

## Miniaturized and handy robot controlled by human voice

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### ABSTRACT

The goal of technology today seems to be to minimise human effort. There are numerous technological tools at our disposal that lessen the need for human labour in mechanical tasks. The gifted human are blessed enough to perform the basic tasks. But what about those who are physically unable? This paper focuses on miniaturized and handy robot that can be controlled by human voice to help the ungifted feel gifted. But it still has advantages for both physically challenged people and those with special abilities. This paper uses The ATmega328P microcontroller for the creation of the voice-activated robot. The electronics architecture and the software architecture are the two fundamental components of the robot's architecture. The spoken commands we give the robot are internally translated into low level machine commands that a microcontroller could comprehend, and the accompanying actions, such as moving forward, backward, left, or right, or even dancing, can be carried out. Depending on the speech orders that are supplied to the robot, it can carry out a variety of tasks. Human speech is captured and translated into straightforward commands for action. The designed miniaturized and handy voice-controlled robot can be a useful tool for lessening human effort and, more crucially, for closing the achievement gap. Physically disabled people can do their tasks quite simply with the help of straightforward voice commands. In military applications when there is a higher risk of human loss, it may also be used. It is just as effective and has a longer lifespan when utilised in industrial applications.

**Keywords:** Miniaturized, Handy, Voice, Robot

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### INTRODUCTION

The goal of technology today seems to be to minimise human effort. There are numerous technological tools at our disposal that lessen the need for human labour in mechanical tasks. The gifted human are blessed enough to perform the basic tasks. But what about those who are physically unable? This paper focuses on miniaturized and handy robot that can be controlled by human voice to help the ungifted feel gifted. But it still has advantages for both physically challenged people and those with special abilities. This paper uses The ATmega328P microcontroller for the creation of the voice-activated robot. The model is a prototype of miniaturized and handy robot controlled by voice. The concept to make a robot that can work on spoken commands. Numerous articles show how a robot and smartphone can communicate and how

a mobile device can remotely control a robot. A smart phone makes a great interface for remotely automating the robot. It has a lot of helpful features.

For the necessary duty in this design, an android application with a microcontroller is utilised. Bluetooth technology makes it easier for the application and robot to connect. The commands given will reach the module through the channel and be forwarded to it. The goal of the robot is to work on the user's commands and carry them out. Here, the system needs accent training before it can begin understanding the commands given, which have been inserted via codes. With the advent of gesture concepts, the divide between the real and digital worlds has shrunk in today's technological age. We favour technology over people for all hazardous tasks. Even though these robots were first operated manually, they can now be directed with voice commands and hand gestures which can help the differently abled people. The interplay between the computer and human body language can be used to define this gesture and voice recognition system. By doing so, the communication channel between technology and people is built. This work aims to increase the robot's total security while also streamlining its control system [1]. Mobile phone is used for communication. The voice validity is checked by various examinations. These features make it effective in applications as businesses, clinics, and how, including environmental research facilities [2]. With the use of this prototype, individuals are able to maneuver a wheelchair independently by simply speaking commands over Bluetooth. While moving, if an obstruction is found, the device alerts the user and pauses. Additionally, it detects emergency fires and smoke and alerts the designated number so that the necessary assistance may be obtained. All the functionalities are combined into a single module to create a prototype [3]. The mechanical design of robot, suitable motor choice, and electronic components that control the robot joints make up the hardware component. The algorithms that translate the intended word into a series of target points and the control algorithms that finally cause the robot to move in accordance with the specifications are both found in the software part. The writing process used in this instance is created using speech recognition technology. Both Android applications and a microphone can be used to perform this voice recognition [4]. The goal is to use a voice-controlled system to create an Intelligent Personal Assistant (IPA) that can provide a person with a variety of services. This golem was specifically created for this group of people because its main function is to assist a senior or disabled person [5]. This paper outlines straightforward hardware for speech, object, and face detection and recognition. using a cloud server that is online. The robot receives the speech signal orders that have been converted to text over a Bluetooth network [6]. The audio compression format for speech coding is called Adaptive Multi-Rate (AMR or AMR-NB or GSM-AMR). The AMR speech codec is made up of a multi-rate narrowband speech codec that can encode narrowband signals (200 -3400 Hz) at varying bit rates between 4.75 and 12.2 kbit/s, with toll quality voice starting at 7.4 kbit/s [7]. The goal is to use Arduino to create a robotic car that can be driven using voice commands. The Arduino device serves as the foundation for the project's entire mechanism. The "hand gesture" feature, which is dependent on the radio frequency that is placed on the user's hand, enables it to move wirelessly [8]. When a voice instruction reaches the control unit, the robot should use a camera that is mounted to it to search for the object. The robot rotates 360 degrees by capturing a picture every interval of time, which is then examined. The robot will calculate the distance between the object and itself if it is able to detect it [9] [10]. This study develops a four-wheeled voice assistant robot that can be operated using an Android smartphone. The user's voice commands are transmitted to the robot through the Bluetooth network using an Android mobile phone [11]. The operator must carry out a set of steps in the correct order

in order to give voice control. Additionally, the commands that would be required in the event of interactive action correction are taken into account [12]. The Bluetooth Module (HC-05), which is directly attached to the Arduino Uno R3, is connected to the Android application (AMR-Voice). The robot responds to our commands by performing the requested task. Voice command Robots are quite helpful in places where people can't go. Robots can operate in a variety of conditions, including hazardous environments, engulfed in flames, polluted areas, and even on slopes. For people with physical disabilities, this robot is quite helpful. Due to this robot's modest size, we can utilise it for surveillance or espionage [13]. For the purpose of receiving the voice command, the Bluetooth module HC-05 will be interfaced with Arduino in the vehicle. The specific command for the car will be given using the Android app. A Bluetooth module HC-05 will now receive the commands during the reception phase [14].

## Materials and Methods

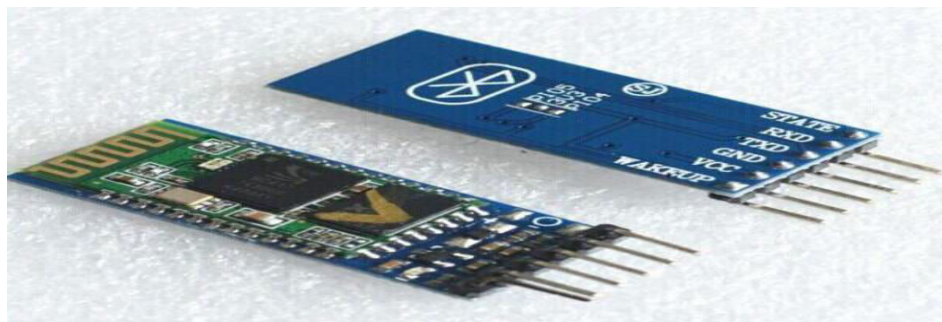
### ATmega 328P

Figure 1 depicts an Arduino board that was created by Arduino.cc and is based on an open source microcontroller chip called the ATmega328p. The board has 14 digital pins and 6 analogue pins, both of which can be coded using the Arduino IDE with a Type B USB connector. External mains-voltage batteries are able to power it.



*Fig1. ATmega328p micro controller  
2.2 HC05 Bluetooth module*

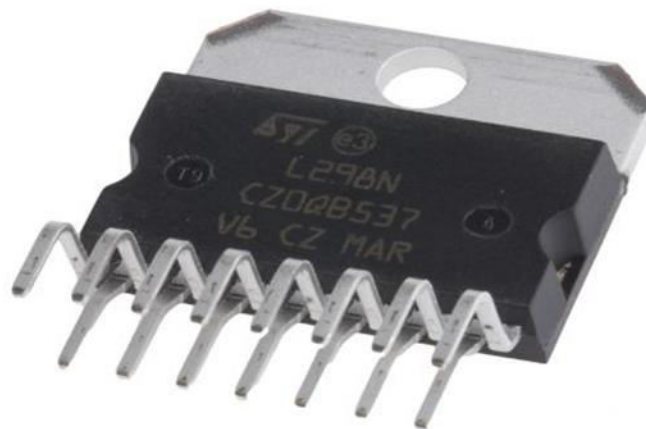
Figure 2 displays the HC05 module is a straightforward Bluetooth serial port protocol module made for setting up wireless serial connections. Its footprint is just 12.7 mm x 27 mm. The full design cycle will be made simpler.



*Fig 2. HC05 Bluetooth module*

### 2.3 MOTOR DRIVER IC L298N

Figure 3 shows the motor driver L298N that has a high voltage and current, two full-bridge driver intended to drive inductive loads such relays, solenoids, DC motors, and stepper motors. It also accepts normal TTL logic levels (Control Logic). To enable or disable the device independently of input signals, there are two enable inputs available. Each bridge's bottom transistors have connected emitters, and an external sensing resistor can be connected to the corresponding external terminal using the appropriate wires.



*Fig 3 MOTOR DRIVER IC L298N*

### 2.4 AMR VOICE

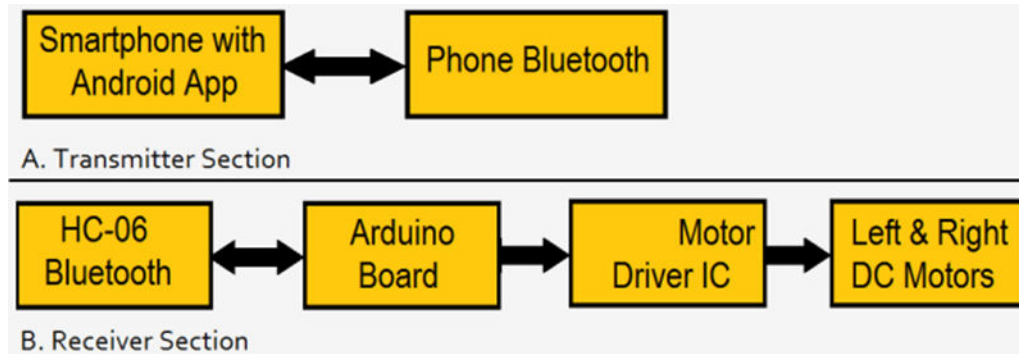
Figure 4 illustrates AMR VOICE is the name of an Android app that was created with the aid of the app. The software offers the capability to access the phone's Bluetooth settings and establish a connection.



*Figure 4. Developed Android app*

## 2.5 Block diagram

Figure 5. shows the block diagram of the voice controlled robot indicating the transmitter and receiver section

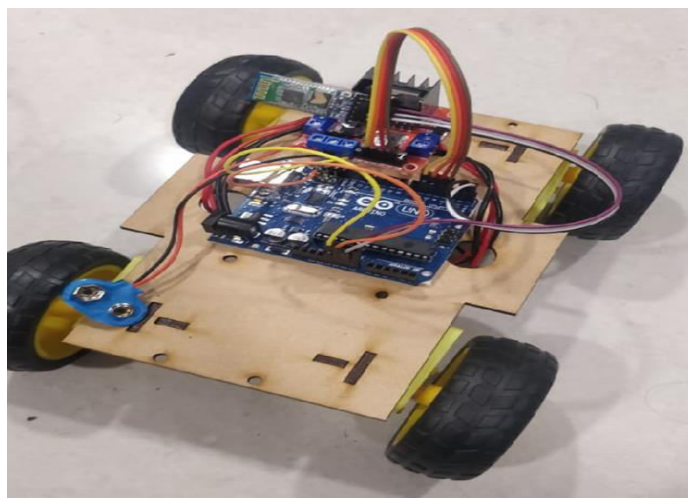


*Figure 5 Shows the block diagram*

## Results and discussion

The microphone on an Android smart phone is used to recognise human voice. This voice is analysed and converted into English language using the algorithms of the Android operating system and artificial intelligence software. The multidisciplinary discipline of computational linguistics known as speech recognition creates approaches and technology that allow computers to recognise and translate spoken language into text. It is often referred to as speech to text, computer voice recognition, or automatic speech recognition (ASR) (STT). It draws on expertise and study from the domains of linguistics, computer science, and electrical engineering.

Speaking from a technological perspective, voice recognition has a long history and has seen a lot of important technological developments. Big data and deep learning advancements in recent years have advanced the industry. In addition to more academic papers being published on the subject, a variety of deep learning approaches have been embraced by the global industry for developing and implementing speech recognition systems.



*Figure 6 shows the assembled image*

The construction image for a miniaturized and handy robot controlled by voice utilising the Arduino software is shown in Figure 6. According to the requirements and specifications, the job was finished. Basic movements can be managed by voice commands. The suggested system is primarily based on robot that can be controlled by voice used for differently abled people and normal people, which enables voice commands to be sent to the robot using an Android application. The project operator's vocal instructions are used to voice-command the robot controlled by voice. These voice commands must be issued using an Android app that has been installed on the user's Android smartphone. An appropriate command is transmitted to the robot car after speech recognition is completed in the android app. These commands are decoded by a microcontroller installed on the vehicle, which then issues the proper command.

## **CONCLUSION**

This paper aims to provide a little present to the unfortunate individuals who are physically challenged. Their daily tasks can be completed extremely effortlessly by just short speech instructions. The Bluetooth's range and the time it takes for voice commands to be transmitted and received are the main difficulties we went through when implementing this project. This project demonstrates its value to the robotics community.

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