

## DTMF BASED HOME AND INDUSTRIAL AUTOMATION

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### Abstract

This paper presents an effective technique for the user to monitor and control the house/office appliances and other equipment's via the mobile phone. The automation improves the lifestyle of control of the device. This approach is based on embedded system. In this project, we propose a unique System for automation utilizing Dual Tone Multi Frequency (DTMF) that is paired with a wireless module to provide seamless wireless control over many devices in a house & Industry. This paper suggests a method for control using the DTMF tone generated when the user pushes mobile phone keypad buttons or when connected to a remote mobile system. The advantage of this system is that it can be operated from any distant or remote area.

**Keyword:** DTMF, Microcontroller, Embedded System, Mobile Phone, solar panel, controller circuit.

### Introduction

The project is designed to allow easy use of a mobile phone to control appliances in the home. Using a mobile phone the development of the control system will be carried out using SMS. This will communicate with another mobile phone, which in turn controls the devices attached to microcontroller modules. When the action has been carried out then a response is sent to the user. The project involves three main areas, research, development\programming, testing and the writing of the report.[1]

These devices should be controlled as well as turn on/off if required. Most of the times it was done manually. Now it is a necessity to control devices more effectively and efficiently at anytime from anywhere.[2]

The underlying principle mainly relies up on the ability of **DTMF (Double Tune Multi Frequency)** ICs to generate DTMF corresponding to a number or code in the number pad and to detect the same number or code from its corresponding DTMF[3]. a DTMF generator generates two frequencies corresponding to a number or code in the number

pad which will be transmitted through the communication networks, constituting the transmitter section which is simply equivalent to a mobile set.[4]

In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist them with the muscular requirements of work, automation greatly reduces the need. [5]

This system is used as anti-theft system. The use of advance microcontroller reduces size of the hardware to a greater extent. There are no specifications for the kind of mobile used. The complete circuitry is proved to be very much economical. The set of instructions is very much simplified. This eliminates the requirement of expert user. An introductory knowledge of mobile phone is more than sufficient.

As per our survey or literature various workers gained achievement in this field "N. sriskanthan" explained the model for home automation using Bluetooth via PC that works lack to support mobile technology.

### Proposed Methodology:

In the present project a microcontroller is used as a control unit which gets inputs (instructions, commands) from a mobile connected through GSM. To make the connection more secure, consumer authentication along with a password will be provided. To switch on/off any appliance positioned at controller's part, the cellular phones are connected, the appropriate tone and password are entered. The tone entered is decoded via the DTMF decoder which further translates it into binary values. Binary values are the input to the microcontroller which verifies each tone individually and corresponding output is given at the output terminal. Thus, when the relay drive is activated by the microcontroller, the device either gets ON or is switched OFF as per the requirement. Our project makes use of auto answer facility and hence eliminates the need of a ringdetector circuit.

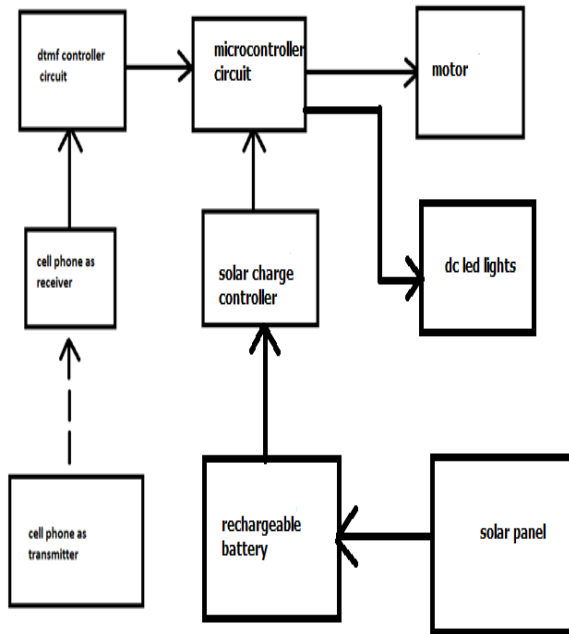


Fig. Block Diagram.

**DTMF Decoder**

- DTMF is short for Dual Tone Multi Frequency.
- It is a generic communication term for touch tone (a Registered Trademark of AT&T).
- The tones produced when dialling on the keypad on the phone could be used to represent the digits, and a separate tone is used for each digit.
- Pressing any key generate unique tone which consists of two different frequencies one each of higher and lower frequency range.
- The resultant tone is convolution of two frequencies Fig. shows mobile keypad frealso shows tone frequency associated with a particular key.

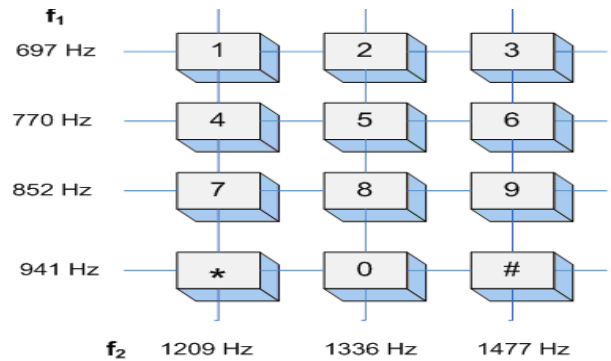
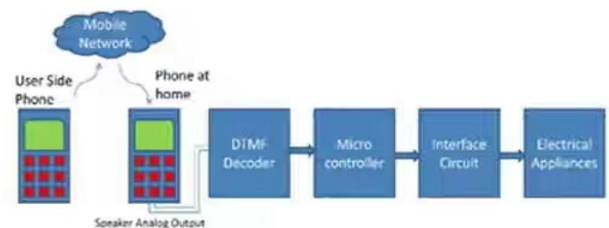


Fig. Phone keypad for DTMF generation

Table 1 - Frequencies generated on Key presses

Button	Low frequency (Hz)	High frequency(Hz)
1	697	1209
2	697	1336
3	697	1477
4	770	1209
5	770	1336
6	770	1477
7	852	1209
8	852	1336
9	852	1477
0	941	1209
*	941	1336
#	941	1477

In this project we interfaced 8051 microcontroller with Motorola’s C168 GSM mobile phone to decode the received message and do the required action. The protocol used for the communication between the two is AT command. The microcontroller pulls the SMS received by phone, decodes it, recognizes the Mobile no. and then switches on the relays attached to its port to control the appliances. After successful operation, controller sends back the acknowledgement to the user’s mobile through SMS.



### Solar Panel And Controller Circuit

- The controller circuit will be used to provide constant voltage to the battery even when the intensity of sunlight is high.
- This circuit will also run the street light controller circuit this entire thing will run on solar energy.
- A charge controller, charge regulator or battery regulator limits the rate at which electric current is added to or drawn from electric batteries.
- It prevents overcharging & may prevent against over voltage

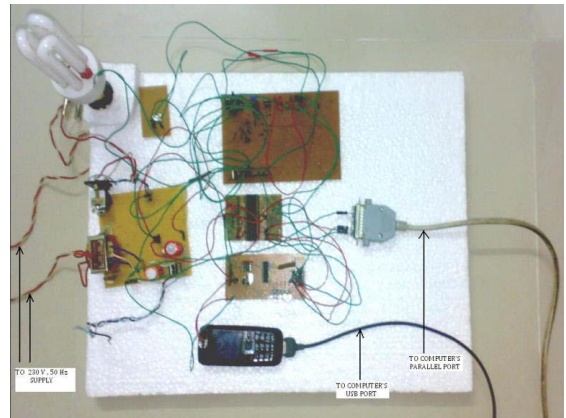
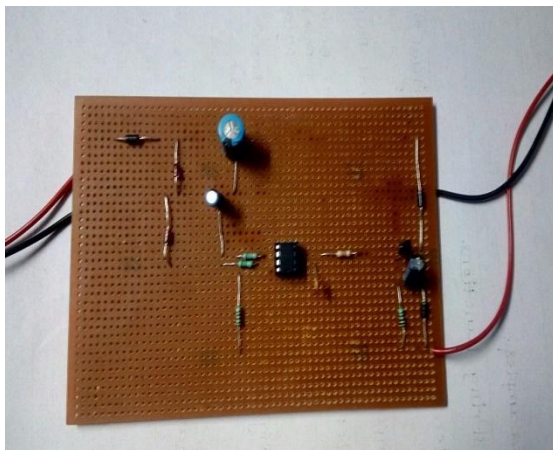
#### 89S52Microcontroller:-

low-power , high performance CMOS 8 bit microcontroller with 8 KB of flash memory . this powerful microcontroller is suitable for many embedded control applications.

#### Relays:-

A relay is a simple electromechanical switch made up of an electromagnet and a set of contacts.

### Experimental Result:



### Future scope

**Video Calling:** In future we can add video facility to our circuit. It will be an advanced way like video conferencing. Along with the reply as a voice we will get the visual status of condition of the devices. Also if anybody is misusing our device we can immediately make it off. Means for security purpose also we can use it. It will be applicable in home, offices, industry, and our vehicle parking system, agriculture also. **Alarm Facility:** Alerts user on occurrence of any abnormal conditions like power failure, parameters exceeding prescribed limits, **Voice Operated System:** A system is developed for remote monitoring and control of devices using mobile through spoken command. **Use of Robots:** In this the static circuitry will be replaced by the Robots which will be controlled through commands given remotely by mobile. This will be major step in automation and will have tremendous future scope of development and applications.

### Conclusion:

This paper presents a method to control a domestic system using the DTMF tone generated by transmitting telephone instrument when the user pushes the keypad buttons of the mobile phone connected to the remote domestic system. This control method uses commercial mobile communication networks as the path of data Transmission. This enables the user to control the system continuously by sending the mobile phone DTMF tone.

The advantage of this system is that it can be operated remotely. This system is more reliable and it can also be used for security purpose.

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