Application of RFID Based E-Voting System Through PIC18F452 Microcontroller

Shrushti B. Walvekar
Dept of Electronics and Communication Engineering
Karnataka Law Society's Shri Vasantrao Potdar Polytechnic, Tilakwadi, Belagavi-590006

Abstract- *Our project "Electronic Passport using RFID" is mainly intended to design an advanced E-voting system using RFID and keypad which helps in getting the voter details instantaneously using RFID technology. This project explains the consideration of microcontroller, RFID module, LCD, power supplies, LED's, RS232 cable, MAX232 and buzzer interfacing to microcontroller. This is very much helpful for the election officers to extract the details of the individual's person instantaneously and to identify nonregistered persons. The major features of this project are Data logging into PC using RS232 cable, MATLAB based image of authorized voter details display along with image, identification of voter through RFID communication and automatic display of voter details on LCD and on PC. The system also facilitates the voting data display when the election commissioner officer shows his tag and enters the password from keypad matches. When any voter ID is recognized as unauthorized then the system alerts through buzzer alarm. The Microcontroller is programmed using Embedded C language which provides effective environment in performing the task. This project can be extended using a GSM module. GSM module sends the alert message to the respective authorities when unauthorized card is detected by the RFID reader.*

Keywords- RFID, LED, RS232 cable, MAX232, LCD

I. INTRODUCTION

The project aims in designing an advanced E-voting system using RFID and keypad which helps in getting the voter details instantaneously using RFID technology. This is very much helpful for the election officers to extract the details of the individual's person instantaneously and to identify nonregistered persons. Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. One among the technologies which had greater developments is RF communications. The result of this is the RFID cards which transmit a unique identification number. This number transmitted by the RFID can be read with the help of a RF reader. The main aim of this project is to extract voter ID registration details based on RFID technology like name, image, phone number, address, age, voter ID number etc. In this project the RFID tags are used for identifying the authorized person, and the RFID reader which is interfaced to microcontroller decodes the RFID tag of the particular voter individual details along with image and those particular authorized details are displayed on PC with MATLAB through RS232 cable. Micro controller forms the controlling module, and it is the heart of the device. The controller performs the functionality of receiving data from the RFID. The microcontroller is programmed in such a way that the data from microcontroller is continuously sent to PC. The user initially need to show the tag and also need to enter the unique password from keypad when the voter tag and password matches then the system declares the individual as authorized. The authorized individual can vote the candidate from the keypad. The individual details along with image gets displayed on PC with MATLAB and the received data will be fed to PC through a Microcontroller. When any voter ID is recognized as unauthorized then the system alerts through buzzer alarm. The system also facilitates the voting data display when the election commissioner officer shows his tag and enters the password from keypad matches. The Microcontroller is programmed using Embedded C language which provides effective environment in performing the task.The major features of this project are:

1. Data logging into PC using RS232 cable.
2. MATLAB based image of authorized voter details display along with image
3. Identification of voter through RFID communication.
4. Automatic display of voter details on LCD and also on PC.
5. Alerting through buzzer alarm system when the voter card is unauthorized.

An embedded system using hardware to perform a dedicated task. Main devices used in embedded products are Microcontrollers. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result. The project "RFID based E-Voting System" using PIC18F452 microcontroller is an exclusive project which is used to recognize the authorized voter individual using RFID and keypad when the user is identified then the details instantly displays on the PC MATLAB along with image his details using RFID technology.

II. METHODOLOGY

Embedded Systems:

An embedded system is a computer system designed to perform one or a few dedicated functions often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems are controlled by one or more main processing cores that are typically either microcontrollers or digital signal processors (DSP). The key characteristic, however, is being dedicated to handle a particular task, which may require very powerful processors. Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. In general, "embedded system" is not a strictly definable term, as most systems have some element of extensibility or programmability. A modern example of embedded system is shown in fig: 1. Labelled parts include microprocessor (4), RAM (6), flash memory (7).Embedded systems programming is not like normal PC programming. In many ways, programming for an embedded system is like programming PC 15 years ago. The hardware for the system is usually chosen to make the device as cheap as possible. Spending an extra dollar, a unit in order to make things easier to program can cost millions. Hiring a programmer for an extra month is cheap in comparison. This means the programmer must make do with slow processors and low memory, while at the same time battling a need for efficiency not seen in most PC applications. Below is a list of issues specific to the embedded field.

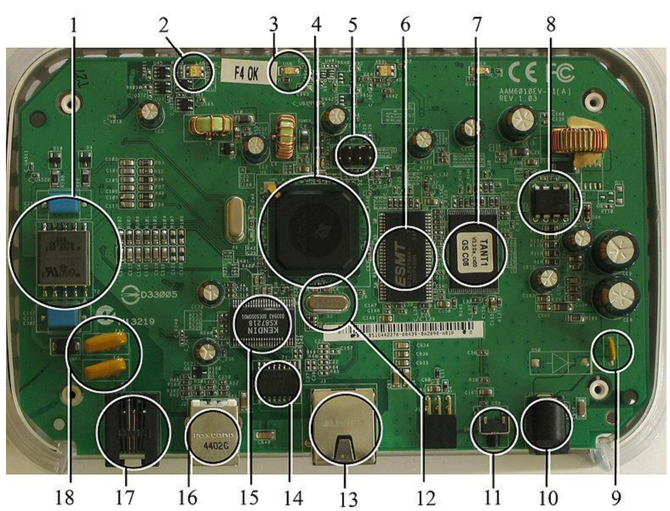

Fig 1:A modern example of embedded system

Need For Embedded Systems:

The uses of embedded systems are virtually limitless, because every day new products are introduced to the market that utilizes embedded computers in novel ways. In recent years, hardware such as microprocessors, microcontrollers, and FPGA chips have become much cheaper. So when implementing a new form of control, it's wiser to just buy the generic chip and write your own custom software for it. Producing a custom-made chip to handle a particular task or set of tasks costs far more time and money. Many embedded computers even come with extensive libraries, so that "writing your own software" becomes a very trivial task indeed. From an implementation viewpoint, there is a major difference between a computer and an embedded system. Embedded systems are often required to provide Real-Time response. The main elements that make embedded systems unique are its reliability and ease in debugging.

Stand Alone Embedded System:

These systems takes the input in the form of electrical signals from transducers or commands from human beings such as pressing of a button etc.., process them and produces desired output. This entire process of taking input, processing it and giving output is done in standalone mode. Such embedded systems comes under stand-alone embedded systems

Eg: microwave oven, air conditioner etc...

Real-time embedded systems:

Embedded systems which are used to perform a specific task or operation in a specific time period those systems are called as real-time embedded systems. There are two types of real-time embedded systems.

Network communication embedded systems:

A wide range network interfacing communication is provided by using embedded systems.

Eg:

- Consider a web camera that is connected to the computer with internet can be used to spread communication like sending pictures, images, videos etc.., to another computer with internet connection throughout anywhere in the world.
- Consider a web camera that is connected at the door lock.

III. APPLICATIONS OF EMBEDDED SYSTEMS

Consumer applications: At home we use a number of embedded systems which include microwave oven, remote control, vcd players, dvd players, camera etc….

Office automation: We use systems like fax machine, modem, printer etc…

Industrial automation: Today a lot of industries are using embedded systems for process control. In industries we design the embedded systems to perform a specific operation like monitoring temperature, pressure, humidity ,voltage, current etc.., and basing on these monitored levels we do control other devices, we can send information to a centralized monitoring station.

Computer networking: Embedded systems are used as bridges routers etc..

Tele communications: Cell phones, web cameras etc.

In this chapter the block diagram of the project and design aspect of independent modules are considered. Block diagram is shown in fig: 2.

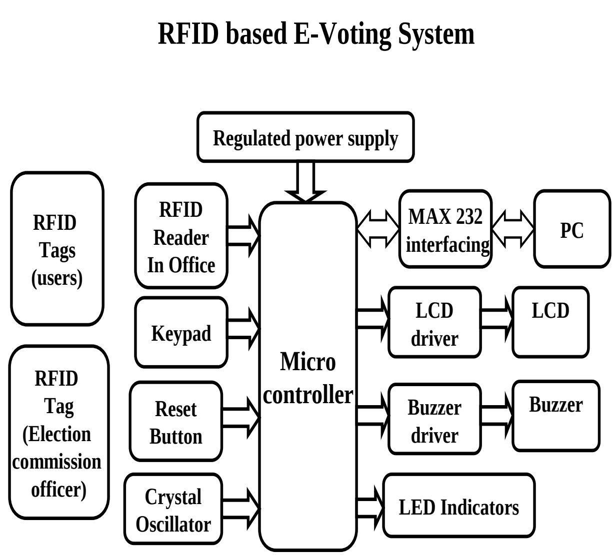

Fig2: Block diagram of RFID based E-Voting System

The main blocks of this project are:Micro controller (18F452), Reset button, Crystal oscillator, Regulated power supply (RPS), LED indicator, RFID module, RS232 cable, LCD and Buzzer

Microcontroller:

Fig 3: Microcontrollers

Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical. The pin configuration of the PIC18F452 microcontroller (DIP package).This is a 40-pin microcontroller housed in a DIL package, with a pin configuration similar to the popular PIC16F877.

PIC18F2X2 microcontrollers are 28-pin devices, while PIC18F4X2 microcontrollers are 40-pin devices. The architectures of the two groups are almost identical except that the larger devices have more input-output ports and more A/D converter channels. In this section we shall be looking at the architecture of the PIC18F452 microcontroller in detail. The architectures of other standard PIC18F-seriesmicrocontrollers are similar, and the knowledge gained in this section should be enough to understand the operation of other PIC18F-series microcontrollers. The program memory contains a 31-level stack which is normally used to store the interrupt and subroutine return addresses. The PIC18F452 consists of timers/counters, capture/compare/PWM registers, USART, A/D converter, and EEPROM data memory.

The PIC18F452 consists of:

1. 4 timers/counters
2. 2 capture/compare/PWM modules
3. 2 serial communication modules
4. 8 10-bit A/D converter channels
5. 256 bytes EEPROM

The basic features of PIC18F-series microcontrollers are:

- 77 instructions
- PIC16 source code compatible
- Program memory addressing up to 2Mbytes
- Data memory addressing up to 4Kbytes
- DC to 40MHz operation
- 8 _ 8 hardware multiplier
- Interrupt priority levels

- 16-bit-wide instructions, 8-bit-wide data path
- Up to two 8-bit timers/counters
- Up to three 16-bit timers/counters
- Up to four external interrupts
- High current (25mA) sink/source capability
- Up to five capture/compare/PWM modules
- Master synchronous serial port module (SPI and I2C modes)
- Up to two USART modules
- Parallel slave port (PSP)
- Fast 10-bit analog-to-digital converter
- Programmable low-voltage detection (LVD) module
- Power-on reset (POR), power-up timer (PWRT), and oscillator start-up timer (OST)
- Watchdog timer (WDT) with on-chip RC oscillator
- In-circuit programming

In addition, some microcontrollers in the PIC18F family offer the following special features:

- Direct CAN 2.0 bus interface
- Direct USB 2.0 bus interface
- Direct LCD control interface
- TCP/IP interface
- ZigBee interface
- Direct motor control interface

The following are new with the PIC18F series:

- Number of instructions doubled
- 16-bit instruction word
- Hardware 8 _ 8 multiplier
- More external interrupts
- Priority-based interrupts
- Enhanced status register
- Increased program and data memory size
- Bigger stack
- Phase-locked loop (PLL) clock generator
- Enhanced input-output port architecture
- Set of configuration registers
- Higher speed of operation
- Lower power operation
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Most devices in the PIC18F family are source compatible with each other. The architectures of most of microcontrollers in the PIC18F family are similar.

PIN Diagram of PIC18F452:

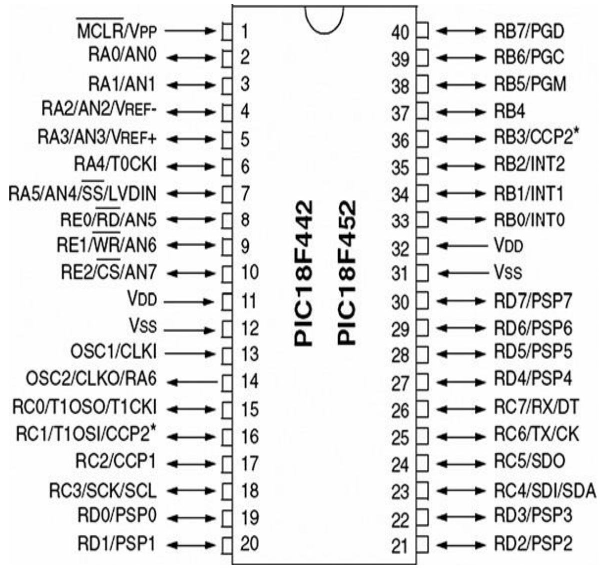


Fig 4: The pin diagram of the PIC18F452 microcontroller

Power Supply:

PIC18F452 can operate with a supply voltage of 4.2V to 5.5V at the full speed of 40MHz. The lower power version, PIC18LF452, can operate from 2.0 to 5.5 volts. At lower voltages the maximum clock frequency is 4MHz, which rises to 40MHz at 4.2V. The RAM data retention voltage is specified as 1.5V and will be lost if the power supply voltage is lowered below this value. In practice, most microcontroller-based systems are operated with a single þ5V supply derived from a suitable voltage regulator.

Reset:

The reset action puts the microcontroller into a known state. Resetting a PIC18F microcontroller starts execution of the program from address 0000H of the program memory. The microcontroller can be reset during one of the following operations:

1. Power-on reset (POR)
2. MCLR reset
3. Watchdog timer (WDT) reset
4. Brown-out reset (BOR)
5. Reset instruction

Capture/Compare/PWM Modules (CCP):

The PIC18F452 microcontroller has two capture/compare/PWM (CCP) modules, and they work with Timers 1, 2, and 3 to provide capture, compare, and pulse width modulation (PWM) operations. Each module has two 8-bit registers.

Analog-to-Digital Converter (A/D) Module:

An analog-to-digital converter (A/D) is another important peripheral component of a microcontroller. The A/D converts an analog input voltage into a digital number so it can be processed by a microcontroller or any other digital system. There are many analog-to-digital converter chips available on the market, and an embedded systems designer should understand the characteristics of such chips so they can be used efficiently.

Interrupts:

The PIC18F452 microcontroller has both core and peripheral interrupt sources.

The core interrupt sources are:

- External edge-triggered interrupt on INT0, INT1, and INT2 pins.
- PORTB pins change interrupts (any one of the RB4–RB7 pins changing state)
- Timer 0 overflow interrupt

The peripheral interrupt sources are:

- Parallel slave port read/write interrupt
- A/D conversion complete interrupt
- USART receive interrupt
- USART transmit interrupt
- Synchronous serial port interrupt
- CCP1 interrupt
- TMR1 overflow interrupt
- TMR2 overflow interrupt
- Comparator interrupt

Program Memory Organization

All PIC18F devices have a 21-bit program counter and hence are capable of addressing 2Mbytes of memory space. Addresses 0008H and 0018H are reserved for the vectors of high-priority and low-priority interrupts respectively, and interrupt service routines must be written to start at one of these locations.The PIC18F microcontroller has a 31-entry stack that is used to hold the return addresses for subroutine calls and interrupt processing. Program memory is addressed in bytes, and instructions are stored as two bytes or four bytes in program memory. The least significant byte of an instruction word is always stored in an even address of the program memory. An instruction cycle consists of four cycles: A fetch cycle begins with the program counter incrementing in Q1. In the execution cycle, the fetched instruction is latched into the instruction register in cycle Q1. This instruction is decoded and executed during cycles Q2, Q3, and Q4. A data memory location is read during the Q2 cycle and written during the Q4 cycle.

Data Memory Organization:

The data memory address bus is 12 bits with the capability to address up to 4Mbytes. The memory in general consists of sixteen banks, each of 256 bytes, where only 6 banks are used. The PIC18F452 has 1536 bytes of data memory (6 banks _ 256 bytes each) occupying the lower end of the data memory. The special function register (SFR) occupies the upper half of the top memory bank. SFR contains registers which control operations such as peripheral devices, timers/ counters, A/D converter, interrupts, and USART.

Regulated power supply:

A power supply may include a power distribution system as well as primary or secondary sources of energy such as

- Conversion of one form of electrical power to another desired form and voltage, typically involving converting AC line voltage to a well-regulated lower-voltage DC for electronic devices. Low voltage, low power DC power supply units are commonly integrated with the devices they supply, such as computers and household electronics.
- Batteries.
- Chemical fuel cells and other forms of energy storage systems.
- Solar power.
- Generators or alternators.

3.3.2 Block Diagram:

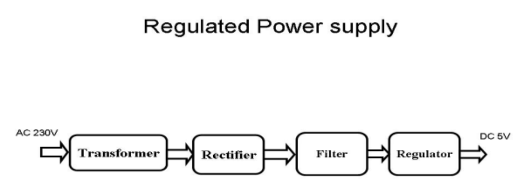


Fig 5 Regulated Power Supply

The basic circuit diagram of a regulated power supply (DC O/P) with led connected as load is shown in fig:6.

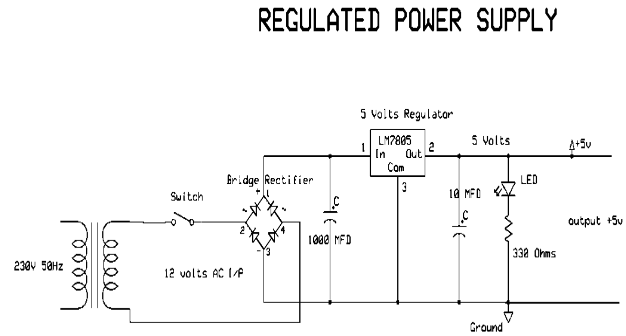


Fig 6 Circuit diagram of Regulated Power Supply with Led connection

The components mainly used in above figure are

- 230V AC MAINS
- TRANSFORMER
- BRIDGE RECTIFIER(DIODES)
- CAPACITOR
- VOLTAGE REGULATOR(IC 7805)
- RESISTOR
- LED(LIGHT EMITTING DIODE)

IV. RFID MODULE

RADIO FREQUENCY IDENTIFICATION uses a semiconductor (micro-chip) in a tag or label to transmit stored data when the tag or label is exposed to radio waves of the correct frequency.

The Elements of an RFID System

RFID systems fundamentally consist of four elements:

The RFID tags.
The RFID readers
The antennas and choice of radio characteristics,
The computer network (if any) that is used to connect the readers.

Advantages of RFID Technology

RFID technology has a number of advantages.

- RFID tags are very simple to install/inject inside the body of animals, thus helping to keep a track on them. This is useful in animal husbandry and on poultry farms. The installed RFID tags give information about the age, vaccinations and health of the animals.
- RFID technology is better than bar codes as it cannot be easily replicated and therefore, it increases the security of the product.
- Supply chain management forms the major part of retail business and RFID systems play a key role by managing updates of stocks, transportation and logistics of the product.
- Barcode scanners have repeatedly failed in providing security to gems and jewelries in shops. But nowadays, RFID tags are placed inside jewelry items and an alarm is installed at the exit doors.
- The RFID tags can store data up to 2 KB whereas; the bar code has the ability to read just 10-12 digits.

Disadvantages of RFID Technology

The RFID technology, though very beneficial, is expensive to install. Small and medium scale enterprises find it costly to use it in their firms and offices.

- It is difficult for an RFID reader to read the information in case of RFID tags installed in liquids and metal products. The problem is that the liquid and metal surfaces tend to reflect the radio waves, which makes the tags unreadable. The tags have to be placed in various alignments and angles for taking proper reading. This is a tedious task when the work involves big firms.
- Interference has been observed if devices such as forklifts and walkie-talkies are in the vicinity of the distribution centers. The presence of mobile phone towers has been found to interfere with RFID radio waves. Wal-Mart, the retail sector giant, has installed billions of RFID tags in their products throughout the world and they have encountered such problems.
- The USA and Europe, for instance, have different range of frequencies that allow RFID tags to function. This makes it mandatory for international shipping companies and other organizations to be aware of the working pattern of other nations also, which can be very time-consuming.
- RFID technology has been referred to as invasive technology. Consumers are apprehensive about their privacy when they purchase products with RFID tags. Once the radio chips are installed in the product, the customer can be tracked and his personal information can be collected by the RFID reader. However, many stores have a facility that deactivates the RFID tags after the product has been purchased.

Serial Communication:

Serial data communication uses two methods, asynchronous and synchronous. The synchronous method transfers a block of data at a time, while the asynchronous method transfers a single byte at a time. With synchronous communications, 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 communications 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 communications.

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 causes 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.There are special IC chips made by many manufacturers for serial data communications. These chips are commonly referred to as UART (universal asynchronous receiver-transmitter) and USART (universal synchronous-asynchronous receiver-transmitter). The 8051 has a built-in UART.

The main requirements for serial communication are**:**

- Microcontroller
- PC
- RS 232 cable
- MAX 232 IC
- Hyper Terminal

RS 232 cable:

RS232 means recommended standard, it is a cable in which serial communications can be done. Information being transferred between data processing equipment and peripherals is in the form of digital data which is transferred in either a serial or parallel mode. Parallel communications are used mainly for connections between test instruments or computers and printers, while serial is often used between computer and other peripherals.The RS-232 interface is the Electronic Industries Association (EIA) standard for the interchange of serial binary data between two devices. It was initially developed by the EIA to standardize the connection of computers with telephone line modems. The standard allows as many as 20 signals to be defined, but gives complete freedom to the user. Three wires are sufficient: send data, receive data, and signal ground. The remaining lines can be hardwired on or off permanently. The signal transmission is bipolar, requiring two voltages, from 5 to 25 volts, of opposite polarity.

Fig: 7 RS 232 cable

RS-232 Specifications:

TRANSMITTED SIGNAL VOLTAGE LEVELS**:**
Binary 0: +5 to +15 Vdc
(Called a “space” or “on”)
Binary 1: -5 to -15 Vdc
(Called a “mark” or “off”)

RECEIVED SIGNAL VOLTAGE LEVELS:

Binary 0: +3 to +13 Vdc
Binary 1: -3 to -13 Vdc

DATA FORMAT:

Start bit: Binary 0
Data: 5, 6, 7 or 8 bits
Parity: Odd, even, mark or space (not used with 8-bit data),
Stop bit: Binary 1, one or two bits

DB9 pin connector:

Serial Ports come in two "sizes", There are the D-Type 25 pin connector and the D-Type 9Pin connector both of which are male on the back of the PC, thus you will require a female connector on your device. Below is a table of pin connections for the 9 pin and 25 pin D-Type connectors.

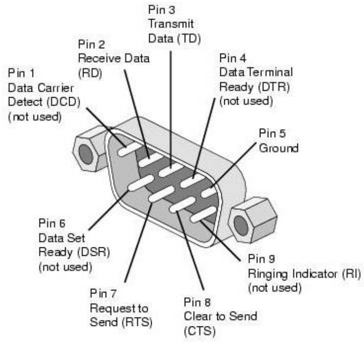


Fig 8:DB9 pin connector

The pins of above DB9 are**:**

1. Data carrier detect
2. Received data
3. Transmitted data
4. Data terminal ready
5. Signal ground
6. Data set ready
7. Request to send
8. Clear to send
9. Ring indictor

Serial Pinouts (D9 Connectors) D-Type-9 Pin No. Abbreviation Full Name:

Pin 3 TD Transmit Data
Pin 2 RD Receive Data
Pin 7 RTS Request to Send
Pin 8 CTS Clear To Send
Pin 6 DSR Data Set Ready
Pin 5 SG Signal Ground
Pin 1 CD Carrier Detect
Pin 4 DTR Data Terminal Ready
Pin 9 RI Ring Indicators

MAX232 integrated circuit:

A MAX232 IC has a set of four external capacitors of the specification 1 microfarad .This IC is basically transceiver IC alike to assart chip used in data communicating devices like modem, drivers and other electronic system devices .The capacitance can have a deviation of up to 0.1 microfarad.

The Maxim MAX232 communications interface IC is used to convert +5 volt TTL or CMOS levels to RS232 levels. The dual level 10 volt signals are derived from the +5 volt power supply via charge pump circuitry. This feature eliminates the +/- 12V rails that used to be required with older technology devices such as the old industry standard 1488 and 1489 chips.

Description information:

Serial RS-232 (V.24) communication works with voltages (between -15V ... -3V are used to transmit a binary '1' and +3V ... +15V 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 0V ... +5V (roughly 0V ... +0.8V referred to as low for binary '0', +2V ... +5V for high binary '1'). Modern low-power logic operates in the range of 0V ... +3.3V or even lower. So, 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 grokked 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.

RS-232		TTL		Logic
-15V ... -3V	<->	+2V ... +5V	<->	1
+3V ... +15V	<->	0V ... +0.8V	<->	0

Specifications:

1. Supply voltage: +5V dc.
2. Supply current: 10 MA max.
3. Tx o/p volts swing: +/-9 V typ
4. RS232 i/p range: +/-30V max
5. Operates upto 120 kbit/s
6. Two drivers and two receivers
7. low supply current :8 mA

Applications:

– TIA/EIA-232-F, Battery-Powered Systems, Terminals, Modems, and Computers

The main requirements for serial communication are**:**

- Microcontroller
- PC
- RS 232 cable
- MAX 232 IC
- Hyper Terminal

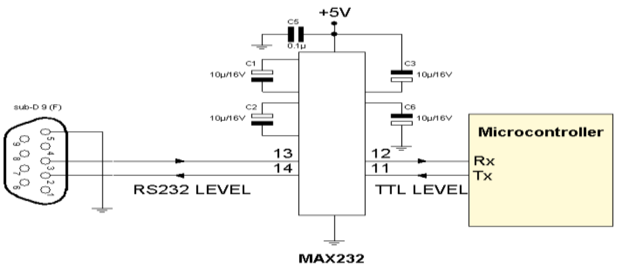


Fig 9: schematic diagram of pc interfacing with microcontroller

LCD DISPLAY

LCD Background:

One of the most common devices attached to a micro controller is an LCD display. Some of the most common LCD's connected to the many microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

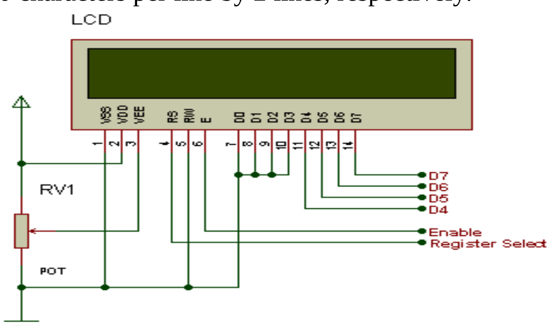


Figure 10: LCD Pin diagram

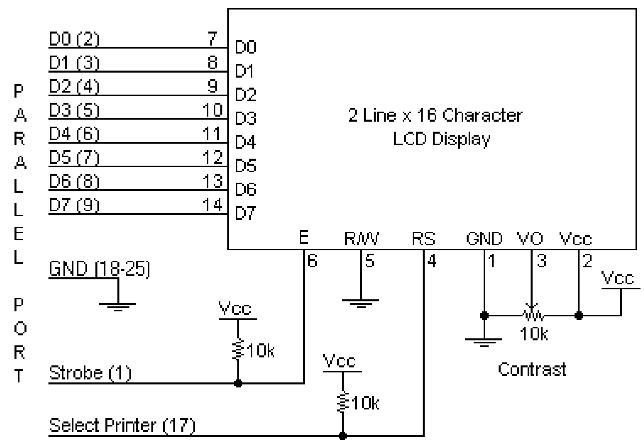
Pin description:

Table 1: Character LCD pins with Microcontroller

Pin No.	Name	Description
Pin no. 1	VSS	Power supply (GND)
Pin no. 2	VCC	Power supply (+5V)
Pin no. 3	VEE	Contrast adjust
Pin no. 4	RS	0 = Instruction input, 1 = Data input
Pin no. 4	RS	0 = Instruction input, 1 = Data input
Pin no. 5	R/W	0 = Write to LCD module, 1 = Read from LCD module
Pin no. 6	EN	Enable signal
Pin no. 7	D0	Data bus line 0 (LSB)
Pin no. 8	D1	Data bus line 1
Pin no. 9	D2	Data bus line 2
Pin no. 10	D3	Data bus line 3
Pin no. 11	D4	Data bus line 4
Pin no. 12	D5	Data bus line 5
Pin no. 13	D6	Data bus line 6
Pin no. 14	D7	Data bus line 7 (MSB)

The LCD requires 3 control lines are referred to as **EN**, **RS**, and **RW**.The **EN** line is called "Enable." This control line is used to tell the LCD that we are sending it data. The **RS** line is the "Register Select" line. When RS is low (0), the data is to be treated as a command or special instruction (such as clear screen, position cursor, etc.). When RS is high (1), the data being sent is text data which should be displayed on the screen. The **RW** line is the "Read/Write" control line. When RW is low (0), the information on the data bus is being written to the LCD. When RW is high (1), the program is effectively querying (or reading) the LCD. Only one instruction ("Get LCD status") is a read command. All others are write commands--so RW will almost always be low.Finally, the data bus consists of 4 or 8 lines (depending on the mode of operation selected by the user). In the case of an 8-bit data bus, the lines are referred to as DB0, DB1, DB2, DB3, DB4, DB5, DB6, and DB7.

Schematic:



Circuit Description:

Above is the quite simple schematic. The LCD panel's Enable and RegisterSelect is connected to the Control Port. The Control Port is an open collector / open drain output. We make no effort to place the Data bus into reverse direction. Therefore we hard wire the R/W line of the LCD panel, into write mode. This will cause no bus conflicts on the data lines. As a result we cannot read back the LCD's internal Busy Flag which tells us if the LCD has accepted and finished processing the last instruction. This problem is overcome by inserting known delays into our program. The 10k Potentiometer controls the contrast of the LCD panel. Nothing fancy here. As with all the examples, I've left the power supply out. We can use a bench power supply set to 5v or use an onboard +5 regulator. Remember a few de-coupling capacitors, especially if we have trouble with the circuit working properly.

Checking the busy status of the LCD:

As previously mentioned, it takes a certain amount of time for each instruction to be executed by the LCD. The delay varies depending on the frequency of the crystal attached to the oscillator input of the LCD as well as the instruction which is being executed. The "Get LCD Status" command will return to us two tidbits of information; the information that is useful to us right now is found in DB7. In summary, when we issue the "Get LCD Status" command the LCD will immediately raise DB7 if it's still busy executing a command or lower DB7 to indicate that the LCD is no longer occupied. Thus our program can query the LCD until DB7 goes low, indicating the LCD is no longer busy. At that point we are free to continue and send the next command.

Applications:

- Medical equipment
- Electronic test equipment
- Industrial machinery Interface
- Serial terminal
- Advertising system
- EPOS
- Restaurant ordering systems
- Gaming box
- Security systems
- R&D Test units
- Climatizing units
- PLC Interface
- Simulators
- Environmental monitoring
- Lab development
- Student projects
- Home automation
- PC external display
- HMI operator interface.

Buzzer

To interface a buzzer the standard transistor interfacing circuit is used. Note that if adifferent power supply is used for the buzzer, the 0V rails of each power supply mustbe connected to provide a common reference.

Buzzers also just have one ‘tone’, whereas apiezo sounder is able to create sounds of many different tones.

To switch on buzzer -high 1
To switch off buzzer -low 1

In this project, schematic diagram and interfacing of PIC18F452 microcontroller with each module is considered**.**

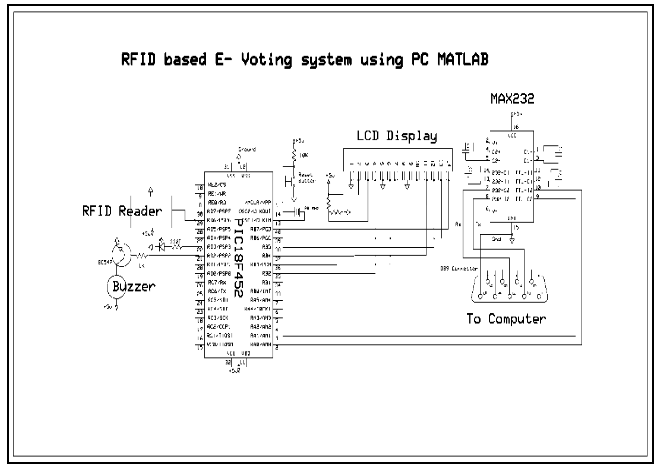


Fig 14: schematic diagram of RFID based E-Voting System

The above schematic diagram of RFID based E-Voting Systemexplains the interfacing section of each component with micro controller, RFID and Keypad. Crystal oscillator connected to 13th and 14th pins of micro controller and regulated power supply is also connected to micro controller and LED’s also connected to micro controller through resistors. Thedetailed explanation of each module interfacing with microcontroller is as follows:

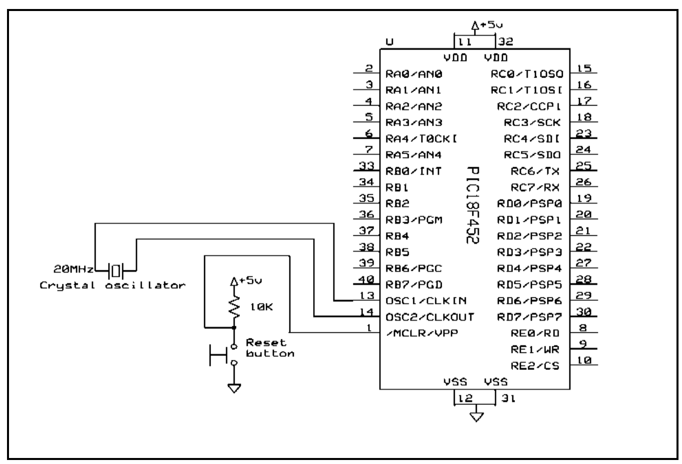


Fig 5.2: Diagram of crystal oscillator and reset input interfacing with micro controller

Advantages:

1. Highly efficient and user friendly design.
2. Easy to operate.
3. Low power consumption.
4. Efficient design.
5. Data logging into PC using RS232 cable.
6. MATLAB based image of authorized voter details display along with image on PC
7. Identification of voter through RFID communication.

8. Automatic display of voter details on LCD and also on PC.
9. Alerting through buzzer alarm system when the voter card is unauthorized.

Disadvantages:

1. Interfacing RFID reader with microcontroller is highly sensitive.
2. Interfacing PC with MATLAB supports only for limited distance as it is wired connected

Applications:

This system can be practically implemented in real time at places where security is a concern for voting applications at MNC companies, schools, colleges etc

V. RESULTS AND CONCLUSION

The project "RFID based E-Voting System" was designed an advanced e-voting system sing RFID and keypad with voter details instantaneously display on PC with MATLAB.

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested. Our project "Electronic Passport using RFID" is mainly intended to design an advanced E-voting system using RFID and keypad which helps in getting the voter details instantaneously using RFID technology. And using the keypad user can enter the relevant password when the voter tag and the password matches then the user details are displayed on PC using MATLAB software. This is very much helpful for the election officers to extract the details of the individual's person instantaneously and also to identify non registered persons.

The main aim of this project is to extract voter ID registration details based on RFID technology like name, image, phone number, address, age, voter ID number etc. In this project the RFID tags are used for identifying the authorized person, and the RFID reader which is interfaced to microcontroller decodes the RFID tag of the particular voter individual details along with image and those particular authorized details are displayed on PC with MATLAB through RS232 cable. Micro controller forms the controlling module and it is the heart of the device. The controller performs the functionality of receiving data from the RFID. The microcontroller is programmed in such a way that the data from microcontroller is continuously sent to PC. The user initially need to show the tag and also need to enter the unique password from keypad when the voter tag and password matches then the system declares the individual as authorized. The authorized individual can vote the candidate from the keypad. The individual detail along with image gets displayed on PC with MATLAB and the received data will be fed to PC through a Microcontroller. When any voter ID is recognized as unauthorized then the system alerts through buzzer alarm. The system also facilitates the voting data display when the election commissioner officer shows his tag and enters the password from keypad matches. The Microcontroller is programmed using Embedded C language which provides effective environment in performing the task. This project can be extended using a GSM module. GSM module sends the alert message to the respective authorities when unauthorized card is detected by the RFID reader. The system can also be extended using Wi-Fi technology for unauthorized details display on android mobile phone.

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