DESIGN AND IMPLEMENTATION OF ELECTRONIC VOTING MACHINE



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Declaration

It is declared hereby that this thesis paper or any part of it has not been submitted to anywhere else for the award of any degree.

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This is to certify that this project entitled "**Design and Implementation of Electronic Voting Machine"** is done by the following students under my direct supervision. This project work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering, Sonargaon University (SU) in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering.

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ABSTRACT

The use of technology for elections began over a century ago with mechanical voting machines. These evolved into a variety of electro-mechanical systems, including the punched card vote tabulation machines made infamous in the US presidential elections in 2000. In rare cases there is now internet voting, which gives voters freedom to cast their ballot from a location of their choice.1EVMs are a subset of available electronic voting technologies.2 Their introduction has not followed the typical pattern in which technology is first taken up in the technologically-developed world, and then later adopted by less developed countries. Instead the trend appears to move in the opposite direction, whereby EVMs have beentaken up in some poorer countries, but wealthier, more established democracies have often rejected their use.Among less developed countries, there is a tendency to use EVMs without sophisticated and costly transparency mechanisms, such as voter-verified paper audit trails.

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List of Abbreviations

LCD	Liquid Crystal Display
LED	Light Emitting Diodes
ISP	In System Programming
EEPROM	Electrically Erasable Programmable Read-Only Memory
PWM	Pulse Width Modulation
USB	Universal Serial Bus
ICSP	In-Circuit Serial Programming
AC	Alternating Current
DC	Direct Current
IDE	Integrated Development Environment
SRAM	Static Random Access Memory
UART	Universal Asynchronous Receiver/Transmitter
SPP	Serial Port Protocol
AFH	Adaptive Frequency Hopping Feature

CHAPTER 1

1.1 Introduction

Elections allow the populace to choose their representatives and express their preferences for how they will be governed. Naturally, the integrity of the election process is fundamental to the integrity ofdemocracy itself. The election system must be sufficiently robust to withstand a variety of fraudulent behaviors and must be sufficiently transparent and comprehensible that voters and candidates can accept the results of an election. This paper presents a survey of the state of the art in Electronic Voting, including the various works done in Internet Voting and the arguments against its use, as well as in electronic poll-site voting. Electronic voting refers to the use of computers or computerized voting equipment to cast ballots in an election. Sometimes, this term is used more specifically to refer to voting that takes place over the Internet. Electronic systems can be used to register voters, tally ballots, and record votes. The design of a "good" voting system, whether electronic or using traditional paper ballots or mechanical devices must satisfy a number of competing criteria. The anonymity of a voter's ballot must be preserved, both to guarantee the voter's safety when voting against a malevolent candidate, and to guarantee that voters have no evidence that proves which candidates received their votes. The existence of such evidence would allow votes to be purchased by a candidate. The voting system must also be tamper-resistant to thwart a wide range of attacks, including ballot stuffing by votes and incorrect tallying by insiders.

1.2 Electronic Voting Systems

There have been several studies on using computer technologies to improve elections. These studies caution against the risks of moving too quickly to adopt electronic voting machines because of the software engineering challenges, insider threats, network vulnerabilities, and the challenges of auditing. Electronic voting machine is a simple machine that can be operated easily by both the polling personnel and the voters. Being a standalone machine without any network connectivity, nobody can interfere with itsprogramming and manipulate the result. Keeping the erratic power supply

position in many places in thecountry, the machines have been made to run on batteries. It has mainly two units: Control unit and Ballot unit. The Control Unit is the main unit which stores all data and controls the functioning of EVM. The program which controls the functioning of the control unit is burnt into a micro chip on a "one time programmable basis". Once burnt it cannot be read, copied out or altered. The EVMs use dynamic coding to enhance security of data transmitted from ballot unit to control unit. Although there has been cryptographic research on electronic voting, and there are new approachessuch as currently the most viable solution for securing electronic voting machines is to introduce a "voter-verifiable audit trail". A verifiable audit trail does not, by itself, address voter privacy concerns, ballot stuffing, or numerous other attacks on elections. Some vendors have claimed "security through obscurity" as a defense, despite the security community's universally held belief in the inadequacy of obscurity to provide meaningful protection.

1.3 Methodology

It is also known as e-voting is a term encompassing several different types of voting, embracing both electronic means of casting a vote and electronic means of counting votes. Electronic voting technology can include punched cards, optical scan voting systems and specialized voting kiosks (including self-contained direct-recording electronic voting systems, or DRE). It can also involve transmission of ballots and votes via telephones, private computer networks, or the Internet. And, of course, EVM helps maintain total voting secrecy without the use of ballot papers. And, at the end of the polling, just press a button and there you have the results.

1.4 Objective

Researchers in the electronic voting field have already reached a consensus pack of following core properties that an electronic voting system should have.

1.5 Project Outline

Chapter 2 shows a study of the literature review of related work which was used to develop the project.

Chapter 3 describes the block diagram, working procedure, connection diagram and explanation.

Chapter 4 describes all the hardware devices and power supply to the project.

Chapter 5 reviews the results found through the project and provides a discussion on the findings.

Chapter 6 specified the limitations of the project, provides the future works that may be approached and conclusion.

1.6 Summary

Firstly, we discuss about Electronic voting machine. We also discuss about Benefits of Electronic voting machine and Advantages, Disadvantages of the security system. Then we discuss about problem statement, methodology and objective of this project. Lastly, we discuss about project outline in this chapter.

CHAPTER 2

LITERATURE REVIEWS

2.1 Introduction

As an essential part of researching the three main questions posed by this thesis, it was necessary to examine and review available literature material for suitability for inclusion into this thesis. There are three sections to the literature review
Corresponding to each of the questions posed.

2.2 Properties of EVM

Researchers in the electronic voting field have already reached a consensus pack of following core properties that an electronic voting system should have.

2.3 Mechanism of Security Access System

Some countries have slowly introduced EVMs, taking into account local context and capacities. Brazil is such a case and its EVM arrangements are considered to be successful. India also has taken a long-term, gradual approach, though scrutiny of EVM functioning is limited, both in terms of transparency of the EVMs and lack ofaccess to observers. Use of EVMs in India is increasingly subject to criticism.

Rapid introduction of EVMs Other countries have introduced EVMs at a faster pace. Paraguay, for example, moved quickly from pilots in 2001 to binding implementation during the 2003 presidential elections, when 53% of registered voters used EVMs.

Decisions not to introduce EVMs While most established and new democracies have decided not to use EVMs, some have tried them and then ultimately decided against their use. Others have decertified the systems in use, while not rejecting EVMs in principle. This includes Germany, the Netherlands, the UK, Finland and Ireland.

2.4 Types of Security Access System

The introduction of electronic voting machines (EVMs) to conduct elections is a major step for any country. Benefits can include the inhibition of polling-station fraud, as well as improved accuracy and speed of counting and results transmission. EVMs are often perceived as a modern tool of governance. At the same time, EVMs are expensive and have multiple associated risks. These relate to limited transparency and therefore confidence in the process and outcome of anelection. EVMs also create opportunities for manipulation and are accompanied by the risk of malfunction; e.g., as a result of faulty storage or use. Switching to EVMs is by no means a purely technical measure. Rather, it is an important public policy choice. As such, there must be full disclosure of information about EVMs, along with broad and informed public debate before they are introduced.

2.5 Electronic Voting Machine (EVM) Access Systems

Public confidence is a key requirement for successful elections because without widespread trust results may be rejected. Lack of trust in an electoral process can be exacerbated by the use of new technology, which many voters can find difficult to understand. Lack of confidence in the electoral process is a critical problem for any democracy, in particular in situations where there is a high risk of conflict and disaffection. Decisions on EVMs should be taken with extreme care. While they offer much promise, there are also many perils to be overcome..

2.6 History of Electronic Voting Machine (EVM)

There are different forms of Electronic Voting Machines are used in across the world. The variations of EVM are as follows:

Paper-based electronic voting system: Sometimes called a "document ballot voting system," paper-based voting systems originated as a system where votes are cast and counted by hand, using paper ballots. With the advent of electronic tabulation came systems where paper cards or sheets could be marked by hand, but counted electronically. Most recently, these systems can include an Electronic Ballot Marker (EBM), that allow voters to make their

selections using an electronic input device, usually a touch screen system similar to a Direct-recording electronic (DRE). Systems including a ballot marking device can incorporate different forms of assistive technology.;

Direct-recording electronic (DRE) voting system: Electronic voting machine by Premier Election Solutions formerly Diebold Election Systems used inall Brazilian elections. A DRE voting machine in Fig.1 records votes by means of a ballot display provided with mechanical or electro-optical components that can be activated by the voter (typically buttons or a touch screen); that processes data with computer software; and that records voting data and ballot images in memory components.After the election it produces a tabulation of the voting data stored in a removable memory component and as printed copy. The system may also provide a means for transmitting individual ballots or vote totals to a central location for consolidating and reporting results from precincts at the central location. These systems use a precinct count method that tabulates ballots at thepolling place. They typically tabulate ballots as they are cast and print the results after the close of polling.

(iii) Indian EVM Device: India is world's largest democracy. It is perceived to be charismatic one as it accommodates cultural, regional, economical, socialdisparities and still is able to stand on its own. In 2004, India had adopted Electronic Voting Machines for its elections to the Parliament with 380 million voters had cast their ballots using more than a million votingmachines. The Indian EVMs are designed and developed by two Government Owned Defense Equipment Manufacturing Units, Bharat Electronics Limited (BEL) and Electronics Corporation of India Limited (ECIL). Both systems are identical, and aredeveloped to the specifications of Election Commission of India. The System is a set of two devices running on 6V batteries. One device, the Voting Unit is used by the Voter, and another device called the Control Unit is operated by the Electoral Officer. Both units are connected by a 5 meter cable (Fig.2). The Voting unit has a Blue Button for every candidate, the unit can hold 16 candidates, but up to 4 units can be chained, to accommodate 64 candidates. The Control Units has three buttons on the

surface, namely, one button torelease a single vote, one button to see the total number of vote cast till now, and one button to close the election process. The result button is hidden and sealed; it cannot be pressed unless the Close button is already pressed.

(iv) Public network DRE voting system: A public network DRE voting system is an election system that uses electronic ballots and transmits vote data from the polling place to another location over a public network. Vote data may be transmitted as individual ballots as they are cast, periodically as batches of ballots throughout the Election Day, or as one batch at theclose of voting. This includes Internet voting as well as telephone voting. Public network DRE voting system can utilize either precinct count or central count method. The central count method tabulates ballots from multiple precincts at a central location.

(v) Diebold AccuVote-TS: The Diebold AccuVote machine is the system that tested [2], and is in use in the State of Maryland. It uses a touch screen (Fig. 3) with a card reader that the voter gets after being authenticated by polling officials Indeed, the CVS source code repository for Diebold's AccuVote-TS DRE voting system recently appeared on the Internet [18]. This appearance, announced by Bev Harris and discussed in their book, Black Box Voting [8], gives us a unique opportunity to analyze a widely used, paperless DRE system and evaluate the manufacture's security claims. Jones discusses the origins of this code in extensive details [9]. Diebold's voting systems are in use in 37 states, and they are the second largest and the fastest growing vendor of electronic voting machines. And also onlyinspected unencrypted source code, focusing on the AVTSCE, or AccuVote-TS version 4, tree in the CVS repository. This tree has entries dating from October 2000 and culminates in an April 2002 snapshot of version 4.3.1 of the AccuVote-TS system. From the comments in the CVS logs, the AccuVote-TS version 4tree is an import of an earlier AccuTouch-CE tree. They did not have source code to Diebold's GEMS back-endelection management system. A group led by Avi Rubin analyzed the Diebold AccuVote TS DRE voting machine and found numerous flaws [18]. SAIC was commissions by the state of Maryland to do another analysis of the

Diebold voting system and found the system, as implemented in policy, procedure, and technology, is at high risk of compromise. Based on these reports, the California Secretary of State's office established security procedures for DRE voting machine. Diebold used uncertified software in their electronic voting equipment in California. Diebold was then banned from California elections by the California Secretary of State

2.7 Figure of Electronic Voting Machine (EVM)

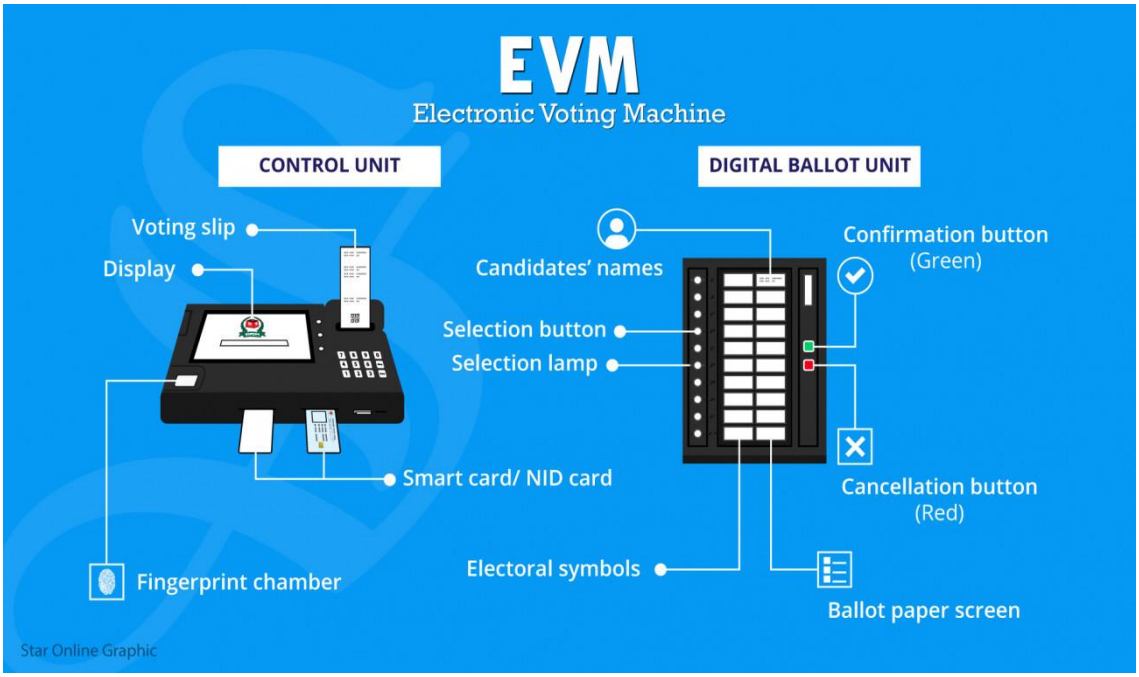


Figure 2.1: Figure of Electronic Voting Machine (EVM)

2.8 Summary

Firstly we discuss about Electronic Voting Machine (EVM) system, Mechanism of security access system. We also discuss about Types of security access system, Electronic Voting Machine (EVM) systems, history of Electronic Voting Machine (EVM). Lastly we discuss about the history of Electronic Voting Machine (EVM).

CHAPTER 3

THEORETICAL MODEL

3.1 Introduction

Arduino Libraries is the most important for arduino based project. So that we briefly discuss about arduino libraries, algorithm and working procedure of Smart card door Security system. We present our whole procedure in this project by the algorithm.

3.2 Microcontroller Libraries Used

3.2.1 Software Serial

The Arduino hardware has built-in support for serial communication on pins 0 and 1 (which also goes to the computer via the USB connection). The native serial support happens via a piece of hardware (built into the chip) called a UART. This hardware allows the ATMega328 chip to receive serial communication even while working on other tasks, as long as there room in the 64 byte serial buffer.

3.2.2 Functions Used

Software Serial (rx Pin, txPin)

Software Serial is used to create an instance of a Software Serial object, whose name you need to provide as in the example below. The inverse logic argument is optional and defaults to false. See below for more details about what it does. Multiple Software Serial objects may be created, however only one can be active at a given moment.

Rx Pin: The pin on which to receive serial data Tx Pin: the pin on which to transmit serial data.

Begin (speed)

Sets the speed (baud rate) for the serial communication.

Read ()

Return a character that was received on the RX pin of the software serial port. Note that only one Software Serial instance can receive incoming data at a time.

3.3 Connection Diagram of Electronic voting machine

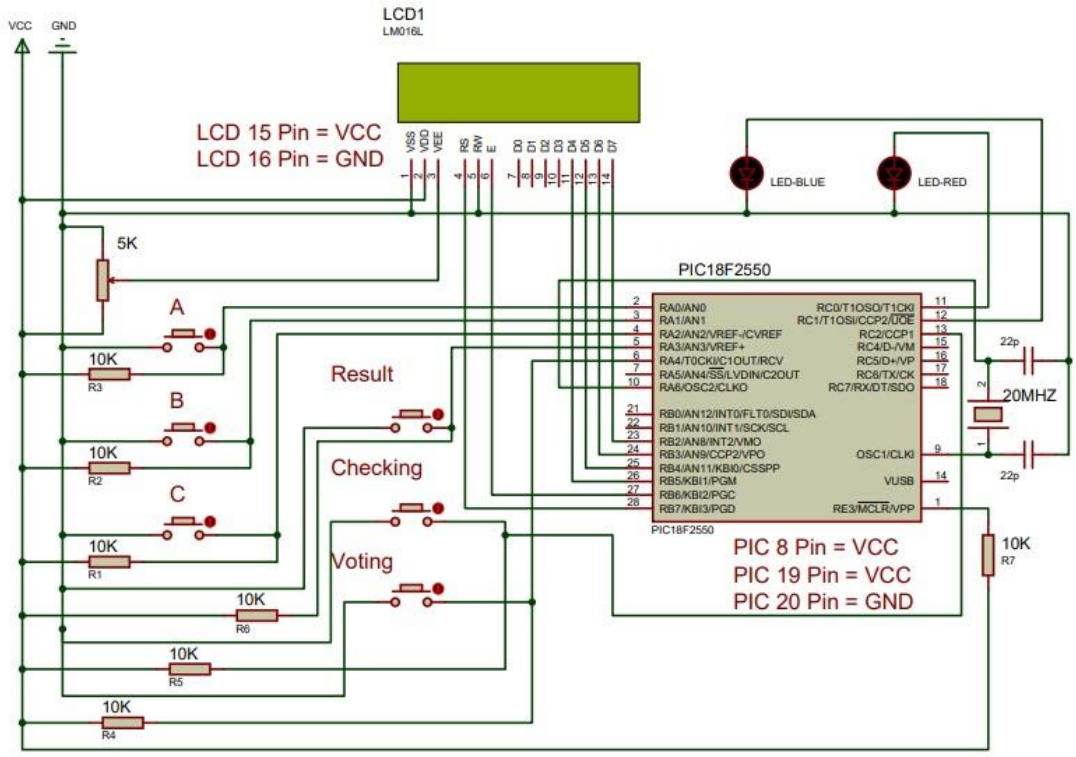


Figure 3.1: Connection Diagram of Electronic voting machine

3.4 Block diagram of Electronic voting machine

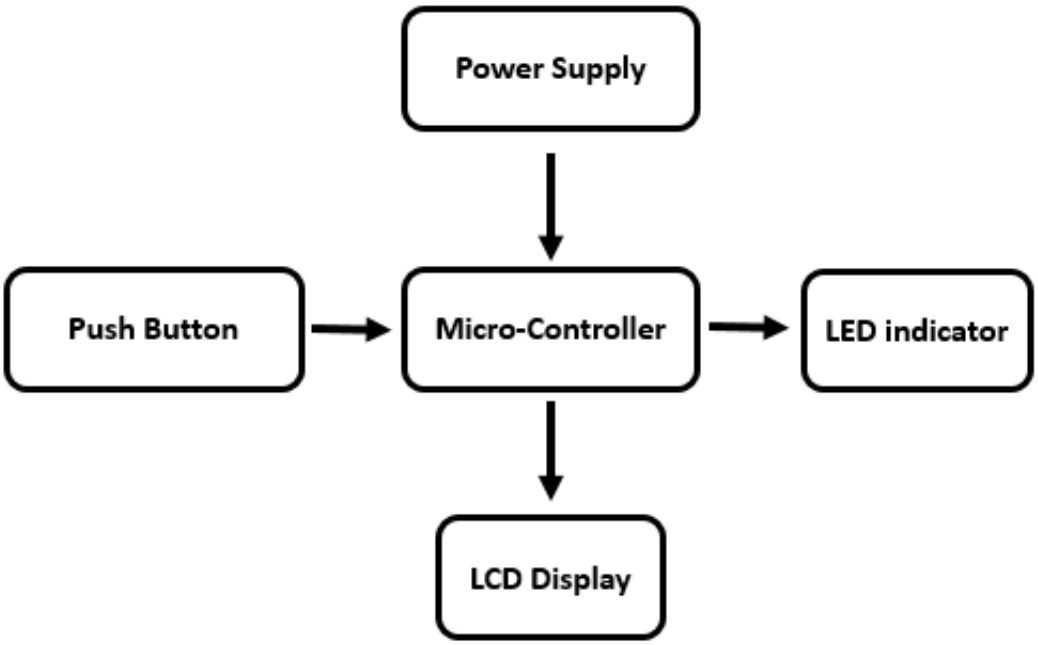


Figure 3.2: Block diagram of Electronic voting machine

Table No 3.1: The function of this project

System Block	Function
Arduino Microcontroller (ATMega328)	As data processing center
Adaptor (5V)	As the power supply
LED	As indicator
LCD	Mechanical working

The system required a program that must be implemented to the microcontroller. Programming language for the Arduino microcontroller is C language. To run the program and incorporate the program to the microcontroller needed software i.e. Arduino. Microcontroller Arduino has been equipped with an internal EEPROM, Flash memory, etc. This section will examine the input, and give orders to the LED,

3.5 Flowchart of Electronic voting machine

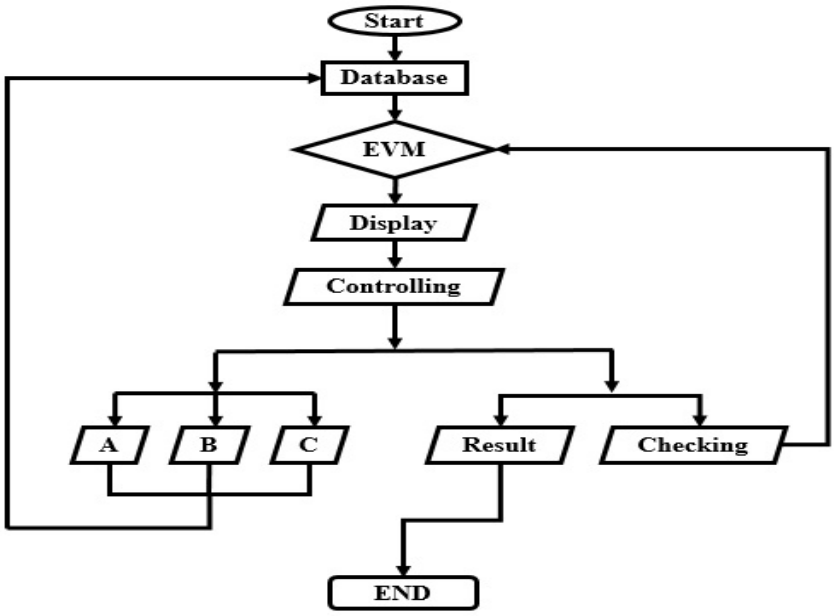


Figure 3.3: Flowchart of Electronic voting machine

3.6 Summary

Firstly, we showed the connection diagram. Then we discuss about the block diagram and explanation. And lastly we briefly discuss about working procedure in this project.

CHAPTER 4

Hardware Development

4.1 Introduction

Now-a-days the telecommunication technologies become wider and more new features exist to make human life better. Now in our world of technology the old methods of voting are also being changed to match the trends in the other fields of life. The voting is migrating from the conventional ballot papers and boxes to the electronic methods. In democratic system voting has always been an essential part. Athenian democracy introduced first democratic system in 6th century BC when plurality vote was adopted. Till 13th century plurality voting with some variants was used in elections and then approval voting was introduced in Venice to elect their great council. Consider the case of Switzerland, where voters have been given full right to say their own choices for selecting desired candidates orally in front of officers sitting in election pane.

4.2 Components Name and Quantity

Table No 4.1: Components Name and Quantity

SL	Component Name	Quantity
1	Microcontroller IC	1 Pcs
2	Push Button	6 Pcs
3	LCD Display	1 Pcs
4	LED	2 Pcs
5	Resistor	10 Pcs
6	Connecting Wire	As Require
7	Adapter	1 Pcs
8	Bread board	1 pcs

4.3 Microcontroller

A microcontroller is an integrated circuit (IC) device used for controlling other portions of an electronic system, usually via a microprocessor unit (MPU), memory, and some peripherals. These devices are optimized for embedded applications that require both processing functionality and agile, responsive interaction with digital, analog, or electromechanical components.

The most common way to refer to this category of integrated circuits is “microcontroller" but the abbreviation “MCU” is used interchangeably as it stands for “microcontroller unit”. You may also occasionally see “µC” (where the Greek letter mu replaces “micro”).

“Microcontroller” is a well-chosen name because it emphasizes defining characteristics of this product category. The prefix “micro” implies smallness and the term "controller" here implies an enhanced ability to perform control functions. As stated above, this functionality is the result of combining a digital processor and digital memory with additional hardware that is specifically designed to help the microcontroller interact with other components.

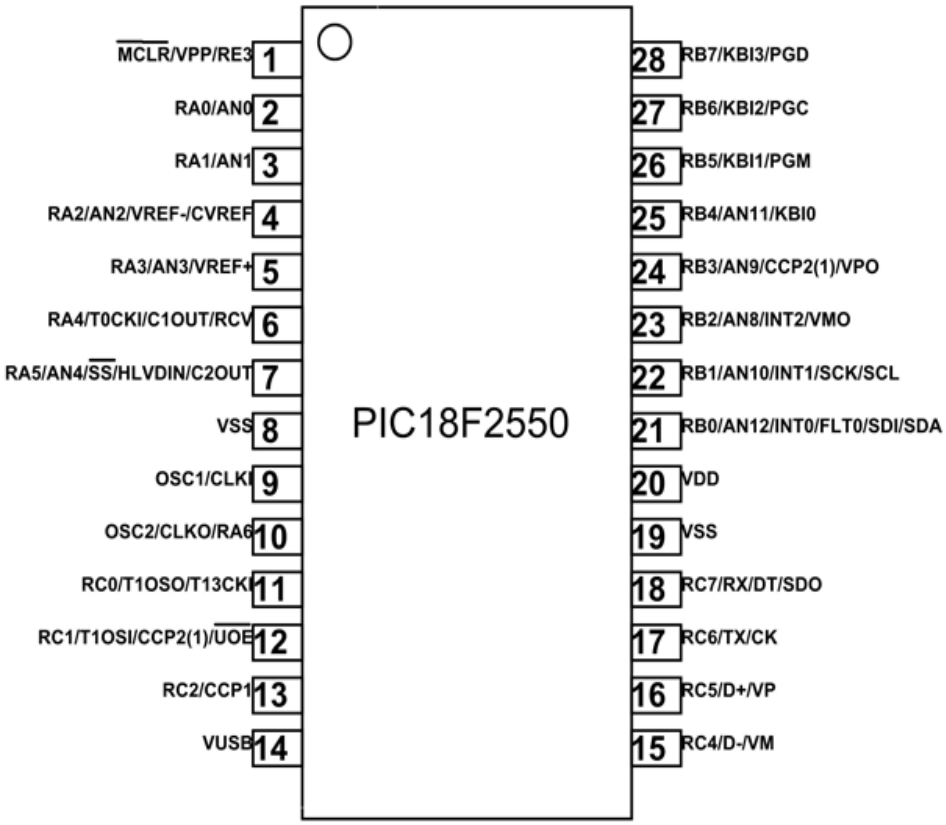


Figure 4.1: Identification microcontroller PIC18F2550

4.3.1 Use of Microcontrollers

People will sometimes use the term “microprocessor” or "MPU" when referring to a microcontroller, but these two devices are not necessarily the same. Both microprocessors and microcontrollers function as small, highly integrated computer systems, but they may serve different purposes.

The term “processor” is used to identify a system that consists of a central processing unit and (optionally) some memory; a microprocessor is a device that implements all of a processor’s functionality within a single integrated circuit. Microcontrollers, by comparison, place greater emphasis on additional hardware modules that allow the device to control a system rather than simply execute instructions and store data.
The diagram below illustrates this concept.

Overall, using the terms "microprocessor" and "microcontroller" interchangeably is not a major problem when we’re speaking informally or when we’re trying to avoid

saying the same word over and over again. However, in the context of a technical discussion, it's important to maintain the distinction between the two concepts

.

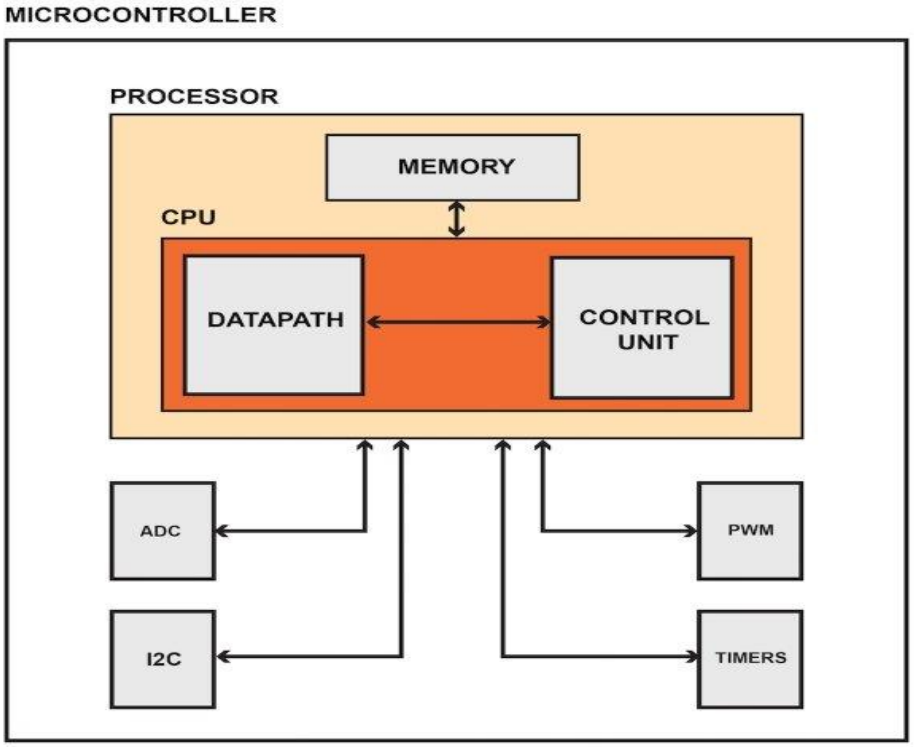


Figure 4.2: Microcontroller

4.3.2 Technical Specification of Microcontroller

Table No 4.2: Technical Specification

ARDUINO MICROCONTROLLER	
Microcontroller	PIC18F2550
Architecture	PIC
Operating Voltage	5V
Flash Memory	32 KB of which 0.5 KB used by boot loader
SRAM	2 KB
Clock Speed	4 - 48 MHz
Analog I/O Pins	6
EEPROM	1 KB
DC current per I/O pins	40 mA on I/O pins; 50 mA on 3.3 V Pin

4.3.3 Technical Specification of General

Table No 4.3: Technical Specification (General)

GENERAL	
Input Voltage	2-5.5 V
Digital I/O Pins	20 (of which 6 provide PWM output)
PWM Output	6
PCB Size	53.4 × 68.6 mm
Weight	10 gm.

4.3.4 Power

The power pins are as follows:

• VIN: The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source).

• 5V: The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.

• GND: Ground pins.

4.3.5 Memory

The PIC18F2550 has 32 KB of flash memory for storing code. It has also 2 KB of SRAM and 1 KB of EEPROM.

4.3.6 Inputs and Outputs

Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analog Write() function.

SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language.

LED: 13, there is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the on the board.

4.3.7 Communication

The microcontroller IC has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The PIC18F2550 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX).

4.4 LCD Display

16x2 LCD unit is widely using in embedded system projects because it is cheap, easily available, and small in size and easy to interface. 16x2 have two rows and 16 columns, which mean it consist 16 blocks of 5x8 dots. 16 pin for connections in which 8 data bits D0-D7 and 3 control bits namely RS, RW and EN. Rest of pins is used for supply, brightness control and for backlight.

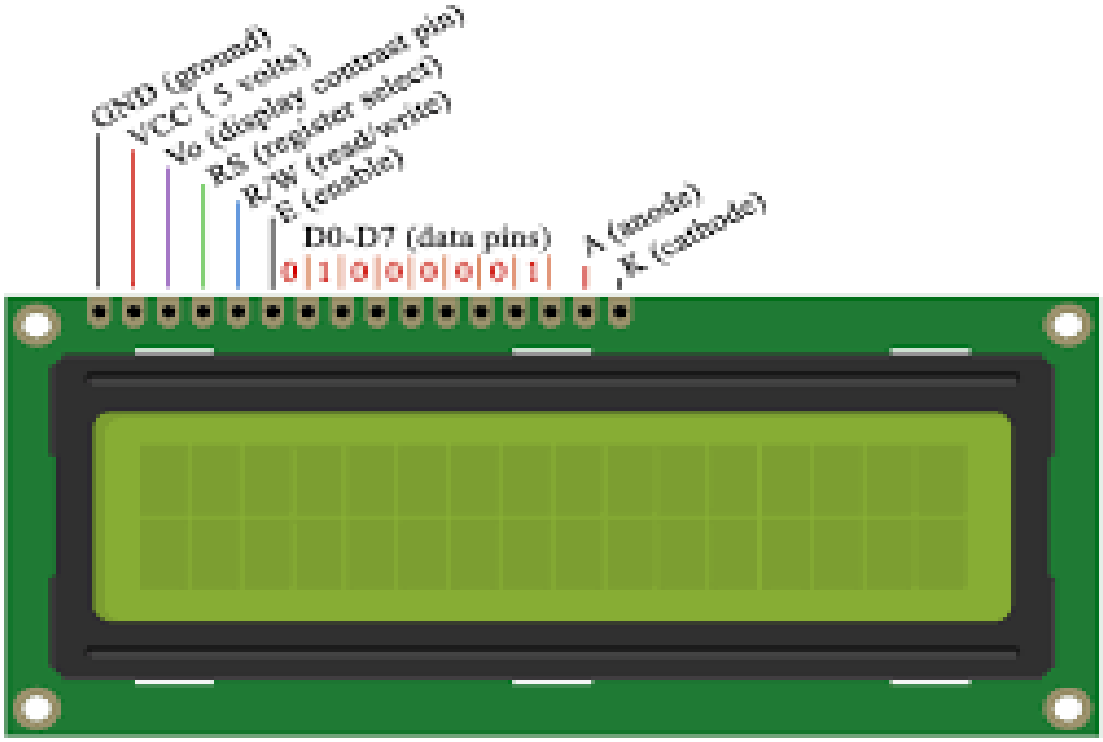


Figure 4.3: LCD Display

4.5 Connector

- An electrical connector, a device for joining electrical circuits together
- Audio and video connector, electrical connectors (or optical connectors) for carrying audio signal and video signal, of either analog or digital format
- Gender of connectors and fasteners
- Power connector, devices that allow electrically operated equipment to be connected to the primary alternating current (AC) power supply in a building
- RF connector, an electrical connector designed to work at radio frequencies in the multi-megahertz range



Figure 4.4: Connector

- Circular connector
- Cigar lighter receptacle
- Blind mate connector, one in which the mating action happens where you can't see or feel it ensure that it is correctly aligned. They have self-aligning features which allow a small misalignment when mating..

4.6 LED

Light Emitting Diode is abbreviated as LED. They are used at different places such as street lighting; home LED lighting, commercial LED etc. LED lights are small light bulb which fits into the electrical circuit. Working mechanism of LED lights is depending upon the electrons in the semiconductor. LED lights have more lifespan then other ordinary lights.



Figure 4.5: LED

4.7 Resistor

A resistor is an electrical component that limits or regulates the flow of electrical current in an electronic circuit. Resistors can also be used to provide a specific voltage for an active device such as a transistor



Figure No 4.6: Resistor

4.8 5 Volts Adapter

An adapter or adaptor is a device that converts attributes of one electrical device or system to those of an otherwise incompatible device or system. Some modify power or signal attributes, while others merely adapt the physical form of one electrical connector to another.



Figure 4.7: 5 Volt Adapter

4.9 Summary

Firstly we discuss about components name which are used in this project. Then we discuss about microcontroller IC where we briefly discuss about why microcontroller IC, technical specification, power, inputs outputs, memory, communication etc. Then we briefly discuss about LCD, push Switch, LED, resistor and 5 volts adapter in this chapter.

CHAPTER 5

RESULT AND DISCUSSIONS

5.1 Introduction-

EVM stands for Electronic Voting Machine. This makes polling much fast and is more reliable than ballot papers, by preventing bogus voting to a great extent. The EVMs saves considerable time, money and manpower. It also helps in maintaining the secrecy of individual voting. At the end of polling, just press a button and there you have the result.

5.2 Electronic Voting Machine (EVM)

Active Electronic Voting Machine (EVM).

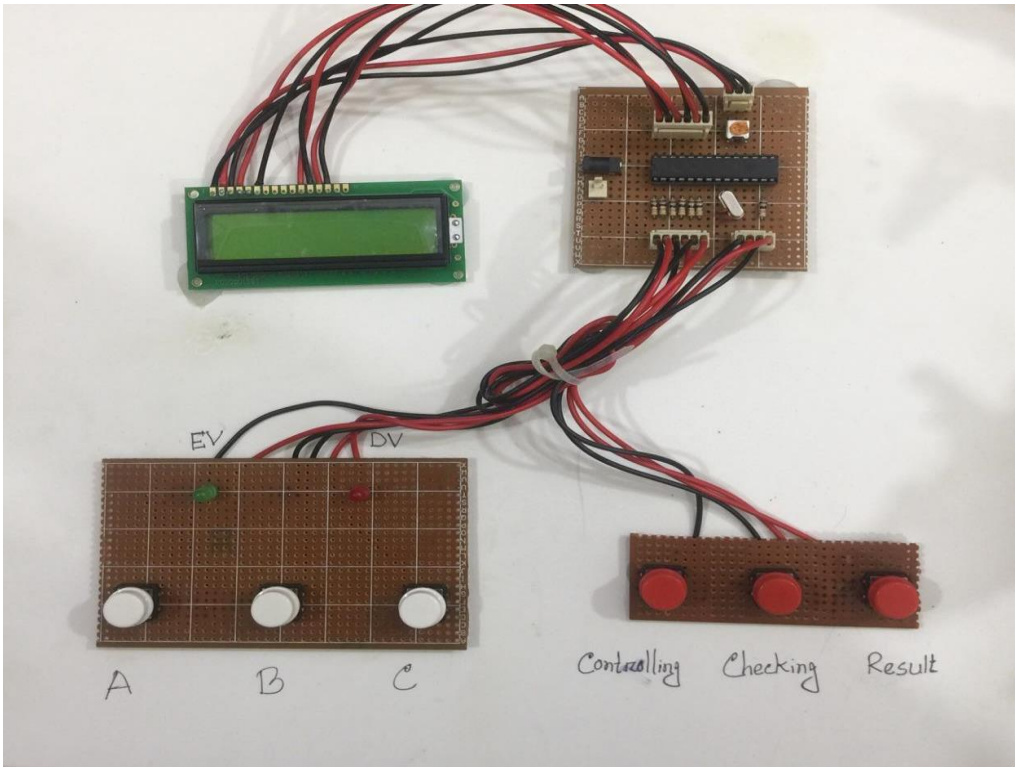


Figure 5.1: Electronic Voting Machine (EVM) Full Project

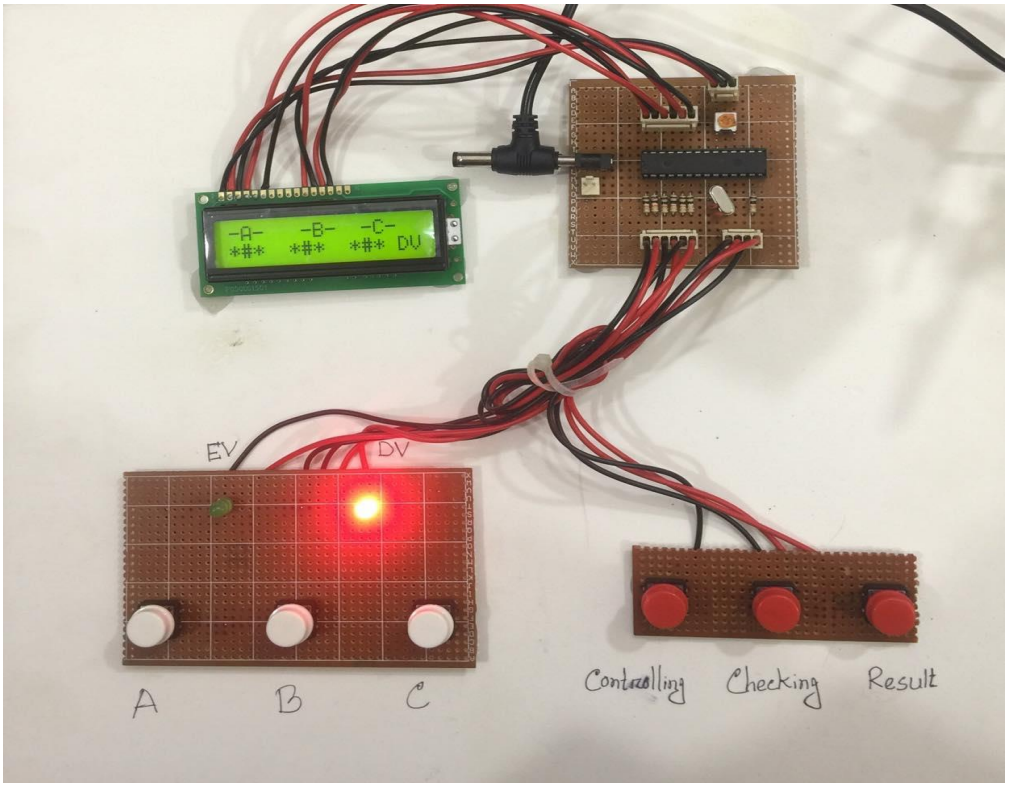


Figure 5.2: Electronic Voting Machine (EVM) Disable Project

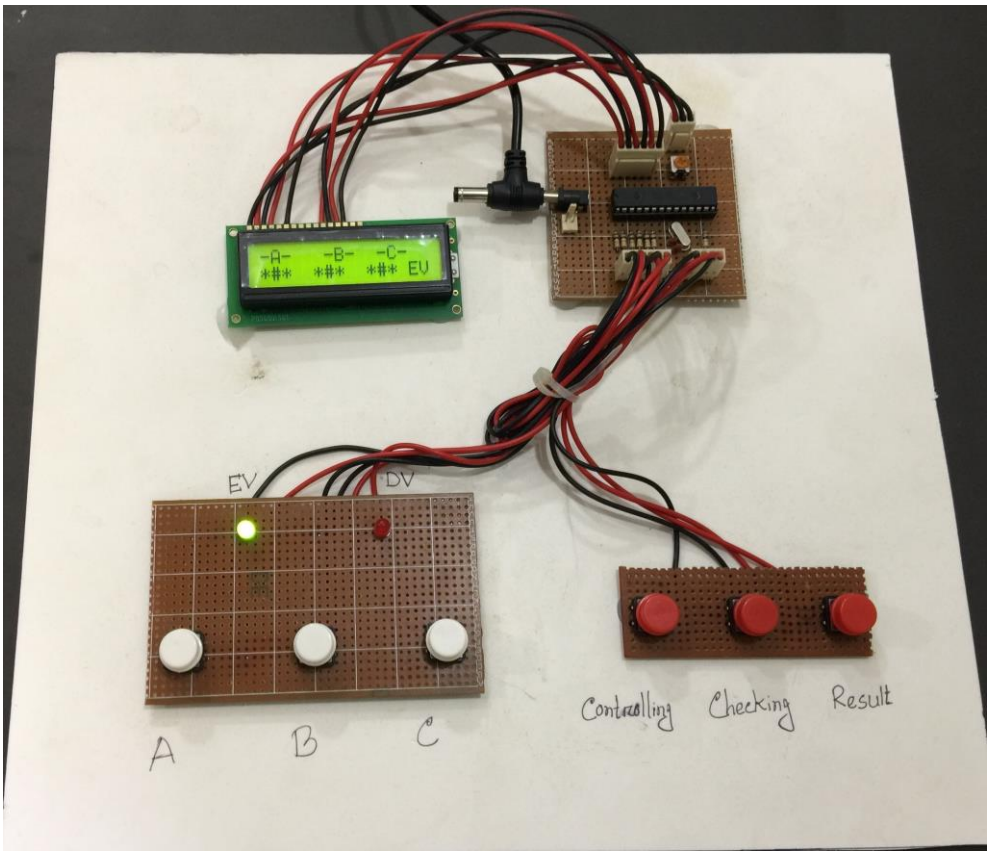


Figure 5.3: Electronic Voting Machine (EVM) Enable Project

5.3 Total Project Cost, Quantity and Price

Table No 5.1: Equipment Cost

SL	Equipment Name	Quantity
1	Microcontroller IC	1
2	LCD Display	1
3	5V adapter	1
4	Push Switch	6
5	White board	As necessity
6	LED	2
7	Glue	1
8	Wire	As necessity
9	Bread board	1
10	Resistance	10
11	Connector	10
12	Other	As necessity

5.4 Limitations of the Work

Traditionally, votes were cast on paper and countedby hand [2]. Voters were confident that the marks they made on ballots reflected their intended vote. Voting machines that used levers and punch card systems also provided voters with a high degree of confidence that they cast their votes as intended. Until the 2000 elections voters also routinely. Ssumed their votes were properly counted. The most pressing verifiability problem with the use of computerized voting is that the systems are provided by private companies, and the government usually has no oversight into the production of the systems beyond choosing whether or not to use them

5.5 Summary

Election Commission of India is using EVM for conducting polling throughout the country. But in IIT, the premier Engineering Institute of India, still polling for Gymkhana or Hall Executive Committee elections are held on Ballot Paper!!! This motivated us to take this topic as our Summer Project and make a working model of EVM.

CHAPTER 6

CONCLUSIONS

6.1 Conclusions

This review discussed introduction about EVM and its variation, Issues of Electronic voting machine, Taxonomy, and Biometric based Electronic voting machine. Our efforts to understand electronic voting systems leave us optimistic, but concerned. This paper suggest that the Electronic voting machine system has to be further studied and innovated to reach all level of community, so that the voter confidence will increase and election officials will make more involvement in purchasing the innovated Electronic voting machine for conduct smooth, secure, tamper-resistant Elections.

6.2 Future Scopes

- A timer could be included, which could automatically end the voting after specified duration of time.
- Biometric Verification of voters, so that automatically it can be insured that one person is voting only once.
- It can be made more interactive by adding Sound effect (speech) to it.
- EEPROM can be used to store the data permanently.
- If we make more than one EVM, each to be used at different locations and the final result is the addition of result of all, we could think of connecting them to communicate with each other and final result can be shown on one of the LCD.

Reference

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Appendix

The code used in Microcontroller

```
 short dat_can1=0,dat_can2=0,dat_can3=0,con=4;
 char txt[]="       ";
 char txt2[]="    Digital Voting Machine";
 int i=0,j=0,chk=10;
 chbhar c1i='0',c1j='0',c1k='0';
 char c2i,c2j,c2k;
 char c3i,c3j,c3k;
 int can_1adrs =15; // Keeping memory address for Candidate 1
 int can_2adrs =19;   // Keeping memory address for Candidate 2
 int can_3adrs = 29;   // Keeping memory address for Candidate 3
 int chkk = 33,aq=0,b=0,aa=0,bb=0,cc=0;
//// these functions should be called with this structure
 /// I used this , because MikroC's short to str conversion didn't work .
 dat_can2=EEPROM_Read(can_2adrs); // reading previous data if avail able for Candidate 2
Lcd_Cmd(_LCD_CLEAR);
}
 while(1){
    Lcd_Out(1,1," C");
 if(PORTA.F4==0){  // if control button is pressed , it enables voting.
 con=3;
 }
 if(con!=3){    // if control button is not pressed ,naturally it disables voting.
 Lcd_Out(2,15,"DV");

 }
 while(con==3){    // if control button is pressed , it enables voting.
  Lcd_Out(2,15,"EV");
if(PORTC.F2==0){   // when view status button is pressed
  delay_ms(4000);
  con=5;    // con=5 makes disable voting
 }
   if(PORTA.F0==0){
    dat_can1=dat_can1+1;   // Candidate 1 variable is incrementing .
   EEPROM_Write(can_1adrs,dat_can1); // writing the incremented value on EEPROM for Candidate
1
    con=5;    // con=5 makes disable voting
   }
```

```
   if(PORTA.F1==0){
    dat_can2=dat_can2+1;      // Candidate 2 variable is incrementing .
   EEPROM_Write(can_2adrs,dat_can2);   // writing the incremented value on EEPROM for Candidate
   }
   if(PORTA.F2==0){
    dat_can3=dat_can3+1;         // Candidate 3 variable is incrementing .
   EEPROM_Write(can_3adrs,dat_can3);          // writing the incremented value on EEPROM for
Candidate 3
    con=5;                 // con=5 makes disable voting
   }
   Lcd_Cmd(_LCD_CLEAR);
   for(j=1;j<17;j++){
  Lcd_Out(1,1,"   Result...");
    }
   if(dat_can2>dat_can1&&dat_can2>dat_can3){
  Lcd_Out(1,1,"  Winner is B");
  Lcd_Out(2,1,"Congratulation!!");
    Lcd_Cmd(_LCD_CLEAR);
        dat_can2=0;
 //Erasing All Datas
  else if(dat_can1>dat_can2&&dat_can1>dat_can3){
  Lcd_Out(1,1,"  Winner is A");
  Lcd_Out(2,1,"Congratulation!!");
    Lcd_Cmd(_LCD_CLEAR);
   }
    Lcd_Cmd(_LCD_CLEAR);
   }
   else{
  Lcd_Out(1,1," Something is");
  Lcd_Out(2,1,"   Worng!!!");
    Lcd_Cmd(_LCD_CLEAR);
   }
    con=5;
   }
 }
```