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Robotic Arm Controlled by Using Arduino Uno

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***Abstract*-In recent years the industry and daily routine works are found to be more attracted and implemented through automation via Robots. The pick and place robot is one of the technologies in manufacturing industries which is supposed to perform pick and place operations. The system is so designed that it eliminates the human error and human intervention to urge more precise work. There are many fields during which human intervention is difficult but the method taken into account has got to be operated and controlled. This results in the world during which robots find their applications. Literature suggests that the pick and place robots are designed, implemented in various fields such as; in the bottle filling industry, packing industry, utilized in surveillance to detect and destroy the bombs etc. The project deals with implementing a pick and place robot using Arduino for any pick and place functions. The pick and place robot so implemented is controlled using Bluetooth over Arduino Uno. The robotic arm implemented has three degrees of freedom. Many other features like line follower, wall hugger, obstacle avoider, detector etc are often added to the present robot for versatility of usage.**

***Keywords*- Pick & Place Robot, Robotic arm, Robo-Arduino.**

I.INTRODUCTION

These days' people always needed additional help systems. With the rapid increase within the flow of data , people are now guided to look for various markets and other people have entered the competition to manufacture quality products cheaply.

Automation systems are also needed to realize this. Because standardized automation systems are required to attenuate errors also on experienced and well trained employees for quality products. Because of their physical characteristics, people needed to use auxiliary machines in places where their strength wasn't enough. These machines, which are operated with the necessity for human assistance before hand, are made to work spontaneously without the necessity of human power with the progress of technology.

One of the foremost used components of automation systems is robots. Robotic systems; Mechatronics Engineering, engineering , EE and Computer Engineering have all come close to figure together. In the project, researchers are done and implemented so as to possess knowledge about mechanics and software during the operations administered by the robot arm which is designed to satisfy the tasks determined in accordance with predetermined commands.

A robotic arm may be a sort of mechanical arm, usually programmable, with similar functions to a person's arm; the arm could also be the sum of the mechanism or may be part of a more complex robot. The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement. The links of the manipulator are often considered to form a kinematic chain. The terminus of the kinematic chain of the manipulator is understood because it is the highest effector and it's analogous to the human hand. However, the term "robotic hand" as a synonym of the robotic arm is typically proscribed.

Present day industry is increasingly turning towards computer-based automation mainly thanks to the necessity for increased productivity and delivery of end products with uniform quality. The inflexibility and usually high cost of hard-automation systems, which are used for automated manufacturing tasks within the past, have led to a broad based interest within the use of mechanical arm capable of performing a spread of producing functions during a flexible environment and at lower costs.

The use of commercial mechanical arm characterizes a number of contemporary trends in automation of the manufacturing process. However, present day industrial mechanical arms also exhibit a monolithic mechanical structure and closed-system software architecture. They are targeting simple repetitive tasks, which tend to not require high precision.

The robots so programmed for pick and place operation are often made versatile and more efficient by providing

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the feedback and making it work on its own than any human intervention. It can be made possible by an image processing tool interfaced with this Arduino.

The features which will be added on to enhance its efficiency, make it operate its own thought with none human intervention are line follower, wall hugger, obstacle avoider, metal detector, bomb diffuser etc.

II. LITERATURE SURVEY

John Iovine, during this book various aspects of designing a Robot is described. It deals with differing kinds of Arm design.

The other references listed within the references section discusses similar concepts in its various fields like color identification and segregation robot, robot for surveillance, pick and place robot controlled using android etc.

III. PROBLEM STATEMENT

The pick and place robot being implemented to ease the method of sorting, process of moving heavy materials etc. Usually The transfer process of the heavy materials is being administered, using man power and if the transfer process is repeated for a period of your time , it can cause injuries to the operator.

By using the particular robot, the operator will no longer have to bend and lift up heavy loads thus preventing injuries andincreasing the efficiency of the work. Operators will makemistakes whether small or big during a while. In the industrialworld, the industry cannot afford to make any kind of mistakes.Humans today do all the tasks involved within the manufacturing industry by themselves.

However, a Robotic arm is often used for various tasks like welding, drilling, spraying and lots of more.

IV. OBJECTIVE

The main objectives of this project are:

- To control the displacement of the robotic arm so that the arm can be used to pick and place the elements from any source to destination.
- To control the displacement and movement of robotic arm using Bluetooth Transmitter and Receiver.
- To implement a robotic arm with three degrees of controlling techniques, vehicle design etc.

ER. Rajput, during this book the operation and control of robots is discussed. In this book, details and methods of interfacing hardware components such as DC motor, Servo motor and Bluetooth Transmitter and Receiver is discussed.

V. METHODOLOGY

The diagram of the proposed system is shown in Fig1. It consists of an Atmega328 Microcontroller IC, four DC Motors with driver IC, two servo motors and power supply.The pick and place robotic arm consists of a robotic arm placedon a moving vehicle (chassis). The vehicle is able to move along any type of surface irrespective of whether it is smooth or rough. The pick and place robot uses four motors for the operation of the chassis, two servo motors for the operation pick and place operation.

The pick and place arm consists of an arm assembly with a jaw, which is simply able to move in up and down direction.There are two motors for the arm assembly, one for the up and down motion and other for jaw opening and shutting .For the controlling of motor, motor driver IC and Atmega328 microcontroller are used. The input signal or controlling signal isgiven from a wireless playstation, which is interfaced with the microcontroller by a RF receiver module. When the signal is sent from the playstation it is decoded in the controller and proper controlling signal is sent to actuators (dc motors or servomotors) in the system.

The control task is to maneuver the robot arm from an initial position to a final position. To achieve that we require prior knowledge of either desired position or angle of every joint, where using the angels is named forward kinematic while using the position is called the inverse kinematic. This is done using many types of controllers.

The controller is employed to attenuate the error between the specified and therefore the actual positions. In doing so, the controller must meet certain specifications. These specifications like reducing overshoot, minimizing rising time and eliminating steady state error. In addition reducing the load disturbances, which modeled on each motor.

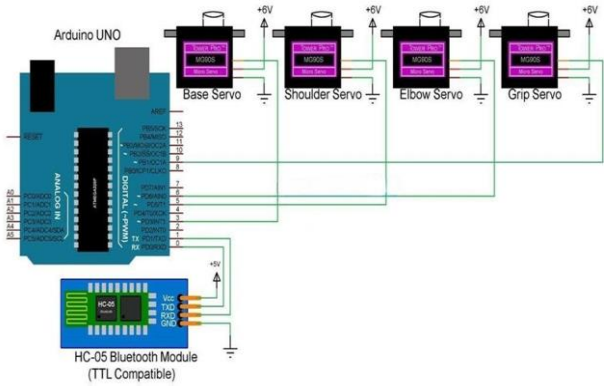

Fig 1.Circuit Diagram.

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The diagram of the proposed system is shown in Fig1. It consists of an Atmega328 Microcontroller IC, four servo Motors with Driver IC and power supply. The pick and place robotic arm consists of a robotic arm controlled over bluetooth .The pick and the robot uses three motors for the operation, one servo motor for the operation, and a pick and place operation. The pick and place arm consists of an arm assembly with a jaw, which is simply able to move in up and down direction.

Assembly, one for the up and down motion and other for jaw opening and shutting . For the controlling of motor, motor driver IC and Atmega328 microcontroller are used. The input signal or controlling signal is given from a wirelessly over a bluetooth module which is interfaced with the microcontroller by abluetooth receiver module. When the signal is sent from the android app it is decoded in the controller and proper controlling signal is sent to actuators (dc motors or servo motor) in the system.

HC-05 module is a simple to use Bluetooth SPP (Serial Port Protocol) module,designed for transparent wireless serial connection setup.The HC-05 Bluetooth Module are often utilized in a Master or Slave configuration, making it an excellent solution for wireless communication.This interface bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband.

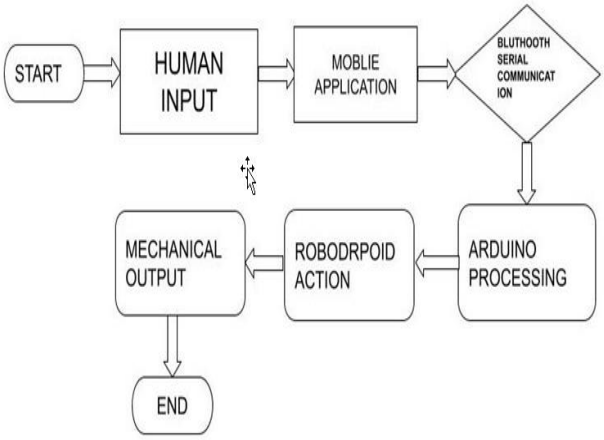

Fig 2. Flow Chart.

The above Fig 2 depicts the methodology during which the system is programmed. In the Arduino platform the signals sent from play station are often read on Arduino using the inbuilt function PSx.read() by including the Psx.h header file including the supporting files for execution. The receiver flag of the Arduino controller is monitored to detect if any instruction is applied to the controller. Once the receiver flag becomes high it indicates an impact signal is shipped to the robot. The next task is to decode the instruction being requested to perform. The signal being applied is read and stored within the variable called "DATA" further the algorithm searches for the opcode that executes when it's matched with the code stored in "DATA".

Example: As we all know that when UP button of the play station is pressed the code been read on Arduino by function is DATA = Psx.read(); , thanks to which the worth or data stored in variable DATA is Psx.Up now the program is made such what the controller should perform when data is read as Psx.Up. In this case all the four motors are instructed to maneuver within the forward direction by the controller. Hence the chassis moves in forward direction.

Similarly if data has been read and stored within the variable Psx.Down then all the dc motors are instructed to maneuver within the reverse direction. Hence the chassis moves in reverse direction. Such eight conditions are programmed and depicted within the flowchart.

1. Hardware Implementation:

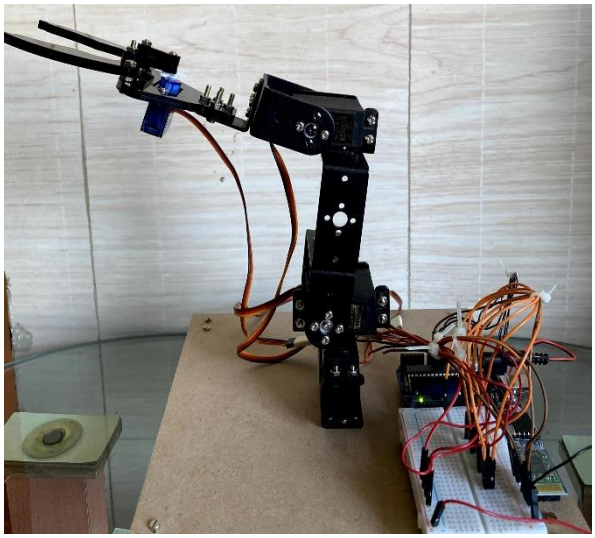

Figure 3.implemented project model

The above figure 3, represents the pick and place robotic armmounted on the chassis. The pick and place robot soimplementedis controlled using a bluetooth signal. The robotic arm implemented has three degrees of freedom. The circuit ispowered up by a 12V 1A battery fitted within the body of the chassis.

VI. CONCLUSION

Many tasks are made easier and therefore the resulting error level has been reduced to a minimum. For example; some pharmacy-based drug-giving robots and a projected robot arm are developed. In addition to the present, the power to maneuver the robot arm is further increased, and when the camera is placed within the finger area and therefore the sensitivity is increased, it is often utilized in a

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good range of applications from the medical sector to the automation systems.

With the robotic arms developed during this way, the danger of infecting the patient within the medical sector is minimized, while the human errors are minimized during the surgical intervention. moving robot arm design and this robot arm with a suitable microcontroller and Bluetooth module with android application.

The main problem to overcome in this project was to interface the Arduino Uno board with the android device via Bluetooth module. Android based robotic arm provides remote access to hard-to-reach places and with android based interface it comes under the category of user-friendly projects.

The robots so programmed for pick and place operation are often made versatile and more efficient by providing the feedback and making it work on its own than any human intervention. It can be made possible by an image processing tool interfaced with this Arduino Uno. The features that can be added on to improve its efficiency,make it operate on its own without any human intervention are line follower, wall hugger, obstacle avoider, metal detector, bomb diffuser etc.

REFERENCES

[1] MohdAshiqKamarilYusoffa, Reza EzuanSaminb, Babul Salam Kader Ibrahimc, Wireless Mobile Robotic Arm, International Symposium on Robotics and Intelligent Sensors 2012 (IRIS 2012), 1072 – 1078.
[2] Nikesh. R.Vange, Atul.V. Nar, Dhananjay.B. Surve, Anita. P.Trimukhe, Manisha. M. Patil, Rajesh.A. Patil, Object Sorting Robotic Arm Based on Color Sensing Mechanism, International Journal of Emerging Technology and Advanced Engineering , (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 5, Issue 5, May 2015)
[3] Er. R.K. Rajput, Robotics and Industrial Automation", S. Chand Publications, 2014.
[4] Tan, Ming Chun (2005). Autonomous Robot Navigation using Radio Frequency. Bachelor Project. Thesis. UniversitiTeknologi Malaysia, Skudai.
[5] Jennifer Bray, Charles F. Sturman (2002). "Bluetooth: connect without cables", Upper Saddle river, New Jersey: Prentice-Hall PTR
[6] Robot entry, http://education.yahoo.com/reference/dictionary/entry/robot accessed on 7th April 2012 at 2.00p.m.
[7] D.L. Pieper. The kinematics of manipulators under computer control. PhDThesis, Stanford University, Department of Mechanical Engineering, 1968
[8] L.Feng, J.Borenstein, D. Wehe, A Completely Wireless Development System for Mobile Robots. ISRAM conference, Montpellier, France, May 27-30, 1996, pp.571-576.

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