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DESIGN AND ASSEMBLY OF PICK AND PLACE ROBOT

Varsha Rani Yadav*, Sankalp Verma**

*(Mechanical, Mtech Scholar, Shri Shankaracharya Technical Campus Bhilai,
Email: varsharaniyadav9@gmail.com)

** (Mechanical, Senior Associate professor,Shri Shankaracharya Technical Campus Bhilai
Email: sankalpv.07@gmail.com)

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Abstract:

Automation is creating revolution in the present industrial sector, as it reduces man power and time of production.This paper include the Design & Assembly of a 3 degree of freedom Pick and Place robot. The robot is to be developed for a pick and place application which would function in manual mode by taking inputs from a user. It would be further developed to operate in automatic mode that would allow it to under take repetitive tasks.

Keywords **—SCARA, SKU, CAD, DOF**

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I. INTRODUCTION

The Pick and Place acronym stands for Selective Com pliant Assembly Robot or Selective Compliant Articul ate Robot. The Pick and Place robot is a variation of articulated robot-arms that are widely used in industries for applicationsscarasku ranging from welding, painting, assembly. The main r eason for the popularity of industrial robots is the effici ency in doing repetitive tasks that would be otherwise mono tonous and tedious work for a human being to carry out. Robots of this nature can work continuously with out any breaks hence allowing industries to achieve a competitive advantage over an alternate human labour force. However

- a key disadvantage of an industrial robot over a human labourer is its inability to make timely decisions given a particular scenario where quick decisions need to be made.

One of the key features of an Industrial robot is that they consist of a series of links that are supported by motor actuated joints which may exte nd from a base to an end-effector. Each of the links constitute to a single degree of freedom while an articulate robot should consist a minimum of three degrees of freedom which equates to three links from base to end-effector. These three links are usually termed as "shoulder", "elbow" and "wrist" so that its functionality mimics that of a human hand. To access all areas of a defined work envelope an articulate robot should typically consist of six degrees of freedom. Industrial robots also have the ability to be reprogrammed hence allowing industries to utilize the m for different tasks depending on the requirement.

Types

Cartesian robot: - Three prismatic joints, whose axes are coincident with a Cartesian co-ordinate constitute a Cartesian robot. Arc welding, handling precision tools and pick and place work are some of its application.

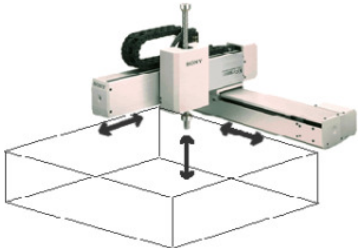

Figure 1: Cartesian Robot

- **Cylindrical robot**: - A robot having axes that forms a cylindrical co-ordinate system is called as cylindrical robot. Some of its applications include assembly operations, handling at machine tools, spot welding, and handling at die casting machines.

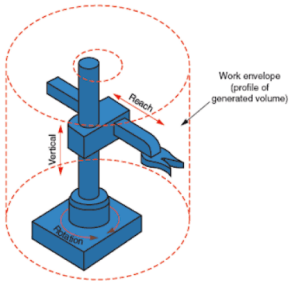

Figure 2: Cylindrical Robot

- **Spherical robot**: - A robot having an axes that forms a polar co-ordinate system is called a spherical robot. It is used for applications such as handling machine tools, spot welding, die casting, fettling machines, gas welding and arc welding etc.

Figure 3: Spherical Robot

- **Scara Robot**: - Two rotary joints which are parallel and are used to provide compliance in a plane constitutes a robot termed scara. Its applications include pick and place work, sealant, assembly operations and handling machine tools.

Figure 4: Scara Robot

- **Articulated robot**: - A robot consisting of an arm having at least 3 rotary joints is termed as Articulated. It is used in die casting, assembly operations, fettling machines, gas welding, arc welding and spray painting.

Figure 5: Articulated Robot

- **Parallel Robot**: - Arms having concurrent prismatic or rotary joints constitute a parallel robot. One of the use is a mobile platform handling cockpit flight simulators.

Figure 6: Parallel Robot

- **Anthropomorphic robot**: - A robotic arm which is similar to a human hand i.e. consists of independent fingers and thumbs is called as Anthropomorphic robot.

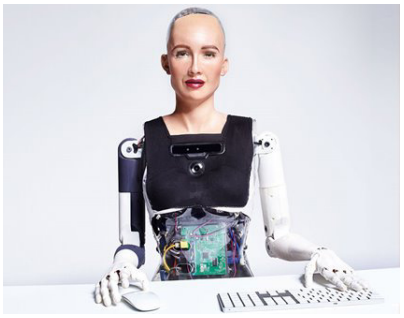

Figure 7: Anthropomorphic robot

II. DESIGN &ASSEMBLY

- **Base Design**

The very first part need to be visualized and designed is base. It should be strong sturdy and dimensionally stable in order to support the whole design.

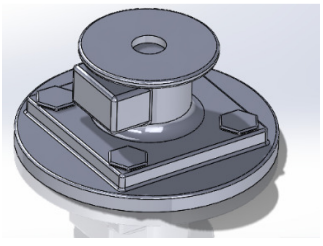

Figure 8: Base

- **Cylindrical rotary joint**

After base of the pick and place robot has been put on place there should be cylindrical rotary joint need to be designed to perform whole 360^0 movement action.

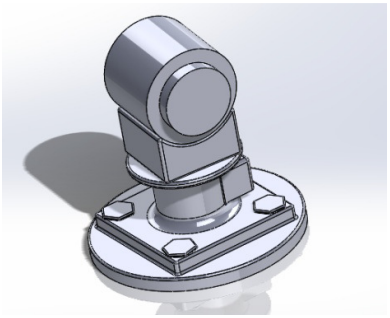

Figure 9: Cylindrical rotary joint

- **Arm joint**

Arm of the robot is one of the crucial part of whole assembly. It carries the job of accurately performing vertical and horizontal position of end effecter to carry out pick and place operation.

Figure 10: Arm joint

- **End effector**

End effector used to perform end operation and make it flexible to choose according to application robot going to perform.

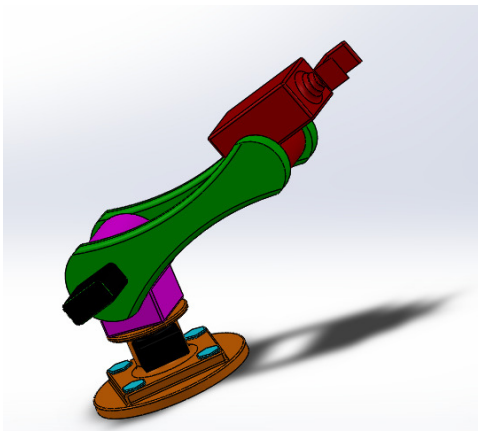

Figure 11: End effector with Assembly

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