Design And Analysis of Voice Controlled Robot

Sudarshan T A
Dept of Mechanical Engineering
New Horizon College Of Engineering, Bengaluru, India

Abstract- *Robot voice has the ability to understand thousands of voice commands and perform required action. The voice recognition is a bit difficult task because each person has his own accent. By using the android app the textual content was transmitted to the Arduino using Bluetooth through mobile phone handsets which had built-in microphone process the signal and the robot made movement according to voice command The robot was able to move forward, backward, left and right according to the input given to L293D from Arduino Uno which gave input according to the command received from user. If user gave the voice command "autonomous" the robot started moving autonomously without hitting any obstacle. The avoidance of the obstacle was guided by the ultrasonic sensor which was able to senses the obstacle. Then it gave command to microcontroller to move in such a way so that the robot did not face any obstacle on its way.*

Keywords- Robot, Aurdino

I. INTRODUCTION

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

Fig (1) Voice controlled robot

Speech signals are the most important means of communication in human beings. Almost every conversation to interact is done by means of voice signals. Sounds and various speech signals can be converted into electrical form using a microphone. Voice recognition is a technology which is used to convert the speech signals into a computer text format. This voice recognition technology can be used to control and generate speech acknowledgement using some external server.

II. PROBLEM STATEMENT AND OBJECTIVE

The most challenging part of the entire system is designing and interfacing various stages together. Our approach was to get the analog voice signal being digitized.

The frequency and pitch of words be stored in a memory. These stored words will be used for matching with the words spoken. When the match is found, the system outputs the address of stored words. Hence we have to decode the address and according to the address sensed.

The assistant robot can be used for various purposes . In chemical industries: In chemical industry, people cannot handle the chemicals which might be having high temperature. Thus, industrial robot is a vital development towards improving the safety standards in industries.

In homes and for daily needs: People may need assistance to reduce their manual effort, which may be mostly needed in the case of physically handicapped people or the old-aged people.

In hospitals: This assistant can be used extensively in the hospitals where it can be used in surgical operations. Robotic arm has been used in various surgeries across hospitals . military purposes where the commands can be given to robot without risk by increasing the range and by installing cameras.

. Since we wanted the car to be wireless, we used RF module. The address was decoded using microcontroller and then applied to RF module. This together with driver circuit at receivers end made complete intelligent systems. It must be noted that we did not use wireless mic instead used analog RF module which transmitted 5 different frequencies each for right, left, forward, backward, crane movement.

The reason is that the cost per hour to operate a robot is a fraction of the cost of the human labor needed to perform the same function. More than this, once programmed, robots

repeatedly perform functions with a high accuracy that surpasses that of the most experienced human operator. Human operators are, however, far more versatile.

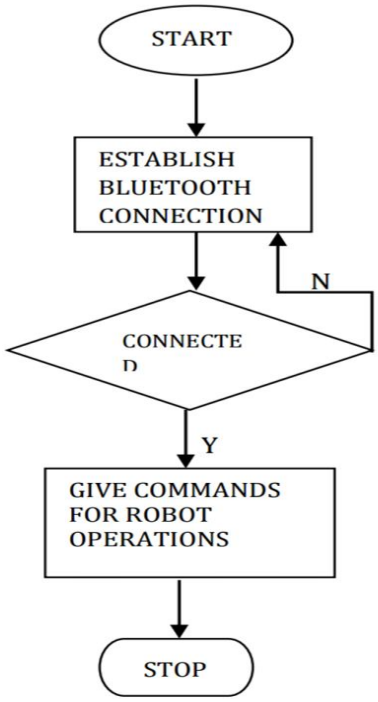
III. METHODOLOGIES AND EXPERIMENTATION

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single- microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet.

Flow chart



Step 1: Pair the transmitter to the Bluetooth module.
Step 2: If paired, give the commands.
Step 3: If not , check the connections.
Step 4: It performs according to the commands encoded in the program.

Algorithm

1. Start
2. Establish Bluetooth connectivity between Android Application and the Bluetooth module on the robot.
3. Check whether the device is connected
.4.If connected, give the pre-defined instructions/commands to the micro-phone of the mobile handset.
5. The voice commands should be trained to the EasyVR module.

IV. RESULTS AND DISCUSSION

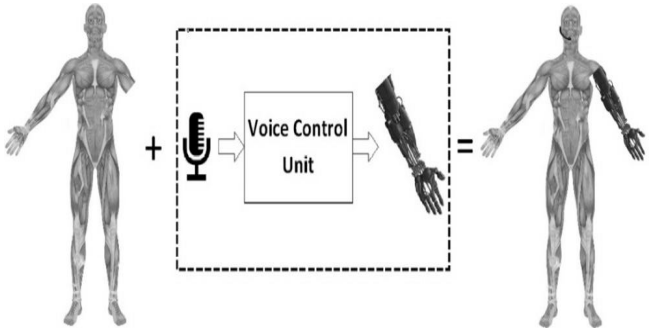


Fig (2) :Voice control unit

Voice which is used for voice processing in the literature by has been improved, and physical implementation of this model was implemented. In order to evaluate the interoperability of the system, a four-jointed RRRR (Rotational-Rotational-Rotational-Rotational, 4-rotary joints) robot arm model was designed, and this model was turned into a physical product. After making the necessary connections between the robot arm and the voice processing system, predefined voice commands were applied to the system. Finally, it was observed that how much of the applied voice commands was performed by the robot arm. According to the observed results; the detection rate for voice commands has increased even more owing to the developed system. The designed voice control system for the prosthetic robot arms is more efficient than the voice recognition systems used in the literature.

The robot arm was studied according to the mathematical model referred. Voice recognition system and control card, were integrated to the robot arm. The robot arm was used for observing how efficient of the system that was designed for voice commands works. Various voice commands were defined with the purpose of studying the system.

Codes Used For Voice Controlled Robot

```
#include<AFMotor.h>
AF_DCMotor motor1(1, MOTOR12_1KHZ);
AF_DCMotor motor2(2, MOTOR12_1KHZ);
AF_DCMotor motor3(3, MOTOR12_1KHZ);
AF_DCMotor motor4(4, MOTOR12_1KHZ);
int tx=1;
int rx=0;
char inSerial[15];
char command;
void setup()
{
Serial.begin(9600); //Set the baud rate to your Bluetooth module.
}
void loop(){
int i=0;
int m=0;
delay(500);
if (Serial.available() > 0) {
while (Serial.available() > 0) {
inSerial[i]=Serial.read();
i++;
}
inSerial[i]='\0';
Check_Protocol(inSerial);
}
}
void Check_Protocol(char inStr[]){
int i=0;
int m=0;
Serial.println(inStr);
if(!strcmp(inStr,"*forward#")){
forward();
delay(1200);
Stop();
for(m=0;m<11;m++){
inStr[m]=0;}
i=0;}
if(!strcmp(inStr,"*back#")){
back();
delay(1200);
Stop();
for(m=0;m<11;m++){
inStr[m]=0;}
i=0;}
if(!strcmp(inStr,"*left#")){
left();
delay(350);
Stop();
for(m=0;m<11;m++){
inStr[m]=0;}
i=0;}
if(!strcmp(inStr,"*right#")){
right();
delay(350);
Stop();
for(m=0;m<11;m++){
inStr[m]=0;}
i=0;}

if(!strcmp(inStr,"*stop#")){
Stop();
for(m=0;m<11;m++){
inStr[m]=0;}
i=0;}
else{
for(m=0;m<11;m++){
inStr[m]=0;
}
i=0;
}}
void forward()
{
motor1.setSpeed(255);
motor1.run(FORWARD);
motor2.setSpeed(255);
motor2.run(FORWARD);
motor3.setSpeed(255);
motor3.run(FORWARD);
motor4.setSpeed(255);
```

```
motor4.run(FORWARD);
}
void back()
{
motor1.setSpeed(255);
motor1.run(BACKWARD);
motor2.setSpeed(255);
motor2.run(BACKWARD);
motor3.setSpeed(255);
motor3.run(BACKWARD);
motor4.setSpeed(255);
motor4.run(BACKWARD);
}
void left()
{
motor1.setSpeed(255);
motor1.run(FORWARD);
motor2.setSpeed(255);
motor2.run(FORWARD);
motor3.setSpeed(0);
motor3.run(RELEASE);
motor4.setSpeed(0);
motor4.run(RELEASE);
}
void right()
{
motor1.setSpeed(0);
motor1.run(RELEASE);
motor2.setSpeed(0);
motor2.run(RELEASE);
motor3.setSpeed(255);
motor3.run(FORWARD);
motor4.setSpeed(255);
motor4.run(FORWARD);
}
void Stop()
{
motor1.setSpeed(0);
motor1.run(RELEASE);
motor2.setSpeed(0);
motor2.setSpeed(0);
motor2.run(RELEASE);
motor3.setSpeed(255);
motor3.run(FORWARD);
motor4.setSpeed(255);
motor4.run(FORWARD);
}
motor2.run(RELEASE);
}
}
```

V. CONCLUSION

Robot voice has the ability to understand thousands of voice commands and perform required action. The voice recognition is a bit difficult task because each person has his own accent. By using the android app the textual content was transmitted to the Arduino using Bluetooth through mobile phone handsets which had built-in microphone process the signal and the robot made movement according to voice command The robot was able to move forward, backward, left and right according to the input given to L293D from Arduino Uno which gave input according to the command received from user. If user gave the voice command “autonomous” the robot started moving autonomously without hitting any obstacle. The avoidance of the obstacle was guided by the ultrasonic sensor which was able to senses the obstacle. Then it gave command to microcontroller to move in such a way so that the robot did not face any obstacle on its way.

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