

# Arduino Based Robot for Pick and Place Application

Priya H. Pande

Pallavi V. Saklecha

Prof. Pragati D. Pawar

Prof. Atul N. Shire

**Abstract** — Here, the project is designed to develop a system in which robot is used for pick and place application. In this highly developing society, time and man power are critical constrains for completion of task in large scales. The automation playing important role to save human efforts in most of the regular and frequently carried works. The pick and place robot is one of the technologies in the manufacturing industries which is designed to perform pick and place operation. The system is designed in such a way that, in which the human error are eliminated to get more precise work.

The project deals with implementing a pick and place robot using arduino microcontroller. Here, the robot which is implemented have an ability to locate itself to the location where the object to be lifted is available with the help of chassis and dc motors which not only perform the movement of robot but also movement of robotic arm became possible and with the help of robotic arm it can hold the object and place it at desired destination.

**Key Words** —

Arduino microcontroller, IR sensors, Motor driver IC, Robotic arm, Chassis.

## I. INTRODUCTION

In the highly developing society, time and man power are critical constrains for completion of task in large scales. The robotics plays an important role to save human efforts in most of the regular and frequently carried work. Robot is a machine that looks and works like a human being and now it has become an unstoppable forced in the development of modern machinery as they made life easier. So, in this project a robot is designed for performing the work of picking and placing object from source point to destination. The pick and place robot is an Arduino based system that picks object from source location and places at desired location. By taking inspiration from the nature many element of the robot has built. So that construction of the manipulator as the arm of robot is based on human arm.

## II. LITERATURE SURVEY

Harish K , Megha D , Shuklambari M , Amit K , Chaitanya K Jambotkar, Presented Pick and Place Robotic Arm Using Arduino [1]. In this paper a system of pick and place robot is designed using arduino which is implemented via RF signal. Here, the input signal or controlling signal is given from a wireless play station, which is interfaced with the microcontroller by a RF receiver module. When the signal is

sent from the play station it is decoded in the controller and proper controlling signal is sent to actuators (dc motors or servo motor) in the system.

Dr.P.Gomathi, S.Baskar, presented Design and Implementation of Pick and Place Robot Using Arduino for Smart Grid Monitoring [2]. In this paper the system is developed using arduino microcontroller to build up the equipment and programming for a Bluetooth controlled automated arm. This system is Bluetooth controlled having a mechanical arm for pick and place application.

N. U. Alka, A. A. Salihu, Y. S. Haruna and I. A. Dalyop, A Voice Controlled Pick and Place Robotic Arm Vehicle Using Android Application [3], In This paper the system of pick and place robotic arm vehicle is developed using an android application to control the robot through voice commands. The robotic vehicle is android voice application controlled for remote operation.

Mr. Vedant Chikhale, Mr. Raviraj Gharat, Ms. Shamika Gogate, Mr. Roshan Amireddy, Voice Controlled Robotic System using Arduino Microcontroller [4], In This paper the system of voice controlled robot is developed using an arduino microcontroller and Bluetooth module application to control the robot through voice commands. The robotic vehicle is android voice application controlled for remote operation. The wireless camera is interfaced with Arduino to record forward movement of the robotic system which also includes wireless night vision camera. Also an obstacle detector is added to protect the system from obstacles.

## III. LINE FOLLOWER ROBOT

As the name suggested itself, a Line follower robot is an automated guided vehicle, which follows a visual line embedded on floor. Usually, the visual line is the path in which the line follower robot goes and it will be a black line on a white surface.

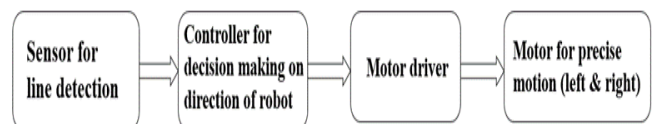


Fig. 1. Block diagram for Line Follower robot

## IV. PROPOSED SYSTEM

“Arduino based robot for pick and place application”, this project is designed to develop a system in which robot eliminate human error to get more precise work and also for cost effectiveness as well as for reducing harm to the object.

Here, the robotic arm is main part of our system. The system which has implemented contain an ability to pick the object from source position where the object to be lifted is available with the help of robotic arm (it performs pick & place operation) And robot moves towards the destination position by using robot chassis and placing the object at desired destination while calculating whether the rack is filled or not. If it will have filled then robot moves towards next rack and check, if this one will empty then the object will have placed at that location, and robot returns back to its original position for picking next object and this work will get continue.

## V. BLOCK DIAGRAM

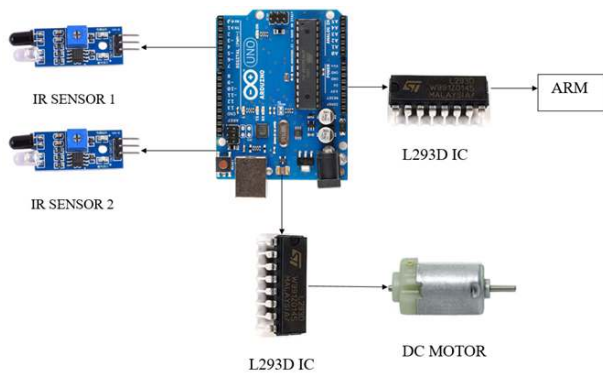


Fig. 2. Block Diagram

## VI. CIRCUIT DIAGRAM

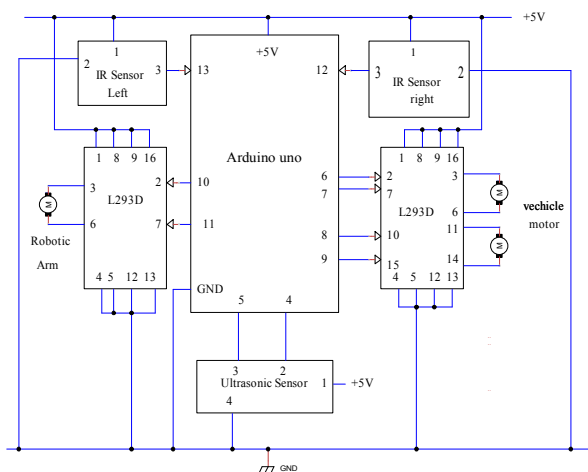


Fig. 3. Circuit Diagram

## VII. WORKING

The working of our project is divided into some basic module that is power supply part, controlling part sensing part and output part. In power supply part we used lithium battery which gives high performance & functionality at very low cost. In controlling part Arduino plays important role whenever we provide input to an arduino it turns on IR sensors and for that values motor get starts and follow the line by using line follower application. And according to that values of sensors motor performs the operation of picking and placing the object at desired location.

## VIII. HARDWARE USED

### 1. Arduino Uno

Arduino board designs use a variety of microprocessor and controllers. The boards are equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits. The arduino board having serial communications interfaces, including Universal Serial Bus (USB) which also uses for loading programs from personal computers to the board. The microcontrollers are typically programmed using a dialect of features from the programming language C and C++.



Fig. 4. Arduino Uno

### 2. L293D Motor Driver IC

L293D is a simple 16 pin motor driver dual H-bridge integrated circuit (IC). This IC acts as current amplifier since they take a low-current signal and provide a higher-current signal. This higher current signal use to drive the motors. L293D contains two inbuilt H-bridge driver circuits. In the common mode of operation, two DC motors can drive simultaneously, in forward or reverse direction.



Fig. 5. L293D Motor Driver IC

### 3. Ultrasonic sensor

By using sound waves an ultrasonic sensor can measure the distance to an object. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. After calculating the passed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between sonar sensor and the object. Here, we have calculated the possible distance in between ultrasonic sensor and rack. Whenever the robot will follow the path one time will come at which the calculated distance will matched with rack and that result will be sent to arduino for further operation.



Fig. 6. Ultrasonic sensor

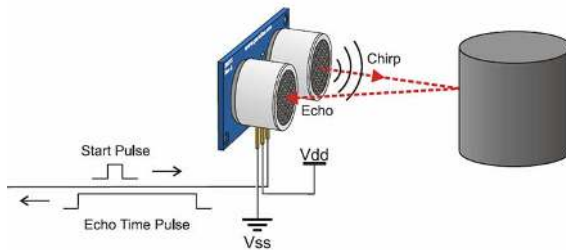


Fig. 7. Working of Ultrasonic sensor

### 4. IR Sensor (Infrared Sensor)

IR sensor is an electronic device which use to sense certain object in the surrounding by detecting infrared radiation. Here, we have used two IR sensors for detecting black line which will be followed by robot for movement. These IR sensors are placed in reflective way so that whenever they come into proximity of reflective surface or dark surface, the light emitted by IR LED will be detected or will not be detected by photo diode and this all data from both the sensors will be continuously monitored by arduino and so it will turn the robot as per the line detected by them.



Fig. 8. IR Sensor

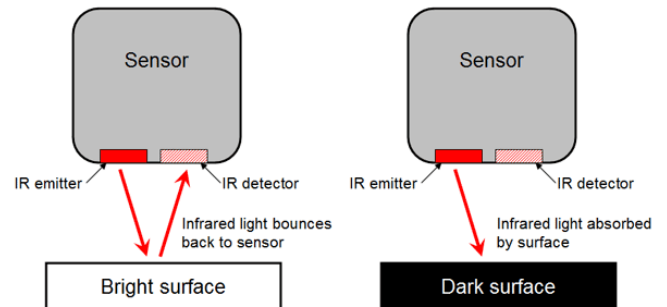


Fig. 9. Working of IR Sensor

### 5. Robotic ARM or Gripper

a gripper can hold, tight, handle and release the object as like human hand. A gripper is the component of an automated system. A gripper can attach to a robot or it can be a part of a fixed automation system.



Fig. 10. Robotic ARM or Gripper

## VIII. FLOW DIAGRAM

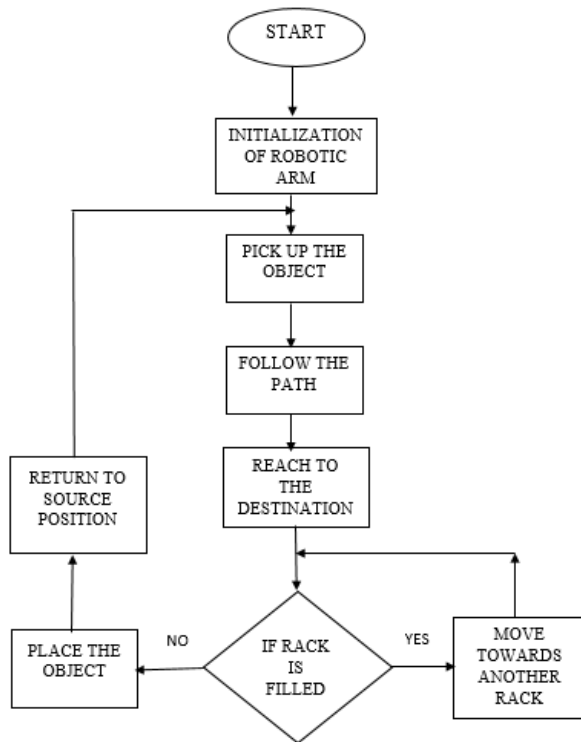


Fig. 11. Flow diagram

## IX. ALGORITHM

- Step 1: Start
- Step 2: Initialization Robotic arm
- Step 3: Pick up the object
- Step 4: Follow the path
- Step 5: Reach to the destination
- Step 6: checked whether the rack is filled or not
- Step 7: If rack is filled go to step 8 & if rack is not filled go to step 9
- Step 8: Place the object and go to step 10
- Step 9: Move towards another rack and go to step 6
- Step 10: Return to the source position and go to step 3.

## X. ADVANTAGES

1. It perform defined task with speed and accuracy.
2. It Increases consistency in its work.
3. It is wireless and fully automatic.
4. It is Simple in design.
5. It is Reliable.
6. It provide organized controlled.

## XI. LIMITATION

1. Sometimes battery may get failed.

## XII. APPLICATIONS

1. Shopping malls
2. Material Handling
3. Hazardous Environment
4. Industries
5. Placing of books in library
6. Agriculture

## CONCLUSION

The proposed system "ARDUINO BASED ROBOT FOR PICK AND PLACE APPLICATION" is designed to develop a robot which performs a task of carrying object from source position to destination position while calculating the path using line following application. Also it is provided by a feature that, it place the object in the rack by judging whether it is filled or not. It became possible with the help of IR sensor, receiver & transmitter pin on the arduino board. Further process will get continued depending on controlling part. In such a way that the system will work.

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### AUTHOR'S PROFILE

	<p><b>Priya H Pande</b>                  Presently I am pursuing BE in the Electronics and Telecommunication Engineering at Jawaharlal Darda Institute of Engineering &amp; Technology, Yavatmal</p>
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	<p><b>Pallavi V. Saklecha</b>                  Presently I am pursuing BE in the Electronics and Telecommunication Engineering at Jawaharlal Darda Institute of Engineering &amp; Technology, Yavatmal</p>
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	<p><b>Prof. Pragati D. Pawar</b>                  Received the B.E. degree in Electronics &amp; Telecommunication Engineering from Kavikulguru Institute of Technology &amp; Science, Nagpur University, Nagpur and Master's Degree in Electronics from S.R.T.M.U., Nanded. Presently I am pursuing Ph.D in the area of Digital Image Processing and currently working as an Assistant Professor in Electronics and Telecommunication Engineering at Jawaharlal Darda Institute of Engineering &amp; Technology, Yavatmal (M.S) INDIA since 2008 till date.</p>
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	<p><b>Prof. Atul N. Shire</b>                  Received the B.E. degree in Electronics &amp; Telecommunication Engineering from Jawaharlal Darda Institute of Engineering &amp; Technology, Yavatmal, Amravati University and Master's Degree in Electronics from G.H.Raisoni, Nagpur. Currently I am working as an Assistant Professor in Electronics and Telecommunication Engineering at Jawaharlal Darda Institute of Engineering &amp; Technology, Yavatmal (M.S) INDIA.</p>
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