

## REVIEW PAPER ON INDUSTRIAL PICK & PLACE ROBOTIC ARM

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**Abstract :-** This paper focuses on the review of robotic arm from various papers which successful completed their work on design and development of the robotic arm. By reviewing several papers ,we can get ideas of various controllers used in the arm. Various methods of design calculation of several authors. Different authors use different mechanical and electronic consideration for their work. It is expected that refering several papers and extracting information from them would help to conceive help in design of robotic arm.

**Keywords:** End Effector , Gripper, Robotic Arm.

### I. INTRODUCTION

Robot is a machine to execute different task repeatedly with high precision. Thereby many functions like collecting information and studies about the hazardous sites which is too risky to send human inside. Robots are used to reduce the human interference nearly 50 percent. Robots are used in different types like fire fighting robot, metal detecting robot, etc. The first robotic arm to be used in an automobile industry was “UNIMATE” in GM motors USA in 1950s. From then there has been tremendous improvement in the research and development in robotics. Now robots are an integral part of almost all industries. Robots have to do different tasks including welding, trimming, picking and placing etc. These robots are controlled in different ways like keypads, voice control, etc. In this paper, we reviewed five papers on robotic arm briefly. This would help to conceive knowledge of robotic arm from several authors. Various design consideration are described in the form of review to make it comfortable to understand.

### II. LITERATURE SURVEY

#### [1] Design Analysis of a Remote Controlled “Pick and Place” Robotic Vehicle.

In this paper The design of a Remote Controlled Robotic Vehicle has been completed. A prototype was built and confirmed functional. This system would make it easier for man to unrivalled the risk of handling suspicious objects which could be hazardous in its present environment and workplace. Complex and complicated

duties would be achieved faster and more accurately with this design. The use of Robots is highly recommended for Industries especially for safety and productivity reasons. In their design work, they included a Robotic arm of five Degree of Freedom with its base resting directly on top of the vehicle, a body having four drive wheels coupled to the ends. In the mode of operation of robot ,they incuded operation such that when the operator issues a command from the remote control to the robotic vehicle all necessary tasks will be carried out by sending signals to the microcontroller. The microcontroller then issues command to the respective channels that makes up the communication links. The electric motor will operate as per given command and the direction, speed and motion of the motor is regulated by the microcontroller.

#### [2] Design and operation of synchronized robotic arm.

In this paper propose The robotic arm can be designed to perform any desired task such as welding, gripping, spinning etc, depending on the application. For example, robot arms in automotive assembly line perform a variety of tasks such as wiewling and parts rotation and placement during assembly. The robot arms can be autonomous or controlled manually and can be used to perform a variety of tasks with great accuracy. The robotic arm can be fixed or mobile and can be designed for industrial or home applications. Robotic hands often have built-in pressure sensors that tell the computer how hard the robot is gripping a particular object.

They designed Robotic Arm using the Microcontroller i.e. ATMEGA8 Micro-controller using Arduino programming. This process works on the principle of interfacing servos and potentiometers. Interfacing is done by using Arduino board. The remote is fitted with potentiometers and the servos are attached to the body

of the robotic arm. The potentiometer converts the mechanical motion into electrical motion. Hence, on the motion of the remote the potentiometers produce the electrical pulses. The board then processes the signals received from the potentiometers and finally, converts them into requisite digital pulses that are then sent to the servomotors. This servo will respond with regards to the pulses which results in the moment of the arm.

DC motors equipped with a servo mechanism are used for precise control of angular position. Servomotor used are which has Stall torque -10kg/cm. ATmega8 is a AVR 8-BIT Microcontroller featuring Insystem Programmable capability along with Flash code storage. This micro-controller is re-programmable up to 1000 times. It also features 32 working registers, single clock cycle execution giving up to 1MIPs/MHz. The robotic arm which is made by them can be used remotely and the task can be accomplished. These kind of arms have various applications.

### **[3] Design of a Robotic Arm with Gripper & End Effector for Spot Welding.**

In this paper propose of This robotic technology makes the spot welding operation more flexible and time oriented. With the help of pick and place mechanism the material handling has been easily carried out. The variation in the mechanical structure and the angle of movement can be changeable. The human hand design forms the basis of this project of developing a robotic gripper and is the source of inspiration to achieve the sufficient level of dexterity in the domain of grasping and manipulation if coupled with wrist and arm.

instrument. To achieve this goal they intend to incorporate a simple linkage actuation mechanism. An AC motor is used along with spur gears and a threaded shaft arrangement. The gripper can perform the basic function of picking, holding and grasping of objects by means of a DC motor and it forms the mechanism for the spot welding.

The Project Aims to Build A Prototype of robotic arm with gripper & end effectors for spot welding, the various objectives of the prototype is as follows:-

- i) Having a rigid mechanical structure.
- ii) Ability to move each parts at define angle.
- iii) Optimum power consumption.
- iv) To pick the material in jaws and join itself by means of spot welding mechanism.

From this paper ,they concluded that This robotic technology makes the spot welding operation more flexible and time oriented. With the help of pick and

Gripper is an end effectors or tool to grasp any physical thing that may be a human hand or any

place mechanism the material handling has been easily carried out .The variation in the mechanical structure and the angle of movement can be changeable

### **[4] Design And Implementation Of A Robotic Arm Based On Haptic Technology**

In this paper, various aspects to design a robotic arm based on the haptic technology considering various aspects of it, and the basics of machine designing are observed that are explained clearly .These robots have a wide range of industrial and medical applications such as pick and place robots, surgical robots etc. They can be employed in places where precision and accuracy are required. Robots can also be employed where human hand cannot penetrate. The screen shot shows the designed robot and its functionality.

In this paper, a robotic arm with four degrees of freedom is designed and is able to pick the objects with a specific weight and place them in a desired location. To facilitate the lifting of the objects, Servomotors with a torque of 11 kg are used. The programming is done on ATMEGA-328 Microcontroller using Arduino programming. The Microcontroller along with input pins is soldered on a PCB board. The input is given using a remote, which is an arm, made of Polycarbonate fitted with Potentiometers with a certain angle of rotation. The Potentiometers detect the angle of the rotation and the signals are sent to the Microcontroller accordingly.

This kind of the arms have many applications in the field of industrial robotics where the automation is required. This Haptic Robot arm is used for various applications, of them few are as follows:

- To lift heavier objects.
- To lift nuclear wastes without harming the humans.
- Used as external limbs of a surgeon during a complex retinal or heart surgeries.
- Prototype for a Bomb disposal robot.

### **[5] Design of a Robotic Arm for Picking and Placing an Object Controlled Using LABView**

In this paper, LABView controlled robotic arm was successfully designed. The robotic arm was found to be user friendly and the integration of accelerometer was much helpful in attaining the feedback regarding the position of the arm. The research in this paper was carried out at Hindustan Institute of Technology and science, Chennai. This work was supported by the e-MEN Robotic Research Centre Palakkad.

This paper focuses on designing a robotic arm for picking and placing an object controlled using LABView. This is expected to improve the accuracy and simplicity in control. In this paper, we introduce

LABView based control of the robotic arm. The LABView is designed to input the coordinates of object in the real time environment. To select the real time object, the corresponding coordinate is inputted. The action of picking or placing is also given through the LABView panel. Once the robot gets the coordinates, it uses the inverse kinematics to calculate the required rotation.

The robotic arm has 2 links and 3 joints. It is mounted on the center of a table or the platform on which it is supposed to deal with the objects. The end point of the second link has an electromagnet and all objects are magnetically attractive. The range of the arm is the total length of the two links. The length of each link can be designed as per requirement. It can be of equal or different lengths. The arm has 3 degrees of freedom. Each joint has a dc geared motor for the link movement. The robot electronics consists of a PIC microcontroller, PC with LABView installed in it, motor driving unit, accelerometer at the tip of the arm and a power supply.

Once the robot gets the coordinate values, it computes the angles using the inverse kinematics and proper rotations are made by the motors. These angle values are stored in eeprom of the controller. Onboard software is mainly developed with micro C. This software interfaces between the PC and the robot by receiving interrupts through RS232, to control all robot functions. Simulations have been executed in PIC simulator. The LABView panel was developed using the LABView software. It is designed in such a manner to send the command signals and receive the coordinate details from accelerometer through RS232. This improved the accuracy and simplicity in control.

### **III. ACKNOWLEDGMENT**

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### **IV. CONCLUSION**

We can conclude that we successfully reviewed several papers from different authors and tried to simplify the concept of robotic arm.

### **V. REFERENCES**

1. Puran Singh, Anil Kumar, Mahesh Ashish "Design of robotic arm with Gripper and End effector for spot welding", Universal journal of mechanical Engineering J(3):92-97,2013. Ujme.2013.010303.
2. B.O.Omijeh R.Uhunmwangho, M.Ehikhamenl, "Design analysis of Remote Controlled Pick and Place Robotic vehicle", International Journal of Engineering Research and development, Volume10,

Issue 5, 2014, PP 57-68.

3. Shyam R. Nair, "Design of Robotic Arm for Picking and Placing an Object Controlled Using LAB view", International Journal of scientific and research publication, Volume2, Issue 5, 2012, ISSN 2250 3153.
4. Vijay Kumar, "Robotic Grasping and Contact: A Review", Grasp Laboratory, University of Pennsylvania Philadelphia, PA 19104.
5. Jegedele Oladele, Awodele Oludele, Ajayi Ayodele, "Development of a Microcontroller Based on Robotic Arm ", Babcock University, Iilisan-Remo, Nigeria.