

# DTMF BASED MULTIFUNCTIONAL DEVICE

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**Abstract**— The aim of our project is to make a device which makes the use of DTMF (dual tone multi frequency) for communication between the device.

It is made to overcome or prevent the main drawback of Bluetooth technology i.e. range of communication between devices

## I. INTRODUCTION

Mobile phones are widely used nowadays, for different application such as wireless control and monitoring due to its availability and ease of use. A remote control vehicle differs from a robot in that the remote control vehicle is always controlled manually and does not take any further action autonomously. It is vital that a vehicle should be able to proceed accurately to a target area; manoeuvring within that area to fulfil its mission and to return accurately and safely to base.

Robotic vehicle based on DTMF technology is explained in this project. When a key is pressed from our mobile, it generates a tone combination of two frequencies from our keypad. In the two frequencies, one is high frequency and another one is low frequency. This combination of two tones makes it nearly impossible to reproduce by the human voice. Each of the four rows of keys in a telephone is assigned a low frequency tone and each of the three columns is assigned a high frequency tone. A fourth column of keys labeled as A, B, C, and D is optional and is mostly used in military networks. This frequency can be decoded by the decoder IC into binary sequence. The main purpose of using DTMF in this project was to overcome the drawback of limited range and limited frequency. It provides the advantages of robust control, large working range as the coverage area of the service provider.

With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. We are going to use a mobile phone that will be used to control the device as a remote control does. The DTMF technology and the GSM module are combined in a single GSM module. With Interfacing of DTMF with Arduino we can use DTMF's output as input to Arduino and assign particular function to robot for that input. That means when we press particular key of transmitter mobile, generated frequency will be decoded by DTMF decoder and Arduino take that decoded binary output as input and robotic vehicle will perform that particular task which user wants to.

In this project we are going to interface a camera V380 to observe the obstacles in the surrounding as well view live movements of the surrounding through the camera interfacing similar to the one used for surveillance.

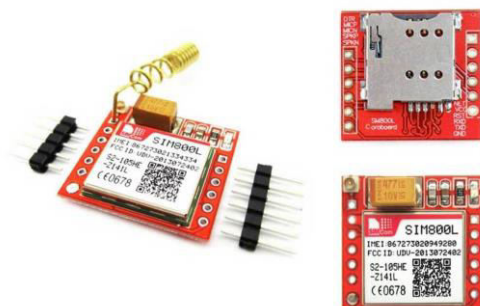
## METHODOLOGY

- Hardware section
- Software section

### 1. Hardware section:

The hardware section consists of the different interfacing sections with arduino. They are as follows:

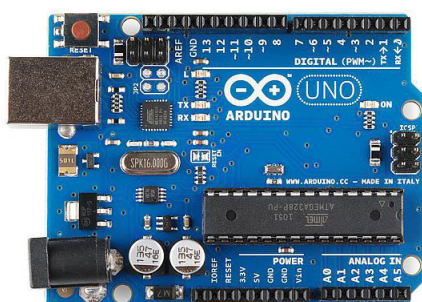
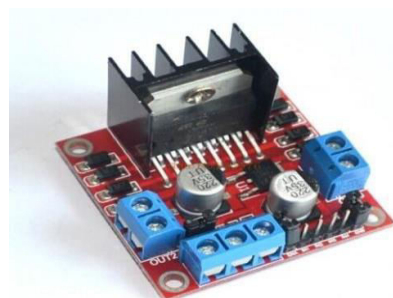
- Interfacing of DTMF and GSM module with Arduino:



Using DTMF gives us wide range of control over the device. There are 12 keys on the dial pad of the mobile phone including hash (#) and \* keys and by pressing particular key the cell phone transmits unique frequency to the GSM module. DTMF decoder decodes that frequency into 4 bit binary code and by programming the arduino we will be able to assign particular functions to the device.

The GSM module is used for the purpose of initiating a call with the users mobile phone. Initiating a call helps to control the device over a greater distance. The SIM800L GSM module is used for the following purpose. Pin 2 and 3 are of GSM are connected to the arduino pins RX and TX respectively.

- Interfacing of L298N H-Bridge Motor Driver with Arduino:



In our project we are going to use 12v battery. But Arduino required voltage is at most 5v. Thus we are using L298N H-Bridge Motor Driver. This motor driver takes corresponding output of Arduino related to DTMF output. For example we want to assign key no.2 as to give command to move forward.

That means right motor should rotate anticlockwise and left motor should rotate in clockwise direction. For key 2, DTMF decode it as 0010. Arduino take 0010 as input and as per our programming it gives output as 1A=0, 2A=1 for left motor and 3A=0, 4A=1 for right motor. Motor driver use this combination and provide 12V power to run the motors. Using this we can control the motor as per our requirement. Thus we are able to achieve basic motive of our project. There are six conditions in this DTMF controlled device that are given below:

INPUT					OUTPUT				
MOBILE KEY	DTMF DECODER				LEFT MOTOR		RIGHT MOTOR		ROBOT MOVEMENT
	Q4	Q3	Q2	Q1	IN1	IN2	IN3	IN4	
2	0	0	1	0	0	1	0	1	FORWARD
8	1	0	0	0	1	0	1	0	BACKWORD
4	0	1	0	0	1	0	0	1	LEFT
6	0	1	1	0	0	1	1	0	RIGHT
5	0	1	0	1	0	0	0	0	STOP

## 2. Software section:

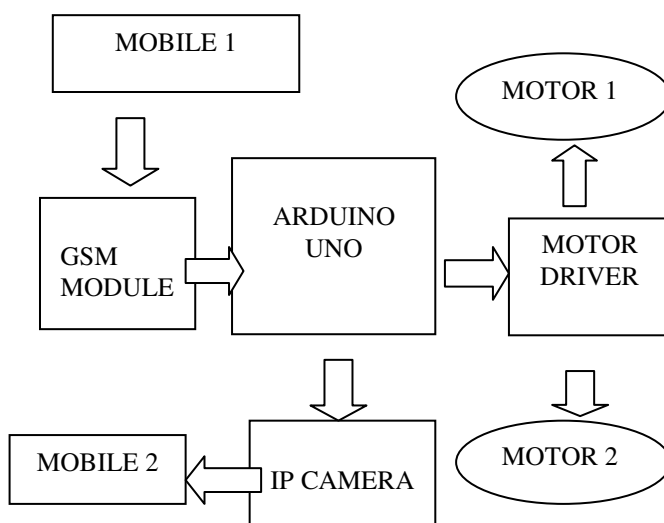
The software section consists of the connection of camera with the app.



A camera named V380 is used to avoid sight blindness of the device. It uses an app to display the live movements of the surroundings on the mobile phone. The following steps are used to connect the camera to the mobile phone:

1. Open Google Play Store, search, download, and install V380
2. Connect the power plug to the camera and place the camera right next to your Wi-Fi router.
3. Press and hold the reset button on the back of the camera until you hear the following sound:
4. Open the app V380
5. Click on "WIFI quick setup"
6. Your phone has to be connected to your WiFi network.
7. There will be a screen searching for the camera through your Wi-Fi connection
8. Successfully installed.

## • BLOCK DIAGRAM



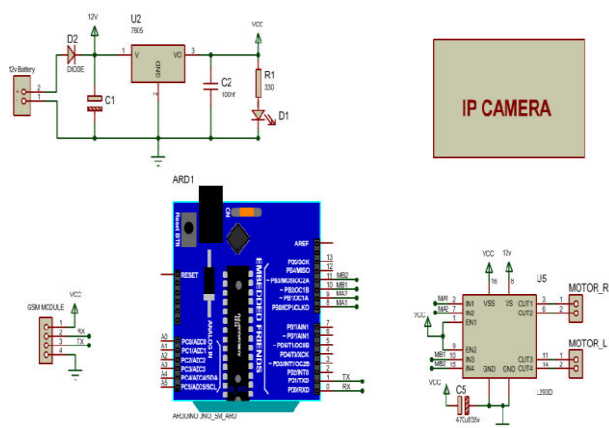
## • WORKING

The main motive of our project was to get rid of limited range and limited frequency. After finding the solution for our motive we realised that we need to overcome various cons regarding our motive. Initially we were going to use 2 mobile phones one as transmitting and the other as receiving and the camera of the phone was used to avoid the problem of sight blindness. But the problem with this was both the phones had to be connected to the same router due to which it was not possible to view the live movements beyond a specified range. To overcome this a camera V380 is used which avoids the problem of range for viewing the live movements in the surrounding.

Instead of using a separate DTMF and GSM module, a SIM800L having the DTMF function is used. The GSM module is used for the initiation of a call. The motor driver and the GSM module are interfaced to the Arduino in order to control our device by programming the arduino in C. The arduino makes it easy to control the motors.

A motor driver L298N H-bridge IC is used that allows to control the speed and direction of 2 DC motors. It also converts the 12V power supply to 5V which is required for arduino. The camera is connected to a mobile phone through the app V380. This helps to view the surroundings via the device from any distance.

## • CIRCUIT DIAGRAM



## • SUMMARY OF LITERATURE REVIEW

Purpose of DTMF based multifunctional device is to perform task to get environmental information without worrying about the range of control. A lot of research has been made in past on this system, where different sensors are used to capture the information or movement along with different micro-controllers to process the information and take action accordingly. Some of them are mentioned below with the techniques used to achieve the desired result.

1. We can take information that the importance of DTMF (Dual Tone Multi-frequency) is not restricted to handle telecommunication signaling between telephone handsets and switching centers over analog telephone lines invoice-frequency bands but we can extend the use of this technology in different application such as Robotics, Automation etc.
2. L298N H-Bridge dual motor controller which is a typical motor driver which allows DC motor to drive on either direction. It contains two inbuilt H-bridge driver Circuits which can control asset of two DC motors simultaneously in any direction. The module can drive DC motors

that have voltages between 5 and 35V, with a peak current up to 2A.

## • SUGGESTIONS FOR FUTURE USE

As our project is multifunctional we can implement various futuristic functions which can be used in Home automation, night vision sensing, military industrial application as well as disaster prone areas. Overall algorithm can be improved to reduce the delay as well as to improve efficiency of robot.

## • REFERENCES

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- 1.2. ABDUL-RAHMAN AI-ALI, ABDUL KHALIQ MUHAMMAD, "GSM-BASED DISTRIBUTION TRANSFORMER MONITORING SYSTEM", IEEE MELECON 2004, MAY 2004, PAGE NO.999-1002.

## • CONCLUSION

The robot accomplished it's original goal of getting controlled within the range of 100m using DTMF technology. Many challenges were encountered along the way such as, overcoming collision of robot with obstacle, sight blindness, designing of overall project model and lengthy programming and debugging process with Arduino.

## • ACKNOWLEDGMENT

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