PICK AND PLACE ROBOT USING VACUUM GRIPPERS FOR UNEVEN SOLID OBJECTS

M.Chandra Mohan
Assistant Professor, Dept of Mechatronics, Bharath Institute of Higher Education & Research, Chennai, India.¹²³⁴

Abstract - To doing repeated works have become immense in today’s situation, like picking and placing objects from one place to another, have been a tiresome work, our work focuses on taking this job away from humans and handing it to a device which is capable of doing this job in an efficient way on its own. In this paper of two axis robotic arm with vacuum gripper focuses on doing the repeated tasks of picking and placing, so that it could easy the work of humans. We have used hydraulic plunger for robot arm and diaphragm pump for vacuum gripper.

I. INTRODUCTION

In industries doing repeated tasks like picking and placing objects in conveyor belts is of major importance. Employing manpower for this kind of tasks requires more money have to employ shifts and the human being doing this kind of tasks, experiences much fatigue, so it is advisable to employ a device, especially automated device to do these kinds of frequent chores. This system has developed such a device which does work of picking and placing, doing effectively which works a two axis robot arm, to position its arm to the required place, to accomplish a perfect task, after setting up perfectly, it continues to do its repeated task, it does this operation more accurately and precisely. Robots are replaced for humans to do this kind of works increasing productivity.

II. HARDWARE USED

2.1 VACUUM PUMP

Vacuum pump consists of two bearings connected with cam eccentric shaft with connecting rod and plunger assembly and control valve protected with springs and gaskets. The pump body is made of aluminium pressure cast of Lm6 material. Fig. 1 shows vacuum pump.

![Vacuum Pump](image)

Crankshaft made of forged En8 material and cams are grinded. Pulley is made of mild steel material with four 6mm threaded holes. The shaft will be connected with four hold pulley with offset key and provision of handle to rotate the pulley which is operated by manually. Whenever the pulley is rotated the crankshaft connected with the pulley start functioning and the plunger starts to operate.

2.2 HOSE

Hose is made of alkaline plastic material which is used for suction process in vacuum pump. The outer diameter of the hose is 6mm. The inner diameter of the hose is 3mm.

2.3 FUNNEL

Funnel is made of poly vinyl chloride. The diameter of front conical shape is 1.5 inches. The backend of funnel is 3/8 th inches x 1 inch long.

2.4 L-BRACKET

L-bracket is 3 inches long on either side with two 5mm holes on one side and two 8mm holes on the other side. It is made of mild steel material. It has accurate 90 degree

2.5 CONNECTORS
Connectors are made of high density plastic which is used to link tube with joints. It is of diameter of 3/8 th x ¼ inches size.

2.6 ELASTIC BAND
Elastic band is made of synthetic rubber. It is used to reverse the arm by creating tension to the arm.

2.7 PLUNGER
Plunger is made of low density plastic and plunger barrel is made of synthetic clear silicon material. It is used to pressurise the fluid for the movement of the arm

III. ROBOT ARM

Robot arm which is used is made of poly vinyl chloride. On the robot arm plunger, hose, elastic band are mounted. It is used as main support to move the gripper and grab objects. The action of robot arm is controlled by the fluid movement by plunger.

The each servo motor rotation will be changed by moving the slider up and down. The initial position and orientation of each servo motor are fixed by placing the slider in different places. Each slider position identified by trial and error method. The Fig. 2 shows the initial joint position of the robot. After bringing the robot arm to initial position need to save the slider position for initial arm position and orientation.

I. EXPERIMENT AND RESULT

The Fig. 3 shows schematic diagram of the system

The robot arm should be moved by pressing the plunger which is connected through the hose. Totally four plungers are used, which is connected in two hose, each consist of two plungers. In each hose one plunger is connected to the front end and other is connected to the back end. When plunger is pressed at one side it pushes the plunger at other side with the help of fluid flow. When plunger moves the arm connected with it moves. The vacuum gripper is placed at the end of arm so this is also moved when plunger acts. By pressing the plunger, the vacuum gripper can be taken to the desired location to grab the object. After placing the gripper on the object tightly, start to crank the vacuum pump with the help of crank handle. Thus the suction takes place and the uneven solid objects are picked and placed to the desired location. Repeat the process for successful operation if necessary.

II. CONCLUSION

From this paper we are obtained how to make the robotic arm and how it’s designed. This robot is controlled by servo controller. The robot arm joints are rotated by servo motors. The control signals are sending by the computer using Bluetooth technology. So we can
use this type of robotic arm in the field of human inaccessible places. In this robot twisting joint is used before gripper joint. By using this joint can change the orientation of the picked objects as well as orientation of tools.

REFERENCES

[6]. “Rhino XR-4” 5-axis articulate robot; Rhino Robots, Inc., Illinois, USA.