# DTMF BASED CONTROL ROBOT USING ARDUINO

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**Abstract** -*In this project robot plays a fundamental role in fields of medicine, industries, home automated system and many others. We can control the robot using dual tone multiple frequency (DTMF) technology. The objective of designing this robot is simply to facilitate the humans in the future for security purpose. In the present scenario, their many recent developments of robotics and communication on a large scale. The robot is in the form of vehicle car with a web cam, which acquires and sends picture pc. DTMF technology is most useful technique at present day. In this project the robot is control by a mobile phone that makes a call to the mobile phone attached to the robot. In this process a call, if any button is pressed a tone corresponding to the button pressed is heard at the other end of call. This tone is called as dual tone multiple frequencies. This DTMF is gives advantages over the RF it increase the range of working and also gives good result in case of motion and direction of robot using mobile phone through microcontroller this type of wireless communication gives the remote handling operation of robot using DTMF.*

**Keywords**: Dual tone multiple frequency (DTMF), ATmega328p microcontroller, mobile module, motor driver IC, sensor

## 1. INTRODUCTION

Wireless communication is the most evolving field if application is present scenario where different technology can be used so, to have automated system with flexibility, reliability and accuracy. "Robot" is an automatically machine that replace manual work human through it may not look much like a human being or function in human like manner. A robot is electromechanical machine which is guide by computer, mobile phone and programming and is thus to do text on its own.

Conventially, wireless control robot used RF circuit which have drawbacks of limited working range and frequency range, used of mobile phone can overcome this limitation it provides the advantages of working range as well as coverage area of the service provider, no interference with other controller and robot control so, this system will be a powerful and flexible tool that will offers this service at any time, and from anywhere with the constraints of the technologies being applied. The robot can captured audio and video information from the various equivalent environments and can be sending to a remote station through DTMF signal. The mobile operated camera has been

designed in a way that it can fulfill the needs of armed forced and also for personal security.

The robot is made for purpose by military operations robot for navigator in forest, army. The mobile operated robot is a very application of DTMF technology since, the range of a robot communication is not limited and it just depends on the network of mobile and in the present sanitaria the mobile network is everywhere.

### 1.1 Block diagram for DTMF control robot using ARDUINO
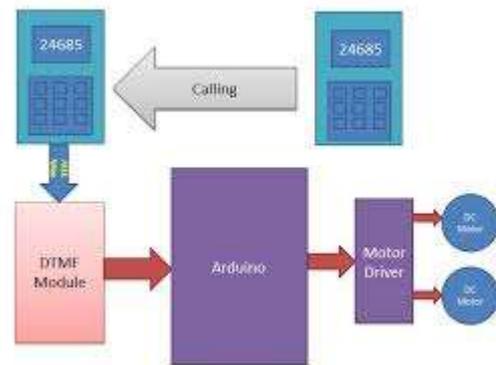


**Fig-1. Block Diagram of DTMF Control Robot Using Arduino**

The blocked diagram of DTMF control robot using Arduino mainly consist of three section that is-

1. Remote section
2. Control section
3. Driver section

**Remote section**

This section's main component is DTMF here we get a tone from our cell phone by using aux wire to DTMF decoder IC namely MT8870 which decode the tone into digital signal of four bit.

**Control section**

Arduino UNO is use for controlling whole the process of robot. Arduino reads commands send by DTMF decoder and compare with define code or pattern. If

commands are match arduino sends respective command to driver section.

**Driver section**

Driver section consist motor driver and two DC motors. Motor driver is used for driving motors because arduino does not supply enough voltage and current to motors. So, we add a motor driver circuit to get enough voltage and current for motor.by collecting commands from arduino motor driver drive motor according to commands.

**1.2 Objective**

The project of DTMF based control robot using arduino is microcontroller board based on the atmega328. In the project the robot is used to control the instruction of user. The objective of designing this robot is simply to facilitate the human in the future for security purpose. In the present scenario, there are many recent developments of robotics and communication on a large scale. The robot is in the form of a vehicle mounted with web cam, which acquires and send picture to the pc. The movement of vehicle is control by microcontroller; our idea is to make a robot to tackle the hostage situation and the worst conditions which cannot be handling by human being The main features of this robot is that it is password protected and authenticated so, that unauthorized person cannot communicate with robot at any cost.

**2. COMPOENT DETAILS**

**2.1 ARDUINO**

It is an open source computer hardware and software and software company project and user community that designs and manufactures single-board microcontrollers and microcontroller kit. Hardware means arduino circuit and software means where we can type our program or command the arduino. So basically it has two sides like programing to control the project and hardware means arduino device



**Fig-2. Arduino Device**

**2.2 DTMF Decoder**

DTMF means Dual-Tone-Multi-Frequency. DTMF signaling is used for telecommunication signaling over analog telephone lines in the voice-frequency band between telephone

handsets and other communication devices and the switching center. The DTMF system generally uses eight different frequency signals transmitted in pairs to represent sixteen different numbers, symbols and letters. When someone presses any key in the key pad of the handset, a DTMF signal is generate unique tone which consists of two different frequencies one each of higher frequency range (>1KHz) and lower frequency (<1KHz) range. The resultant tone is convolution of two frequencies [2]. The frequencies and their corresponding frequency are shown in Table I.

**Table 1: DTMF Keypad Frequency**

| frequency | 1209Hz | 1336Hz | 1477Hz | 1633Hz |
|---|---|---|---|---|
| 679Hz | 1 | 2 | 3 | A |
| 770Hz | 4 | 5 | 6 | B |
| 852Hz | 7 | 8 | 9 | C |
| 941Hz | * | 0 | # | D |

Each of these tones is composed of two pure sine waves of the low and high frequencies superimposed on each other. These two frequencies explicitly represent one of the digits on the telephone keypad. Thus generated signal can be expressed mathematically as follows: $f(t)=A_H\sin(2\pi f_H t)+A_L\sin(2\pi f_L t)$ Where: AH, AL: are the amplitudes fH : high frequency range ,fL : low frequency range

**2.3 MT-8870 DTMF DECODER IC**

The MT-8870 is a DTMF Receiver that integrates both band split filter and decoder functions into a single 18pin DIP package. It is manufactured using CMOS process technology. The MT8870 offers low power consumption (35 MW max) and precise data handling. Its decoder uses digital counting techniques to detect and 382| P a g decode all 16 DTMF tone pairs into a 4-bit code. The DTMF signal from the user mobile phone is picked up by the system mobile phone. The tip and ring of the microphone is connected to the specified pin of CM8870 as shown in the Fig. 4. C1, R1 and R2 have been adjusted for gain control of the input signal. Resistance R3 and capacitor C2 has been used to set the "guard time "which is a time duration through which a valid DTMF tone must be present for its recognition. The "Q-test "signal (pin15) indicates that the valid DTMF tone has been detected. Increase the resistor between pin2 and pin3 (not the one connects to 100nF) from 100K to 220k, 330K or 470K. This increases the input gain from 1 to 2.2, 3 3 or 4.7 to suit your input signal strength3.3
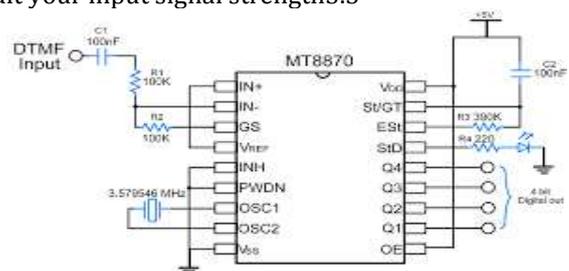


**Fig-3. MT-8870 DTMF**

## 2.4 DC MOTORS

The 6volt 50 rpm generated DC motor is used in this system. The motors are significant on rpm of it like 50rpm, 75rpm, 150rpm, 250rpm.In this system we used 50 rpm motor which is connected to the motor driver. The motor driver gives the command to the motors to rotate with the help of AVR controller. The motor is used to movement of the robot or vehicle. DC motor is electromechanical device that converts electrical energy into mechanical energy that can be used to do many works. It can produce mechanical movement to moving the wheels of the robot. DC motor has two wires, we can say them positive terminal and negative terminal, when these wires are connected with power supply the shaft rotates. We can reverse the direction of the rotation. L293d chip is very safe to use for DC motor control. This L293D is 16bit chip. Chip is design to control four DC motor, there are two inputs and two outputs for each motor.



**Fig-4. DC MOTOR**

## 3. SENSOR

### 3.1RAIN DETECTOR

A rain sensor is switching device activated by rainfall. There are two main applications for rain sensor. The rain sensor module is an easy tool for rain detection. It can be used as a switch when raindrop falls through the raining board and also for measuring rainfall intensity. The module features, a rain board and the control board that is separate for more convenience, power indicator LED and an adjustable sensitivity though a potentiometer. The analog output is used in detection of drops in the amount of rainfall. Connected to 5V power supply, the LED will turn on when induction board has no rain drop, and DO output is high.



**Fig-5. Rain Detector**

### 3.2 FIRE SENSOR

A fire detector sensor used or designed to detect and response the presence of flame or fire responses to detected flame or fire depend on the installation but can include sounding and alarm, deactivating fuel line and activating a fire suppression system. The fire detector used in Gas fueled cookers



**Fig-6. Fire Sensor**

## 3.3 METAL DETECTOR

The operation of metal detectors is based upon the principles of electromagnetic induction. Metal detectors contain one or more inductor coils that are used to interact with metallic elements on the ground. The single-coil detector illustrated below is a simplified version of one used in a real metal detector. A metal detector is an electronic instrument which detects the presence of metal nearby. Metal detectors are useful for finding metal inclusions hidden within objects, or metal objects buried underground. They often consist of a handheld unit with a sensor probe which can be swept over the ground or other objects. If the sensor comes near a piece of metal this is indicated by a changing tone in earphones, or a needle moving on an indicator. Usually the device gives some indication of distance; the closer the metal is, the higher the tone in the earphone or the higher the needle goes. Another common type are stationary "walk through" metal detectors used for security screening at access points in prisons, courthouses, and airports to detect concealed metal weapons on a person's body.



**Fig-6.Metal Detector**

## 4. METHODOLOGY

The technology used is dual tone multi frequency (DTMF). DTMF produced arduino signal of two tones from frequency of 697Hz to 1633Hz. The arrangement of keypad in DTMF is seen such that each row and Colum has its own corresponding frequency above figure is a representation of the typical DTMF keypad and the associated row and column frequencies. When any of the key from 1 to 9 including special symbols is pressed present in keypad particular code is transmitted. This code with two frequencies among which one is higher frequencies and second is lower frequencies.
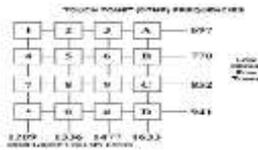
First we make a call by using remote phone to received phone and then attend the call by manually or automatic answer code. Now, here this DTMF control robot is controlled by cellphone. When we press 2 by remote phone robot start to moving forward and moving continuously forward until next command comes. When we press '8' by remote phone, robot c change his state and start moving in backward direction until other command comes. When we press'4'robot get turn left till next command executed When we press '6' robot turn to right and for stopping we press '5'.

## 5. CONCLUSION

In the designing of our project, we have kept in mind the user. The controlling of robot can overcome the drawback of RF communication which has a limited range whereas this car can be controlled from anywhere just using this DTMF technology. It will provide robust control over a wide area of the service provider.The programing used in project give very good control on the movement of the robot. The future scope or implications of the project are very great. This project based on wireless communication and can be achieved using Wi-Fi network or internet

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