

# Dual Mode Surveillance Robot

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**Abstract**— There are various wired and wireless technologies available in order to control an unmanned vehicle. Considering the use of RF (radio frequency) technology to control the robot, then it has a drawback of such as range of radio frequency, line of sight etc. Instead of Radio frequency if we use DTMF technology the problem of range is solved. DTMF (Dual Mode Multi Frequency) is one of the oldest use technology in the field of engineering. In this project we will be able to control the robot in autonomous mode as well manual mode. The operation in manual mode will be based on the use of DTMF technology and in the autonomous mode the robot will function with the help of different sensor at remote location. The outcome of the whole function of the robot will help to do surveillance of a specific geographical area.

**Key words:** DTMF Robot, Surveillance, Arduino, Unmanned Vehicle, Autonomous, Obstacle Avoidance

## I. INTRODUCTION

According to us the robot can be controlled by using two different technologies, the first is using the radio frequency (RF) and the second is the use of DTMF technology. Since every technology has some drawback likewise the RF technology also has some the drawback of line of sight. The conventional method to control the car wireless will have a drawback of line of sight [7]. Due to which the bot can be control till the line of sight only. This line of sight problem can be removed by using the DTMF technology. The range to control the bot depends upon the mobile network in the GSM (Global System for Mobile) module, hence the issue of line of sight is solved with this technology.

There are two frequency used in DTMF i.e. the low frequency signal and the high frequency signal. The low group frequency range is 697-941Hz and high group frequency is 1209-1633Hz [8]. Whenever the user presses any button a tone is generated (low frequency) called as which is then passed to high frequency signal which act as a carrier wave. Then both the signals are super imposed on each other which generate a final DTMF signal which is transmitted to the remote location to the DTMF decoder. This DTMF signal travels through the space, at the remote location where the bot it placed which consist of a mobile and various other sensors. There is a DTMF decoder which separates the frequency and find which button was pressed. Then as per programed the robot functions. If in case the DTMF signals fails, the robot has various sensors such as Ultrasonic, IR (infra-red) sensor which will make the bot to function as the obstacle avoidance bot. These sensors are used for mid-range distance measurement [4.] We are also using the camera of the mobile to get the live streaming using AIR-DROID application.

## II. BLOCK DIAGRAM

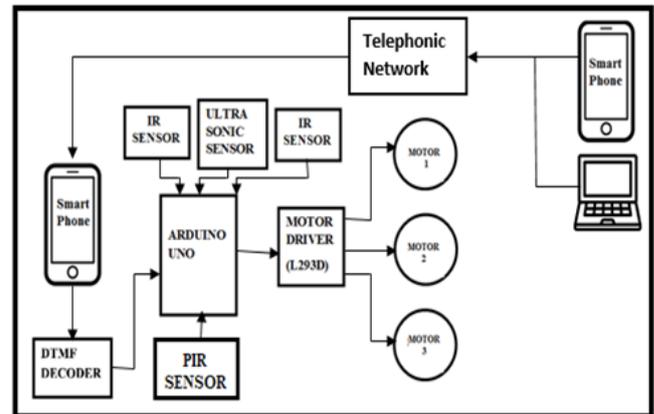


Fig. 1: Block diagram

## III. WORKING

As shown in the block diagram the Arduino is used as a main controller. Since the output on the controller is not that efficient to drive the motors, we have used IC L293D which functions as a motor driver, in which three motors of 100 RPM (revolutions per minute) are interfaced. The function of two motors are to drive the robot and the servo motor (third motor) are used for the rotation of the camera.

There is a cellular phone (the call receiving setting is set to auto receiving mode) connected on the robot via the DTMF decoder to the Arduino. The robot receives the DTMF from the phone stacked on the robot [9]. To operate the robot in the autonomous mode there are sensor such as Ultrasonic and IR to detect the distance in order to avoid the obstacles. In order to sense human being we have used PIR (passive infrared sensor) sensors. The PIR sensors sense the thermal energy of the surrounding and provide the changes in the sensed output parameter depending upon it.

At the remote location there will be another cellular phone and a laptop. Cellular phones used to send DTMF signal and the laptop is used for viewing the live streaming if the video received from the phone kept on the bot. The communication takes place through the wireless telephone network.

#### IV. FLOW CHART

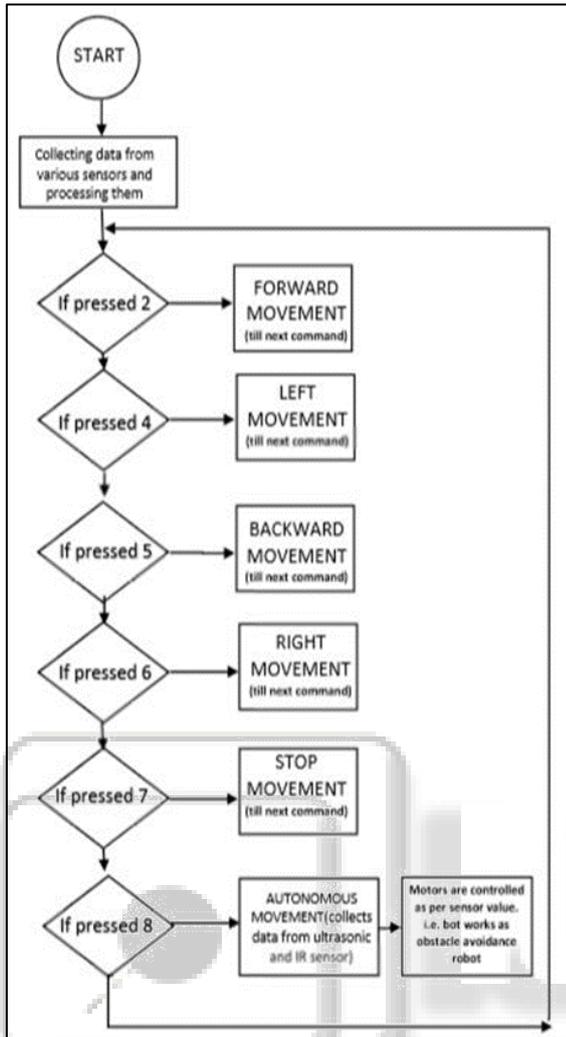


Fig. 2: Flow chart

#### V. COMPONENTS

##### A. DTMF Decoder

The IC MT8870 is called as the DTMF Decoder [1]. The function of the DTMF Decode is to separate the low and high frequency converting them into binary digit. Further processing is of the converted binary data is done by the controller. The lowest frequency used is 697Hz and the highest frequency used is 1633Hz [6].

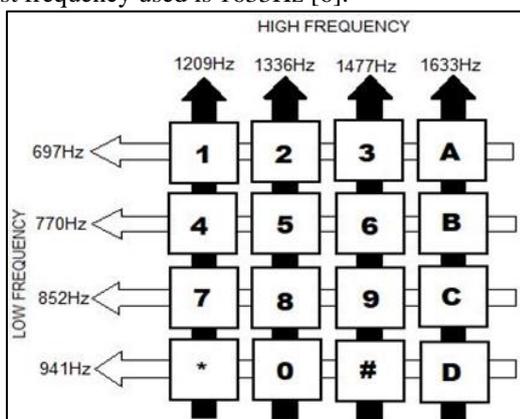


Fig. 3: DTMF keypad frequency

##### B. Motor Driver IC

In order to provide the required power to the motors we use motor driver IC L293D. It is a quad, high current driver [5]. The working of the motor drivers I according to the H bridge concept [1].

##### C. Obstacle Avoidance Sensor

These obstacle avoidance sensors will help the robot to from any collision [2]. The echo signal from the transmitter is transmitted and received back from receiver which is used to calculate the distance to the obstacle. The IR sensors uses infra-red signals for the detection.

##### D. Battery (Power Supply)

In order to provide the supply to whole bot we are using a power bank of 10000mAh.

##### E. DC Motors

To drive the robot, we have used a DC motor rating 5V having 100 RPM (revolution per minute).

##### F. Arduino (Microcontroller)

This the main brain on the robot which control and processes the data received from the various sensors. It has an operating voltage of 5V and 6 Analog pin.

#### VI. APPLICATIONS

##### A. Defense Activity

Since the work related to defense is very dangerous. These dangerous locations can have surveyed by this robot without putting any life in danger [3].

##### B. Scientific Uses

The places are coal mining, there as harmful gases where a human life can be dangerous. At that places we can send the bot very easily.

#### VII. FUTURE SCOPE

Any user can call and control the robot. Hence we will try to introduce password protection.

Face recognition using the camera at the used at the robot in order to detect the suspicious person.

#### VIII. CONCLUSION

Hence the DTMF is very adaptable technology which can be used all most everywhere in variety of applications. Initial installment will be a bit difficult for a beginner in order to understand DTMF technology. We were able to control the robot and were able to do the surveillance successfully with the help of use of DTMF technology.

## IX. DESIGNED ROBOT

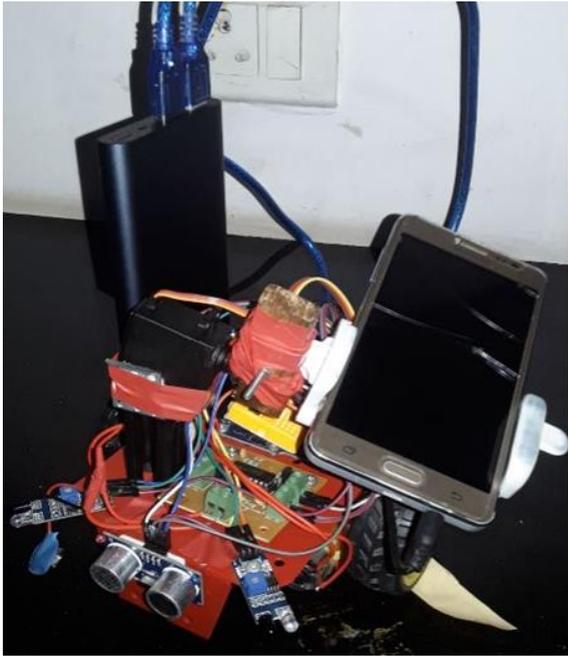


Fig. 4: Designed hardware

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