



DTMF Based Robotic Control for Surveillance Monitoring

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Abstract:

This project is used to develop a robot controlled by phone using DTMF(Dual tone multi frequency) since it is more powerful & equipped with sensors. The main advantage of this robot is robust, large working area. DTMF control by generating the tone by pressing the keypad buttons from mobile which is act as remote. Basically, robot receives the tones from another mobile stuck with it. This robot is mainly used in detection of human beings who stuck in earthquake. This robot can be used in other hazardous area also. Several analyses have been taken to network providers, robot operator, sensor analysis and robot localization analysis.

1. INTRODUCTION

This paper deals with the DTMF based controlled robot. The main disadvantage of robot is operating in shorter range only. The DTMF robot overcomes this problem. The methods that used DTMF based robots because in early days the robots are made use of RF-radio frequency, Infrared, Wi-Fi, WLAN or Bluetooth etc. It has a drawback of limited working range, frequency and limited control only. So we overcome this problem by using DTMF which can be access in large working area and we can control it by using our mobile phone. Since DTMF is one of the wireless communication technology used to control the robots anywhere. Hence the phone has become most popular electronic devices in recent years. And everyone has mobile phone in their hands so it can be easily access in anywhere. So this also become an additional advantage for this project. Controlling of robot is done in three phases 1.Sensing 2.Processing and 3.Commanding. Since several sensors and processes can be used to perform. The commands are fed to the robot in many ways. Sensing is carried out by using several sensors. Some sensor like proximity sensor, Camera is used for this project. Microcontrollers act as processing unit. Microcontrollers are used to make decisions based on the results of sensor. DTMF is used for navigating the robot wirelessly in anywhere. Commanding is done by mobile phones. Conventionally; Wireless-controlled robots use RF circuits, which have the drawbacks of limited working range, limited frequency range and the limited control. Use of a mobile phone for robotic control can overcome these limitations. It provides the advantage of robust control, working range as large as the coverage area of the service provider, no interference with other controllers and up to twelve controllers. Although the appearance and the capabilities of robots vary vastly, all robots share the feature of a mechanical, movable structure under some form of control. The Control of robot involves three distinct phases: perception, processing and action. Generally, the preceptors are sensors mounted on the robot, processing is done by the on-board microcontroller or processor, and the task is performed using motors or with some other actuators.

2.METHODS & MATERIALS:

In this project the robot, is controlled by a mobile phone that makes call to the mobile phone attached to the robot in

the course of the call, if any button is pressed control corresponding to the button pressed is heard at the other end of the call. This tone is called dual tone multi frequency tone (DTMF) robot receives this DTMF tone with the help of phone stacked in the robot. The mobile that makes a call to the mobile phone stacked in the robot acts as a remote. DTMF signaling is used for telephone signaling over the line in the voice frequency band to the call switching center. The version of DTMF used for telephone dialing is known as touch tone. DTMF assigns a specific frequency (consisting of two separate tones) to each key s that it can easily be identified by the electronic circuit. The signal generated by the DTMF encoder is the direct Algebraic submission, in real time of the amplitudes of two sine(cosine) waves of different frequencies, i.e. ,pressing 5 will send a tone made by adding 1336hz and 770hz to the other end of the mobile. The tones and assignments in a dtmf system shown below Figures shows the block diagram and circuit diagram of the microcontroller-based robot. The important components of this robot are DTMF decoder, Microcontroller and motor driver.

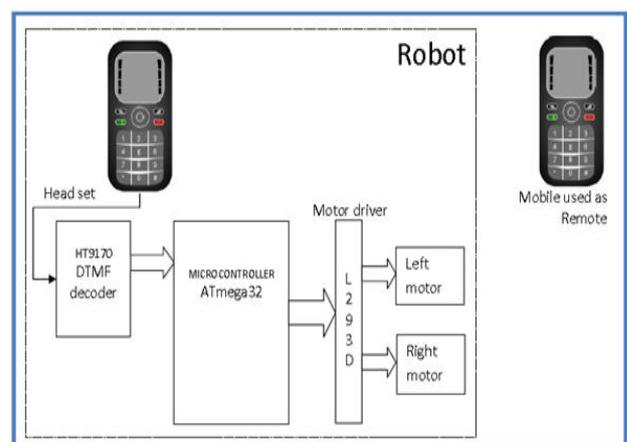


Figure 1 Block diagram

DTMF DECODER:

The HT9170 series are dual tone multi frequency receiver .all types of the HT9170 series use digital counting techniques to detect and decode all the 16 DTMF tone pairs into a 4-bit code output a built-in dial tone rejection circuit is provided to eliminate the need for pre-filtering.when input signals given at vp(1) and vn(2) pins are recognized to be effective, DV(15) Becomes high and the correct 4-bit code tone transfer to the output pins D₀(11)-D₃(14).

MICROCONTROLLER:

Arduino Uno

- ATmega328P microcontroller
- Input voltage -7-12V
- 14 Digital I/O Pins (6 PWM outputs)
- 6 Analog Inputs
- 32k Flash Memory
- 16Mhz Clock Speed



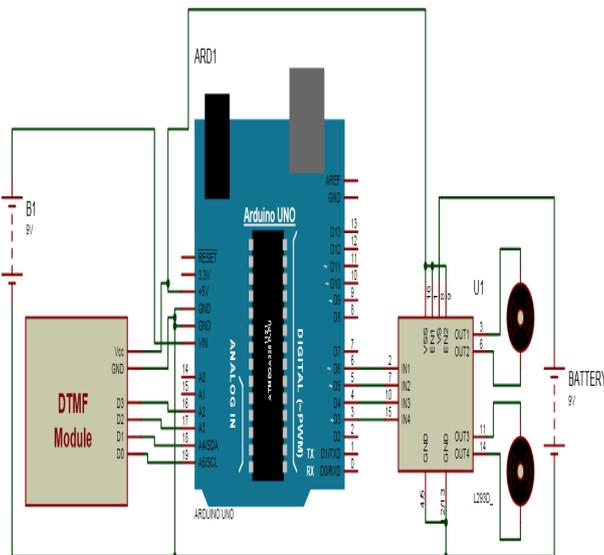
MOTOR DRIVER IC:



This Motor Driver Board is designed to Work with L293D IC. This can control 2 DC Motors, their direction using control lines and their speed using PWM.

3. CIRCUIT DISCRIBTION:

The circuit of the DTMF based controlled robot form a building blocks of the robot it plays a vital role for the design of robot. It is very important for the setup of robot. Here the Arduino plays a major role in this design. So care is taken. If any of the connection is wrong total setup will be also wrong. The following circuit for basic land rover of DTMF based controlled robot.



4. IMPLEMENTATION OF DTMF BASED ROBOT

The implementation of robot can be done hardware. The operation of this robot can be done by step by step. The operating phone is made to call to the mobile stacked with the robot. The mobile stacked with the robot is made in auto-answering mode so only when it is receiving calls from the operating mobile it will be able to answer it. Thus, this mobile acts as an encoder. From the operating mobile the keys are pressed to instruct the robot like 2 is for up, 4 is for left, 6 is for right, 8 is for down or reverse and 5 is for stop. Thus, when keys are pressed a tone is generated in the receiving phone. Thus, this tone is decoded by the DTMF. This DTMF decodes to 4-bit binary and will give the decoded signal to the Arduino UNO. The Arduino UNO will take the decision based on the DTMF decoder's output. The Arduino UNO will give the commands to the motor driver. The motor driver navigates the robot according to the instruction.

Mobile Key	Input				Output				Robot Movement
	DTMF Decoder				Motor				
	D3	D2	D1	D0	M11	M12	M21	M22	
5	0	1	0	1	0	0	0	0	Stop
4	0	1	0	0	1	0	0	0	Left
6	0	1	1	0	0	0	1	0	Right
2	0	0	1	0	1	0	1	0	Forward
8	1	0	0	0	0	1	0	1	Backward

5.RESULT AND DISCUSSION

The specification of system is used in the project of DTMF based robotic control.

SYSTEM	SPECIFICATION
DRIVER CIRCUIT	L293D
DC GEAR MOTOR	3-6V RPM-240
ARDUINO UNO	3.3 V
DTMF	HT9170
BATTERY BOX	4AA
WHEEL	6.5X2.7
BATTERY	9V
SPEED ENCODER	DISC

6. CONCLUSION

Thus the DTMF BASED CONTROLLED ROBOT has been designed and implemented. This paper showed an approach to robot using DTMF tone through mobile phone network. Using mobile phone to control the robot over a larger area reduces the overall cost. By using DTMF tone there is a new dimension for the robot by allowing it to be navigated in a wider range. By giving correct input to the DTMF the accuracy of the robot is maintained. In the future we would like to give this robot intelligence by controlling it through a computer automatically and simultaneously. We would also like to add some means with the robot to observe its surroundings so that it can operate from a far.

7. FUTURE SCOPE

In the future this robot can be controlled by computers with robot intelligence controlling and automatic. It can also be operated

in hazards areas some including some more features in it. The ease accessible of this robot can be made easier by connecting the WIFI with. So we can achieve very larger range of operation. For the betterment of the surrounding views for the object or humans by doing image processing in it.

8. REFERENCE:

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