



**DEVELOPMENT OF SIX DEGREE OF FREEDOM
SCARA ROBOT**

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ABSTRACT

SCARA Robot is one of the types of robot that exist today. The SCARA acronym stands for Selective Compliant Assembly Robot Arm or Selective Compliant Articulated Robot Arm. By virtue of the SCARA's parallel-axis joint layout, the arm is slightly compliant in the 'X-Y' direction but rigid in the 'Z' direction. Regarding this project, the author has designed the actuators, also known as servo motors for the SCARA robot that has been initially designed by students from the previous year. The strength of the SCARA robot has been determined analytically using Finite Element Analysis via CATIA. The actuators are designed not just to move the SCARA arms in the appropriate order but to determine the most efficient cost that should be spent on them. The process of designing the actuators involved the calculations of inertia, voltage, current, speed, torque and etc. Most of the calculations are based on calculations provided by Maxon Motor Company; a company that has been so tremendous in robotics and plays a major part in supplying this project. However, the results from the machine-human interface provided by Maxon depend on manual calculations of equation of motion. Every aspect must be considered so that the actuators, which going to be selected at the end of the research shall work as expected and the programming process may run smoothly. In term of control system, transfer functions that relate the torque constant, rotor inductance and terminal resistance are produced. These transfer functions are manipulated in order to obtain stability for each actuator respectively. The study on the stability is then conducted using Simulink of MATLAB. Simulink would enable the system to be controlled appropriately by bounding some characteristics such as settling time, rise time and peak time within specified value that would make it dynamically stable.

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