

UNIT-2

FORWARD KINEMATICS

2.1 Forward Kinematics

A manipulator is composed of serial links which are affixed to each other revolute or prismatic joints from the base frame through the end-effector. Calculates the position and orientation of the end-effector in terms of the joint variables is called as forward kinematics. In order to have forward kinematics for a robot mechanism in a systematic manner, one should use a suitable kinematics model. Denavit-Hartenberg method that uses four parameters is the most common method for describing the robot kinematics. These parameters a_{i-1} , α_{i-1} , d_i and θ_i are the link length, link twist, link offset and joint angle, respectively. A coordinate frame is attached to each joint to determine DH parameters. Z_i axis of the coordinate frame is pointing along the rotary or sliding direction of the joints. Figure 2 shows the coordinate frame assignment for a general manipulator.

In addition, the boundaries of robotics cannot be clearly defined, since also its “core” ideas, concepts and algorithms are being applied in an ever increasing number of “external” applications, and, vice versa, core technology from other domains (vision, biology, cognitive science or biomechanics, for example) are becoming crucial components in more and more modern robotic systems.

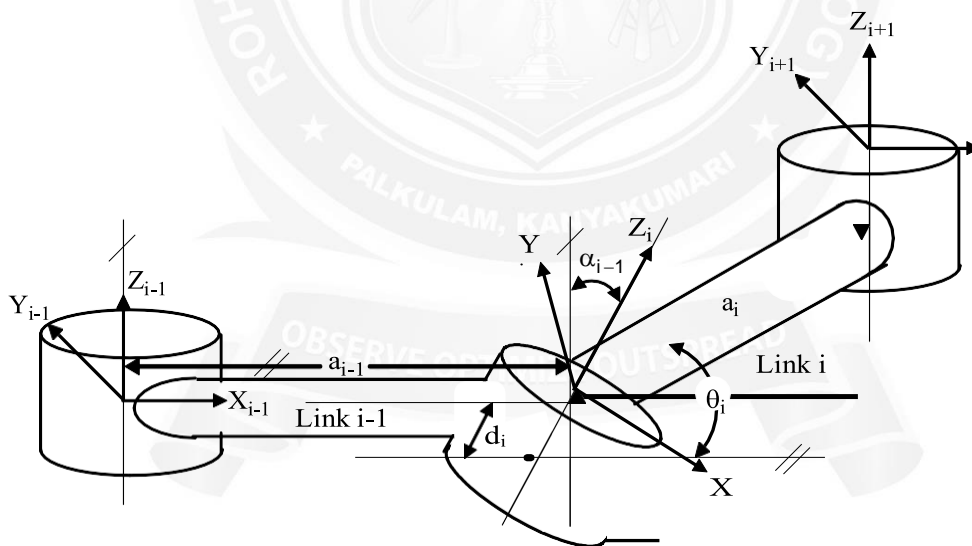


Figure 2. Coordinate frame assignment for a general manipulator