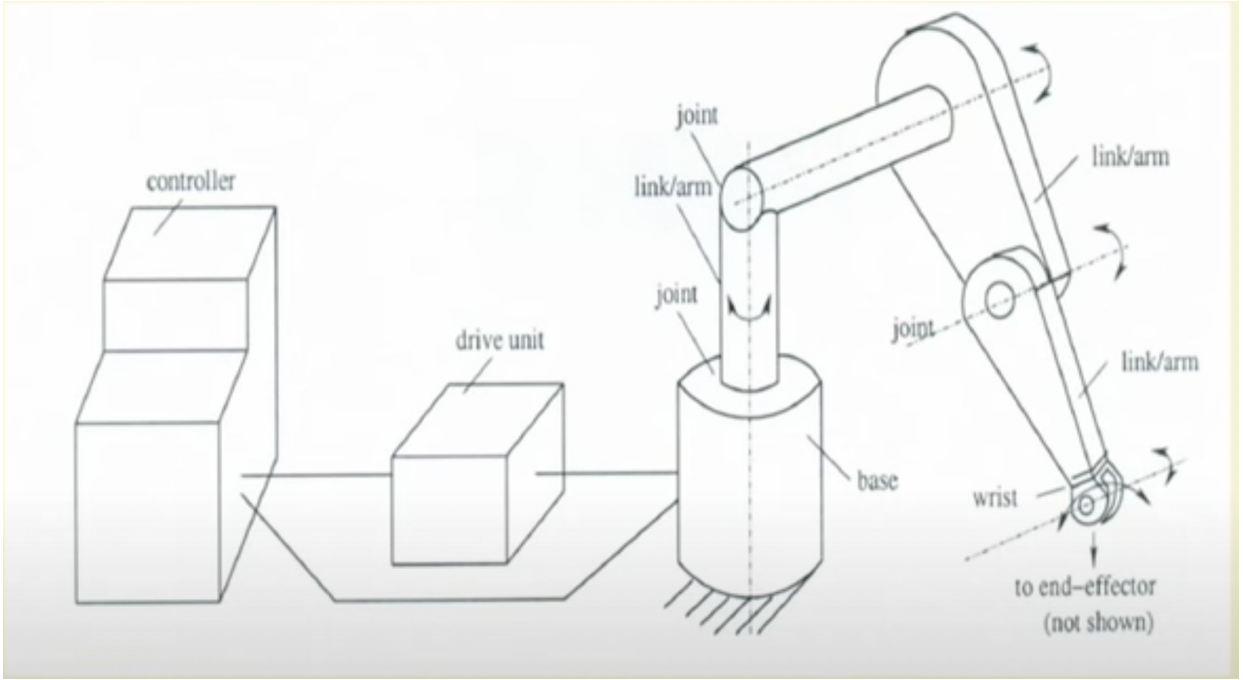
Introduction to robots and robotics

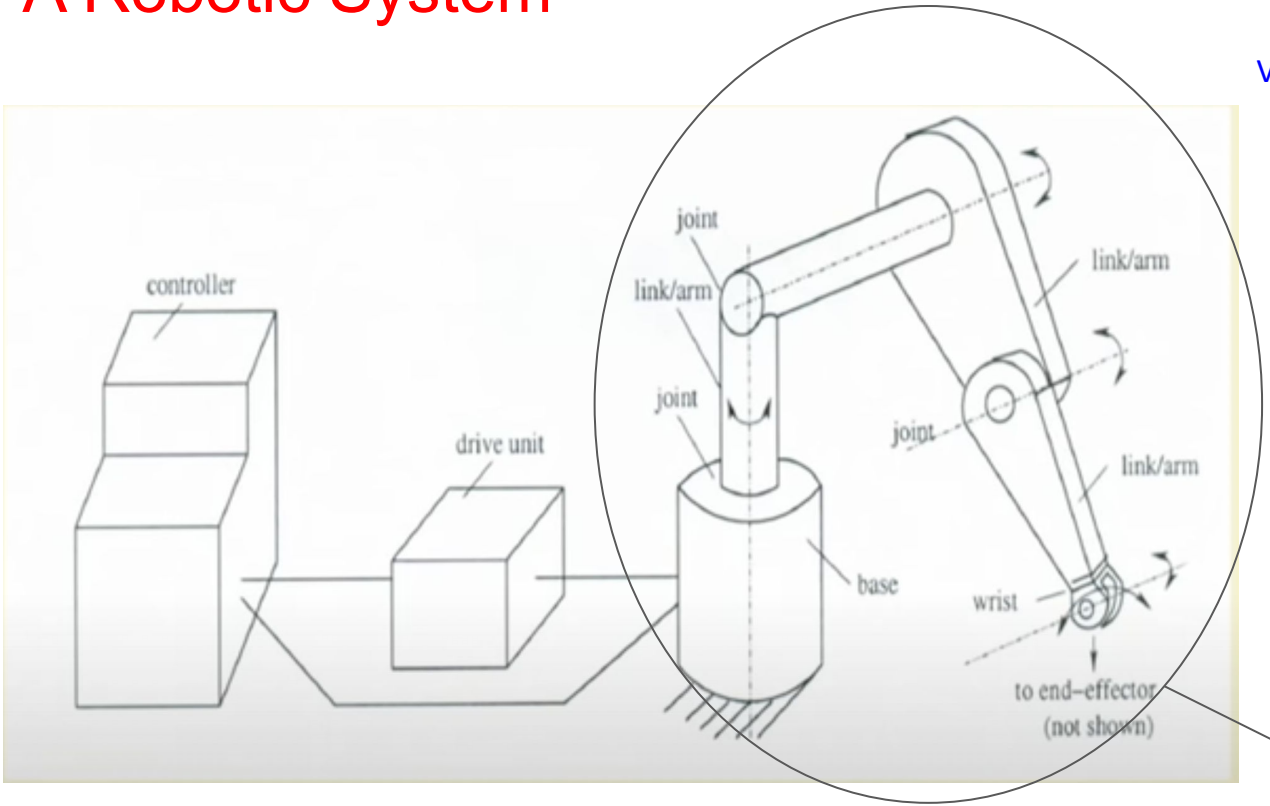
A Robotic System



Various Components

1. Base
2. Links and Joints
3. End-effector/gripper
4. Wrist
5. Driver/Actuator
6. Controller
7. Sensors

A Robotic System



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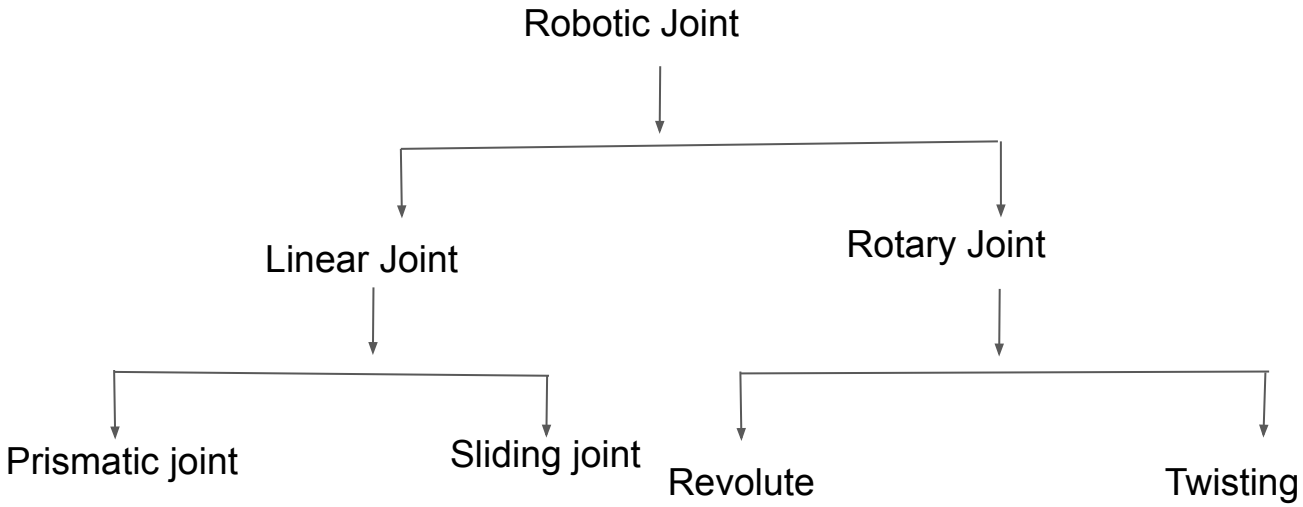
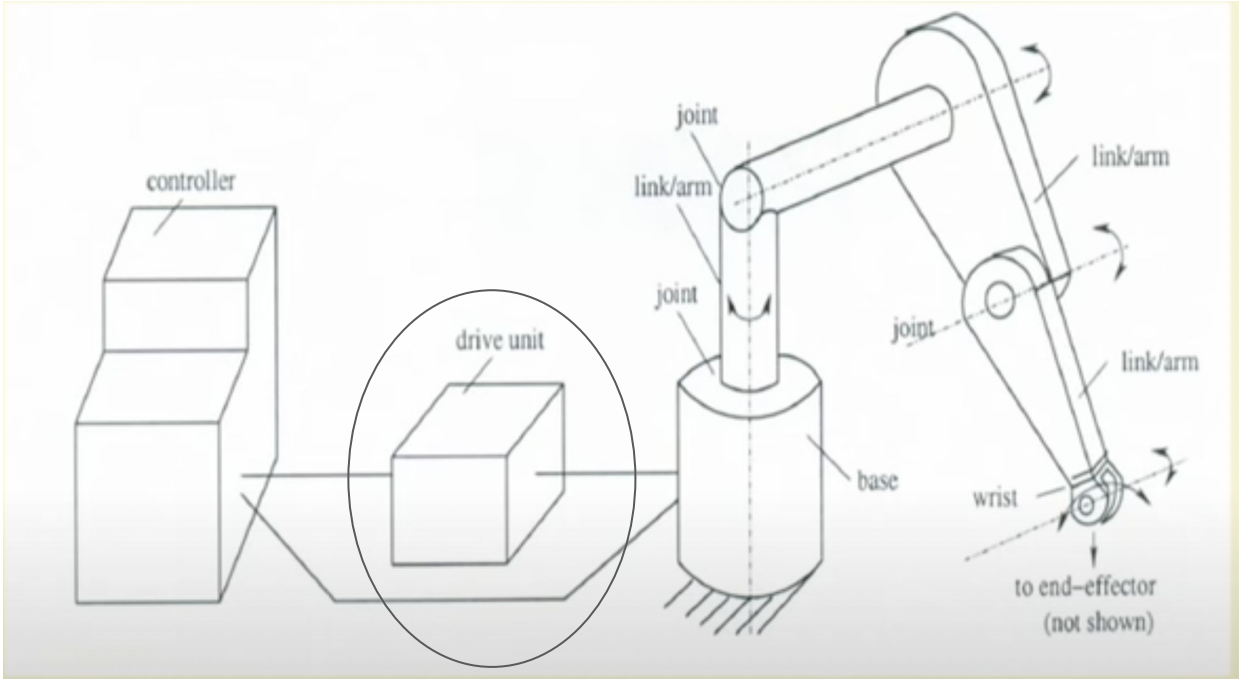
This is actually a manipulator

Robotic Joint



A Robotic System



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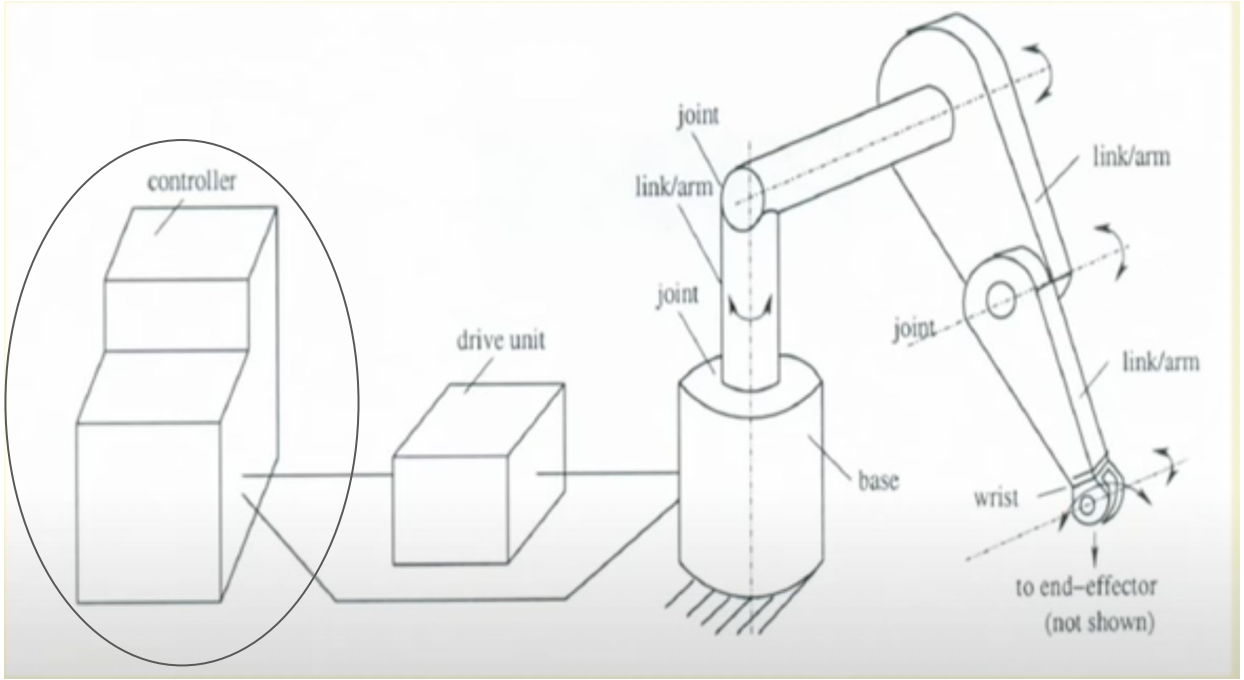

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Interdisciplinary areas in Robotics

Mechanical Engineering

- **Kinematics**: Motion of robot arm without considering the forces and / or moments
- **Dynamics:** Study of the forces and /or moments
- **Sensing :** Collecting information of the environment

Interdisciplinary areas in Robotics

Computer Science

- **Motion Planning:** Planning the course of action
- **Artificial Intelligence:** To design and develop suitable brain for the robots

Electrical and Electronics Engineering

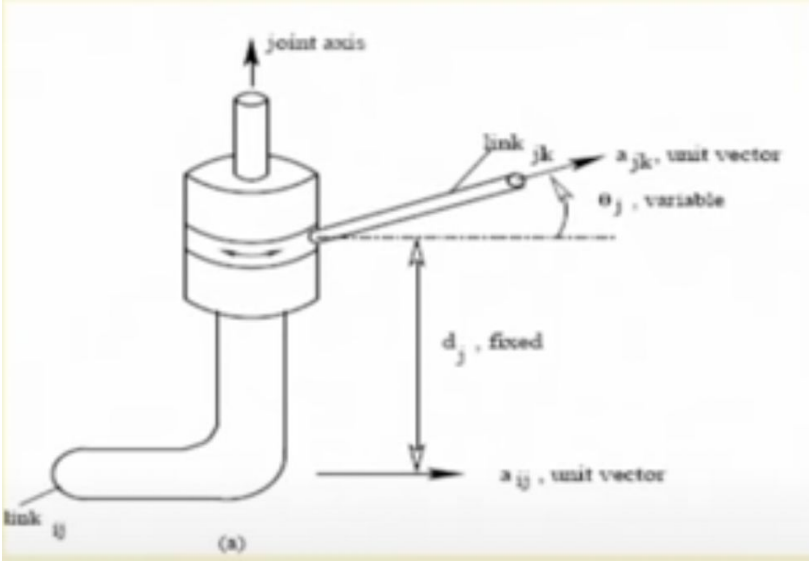
- Control Schemes and hardware implementations

General Sciences

- Physics
- Mathematics

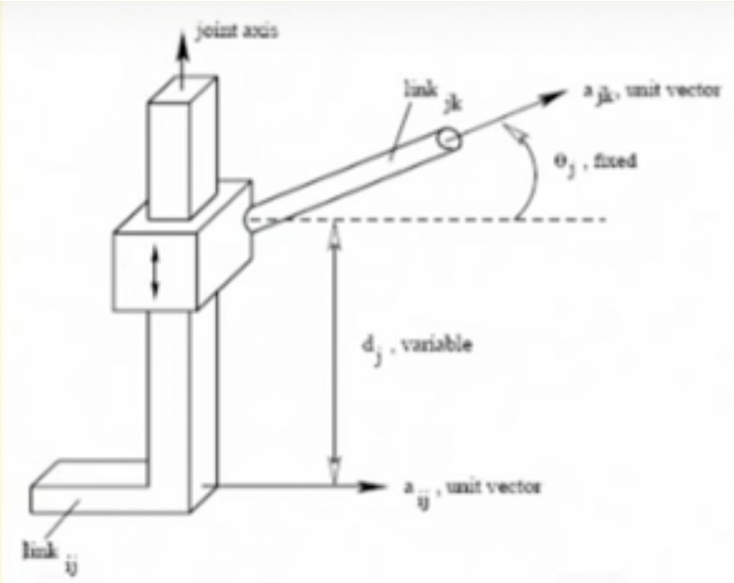
Connectivity / Degree of freedom of a joint

It indicates the number of rigid (bodies) that can be connected to a fixed rigid body through the said joint



Revolute joint (R)

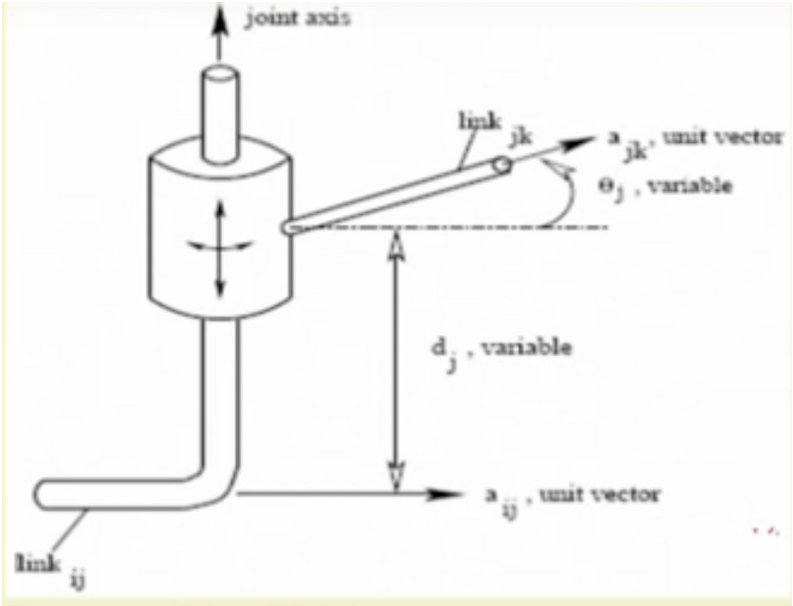
Prismatic Joint (P)



Joints with One dof

Prismatic Joint (P)

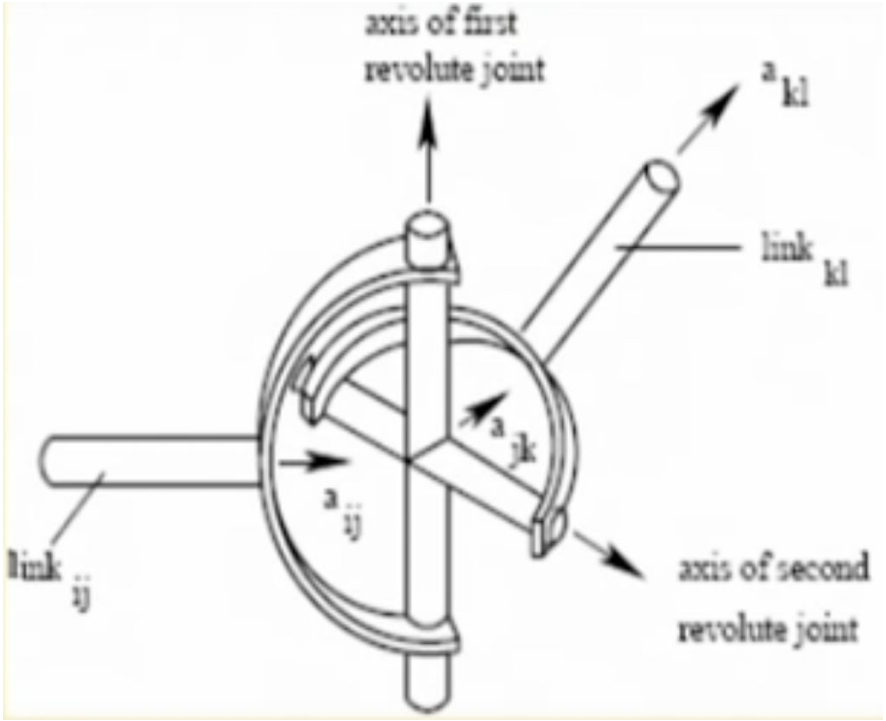
Cylindrical Joint (C)



Joints with two dof

Cylindrical Joint (C)

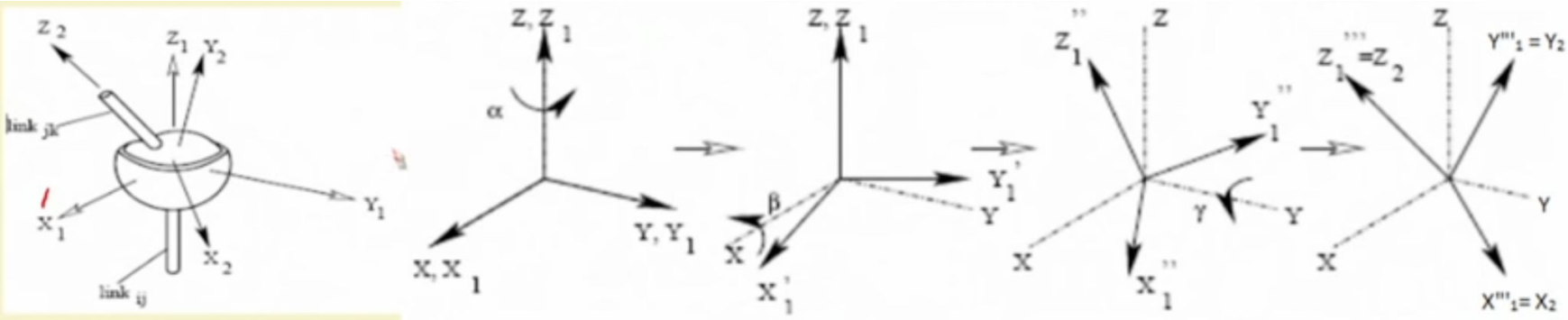
Hooke Joint or Universal Joint (U)



Joints with two dof

Hooke Joint or Universal Joint (U)

Ball and Socket Joint/ Spherical Joint (S’)



Joints with three
Ball and Socket Joint/ Spherical Joint (S’)