

Home Automation Using Voice Recording Playback and Dual Tone Multiple Frequency (DTMF)

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ABSTRACT:

This paper represents an effective technique for the user to monitor and control the house (or) office appliances and other equipment via a mobile phone. The home automation improves the lifestyle and control of the home devices. Our work is based on an embedded system. In this project, we propose a unique system for Home Automation utilizing Dual Tone Multi Frequency (DTMF) that is paired with a mobile to provide seamless wireless control over many devices within a house. We can operate our system from any distant area. The principle used in the mobile for decoding is DTMF tone.

KEYWORDS: DTMF, Microcontroller, Cell Phone.

I.INTRODUCTION

The aim of the proposed system is to develop a cost effective solution that will provide controlling of appliances remotely. 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 any time from anywhere. The objective of this project is tenable users to remotely control their appliances and systems using a cell phone using dual tone multiple frequency (DTMF). To access the control unit, the user should send authentication code along with the required/desired function/action to his/her control system via call. Upon being properly authenticated, control unit would relay the commands to a microcontroller that would perform the required function/action and return a feedback using voice playback. This project we propose a unique System for automation utilizing the Dual Tone Multi Frequency (DTMF) that is paired with a wireless module to provide seamless wireless control over many devices. This user console has many keys, each corresponding to the device that needs to be activated. Based upon this the required appliance is triggered and appropriate feedback is generated.

II.COMPONENTS USED:

1.DUAL TONE MULTIPLE FREQUENCY(DTMF):

DTMF is Dual Tone Multiple Frequency is a signaling system for identifying the number dialed on DTMF keypad. Prior to the development of DTMF, telephone numbers were dialed by users with a loop-disconnect (LD) signaling, more commonly known as pulse dialing (dial pulse, DP). DTMF has enabled the long distance signaling of dialed numbers in voice frequency range over telephone lines. DTMF (Dual tone multi frequency) as the name suggests uses a combination of two sine wave tones to represent a key. As the signals are audible tones in the voice frequency range, they can be transmitted through electrical repeaters and amplifiers, and over radio and microwave links, thus eliminating the need for intermediate operators on long-distance circuits. Each key pressed on the keypad generates two tones of particular frequencies, so a voice or a random signal cannot mimic DTMF signaling tones. One tone is generated from a **High DTMF frequency** group of tones and the other from **Low DTMF frequency** group. When a button is pressed, both the row and column tones are generated by the telephone or touch tone instrument. These two tones will be distinctive and different from tones of other keys. So there is a low and high frequency

associated with a button, it is essentially the sum of two waves is transmitted. These encoded data can be stored and processed in a microcontroller to perform different tasks. These codes are the address of the destination which is read and preceded by the computer.

2. MICROCONTROLLER 8051:

Microcontroller is a control device which incorporates microprocessor. Microcontroller 8051 has these following features in it:-

- 4 Kb of ROM is not much at all.
- 128b of RAM (including SFRs) satisfies the user's basic needs.
- 4 ports having in total of 32 having in total of 32 sufficient to make all necessary connections to peripheral environment.

3. VOICE RECORDING PLAYBACK MODULE (VRPB):

This project is based on APR9600 IC which allows you to record 60 seconds voice and then playback it, with a very high quality. Here we are using DC power supply instead of transformer in order to avoid disturbances.

III. PRINCIPLE:

In the present project a microcontroller is used as a control unit which gets inputs (instructions, commands) from a mobile connected. To make the connection more secure, consumer authentication along with secure, 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.

IV. FUNCTIONAL REQUIREMENT:

1. The microcontroller within the control unit will issue its command to the electrical appliances through a simple control circuit.
2. The pin is used for the verification of the authorized user.
3. The control unit will control the electrical appliances and detect the status of the appliances to be relay back to the microcontroller.
4. Once the pin is authenticated, microcontroller performs the desired functions.

V. TECHNOLOGY CONSIDERATION:

1. **Cellular Networks:** The widely available networks are based on GSM. This network provides a wide area of coverage and can be utilized more cost-effectively for this project.
2. **Communication protocols:** The available communication protocols are DTMF.
3. **I/O interfaces between micro - controller and devices:** Serial or parallel I/O will be considered as options for connection between the user and the microcontroller. Using the microcontroller, a control circuit will be implemented to control the electrical appliances.

VI. TECHNICAL APPROACH:

Assuming that the control unit is powered and operating properly, the process of controlling a home device will proceed through this process. The remote user makes a call and authenticates using a pin. User sends the commands to the DTMF for decoding and then further forwards it to microcontroller. Microcontroller

issues commands to the appliance. Microcontroller checks for completion status and sent it back to the user as a voice.

VII. SOFTWARE USED:

In this project, We have used Keil μ Vision4 software in Embedded C language. Keil is a cross compiler. A cross compiler is similar to the compilers but we write a program for the target process on the host processors. It means being in one environment you are writing a code for another environment is called cross development. And the compiler used for cross development is called cross compiler. So the definition of cross compiler is a compiler that runs on one computer but produces object code for a different type of computer. The Keil ARM tool kit includes three main tools, assembler, compiler and linker. An assembler is used to assemble the ARM assembly program. A compiler is used to compile the C source code into an object file. A linker is used to create an absolute object module suitable for our in-circuit emulator.

VIII. APPLICATION AND ADVANTAGES:

1. Effective control of home appliances using mobile phone.
2. Increases power efficiency and the lifetime of the appliances.
3. Power wastage is reduced.
4. DTMF has enabled the long distance signalling of dialled numbers in the voice frequency range over telephone lines.
5. This has eliminated the need of telecom operators between the caller and called party and evolved automated dialling in the telephone switching centers.
6. Use of two frequencies makes the system more noise immune. Hence, DTMF is popularly used.

IX. CONCLUSIONS:

This experiment was designed keeping in mind the interest of the common people with the belief that the ultimate outcome of this project will be of much help to them, making their lives simpler. It was done using the wireless system and it is extremely fast and efficient. The DTMF tone can be transmitted over the GSM links and hence, the basis for the control of multiple devices from a distance was successfully achieved. This will help people to regulate the switching of a device situated at a hazardous place like a chemical plant where the presence of a human is harmful.

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