



IJIRCCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 2, February 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.165



9940 572 462



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Material Management System Using Robotic Arm

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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 designed to perform pick and place operations. The system is so designed that it eliminates the human error and human intervention to get more precise work. There are many fields in which human intervention is difficult but the process under consideration has to be operated and controlled this leads to the area in which robots find their applications. Literature suggests that the pick and place robots are designed, implemented in various fields such as; in bottle filling industry, packing industry, used in surveillance to detect and destroy the bombs etc. The project deals with implementing an pick and place robot using Robo-Arduino for any pick and place functions. The pick and place robot so implemented is controlled using RF signal. The chassis is supported for the displacement of robotic arm by four Omni wheels. The robotic arm implemented has two degrees of freedom. Many other features such as line follower, wall hugger, obstacle avoider, metal detector etc can be added to this robot for versatility of usage.

KEYWORDS: Pick and Place Robot, Soft catching Arm, Object, Rotation, Blue Control.

I. INTRODUCTION

Material handling robots can automate some of the most tedious, dull, and unsafe tasks in a production line and are one of the easiest ways to add automation. Material handling robots enhance the efficiency of your production line and increase customer satisfaction by providing quality products in a timely manner. The term material handling encompasses a wide variety of product movements. Part selection and transferring, palletizing, packing, and machine loading are just a few of the applications that are considered material handling. When picking material handling equipment for your facility, you should consider payload and speed requirements, end-of-arm tooling or grippers needed, facility layout and floor-space, the type of material being handled and any additional possible production problems.

II. PRESENT THEORIES AND PRACTICES

Robotic arms are most common type of pick and place robots. A five axis robotic arm robot can be used from standard pick and place application where objects are picked up and moved to other location and single plane.

The mobile robot has been developed successfully as the movement of robot including a mobile and arm robot can be controlled wirelessly. This robot is expected to overcome the problem such as picking or placing object that away from the user, pick and place hazardous object in the fastest and easiest way.

III. PROBLEM STATEMENT

The pick and place robot being implemented to ease the process of sorting, process of moving heavy materials etc. Usually the transfer process of the heavy materials is being carried out, using man power and if the transfer process is repeated for a period of time, it can cause injuries to the operator. By using the particular robot the operator, will no longer have to bent and lift up heavy loads thus preventing injuries and increasing the efficiency of the work. Operator will make mistakes whether small or big in a while. In the industrial world, the industry cannot afford to take any kind of mistakes. As every mistake is costly whether in terms of time, money and material.

IV. PROPOSED METHODOLOGY

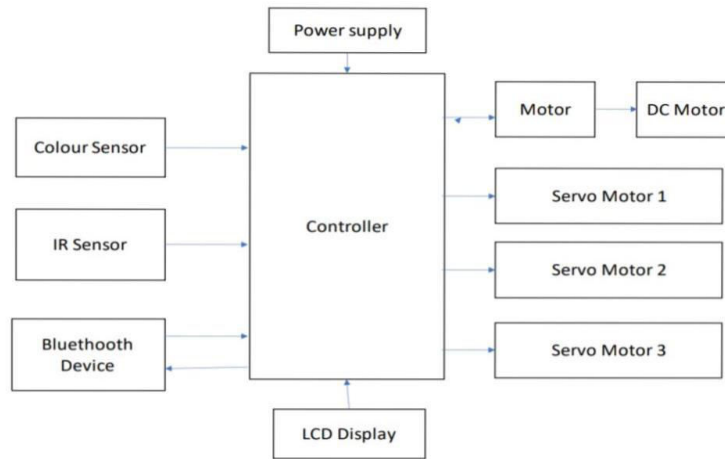


Fig 1: Proposed Methodology

The general structure of the proposed method is presented in Figure 1, which consists of Arduino mega microcontroller, Bluetooth module, DC motors with driver IC and voltage regulator. The Bluetooth module, driver IC and voltage regulator are interfaced with microcontroller. When the user given a command to the microcontroller, it is then checked with the pre-sorted character and if they are same then the robot do the particular operation such as it can move to any direction forward, backward, left, right, arm up, arm down, pick up object and place it. There are four motors are used in which two motors are used for the movement of vehicle and one for the movement of arm and the remaining one for the movement of gripper. The maximum upward and downward movement of arm, closing and opening of jaw is limited by the mechanical push button type switches. Blue control application is used to send commands to the controller. Blue control is a basic universal remote control for Bluetooth enabled serial devices such as Bluetooth module connected to a controller. When button is pressed corresponding ASCII code will sent to the controller.

The sorting of material is based on colour and so photodiode is used as colour sensor. The sensor colour detection is based on the RGB colour model which includes a wide range of colours. After sensing the colour of object, picks the object using a gripper. This requires controlling the gripper motor. The controller now moves the arm to the dropping location where the gripper motor is again controlled to drop the object.

Basically the operation of proposed system is divided into two parts:

1. Colour Sensing
2. Pick and Place Control

1. Colour Sensing:

Procedure for colour sensor is that it detects primary RGB colours first and then it checks for reflected colour intensities. The RED colour object reflects RED colour with high intensity, similarly for GREEN and BLUE. By using these three basic colours any colour is formed. If we know the fixed values of primary colour it is easy to determine the colour of tested object. Each colour is having particular intensity value and corresponding light intensity is reflected on sensor, accordingly the sensor will produce the output.

2. Pick and Place control:

This operation is controlled with the help of three servo motors and one stepper motor. After sensing the colour by sensor it pick the object a gripper.

V. FLOWCHART

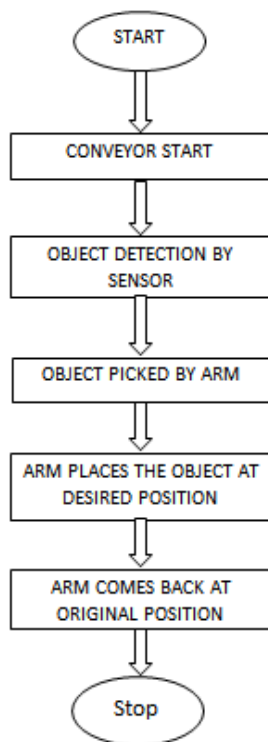


Fig 2: Flowchart

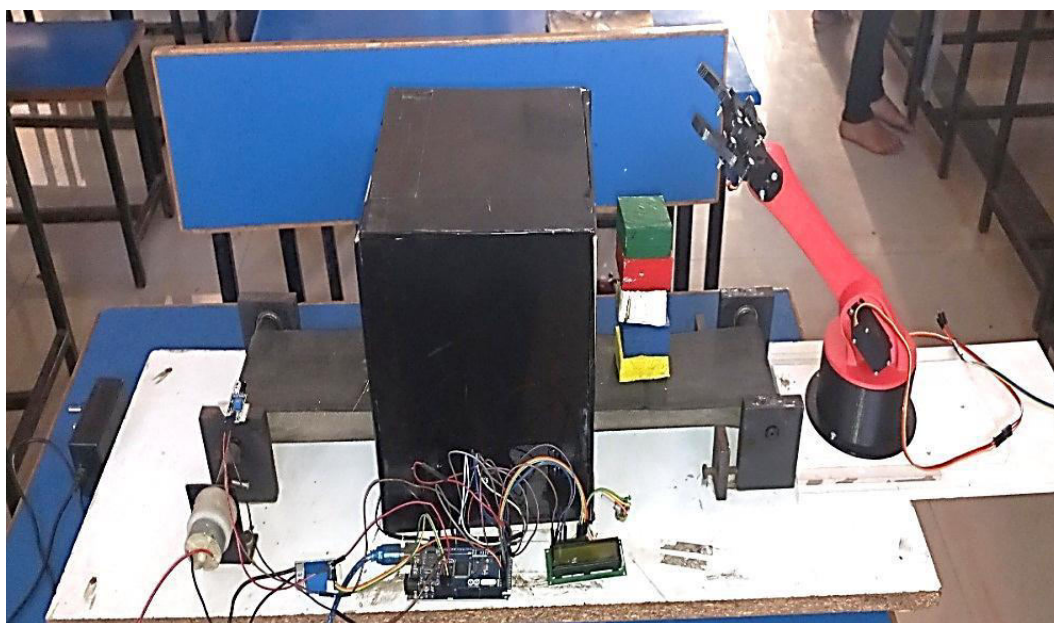


Fig 3: Proposed system



VI. CONCLUSION AND FUTURE WORK

The paper presents the design and development of a pick and place robotic arm with the application of color sorting of spherical objects using advanced sensors. The different colours are identified by the advanced color sensor TCS34725FN. After the color is identified the objects are picked and dropped by the gripper in the respective position in an efficient manner. Finally, this is a low cost system with simplest concepts which saves manual time and work.

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Impact Factor: 8.165

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