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Voice Controlled Robotic Vehicle

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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 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 Operating System. 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.A robotic arm is mounted at the front of the system to make changes in the environment along with Lcd screen to view the received commands. An obstacle detector is added to protect the system from object on the way by using an ultrasonic sensor.

Keywords- Arduino UNO, Android Application

I. **Introduction**

Voice controlled robotic system aims at achieving successful places where human intervention is at high risk such as hot or sub zero temperature environment, war fields, disaster affected zone, etc. It also aims to fulfil the task assigned to the user through various commands. 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. 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 object on the way by using an ultrasonic sensor. The whole circuitry is powered using a 12V rechargeable battery mounted on the system. When we say voice control the first term to be considered is Speech Recognition i.e., making the system to understand human voice. Speech Recognition is a technology where the system understands the words not its meaning given through speech. Speech is an ideal method for robotic control and communication.The purpose of our research is to provide simpler robot's hardware architecture but with powerful computational platforms so that robot's designer can focus on their research and tests instead of Bluetooth connection infrastructure. This simple architecture is also useful for educational robotics, because students can builds their own robots with low cost.

II. **LITERATURE SURVEY**

Worldwide investment in industrial robots up 19% in 2003. In first half of 2004, orders robots were up another 18% to the highest level ever recorded. Worldwide growth in the period 2004-2007 forecast at an average annual rate of about 7%. Over 600,000 household robots in use – several millions in the next few years.

UNECE issues its 2004 World Robotics survey

We refer the navigation system from ARDUINO BASED VOICE CONTROLLED ROBOT and author of **K.Kannan and Dr. J Selvakumar**. They are defining the modes of speaking Robot.

There are generally three modes of speaking, including:

- Isolated word (or phrase) mode: In which the user speaks individual words (or phrases) drawn from a specified vocabulary.
- Connected word mode: In which the user speaks fluent speech consisting entirely of words from a specified vocabulary (e.g., telephone numbers).
- Continuous speech mode: In which the user can speak fluently from a large (often unlimited) vocabulary.

We refer the Voice Recognition system from SPEECH RECOGNITION FOR ROBOTIC CONTROL and author of **Prof. Bhuvaneshwari Jolad and Mohnish Arora**. They define how to recognise voice of Robot.

- Small vocabulary systems which provide recognition capability for up to 100 words.
- Medium vocabulary systems which provide recognition capability for from 100 to 1000 words.
- Large vocabulary systems which provide recognition capability for over 1000 words.

- Speaker dependent systems which have been custom tailored to each Individual talker.
- Speaker independent systems which work on broad populations of talkers, most of which the system has never encountered or adapted to.
- Speaker adaptive systems which customise their knowledge to each individual user over time while the system is in use.

We refer the communication system from VOICE CONTROLLED ROBOTIC VEHICLE and author **Rohan Ganu and Chetna Bhatia**. They define how to Robot communicate

- One-way communication: In which each user spoken input is acted upon.
- System-driven dialog systems: In which the system is the sole initiator of a dialog, requesting information from the user via verbal input.
- Natural dialogue systems: In which the machine conducts a conversation with the speaker, solicits inputs, acts in response to user inputs, or even tries to clarify ambiguity in the conversation.

III. METHODOLOGY

COMPONENT

1. Arduino Uno
2. LCD Screen
3. Motor Driver
4. Ultrasonic Sensor
5. Bluetooth Module

1. ARDUINO UNO

Arduino uno a micro controller board based on the ATmega328P. It has 14 digital input/output pins .It also has 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, and a reset button. It is the most widely used and user friendly micro controller. Simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

2. LCD SCREEN

LCD screen is a flat-panel display, electronic visual display that uses the light-modulating properties of liquid crystals and the liquid crystals do not emit light directly. LCDs are available to display arbitrary images. It has a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays.

3. MOTOR DRIVER

L293D has quadruple high current half-H drivers.

Wide Supply-Voltage Range: 4.5V to 36V.

High-Noise-Immunity Inputs.

Output Current 600mA Per Channel

Peak Output Current1.2A Per Channel.

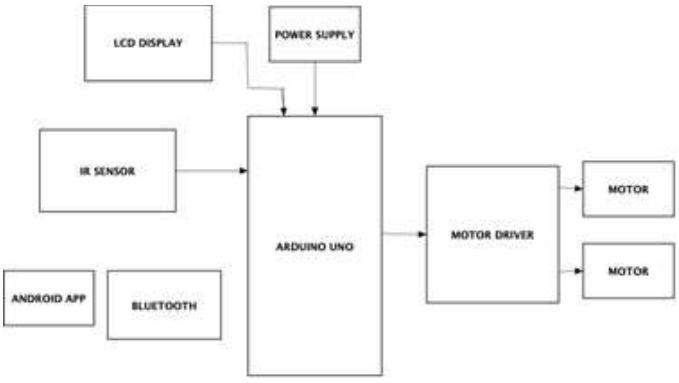
4. ULTRASONIC SENSOR

HC-05 is the ultrasonic ranging sensor. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each HC-05 module includes an ultrasonic transmitter, a receiver and a control circuit. There are only four pins on the HC-05:- VCC, Trigger, Receive, and GND.

5. BLUETOOTH MODULE

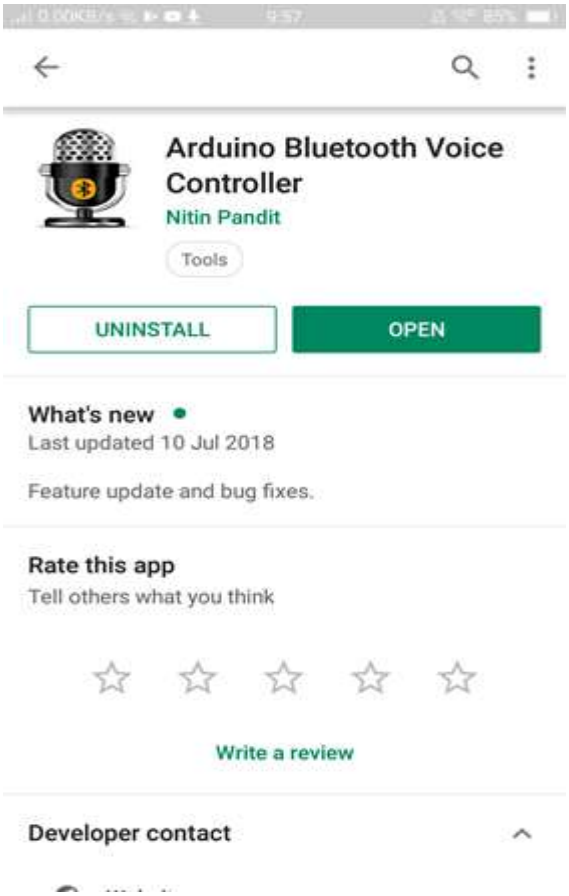
Bluetooth module has a typical -80dBm sensitivity and up to +4dBm RF transmit power.It has a PIO control, UART interface with programmable baud rate, integrated antenna and an edge connector. Its auto-pairing pin is"1234" as default pin and it auto-reconnect in 30 min when disconnected as a result of beyond the range of connection.

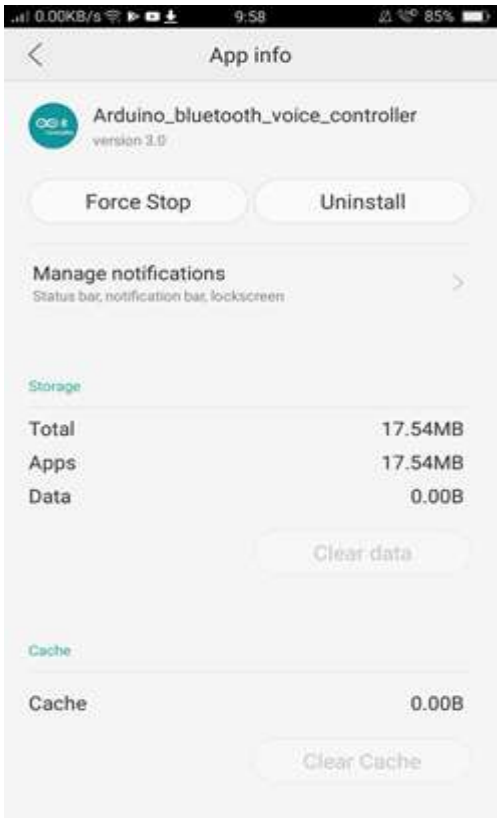
IV. BLOCK DIAGRAM



V. IMPLEMENTATION

In this proposed system a speech recognition module is not required to recognize human voice to control robot. In this system an android application is used to recognize and process human voice which is further converted into text (making use of google speech to text converter). This text is transferred to the robot using Bluetooth. This text is further processed by the controller to control the robot accordingly. Here implementation includes following procedure. Download the application "**ARDUINO BLUETOOTH VOICE CONTROL**" from Google play store and install it.



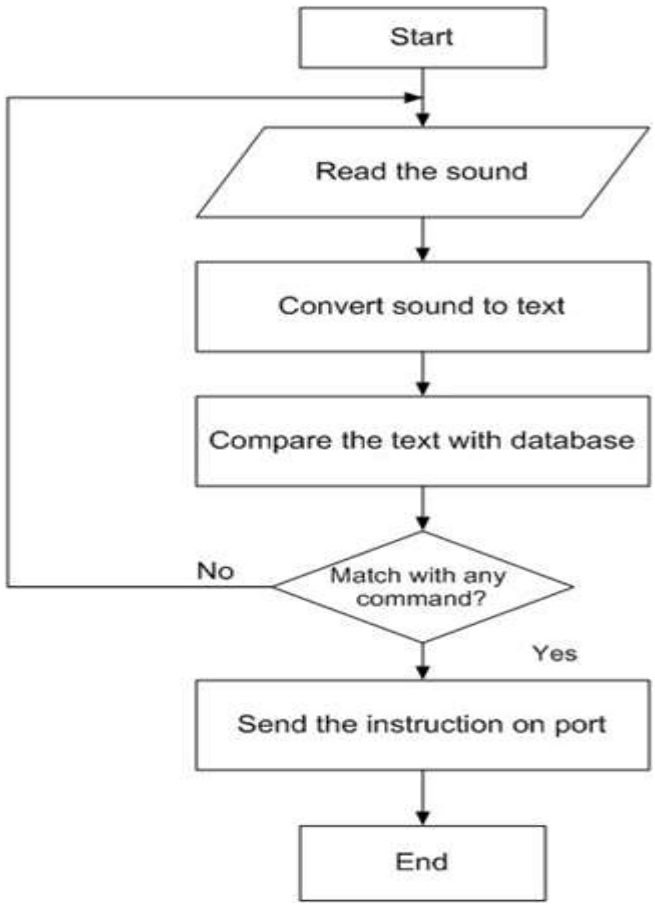


www.tutorialslink.com

VI. **COMMANDS**

1. Forward – moves the vehicle in forward direction.
2. Backward - moves the vehicle in backward direction.
3. Left – moves the vehicle towards left.
4. Right – moves the vehicle towards right.
5. Stop – stops the vehicle.

VII. **Flow Chart**



VIII. **Algorithm**

- The voice commands should be trained to the serial communication module.
- Then the stored voice commands are represented in the form of binary numbers such as move forward – 001, move backward – 010 etc.
- These binary values are transmitted via Bluetooth module which is a transceiver.
- The transmitted binary values are then received by another Bluetooth module which is present on the receiver side.
- Atmega Controller will take those binary values and performs action(DC motors) according to the binary values.

IX. ADVANTAGES

- It can be used to bring and place small objects.
- It is the one of the important stage of Human robots.
- Command and control of appliances and equipment.

X. RESULTS AND CONCLUSION

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.

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