

## **Basavaraj Kabade, K. T. Nagaraja, Swathi Ramanathan, A. Veeraragavan, P. S. Reashma**

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**Abstract :** Pick and place task is one among the most important tasks in industrial field handled by 'Selective Compliance Assembly Robot Arm' (SCARA). Repeatability with high-speed movement in a horizontal plane is a remarkable feature of this type of manipulator. The challenge of design SCARA is the difficulty of achieving stability of high-speed movement with the long length of links. Shorter links arm can move more stable. This condition made the links should be considered restrict then followed by restriction of operation area (workspace). In this research, authors demonstrated on expanding SCARA robot's workspace in horizontal area via linear sliding actuator that embedded to base link of the robot arm. With one additional prismatic joint, the previous robot manipulator with 3 degree of freedom (3-DOF), 2 revolute joints and 1 prismatic joint becomes 4-DOF PRRP manipulator. This designation increased workspace of robot from 0.5698m<sup>2</sup> performed by the previous arm (without linear actuator) to 1.1281m<sup>2</sup> by the proposed arm (with linear actuator). The increasing rate was about 97.97% of workspace with the same links' lengths. The result of experimentation also indicated that the operation time spent to reach object position was also reduced.

**Keywords :** kinematics, linear sliding actuator, manipulator, control system

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