# VOICE CONTROLLED PICK &PLACE ROBO USING ANDROID APPLICATION

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**Abstract:** *Robotics has become an interesting area of research in the field of Electrical Engineering. This is due to the vast potential it holds in reducing human effort in performing tasks faster while still maintaining operational accuracy. The recently introduced Android operating system used in many devices such as mobile phones, tablets is user friendly and can be extended to control smart and intelligent systems such as robots.*

*Our design develops a pick and place robotic arm vehicle using an android application to control the robot through voice commands. Arduino programming language, which is an open source and simplified version of C++ known for its friendly architecture was used to program the controller. The integration of control unit with blue-tooth device was done to capture and read the voice commands. The robotic vehicle then operates as per the command received via android application.*

**Keywords: DC Motors, IR sensors,Battery,Android.**

## 1. INTRODUCTION

It's always been a dream of person to make machines that behave like humans. Recognizing the speech and responding accordingly is a crucial a part of this dream. With the improvements of the technology and researches on artificial intelligent, this dream comes true relatively. Our paper aimed to form contribution to the present dream. Controlling the machines and environment with speech makes human life easier and easier. This paper may be a simple implementation of this approach.

Speech is that the most used way of communication for people. We born with the talents of speaking learn it easily childhood and mostly communication with one another with speech throughout our lives. By the event of communication technologies within the last era, speech starts to be a crucial interface for several systems. Rather than using complex different interfaces, speech is simpler to speak with computers.

Our paper, it's aimed to regulate a robot with speech commands. The robot is in a position to recognize spoken commands to maneuver correctly. to offer a direction to robot, first the voice command is send to the ANDROID phone. The android recognizes the command by speech recognition system. Then android converts the voice command to direction command that predefined and recognizable by robot. When the robot gets the direction command, it moves according to spoken command.

## 2. OBJETIVE OF THE PAPER

Today, the sole aim of technology seems to be to scale back the human efforts to the minimum. We have many electronics devices that reduce the mechanical work of humans. Humans, to be precise, the "gifted humans" are fortunate enough to hold out their daily chores. But what about the physically disabled?

There are numerous occasions where the human can't work. In such situations, without a considerable amount of safety precautions like within the disposal of hazardous wastes, radioactive substances, remote handling of explosive devices and lighting and hostage situations among others, work is impossible. Robot can safely add hazardous and risky conditions ensuring human safety and replacing massive human manpower .our paper solve most of these problems.

# 3. WORKING PROCEDURE

The paper consist of two main sections; hardware (which entails the physical components) and software (which is the encoded computer instructions allowing signal processing to be achieved).The block 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 placed on a moving vehicle (chassis). The vehicle is able to move along any type of surfaces irrespective of 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 only 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 closing. For the controlling of motor, motor driver IC and Atmega328micro controller is used. The input signal or controlling signal is given from an android application, which is interfaced with the Arduino by a RF receiver module. When the signal is sent from the android application it is decode in the controller and proper controlling signal is sent to actuators (dc motors or servo motor) in the system.
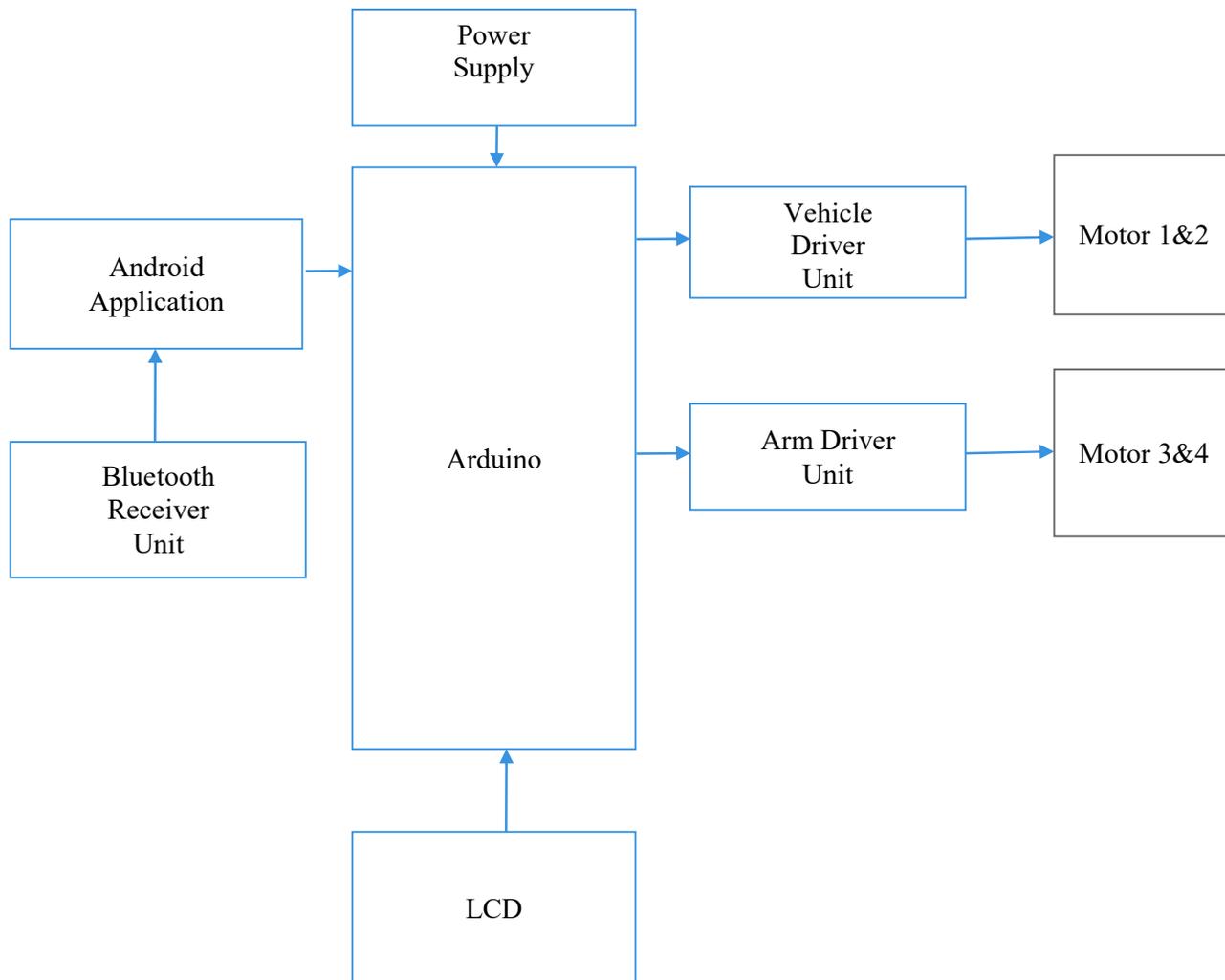


**Figure 1: Block Diagram of the Robot**

### 3.1 HARDWARE DESCRIPTION:

**Arduino:** Arduino is an open-source platform used for building electronics papers. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.
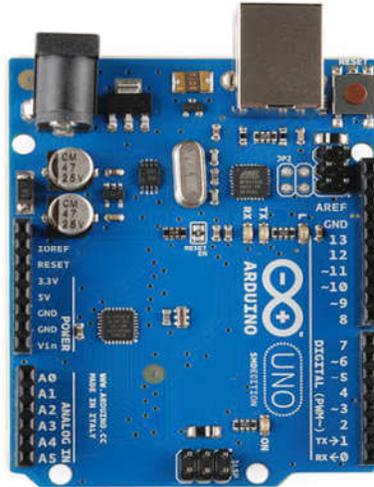


**Figure 2:**Arduino

**HC-05 Bluetooth Module:** HC-05 Bluetooth module provides switching mode between master and slave mode which means it able to use neither receiving nor transmitting data. Comparing it to the HC-06 module, which can only be set as a Slave, the HC-05 can be set as Master as well which enables making a communication between two separate Arduino Boards.
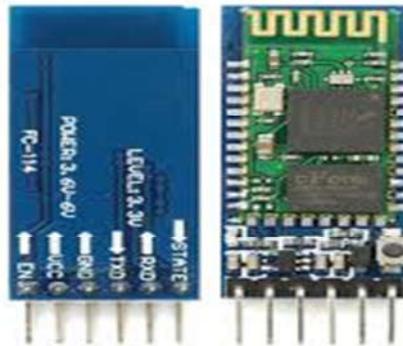


**Figure 3:HC-05 Bluetooth Module**

**LCD Display:**LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits.A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.



**Figure 4:LCD Display**

**L298 Motor Driver:** L298 motor driver controller board is a low-cost module that allows controlling the speed and direction of two dc motors simultaneously or one bipolar stepper motor or smart car essential. This module is equipped with a 16 pin STLN298 chip that accepts standard TTL logic levels with strong driving ability, low heat, and strong anti-interference ability. It has high voltage, high current dual H bridge motor driver that can drive DC motors with voltages between 3V and 35V, with peak current up to 2A each, providing 5V output interface which can either be "enabled" or "disabled" using a jumper. For motor supply voltages up to 12V, 5V interface will be enabled that can be used as an output for powering 3.3V MCU. But for motors having a voltage greater than 12V, the jumper must be disconnected.
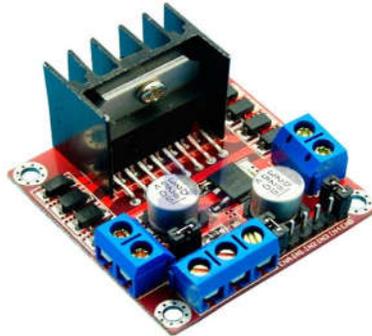


**Figure 5:L298 Motor Driver**

### 3.2 SOFT WARE DESCRIPTION:

The Arduino integrated development environment (IDE) is a cross- platform application for different operating systems that is written in the code programming language Java. This programming includes a code editor with multiple options like text cut and paste, searc and replace the text, automatic bracematching and syntax highlighting and it also gives simple *one-click* mechanisms solution to compile and upload programs to an Arduino board. This also contains a message giving area where user can give message about the type of the program or comments, a text console, a toolbar with buttons for common functions are some of this programs key features.

The following are some of the Arduino commands :

- pinMode()
- digitalWrite()
- digitalRead()
- analogRead()
- analogWrite()
- shiftOut()
- pulseIn()
- millis()
- micros()
- delay()

Arduino integrated development environment (IDE) setup:

1. Download Arduino Integrated Design Environment (IDE) from
   https://www.arduino.cc/en/Main/Software.

2. Once it's been opened. It opens into a blank Place where you can start programming immediately. First, we should configure the board and port settings to allow us to upload code. Connect your Arduino board to the PC via the USBcable.

3. You have to tell the Arduino IDE what board you are uploading to. Select the Tools pull down menu and go to Board. This list is populated by default with the currently available Arduino Boards that are developed by Arduino. If you are using an Uno or an Uno-Compatible Clone (ex. Funduino, SainSmart, IEIK, etc.), select Arduino Uno. If you are using another board/clone, select thatboard.

4. If you downloaded the Arduino IDE before plugging in your Arduino board, when you plugged in the board, the USB drivers should have installed automatically. The most recent Arduino IDE should recognize connected boards and label them with which COM port they are using. Select the Tools pull down menu and then Port. Here it should list all open COM ports, and if there is a recognized Arduino Board, it will also give its name.Select the Arduino board that you have connected to the PC. If the setup was successful, in the bottom right of the Arduino IDE, you should see the board type and COM number of the board you plan to program. Note: the Arduino Uno occupies the next available COM port; it will not always be COM3.

5. At this point, your board should be set up for programming, and you can begin writing and uploading code.

6. One common procedure to test whether the board you are using is properly set up is to upload the "Blink" sketch. This sketch is included with all Arduino IDE releases and can be accessed by the File pull-down menu and going to Examples, 01. Basics and then select Blink. Standard Arduino Boards include a surface-mounted LED labeled "L" or "LED" next to the "RX" and "TX" LEDs, which is connected to digital pin 13. This sketch will blink the LED at a regular interval, and is an easy way to confirm if your board is set up properly and you were successful in uploadingcode.

Source Code:

Automated Robo Source code.docx

| Command | Response of system |
|---|---|
| "Forward" | Vehicle moves in forward direction |
| "Backward" | Vehicle moves in reverse direction |
| "Left" | Vehicle moves in left direction |
| "Right" | Vehicle moves in right direction |
| "Up" | Arm moves in upward direction |
| "Down" | Arm moves in downward direction |
| "Open" | Robo Wrist opens |
| "Close" | Robo Wrist closes |
| "Stop" | System stops operating |

## Table1: Summary of Execution Program

## 4. EXISTING SYSTEM

Though there are various automated robots to select and place an object from source to destination using different technologies, still there are many challenges that require to be addressed and some of them are listed below

• Singular Voice Recognition , during this one person voice command are preinstalled within the app and whenever it receives an equivalent voice commands from same person then only the Robot starts working. So other person cannot operate the robot.

• Low Data Transmission Rate, it's limited to perform tasks to its coverage area only.

• High Susceptibility to noise.

# 5.  PROPOSED SYSTEM

To beat all the restrictions mentioned above within the study, the planning of Voice Controlled Robot using Arduino is proposed. It's designed such,

- It's Multi Voice Recognition; such anyone can operate the robot with their Voice commands.
- It's designed with soft gripper so no additional pressure is suspected on the thing.
- It's designed with high degree of perfection which results in high accuracy.
- It's coverage area is best than the prevailing system.

# 6.  RESULT ANALYSIS
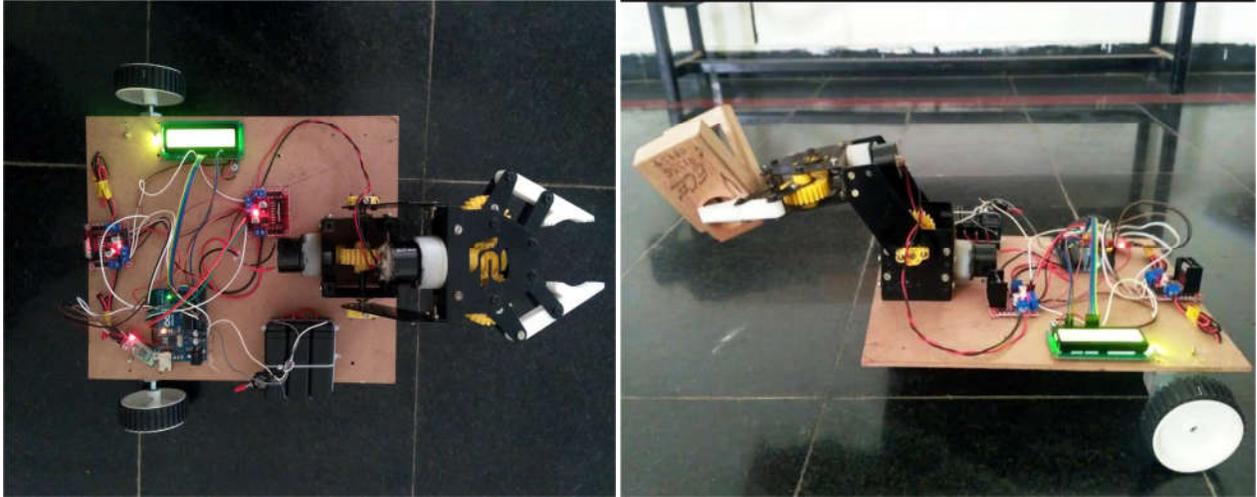


**Flow Chart of Execution:**
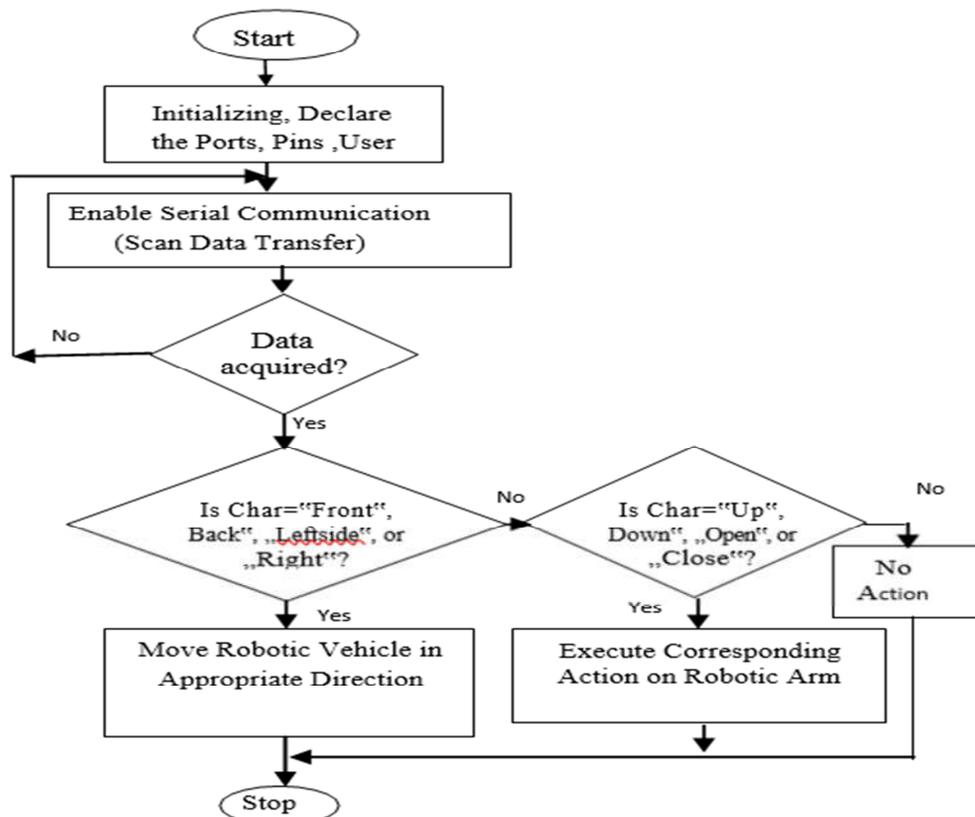
**Programming Language:** The programming language used is Arduino which may be a simplified version and compatible with both C and C++ programs. The Arduino paper provides the Arduino Integrated development environment (IDE), which may be a cross-platform application written in Java programming language Applications include Ardupilot, Arduinome, Arduino phone, D.C. control etc.

**Android Application:** Two applications (also apps) are necessary for the operation of voice command recognition from an android device;"Arduino voice control" app which is that the main app through which reception of voice commands from user and Bluetooth synchronism is achieved. "**Google Voice Search**" app which is that the supporting app having a library English (or any chosen speech language) words by which a given command is known and also translated into a string of characters for transmission to the receiver for necessary decoding.
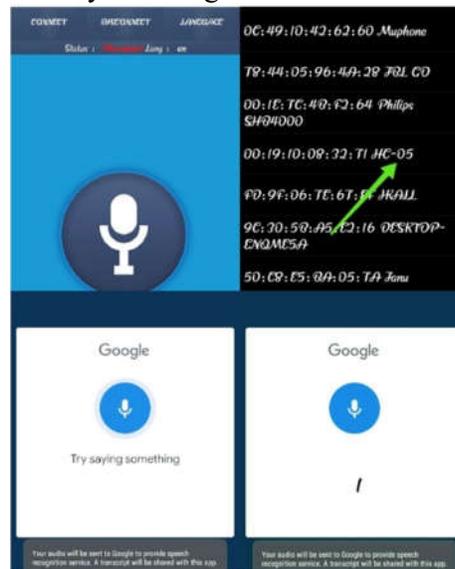


**Android Bluetooth Receiver:**This device interfaces the given commands to the controller. it's pre-configured as a slave Bluetooth device. Once it's paired to a master Bluetooth device like PC, smart phones and tablet, its operation becomes transparent to the user. No user code specific to the Bluetooth module is required within the least in the user microcontroller program. It has two modes of operation; AT (or Command) mode, where it connected as a master with the Arduino development board then to the pc system to enable changes in device settings like name of device, baud specification (UART), status of device etc. the opposite mode is understood as Data Transfer mode, where it's connected as a slave configuration to the controller to receive Bluetooth signals from an external source, decode into appropriate translation and pass the instruction to the controller for action.

**Execution Program:** Here a summary of the command instructions written within the Arduino programming environment and intended response for the system is displaced.

# 7. CONCLUSION

Robotic Technology is making so much rapid progress so that it is been evident fact that it will be playing a huge role in human life in current and future generations to come. Thanks to Robo Arm movement idea that is reducing many human tasks in several platforms like medical, Industrial, Defence etc., with minimum parallax errors. In the Field of Medical these Robo arm movement mechanism helps in doing so many sophisticated surgeries easily, where Human efforts can sometimes lack definitive results. In other Platforms this Robotic Movement arm can be helpful in automated industrial applications on conveyor belts, where the work environment factors prove to be much tougher for humans. Despite the fact that the automated robo arm made by this aspect is of prototype quality, it has a quality that can be improved for much bigger picture of robotic systems. Besides this, robotic arm sector, which is open to future developments, which will keep its importance in the Automated goal with minimised errors.

The project "Voice controlled pick & place robot using android application" was designed a robotic arm such that the robot can be operated by the voice commands which being operated by the android mobile application. The controlling of the robot is done wirelesslythrough android smart phone using the Bluetooth feature present in it. The objective of this project has been achieved which was developing the hardware and software for a voice controlled pick and place robot. From observation that has been made, it clearly shows that the movement is precise, accurate and easy to control and user friendly to use. The robotic arm control method is expected to overcome the problem such as placing & picking object that away from the users and to pick & place hazardous object in a very fast and easy manner.During the process of making and developing this idea, a lot of theoretical knowledge is gained and has been put to the practice and it has been ensured that it is suitable for the purpose of the project.

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