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VOICE ACTIVATED ROBOT

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ABSTRACT

Using a Bluetooth module, this project offers a "Voice Activated Robot" that can be controlled by a user's smartphone through orders. With its wireless control capability, users can use voice commands to manipulate the robot's movements and moments. A micro controller in this system receives commands from a human user through an Arduino Bluetooth. Interfaces between the Bluetooth module and controller are possible. A collection of control data is generated in order to carry out tasks following the analysis of the voice commands. The Arduino Bluetooth receives the speech, and the voice module processes it. Then text is created from voice. The micro controller receives the commands, processes them, and then moves the robot in various directions while determining what steps to take to control it.The principal aim is to create a voice-activated robot that can be directed by a human voice and can move forward, backward, and turn left or right. The Arduino IDE is used for the software component.

Key Words: Android, battery, Micro controller, Bluetooth, Wireless Robot, Voice Module, DC Motor

INTRODUCTION :

Any robotic system's main attraction is its ability to save time and money through the reduction of human labor. Natural language processing is a new technology that allows us to control objects with our voices. Basically, the robot responds to spoken orders from humans. Voice commands can be directly supplied by the user to the voice-activated robot through an interface, or even through individual application buttons. The robot is propelled by four DC servo motors that are linked to a microprocessor located on the receiving end. This robot can be stated to be wireless. The smartphone with the installed Android app functions as a transmitter. The Android application provides the commands. Using a Bluetooth link, the Arduino can be identified by the Arduino Bluetooth program. The Arduino connects to the Bluetooth module (HC-05). Because it is programmed, establishing a Bluetooth link between the Arduino Bluetooth Android application and the HC-05 Bluetooth module is easy. The user gives commands to the Arduino Bluetooth device. The basic idea behind this model is an Android smartphone interacting via Bluetooth with the robot to make our work easier and more relevant. Every robotics technology has advantages and disadvantages of its own. However, voice-activated systems based on Bluetooth have the advantage. It is possible to extend the range of device connectivity from 10 to 100 meters. Additionally, Bluetooth operates on the 2.4GHz band. For Bluetooth services, a maximum speed of 2.8 Mbps can be obtained. As a result, these benefits set the path for rapid improvements in Bluetooth-based voice recognition technologies.

LITERATURESURVEY:

Up to 19% of global investment went toward industrial robots in 2003. Orders for robots increased by 18% in the first half of 2004, the highest percentage ever recorded. Global growth is expected to have averaged 7% yearly increase between 2004 and 2007. according to a 2004 World Robotics survey, there are currently over 800,000 household robots in operation and several millions in the coming years. Robotic speech modes are being defined by K. Kannan and Dr. J Selvakumar. Speaking normally occurs in three modes: 1) Isolated word mode, 2) Connected word mode 3. The method of continuous discourse.

Prof. Bhuvaneshwari Jolad and Mohnish Arora explain how to identify a robot's speech. Authors Chetna Bhatia and Rohan Ganu described robot communication.The current system, which mostly uses Wi-Fi as a communication channel between hardware and software components. Wi-Fi's primary disadvantage was its limited range, which meant that users had to be within it. Next, an automation running on Android was created. Wi-Fi was replaced with the internet, and its drawback was that the internet was not always available. A robotic management strategy with embedded intelligence was created. Its foundation was the Ethernet network's utilization. Additionally, the system had GSM support to address the issue of network unreliability. That was the only drawback because it was expensive.A few researchers developed systems based on Bluetooth, which we came to the conclusion was a suggested system. In {Voice Based Robot Control}, International Conference on Information Acquisition,543-547,2005, X. Liu, A. D. C. Chan, R. Chen, K. Wang, and Y. Zhu are mentioned. The paper titled "Arduino based voice-controlled robot" was presented at the 2019 IEEE International Conference on Computing Communication and Intelligent Systems (ICCCIS) by Aditya Chaudhry, Manas Batra, Prakhar Gupta, Sahil Lamba, and Suyash Gupta. The paper "A Bluetooth Based Sophisticated Home Automation System Using Smartphone" was presented at the IEEE International Conference on Intelligent Control Power and Instrumentation (ICICPI) in 2016 by Sukhen Das, Sanjoy Ganguly, Souvik Ghosh, Rishiraj Sarker, and Debaparna Sengupta. Voice-Activated Robot with Bluetooth and Arduino, Published in 2023 Third International Conference on Intelligent Data Systems (ICSMDI), Conference dates: March 30-31, 2023; Date of Addition to IEEE Xplore: May 26, 2023; DOI: 10.1109/ICSMDI57622.2023.00103; IEEE Publisher. Therefore, Bluetooth-based robots are useful for researchers, educators, and hobbyists alike since they provide a practical, dependable, and affordable alternative for wireless robot control. Bluetooth modules are a cost-effective option for giving robots wireless control because they are widely available and cost-effective. By providing secure connection protocols, Bluetooth makes sure that the robot's control signals stay protected from outside interference and unauthorized access.

EXISTING SYSTEM :

Voice-activated robots have gained a lot of popularity in recent years, and there are already a few systems in use, including the one used in this project. One such is Alexa, a voice-activated virtual assistant from Amazon that can do a number of things, including playing music, responding to queries, and managing smart home appliances. Another illustration is Google Assistant, which can be found on smartphones and other gadgets like Google Home. Advanced speech recognition technology is used by these systems to understand and process voice commands. For the purpose of interpreting spoken words and delivering pertinent responses or actions, they depend on cloud-based servers. Similar virtual assistants or voice-activated robots have been produced by various different organizations and developers. Currently in operation, the system communicates between software and hardware components mostly through Wi-Fi. The primary limitation of Wi-Fi range is that the user needs to be within its range. The next step was to design an automation using Android. Instead of using Wi-Fi, it used the internet, and its drawback was that the internet was unavailable. A smart robotic management scheme that is embedded was developed. Its foundation was the utilization of an Ethernet network. In order to solve the issue of network unavailability, the system additionally included GSM functionality. So, the only drawback was that it was expensive.

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PROPOSED SYSTEM :

In this model, an Android smartphone application was used to control the Arduino micro controller and design the voice-activated robot. The human voice is the primary focus here because it is the way we most naturally and regularly convey our thoughts to others. Through application, these human words are transformed into signals, which the robot uses to carry out tasks. First, we have installed the Bluetooth module's required libraries and installed the Arduino IDE. To control the motors, connect the Arduino board to the motor driver and Bluetooth module, respectively.Put the wheels, motors, and chassis of the robot together. Create an Arduino code that will listen for voice commands and use that information to drive the motors. Give the robot voice commands from your mobile device or laptop to test it out.
Therefore, in response to commands, the suggested system moves forward, backward, left, and right. It also serves as a welcoming robot at event

HARDWARE COMPONENTS

ARDUINO UNO: The popular open-source electronics platform Arduino has completely changed how people use and produce technology. This micro controller, which has several digital and analog input/output pins, is based on the ATmega328P. The Arduino Integrated Development Environment (IDE), which is built on, allows users to program the Arduino UNO.This is C and C++ based. In order to control different sensors, actuators, and other electronic components, users can create and upload code to the board.

FIG 1: ARDUINO UNO

- **BLUETOOTH MODULE:**Bluetooth is a great way to wirelessly transfer small amounts of data over short distances (less than 100 meters) in the field of embedded devices. It can be utilized for smartphone-based project management or real-time data logging. The HC-05 is one of the most popular and reasonably priced Bluetooth module. The HC-05 has several pins and indicators, which make it easier to manage various operations and see the condition of them through the indicators. To connect to the Arduino, we will need to use four of these pins. The GND, RX, TX, and VCC pins are a few of these.

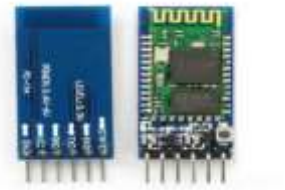

FIG 2: HC-05 BLUETOOTH MODULE

- **L298D MOTOR DRIVER:** The L298 is an integrated large circuit packaged in a 15-lead Multi watt and PowerSO20 configuration. Designed to meet conventional TTL (Transistor–Transistor Logic) levels, this high voltage, high current double full-bridge driver can operate inductive loads such relays, solenoids, DC, and stepping motors. To turn on or off the device without depending on input signals, there are two enable inputs available.

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FIG 3: L298D MOTOR DRIVER

- **SOUND MODULE:** An essential part of a voice-activated robot is the sound module, which receives, processes, and interprets audio signals to carry out the appropriate tasks. To improve accuracy of voice command detection in the presence of background noise, these modules might have capabilities like noise cancellation. Incoming audio signals are captured and analyzed by the sound module, which usually consists of a signal processing circuit and an array of microphones.

FIG 4: SOUND MODULE

- **WHEELS:** These are basic devices made of a hard, circular block of material that is axially placed around a wheel such that when torque or gravity gives a moment, the wheel revolves around it. Huge loads can be conveyed when the wheel is positioned with a load-bearing platform and rotates on the horizontal axis.

- **BATTERY:** Usually, robots compete utilize 12V 1.3Ah Rechargeable Lead Acid Batteries. These batteries enable wired or wireless robots to operate at a fast speed for extended periods of time. Rechargeable Sealed Lead Acid (SLA) batteries are the most widely used general purpose batteries. The benefits of SLA are low cost, robust and require minimal maintenance. As long as it gives your SLA battery the right voltage, any normal DC power supply will work to charge it.

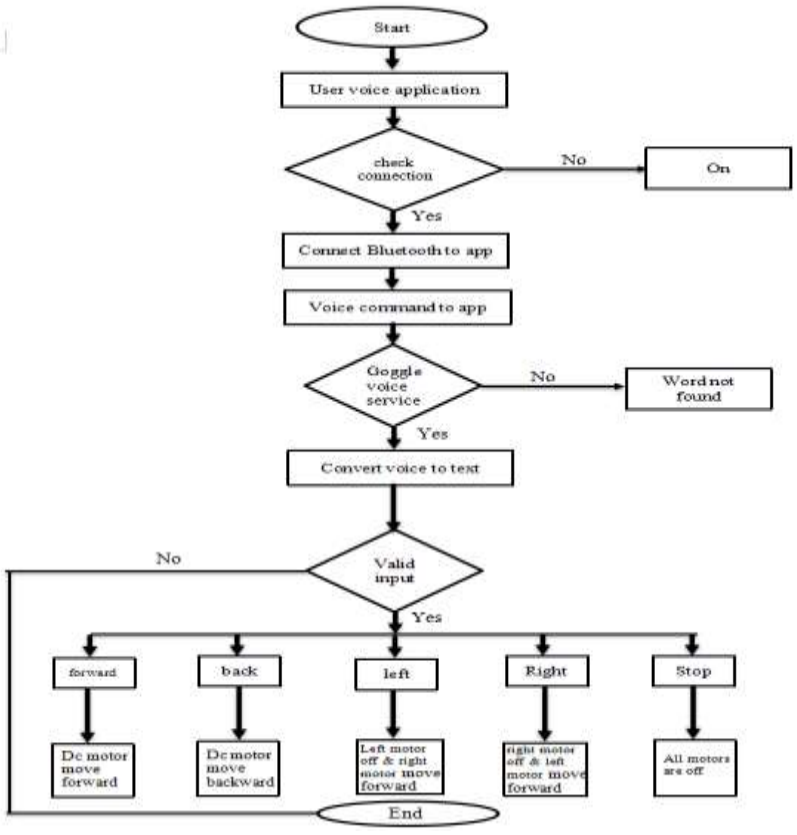
FIG 6: BATTERY

- **DC SERVO MOTOR:** A motor utilized in servo systems is referred to as a servo motor, according to the DC definition. The feedback signal (position, velocity, acceleration, etc.) powers the motor in a servo system, which is a closed-loop system. Accurate location or velocity is obtained by using this signal as an error and translating it according to the controller. To match power, the motors are

connected to a load or output shaft via a gear train. As servo motors translate electrical signals into angular velocity or position, they function as mechanical transducers.

FIG 7: DC SERVO MOTOR

FLOWCHART:



HARDWARE SETUP & RESULTS:

With a Bluetooth module and Arduino, a voice-activated robot can be controlled easily with voice commands. Wireless connectivity enables remote control and interaction with the robot from a distance. Customized voice commands and the integration of extra features expand the robot's possibility of movement in all four directions.

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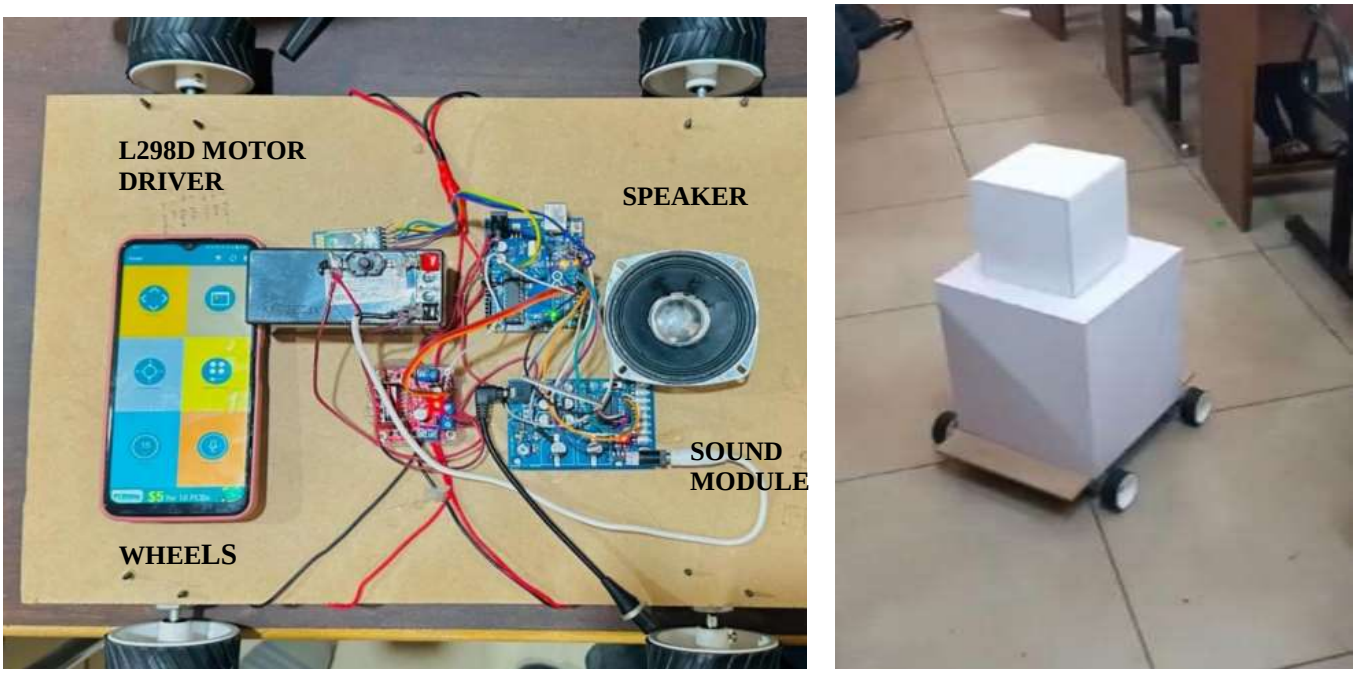

FIG: EXPERIMENTAL SETUP

1. VOICE COMMANDS:

Movement	Commands
Forward	Commandprocessed,movingforward
Backward	Commandprocessed,movingbackward
Left	Commandprocessed,executingleftturn
Right	Commandprocessed,executingrightturn
Stop	Missioncompleted,thankyouhaveaniceday

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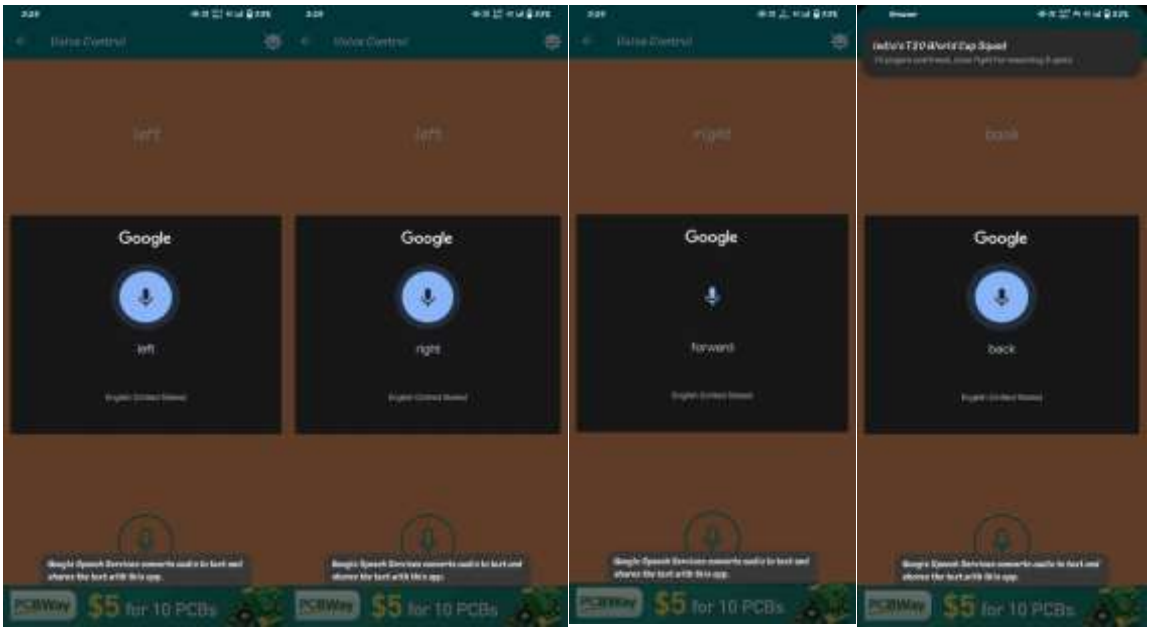

LEFT **RIGHT** **FORWARD** **BACK**

FIG: VOICE--TEXT COMMANDS

CONCLUSION:

In this paper, the design and analysis results of the The project that uses voice control is programmable. This project used an Android application and human voice command. The Android smart phone's microphone is used to identify human voice. Using the algorithms and software of the Android operating system, this voice is studied and translated into English words. Using an Arduino Bluetooth voice control, a Bluetooth application is used for voice recognition. This application uses a Bluetooth device to send the voice message input as text. The project has positive effects on human life. The voice control robot is helpful for individuals with disabilities, for surveillance purposes, and even for administrative events at institutions. It is simple to use because it operates via voice command. It is helpful in user-friendly places that are inaccessible to humans. Voice activated robots are designed to carry out necessary tasks by listening to user orders

REFERENCES:

1. Voice Based Robot Control, International Conference on Information Acquisition, 543-547, 2005; X. Liu, A. D. C. Chan, R. Chen, K. Wang, Y. Zhu.
2. "Arduino based voice-controlled robot", Proceedings of the IEEE International Conference on Computing Communication and Intelligent Systems (ICCCIS), 2019, Aditya Chaudhry, Manas Batra, Prakhar Gupta, Sahil Lamba, and Suyash Gupta.
3. "A Bluetooth Based Sophisticated Home Automation System Using Smartphone", Proceedings of the IEEE International Conference on Intelligent Control Power and Instrumentation (ICICPI), 2016, Suchen Das, Sanjoy Ganguly, Souvik Ghosh, Rishiraj Sarker, and Debaparna Sengupta.
4. A Robot with Voice Control Utilizing Arduino and Bluetooth Printed in 2023 Third International Conference on Intelligent Data Systems (ICSMDI),30–31 March 2023; 26 May 2023; Date Added to IEEE Xplore; DOI: 10.1109/ICSMDI57622.2023.00103; IEEE Publisher.