

VOICE CONTROLLED PERSONAL ASSISTANT ROBOT

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Abstract: In this paper, a system is proposed that focuses on the concept of how to control a robot with a human voice. Voice-controlled robots are just a practical example of controlling simple robot movements by giving routinely-used voice commands. The system uses his Android app as his medium for sending human commands to the microcontroller. The controller can connect to the Bluetooth module using the UART protocol. Audio is received by Android app and processed by the speech engine. The speech is converted to text. The microcontroller further processes this text and takes appropriate measures to control the robotic movement.

Keywords: Robot, DC Motor, Robotic Arm, Stepper Motor, Gripper, Camera, ARDUINO UNO, ARDUINO IDE,

I. INTRODUCTION

As we all know in today's world, one of the most powerful and rapidly developing devices is a smartphone, and all credit goes to powerful processor chips and their mode of communication. Here in our research also we used one such method for communication i.e., Bluetooth. This technology was created by Ericsson telecom vendor in 1994. Bluetooth provides connectivity between devices for file transferring. It's so powerful that it can connect almost seven other devices at the same time and can transfer data simultaneously. It is best suited for the home environment .

This is the reason why smartphones are becoming so powerful in recent years as it turned smartphones into an all-purpose portable device. Using an android phone as a center for communication between robots and humans is already a very active field of research with several opportunities.

Till now, speech recognition proved to be one of the ideal methods for controlling a robot. The system we designed is also based on the same technology as it is the easiest and very efficient way of giving commands. It's simply a technology where the system has to understand words, not it's meaning, thus reducing the computational time. In our system, speech recognition is separately handled by the android smartphone i.e., it functions independently from the robot's main intelligence.

Speech recognition also allows the user to perform multitasking by letting him/her concentrate on other stuff and giving the command to the machine simultaneously. Furthermore, it's even more robust as anyone can control the robot with their command providing you, even more, convenience to household people. Just giving directions for controlling a robot just by talking to it makes it simpler to operate while improving the efficiency and efficiency of working with that device. There is no limit to the applications where robots can work. Hence, the need to accurately and efficiently controlling the robots is also increasing.

There exist hundreds of methods for controlling robots. This research paper aims to focus on one method out of those hundred i.e., audio channels based closed-loop systems, which is again one of the best and most efficient methods to control the robot as it uses speaking to communicate with the devices.

This system is not similar to any other system in which robots are fed with lots of words that in the future, they can recognize words with themselves. In this paper, built a system which let a simple voice controlled personal assistant robot to move in all four possible directions i.e.; the robot can do the following tasks. It can move forward, backward, turn left and right and can stop at any time.

II. LITERATURE SURVEY

[1] To control a robot we are using our voice we a very simple approach 1st all the human commands gets converted into text and for this we use Google's speech to text converter, it's all implemented in the android app that we are using next the text form of command is being transmitted to the Bluetooth module of the robotic arm. This Bluetooth module acts as a bridge between micro controller of car and android app for data transmission. After the text command is received by micro-controller, it controls the movement of the robotic arm accordingly. As this project was for educational purposes so that students can try this on their own in their studies, so we used a very simple hardware architecture that we used we cost-effective hardware.

[2] In this proposed system, a smart phone is used as the speech recognition device . To do this, we'll use an Android application that uses Google Speech Recognition to recognize human speech and finally convert it to text using the Google Speech to Text API. The converted text acts as code for the microcontroller and the is sent to the microcontroller via Bluetooth and the HC-05 is used for this purpose. The d code from the is transmitted (Tx) from the smartphone and sent to the decoding circuit. Here are the steps to do this: Download the "Arduino Bluetooth Control" app from the Google Play store. Make sure HC-05 is paired with your smart phone, uses password "1234" to pair.

[3] Over the years, people have invested in new technologies that have evolved to reduce human effort and save lives. People with disabilities and the elderly may have difficulty handling objects and need a helper. Therefore, if a robot assistant that can be operated with voice commands is developed. You should be able to run safe tasks. Desired task should be accomplished given some constraints. There are types of robots used in industry for easy and fast work. Can be human controlled or automated. In recent years, the demand for artificial intelligence and automation in the service field has increased due to the earthquake disaster, the silver society, and labor shortages. His robotics with detectors, mechanisms and process intelligence have so far progressed in parallel with CPU development.

[4] Pick and place robotic arms are widely used in industry. Example on the production line. Helps you select components and place them where you want them. Here, in this work, a mobile robot that can pick up and place objects by voice command is developed for a wheelchair bound person. people can pick up objects and place them where they want with the help of this fully automated mobile robot This mobile robot can reach into a small closet to pick up an object The robot is fully controlled by human voice commands such as: B. Left, right, straight, and many others to indicate the direction the robot should navigate. Therefore, 4,444 of these robots help a disabled person to carry out her 4,444 daily activities without much difficulty.

[5] Voice control of home assistant robots is developed in of this publication. Voice commands are processed in real time using an offline server. Voice commands are sent directly to the server through the wired network. Personal Assistance Robot is developed on microcontroller based platform and can detect his current position. A performance evaluation is performed on his promising results from the first experiment. Potential improvements of are also discussed for potential applications in homes, hospitals, automotive systems, and industry. The effect of the distance between mouth and the microphone, the robot's performance, and the effect of sound on speech-to-text conversion are some of the areas that can be further investigated. Voice commands are processed using a cloud server that operates independently of the speaker's accent, so the speaker's accent does not affect the robot's behavior

III. METHODOLOGY

In this application, the smartphone is used as a speech recognition device. For this, we will use an Android application that will recognize human speech using, Google Speech Recognition and finally convert it to text using the Google Speech to Text API. The variable will be the number of the microcontroller and will be sent to it via bluetooth, for example HC-05 for this use. The HC05 will act as a Receiver (Rx) which will receive the code from the smartphone and send it (Tx) to the decision circuit. Here are the steps to do it: Download "Arduino Bluetooth Control" from Google Play Store. Make sure the HC-05 is paired with your smartphone and use the password "1234" to pair. Then select HC-05 in application search. Now click on voice command Say "Forward" to make car go forward. Say "Back" to make the robot move backwards. Saying "Left" tells to turn the car to the left Saying "Right" tells to turn the car to the right. Say "stop" to stop the bot.

Disconnect Bluetooth after use. to your smartphone & to make it paired use password "1234". Then chose the HC-05 option in the app searching list. Now click on the voice command. Articulate "Forward" to make the car move in the forward direction. Speak "Backward" to make the robot move backward. Speak "Left" to turn the car towards left Articulate "Right" to let the car turn in the right direction. Say "stop" to stop the robot. Disconnect the Bluetooth connection after use.

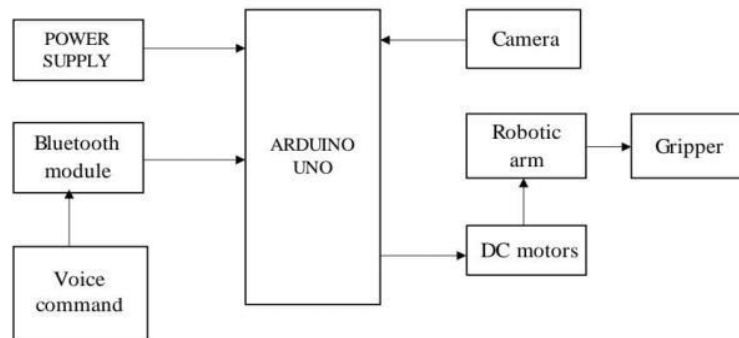


Fig 1. Block Diagram

We use a very simple method to control the robot using our voice. All human commands are converted to text, for this we use text changes using google speaker, after that all we use is the text of the command. sent to the bluetooth module of the robot in the android application. This bluetooth module acts as a bridge between microcontroller and application for data transfer. After receiving the command, the microcontroller controls the movement of the robotic arm accordingly. Since our project is geared towards learning so that students can try on their own while learning, we used very simple hardware and efficient tools.

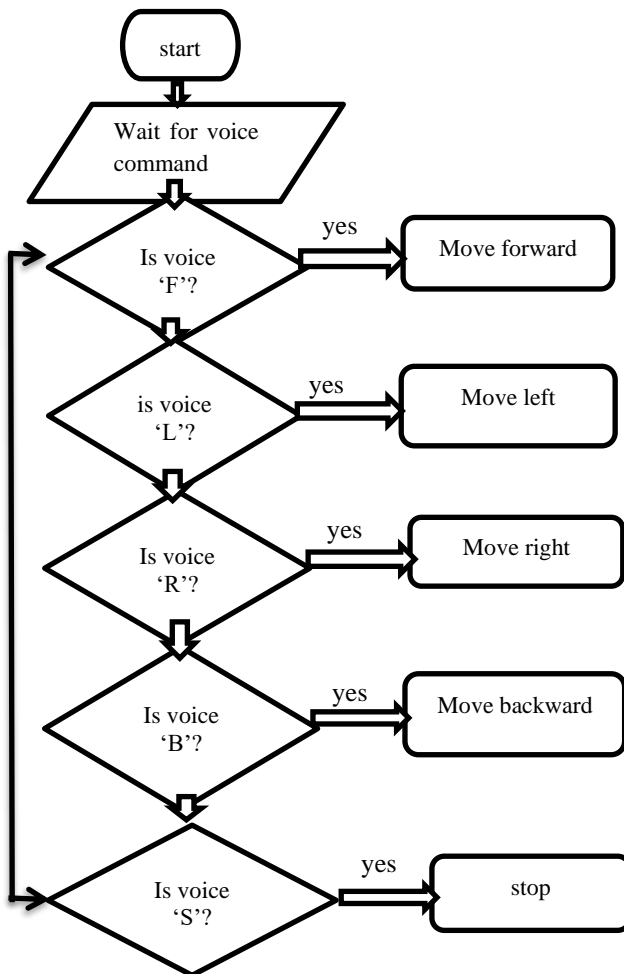


Fig 2. Flow chart

IV. HARDWARE COMPONENTS**A. ARDUINO UNO (ATMEGA328P)**

ARDUINO UNO is an ATmega328P based microcontroller with 14-pin digital output. ARDUINO UNO has 6 analog inputs, 16 MHZ quartz crystal, USB connection and power input. ARDUINO BOARD has a RESET button to reset the program from the graphic row. It also clears and restarts memory that prevents existing sketches from running. It's like a hug. ARDUINO has everything it needs to support a microcontroller, it just needs to be connected to a computer. ARDUINO is called the heart of the project as it does everything that needs to be done, from collecting fingerprints to scanning and reading keystrokes and displaying them on the LCD. The motherboard also has 1KB memory for EEPROM to save current data, and data saved after power failure is stored in 1000KB EEPROM memory.



Fig 3. ARDUINO UNO

B. ROBOTIC ARM

A robotic arm is a general purpose arm that functions similarly to a human arm; Arms can be part of many machines or complex robots. It is recommended that the connections between these devices allow rotation (as in robot speech) or translational (linear) displacement. The connections between the components can be thought of as forming a kinematic chain. The end of the kinematic chain of the robotic arm is called the end effector, which resembles a human hand. However, the use of the word "manipulator" as a synonym for a robot arm is generally prohibited.



Fig 4. ROBOTIC ARM

C. DC MOTOR

DC motor is a type of DC motor. In an electronic device, the process relies on simple electronic devices. Figure 5 shows the DC motor conductor and the strength of the external magnetic field. It is a device that converts electrical energy into electricity. It works by putting a current conductor in a magnetic field, a force that causes it to return to its original position. A simple DC motor consists of a field winding that provides magnetic flux and an armature that acts as a conductor.



Fig 5.DC MOTOR

D.GRIPPER

A handle, sometimes called a grip, is often used to measure and strengthen the hand; This particular grip is called a gripper, which means that the main point of action is four fingers, not the thumb. There are differences between brands, but standard grippers have two levers that use torsion springs. The length and material of the products differ from the material from which they are made; springs are made of different types of metal and handles are usually made of wood, plastic, iron or aluminum.



Fig 6. GRIPPER

E. BLUETOOTH MODULE

The Bluetooth module is a device used to establish a connection, which can help two devices establish a wireless Bluetooth low power connection and establish a protocol for data communication between devices. The data communication between the Bluetooth low energy module is usually tens of meters of the medium, and the data is transmitted in the frequency range. Bluetooth modules come in many brands, types, models and classifications. The variety of applications for Bluetooth modules makes it one of the most accepted communication methods for the Internet of Things (IoT).

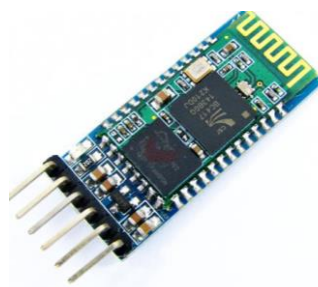


Fig 7. Bluetooth module

F.CAMERA

Camera is an optical device that captures images. Most cameras can capture 2D images, while some higher models can capture 3D images. At a basic level, cameras usually have a sealed box (camera body) and a small hole (aperture) that lets light through and captures an image of the photosensitive surface (usually the sensor or image sensor). It has several mechanisms to control how light falls onto the photosensitive surface, including lenses that focus light and louvers that determine how long the photosensitive area is exposed to light.

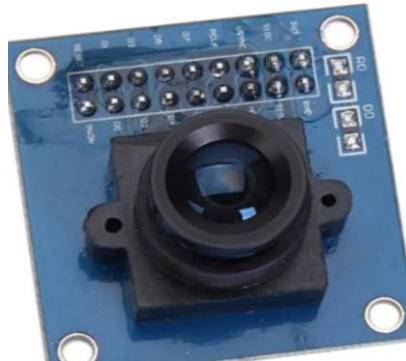


Fig 8.Camera

V. RESULTS

Robot can move forward, backward, left and right, and stop. Arduino voice activated robot car connected to Bluetooth module HC-05 or HC-06. We can give specific instructions to the robot through the Android application installed on the mobile phone. It will be able to pick and place the objects according to the commands given by the user.

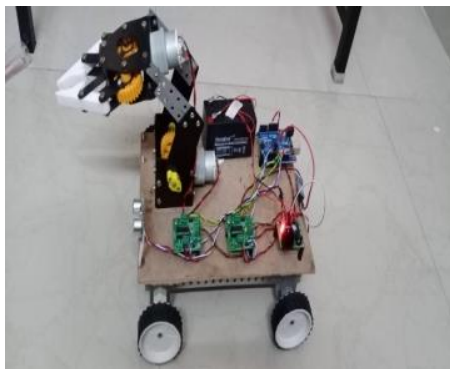


Fig 9.1.side view of project



Fig 9.2.Top view of project

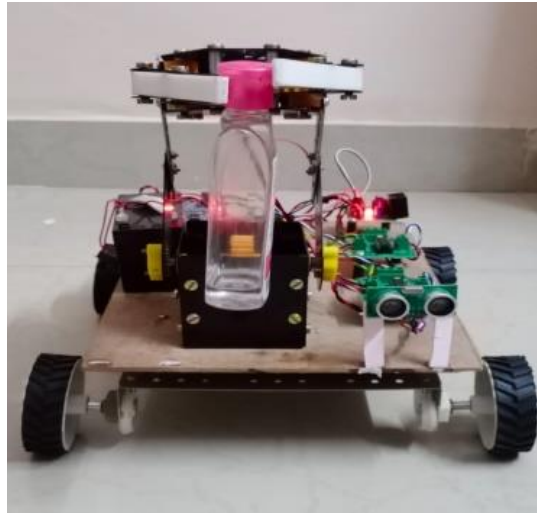


Fig 9.3 Picking up the object



Fig 9.4 Placing the object

VI. CONCLUSION

The voice-activated robot is perfect for caring for and helping people with disabilities. It is easy to use as it uses simple commands. It works where people can't. These robots are tiny. These robots can be used to spy on people.

VII. FUTURE SCOPE

In the future, improvements may be added to make the project more efficient. These products have many uses, including military, home security, rescue, commercial and medical applications. Using the resources provided, we were able to create a simple prototype of a voice-controlled robot. These robots benefit people's lives as this project is easy to use.

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