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Voice Controlled Robot

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Abstract: Advancements in robotics and artificial intelligence have paved the way for more intuitive human-machine interfaces, with voice control emerging as a promising modality. This paper presents the design, development, and implementation of a voice-controlled robot, aimed at enhancing user experience and interaction with robotic systems. The proposed system integrates state-of-the-art speech recognition technology with robust hardware components to enable seamless communication between users and the robot.

1. Introduction

In recent years, the field of robotics has witnessed remarkable advancements aimed at enhancing human-machine interaction. Among various emerging technologies, voice control has emerged as a promising modality, offering intuitive and hands-free communication with robots. Imagine commanding a robot simply by speaking to it, just like interacting with another person. This concept has sparked considerable interest and research efforts, leading to the development of voice-controlled robots that can understand and respond to human speech commands.

The introduction of voice control adds a new dimension to robotics, enabling seamless communication and interaction between humans and machines. It eliminates the need for complex interfaces or manual control mechanisms, making interactions with robots more natural and accessible to a wider range of users. Whether it's navigating a room, performing household chores, or assisting in industrial settings, voice-controlled robots have the potential to revolutionize various applications and improve overall user experience.

2. Existing Methodology

Voice-controlled robots use technology to understand and respond to spoken commands. They typically include speech recognition to understand what users say, natural language understanding to interpret the meaning of those commands, and a control interface to translate them into actions the robot can perform. These robots often connect to the internet for additional resources and integrate with hardware components like motors and sensors. They provide feedback to users to confirm understanding and may incorporate privacy and security measures to protect user data. Robust error handling ensures smooth operation even in challenging environments.

3. Proposed Methodology

A proposed system for a voice-controlled robot could involve several components working together seamlessly. Firstly, the system would feature robust speech recognition capabilities to accurately interpret user commands. This would be followed by a natural language understanding module to derive the intent behind the commands and map them to specific actions for the robot. The robot's control interface would then execute these actions, integrating with its hardware components such as motors, sensors, and cameras. Additionally, the system would leverage internet connectivity for accessing cloud-based services to enhance speech recognition accuracy and provide additional
functionality

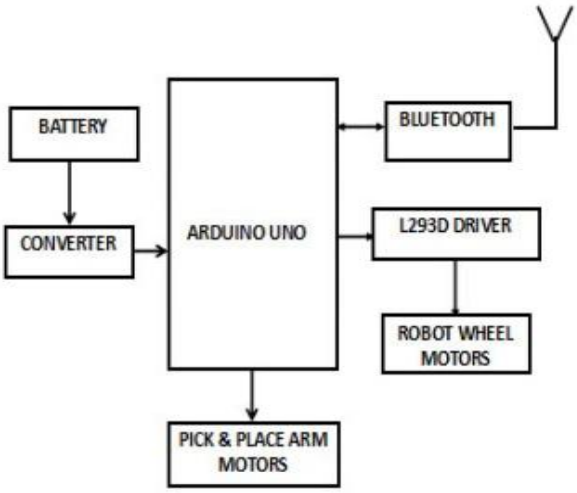

Figure 1: Block diagram of proposed ideology

The main controlling unit of this system is Arduino UNO. It is powered by using the battery. The Arduino can be functioned by using ESP32, a blutooth module which acts as a switch that can be controlled by a remote device. The DC motors are connected to the Arduino by a relay switches used for the movement of the system. Here we use the gear motors for the forward and backward rotation of the wheels. The L298 driver is a high voltage high current dual bridge driver designed to accept standard TTL logic levels and drive inductive loads.A wheel is circular block of durable and hard material which is placed in axil about which the wheel rotates when a moment is applied by the torque or gravity.Spur gears are the simplest type of gears. They consist of flat, disc-like shapes with teeth cut around their circumference.A **lithium-ion battery** (Li-ion battery) is a type of **rechargeable battery** that uses the reversible intercalation of **Li+ ions** into electronically conducting solids to store energy.A pick and place arm, commonly found in industrial automation settings, is a robotic manipulator designed for the precise handling of objects.A servo motor is a type of motor commonly used in automation and control systems to precisely control the position, speed, and acceleration of a mechanism.

4. Schematic structure of voice controlled robot

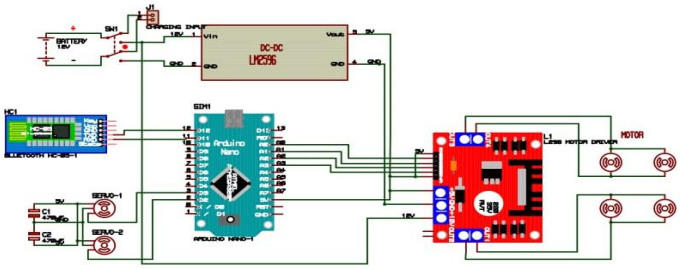

Figure 2: Circuit diagramvoice-controlled robot

At first the user must connect their android device to Bluetooth using the login credentials given. On authentication the user will be connected to the system. After the connection user has to open the application which will be preinstalled in the android phone. The ESP32 is a low-cost System on Chip (SOC) Micro controller developed by ESPRESSIF Systems. It serves as a successor to the popular ESP8266 SOC.Now the user has an option for voice command in which the user gives their command in the form of audio.The user needs to turn on the Bluetooth in the mobile. The wireless communication techniques used to control the robot is Bluetooth technology. User can use various commands like forward, backward, move left, right, stop, start using these commands which are sent from the android mobile. Robot has Bluetooth receiver unit which receives the commands and give it to the microcontroller circuit to control motors. The microcontroller then transmits the signal to the motor driver IC to operate the motors.Spur gears are the simplest type of gears. They consist of flat, disc-like shapes with teeth cut around their circumference.A **lithium-ion battery** (Li-ion battery) is a type of **rechargeable battery** that uses the reversible intercalation of **Li+ ions** into electronically conducting solids to store energy.A pick and place arm, commonly found in industrial automation settings, is a robotic manipulator designed for the precise handling of objects.A servo motor is a type of motor commonly used in automation and control systems to precisely control the position, speed, and acceleration of a mechanism.They are commonly used in applications

where precise control of position, speed, and torque is essential.

5. CONCLUSION

The voice-controlled pick and place robot offers a groundbreaking solution for streamlining industrial processes through intuitive human-machine interaction. By harnessing voice commands for control, this innovative robot enhances efficiency, reduces manual labor, and exemplifies the transformative potential of advanced automation technologies in modern manufacturing environments. Its integration signifies a pivotal step towards realizing smart, adaptive production systems that prioritize precision, speed, and adaptability.

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