# A Survey on Home Automation using Mobile and DTMF Technology

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**Abstract***: In this survey paper of Home Automation we introduced the automations techniques. Today is the world of advanced ubiquitous mobile application which are used exhaustively to save time and energy. In our paper we use DTMF technology using mobile phone. User can control electrical appliances in home or office via mobile phone. Aim for planning of a system which will minimize energy waste in home environment with efficient managing device modes. In this paper we also mention that how the home automation is must for our real life, how it adopt in our environment easily. In the present time we can find most of people clinging to their mobile phone and smart devices thought the day, hence with the help of this companion – a mobile phone some daily household task can be accomplished by personifying the use of mobile phone. Home automation system are designed for mobile phone which control the manner of home appliances like light, fan, bulb and many more using ON OFF relay. Home automation is essence play a very vital role in modern era because of its flexibility in using at different places with high precision which will intern save money and time by decreasing human hard work.*

**Keywords**: Home automation, DTMF (dual tone multi frequency), mobile controlled, electrical appliances.

## 1. Introduction

Home automation refers to the use of computer and technology to control home appliances and feature (such as window and lighting) [7]. Generally appliances in our home are controlled with the help of switches. Now we can see automation of these appliances using many technologies. Home automation technology includes WI-FI technology, Android operating system or DTMF technology.

When we go out of the house we switch OFF the light or the electrical equipment to avoid accident such as short circuit, firing etc. but sometimes we forget to switched OFF them, we have to come back home to do so. This is waste of time and create lots of chaos and tension [1]. Smart home is one in which all electrical equipment around the home technologically smart or intelligent or automated with highly advanced system. Home automation is the device which control the physical environment. It can be used in kitchen, home or offices etc. In the field of home automation microcontroller based system is the great achievement. this system is designed to be low cost and expandable allowing a variety of devices to be controlled. Home automation is being more and more popular and important because it gives the user the comfortable and easy access to the home devices. Smart home is a very promising area, which has various benefit such as providing increased comfort, safety and security to the system [3]. The technology is easy to use and targeted for people without technical background.

This paper proposes a method to control remote machine using mobile and DTMF decoder. Dual tone multiple frequency (DTMF) that is paired with a wireless module to provide seamless wireless control over many devices in house .The process of home automation works by making everything in the house automatically controlled using to control and do the job that would normally do manually.

## 2. Need Of Automation

The need of automation in today's era, main aim of our work is that we have to apply the technology in our homes and in our daily life by which we can make our life style very easier and comfortable.

Home automation is adopted for reason of ease, security and energy efficiency. Development of thermostats allowed more automated control of heating and later cooling. As the number of controllable device in the home rises interaction and communication become useful and desirable feature. For example a furnace can send an alert message when it needed cleaning or a refrigerator when it needs service. Home automation can also provide a remote interface to home appliances or the automation itself to provide control and monitoring on a smart phone or web browser.

The primary purpose of automation is to aid us in living a more convenient and comfortable life.

a) **Comfort:-** It makes home more comfortable since it is away to customize our own home environment. For example when we arrive at our

home we are welcome with a pleasant temperature depending if it winter or summer.

**b) Security:-** It makes home safer, since it allows immediate action when any problem occurs. For example a flood or gas leak is detected and the system immediately turns of the gas/water/electricity.

**c) Economy:-** It makes home more economic since it can optimize the availability resources accordingly to our needs. It save power consumption and use of energy in very efficient manner.

Make low cost, cheaper technology that will easily accept by our society.

## 3. Methodology

Home automation system includes the following technology or devices:-

a) Sensor to measure or detect things like temperature.

b) Controller such as PC or a dedicated home automation controller or mobile phone.

c) Actuators such as motorized valves light switches and motors.

d) Busses for communication that can be wired or wireless.

e) Interface for human machine and to machine interaction.

we are mainly focus to DT MF based home automation because it is easier for making , handling and implementing. And there is no need of maintenance.

**Principle of DTMF technology:-**

**DTMF:-** DTMF is a signaling system for identifying the number dialed on a DTMF keypad. DTMF has enable the long distance signaling of dialed number in voice frequency range over telephone lines.

DTMF is the name suggested uses a combination of two sine wave tone to represent a key. A DTMF keypad (generator or encoder) generate a sinusoidal tone which is mixture of the row and column frequency. The row are the low group frequencies and the column are the high group frequencies.

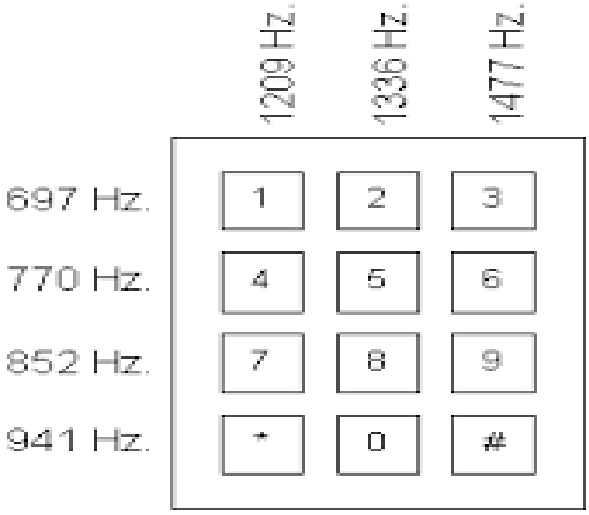


**Figure.1:** DTMF frequency range

Here we use DTMF ( dual tone multiple frequency) which is generated by using cell phone. We can control the home appliances from anywhere in the world (in network area).when we press any key on mobile phone then it generate a frequency after mixing two frequencies and then send it to the receiver end over communication channel. This frequency are used to send the command for switching the relay which is connected to our electrical appliances.

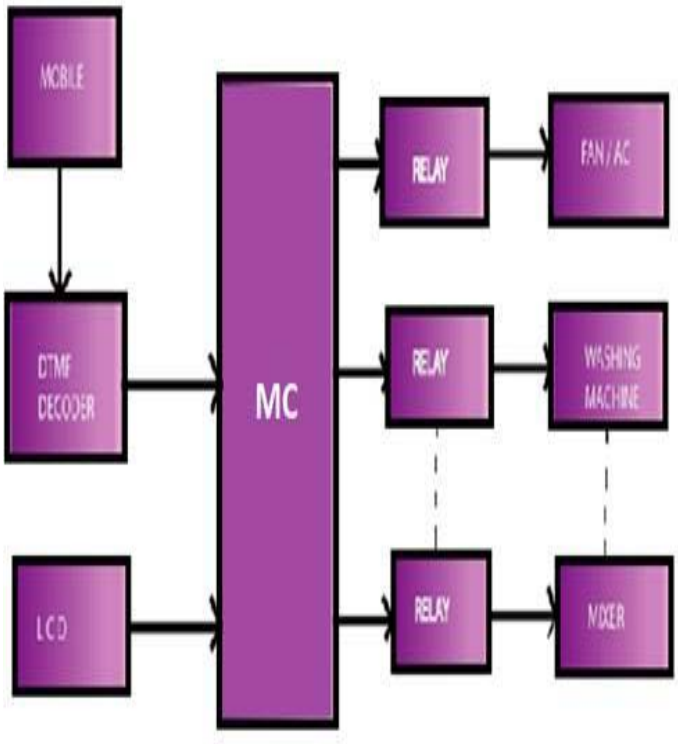


**Figure.2:** Block diagram of home automation using DTMF

The working of this system is such that when we press any key in our mobile phone a frequency is generated which is converted to digital signal by using DTMF decoder. Then

this digital logic given as input to the microcontroller which gives the logic '0' or '1' to the relay. i.e. which will switch ON or OFF to the relay by which we can control the home appliances.
User can activate their device using this DTMF keypad as he/she want to activate. The encoder encodes the user input and send via a communication channel. The receivers receives the modulated signal and demodulate it and the user input.
The system is designed for controlling the devices , it includes a cell phone which is connected to the system via head set. To activate the cellular phone part of the system a call is to be made and as the call is ensured in response the user would any digit to access the system.

**DTMF decoder -** MT8870 is a decoder IC which is used for converting frequency to digital input for the microcontroller. Circuit diagram to decode DTMF code using MT8870 as shown in circuit MT8870 needs crystal oscillator of 3.58 MHz (exactly 3.579545 MHz) and 5v Vcc supply to be functional. Crystal is connected in between pin no. 7 and 8. Pin no. 8 is connected to Vcc and 9 is connected to ground.

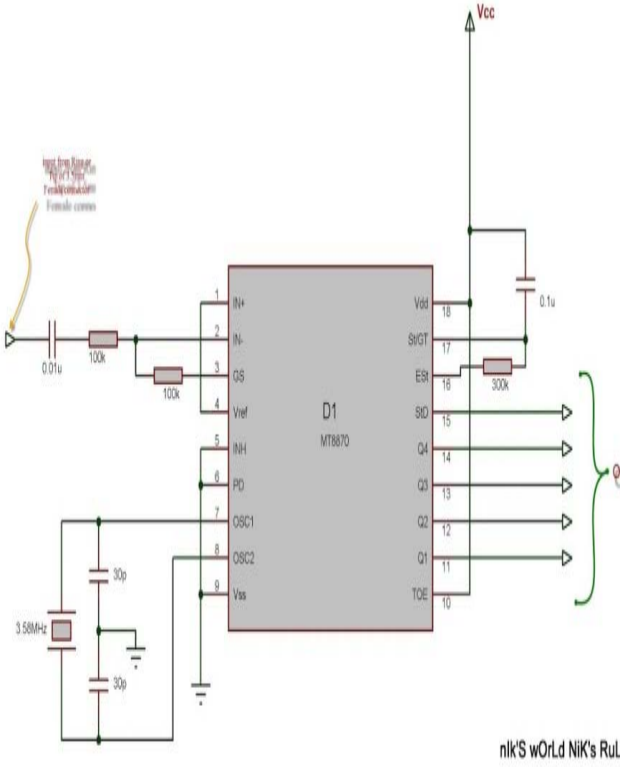


**Figure.3:** MT8870 DTMF decoder

**Microcontroller -** here we use AVR(Advanced virtual RISC) microcontroller series i.e. ATMEGA 16 which is used for controlling the relay and storing the programming which we want to execute. The purpose to use this AVR microcontroller is that we use embedded C language in place of assembly language which is more complicated and lengthy for programming.

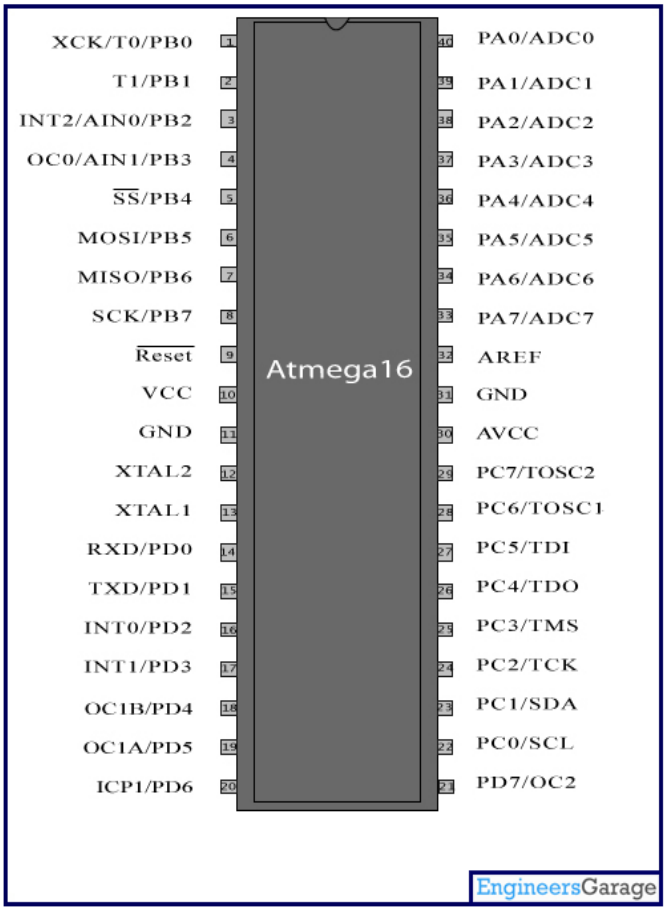


**Figure 3**. Pin diagram of ATMEGA 16

## 4. Use of Automation

**Advantages:-**

a) Save energy, low power consumption.
b) Low cost and cheaper than other technologies like GSM.
c) Easier to design.
d) Easier for implementation.
e) Operated in long range.
f) Less maintenance is required.
g) Our system is flexible and upgradable.

**Disadvantages:-**

a) If there is no network in phone then this system will fail.
b) If mobile doesn't response at that time system cant access.
c) There is need of regular power supply to our system.

**Features**

a) One can control home appliances from anywhere
b) Remote switch ON & OFF drive way, garden, light etc.
c) Open and close sun blinds, roll down shutters and auto gate.
d) Ring door bell to notify staff to open gate from car.

**Application**

a) We can use this system in home and office easily.
b) We can use this system in industries also.
c) By using DTMF we can operate robot and many more things using mobile.
d) This system provides solution for industrial sector to access and control device and machine remotely.

## 5. Future Enhancement

a) It can be used multipurpose by using sensor on it.
b) Heat sensor senses the human body temperature and appliances will operate automatically.
c) We can also use our laptop for controlling purpose.
d) Used as security purpose for various application like hospital, bank, theater etc. Using sensor it control itself.
e) Using call alert system for security purpose.

## 6. Conclusion

In our survey paper "HOME AUTOMATION USING MOBILE AND DTMF TECHNOLOGY" we have concluded that in place of assembly language we adopt Embedded C language which is very efficient and simple for programming, by this we can reduces the length of our program. The approach discussed in the paper is novel and has achieved the target to control the home appliances remotely using mobile and DTMF technology to connect the system port satisfying user need and requirement. The proposed system is better from the scalability and flexibility point of view than the commercial available home automation system. Main objective is to give a survey on smart home research. Smart is the good and beneficial who is very much easy with their professional life and also for those who are about security and comfort but they want to save their electrical energy that is wasted by many people in regular span of time. All the time home can be save from automation so that we have much more time work on the other things or pursuits.

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