IVRS BASED UNIVERSITY AUTOMATION SYSTEM

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WAKNAGHAT

Table of contents

Certificate

This is to certify that the project report entitled **"IVRS Based University Automation System"**, submitted by **Tanvir Singh Marwah, ApoorvaAjmani and ManoharDutt Sharma** in partial fulfillment for the award of degree of Bachelor of Technology in Electronics and Communication Engineering to Jaypee University of Information Technology, Waknaghat, Solan has been carried out under my supervision. This work has not been submitted partially or wholly to any other University or Institute for the award of this or any other degree or diploma.

Signature of Supervisor

Name of Supervisor D.S.SAINI

Designation Asstt. Professor

Date 23.05.11

Acknowledgement

Among wide panorama of people who helped us and motivated to complete our project, we are grateful in presenting to you the rare shades of technology by documenting our project 'IVRS Based University Automation System'.

We express our sincere gratitude and thanks to all those who have helped us in the completion of this project.

Of all the persons who have helped us, we would first like to thank Dr. D.S. Saini, (Assistant Professor, Electronics and Communication Department), under whose able guidance we have completed our project and who helped us at each and every stage of our project.

We also thank all the staff members of our college for their help in making this project a successful one.

Finally, we take this opportunity to extend our deep appreciation to our family and friends, for all that they meant to us during the crucial times of the completion of our project.

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Abstract

In today's competitive world any business must build flexible systems that adapt easily toevolving requirements of the critical business processes. IVRS is one such system thattransforms the traditional business model into customer centric model. IVRS ishistorically interactive speech memory driven that walk the caller through a series ofprompts where they respond to questions by pressing the combination of one or morebuttons of the phone keypad.

We have decided to do project "IVRS Based University Automation System". Our Project allows the user to know the student's attendance and marks quickly through the cell phone without the intention of the college authority. Embedded system has been implemented in the hardware side. The microcontroller controls the whole hardware. Telephone Line is used for communication purpose. Presentation in the class and outcome of the university are made reachable to the parents by our project. It will be very obliging to the parents to be acquainted with their son's/daughter's recital in the college.

The IVR system uses pre-recorded or computer generated voice responses to provide information in response to an input from a telephone caller. The input may be given by means of touch-tone or Dual Tone Multi-Frequency (DTMF) signal, which is generated when a caller presses a key of his/her telephone set, and the sequence of messages to be played is determined dynamically according to an internal menu structure (maintained within the IVR application program) and the user input. The IVRS system which will be designed will provide an ideal platform for the operation of start-ups and existing small concerns. It will be a highly economical and efficient way to replace the Dialogic card which is very costly and requires a high maintenance and regular upgradation.

Signature of student:

Name

Date

List of Figures

List of Tables

List of Abbreviations

GSM	Global System for Mobile communications
RS	Recommended Standard
IVRS	Interactive Voice Response System
VUI	Voice User Interface
CLI	Calling Line ID
CTI	Computer Telephone Integration
VAD	Voice Activated Dialer
TXD	Transmit Data
RXD	Receive Data
IDE	Integrated Development Environment
VB	Visual Basic
DTR	Data Terminal Ready
DSR	Data Set Ready
TTL	Transistor Transistor Logic
SQL	Structured Query Language
CLR	Common Language Runtime
RAM	Random Access Memory
ROM	Read Only Memory

Project phases

This project has evolved over a period of one year and here are the various steps of the process through which the project taken its final shape. We shall be discussing the final algorithm in the sections to follow. The project timeline is shown in the following figure.

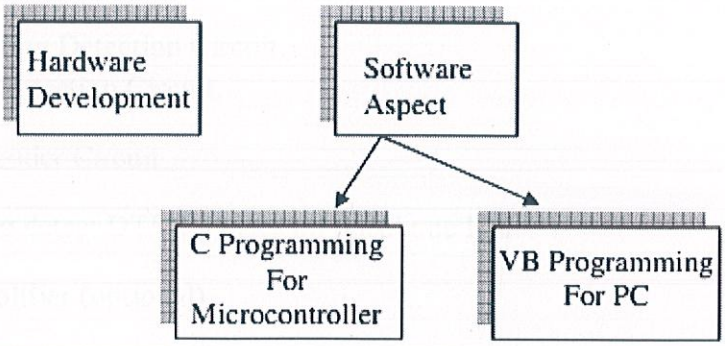


Fig. 1 Phases of project

Components

Hardware

1. Basic Microcontroller based Hardware
   - To interface Telephone line.
   - To provide various control signals.
   - Give commands serially to PC .
2. Telephone Line Interfacing Circuit
   - Ring Detection Circuit.
   - Protection Circuit.
3. DTMF Decoder Circuit
   - To detect DTMF Pulses on telephone line.
4. Audio Amplifier (optional)
   - To drive PC Sound Card audio output.

Software

1. Basic Application Software: for Microcontroller (Using Keil Compiler)
   - I/O Port functionality
   - DTMF Decoder 8870 Driver
   - Serial Communication Driver
   - Real Time Application Support
2. PC Side: Win32 Application Software
   - Student Database .
   - Audio Output Support.
   - Serial Communication Driver.

Chapter 1
Introduction

The Interactive Voice Response (IVR) System serves as a bridge between people and computer databases by connecting the telephone network with the database. The telephone user can access the information from anywhere at any time simply by dialing a specified number and following an on-line instruction when a connection has been established.

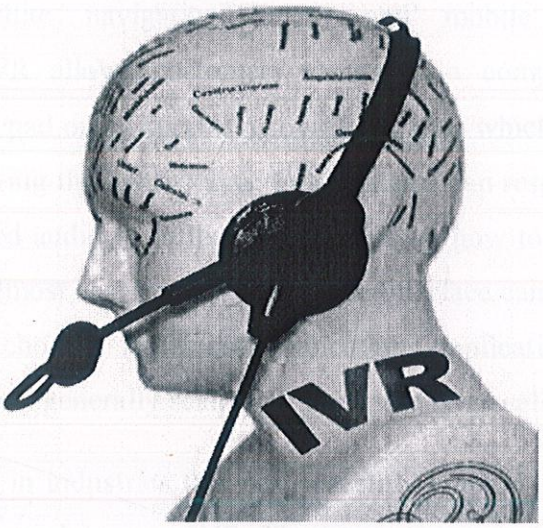


Fig. 2 IVRS

The IVRS system which will be designed will consist of simple components like microcontroller and some basic application chips interfaced to a PC which will have small software running in the backend while the other jobs are performed on the front end.

1.1 What is IVRS - An Introduction

Interactive Voice Response (IVR) systems allow callers to interact with thecommunications system over the mobile. IVR is used to enable the caller to retrieveinformation from a database, enter information into a database, or both. IVR systemsallow the user to efficiently exchange information, reducing clerical processing.

In other words, it's an interactive technology that allows a computer to detect voice and keypad inputs. It's used extensively in telecommunications, but is also being introduced into automobile systems for hands-free operation. Current deployment in automobiles revolves around satellite navigation, audio and mobile phone systems. In telecommunications, IVR allows customers to access a company's database via a telephone touchtone keypad or by speech recognition, after which they can service their own enquiries by following the instructions. IVR systems can respond with pre-recorded or dynamically generated audio to further direct users on how to proceed. IVR systems can be used to control almost any function where the interface can be broken down into a series of simple menu choices. In telecommunications applications, such as customer support lines, IVR systems generally scale well to handle large call volumes.

It has become common in industries that have recently entered the telecom industry to refer to an Automated Attendant as an IVR. The terms Automated Attendant and IVR are distinct and mean different things to traditional telecom professionals, whereas emerging telephony and VoIP professionals often use the term IVR as a catch-all to signify any kind of telephony menu, even a basic automated attendant.

1.2 What is the history of IVRS?

CALL centre's originated as a cost-cutting measure by US companies several decadesago, but they only really started to take off in the UK in the 1970s. The initial centreswere in-house operations in larger organizations and they tended to share and be formedby the same basic assumptions and drivers. The idea was that if you could cluster themajority of telephone based contacts with the customer in a single department you couldhave people focused just on call-related services.

Several advantages would follow. First, as a coherent department focused on telephoneservices, such a 'centre' could be managed more coherently. A second motive was thatthrough careful management of the centre, you would inevitably get the benefit of havingmore calls handled by fewer people.

Steve Morrell, Managing Director at ContactBabel, an organization that specializes inanalyzing the call centre market, points out that this early focus on 'efficiency' and costcutting, in a sense, got the call centre industry started off on the wrong foot - at least inrelation to current 'best practice'.

- "It meant that the whole industry focused on measuring things such as call lengths, ortime to resolution. The faster the operator could complete a call, the more efficient andeffective the contact with the customer was deemed to be," he explains.
- Divide the number of calls by the number of operators, and you could see at a glance how'efficiently' your centre was operating. The bigger the number, the better. The shorter thecall duration and the shorter the time to resolution, the better.
- There were obvious problems with this approach. First, it led to a 'sweat the agent'attitude, since the pressure was on to set call centre agents more and more 'stretching'targets by way of calls per hour that they were supposed to complete. Second, it led to ahigh turnover in staff as people became burned out by the pressure cooker atmosphere.Since the costs of training a call centre agent are not trivial (Morrell puts them at around£6,000 per agent on average), a high staff turnover leads to high costs.

1. A third issue, which took rather longer for companies to grasp, was that agents were notbeing given the opportunity to learn very much about the customer, or to add much valueto the customer's relationship with the organization. In fact in many instances anemphasis on keeping call times as brief as possible would actually cause the agent, atbest, to sound impersonal and unsympathetic to the customer. At worst the experiencewould be decidedly unsatisfactory and would possibly do lasting damage to thecompany's brand and reputation in the customer's eyes.

2. Morrell points out that call centre's were given a huge boost in the UK in the 1980s whentelecoms deregulation led to a fall in the price of fixed line calls. Channeling contact tothe customer through the telephone became an even more cost effective option forcompanies.
    - Since the UK led the way in telecoms deregulation in Europe, this was a major factor in the UK having more call centre seats than any country with the exception of the US.
    - We currently have in excess of 800,000 call centre places across the UK, and the number is projected to go beyond 1,000,000 within the next three years.
    - Colin Mackay, a Director of the industry body, the Call Centre Managers Association(CCMA), points out that pioneering centre set up by Direct Line and then by First Direct,proved how powerful these centre's could be for financial services organizations. "Itmeant that they could reach large numbers of the public without the requirement for salespeople on the street," he said.
3. As Mackay notes, about 80% of the questions that people have about financial servicesproducts, from mortgages to loans and insurance, can be answered over the phone,without the need for a face-to-face meeting. Operations such as Direct Line were able todemonstrate considerable cost savings and efficiencies over conventional financialservices product distribution strategies.
4. Scotland and the north-east of England did very well out of the first two decades of callcentre operations in the UK. As Mackay explains, call centre operators tended to favorregions outside the expensive south-east of England, where building premises were farcheaper, and where there was a reasonably well-educated potential work force. The factthat the north-east of England and Scotland had seen a massive decline in their heavyindustries meant that there was also competitive pressure for jobs, so wages were morecompetitive too, than down south.

1.3 What is the principle of IVRS?

Interactive voice response refers to technology supporting the interaction of customer with the service provider generally over the telephone lines. When a person wants to access any of the services of the Interactive Voice ResponseSystem, he presses a number through his telephone keypad.

The pressed number appearsacross the line and the ring detector circuit senses this ring. After a specified number ofrings the relay is activated through the microcontroller, which in turn connects the line toDTMF decoder.The activation of relay causes the number pressed to appear across the DTMF decoder.The decoder decodes the number pressed and then the decoder output is passed throughthe microcontroller to the computer.Now, when the caller presses a number, the number pressed is decoded by the DTMF decoder and passed to the computer through the microcontroller using MAX232. The computer recognizes the number and accesses the particular file from the database to output the voice message. The output voice is passed through the voice card where the digitized serial data isconverted into analog voice form and passed to the line. The caller gets the informationthrough the line.

1.4 How it works?

An IVR system talks to callers following a recorded script. It prompts a response to thecaller and asks him to respond either by pressing a touchtone key, andsupplies the caller with information based on responses made.

1.5 What can be done using an Interactive Voice response System?

When connecting an Inter-voice system into telephone lines, wireless medium, the applications can handle either incoming or outgoing calls and thenperforms the following voice processing features:

1. DTMF or pulse tone input
2. Provides pre- recorded voice messages
3. Accesses or stores information to and from the back-end host, database or the Internet

1.6 Applications of IVRS

1. Many business applications employ this technology including telephone banking, order placement, caller identification and routing, balance inquiry, and airline ticket booking.
2. Large companies use IVR services to extend the business hours of operation. The use of the VUI (Voice User Interface) is designed to match the customer experience of the web interface. Companies have realized that access to voice services is impulsive and readily available. This is down to the high penetration of mobile phones.
3. Call centers use IVR systems to indentify and segment callers. The ability to indentify customers allows the ability to tailor services according to the customer profile. It also allows the option of choosing automated services. Information can be fed to the caller allowing choices such as, wait in the queue, choose an automated service, or request a callback. (At a suitable time and telephone number) The use of CTI (Computer Telephone Integration) will allow the IVR system to look up the CLI (Calling Line ID) on a network database and indentify the caller. This is currently accurate for about 80% of inbound calls, but will increase as mobile phones become more popular. In the cases where CLI is withheldor unavailable, the caller can be asked to identify themselves by other methods such as a pin number or password. The use of DNIS (Dialed number information services) will ensure that the correct application and language is executed by the IVR system.
4. **Voice-Activated Dialers** - (VAD) Voice-activated IVR systems are now used to replace the switchboard or PABX (Private Automatic Branch Exchange) operators and are used in many hospitals and large businesses to reduce the caller waiting time. An additional function is the ability to allow external callers to page hospital staff and transfer the inbound call to the paged person.
5. **Entertainment and Information** - The largest installed IVR platforms are used for applications such as tele-voting on TV game shows such as Pop Idol and Big Brother which can generate enormous call spikes. Often the network provider will have to deploy Call gapping in the Public network to prevent Network overload.
6. **Anonymous Access** - IVR systems also allow callers to obtain data relatively anonymously. Hospitals and Clinics have used IVR systems to allow callers to receive

anonymous access to test results. This is information that could easily be handled by a person but the IVR system is used to preserve privacy and avoid potential embarrassment of sensitive information or test results. Users are given a pass code to access their results.

7. **Clinical Trials** - IVR systems are used by pharmaceutical companies and contract research organizations to conduct clinical trials and manage the large volumes of data generated. The caller will respond to questions in their preferred language and their responses will be logged into a database and possibly recorded at the same time to confirm authenticity. Applications include patient
8. The following are some of the more common uses of an IVR:
    - Mobile (Pay as you go Top up).
    - Telephone Banking (Balance, payments, and transfers).
    - Mobile Purchases (particularly for mobile content, such as ringtones and logos).
    - Caller identification and routing.
    - Order Placements (Credit Card Payments).
    - Airline (Ticket booking, Flight arrivals, Flight departures, Check in).
    - Adult entertainment (Dating, Chat line etc).
    - Weather forecasts.

1.7 Tradeoffs of IVR System:

- People simply dislike talking to machines
- Older adults may have a hard time following telephone menus and lengthy instructions.
- Younger callers get frustrated with the slowness of multiple phone menus
- Menus are too long.
- There's too much information.
- Voice prompts are hard to understand.

IVR is sometime criticized as being unhelpful and difficult to use due to poor design and lack of appreciation of the callers needs. Some callers object to providing voice response to an automated system and prefer speaking with human correspondent.

Chapter 2

Review of Basic Concepts

2.1 Serial Port Communication

A serial port is a serial communication physical interface through which information transfers in or out one bit at a time. The term "serial port" usually identifies hardwaremore or less compliant to the RS-232 standard, intended to interface with a modem or with a similar communication device.

2.1.1 Types of serial port communication

- There are two basic types of serial communication, synchronous and asynchronous. With synchronous communication, the two devices initially synchronize themselves to each other, and then continually send characters to stay in sync. Even when data is not really being sent, a constant flow of bits allows each device to know where the other is at any given time. That is, each character that is sent is either actual data or an idle character. Synchronous communication allows faster data transfer rates than asynchronous methods, because additional bits to mark the beginning and end of each data byte are not required. The serial ports on IBM-style PCs are asynchronous devices and therefore only support asynchronous serial communication.
- Asynchronous means "no synchronization", and thus does not require sending and receiving idle characters. However, the beginning and end of each byte of data must be identified by start and stop bits. The start bit indicates when the data byte is about to begin and the stop bit signals when it ends. The requirement to send these additional two bits cause asynchronous communication to be slightly slower than synchronous however it has the advantage that the processor does not have to deal with the additional idle characters.
- An asynchronous line that is idle is identified with a value of 1, (also called a mark state). By using this value to indicate that no data is currently being sent, the devices are able to distinguish between an idle state and a disconnected line. When a character is about to be transmitted, a start bit is sent. A start bit has a value of 0, (also called a space state). Thus, when the line switches from a value

of 1 to a value of 0, the receiver is alerted that a data character is about to come down the line.

2.1.2 Advantages of serial port communication

- The serial port cable can be longer than a parallel port cable, as serial port transmits '1' as voltage from -5 to -12 V and '0' as voltage from +5 to +12 V, while parallel port transmits '1' as voltage of 5 volts and '0' as voltage of 0 volts. At the same time the receiver of the serial port receives '1' as voltage from -3 to -25 V and '0' as voltage from +3 to +25 V. Thus serial port can have maximal swing up to 50 volts, while parallel port has maximal swing of 5 volts. Thus the losses in the cable when transmitting data using serial port are less substantial then losses when transmitting data using parallel port.
- The number of wires needed when transmitting data serially is less than when the transmission is parallel. Is the external device has to be installed at a great distance from the computer, the cable with three wires is much cheaper than the cable with 19 or 25 wires if the transmission is parallel. Still one should remember that there are interface creation expenses for every receiver/transmitter.
- Further development of serial port is usage of infrared devices which immediately proved popular. Many electronic diaries and palmtop computers have inbuilt infrared devices for connection with external devices.
- Another proof of serial port universality is microcontrollers. Many of them have inbuilt SCI (Serial Communications Interfaces), used for communication with other devices. In this case serial interface reduces the number of outputs on the chip. Usually only 2 outputs are used: Transmit Data (TXD) and Receive Data (RXD). Just compare that to minimum of 8 outputs when using 8-bit parallel connection.

2.2 GSM

Global System for Mobile communications (GSM) was born from the need by several European countries to introduce a common mobile communication network and overcome the limitations of the existing analogue system. The analogue system was limited in several ways, including its inability to cope with the unprecedented growth in

the demand for mobile communications, the use of open channels allowing for easy 'eavesdropping' and 'cloning', the inflexibility in the introduction of valueadded services and the lack of a common network across Europe, among others.

In 1982 the ConférenceEuropéenne des PostesetTélécommunications (CEPT) formed the "GroupeSpécial Mobile" (GSM) (later to be called Global System for Mobile communications) to define the standards for a new mobile communications system. Although GSM was introduced as an European specific standard, it has been adopted by several countries worldwide. The system was required to allow roaming in participating countries, offer services and facilities found in other public networks and use an internationally standardized signaling system for interconnection of mobile switching centers and location registers.

In the late 1980s it was realized, the specification and implementation of GSM could not be achieved in a single instance. A limited GSM roll-out (phase 1) was effected in 1991, offering basic voice telephony only. The specifications for phase 2, an 'enhancement' to phase 1, includes new supplementary services and the introduction of half rate speech channels. GSM as a standard has been in a constant state of evolution since its inception and will continue to do so into the foreseeable future.

GSM as a network is not defined by a set of rigid and stagnant standards. It is a network not only willing to evolve, but by the very nature of its specifications it needs to evolve. These qualities embodied within GSM make the results described in this thesis feasible and a practical reality.

"A platform [GSM] which is full of hooks, mechanisms and not at least potential to continue to build on and provide mobile communications in all its possible forms and varieties. Even before Phase 2 standard has been completed, GSM has grown far beyond its original geographical "limitations" and the Global System for Mobile communication really starts to deserve its name. With Phase 2, and in particular Phase 2+, GSM will also expand far beyond its originally intended functional boundaries sand open up for new applications, new access methods, new technologies and thus altogether for new categories of market, needs and users. It looks promising."

Chapter 3

Hardware Components

3.1 Power Supply Description

3.1.1 Block Diagram

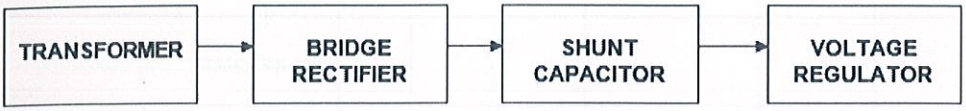


Fig. 3 Power supply block diagram

The power supply circuit comprises of four basic parts:

3.1.2 How it works

- The transformer steps down the 220 V a/c. into 12 V a/c. The transformer work on the principle of magnetic induction, where two coils: primary and secondary are wound around an iron core. The two coils are physically insulated from each other in such a way that passing an a/c. current through the primary coil creates a changing voltage in the primary coil and a changing magnetic field in the core. This in turn induces a varying a/c. voltage in the secondary coil.
- The a/c. voltage is then fed to the bridge rectifier. The rectifier circuit is used in most electronic power supplies is the single-phase bridge rectifier with capacitor filtering, usually followed by a linear voltage regulator. A rectifier circuit is necessary to convert a signal having zero average value into a non-zero average value. A rectifier transforms alternating current into direct current by limiting or regulating the direction of flow of current. The output resulting from a rectifier is a pulsating D.C. voltage.

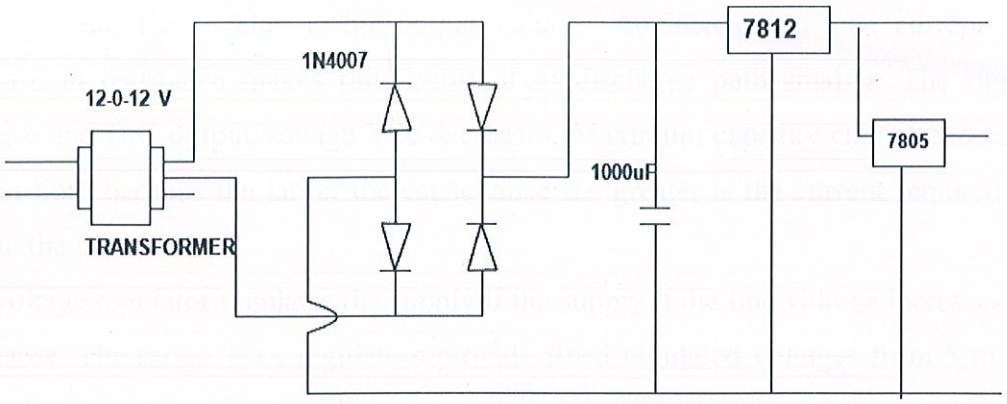


Fig. 4 Power supply circuit diagram

- The ripple of the D.C. voltage is smoothened using a filter capacitor of 1000 micriFarad, 25 V. The filter capacitor stores electrical charge. If it is large enough the capacitor will store charge as the voltage rises and give up the charge as the voltage falls. This has the effect of smoothing out the waveform and provides steadier voltage output. A filter capacitor is connected at the rectifier output and the D.C. voltage is obtained across the capacitor. When this capacitor is used in this project, it should be twice the supply voltage. When the filter is used, the RC charge time of the filter capacitor must be short and the RC discharge time must be long to eliminate ripple action. In other words the capacitor must charge up fast, preferably with no discharge.
- When the rectifier output voltage is increasing, the capacitor charges to the peak voltage Vm. Just past the positive peak, the rectifier output voltage starts to fall but at this point the capacitor has +Vm voltage across it. Since the source voltage becomes slightly less than Vm, the capacitor will try to send current back through the diode of rectifier.
- This reverse biases the diode. The diode disconnects or separates the source the source form load. The capacitor starts to discharge through load. This prevents the load voltage from falling to zero. The capacitor continues to discharge until source voltage becomes more than capacitor voltage. The diode again starts conducting and

the capacitor is again charged to peak value Vm. When capacitor is charging the rectifier supplies the charging through capacitor branch as well as load current, the capacitor sends currents through the load.

- The rate at which capacitor discharge depends upon time constant RC. The longer the time constant, the steadier is the output voltage. An increase in load current i.e. decrease in resistance makes time constant of discharge path smaller. The ripple increase and D.C output voltage Vdc decreases. Maximum capacity cannot exceed a certain limit because the larger the capacitance the greater is the current required to charge the capacitor.
- The voltage regulator regulates the supply if the supply if the line voltage increases or decreases. The series 78xx regulators provide fixed regulated voltages from 5 to 24 volts. An unregulated input voltage is applied at the IC Input pin i.e. pin 1 which is filtered by capacitor. The out terminal of the IC i.e. pin 3 provides a regular output. The third terminal is connected to ground. While the input voltage may vary over some permissible voltage range, and the output voltage remains constant within specified voltage variation limit. The 78xx IC's are positive voltage regulators whereas 79xx IC's are negative voltage regulators.
- These voltage regulators are integrated circuits designed as fixed voltage regulators for a wide variety of applications. These regulators employ current limiting, thermal shutdown and safe area compensation.
- With adequate heat sinking they can deliver output currents in excess of 1 A. These regulators have internal thermal overload protection. It uses output transistor safe area compensation and the output voltage offered is in 2% and 4% tolerance.

3.2 RS-232

3.2.1. Introduction

RS-232 (Recommended Standard - 232) is a telecommunications standard for binary serial communications between devices. It supplies the roadmap for the way devices speak to each other using serial ports. The devices are commonly referred to as a DTE (data terminal equipment) and DCE (data communications equipment); for example, a computer and modem, respectively. RS-232 sets acceptable voltage and signal levels, along with common pin designations, or configurations, for wiring serial connector ports. It also specifies protocols for the control information passed between devices, which include such events such as indicating the beginning or end of a data stream. Electronic data communications between elements will generally fall into two broad categories: single-ended and differential. RS232 (single-ended) was introduced in 1962, and despite rumors for its early demise, has remained widely used through the industry.Independent channels are established for two-way (full-duplex) communications. The RS232 signals are represented by voltage levels with respect to a system common (power / logic ground). The "idle" state (MARK) has the signal level negative with respect to common, and the "active" state (SPACE) has the signal level positive with respect to common. RS232 has numerous handshaking lines. (Primarily used with modems), and also specifies a communications protocol.

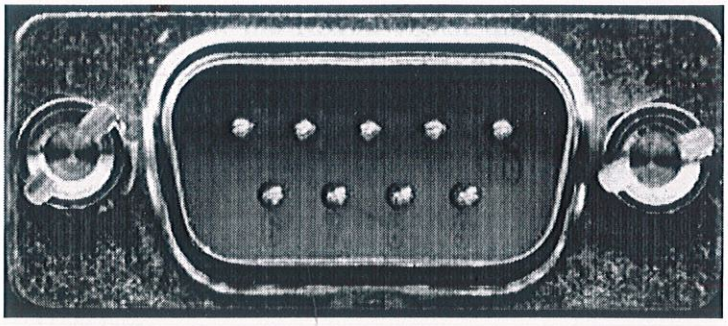
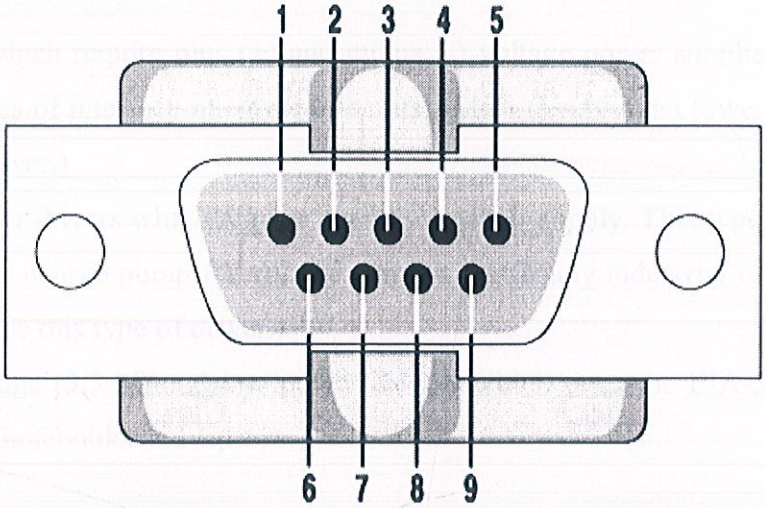


Fig. 5 RS 232



Pin	Signal	Pin	Signal
1	Data Carrier Detect	6	Data Set Ready
2	Received Data	7	Request to Send
3	Transmitted Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicator
5	Signal Ground		

Fig. 6 Pin description

RS232 data is bi-polar.... +3 TO +15 Volts indicate an "ON or 0-state (SPACE) condition" while A -3 to -15 Volts indicates an "OFF" 1-state (MARK) condition.... Modern computer equipment ignores the negative level and accepts a zero voltage level as the "OFF" state. In fact, the "ON" state may be achieved with lesser positive potential. This means circuits powered by 5 V DC are capable of driving RS232 circuits directly;

however, the overall range that the RS232 signal may be transmitted/received may be dramatically reduced.

The output signal level usually swings between +15 V and -15 V. The "dead area" between +3 V and -3 V is designed to absorb line noise. In the various RS-232-like definitions this dead area may vary. Many receivers designed for RS-232 are sensitive to differentials of 1 V or less.

The types of driver ICs used in serial ports can be divided into three general categories:

- Drivers which require plus (+) and minus (-) voltage power supplies such as the 1488 series of interface integrated circuits. (Most desktop and tower PCs use this type of driver.)
- Low power drivers which require one +5 V power supply. This type of driver has an internal charge pump for voltage conversion. (Many industrial microprocessor controls use this type of driver.)
- Low voltage (3.3 V) and low power drivers which meet the EIA-562 Standard. (Used on notebooks and laptops.)

3.2.2 Working

1. The **TD (transmit data)** wire is the one through which data from a DTE device is transmitted to a DCE device. This name can be deceiving, because this wire is used by a DCE device to receive its data. The TD line is kept in a mark condition by the DTE device when it is idle. The RD (receive data) wire is the one on which data is received by a DTE device, and the DCE device keeps this line in a mark condition when idle.
2. **RTS** stands for **Request to Send**. This line and the CTS line are used when "hardware flow control" is enabled in both the DTE and DCE devices. The DTE device puts this line in a mark condition to tell the remote device that it is ready and able to receive data. If the DTE device is not able to receive data (typically because its receive buffer is almost full), it will put this line in the space condition as a signal to the DCE to stop sending data. When the DTE device is ready to receive

more data (i.e. after data has been removed from it's receive buffer), it will place this line back in the mark condition. The complement of the RTS wire is CTS, which stands for **Clear to Send**. The DCE device puts this line in a mark condition to tell the DTE device that it is ready to receive the data. Likewise, if the DCE device is unable to receive data, it will place this line in the space condition. Together, these two lines make up what is called RTS/CTS or "hardware" flow control.

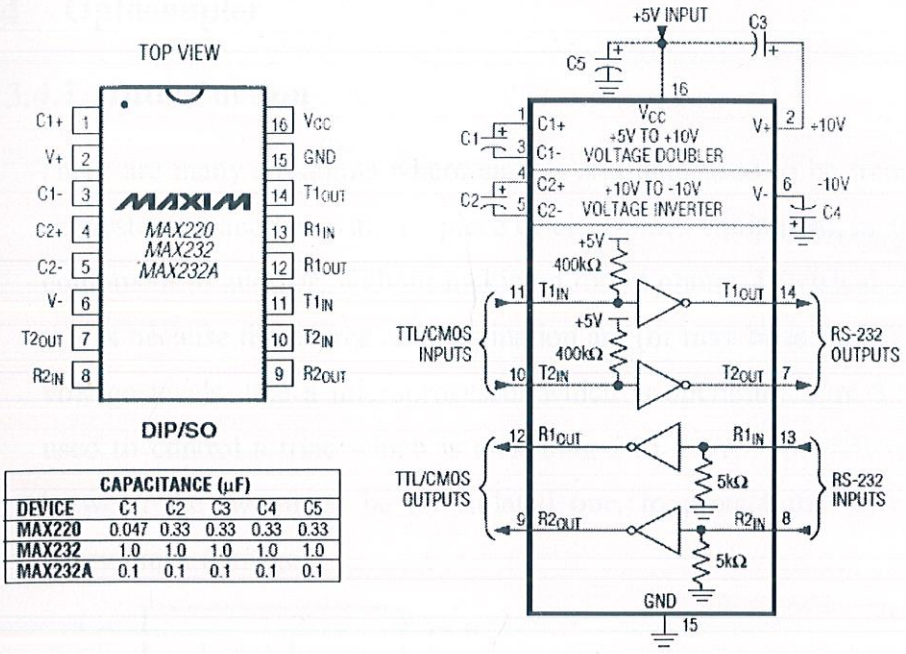
3. DTR stands for **Data Terminal Ready**. Its intended function is very similar to the RTS line. DSR (**Data Set Ready**) is the companion to DTR in the same way that CTS is to RTS. Some serial devices use DTR and DSR as signals to simply confirm that a device is connected and is turned on. The Software Wedge sets DTR to the mark state when the serial port is opened and leaves it in that state until the port is closed. The DTR and DSR lines were originally designed to provide an alternate method of hardware handshaking. It would be pointless to use both RTS/CTS and DTR/DSR for flow control signals at the same time. Because of this, DTR and DSR are rarely used for flow control.
4. CD stands for **Carrier Detect**. Carrier Detect is used by a modem to signal that it has a made a connection with another modem, or has detected a carrier tone.
5. The last remaining line is RI or **Ring Indicator**. A modem toggles the state of this line when an incoming call rings your phone.

3.3 MAX - 232

3.3.1 Introduction

The **MAX232** from **Maxim** was the first IC which in one package contains the necessary drivers (two) and receivers (also two), to adapt the RS-232 signal voltage levels to TTL logic. It became popular, because it just needs one voltage (+5 V) and generates the necessary RS-232 voltage levels internally. This greatly simplified the design of circuitry. Serial RS-232 communication works with voltages (between -15 V to -3 V are used to transmit a binary '1' and +3 V to +15 V to transmit a binary '0') which are not compatible with today's computer logic voltages. On the other hand, classic TTL computer logic operates between 0 V to +5 V (roughly 0 V to +0.8 V referred to as *low* for binary '0', +2 V to +5 V for *high* binary '1'). The maximum RS-232 signal levels are far too high for today's computer logic electronics, and the negative RS-232 voltage can't be grasped at all by the computer logic. Therefore, to receive serial data from an RS-232 interface the voltage has to be reduced, and the *0* and *1* voltage levels inverted. In the other direction (sending data from some logic over RS-232) the low logic voltage has to be "bumped up", and a negative voltage has to be generated, too.

The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply via on-chip charge pumps and external capacitors. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case.



CAPACITANCE (µF)					
DEVICE	C1	C2	C3	C4	C5
MAX220	0.047	0.33	0.33	0.33	0.33
MAX232	1.0	1.0	1.0	1.0	1.0
MAX232A	0.1	0.1	0.1	0.1	0.1

Fig. 7 MAX 232

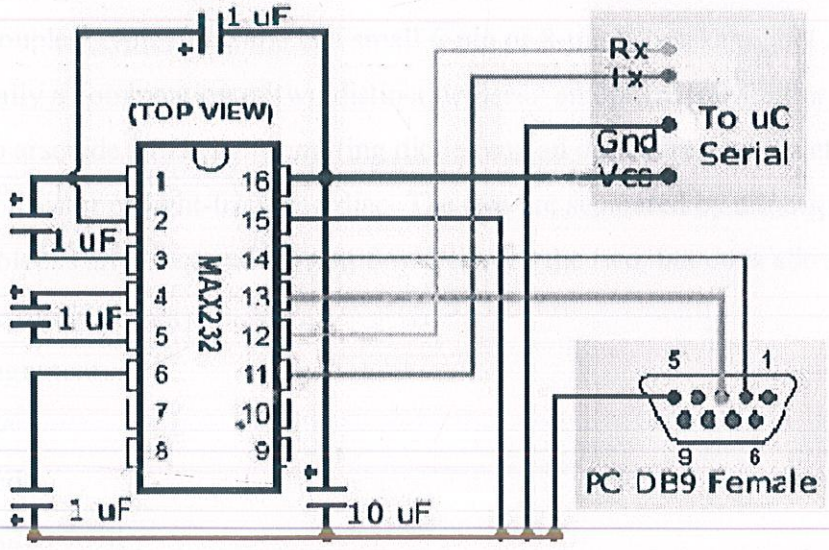


Fig. 8 Pin description

3.4 Optocoupler

3.4.1 Introduction

There are many situations where signals and data need to be transferred from one subsystem to another within a piece of electronics equipment, or from one piece of equipment to another, without making a direct ohmic. Electrical connection. Often this is because the source and destination are (or may be at times) at very different voltage levels, like a microprocessor which is operating from 5 V DC but being used to control a triac which is switching 240 V AC. In such situations the link between the two must be an isolated one, to protect the microprocessor from overvoltage damage.

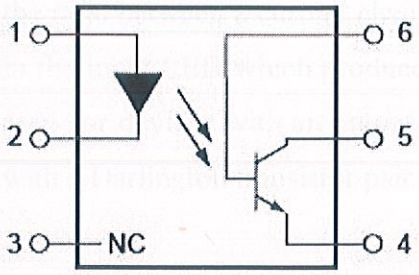


Fig. 9 Pin description

Opto-couplers typically come in a small 6-pin or 8-pin IC package, but are essentially a combination of two distinct devices: an optical transmitter, typically a gallium arsenide LED (light-emitting diode) and an optical receiver such as a phototransistor or light-triggered diac. The two are separated by a transparent barrier which blocks any electrical current flow between the two, but does allow the passage of light.

Pin assignment:-

1. Anode
2. Cathode
3. No Connection
4. Emitter
5. Collector
6. Base

3.4.2 Working

1. Usually the electrical connections to the LED section are brought out to the pins on one side of the package and those for the phototransistor or diac to the other side, to physically separate them as much as possible. This usually allows optocouplers to withstand voltages of anywhere between 500V and 7500V between input and output.

   Optocouplers are essentially digital or switching devices, so they are best for transferring either on-off control signals or digital data. Analog signals can be transferred by means of frequency or pulse-width modulation.

2. The most important parameter for most optocouplers is their transfer efficiency, usually measured in terms of their current transfer ratio or CTR. This is simply the ratio between a current change in the output transistor and the current change in the input LED which produced it. Typical values for CTR range from 10% to 50% for devices with an output phototransistor and up to 2000% or so for those with a Darlington transistor pair in the output.

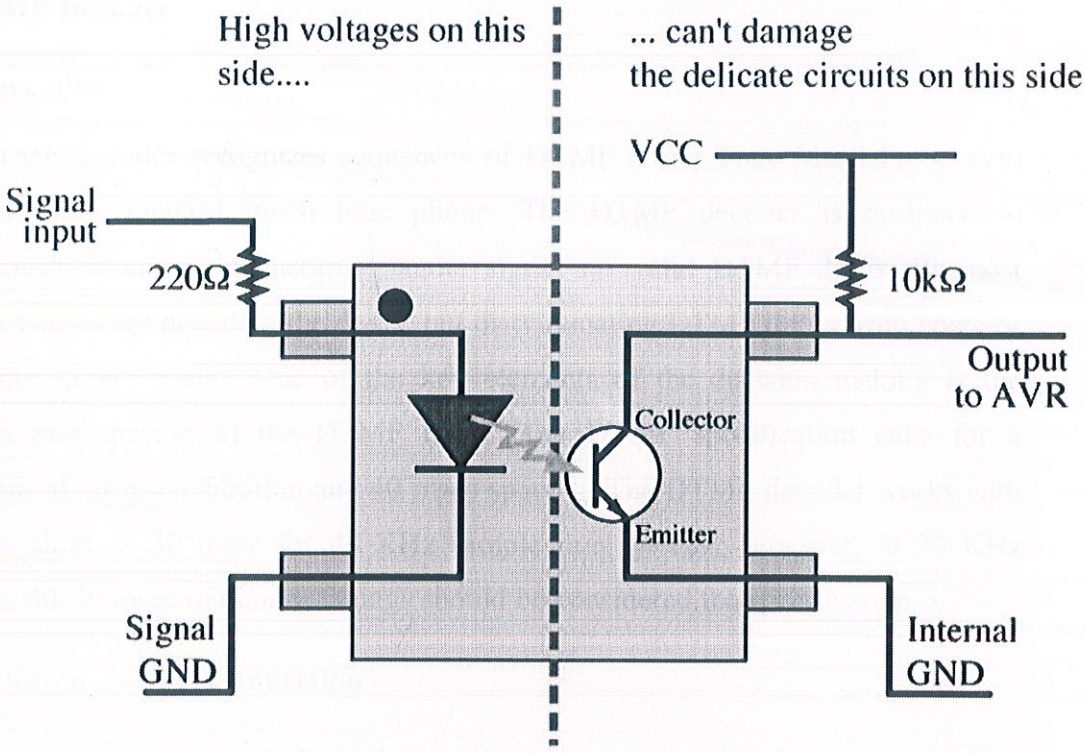


Fig. 10 Optocoupler Description

3.5 DTMF Decoder

3.5.1 Operation

The DTMF decoder recognizes sequences of DTMF (Dual Tone Multi-Frequency) tones from a standard touch tone phone. The DTMF decoder is designed to continuously monitor the incoming audio signal for valid DTMF digits. Its most difficult task is not decoding the digits, but discriminating DTMF digits from voice or other interference audio. One of the key elements of the decision making is the duration and spacing of the DTMF tones. The DTMF specification calls for a minimum of 40 msec duration and 40 msec spacing. The DTMF decoder works with tones as short as 30 msec for 48 KHz sample rate systems; however, in 32 KHz systems, the 40 msec minimum timings should be considered the specification.

Serial Output and PC Connection

- All data written to the LCD is also sent to the serial output, including the RESET and READY messages.
- Data is sent as standard ASCII characters. E.g., digit '1' is converted to 41H before being sent to the serial port. The PC connection is via the RXD and GND outputs.
- The following table shows the pin connections required for both 9 and 25 pin serial ports on a PC.

Table. 1 Pin Connections

	9 PIN	25 PIN
RXD	2	3
GND	5	7

3.5.2 How does it work?

- DTMF was originally developed to allow sending control information (dialed numbers) across the telephone network. The telephone network has a bandwidth of approx. 300 to 3400 Hz, suitable for voice communications. Any control tones would also need to be in this range and had to work regardless of whether voice was present or not. A single tone or frequency could have been used. However, if voice was present, it would interfere with the control tones, making them useless.

- To overcome this a scheme was developed whereby two tones or frequencies were combined to represent each control code or number. A total of seven tones were needed to represent the digits normally found on a telephone keypad, namely 0-9, * and #. An eighth tone was added so that some extra digits were available for use. These are commonly labeled A, B, C, D . These eight tones were divided into two groups of four tones each, a low-frequency group and a high-frequency group. This our-by-four array produced 16 different combinations, as shown in the following table.

Table. 2 DTMF frequency combinations

Hz	1209	1336	1477	1633
697	1	2	3	A
770	4	5	6	B
852	7	8	9	C
941	*	0	#	D

A valid tone pair has to meet the following criteria:

- Only one tone per group allowed
- Start of each tone must be less than 5mS apart
- Both tones must last at least 40mS
- Each tone must be within 2% of the center frequency
- The tone levels must be within 6dB of each other.

3.5.3 Theory of operation

- IC shown below is a DTMF receiver chip, a CM8870C from California Micro Devices. It is responsible for all the processing described above. The circuit is powered via 5 volts supplied by a voltage regulator. The DTMF signals are picked up by microphone or direct from the telephone line.
- The resistor R1 and R2 on the left hand side are chosen to set the gain of the amplifier. Capacitor C1 is used for filtering the noise and blocking any DC current.
- Before the registration of a decoded tone pair, the receiver checks for a valid signal duration (referred to as "character-recognition-condition"). This check is

performed by an external RC time constant driven by Resistor and Capacitor on right hand side.

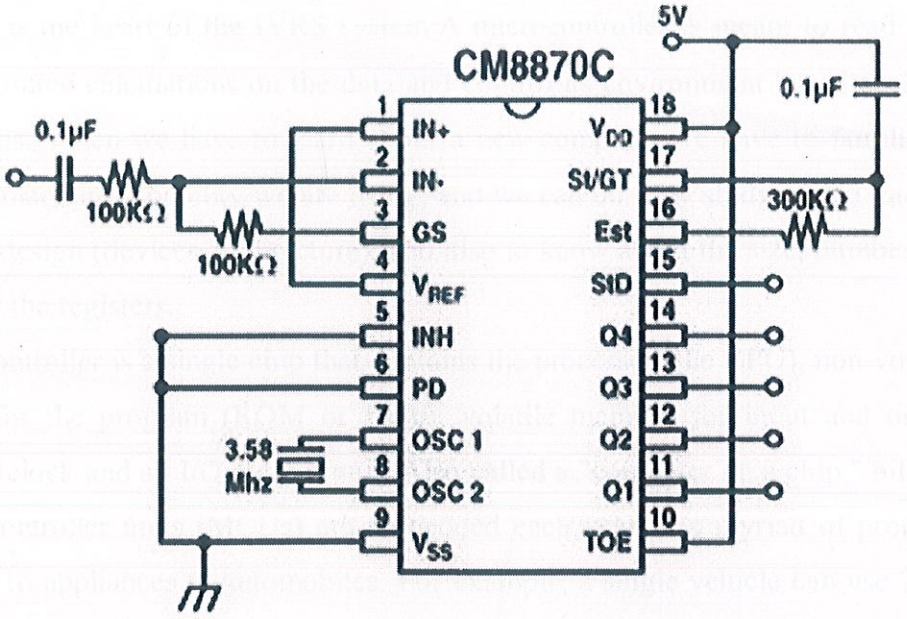


Fig .11 DTMF decoder IC CM8870C

3.6 Microcontroller

3.6.1 Introduction

- The 8051 is the heart of the IVRS system.A microcontroller is meant to read data, perform limited calculations on the data and control its environment based on those calculations. When we have to learn about a new computer we have to familiarize about the machine capability we are using, and we can do it by studying the internal hardware design (devices architecture), and also to know about the size, number and the size of the registers.
- A microcontroller is a single chip that contains the processor (the CPU), non-volatile memory for the program (ROM or flash), volatile memory for input and output (RAM), a clock and an I/O control unit. Also called a "computer on a chip," billions of microcontroller units (MCUs) are embedded each year in a myriad of products from toys to appliances to automobiles. For example, a single vehicle can use 70 or more microcontrollers. The following picture describes a general block diagram of microcontroller.

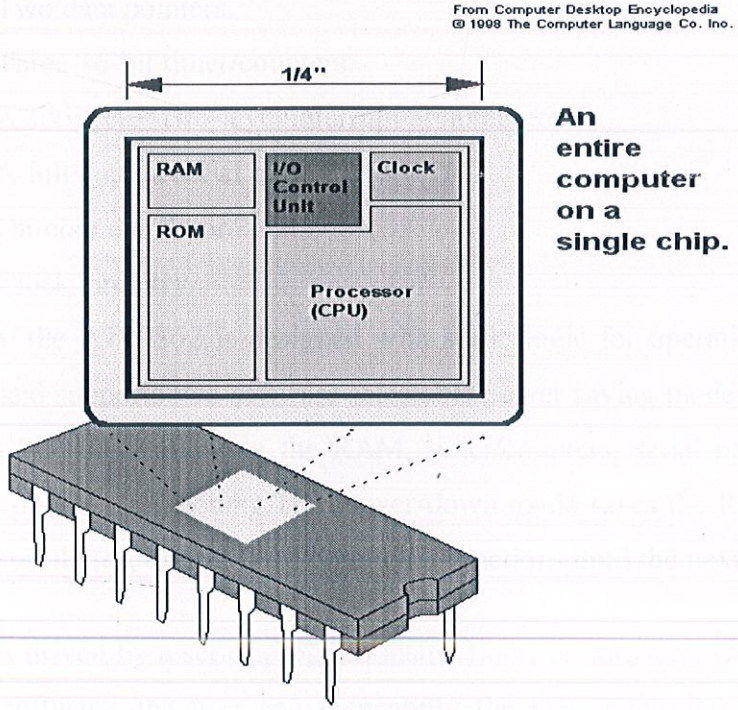


Fig. 12 Microcontroller Inside

2.1.3 Features of 8051

- **AT89S52:** The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller, which provides a highly flexible and cost-effective solution to many, embedded control applications. The AT89S52 provides the following standard features:
  - 8K bytes of Flash.
  - 256 bytes of RAM.
  - 32 I/O lines.
  - Watchdog timer.
  - Two data pointers.
  - Three 16-bit timer/counters.
  - A six-vector two-level interrupt architecture.
  - A full duplex serial port.
  - On-chip oscillator.
  - Clock circuitry.
- In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning.The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt

The hardware is driven by a set of program instructions, or software. Once familiar with hardware and software, the user can then apply the microcontroller to the problems easily.

7227825

The pin diagram of the 8051 shows all of the input/output pins unique to microcontrollers:

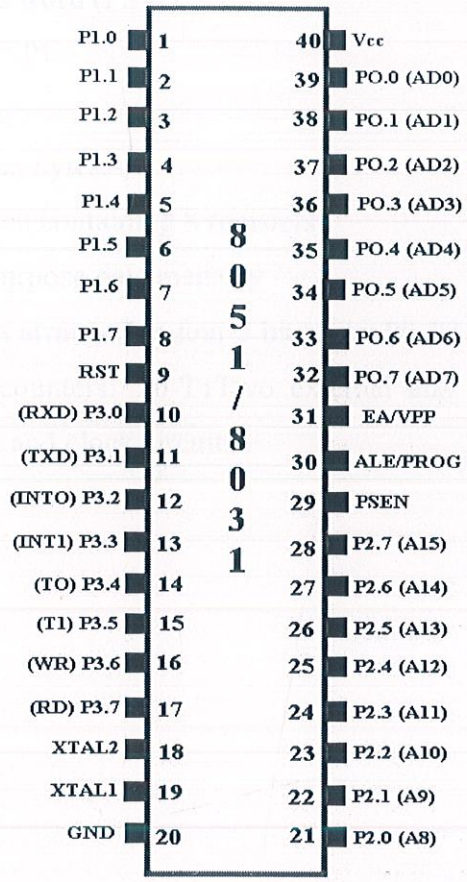


Fig. 13 Microcontroller Pin Description

The following are some of the capabilities of 8051 microcontroller.

- Internal ROM and RAM
- I/O ports with programmable pins
- Timers and counters
- Serial data communication

The 8051 architecture consists of these specific features:

- 16 bit PC &data pointer (DPTR)
- 8 bit program status word (PSW)
- 8 bit stack pointer (SP)
- Internal ROM 4k
- Internal RAM of 128 bytes.
- 4 register banks, each containing 8 registers
- 80 bits of general purpose data memory
- 32 input/output pins arranged as four 8 bit ports: P0-P3
- Two 16 bit timer/counters: T0-T1Two external and three internal interrupt sources Oscillator and clock circuits.

Chapter 4

Software

VB.Net (Microsoft) Visual Basic .NET. Touted by Microsoft as the next version of VB after VB6, but regarded by some as a new language in its own right because of the magnitude of the changes between VB6 and VB.Net. Very infrequently referred to as VB7.

Visual Studio Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It can be used to develop console and graphical user interface applications along with Windows Forms applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silverlight.

.NET NET represents an advanced new generation of software that will drive the Next Generation Internet.

Microsoft Office Microsoft Office is an office suite of inter-related desktop applications, servers and services for the Microsoft Windows and Mac OS X operating systems, introduced by Microsoft in 1989. The latest version is Office 2010 including Microsoft Access which we have used. An office software suite or productivity suite is a collection of programs intended to be used by knowledge workers. The components are generally distributed together, have a consistent user interface and usually can interact with each other, sometimes in ways that the operating system would not normally allow.

Form An object within a Microsoft Access application which is used to display and enter information. Forms may include multiple controls such as text fields and even other forms that are used to

	group and enter data. The forms can also contain a large amount of programming that is used to provide various functions to the user or to manage the operation of the interface.
Toolbar	A program bar which includes a collection of buttons that can be clicked to perform various functions. In Microsoft Access, pre-defined and custom toolbars can be used with forms as part of the user interface.
Foreign Key	A column in a database table that is used to match records with data in another table. One example would be a Customer ID field which is used as the primary key in the main Customer table and then as a foreign key in a table which lists the customer orders. The foreign key identifies which orders belong to a specific customer.
Table	A database object that holds data in the form of rows and columns. This can be a stored object within the database file or an abstract record set that is held in memory during an operation.
SQL	Structured Query Language - A scripting language that is used with relational databases to provide an interface for the retrieval and storage of information in the tables. The language provides keywords such as SELECT, INSERT and ORDER BY to specify actions to be performed on specified fields and tables.
Row	In a database table or query, this is a collection of cells across multiple columns that represent one data record.
Relational Database	A database in which data is arranged into tables by subject or object represented which are then related or joined by common fields. A common example is a customer orders database in which one table contains information specific to the customer such as contact information and another table contains the orders. A Customer ID would be used to link these tables. This allows for organized and flexible entry and storage of the data without the limitations of a flat file. In a properly normalized relational database, data is stored so as to eliminate redundancy of

information. In the example given, the customer contact information is stored once while each customer can have an unlimited number of orders in the related order table. A third related table might store individual items on the orders so that each order could have an indefinite number of products.

Microsoft Access A relational database management system (RDBMS) designed for use on personal computers. The software provides a system for designing database applications for use by a small number of users. These applications can include data entry forms, queries and reports in order to provide for all phases of data collection and analysis.

Query A set of instructions which retrieves data from a database table. In Microsoft Access queries are designed using Structured Query Language (SQL).

Record A collection of fields or values which combine to describe a single item. In Microsoft Access, a record is represented by a single row within a table.

Programming Language

An artificial language used to issue instructions to a computer. Some languages are designed for specific purposes such as business or scientific programming while others are general purpose. Higher-level languages such as BASIC contain commands that resemble human language and use compilers or interpreters to translate the instructions into commands usable by the computer. While the syntax varies, languages often have features such as decision loops, variables and error handling structures in common.

Primary Key The main index on a data table which usually contains a unique value to identify the item stored in each row of the table.

.NET Framework A programming infrastructure created by Microsoft for building, deploying, and running applications and services that use .NET

technologies, such as desktop applications and Web services. The .NET Framework contains three major parts: the Common Language Runtime (CLR), the Framework Class Library, and ASP.NET. See .NET Compact Framework.

Datasheet A display of rows and columns that represent the data held in a data table or generated by a query.

Database In general terms, a database is any collection of formatted data such as an address book or any other list of items that share a set of common characteristics. In a relational database, data is grouped into tables by subject or object type with columns that contain the specific attributes (i.e. name, address, and city) and rows for each item stored. Database applications designed in Microsoft Access include objects such as queries for retrieving specific data, forms for entering and displaying data and reports for compiling the data into a presentable format.

ADO.NET ADO.NET is the preferred data access method in the .NET Framework. Better support for disconnected data access

VB and VB.Net VB is object based and VB.NET is object oriented.

VB

1. Object based language.
2. Does not support inheritance.
3. Does not support for disconnected architecture.
4. No interoperability function.
5. No support for threading.

VB.net

1. VB.net is object oriented.
2. VB.net supports exception handling.
3. VB.net is strongly typed.
4. VB. net supports multithreading.
5. VB.net now has console applications

4.1 Block Diagram

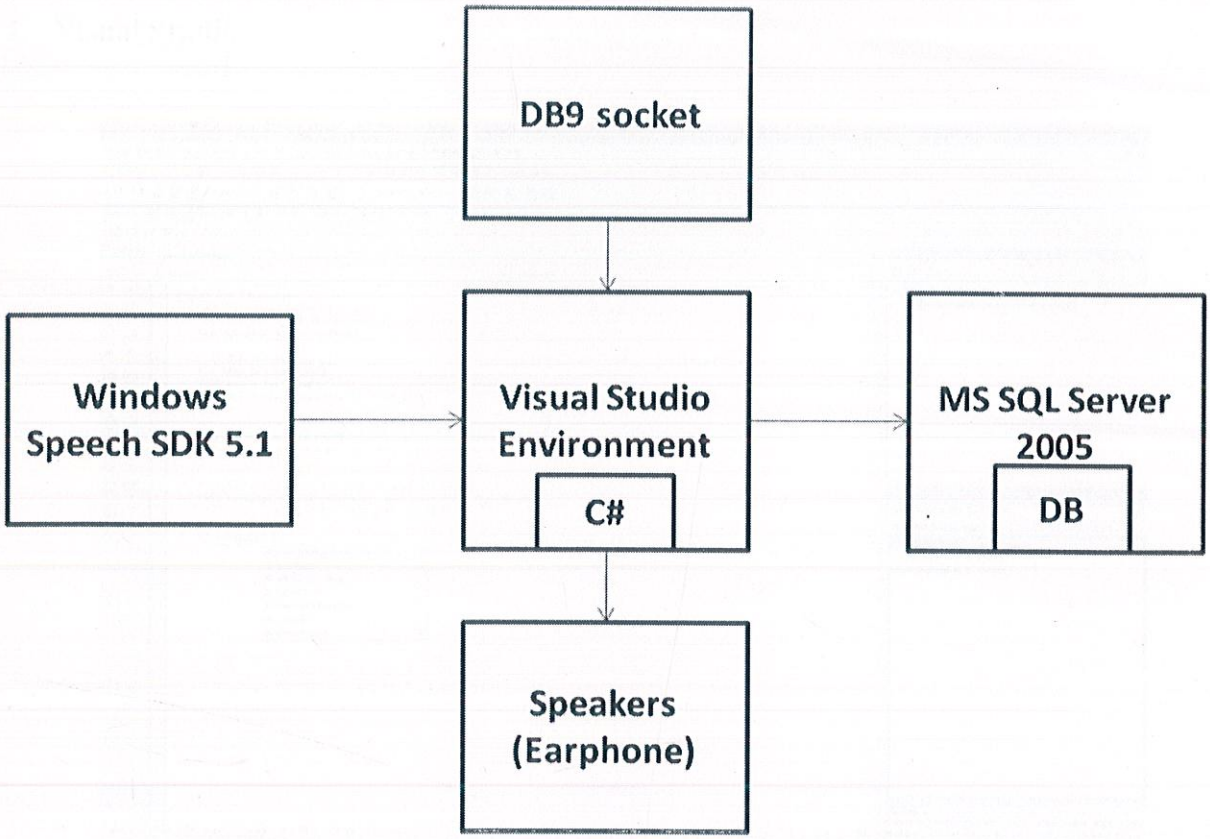


Fig. 14 Software Block Diagram

The software part is divided into two parts. One that runs on the workstation and the other that runs on the microcontroller.

4.2 Software Running on Workstation

1. Visual Studio

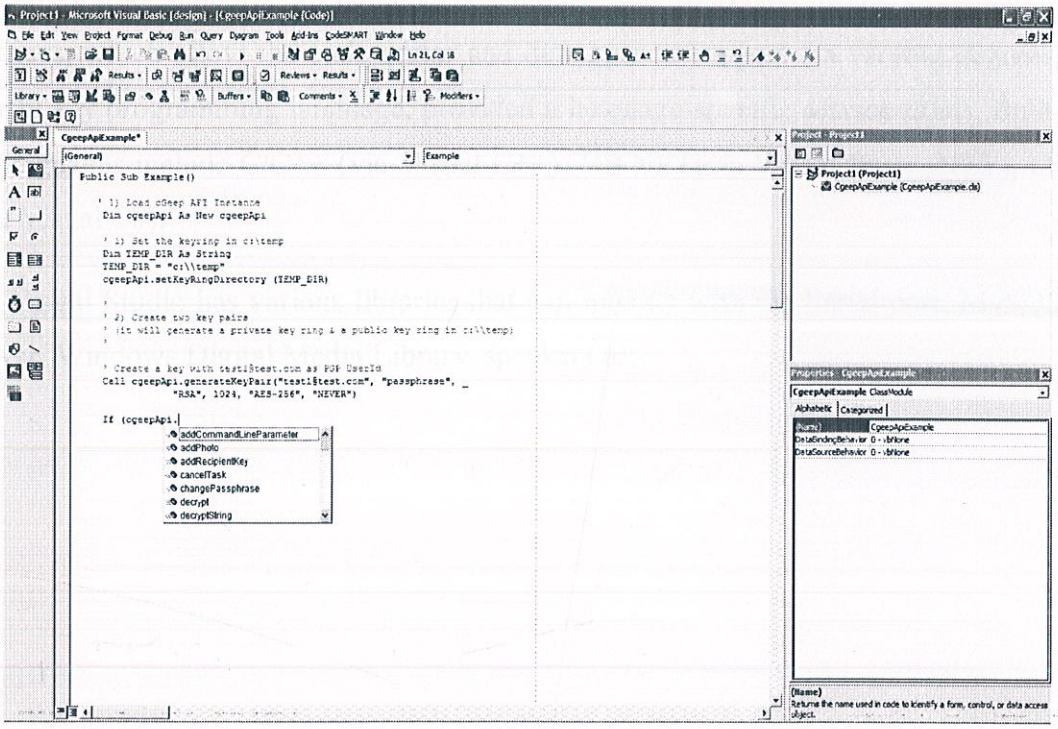


Fig. 15 Visual Studio

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It can be used to develop console and graphical user interfaceapplications along with Windows Forms applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silverlight.

Visual Studio includes a code editor supporting IntelliSense as well as code refactoring. The integrated debugger works both as a source-level debugger and a machine-level debugger. Other built-in tools include a forms designer for building GUI applications, web designer, class designer, and database schema designer. It

accepts plug-ins that enhance the functionality at almost every level—including adding support for source-control systems (like Subversion and Visual SourceSafe) and adding new toolsets like editors and visual designers for domain-specific languages or toolsets for other aspects of the software development lifecycle (like the Team Foundation Server client: Team Explorer).

Visual Studio supports different programming languages by means of language services, which allow the code editor and debugger to support (to varying degrees) nearly any programming language, provided a language-specific service exists. Built-in languages include C/C++ (via Visual C++), VB.NET(via Visual Basic .NET), C# (via Visual C#).

Visual Studio has various libraries that can interact with the Serial port, MySQL server, Windows Digital Media Library, speakers etc.

2. Microsoft SQL Server

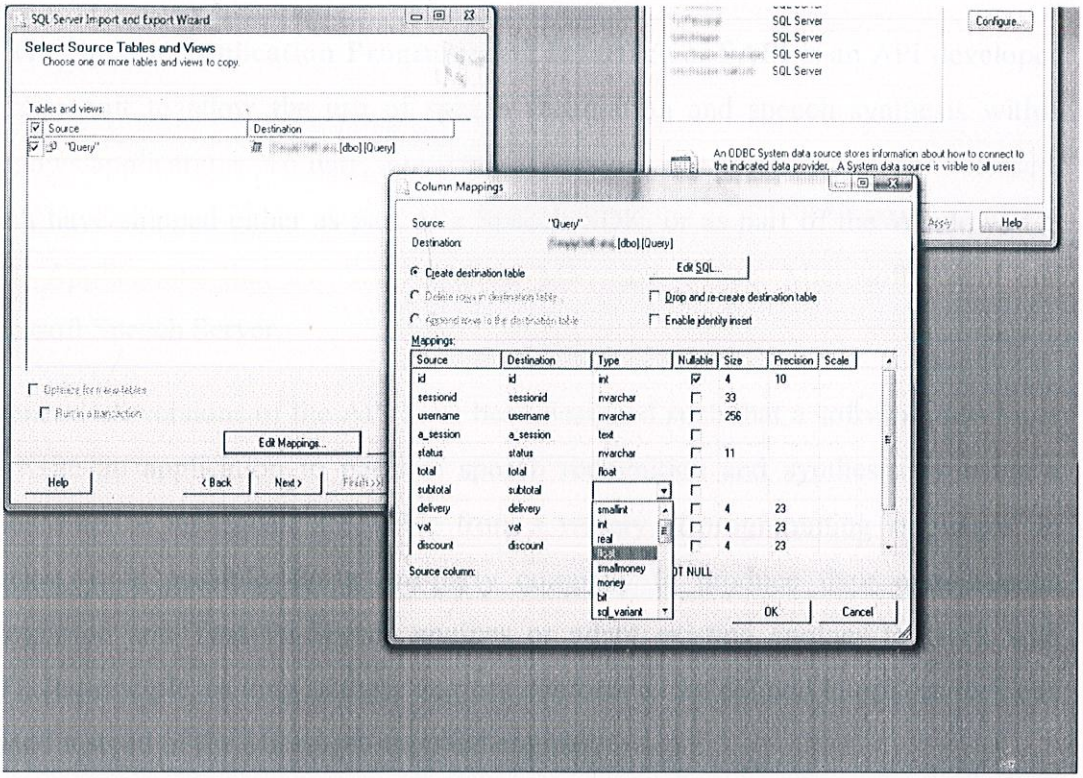


Fig. 16 SQL Server

Microsoft SQL Server is a relational model database server produced by Microsoft. Its primary query languages are T-SQL and ANSI SQL. Microsoft SQL Server is a computer application used to create desktop, enterprise, and web-based database applications. It is used at different levels and with various goals.

Microsoft SQL Server can interact with Visual Studio to create a rich desktop database application.

3. Windows Speech SDK

The Speech Application Programming Interface or **SAPI** is an API developed by Microsoft to allow the use of speech recognition and speech synthesis within Windows applications. To date, a number of versions of the API have been released, which have shipped either as part of a Speech SDK, or as part of the Windows OS itself. Applications that use SAPI include Microsoft Office, Microsoft Agent and Microsoft Speech Server.

In general all versions of the API have been designed such that a software developer can write an application to perform speech recognition and synthesis by using a standard set of interfaces, accessible from a variety of programming languages. In addition, it is possible for a 3rd-party company to produce their own Speech Recognition and Text-To-Speech engines or adapt existing engines to work with SAPI. In principle, as long as these engines conform to the defined interfaces they can be used instead of the Microsoft-supplied engines.

In general the Speech API is a freely-redistributable component which can be shipped with any Windows application that wishes to use speech technology. Many versions (although not all) of the speech recognition and synthesis engines are also freely redistributable.

4.3 Software running on Microcontroller

Kiel

Kiel provides an Integrated Development Environment (IDE) **uVision** for writing programs for 8051 series of microcontrollers. uVision includes a C compiler, Assembler, Linker, Microcontroller Libraries and the GUI. The programming is done in C using the C compiler or in Assembly Language using the Assembler. The microcontroller is not able to understand the C or the Assemble program. It has to be converted into a format which is understood by the microcontroller. When we compile our program written in uVision wither in C or Assembly Language, a hex file is created which can be downloaded on the microcontroller.

4.4 Programming Language

C# (C Sharp)

The first component oriented language in the C/C++ family. Here everything really is an object.

C# is a language designed to be fully compatible with Microsoft's .NET initiative while taking advantage of what has been learned from C and C++ (as well as Java).

C# is designed to be a platform-independent language in the tradition of Java. It's syntax is similar to C and C++ syntax, and C# is designed to be an object-oriented language. There are, for the most part, minor variations in syntax between C++ and C#. Main has no return type, there are no semicolons after class names, there are some (to C++ programmers) strange decisions regarding capitalization - such as the capitalization of Main. Other a few differences, the syntax is often the same. This decision is reasonable, in light of the fact that C syntax has been used with several other languages - notably Java.

Similar to Java, C# does not support multiple inheritances; instead it provides Java's solution: interfaces. Interfaces implemented by a class specify certain functions that the class is guaranteed to implement. Interfaces avoid the messy dangers of multiple

inheritances while maintaining the ability to let several classes implement the same set of methods.

Another helpful feature of C# is garbage collection. Therefore, it is unnecessary to include a destructor for each class unless a class handles unmanaged resources; if so, it's necessary to release control those resources from within the class (The Finalize function is used to clear up these unmanaged resources; it can even be abbreviated with the same syntax as a C++ destructor). Of course, C# also provides direct access to memory through C++ style pointers, but these pointers are not garbage collected until specifically released by the programmer.

C#, as part of the .NET framework, is compiled to Microsoft Intermediate Language (MSIL), which is a language similar to Java's bytecode. MSIL allows C# to be platform independent and runs using just in time compiling. Therefore programs running under .NET gain speed with repeated use. Furthermore, because the other languages that make up the .NET platform (including VB and COBOL) compile to MSIL, it is possible for classes to be inherited across languages. The MSIL, like bytecode, is what allows C# to be platform independent.

The potential for C# is great if the .NET platform succeeds. C# is designed to take advantage of the design of .NET, and Microsoft has poured a great deal of money into .NET. Do you need to learn C#? If you know C++, you'll probably be able to pick it up quickly, and yes, you can still use C++ with .NET. It's important to keep an eye on C# to see how it will affect you.

Chapter 5

Working of the project

Block Diagram

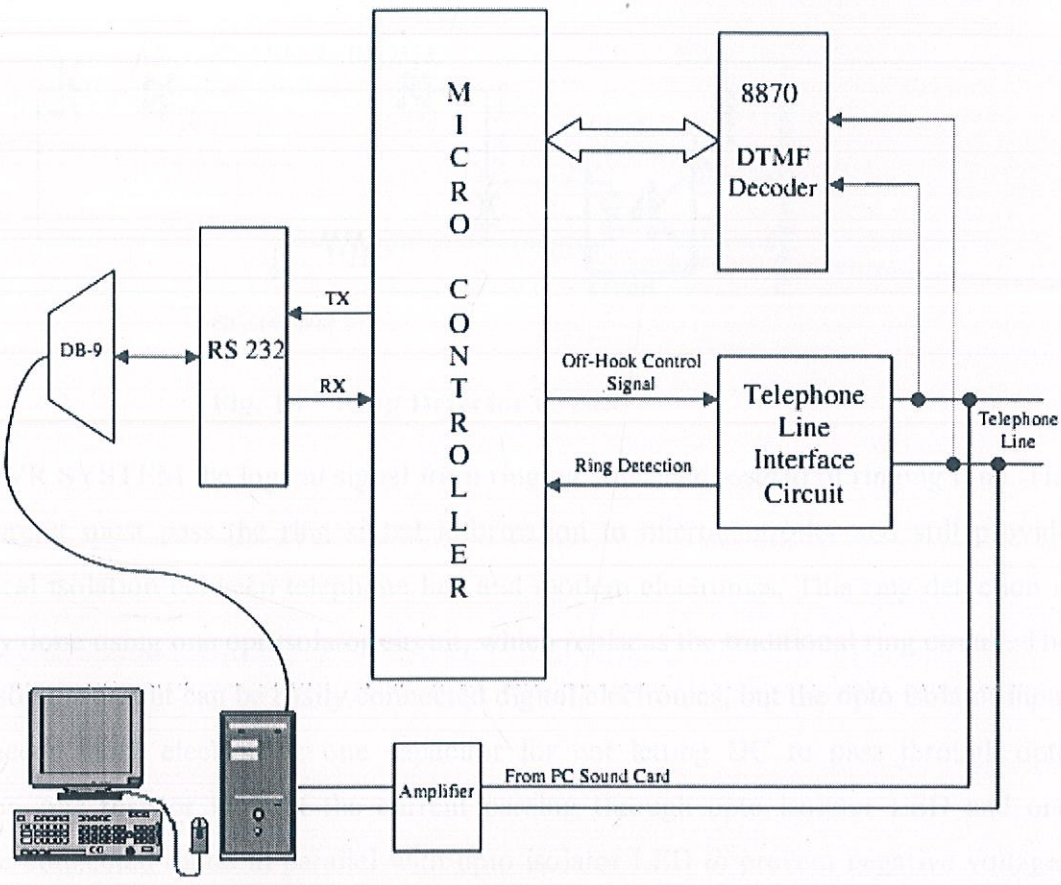


Fig. 17 IVRS Block Diagram

Here is the functional block diagram of the system.The 8051 is the heart of the IVRS system. It controls the operation of various parts of the IVRS system.When a telephone call is detected by the ring detector, the micro controller switches the relay to the DTMF and sends a signal to the PC via RS 232 to run the wave file welcoming the user to the IVRS. The number given by the user is decoded by the DTMF IC and is stored in the 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 various working blocks of IVR systems are:

1) **Ring Detector:** Ring Detector is starting block of IVR system. The basic function of this section is to detect the incoming ring. When a person calls the institute this section detects the ring and generates pulse accordingly and off-hooks the telephone.

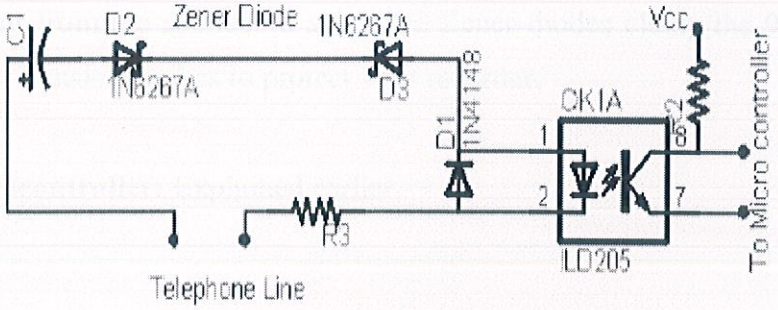


Fig. 18 Ring Detector circuit

In IVR SYSTEM the logical signal from ringing is needed instead of ringing tone. The ring circuit must pass the ring signal information to microcontroller and still provide electrical isolation between telephone line and modem electronics. This ring detection is usually done using one opt isolator circuit, which replaces the traditional ring circuit. The opto isolator output can be easily connected digital electronics, but the opto isolator input side needs more electronics: one capacitor for not letting DC to pass through opto isolator, one resistor to limit the current passing through opto isolator LED and one reverse connected diode in parallel with opto isolator LED to prevent negative voltages from damaging the LED. This is the basic ring detection circuit.

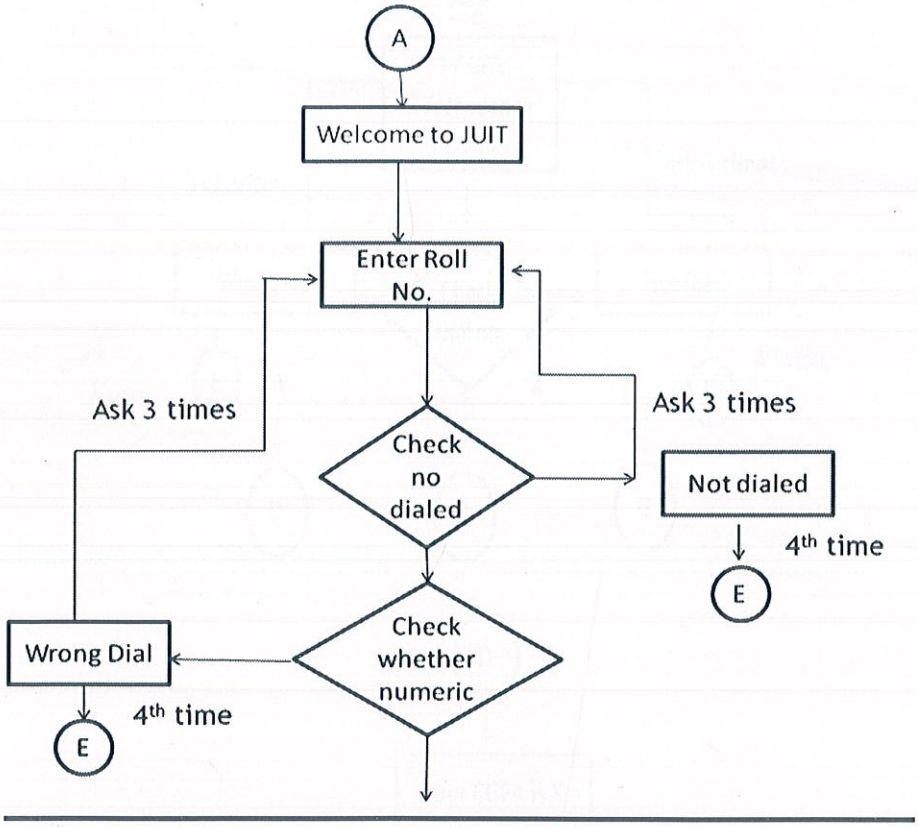
2) **Relay Circuit:** The basic function of Relay is to switch the telephone line between 'Ring Detection' and 'DTMF Decoding & Audio transmission'. Telephone line is generally monitored by microcontroller via Opto coupler to detect the ring. Once the ring is detected the relays is activated by Microcontroller to Off-Hook the phone and decode the DTMF signals pressed by caller.

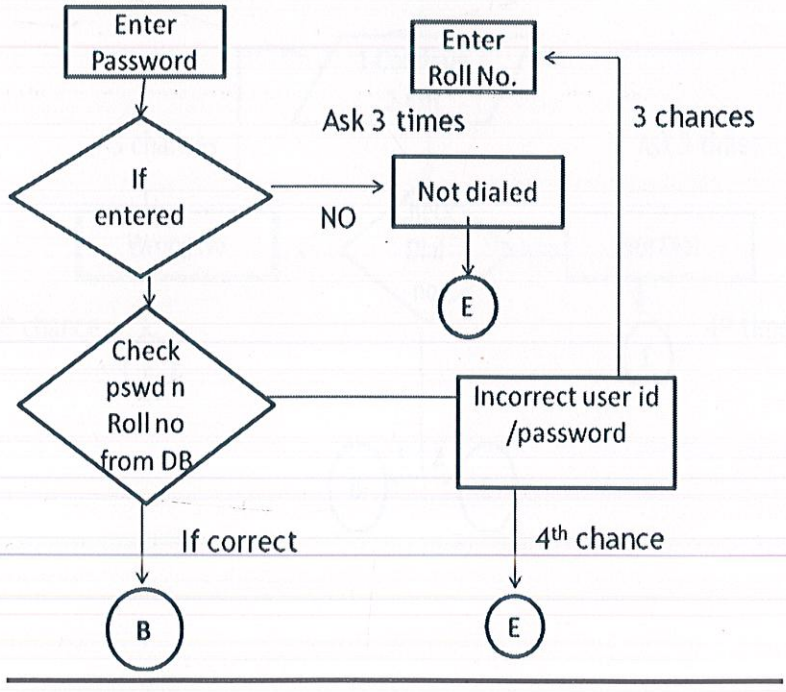
3) DTMF Decoder: Explained earlier.

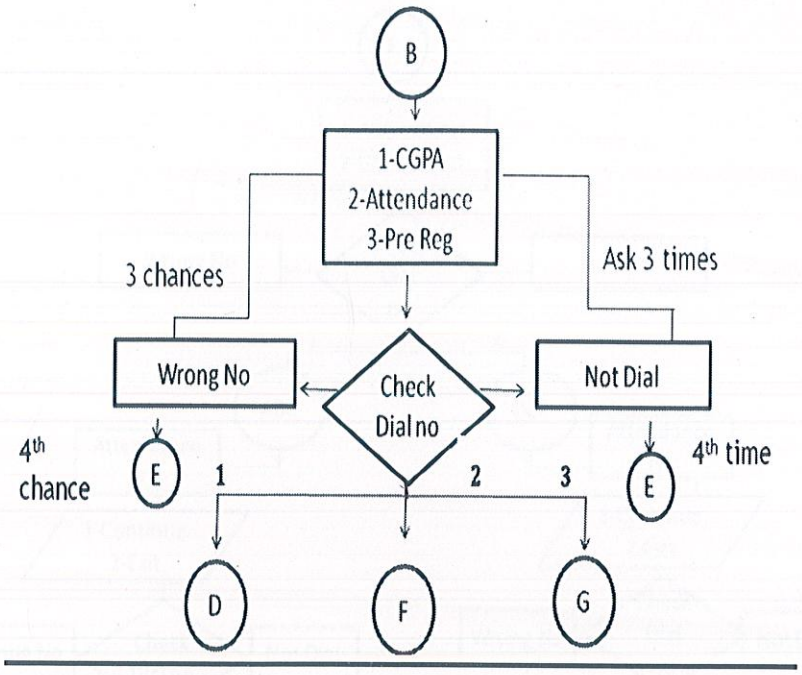
4) Telephone Interface circuit: This circuit allows you to couple audio from a computer soundcard into telephone line. The RJ-45 jack is set up to feed the circuit through the phone line. The active signal for a single phone is on the red and green wires. The capacitor blocks any DC current from flowing through the transformer. The resistor limits the current of the 90V ringing signal. The transformer isolates the telephone side of the circuit from the soundcard side. The Zener diodes clamp the 90 volt ringing signal and other transient spikes to protect your recorder.

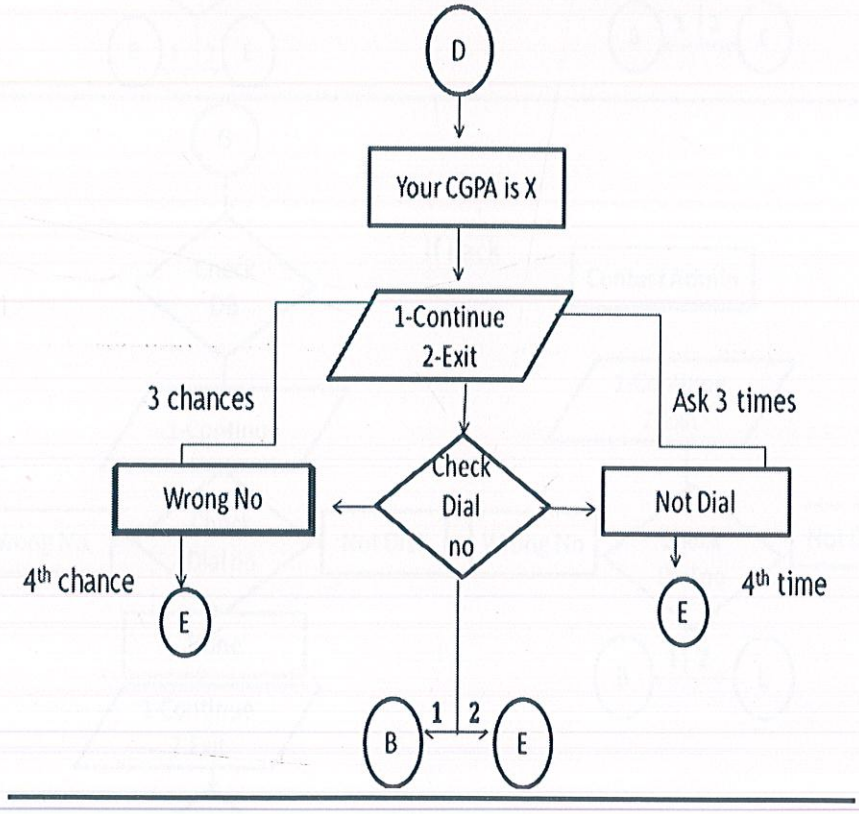
5) Microcontroller: Explained earlier.

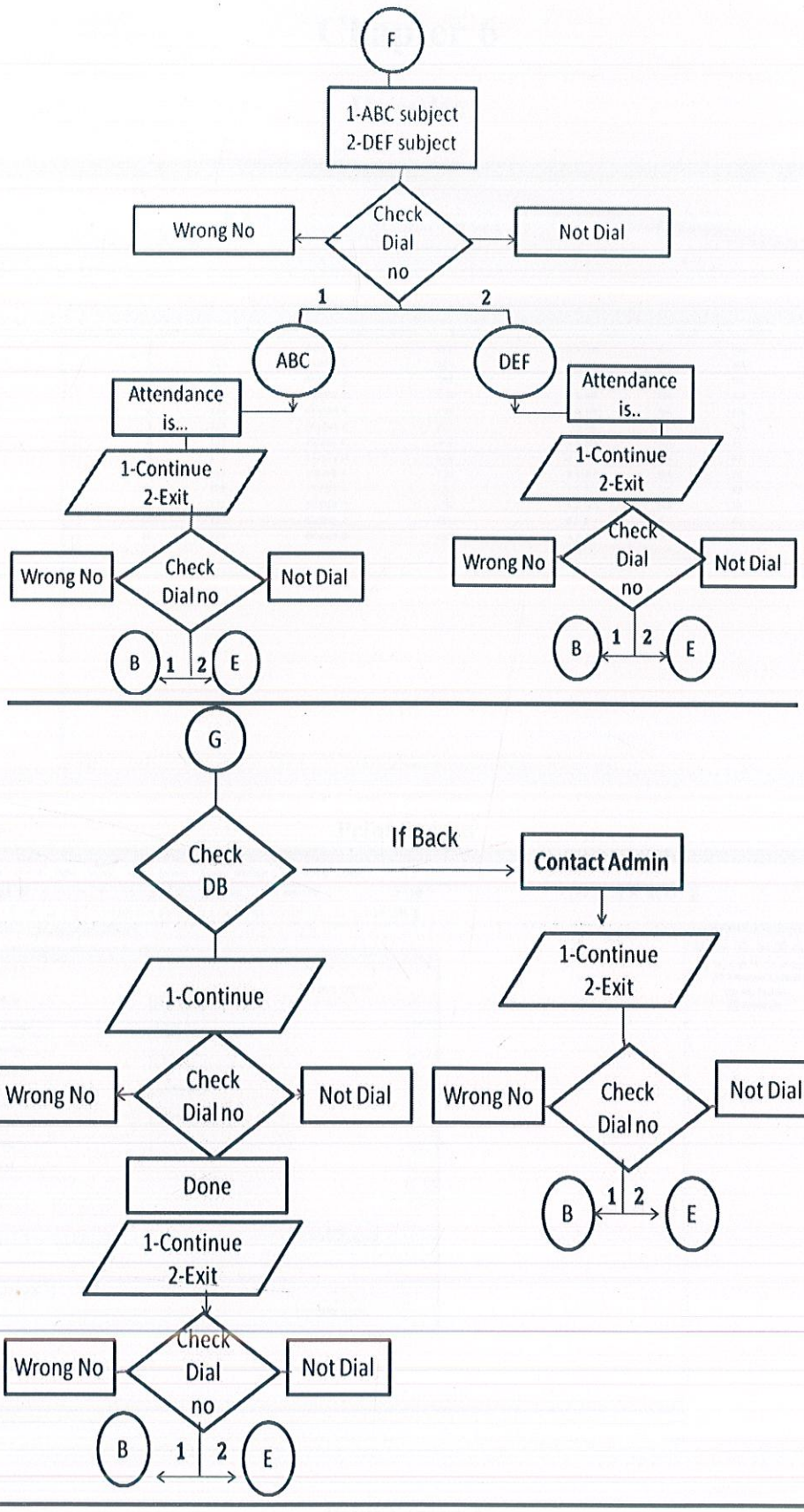
Flowchart


A
Welcome to JUIT
Enter Roll No.
Ask 3 times
Check no dialed
Ask 3 times
Not dialed
4th time
E
Check whether numeric
Wrong Dial
4th time
E


Enter Password
Enter Roll No.
Ask 3 times
3 chances
If entered
NO
Not dialed
E
Check pswd n Roll no from DB
Incorrect user id /password
If correct
4th chance
B
E

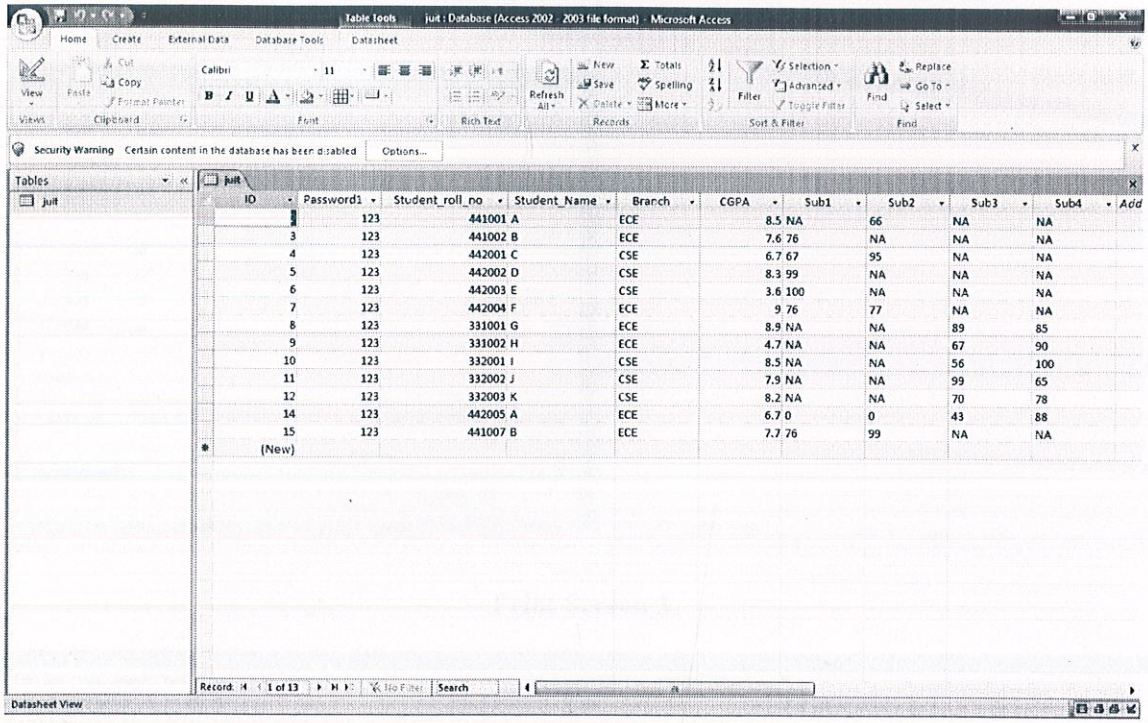

B
1-CGPA
2-Attendance
3-Pre Reg
3 chances
Ask 3 times
Wrong No
Check
Dial no
Not Dial
4th
chance
E
1
2
3
E
4th time
D
F
G


D
Your CGPA is X
1-Continue
2-Exit
3 chances
Ask 3 times
Wrong No
Check
Dial
no
Not Dial
4th chance
E
E
4th time
1
2
B
E


F
1-ABC subject
2-DEF subject
Check Dial no
Wrong No
Not Dial
1
2
ABC
DEF
Attendance is...
Attendance is..
1-Continue
2-Exit
Check Dial no
Wrong No
Not Dial
B
1
2
E
G
Check DB
If Back
Contact Admin
1-Continue
Done

Chapter 6

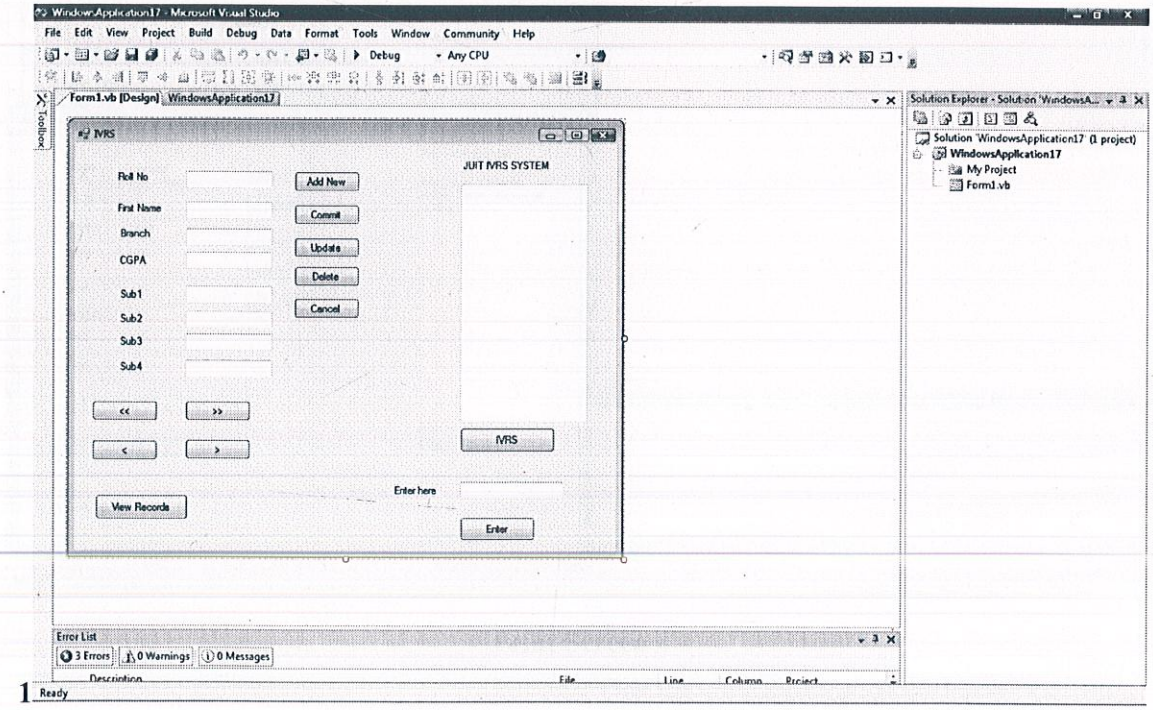
Results



ID	Password1	Student_roll_no	Student_Name	Branch	CGPA	Sub1	Sub2	Sub3	Sub4
1	123	441001	A	ECE	8.5	NA	66	NA	NA
3	123	441002	B	ECE	7.6	76	NA	NA	NA
4	123	442001	C	CSE	6.7	67	95	NA	NA
5	123	442002	D	CSE	8.3	99	NA	NA	NA
6	123	442003	E	CSE	3.6	100	NA	NA	NA
7	123	442004	F	ECE	9	76	77	NA	NA
8	123	331001	G	ECE	8.9	NA	NA	89	85
9	123	331002	H	ECE	4.7	NA	NA	67	90
10	123	332001	I	CSE	8.5	NA	NA	56	100
11	123	332002	J	CSE	7.9	NA	NA	99	65
12	123	332003	K	CSE	8.2	NA	NA	70	78
14	123	442005	A	ECE	6.7	0	0	43	88
15	123	441007	B	ECE	7.7	76	99	NA	NA
(New)									

Datasheet View

Print Screen



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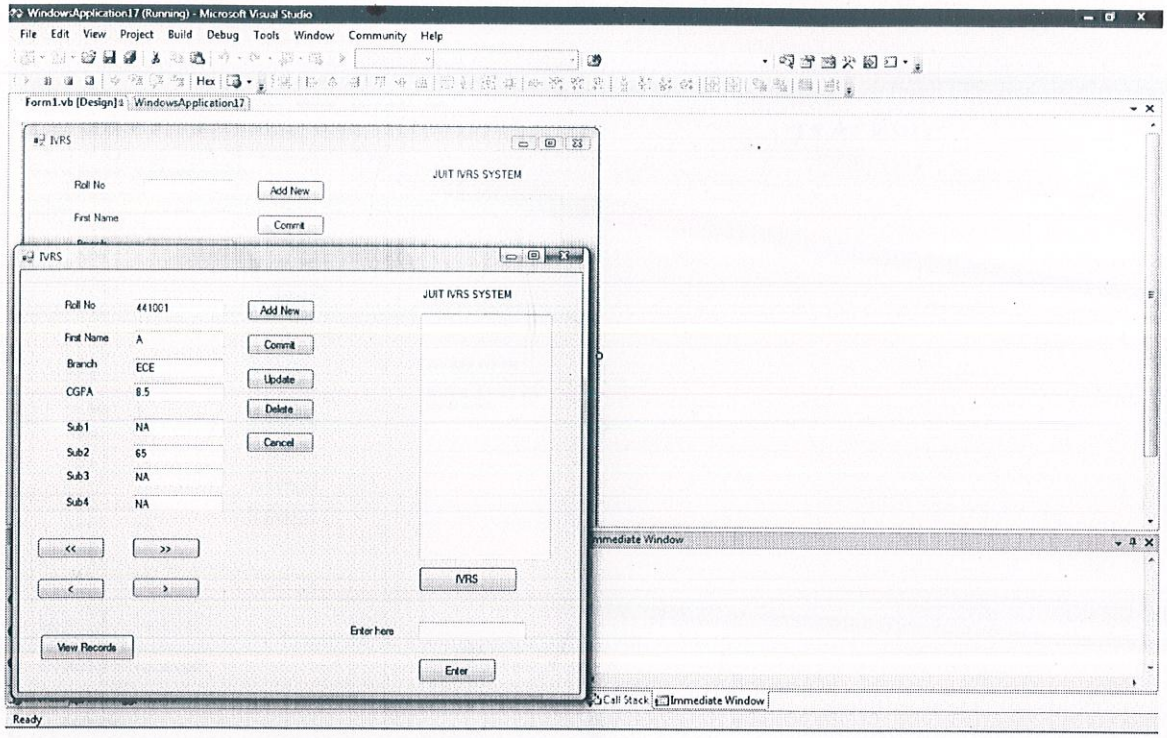
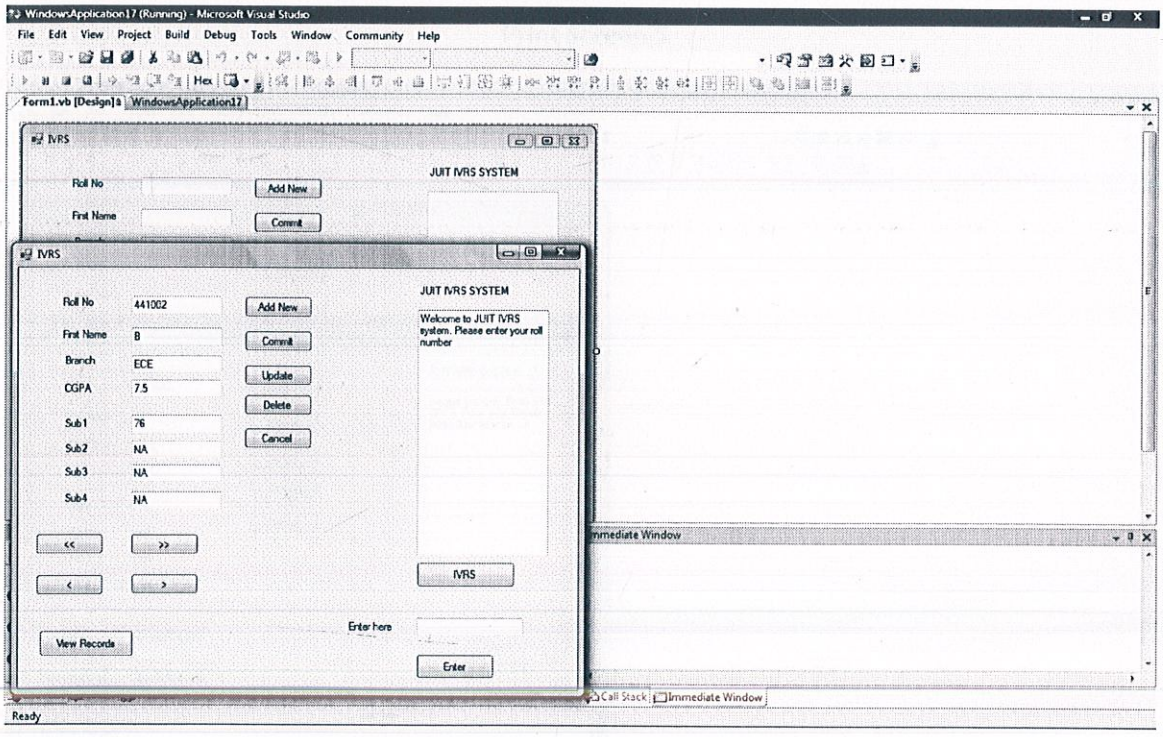


Print Screen 3



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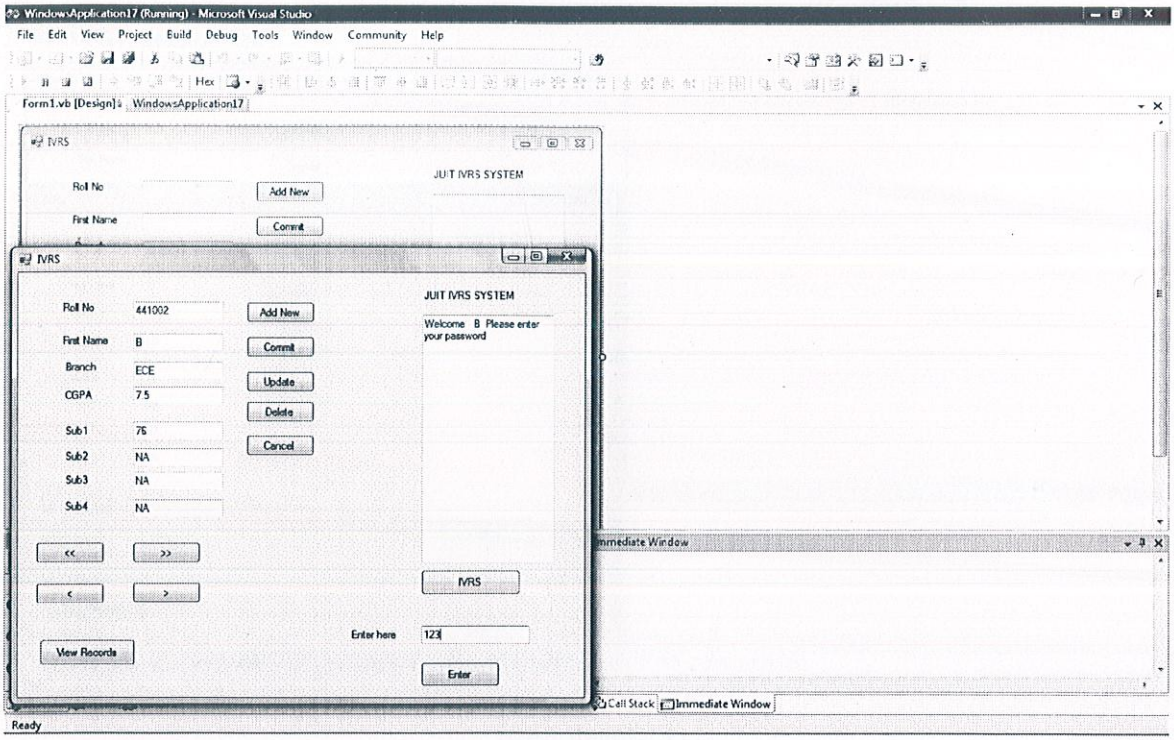

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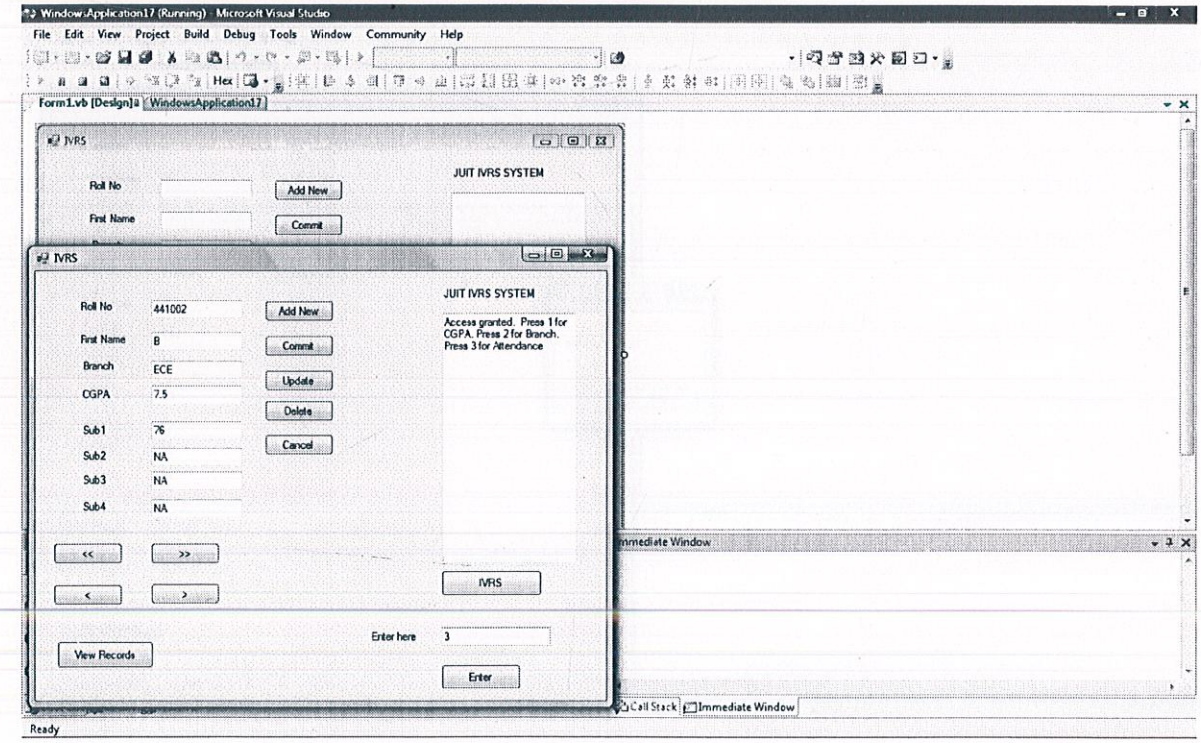
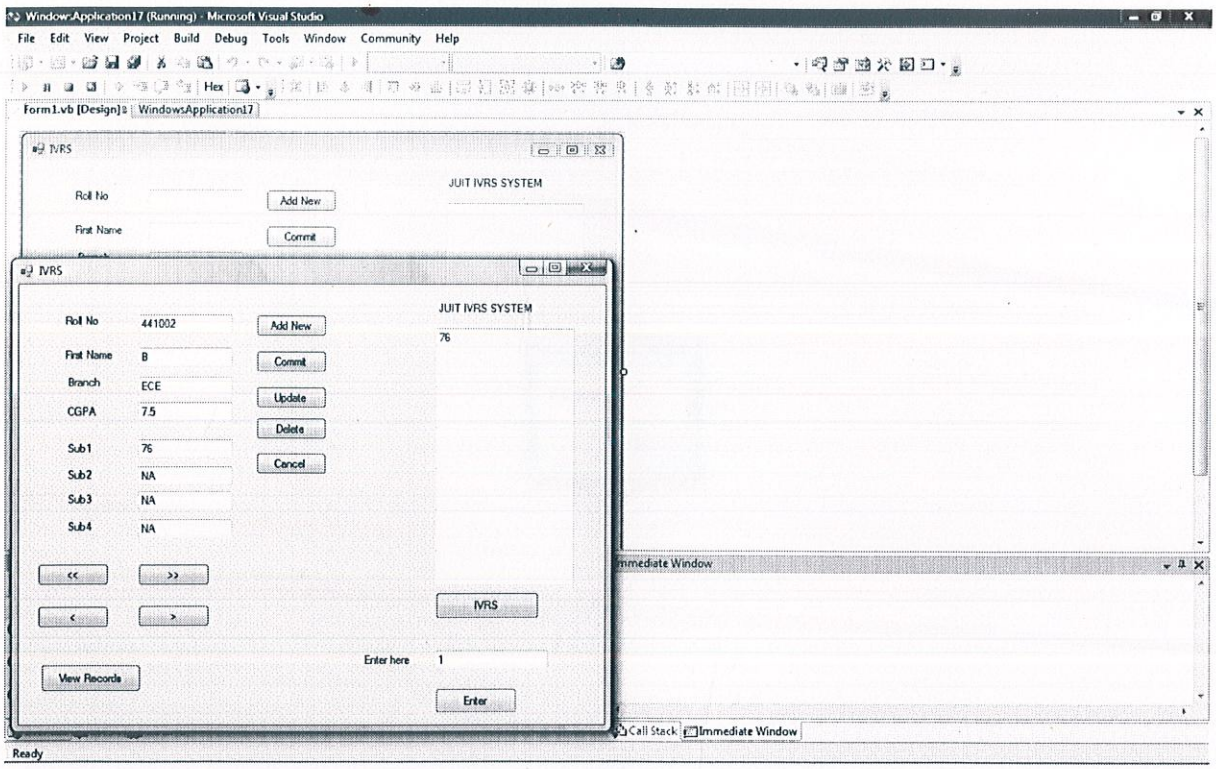
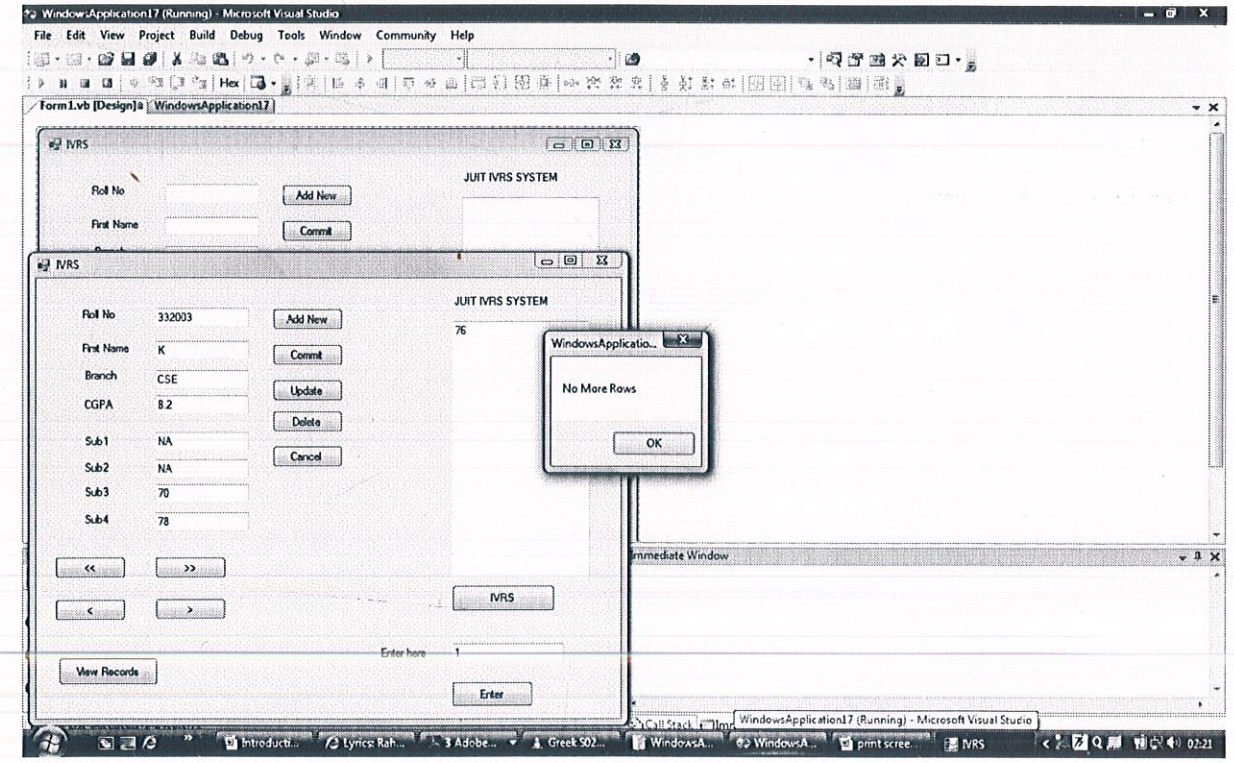


Print Screen 6



Print Screen 7



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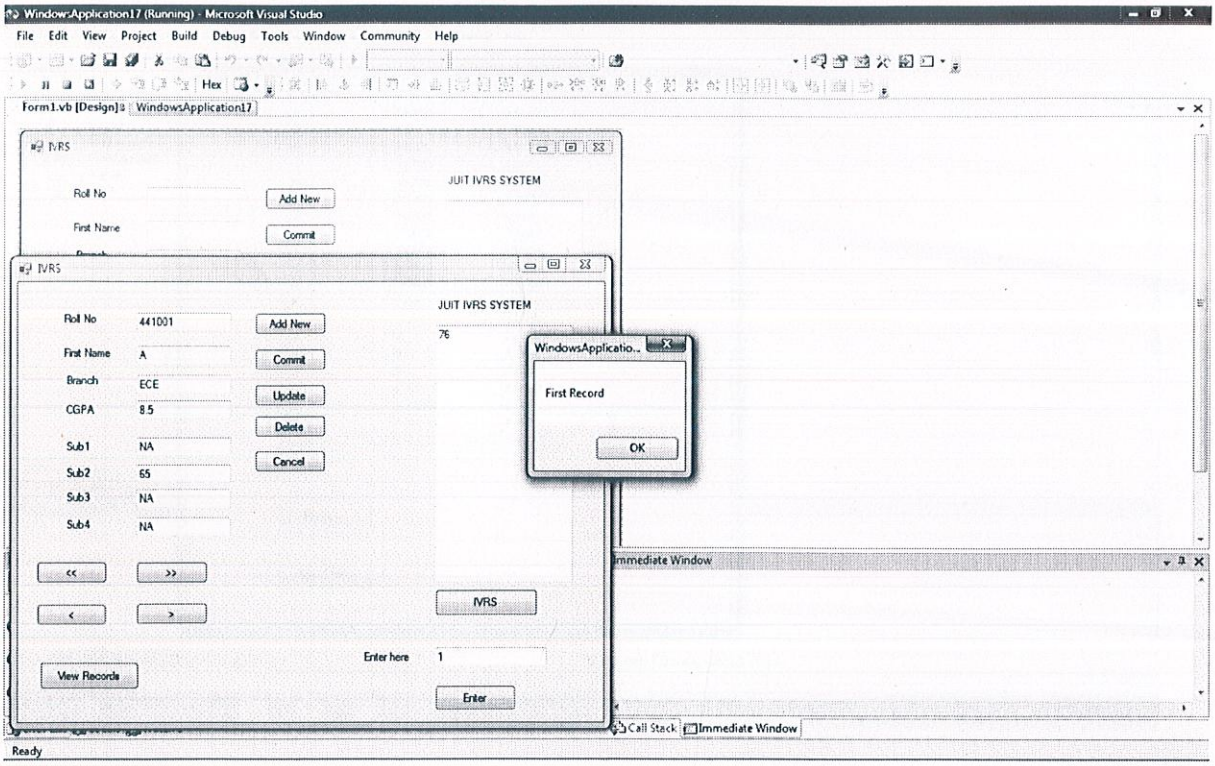
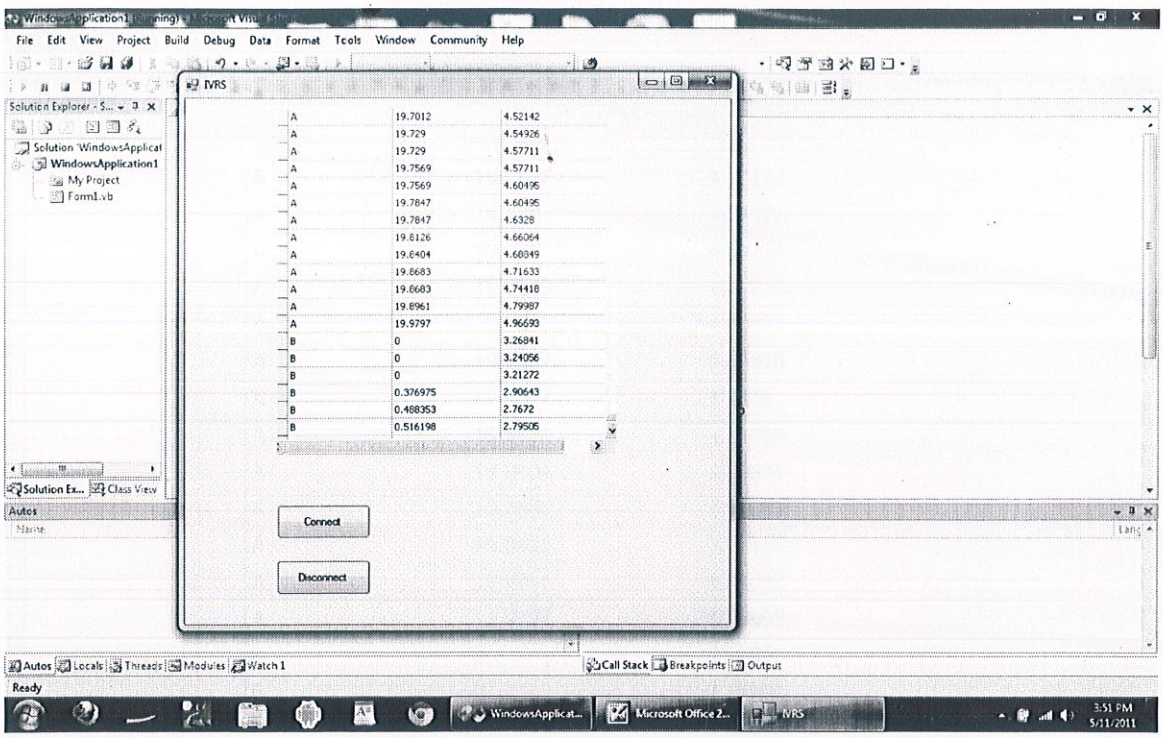
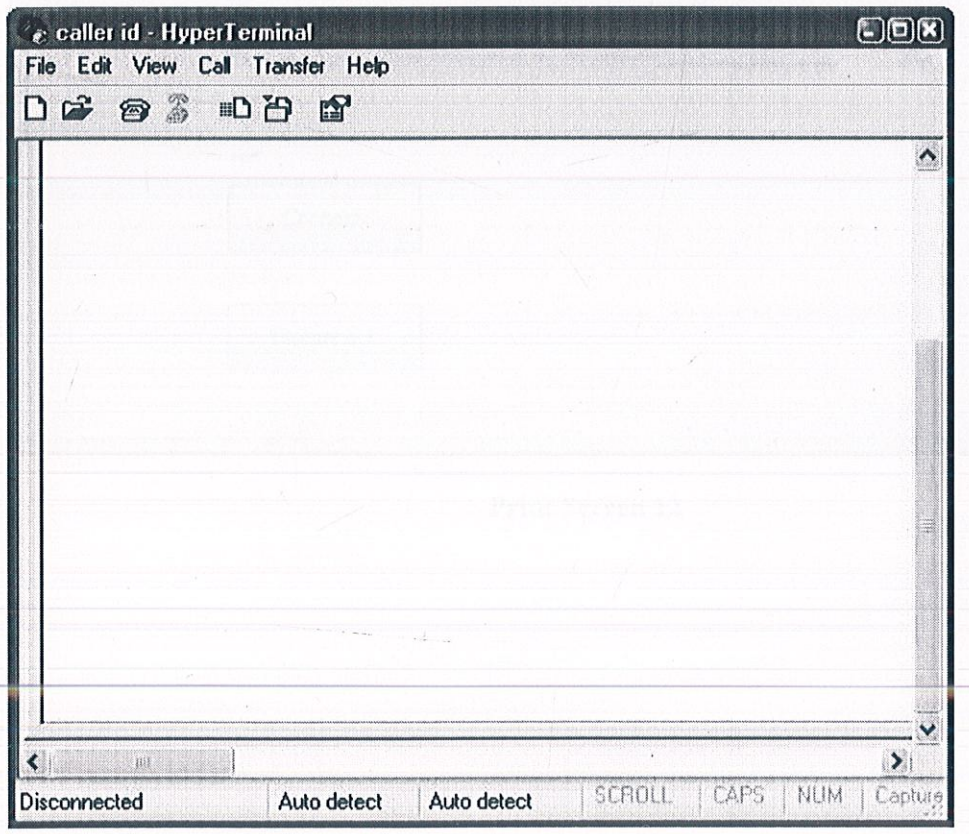


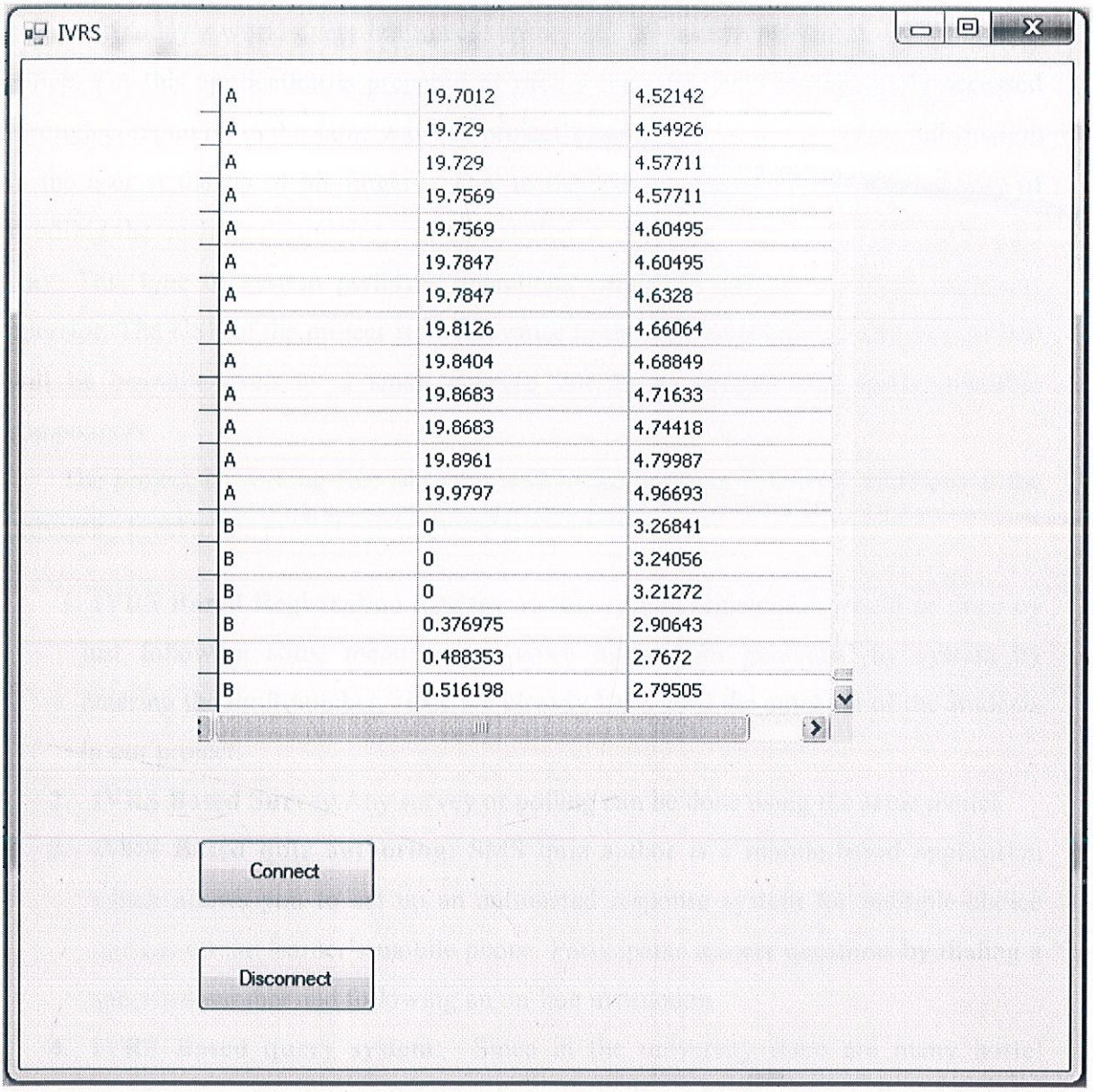
Print Screen 9



Print screen 10



Print Screen 11



Print Screen 12

Scope of the project

In today's world everything needs to be done from the comfort of one's home or office. For this application is prepared in such a way that they can be easily accessed through computers. In the same way our project's aim is to provide the entire information to the user at the tip of his fingers. Due to this project the traditional manual way of handling the customer's queries will be handled in a more technological and automated way. This type of system performs operations similar to that of a human telephone operator. The USP of the project is its relevance to the field of telephony and its cost that will be bearable even by a small concern due to its simpler and easily available components.

The project is working fine and very well tested however following additions at the university level to the project can improve applicability of it:

1. **IVRS Based Registration System**: In this system registration would be done by just following some menu driven voice instructions generated by system by entering the draft number, since we already have used the database of the students in our project.
2. **IVRS Based Survey**:Any survey or polling can be done using the same model.
3. **IVRS Based quiz authoring**: SMS quiz author is a mobile-based application which allows you to set up an automated response system for multiple-choice quizzes on the learner's mobile phone. Participants answer questions by dialing a specified number and following an on-line instruction.
4. **IVRS Based query system**: Since in the university there are many hostel problems, so by this system student can register his/her query directly to the administration by just following some menu driven voice instructions.

These applications were all at the university level. Now at national level this model can be used for **IVRS based election contesting**, which would replace the traditional voting system, and in turn would be more transparent, reliable, and secure. Hence there are many research areas where the same model can be used to ease the process.

Conclusion

The main objective of our project was to design an efficacious model to liberalize the administration process at our university. In this project a low cost, secure, ubiquitously accessible, auto-configurable, remotely controlled solution for student ease has been introduced. The approach discussed and implemented in the project is novel and has successfully achieved the target to enable the student to remotely access their database using the IVRS based system thus satisfying the student's needs and requirements. During tests, the full functionality of the system was checked and after going through the various modules, we found that our system comprises of the following four features, namely **security**, **cost**, **time**, and **ease of access**.

The following benefits are offered by our system:

1. **Security**: The users are expected to acquire login and password to access the system. This adds protection from unauthorized access.
2. **Cost efficient:** In the present day Mobile phone call is cheapest method of communication. Most network providers are continuously providing schemes for calls at very reasonable rate.
3. **Time efficient:** It is highly time efficient as the student just has to dial a number and the rest of the process is fully automated.
4. **Accessibility**: All students have access to services without being physically present at the university just with the help of a mobile phone.
5. **Reliability**: The system performs dependably, accurately, and consistently.
6. **Accuracy**: The implemented system is more accurate, minimal error possible.
7. **Usability**: The system is easier and more convenient to use.

It can be seen that the project is developed in such a way that it is advantageous for the university.IVRS can be used by university to know about various departments, mode of working and levels of control. Hardware circuitry of IVRS is very compact and it can be used as a card in computer. By the wide spread of internet it is possible to know information from anywhere in the world with the advanced features of Interactive Voice Response System.

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Appendix

Algorithm (Microcontroller End):

Step 1: Check if the ringing signal is present in the telephone line.

Step 2: If ringing signal is present then wait for 10 seconds, & go to step 3 or else go to step 1.

Step 3: If ring continues then activate the relay or else go to step 1.

Step 4: Establish a dedicated line connection.

Step 5: Wait for the response of the caller.

Step 6: Deactivate the DTMF decoder by relay control circuit to save the . decoder from getting false input.

Step 7: Pass the audio signal via the isolation transformer.

Step 8: Check if the signal is continued. If yes go to step 3 else go to step 7.

Step 9: Terminate the call.

Step 10: Stop the system.