

IVRS Latch with Security System

Amit Patel ,Gaurav Vikamshi , Pratik Patil , Ravinder Singh Sandhu.
 Dept. of Electronics and Telecommunication.
 K.C. College of Engineering & Management Studies & Research, Thane.
 ravisandhu17@gmail.com

Abstract--Interactive Voice Response System (IVRS) is one of the most important breakthrough in the field of telecommunication. IVRS provide a voice response to the customers and guide them to the information they require. The customers can call up any institute such as banks, universities, tourism industry and obtain any information by simply pressing certain button on his telephone as per the guidance of the voice fed into the computer. IVRS is an electronic device through which information is available related to any topic. IVRS is usually employed to know more about the organizations and can be modified to respond to voice of the customer for better response customer satisfaction. IVRS can be employed in customer services thereby improving its flexibility and efficiency.

I. INTRODUCTION

The mentioned project is based on Intel controller 8051. You can open your door latch using your mobile phone and landline phone. Not only it can operate the latch of your house it can also dial out a telephone number in case of security threat. The threat could be from fire or intruder. The device is password protected. User can change the password and security telephone number, the number on which you will like to receive emergency call from your home office in case of any security breach. After eight rings you will hear 'please enter your password'. When you enter the password, if your password is correct then device will open the latch only for ten seconds that is the enough time to enter the apartment or you keep the door open for the required period of time latch will shut automatically with its own spring tension when you shut the door. The said project is designed on the DTMF decoding our modern telephone and even our mobile phone uses DTMF coding for number dialing. These DTMF codes can be decoded and utilized for useful purposes. The circuit utilizes IC 8870 for DTMF decoding. Microcontroller 89C51 reads these codes and takes the necessary action. Door latch can be opened by entering the correct password; you can also

connect security sensors of your choice, in case if any breach of security takes place, the device will dial out the pre-stored number and deliver an emergency.

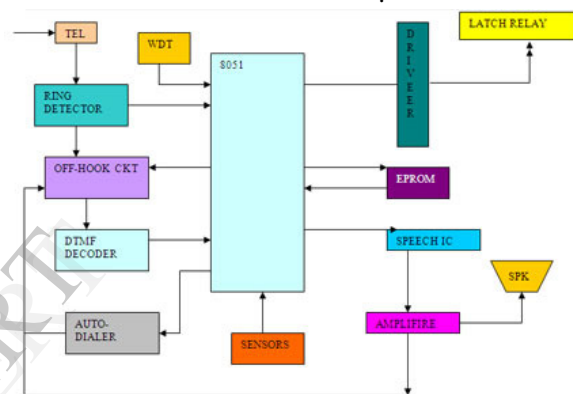


Fig 1 Basic mechanism of GSM controlled Security System

II. PASSWORD PROTECTION

Telephone line is connected at connector K1. Whenever someone calls this number, that time telephone line carries about 70V ringing signal, signal is rectified by the bridge D5-D8 and filtered by C4, R20, and D9, and drives an optocoupler IC U8 MCT2E. Collector of the optocoupler will go low whenever bell rings. Since the collector is connected to P2.7 of Microcontroller 89C51. Number of times it goes low is counted by Microcontroller. After eight rings, P1.0 will go high and switch ON transistor T4 and energize the off hook relay RL1. The contacts of the relay RL1 will become closed and the telephone line will get connected to DTMF decoder IC 8870, through C7 and C8. Resistance R8 comes across the telephone line and that lowers the voltage, and this ultimately sends messages to exchange the user has lifted the handset. At the same time, Microcontroller pin P3.5 will trigger the voice IC API8208 where all the messages are stored. Caller will get the message "PLEASE ENTER THE PASSWORD", the default password is 1-2-3-4-5-6. When caller enters his 6 digit password, IC 8870 decodes these numbers and binary numbers are available at Q1 to

Q4, Pin no 11-14 of DTMF decoder whenever new code comes, Pin no 15(STB) of DTMF decoder will pulse low, and is connected to P1.1 informing Microcontroller that codes are available please take them. Microcontroller will read these codes one by one, through its line P1.2-P1.5. If the code matches with the code inside the MC, MC will switch ON the Electromagnetic operated latch for 10secs and user can enter the apartment. If the password entered is not correct, Microcontroller will disconnect the telephone line without any reply, by making P1.0 LOW. You can also change the password stored. This password stored goes into serial EPROM IC 9346 that is non volatile RAM in case power fails the password is not lose

III. CHANGING THE PASSWORD

Dial this number from other line after eight bells you receive a message "PLEASE ENTER YOUR PASSWORD". (1,2,3,4,5,6 and #) So you enter your password and wait for the message, if you enter 2 then device will respond "PLEASE ENTER NEW PASSWORD WHEN YOUR PASSWORD ENTRY IS OVER PRESS #" once the password entry indicates that your entry is over, Microcontroller will respond "YOUR PASSWORD HAS BEEN CHANGED". Keep the headset back on the instrument from where you are calling, next time when you dial you will have to enter the new password. Similarly you can also change the Telephone Number. IC U74047 acts like a watchdog, as long as communication is going on it does nothing, the moment communication is over its output at PIN No 10 connected to PIN P3.2-INT0 will interrupt the processor and will make the P1.0 Low and disconnect the telephone line. The time to switch Off the Off-hook relay is decided by C6 and R19 connected to IC 4047. Transistor T1 and T2 drives the LED D12 to give visual indication of communication. Transformer TR1 is 1:1 transformer (160 OHM) provides isolation between telephone line and speech circuit.

IV. SECURITY SENSOR AND LATCH MAGNET

The 89C51 is a low power, high performance CMOS 8 bit microcontroller with 4Kbytes. This unit consists of a DTMF decoder IC8870. It generates codes which are given to the microcontroller unit. The main application of LCD in this project is to display the status of MODEM. The power supply of the telephone controlled switch is conventional and based on fixed voltage regulator of 5V. Working of ring detector, Ring

detector unit consist of a diode bridge, voltage controllers, an opto-coupler, voltage and other components. The main function of this unit is to detect the ringing signal and rectifies it, the rectified signal is given to the interrupt controller.

V. WORKING OF VOICE TRIGGERING CIRCUIT

This circuit consists of APR 9600 IC. It can record up to 8 various tones in 1 minute. We are using this IC because it is the only IC which has the capacity to save more number of tones than others. The tones are as 'PLEASE WAIT' if we enter a correct password and the door is about to open "PLEASE ENTER THE CORRECT PASSWORD' is the voice output when we enter a wrong password.

VI. FUNCTION OF SECURITY SENSOR AND LATCH MAGNET

If someone unknown tries to break the door/latch then immediately an alert is sent onto the mobile that "someone unknown has entered" by the security sensor. The latch magnet consist of a double pole and double throw relay which switches the incoming telephone line to the DTMF decoder after the call is detected .

VII. DIFFERENT PARTS OF IVRS

A. Microcontroller

Memory of the microcontroller. The code stored in the microcontroller is send to the serial port. If any hardware failure occurs, it is the microcontroller which is taking necessary measures. The IVRS system makes use of a stand by computer so as to working 24hrs a day for customer satisfaction. In these cases the microcontroller switches from the first computer to the second.

VIII. THE BASIC FEATURES

A microcontroller is meant to read data, perform limited calculations on the data and control its environment based on those calculations. The microcontroller consists of an 8-bit CPU in addition to RAM of 128 bytes, ROM, parallel I/O, serial I/O, counters, clock circuits etc, the EEPROM has a memory of 0 to 4kb. There are four register banks with 8 registers each. The control registers used are TCON, TMOD, SCON, PCON, IP and IE. The program counter is 16 bit while the status word and stack pointer is 8 bit. The 8751 has 4 parallel I/O ports. Hence the dual ports of these may be used as general I/O digital

lines. A system clock generator using an external crystal and two external capacitors provide the required clock for the microcontroller. There are 5 INTERRUPT sources used by 8751 and each can be listed under any of the priority levels. The 5 interrupts are listed below. Source Description

INT 0 Timer 0 INT 1 Timer 1
Serial Prot Internal Request from P3.2 pin
Overflow interrupts from timer 0 activated by flag TFO. External request from P3.3 pin
Overflow interrupts from timer 1
Completion of transmission and reception of one serial frame activates TI and RI.

A. RING DETECTOR

The ring detector is connected directly to the telephone line through the relay which is controlled by microcontroller (8751). The function of the ring detector is to detect if the telephone is ringing or not.

The ring detector consists of op-amp LM 311 which acts as a comparator to convert 98 V (rms, 130 Vpp) ring signal to 5V (low level) step signal for the microcontroller INTO pin. The output of the comparator goes high when the operator picks up the telephone provided along with the IVRS. The presence of the ring detector output for 5 sec enables the micro controller to switch the relay to the dual tone multi frequency (DTMF 8870). The capacitor C1 blocks incoming DC and resistors RA and RB are the voltage dividers to reduce the incoming voltage of 13VPP to 15V. Diode D passes only the positive half of the sine wave during which C2 gets charged to maximum value and acts as the DC value for the input signal which triggers the comparator. This charge does not get discharged easily due to high resistance R3, R4 and R5 are used as voltage dividers to provide reference voltage of 2.5V to pin 2 of LM 311.

B. DTMF DECODER 8870

The DTMF (Dual Tone Multi Frequency) decoder is a specific IC which performs the function of converting the DTMF frequency tones into BCD codes. These BCD codes are fed to the microcontroller to process the data and take necessary action. DTMF decoder 8870 IC has an external crystal oscillator to generate the clock signal, the pins to detect the presence of DTMF tone at its inputs and pins to transmit the BCD codes to the microcontroller,
The input signal from the telephone line is fed to the IN-pin of the DTMF after blocking all the DC in the line. These frequencies are compared with the Vref at the IN+ pin. This comparator pin output is then filtered and fed to the digital detection

algorithm within the IC. It then passes to the code converter where it is converted into 4 BCD codes. The resistors R1 and R2 determine the gain of the differential amplifier incorporated in the IC.
DTMF DECODER (8870)

C. AUDIO AMPLIFIER

The audio amplifier, TDA 2006 can amplify the output of the PC's sound card 12W thereby making the PC output audible on the telephone line. In addition the audio amplifier acts as a buffer between the telephone line and the sound card thereby protecting the sound card from the high voltage present on the telephone line.

D. RELAY

The relay switch is used in IVRS to switch between the ring detector circuits and the DTMF decoder circuit. The relay connects the telephone to the ring detector when the call is not processed by the microcontroller. On receiving a high signal from the microcontroller, the relay switches to the DTMF. Transistor BC 548 is used to drive the relay by providing the required current relay switching.

E. SERIAL COMMUNICATION INTERFACE

The main purpose of the RS 232 IC is to act as a serial interface between the microcontroller and the PC. It provides the voltage compatibility between the TxD and RxD pins of the microcontroller and the serial port of the PC. The voltage level of the TxD and RxD pins of the serial port of the PC are 12V. The RS 232 IC therefore provides compatibility required to interface the computer and the microcontroller.

F. PERSONAL COMPUTER

The PC is a very important ingredient of the interactive voice response system. The codes pressed by the user are serially transmitted by the microcontroller to the PC via RS 232. A visual basic program controls MSCOMM and MMCONTROL, continuously polling the serial port for any input, when the microcontroller receives the first input signal the visual basics program runs the welcome wave file. It then waits for the codes which are transferred to the text boxes from the input buffer. This wave file is played by the visual basics program as the output from the sound card of the PC and is suitably amplified and is heard on the telephone.

IX. SOFTWARE SUPPORT

VISUAL BASIC is an ideal programming language for developing sophisticated professional applications. The use of graphical user interface (GUI) enables user to interact with an application. Visual basic enables us to develop application that: Create read and write to text, database and binary files. Access data base in format such as SQL, ORACLE, MS Access etc Communicate with the application through the clip board dynamic data exchange, object linking and embedding.

Use serial communication ports to communicate with modem and other devices. The information needed by the user is stored in a database. Visual basic acts as user interface to access the information required by the client. ORACLE is a programming language in which the required information is stored in a data base which is a collection of inter-related data. This inter-related data and set of programs is essentially a database management system. DBMS organizes and maintains the information. MICROSOFT AGENT is a set of programmable software services that supports the presentation of interactive animated characters within the windows interface. MS agent enables software developers to incorporate a new form of user interaction known as conversation interface. In addition to the keyboard and mouse input, MS agent includes supports for speech recognition so that so application can respond to

voice commands.

X.CONCLUSION

Interactive Voice Response System has been the latest technology, each provides the foundation for providing convenient new IVRS services for customers as well as reduced operational costs, improved customer satisfaction and retention, increased return on investment and a stronger market presence for the IVRS services provider. A speech interface gives caller more flexible navigation outputs that are less complex and more rigidly hierarchical touch tone menu options. By this concept we aim at hassle free life without compromising security. The EPROM has 4 vacant ports which can be used to connect detectors like, smoke, gas leak, rain detector, etc, thus making this project even more versatile.

REFERENCES

- [1] David Benenaty. BELL LABS TECHANICAL JOURNAL- Vol- 1-Jan 2002-Wiley Publishers
- [2] Frenzel COMMUNICATION ELECTRONICS Principles&Applications.
- [3] Emmanuel .C.Ifeachor, Barrie.W.Jervis . DIGITAL SIGNAL PROCESSING
- [4] <http://www.interscience.wiley.com>
- [5] <http://www.intervoice.com>