

Scorbot-ER 4U Using Forward Kinematics Modelling and Analysis

Authors : D. Maneetham, L. Sivhour

Abstract : Robotic arm manipulators are widely used to accomplish many kinds of tasks. SCORBOT-ER 4u is a 5-degree of freedom (DOF) vertical articulated educational robotic arm, and all joints are revolute. It is specifically designed to perform pick and place task with its gripper. The pick and place task consists of consideration of the end effector coordinate of the robotic arm and the desired position coordinate in its workspace. This paper describes about forward kinematics modeling and analysis of the robotic end effector motion through joint space. The kinematics problems are defined by the transformation from the Cartesian space to the joint space. Denavit-Hartenberg (D-H) model is used in order to model the robotic links and joints with 4x4 homogeneous matrix. The forward kinematics model is also developed and simulated in MATLAB. The mathematical model is validated by using robotic toolbox in MATLAB. By using this method, it may be applicable to get the end effector coordinate of this robotic arm and other similar types to this arm. The software development of SCORBOT-ER 4u is also described here. PC-and EtherCAT based control technology from BECKHOFF is used to control the arm to express the pick and place task.

Keywords : forward kinematics, D-H model, robotic toolbox, PC- and EtherCAT-based control

Conference Title : ICAMS 2018 : International Conference on Automation and Mechatronic Systems

Conference Location : Bangkok, Thailand

Conference Dates : February 08-09, 2018