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Home Automation using Digital Control System

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ABSTRACT

This paper provides remote controlling and automation for homes and offices. These are very essential in present life style. Wireless control is primary concern for everyone. This paper describes a design of effective remote control system that can monitor the house. Apart from remote control concern here we also take care of home automation. This paper gives the best solution for electrical power wastage. The Dual-Tone Multi Frequency (DTMF) technique used in touch tone telephones to control the home appliances (on/off) without actually going near to the switch boards or regulators.

Keywords—DTMF, TRIAC, Relay, Flip Flop, Demultiplexer, Hex Buffer.

I. INTRODUCTION

The remote control used in home automation systems, is a wonderful feature that everyone would like to enjoy, if they were not expensive to install, maintain, and able to be used from long distance. The idea of the remotely controlled home automation systems.

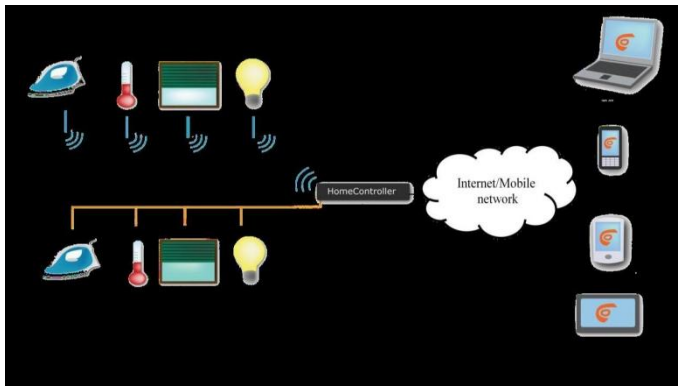

Fig 1: General View

The home automation have many features makes the home owner remotely toggle appliances such as air conditioning and heating units, lamps or porch lights, landscape sprinkler timers, snow-melt systems, outdoor property lighting, and safety lighting. The mobile phones and *Touch-Tone telephones* use the *Dual-Tone Multi Frequency* (DTMF).

That was developed initially for telephony signaling such as dialing and automatic redial. Each key-press on the phone keypad generates DTMF signal consists of two tones that must be generated simultaneously.

II.PROJECT DESCRIPTION

A. Power Supply

Power supply is a reference to a source of electrical power. A power supply unit or PSU can be defined as system that provides electrical or other types of energy to a load or group of loads connected to it. Here in our system we require a 5v DC power supply for all electronic components involved in the project. This requires step down transformer, rectifie, voltage regulator, and filter circuit for generation of 5v DC power.

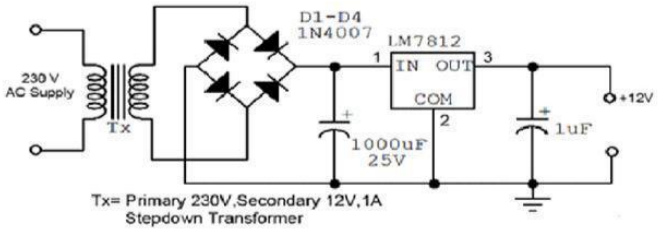

Fig. 2.A : Power Supply circuit

B. DTMF Decoder

Dual Tone Multi Frequency (DTMF) that is paired with a wireless module to provide seamless wireless control over many devices in a house. Dual -tone-multi -frequency (DTMF, also known as touch-tone) are the audible sounds you hear When you press keys on your phone. The tone generator (top) uses the 5589 chip and a DIP switch. You can actually hear the tones through the speaker. Touch-tone is familiar to many (telephone), it is a mature technology, and readily available with off-the-shelf, single-chip, low-cost components. For these reasons DTMF is often used in remote control applications that typically use telephones (e.g. accessing your messages from an answering machine, retrieving your account balance info from your bank's database).

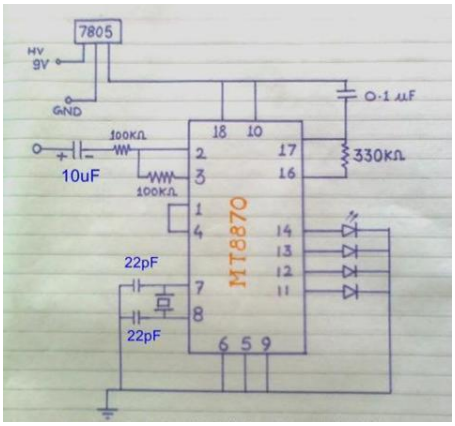

Fig. 2.B: DTMF Decoder

C. Duel Tone Multiple Frequency Keypad

The DTMF keypad is laid out in a 4×4 matrix, with each row representing a low frequency, and each column representing a high frequency. Pressing a single key (such as '1') will send a sinusoidal tone of superimposition of two frequencies (697 and 1209 hertz (Hz)). The original keypads had levers inside, so each button activated two contacts. The multiple tones are the reason for calling the system multi frequency. These tones are then decoded by the switching center to determine which key was pressed. Present-day uses of the A, B, C and D signals on telephone networks are few, and are exclusive to network control. For example, the A key is used on some networks to cycle through different carriers at will. The A, B, C and D tones are used in radio phone patch and repeater operations to allow, among other uses, control of the repeater while connected to an active phone line. The *, #, A, B, C and D keys are still widely used worldwide by amateur radio operators and commercial two-way radio systems for equipment control, repeater control, remote-base operations and some telephone communications systems. But nowadays in mobile handsets the A,B,C,D keys are not used usually.

Properties of DTMF tone frequencies are:

- No frequency is an integer multiple of another.
- The difference between any two frequencies does notequal any of the frequencies.
- The sum of any two frequencies does not equal any of the frequencies.

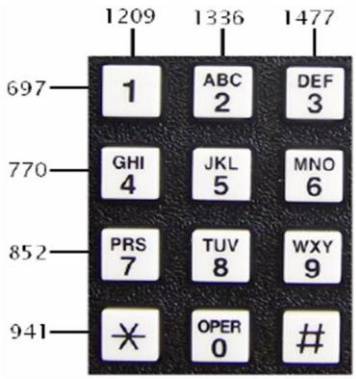

Fig. 2.C. Keypad of cell phone with 12 keys and frequencies

III.RESULTS & DISCUSSIONS

To implement this system in practical life, five relays are taken and for the indication of the outputs, five light emitting diodes (LED) are used. Then some of the keys of the cell keypad are used to experiment the control system by getting the outputs corresponding to the pressed key.

TABLE -- IMPLEMENTED COMMANDS

Key Presed	Results
1	Turn on device 1
2	Turn on device 2
3	Turn on device 3
4	Turn on device 4
5	Turn on device 5
*	Start turn off device
1	Turn off device 1
2	Turn off device 2
3	Turn off device 3
4	Turn off device 4
5	Turn off device 5

The DTMF technology used in this system device is very fast. So the control of the electric devices is very easy with this system. As the cost of the project is low and the network of the cellular communication is wide-spread, the users should experiment this technology in their home. As it is based on wireless cellular communication, they can control their home appliances from any part of the world by pressing keys of their cell phone.

IV.CONCLUSION

It will encourage us to consider bringing Home Automation into our own lives. The plugs in devices make an easy entry point to working with the technology. The received tone is processed with the help of DTMF decoder. The DTMF decoder then transmits the signal to the microcontroller to operate the relay. It provides the advantage of robust control, working range as large as the coverage area of the service provider. In this way, we have developed this which is capable of receiving & decoding the commands and control signals from the distant areas and can work according to our instructions. This home appliances control or home automation project also uses the same DTMF decoder circuit section with little modifications to control home and office electrical appliances. Just connect your cell phone headset (headphone) jack to the mobile phone and then mobile will control electrical appliances and electrical equipment through the DTMF key pad of your cell phone.

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