

ABSTRACT

Robotics is considered as an emerging field of technology with wider applications like electronics, health care and bio-medical. Among various types of robots, micro-robots are classified as device having dimension in the range of micro-meter (about 1 mm) which can perform all the basic operation like moving, applying force and manipulating objects just like conventional robots. Additionally, micro-robots can be categorized to perform task including mobility and functionality that are locomotive and positioning possibility, manipulation possibility, control type and autonomy. Micro-robots consist of three scratch drive actuators (SDAs) and two steering arms which are responsible of the overall movement of the robot. In this work, electrostatic analysis has been performed using ANSYS simulation tool and parametric estimation has been done by using fuzzy simulation tool. The behavior of electrostatic sheet of micro-robot has been briefly analyzed and estimated using ANSYS simulation tool. The results of ANSYS simulation have shown a relationship between voltages and deflection of electrostatic sheet which directly affect the performance of micro-robot. On the other hand fuzzy analysis has been performed for the parametric estimation of the effect of applied frequency and scratch drive actuator and their effect on speed with which the micro-robot works. This work describes that increase in frequency will result in an increase in speed which will furthermore results in frequent switching of the actuators in the required direction. A comparative study was performed in between simulated value and calculated value of the simulation which shows an error of less than 1% between the values. The parametric estimation based on this fuzzy analysis will provide better utilization of micro-robots in the field of bio-medical and health care applications.