

## ABSTRACT

A complex interaction between mechanical and electronic of a robot has made mechatronic approach is important to do. The approach can be a 3D model of robot's physical built on a computer using CAD (Computer-aided design) software. Computer modeling helps minimalizing the cost of prototype and development errors.

Denavit-Hartenberg Parameters of a multi-body robot must be determined to obtain a mathematical visualisation. The multi-body consists of several links connected each other by joints. Denavit-Hartenberg parameters are obtained from derivative of each joint axis. Coordinate transformation on each joint describes the relation between the end-effector and the base coordinate frame. This transformation is required to control the movement of the end-effector in respect of the base using kinematic analysis. Inverse kinematics function generates joint angles which describe manipulator's behaviour.

To apply the kinematics, a humanoid arm is designed and developed using Autodesk Inventor and MATLAB/ Simulink. The end-effector has some task to track the target coordinate  $P_x$ ,  $P_y$ ,  $P_z$ . The peak time of angle variances are; jointclav at 4.168s with angle value  $1.89e + 00$ , jointbicep at 0.063 s with angle value  $1.011e + 01$ , jointfore at 1.929s with angle value  $-5.682e + 00$ , and jointpalm at 0.063s with angle value  $4.428e - 01$ .

**Keywords:** *inverse kinematic, CAD, Denavit-Hartenberg parameter, multibody.*