

# Cell Phone Based Device Control System with Voice Acknowledgement

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**Abstract**— Saving time is the actual need of this smart, fast growing evaluating 21st century. From the vast area of Electronics & Telecommunication we are using the knowledge of microcontroller in embedded system along with the mobile communication part. The microcontroller is an exciting, challenges and growing field. 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 proposed work has been done experimentally and has been verified in real time. Here we come up with the system in home/office which can be controlled by any cell phone from any distance within minimum time and minimum cost. For this we are take help of microcontroller and the communication network.

**Key words:** Cell phone, Microcontroller, Voice Recording and Playback Device, DTMF decoder

## I. INTRODUCTION

In this fast growing 21st century everybody is running out of time and trying to save time. Also in this huge technological advancement in today's competing world people have to pay attention to lot of work in very limited duration of time. Thus it becomes difficult for us to operate the devices at various sites like home, offices and farms, etc simultaneously. For example if a person has switched on/off motor in the farm which is at long distance from home then it is very time and cost consuming to go there and make it on/off. So here we come up with idea that help user to on/off device from long distance with the help of any cell phone. Office/industrial devices can also be on/off with this project.

This project is an example of embedded system and mobile communication as all its operations are controlled by microcontroller and communication takes place using a cell-phone. The use of modern technologies is to achieve the power conservation Can be possible with our project. A major part of power conservation can be achieved by consumer's proper usage of the power for home appliances, for this purpose our project is best as the user can handle devices within very short time and very short cost. Here is a circuit that lets you operate the home appliances like lights and water pump from the office or any other remote place. So if anyone forgets to switch off the lights or other appliances while going out, it help him to turn off the appliance with his cell-phone. The cell-phone works as a remote control for the home appliances or any other devices which we want to operate. We can control the desired appliance by pressing the corresponding key and through this circuit we can operate four devices at a time. This system also gives you voice acknowledgement of the appliance status. This means it gives us the information about that particular appliance, whether it is switched on or off. The user can use any type of cell-phone. Because in cell phones, there is no range limitation as in Infrared and in radio communication.

## II. METHODOLOGY

### A. Block Diagram:

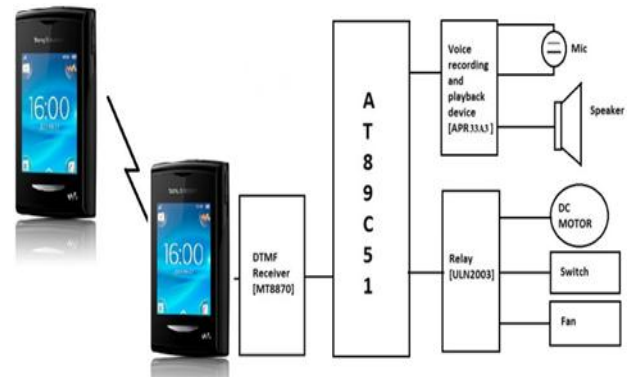


Fig. 1: Functional Block Diagram

### B. Block Diagram Description:

We need two cell phones, one is at the transmitter/user side and the other is at the receiver side. When user makes a call from his cell the call is automatically answered as per mobile functionality, and then user presses the numerical keys one to four for turning on the device, and five to eight for turning off the device[2][5]. The result of each operation is spoken loudly by loudspeaker which is heard by the called user as a voice acknowledgement.

## III. HARDWARE DESCRIPTION

The working of a project is very simple, the mobile at the receiving end having in-build SIM (Subscriber Identity Module) card Receives call from any mobile which is at very long distance. The person who makes a call already know the numerical key configuration provided to operate a remote device.

Function	Mobile Key	Switch
Device one ON	1	1
Device two ON	2	2
Device three ON	3	3
Device four ON	4	4
Device one OFF	5	1
Device two OFF	6	2
Device three OFF	7	3
Device four OFF	8	4

These commands are given by pressing the buttons of a user mobile. These commands are receive at DTMF receiver, and the decoded signal is passes towards the microcontroller IC AT89C51 via bus line. The microcontroller takes further action on that commands received from DTMF decoder. After action takes place the calling person listen the previously recorded message and understand the status of the remote device. The status in the form of on/off is heard at the calling person with the help of

loud speaker and by pressing the mobile keys the status also can be change.

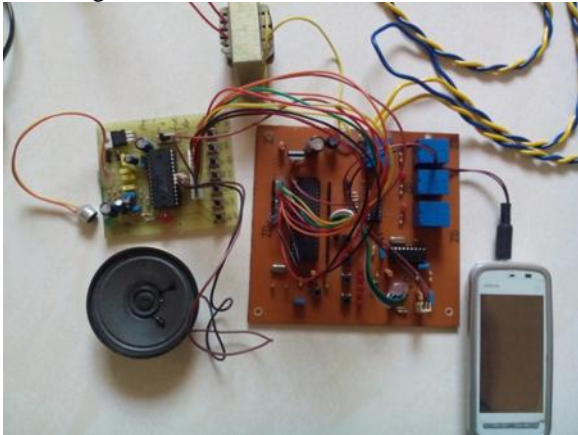


Fig. 2: Hardware Module

#### IV. CIRCUIT DESCRIPTION

The circuit for cell phone-based device control with voice acknowledgement. It comprises microcontroller AT89C51, DTMF decoder MT8870, voice recording/playback device APR33A3 and some resistors and capacitors discrete components. Microcontroller AT89C51 [4] is at the heart of the circuit. It is a low-power, high performance, 8-bit microcontroller with 4 kB of flash programmable and erasable read-only memory used as on-chip program memory, 128 bytes of RAM used as internal data memory. It have 32 individually programmable input/output (I/O) lines divided into four 8-bit ports, two 16-bit programmable timers/counters, a five-vector two-level interrupt architecture, on-chip oscillator and clock circuitry. A 11.0592MHz crystal is used to provide basic clock frequency for the microcontroller with two 33pf capacitors as shown in fig.III. And reset circuit is required for AT89C51 known as power on reset which resets the microcontroller as shown in fig. IV. We can also add switch to reset manually.

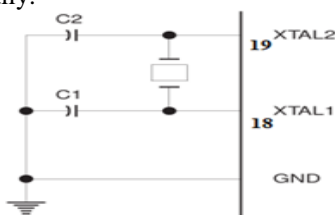


Fig. 3: Oscillator Circuit for At89c51

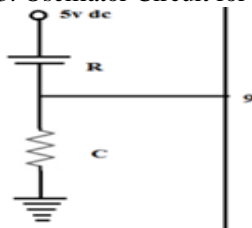


Fig. 4: Reset circuit for At89c51

The DTMF decoder is used for de-coding the mobile signal. It gets [6] DTMF tone from the mobile headset's speaker pins and decodes it into 4-bit digital signal. The DTMF decoder is operated with a 3.579MHz crystal.

Relay Driver IC ULN2003 is used to control automatic action of switches by the properties of relay. Each

ULN2003 consists of seven npn Darlington pairs that feature high-voltage outputs with common cathode clamp diodes for switching inductive loads. But here we four out of seven pairs as we connected four relays.

- There are two modes provided,
- 1) Cell phone mode: - Devices are operated using Cell phone
- 2) User mode: - Devices are operated using manual keys present on the circuit.

From that any one mode is selected by using DIP switch.

#### A. Minimum Circuitry for ICAPR33A3:

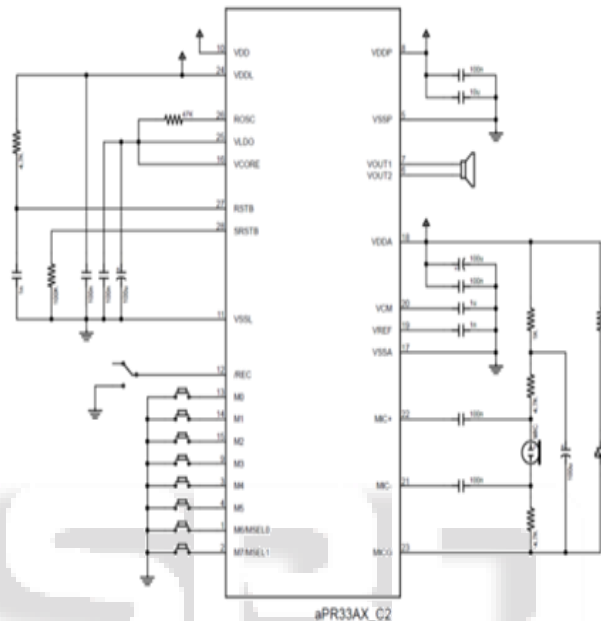


Fig. 5: Circuit diagram Of IC APR33A3

Voice acknowledgement is provided by the APR33A3. It is a single-chip voice recording and play-back device that can record and play multiple messages at random or in sequential mode for 680 seconds. The IC APR33A3 can be operated in 8, 4, 2 message modes. The total 11min (680sec.) are divided in 8 messages accordingly 1.3 min of one message which is sufficient to give user acknowledgement in detail The user can select sample rates with corresponding quality recording lengths. The APR33A series are powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). Operating voltage is 3V-6V, No external ICs required, No battery backup required, Powerful power management, [3] external reset pin, these are some of the features of the APR33A3.

The APR33A3 can record and playback is used in 8 message mode. Users can let the chip enter power-down mode when unused. It can effectively reduce electric current consuming to 15uA and increase the using time in any projects powered by batteries. A speaker is connected to APR33A3 for audio output. The speaker output drives the mic input of the mobile for audio acknowledgement. An electrets microphone is connected to APR33A3 to record the voice in APR33A3. LED flashes to show the busy status of APR33A3 during recording and playback. The audio messages to be recorded in APR33A3, by using eight push to on switches. There is one SPDT switch is used to select

the record mode / play mode in IC APR33A3. Switch is closed for recording and switch is opened for playback 8 mode operation of APR33A3.

#### V. SOFTWARE DESCRIPTION

The program for microcontroller is written using ASM microcontroller programming language. And for burning of IC AT89C51, hex file and Flash magic software is used. The ICAT89C51 has endurance of 1000 write/erase cycles.

#### VI. CONCLUSION

The “Cell Phone Based Device Control System” is an excellent device to operate any electronic equipment from miles of distance within a short time. The mobile technology is becoming advanced day by day and it is used by everyone. It is very much useful in many fields like agriculture, home, factories etc. The use of mobile communication in device control has been thoroughly justified and the previous drawbacks and problems have been overcome. This paper presents a wireless based device control system which can be controlled through DTMF commands. Also the device is user friendly and affordable.

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