



OPTIMIZATION OF ROBOTIC ARM MOVEMENT VEHICLE FOR PICK-AND- PLACE

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Abstract: The aim of the study is to create a Bluetooth-controlled robot arm capable of picking and placing items. To create a pick and place robotic arm mounted on a vehicle and equipped with a soft catching gripper to lift an object. The robot is controlled by a mobile application, and a Bluetooth Module HC05 (device) is installed on the robot, allowing the movement to be handled by the application on the smartphone. The ability of Bluetooth to assist modern robot controls and the introduction of new methods and control theory presented a practical opportunity. This technological advancement, combined with the demand for high-performance robots, resulted in robots that were quicker, more accurate, and more intelligent robots using new robot and control devices. A DC motor is attached to the robot arm for movement, and a Microcontroller controls the robot arm's picking and placing operations. The robot is operated by an Arduino ATmega 328P controller, and it can move forward, backward, left, or right. The operation that must be completed is linked via Arduino. They employ advanced vision systems to recognize, grasp, and move objects from one location to another. Select and position robots can be customized with a range of design choices. The microcontroller is interfaced with the robotic arm.

Index Terms: Robot, microcontroller, interface

I.INTRODUCTION

A robot is a self-contained mechanical system that is operated by a computer programme. Robots outperform humans in terms of speed and performance. Robotics is characterized as the research, design, and implementation of robot systems in manufacturing and other industries. Generally, robots are used to perform tasks that are risky, repetitive, and unpleasant. The robotic arm is possibly the most popular type of pick and place robot, and it is one of the technologies in manufacturing industries that is designed to perform pick and place operations. Pick and Place Robots accelerate the process of picking up parts and relocating them will increase production rates. Pick and place robots are more accurate and do not tyre while performing back-breaking movements that humans may struggle with. Companies benefit from increased output from a pick and place robot system in the long run. The system is structured in such a way that human error and interference are minimized, resulting in more accurate work.

The pick and place mechanical arm is a human-controlled system that detects an object, picks it up from its current location, and places it in the desired location. Humans sense the presence of objects and drive devices in response. Robots are increasingly being incorporated into workplace tasks to replace humans, especially in monotonous tasks. Picking up explosive materials, defusing explosives, or, in the worst-case scenario, picking and placing the bomb somewhere for Containment and repeated pick and position operation in industries may be difficult or dangerous for humans. Therefore, a robot can be used to replace humans in various industries. As a result, a robot can perform tasks that would otherwise be performed by a human.

II.LITERATURE SURVEY

In this paper, the activity and control of robots are talked about. Arduino cookbooks, strategies for interfacing equipment segments, for example, DC engine, Servo engine and RF Transmitter and Receiver are being talked about (ER. Rajput). Different references examine comparative ideas in its different fields, for example, color identification and isolation robot, robot for reconnaissance, pick and place robot-controlled utilizing Bluetooth and so on. Akritic Kaushik, Aastha Sharma [1] clarified that a Sensor gives a way to get-together data on assembling activities and cycles being performed. The motivation behind sensors is to examine work in progress, to notice the work-in-progress edge with the assembling utensils, and to allow

Self-checking of assemblies by the assembling framework's PC. Color sensors register stuff, conversely, genuine nature, or clear file. Genuine nature sensors depend on one of the coloring models, most usually the RGB model (red, green, blue). An enormous level of the noticeable range can be made utilizing these three essential tones. Contingent upon the trouble of the sensor, it tends to be customized to know just one tone or various coloring types or colors for arrangement tasks. Tushar G. Gaikar, Soham N. Zadokar, Rajendra S. Bhandari, Sagar S. Patil[2] portrayed that the essential justification the system is to isolate the thing concerning their concealing code a normally circle the thing according to their shades. This can be refined viably by using progress as a piece of development especially in the field of embedded systems. In this anticipation we are using Arduino (controller) and color sensor.

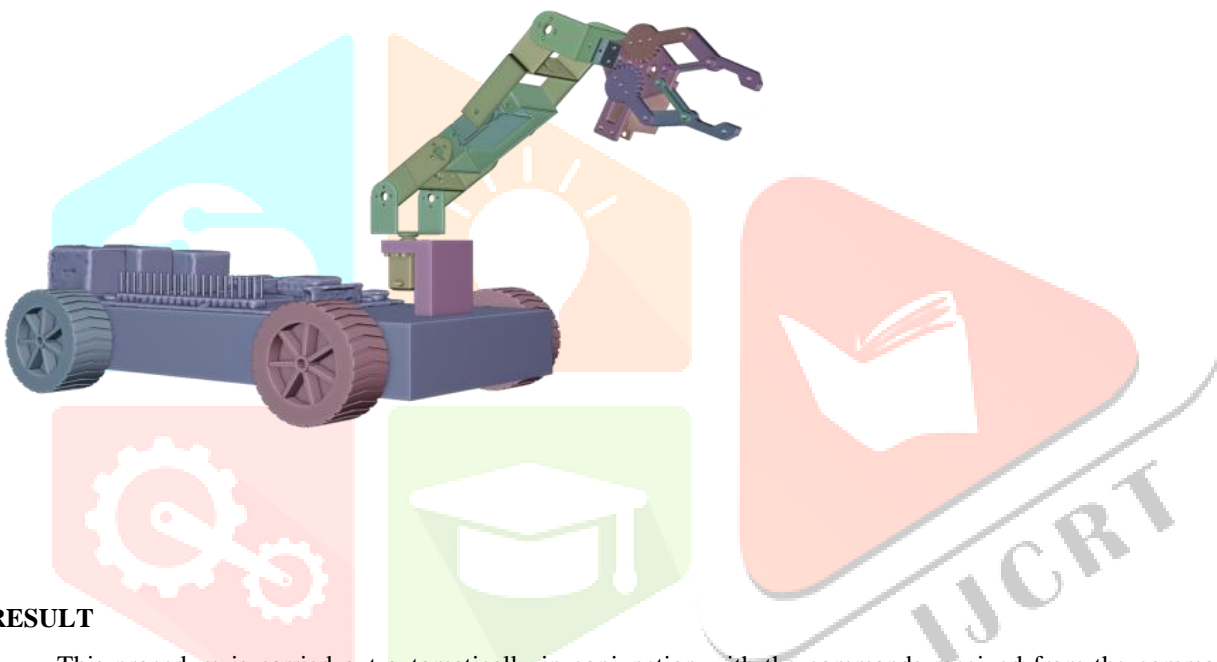
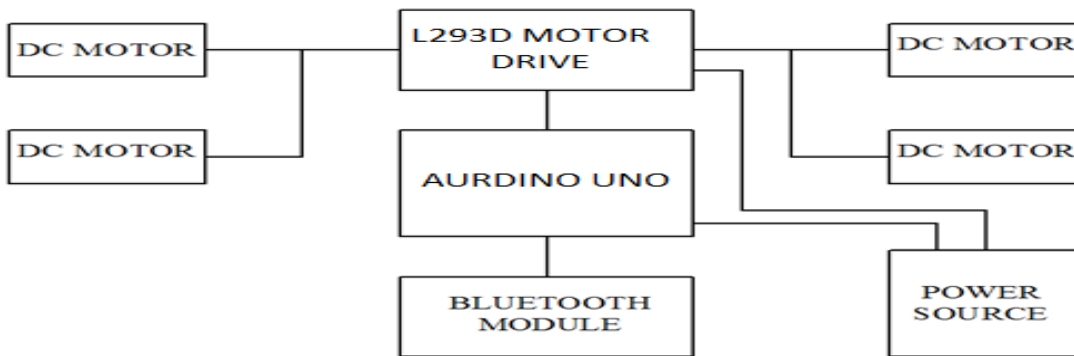
This shading sensor recognizes concealing and gives a sequential yield of RGB worth. It can recognize 16.7 million concealing shades giving RGB regard for the perceived shading. The recognized shading is perceived as a proportion of three fundamental concealing qualities to be explicit Red, Green and Blue with 8-bit precision for each fundamental concealing. Any concealing can be disconnected or combined into three. This sort of robot was before planning for mechanization in ventures for transportation reasons. With progression in advancements, this sort of robot is utilized in Warehouse the board of Amazon. Of course, Amazon has dispatched 'SCOUT' a conveyance robot that homes conveyances. Though it's anything but a line following robot yet works with a comparative system. A short time back there was a recovery of this robot for transportation in Masdar city. Here products were shipped as well as individuals treating it as a path for a vehicle for them (Jagruti Chaudhari, Asmita Desai and S. Gavarskar, 2019).

III.METHODOLOGY

In this paper, we are going to interface the TCS3200 color sensor with Arduino UNO. TCS3200 is a color sensor that can detect any number of colors with the right programming. TCS3200 contains RGB (Red Green Blue) arrays. As shown in the figure on microscopic level one can see the square boxes inside the eye on the sensor. These square boxes are arrays of the RGB matrix. Each of these boxes contains Three sensors, one is for sensing RED light intensity, one is for sensing GREEN light intensity and the last is for sensing BLUE light intensity. The brain of the circuit is an Arduino Uno R3 board having ATmega328 or ATmega328P microcontroller (MCU). It has 14 digital input/output (I/O) pins and six analogue input pins, 32k flash memory, 16MHz crystal oscillator, USB connection, a power jack, ICSP header and reset button.

The working of the paper is simple because this is a basic circuit for interfacing a TCS3200 sensor. When red color is kept near the sensor, it automatically detects the color with the help of photodiode arrays and then RGB color intensity value is displayed in the Arduino serial monitor window along with the color name. At the same time, a red LED glows in the RGB LED. Similarly, the remaining two colours (green and blue) are shown in the Arduino serial monitor window and the respective colour LED glows in RGB LED. The pick and place robotic arm is a mechatronics system that detects the object on the conveyor belt, picks that object from the source location and places it at the desired location. For detection of an object, infrared sensors are used which detect the presence of an object as the transmitter to receiver path for the infrared sensor is interrupted by the placed object. As soon as the robotic arm receives the signal from the controller, picks it with end effectors and places it on the respective destination depending on the respective colour of the object that is black or white. If another object causes an interrupt, it again does the same job. The system uses ATmega328 Microcontroller Unit as its controller for performing different operations by the robot. It is based on a microcontroller equipped with IR object vision sensors to sense the colour of the object. After sensing the object and its colour, the robotic arm places them accordingly to the conveyor belt. Moreover despite the colour. Robot detects the objects on the conveyor belt depending upon the size, shape, magnetic properties and also works efficiently in hazardous conditions without any human requirements automatically.

IV. BLOCK DIAGRAM



V. RESULT

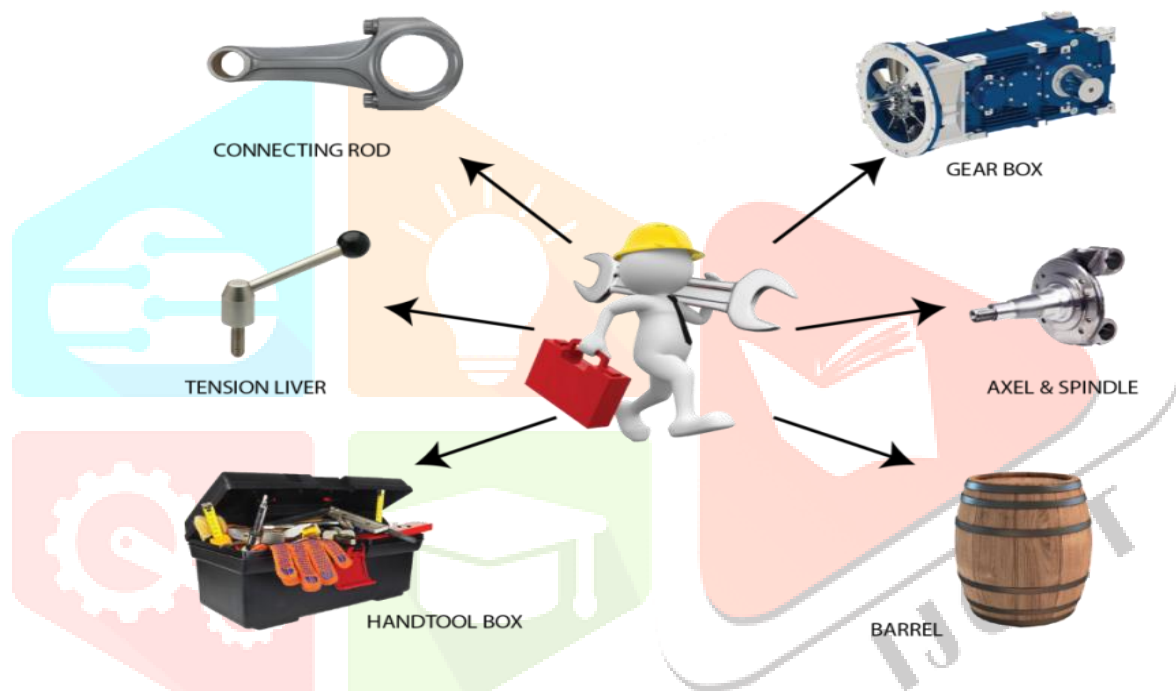
This procedure is carried out automatically in conjunction with the commands received from the command and control units. The mode instructs the controllers to position the various colored objects in the designated locations, and the location information is obtained by choosing necessary operation. As an outcome, the pick-and-place robot with color detection and differentiation capability has been successfully accomplished.

Work Force of Humans:

SL.No	Object	Workers Involved	Time Required to shift 50 Boxes
1.	Valve Rocker Arm (HSRA 1004 F001)	1- operator 2- shifting	30 minutes
2.	Valve Rocker Arm Box (BARA 1044 F001)	3	28 minutes
3.	Gear Shifter Box (HSRA 100114 F001)	4	25 minutes
4.	Crank Shaft Box (F002 A13 091)	3	23 minutes

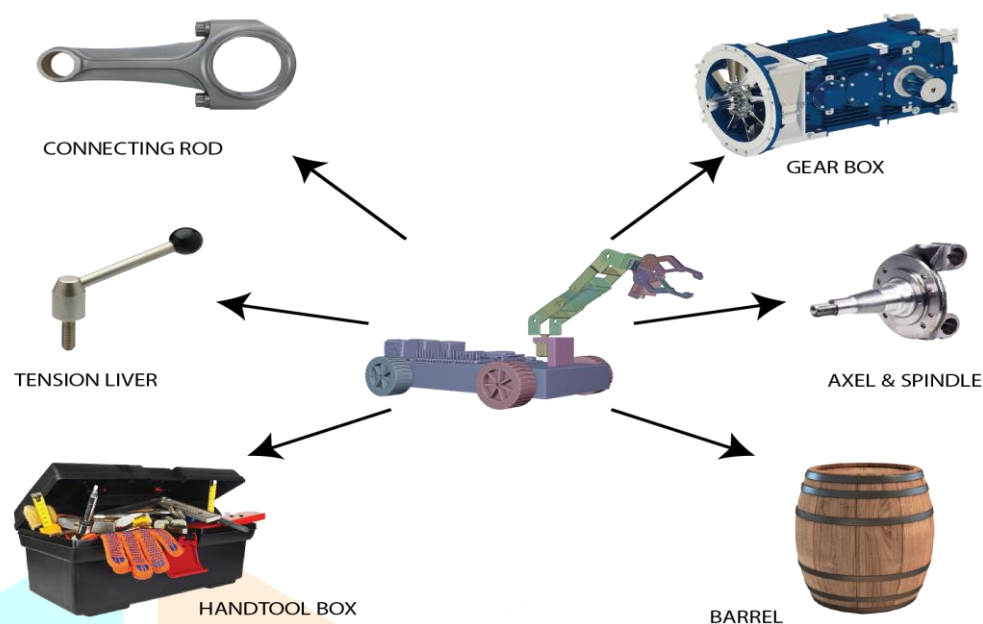
Pick and Place Robot:

SL.No	Object	Colour Code of Box	Time Required to place 100 Boxes
1.	Valve Rocker Arm (HSRA 1004 F001)	Green	10 minutes
2.	Valve Rocker Arm Box (BARA 1044 F001)	Red	9 minutes
3.	Gear Shifter Box (HSRA 100114 F001)	Blue	7 minutes
4.	Crank Shaft Box (F002 A13 091)	Green	7 minutes

VI. Existing METHOD

Here the components or parts are finished; they are packed into wooden boxes. The next move is to transfer these boxes from the packaging house to the transport foundation. This will necessitate the hiring of a worker to run the forklift and move the boxes from one location to another. Since this procedure necessitates the use of an operator and a forklift, it takes longer.

VII. PROPOSED METHOD



Each box is colored and a robot is used to select and position them based on color codes. Colors are used to configure the robot. So that the robot can recognize the boxes based on their colors and then position the components in the desired location. As a result of this procedure, time can be saved, which is a benefit for the business. Fitwell tools and forging Pvt. Ltd TUMAKAURU was approached with this form.

VIII. CONCLUSION

In this paper the goal of designing hardware and software for a wireless mobile robotic arm, implementing the pick and place device process, and testing that meets the goal of our work has been accomplished. Based on the research performed, it is clear that its movement is precise, reliable, easy to monitor and user friendly. The mobile robot has been successfully developed since the automation's movement, as well as mobile and arm automation, can be regulated wirelessly. Robot is supposed to solve problems such as placing or selecting items that are far away from the user, as well as picking and placing dangerous objects in the quickest and most effective manner possible. With work force of humans shifting of 100 boxes was 15 to 30 minutes but with pick and place robot the time consumption of shifting the same number of boxes is reduced to 5 to 10 minutes.

IX. FUTURE SCOPE

Future work could aim to make the system more resistant to environmental variations, as well as to improve the platform's decision-making functionality in order to create a more robust system. System that is truly self-sufficient.

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