Voice Controlled Bot

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Abstract - **Robotic devices tend to reduce the manual labor being put by humans in their daily tasks. In this paper, we develop a voice-controlled bot system.. The voice commands are given to the robot through the microphone, by using an SRC-speech recognition circuit and microcontroller. The robot can perform various movements on the given command like turn left or right, start or stop operations, move forward or backward. The voice commands are processed would result in the real-time performance of the bot. The speech signal would be converted to text form and the communication would take place digitally. The voice command would be converted into a digital audio signal which would be communicated to the robot over a Bluetooth network. The voice-controlled robot is made on a microcontroller 8051 circuitry based platform. It would also have an ultrasonic sensor which would be very useful for obstacle detection if any. The effectiveness of the voice communicated over a distance is measured through several experiments and using various concepts. Various other improvements are also discussed towards prospective applications in households, medical sector and industries factories where parallel tasking is to be performed.**

I. INTRODUCTION

In today's world technology has been at par excellence when it comes to robots, machinery, appliances etc. Various technologies have come out into existence of which one such is Speech recognition or voice recognition. Voice Controlled System basically works on the principle of Speech Recognition. Speech recognition is the technique which helps the machine or the controller understands the spoken words. Speech is the most efficient and best way to control a system. Speech Recognition technique understands the words that have been spoken by the user. This phenomenon can be used in various industries and sites where parallel activities are going to take place. In this system, the controller will recognize the human voice and convert it to a digital signal or information which can be read by the machine.

The Speech circuit used works independently from the main controller power unit. We can also use the concepts of phonetics and linguistics to guide the speech process. The basic idea is to convert the speech signal into audio waves using different speech recognition methods and the command would be given to the microcontroller unit. The most important feature of this circuit is its programmability One can program and function the SRC to recognize the unique command one wants to perform. The SRC can be easily interfaced to the robot's controller. If we want to control any

event or perform any task using this speech recognition technique it will become quite easy, efficient, less time-consuming.

II. PURPOSE

The purpose of this project is to build a bot car which could be handled using speech. The vehicle build by us will not recognize a variety of keywords, we just want it to recognize some of the local words we use for direction. Example of such words is as follows:

1. move forward

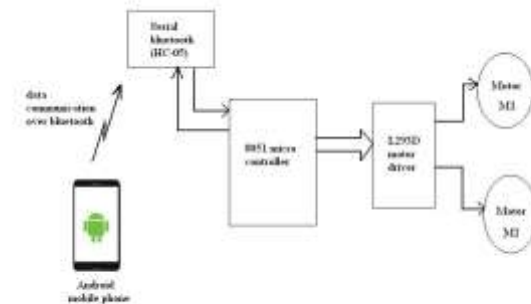2. move back

3. turn right

4. turn left

Fig: Block Diagram of Voice Controlled Bot

2.1 HARDWARE

2.1.1 HC-05 Bluetooth Model

HC-05 Bluetooth Module is and the module which is used for SPP(Serial Port Protocol) module. It is used for unwired communication. It is basically a Master-Slave Configuration. It works at a data rate of 3 Mbps at 2.4GHz radio transceiver.

2.1.2 USBasp Programmer

USBasp is a programmer for AVR controllers. It is made up of some passive elements as well as the ATMega8 microcontroller. It needs to be configured before its actual application. It needs only firmware-only USB and any distinct USB controller is not needed.

2.1.3 DC Motors

It is basically a motor that converts electrical energy into mechanical energy. A DC motor's speed is managed by varying the supply voltage or by changing the strength of the current in field winding.

2.1.4 8051 Microcontroller

A microcontroller is a VLSI IC that is made up of a processor(CPU) and other components like Counters/Timers, ADC, I/O Ports, and Memory. Also known as MCS-51 Architecture, the 8051 microcontrollers was designed by Intel. Some of its features are:

1. 8 - Bit ALU
2. 8 - Bit Accumulator
3. 128 Bytes RAM
4. 4 KB ROM
5. 16 - Bit Timers/Counters

2.2 SOFTWARE

2.2.1 Keil Software

Keil MDK is basically a software development environment for various microcontroller devices. It provides wide range of development tools like ANSI C compiler, debuggers and simulators, linkers, library managers, real time operating systems, etc.

2.2.2 Speech Recognition Application

Those days android phones are developed with an inbuilt speech to text conversion mechanism. The input speech is streamed on a server for converting it to text and the content is given back to our application. Later on, using the Android's Bluetooth, the converted text is sent to the Bluetooth module assembled on the robot for further process.

III. ALGORITHM

1. The voice-controlled robot is trained to respond to the comments received.
2. Some of the basic commands like turn left, move forward, turn right and move backward are stored using some of the binary values.
3. Those binary values are transmitted via Bluetooth signals to the Bluetooth module assembled on the bot.
4. After receiving the signals, they are sent to the 8051 microcontroller which carries out the predefined actions through the DC motors.

IV. APPLICATIONS

1. It helps physically challenged people to carry some object from one place to another place using the arm structure in the robot.

2. It helps the blind persons to reach a destination by using the voice feature.
3. It helps to guide visitors in an association by providing information about the services available.
4. Time-based control is possible because of Real-time Clock (DS1307). For example, it is used in hospitals to inform patients to take the tablets at the right time.
5. It is used in dangerous places.
6. Voice controlled robot vehicle has significant application in industries where a user is able to control the robotic vehicle via voice commands.

V. FUTURE WORK

1. This study work has been narrowed down to a concise range Bluetooth module. Using a long-range module will result in connectivity with the robot for long distances.
2. Power Optimization such as sleep and wakeup plans can be incorporated.
3. Image processing can be implemented in the robot to detect the colour and the objects.
4. For more precise working servo motors can be deployed.
5. For tracking the target Automatic Targeting System can be applied.

VI. CONCLUSION

The voice recognition application has an accuracy of around 75% in properly recognizing a voice command. But it is extremely sensitive to the surrounding noises. There is a probability of misinterpreting some noises as one of the voice commands given to the robot. Also, the correctness of word recognition decreases in face of the noise. The sound coming from motors has a substantial impact on accuracy. There are some drawbacks in the mobile platform. The rechargeable batteries make it too bulky. Hence, we had to implement effective motors to drive the robot making the power consumption higher. So, we had to recharge the batteries repeatedly. The mobile platform had some difficulties in turning due to the heaviness of itself. The back freewheels are used to get stuck when turning especially in reverse motion. Hence, we advise that the steering mechanism will be a better option.

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