



## A NOVEL APPROACH TO OPERATING AND CONTROLLING THE DEVICES USING DTMF

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### ABSTRACT

This project deals with the applying of the twin tone multi-frequency (DTMF) technology utilized in telephones and mobile communication, in real time for dominant electrical appliances in our daily use. It uses a DTMF decoder beside a microcontroller to manage appliance from a far off location. This experiment brings out the employment of home appliances with the assistance of a far off. The remote will emit solely IR radiations and this radiation is alone concerned within the method of communication between the appliance and also the human. this concept may be brought out much that might remedy the disabled. Dual-tone multi-frequency communication (DTMF) is employed for telecommunication communication over analog phone lines within the voice-frequency band between phone handsets and different communications devices and also the switch center. Multi-frequency communication could be a cluster of communication strategies that use a combination of 2 sound sounds. varied medium frequency communication protocols were devised by the Bell System and CCITT.

**Keywords – DTMF, Touch-Tone, DTL.**

### 1. INTRODUCTION:

Robotics is a motivating field wherever each engineer will showcase his inventive and technical skills. Pleasing side of AI is that a golem are often created indigenously by anyone. during this competitive world there's would like for each evangelical,

amateur to skilled, to create an easy golem having innovated applications and with strong control. Mobile phones nowadays became an important entity for one and every one so, for any mobile based mostly application there nice reception. during this situation creating a portable operated land rover may be a sensible plan. Conventionally wireless controlled robots utilize RF

circuits, that had limitations like restricted vary,restricted frequency ranges and controls. however a portable controlled golem will hold up these limitations. it's a strong management, unlimited vary (coverage space of the service provided), no worry of intrusive with different controllers and that we will have the maximum amount has 12 controls. Although the looks and capabilities of robots vary immensely, all robots share the options of a mechanical, transferrable structure underneath some style of management. This management of golem involves 3 distinct phases: perception, process and action [1]. In common preceptors area unit sensors mounted on the golem, process is completed by on-board microcontroller or processor and task (action) is performed victimization motors or with another actuators.

**II. GENERAL BLOCK DIAGRAM**

Receiver cell phone is connected to the DTMF decode rand the digital outputs are fed to the input ports of the RISC microcontroller. The output ports are connected to the motor driver circuit constructed out of L293D. The motors used are geared type.

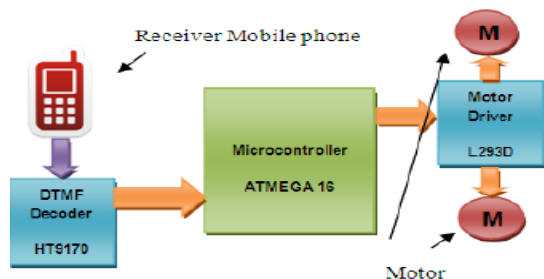


Fig.(i). General block diagram

**III. SOME DEFINITIONS**

**3.1 Cell phones**

Cell phones, conjointly called mobile phones or wireless phones, square measure hand-held phones with integral antennas. Cellphones are literally two-way radios, very like the walkie talkies of the past, albeit rather more advanced. after we persuade our cellular phone receiver, it registers our voice and converts the sound into radio waves. These radio waves square measure then picked up by our cellular phone and reborn into the sound of a person's voice. As always, communication is significant, and cell phones can facilitate North American nation to raised communicate.

**3.2 DTMF Decoder**

The HT9170 may be a full DTMF Receiver that integrates each band split filter and decoder functions into a single 18-pin DIP or SOIC package. factory-made victimisation CMOS method technology, the HT-9170 offers low power consumption (35 mW max) and precise knowledge handling. Table (i) exhibits the DTMF and their corresponding digital outputs of HT9170 decoder IC. Its rewriter uses digital investigating techniques to sight and decode all sixteen DTMF tone pairs into a 4-bit code. It works on three.5795MHz crystal connected between PIN seven and eight. The input is connected to the pin no two via a capacitance of zero.1mf and a network of electrical device every with a value of 100KΩ. The outputs area unit inverted victimisation NAND gates because the input pins of microcontroller ATMEGA sixteen area unit all active low sort. the applying circuit is shown within the figure (ii).

The headphone output of the receiver mobile is connected to the input of the DTMF decoder. Whenever a key is pressed we a distinct tone called Dual tone multiple frequency which is decoded by HT 9170 into a 4 bit digital output with 16 combinations.

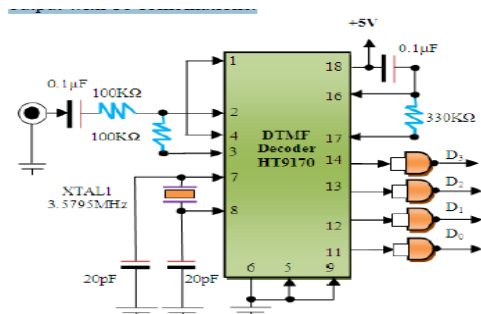


Fig.(ii). Application circuit of DTMF Decoder using HT9170.

### 3.3 ATMEGA16A Microcontroller

The ATmega16 could be a low-power CMOS 8-bit microcontroller supported the AVR increased reduced instruction set computer architecture. By execution powerful directions in an exceedingly single clock cycle, the ATmega16 achieves throughputs approaching one MIPS per Mc permitting the system designed to optimize power consumption versus process speed [2][3]. The AVR core combines a fashionable instruction set with thirty two general purpose operating registers. All the thirty two registers ar directly connected to the Arithmetic Logic Unit (ALU),permitting 2 freelance registers to be accessed in one single instruction dead in one clock cycle. The microcontroller works with a 12MHz crystal. The port A is AN I/O port and may be used as input port. PA0, PA1, PA2 and PA3 ar allforce up mistreatment resistors R1, R2, R3 and R4. The output ports ar directly coupled to the

motor driver L293D via I/O port D. It will provide 40mA of current per pin of I/O and thus it may be connected on to motor driver IC. The application circuit has been shown within the figure (iii).

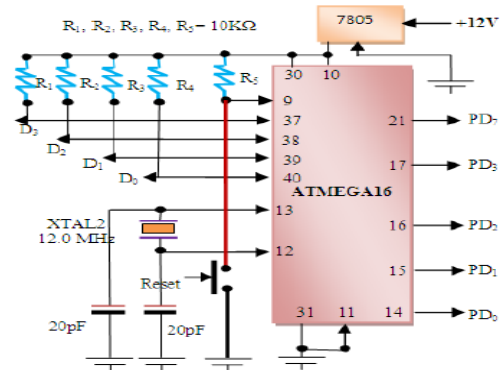


Fig.(iii). Control unit using Microcontroller ATMEGA 16

### 3.4 L293D Motor Controller

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (suchas relays solenoids, DC and stepping motors) and switching power transistors. The application circuit has been shown in the figure (iv).

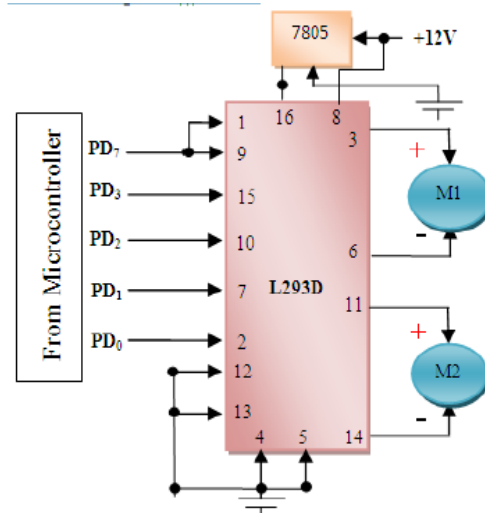


Fig.(iv). Motor driver circuit using L293D

This device is suitable for use in switching applications at frequencies up to 5 kHz. The driver IC works on 5V dc but to provide power to the motors separate high voltage directly from the battery or power source is connected to the pin no 8. The supply working voltage can be provided by a simple three terminal regulator. The enable pins must be pulled high to make the IC work. It is connected to the Port D of microcontroller. Hence, the IC can start functioning when it is commanded by the microcontroller.

#### IV. EXPLANATION OF THE WORKING OF THE LAND ROVER

In order to regulate the golem, we'd like to form a decision to the cellular phone connected to the golem (through head phone) from any phone, that sends DTMF tone on pressing the numeric buttons. The cellular phone within the golem is unbroken in machine answer mode. (If the mobile doesn't have the machine responsive facility, receive the decision by OK key on the rover connected mobile and so created it within the hands-free mode.) thus once a hoop, the cellular phone accepts the decision. currently we tend to could press any button on our mobile to perform actions as listed within the table higher than. The DTMF tones so created area unit received by the cellular phone within the golem [4]. These tones area unit fed to the circuit by the receiver of the cellular phone. The HT9170B decodes the received tone and sends the equivalent binary range to the microcontroller. in keeping with the programme within the microcontroller, the golem starts moving

When the Key '2' is ironed (binary equivalent 00000010) of the remote movable, the output of the microcontroller offers a binary equivalent '10001001'. Port pins PD0, PD3, PD7 square measure high. The high output of PD7 of the microcontroller allows the motor driver IC (L293D). Port pins PD0 through PD3 drives the L293D and successively it controls the motors M1 and M2 within the forward direction, as per the on top of table. Similarly, the motors move takes a Left flip, Right turn, backward motion and Stop as shown within the table (ii).

#### 4.1 ALGORITHM

INPUT: Input signals via the mobile phone that acts as a far off.  
 OUTPUT: Motion of the land rover.  
 Step1: A decision is created by the remote mobile phone to the mobile phone stacked within the land rover and also the decision is received.  
 Step2: The remote mobile phone sends signals to the DTMF decoder via the top phone by pressing the required keys on the data input device.  
 Step3: The DTMF decoder decodes the received tone and sends the equivalent binary variety to the electrical converter.  
 Step4: The electrical converter inverts the decoded signals and sends it to the microcontroller.  
 Step5: The microcontroller is preprogrammed and it generates outputs consistent with the program that is fed into the motor controller.  
 Step6: The motor controller L293D drives the DC meshed motors consistent with the microcontrollers output.  
 Step7: The land rover exhibits the subsequent motion:

Table III: Robotic movement consistent with the keys ironed within the transmitter movable.

#### 4.2 SALIENT FEATURES

This is wireless controlled robot hence the limitation of wired robots is completely overcome by using latest technology of mobile phones [5][6]. Here in our lab we have used RF circuitry hence the limitation of a controlled range is no more a constrain of this model. Limitless area coverage is the main advantage of this land rover.

#### 4.3 Application Area

This land rover will carry something mounted on high it. this will be fitted in a lovely kind of a toy automaton.

It can even be accustomed create mobile bomb by creating some modification. If we tend to use the change IC rather than the driving force IC we will activate and off any appliances connected to the current automaton.

#### V. CONCLUSION

The automaton is controlled by a portable that creates a decision to the portable hooked up to the automaton. In the course of a decision, if any button is ironed, a tone like the button ironed is detected at the opposite finish of the decision. This tone is termed DTMF (dual-tone multiple-frequency). The automaton perceives this DTMF tone with the assistance of the phone stacked within the automaton. The received tone is processed by the (ATmega16) microcontroller with the assistance of DTMF decoder HT9170/MT8870. The microcontroller used

is architecture sort. we are able to additionally use Intel based mostly microcontrollers like 89XX51 series. The decoder decodes the DTMF tone into its equivalent digit and this binary range is shipped to the microcontroller. The microcontroller is programmed to require call a choice a call for any given input and outputs its decision to motor drivers so as to drive the motors in forward direction or backward direction or flip. The portable that creates a decision to portable stacked within the automaton act as a foreign, thus we tend to don't need the development of receiver and transmitter units.

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