

VOICE CONTROLLED ROBOTIC CAR

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Abstract

Voice controlled robotic system is very beneficial in areas where there is high risk for humans to enter. Voice controlled robotic system is controlled through voice commands received via android device. The integration of control unit with Bluetooth device is achieved using a Bluetooth module to capture and read the voice commands. The robotic vehicle operates as per the command received via android device, for this Arduino is integrated in the system. The controlling device may be any smart phone having an Android OS. The transmitter uses an android application required for transmitting the data. The receiver end reads these commands and interprets them into controlling the robotic vehicle. The android device sends commands to move the vehicle in forward, backward, right and left directions. After receiving the commands, Arduino operates the motors in order to move the vehicle in four directions. The communication between android device and receiver is sent as serial communication data. Arduino program is designed to move the motor through a motor driver circuit as per the commands sent by android device. The wireless camera is interfaced with Arduino to record forward movement of the robotic system which also includes wireless night vision camera which will not only allow viewing whatever will be recorded in day time but also during night. A robotic arm is mounted at the front of the system to make changes in the environment along with a lcd screen to view the received commands. An obstacle detector is added to protect the system from obstacles on the way by using an ultrasonic sensor.

Key word: Robotic assistants, operations, wakeup/shutdown, USB cable, personal assistant and industries, systems, Performance

Introduction

Robotics is an evolving technology. There are Various approaches to build robots, and no one is sure which method or technology will be used 100 years from now. Robotics is evolving like the Darwinian evolutionary theory of survival of the fittest. The framework equipment comprises of a controller outfitted with Bluetooth communication module. It'll be connected to the motors and other alternative components of car. When the Bluetooth app is turned on and is connected with the current system via Bluetooth, one will operate the car by giving wireless commands from the app using the functions already programmed in the app. The vehicle will motion in four directions: Forward, Backward, Right and Left. In forward movement, all four motors will motion in the same direction and for backward motion; movement of the motors will be in opposite direction. For left and right movements, either of the motors will rotate and to stop the motors will stop. Instructions are given to the motors through the Bluetooth app of Android Smartphone by the user. This paper describes Voice activation speaker recognition to regulate the Bioloid GP automaton by MFCC and DTW

strategies is enforced well in automaton robots. The first step in the speech recognition process is feature extraction. In this paper, Mel Frequency Cepstrum Coefficient (MFCC) on the characteristic extraction process and Dynamic Time Warping (DTW) used have a feature matching technique. It is to develop a robotic vehicle using Arduino and to controls the vehicle with the help of voice based information. The whole mechanism of the project is based upon the device namely Arduino. The feature of “hand gesture” helps it to move wirelessly depending upon the Radio Frequency, which is placed upon the hand of the user [8]. The voice command was given to the Android smartphone that converts speech to text and it communicates with the control unit through Bluetooth. When voice command reaches the control unit the robot should look for the object using a camera attached to it. The robot will rotate 360degree by taking a snap at each interval of time and the snap is analysed. If the object is detected by the robot then it will calculate the distance between the object and robot .The four-wheeled voice assistant robot that is controlled by an android mobile phone is developed in this paper. The Voice Commands given by the user through the android mobile phone is transferred to the robot by Bluetooth network.

Objectives of the study

The main motive to build a VCRV is to analyse the human voice and act according to the programmed commands. The most basic commands are backward, forward, and right, left and also stop the robot. The vehicle is to be controlled wirelessly with the use of android smartphone; our intention is to make a robotic vehicle with use of advanced smartphone technology in a very simple and economic way. In current scenario vehicles are manually controlled and all are done by the person who is driving the vehicle. Every action like start and stop, applying brake, gear transmission, acceleration requires human effort. But nowadays new technologies have been developed that can be integrated with the conventional vehicles to new vehicle form. In the technology era, the space between the physical and the digital world is brought closer by the introduction of gesture concept. For all dangerous tasks, we prefer technology rather than people. Even though these robots are being controlled manually in the early stages, these can now be controlled via voice and gestures. This technology of gesture and voice recognition can be defined by the interaction between the computer and the body language of human beings. This constructs the communication link between technology and mankind. The target of this work is to upgrade the complete security to the robot and to simplify the controlling mechanism. The voice directions are handled, utilizing an advanced mobile phone. The individual human right hand robot is created on a smaller scale controller based stage and can know about its present area. The viability of the voice control conveyed over a separation is estimated through numerous examinations. Execution assessment is completed with consequences of the underlying investigations. The developments to be forecasted are possibly referring to the applications in ventures, medical clinics and how, including the environmental laboratories .Providing human labor is the biggest problem all over the world. With the help of this device, they can move in a car on their own by just giving voice commands through Bluetooth. If any obstacle is detected while moving it informs the user and stops. It also detects if any fire and smoke occur due to emergency, detects and informs the prescribed number to get the required help. A prototype is developed by incorporating all the features in a single module.

Review of Literature

In 2003, Worldwide speculation in modern robots up 19%. In 2004, orders for robots were up another 18% to the highest level ever recorded. Overall development in the period 2004-2007 conjecture at a normal yearly pace of about 7%. More than 600,000 family unit robots being used several millions in the next few years. Various researches have been made by different researchers in developing this project. Be that as it may, they serve an alternate application and have various innovations actualized. Some of those papers are mentioned below stating their technology and application. Robot Control Design Using Android Smartphone Authors: Mrumal K Pathak, Javed Khan, Aarushi Koul, Reshma Kalane Raunak Varshney The motivation behind this paper is to furnish amazing computational android stages with less difficult robot equipment design. This paper depicts how to control a robot utilizing portable through Bluetooth communication, a few highlights about Bluetooth innovation, segments of the versatile and robot. It present an audit of robots constrained by smart phone by means of moving the robot upward, reverse, left and right side by the android application, for example, Arduino, Bluetooth Smart Phone Controlled Robot Using ATMEGA328 Microcontroller. Authors: Aniket R. Yeole, Sapana M. Bramhankar, Monali D. Wani, Mukesh P. Mahajan. In this paper have structured a robot that can be controlled using an application running on an android smartphone. It sends control order by means of Bluetooth which has certain highlights like controlling the speed of the engine, detecting and sharing the data with telephone about the bearing and separation of the robot from the closest hindrance.

Research Methodology

- When the app is running in the smartphone, user's voice commands are detected by the microphone present in the phone.
- Commands are processed, and speech-to-text conversion is done within the app using Google's speech-recognition technology. Text is then sent to the receiver side (that is, robotic car) via Bluetooth.
- Text received via Bluetooth is forwarded to Arduino Uno board using UART serial communication protocol. Arduino program voice_ctrl.ino checks the text received and, if it is a matching string, Arduino controls the movements of the robot accordingly.

Block Diagram

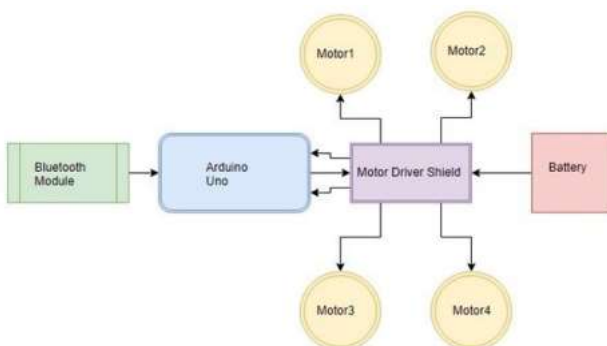


Fig -1: Block Diagram

The Arduino Wireless Voice Controlled Robot comprises of a transmitter and a beneficiary segment. The transmitter end comprises of Smartphone Bluetooth and the Android application introduced on it. Thus, the Receiver area has Arduino board as a processor, HC-05 Bluetooth Module as a remote

communication module, L293D for driving engines, and a couple of DC designed as a section for moving robot.

Result and Discussion

The block diagram of the simple voice controlled robotic vehicle is given it consists of the smartphone that recognizes the voice commands and are being wirelessly transferred to the Bluetooth module HC05. The module at that point changes over the order to content and the series of characters are sent to the Arduino for additional handling. The Arduino microcontroller decodes the string got and correspondingly performs further capacities. The signals are sent to the motor that hence powers and drives the motors connected to it. On the Transmitter area, commands are given to the Mobile Application through the mic. This portable handset is associated with the moving vehicle by means of Bluetooth module. The surveillance is carried on using a wireless camera with night vision mounted on a servo motor to view 180o . A robotic arm is mounted at the front of the system to make changes in the environment along with an lcd screen to view the received commands. The motor driver circuit is used to control the speed of robotic system. An obstacle detector is added to protect the system from obstacles on the way by using an ultrasonic sensor. The whole circuitry is powered using a 12V rechargeable battery mounted on the system. The portable application utilized, is modified so that the voice orders given to the handset are received by the mic and these simple voice orders are changed over to advanced word successions (A to D transformation). These stored sequences are than transmitted to the robotic vehicle via Bluetooth transceiver module and are sent to the transceiver controller. Android application transceiver is used to decode the received signal with the Bluetooth module. The controller contrasts these signals and the put away program orders in it and convert them into voice strings. The voice strings are then used to run the servo engines for the ideal interval of time. The voice commands to the robotic system are sent through Bluetooth via an Android device. These commands are received on the robotic system via Bluetooth module mounted on it. The surveillance is carried on using a wireless camera with night vision mounted on a servo motor to view 180o. A robotic arm is mounted at the front of the system to make changes in the environment along with an LCD screen to view the received commands. The motor driver circuit is used to control the speed of robotic system. An obstacle detector is added to protect the system from obstacles on the way by using an ultrasonic sensor. The whole circuitry is power. The microcontroller, sends directions, which when executed, helps in working of the engine driver. The yield of the Arduino goes to the engine driver IC and it controls the specific engine. A DC power supply is required to run the system. The DC power supply feeds the Microcontroller and the Bluetooth module.

Through our Design and implementation of our proposed system, we are able to achieve the following as results:

1. Robot is controlled through voice commands given by the user who is operating the project.
2. These voice command needs to be given through an android app which is installed on the users android mobile.

3. Speech recognition is done within the android app and then a respective command is sent to the voicecontrolled robot vehicle

Conclusion

Voice control for a home assistant robot is developed in this paper. The voice commands are processed in real-time, using an offline server. The speech signal commands are directly communicated to the server over a wired network. The personal assistant robot is developed on a microcontroller based platform and can be aware of its current location. Performance evaluation is carried out with encouraging results of the initial experiments. Possible improvements are also discussed towards potential applications in home, hospitals, car systems and industries. The effect of the distance between the mouth and microphone on the robot, the performance of the robot, and effect of noise on the speech to text conversion are some of the areas that can be further explored. The accent of the speaker does not affect the operation of the robot as the voice commands are processed using a cloud server which functions irrespective of the accent of the speaker. Using renewable source of energy for the functioning of the robot would not only improve upon the cost of the robot but would also prove to be eco-friendly. The voice controlling commands are successfully transmitted via Bluetooth technology and on reception; the desired operations successfully take place. This project reduces human efforts at places or situations where human interventions are difficult. Such systems can be brought into use at places such as industries, military and defence, research purposes, etc. Solar cells can be a possible source of energy that can be used. The robotic assistant developed has potential applications ranging from chemical industries to comfortable scenario inside homes. This paper should be helpful in showcasing a server based application in developing a voice-controlled robotic assistant.

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