

# Multi Controlled Pick-N-Place Robotic Vehicle

<sup>1</sup>Shalini Rai, <sup>2</sup>Yash Shah, <sup>3</sup>Rutvi Thakar

<sup>1</sup>Student, <sup>2</sup> Student, <sup>3</sup>Assistant Professor

<sup>1</sup>Electronics and telecommunication,

<sup>1</sup>TCET, Mumbai, India

**Abstract:** A pick-n-place Robotic Vehicle using Microcontroller ATmega328, L293D Motor Driver circuit, Wired Remote control box and a Bluetooth module that will provide the necessary interfacing with the central controller and the bot and thus it will be used to pick an object and place it at the desired location. A Specific voice command is given to a voice controlled robot. Whatever the command is given through voice module or Bluetooth module, it is decoded by the existing controller and hence the given command is executed. Here in this project, we have used Bluetooth module and Android application to give voice command in the form of hex code. There are certain digits which can be sent directly to the Bluetooth module and automatically the digit is converted into its hex code. In this project we can use these digits as a voice command for the specified operation pre-programmed in the microcontroller. Using digits as a voice command is easier than using alphabetical commands. In the earlier project based on this note the method which was used were wired which requires a lot of interfacing and programming and this makes the complicating. A robotic vehicle will be capable of taking an object from one location and placing it to the other desired location.

**IndexTerms – Speech processing, android application, microcontroller.**

## I. INTRODUCTION

Since Robot has played a very vital role in the Human life which includes both personal as well as industrial applications such as Human Robots are developed in order to perform the human task more efficiently and in a uniform and precise manner. There are several Robots developed for industrial use in order to perform Heavy task and to minimize the load on the mankind. Several Robots are developed for border security so as to diffuse bombs and detect suspicious objects in the civilian area. In this project we will be designing a robot that can efficiently pick the object and place it to the desired location. Later this robot can be molded into any form depending upon the choice. Industries have also been benefited from the drastic expansion in the fields of Robotics.

Automated machines have been doing the extensive dangerous duties and mundane jobs of Humans providing great productivity and efficient working. Since Robot is never tired extra shifts are indulged in the factories. Farmers are also benefited with this expansive development in the field of robotics and thus make use of Automated

Harvesters which are just another part of Robotics, not only this but there are several other applications such as Robots are used in more dirtier places in Waste Disposal Sites and also Assisted Surgical Robots are used in the field of Medicines.

Texas Military has also initiated various robotic programs such as Predators and Reaper unmanned aerial reconnaissance vehicle which allows the pilot to control the vehicle even from a larger distance. This vehicle can also be sent to high altitude for an enough longer period of time and can launch a mini shaft on the target without any pilot intervention.

This project when expanded on higher level such as, if this project is designed using voice command then the robot which is designed is fully controlled by the speech and will thus not require any kind of Human Intervention making it fully automated and self-dependent

This Pick-n-place Robotic vehicle is designed in order to provide an ease in sorting the Heavy elements. Usually the transfer process is carried out by Human intervention in many places but if this process is carried out for a longer duration of time then it becomes highly injurious to the operator. By designing such a system, the operator will no longer be involved in caring the task on its own and thus this system will provide an ease in the work culture and also be an efficient one. Sometimes in Human involvement it is possible that the operator many tend to do some mistakes, such mistakes on a large scale is un-bearable either with respect to cost, or money, or time.

In order to over-come this above-mentioned issue, we come up with a proposal of designing a 'Pick-n-place Robotic Vehicle' which will be capable of segregating the material it has to lift and type of grip which is needed to hold on to the object, it will also be capable of placing the object from one location to the other desired one.

## II. LITERATURE SURVEY

During the Literature survey we came across many contributions made in the field of Robotic Vehicle which is implemented to perform various pick and place functions depending upon the need later this can molded into any particular form depending on the requirement and need. One of the developments uses a 6V and a 12V motors so to move the arm. These Motors ratings can be changed depending upon the application of the robot. The wired control robotic arm is controlled by wires and the battery. Today the use of Robot has become imminence and is highly expanded. The Following chart shows the use of Robot in Professional and Personal Field Humanoid can provide the suitable assistance to the robot by giving timely instructions to it and the appropriate

commands. There are three basic steps in the design of the robot panel such as forward and reverse, upward and downward direction and picking up and placing down.

The function of moving and rotating the object picked up can be continuous or at fixed interval of time, this can be decided based on the robot planned. From the above project made on Wire Controlled Robotic Arm we come to a conclusion that our robot is designed in such a way that it is perfect in all the aspects, it can able to move, pick and place objects up to 1 kg, in other categories it can able to hold heavy weighted objects .

In a better aspect we conclude that this robot can be used at riskier places in order to diffuse the bombs thus this could prevent the risk of Human Life and also avoid the nuclear wastage as well, while the other makes use of At-mega16, wherein the essential motion subsystem of Robot manipulator for positioning, orientating object so that robot can perform useful task. The main aim of this project is to design and implement a pick and place robotic clamp. This project can be self-operational in controlling, stating with simple tasks such as gripping, lifting, placing and releasing. In this project, the focus is on. There are numerous dimensions over which robotic arms can be evaluated, such as torque, payload, speed, range, repeatability and cost, to name a few. Robot manipulators are designed to execute required movements. Their controller design is equally important.

**III. SYSTEM MODEL**

In this project we are developing a Robotic Vehicle which will be operated on several voice commands, initially the input command is given through voice which will be transmitted to the Bluetooth module and then to the Micro- controller that is interfaced with the device, the character that is received will decide the motion of the Robotic vehicle, there are 5 different characters that are defined and that performs a specific task such as if the received character is ‘f’ then both the motor rotates in the forward direction and the status of the robot is that the vehicle moves in the forward direction, else if the character received is ‘b’ then both the motors rotate in the backward direction and the status of the robot is such that it moves in the backward direction.

Else if the received character is neither f nor b and is ‘R’ then motor 1 rotates in the forward direction and the motor 2 rotates in the backward direction that leads to the status of the vehicle in the Right direction else if the character received if ‘L’ the motor 1 rotates in the backward direction and motor 2 in the forward direction so that the status of the vehicle is such that the vehicle moves in the Left direction. Finally, in order to terminate the movement of the robotic vehicle we need to give character ‘S’ as the command.

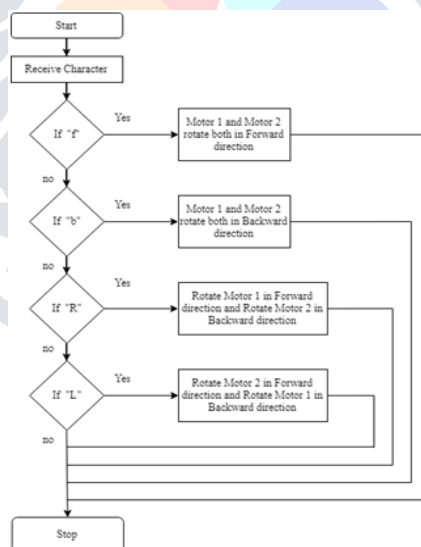


Fig 1: Operation Flow

**IV. BLOCK DIAGRAM**

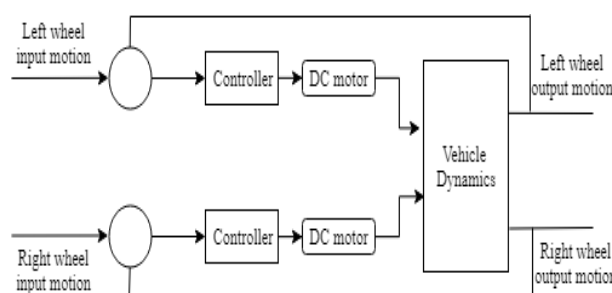


Fig 2: Circuit Operation block diagram

The ATmega328 is a single-chip microcontroller created by Atmel in the megaAVR family. It has a modified Harvard architecture 8-bit RISC processor core. The basic maneuver block diagram of the pick and place robotic vehicle circuit is shown in the Fig 2.

**DC Geared Motors** Any device which alters any form of energy to mechanical energy is called as motors. While conniving any type of Robot the motors plays a very vital role in providing the movement to the body as well as the shaft. Motor operates with the combined effect of current with the perpetual magnet.

The conductor in addition with the current will produces magnetic field which will than react with the magnetic field to produce by the permanent magnet to make the motor rotate. There are 3 three basic types of motor, DC motor, servo motor and stepper motor which are commonly being used in building a robot. The following figure 3 indicates the remote control box consisting of the AP-DP switches which controls the opening and closing of aperture of the robotic clamp.



Fig 3: Remote Control Box

Power supply adapter is used for the pick and place robotic vehicle. The robot is basically operated with two different kind of supply they are: 5V Power Supply and 6V Power Supply. The 5V supply is vital for the microcontroller used and the IR Sensors as well as the Bump Switch.

The 6V Supply is used for driving the servo motors since the 5V battery is insufficient to drive the 5 servo motors used for the robot implementation. 5V supply is necessary in order to drive the micro-controller and IR Sensors used.

HC-05 is a serial Bluetooth module. It can be configured using AT commands. It can work in three unlike configurations (Master, Slave and Loop back). In our venture we will be using it as a slave.

In this Smart Phone controlled Robot, the user of android app sends the data to 8051 microcontrollers through HC-05 module. The flowchart shown in Fig 1 of the system model is best explained by the table shown below (Table 1)

Received Character	Motor 1	Motor 2	Status of Robot
F	Forward	Forward	Moves forward
B	Backward	Backward	Moves backward
R	Forward	Backward	Moves Right
L	Backward	Forward	Moves left
S	Off	Off	Stopped

Table 1: Motion Chart

The arriving data is compared in Atmega328 microcontroller and the decision is made accordingly. Table 1 shows the direction of motors and status of robot for diverse received characters. Fig 4 indicates the bidirectional communication between the microcontroller and Bluetooth module HC-05.

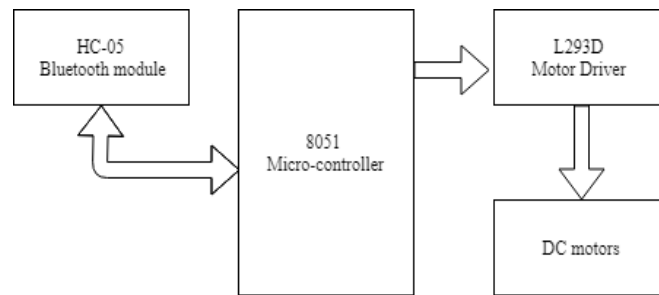


Fig 4: Bluetooth Interface

The Figure 5 shows the component made for the actual picking and placing of the object. The clamp is made by using 2 gears and metallic parts drilled and fixed with the help of screws. This clamp can hence perform the gripping function by its connection with the DC motor with 250 RPM.



Fig 5: Pick-N-Place Clamp

## V. EXPECTED OUTCOMES

A pick-n-place Robotic Vehicle using Microcontroller ATmega328, L293D Motor driver circuit, Wired Remote control box which will be used to pick an object and place it at the desired location. This robot will be able to recognise the voice and perform the specific command to move the robotic vehicle using the Bluetooth interface. Then by using the remote control it can pick and place the object at the desired location. So, overall we can control the movement of the robotic vehicle in 4 ways:

1. Bluetooth terminal interface between the Atmega328 and HC-05 bluetooth module.
2. Speech processing by making use of Arduino voice command
3. Operation by sending character command through arduino software in PC via USB port for communication.
4. Direct command using Android application designed for Android smartphones.

Imparting extra features onto it by adding Line follower concept, a coding using microcontroller will be used. A robotic vehicle will be capable of taking an object from one location and placing it to the other desired location.

Till a point where the line is straight, the robot will follow the line. As soon as it reaches a turn or the location of pick / drop, the mode can be changed to remote controlled mode which can be operated using voice commands.

## VI. CONCLUSION AND FUTURE SCOPE

Robotic process is basically software which involves a robot that performs the human activities. The future scope of Robotic vehicles, arms and other application is very high. The Fig 6 shows the base of the Pick-N-Place Vehicle. There are various human jobs which can be easily performed using various tools and technology. The various monotonous tasks such as structuring, data

accumulating or anything which requires a series of steps are easily carried out with the help of robotic processes. The Robotic applications would be helpful in improving the data gathering and these data can be analyzed in a better way, if all the tasks which are carried out by humans today are performed by robots.

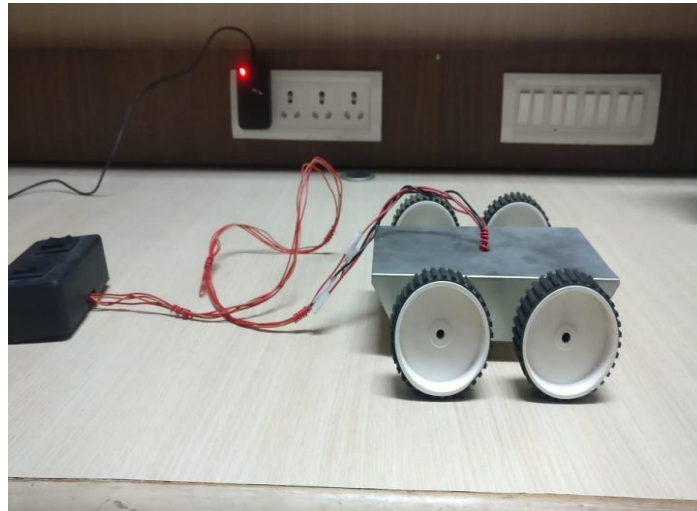


Fig 6: Pick-N-Place Vehicle base

The final product as shown in fig 7 is basically the bot that is been controlled by the different operations like using voice command, wired, using once PC. Initially a fair connection is established between the arduino and the bot so that it can be controlled wirelessly using voice commands there are several characters that are been initialized in the code and as an when the initialized character is entered the bot moves or works in the specified direction . Secondly while transmitting the command through voice, the basic step that has to be obeyed is that a Bluetooth path is initially established and then the command through voice is send and performed by the bot.

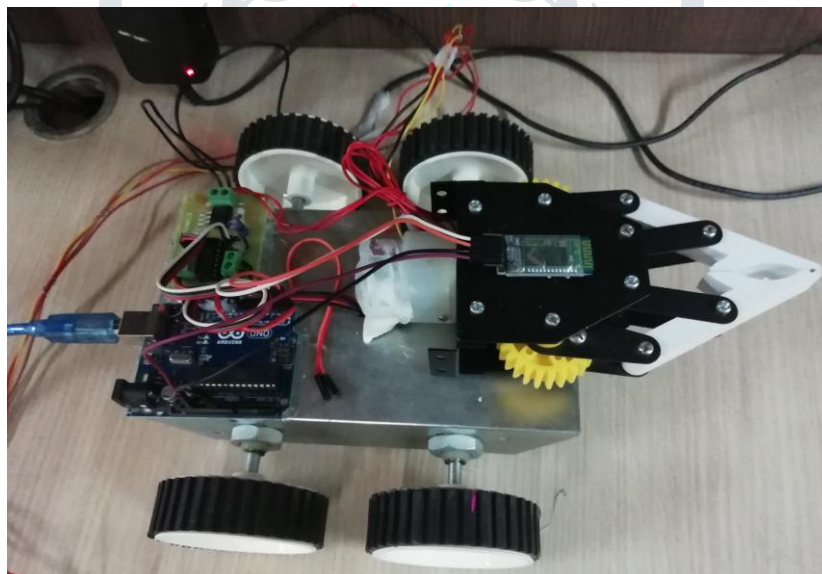


Fig 7: The Pick-N-Place Robotic Vehicle.

During the upcoming year, a tremendous growth is observed in the field of Robotic applications and therefore it reduces the common error and incorrectness while delivering the output thus increasing the efficiency. The Robotic submission in the market is progressing rapidly and thus such tremendous growth in the robot application can benefit the business and the market-place. This is due to the following advantages of Robotic Applications:

1. Efficiency: The Robotic application can perform with ease and without any human intervention thus thereby reducing the error in the task.
2. Accuracy: In order to carry out high data entries and data accumulation, this robotic application can perform the task without any hindrance and thus provides accurate work output
3. Cost Reduction: Since the Robotic applications are based on software thus their up gradation does not involve much cost.
4. Boosted audit and monitoring compliance

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