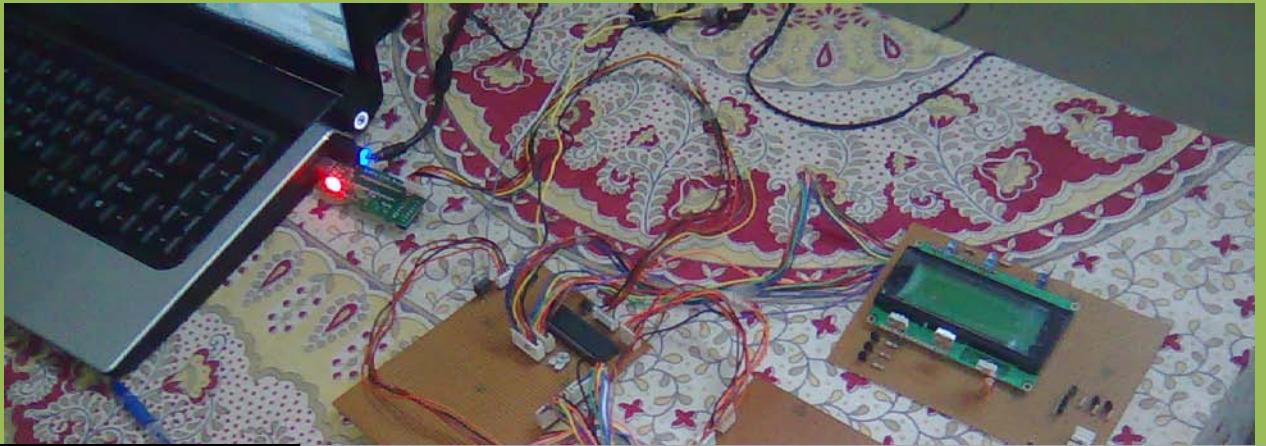


EVM



ELECTRONICS CLUB
IIT KANPUR

ELECTRONIC VOTING MACHINE



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ACKNOWLEDGEMENTS

A project can't be considered as finished until we say thanks to everyone who has contributed to our project.

We would like to thank Electronics Club, IIT Kanpur for giving us the opportunity of a project.

We also express our gratitude to our mentor Siddharth Garg, who helped us at every stage of the project with his valuable suggestions and support.

Special thanks to Saurabh Sankule and Arpit Mathur for their valuable contribution in terms of their suggestion and time.

Table of Contents

ACKNOWLEDGEMENT.....	2
CONTENT.....	3
HISTORY.....	4
OVERVIEW.....	5
PICTORIAL DEPICTION OF WORKING OF EVM.....	5
PROJECT MOTIVATION.....	6
COMPONENTS USED.....	6
MAIN ATTRACTION.....	7
PROJECT OUTLINE.....	7
BALLOT UNIT.....	7
CONTROL UNIT.....	8
LCD.....	9
MCU.....	10
TOUCH SWITCH.....	12
40 KEYS KEYPAD.....	14
PROBLEM FACED.....	15
MISTAKES DONE.....	16
FUTURE SCOPE OF WORK.....	16
LINK TO VIDEO.....	16

HISTORY

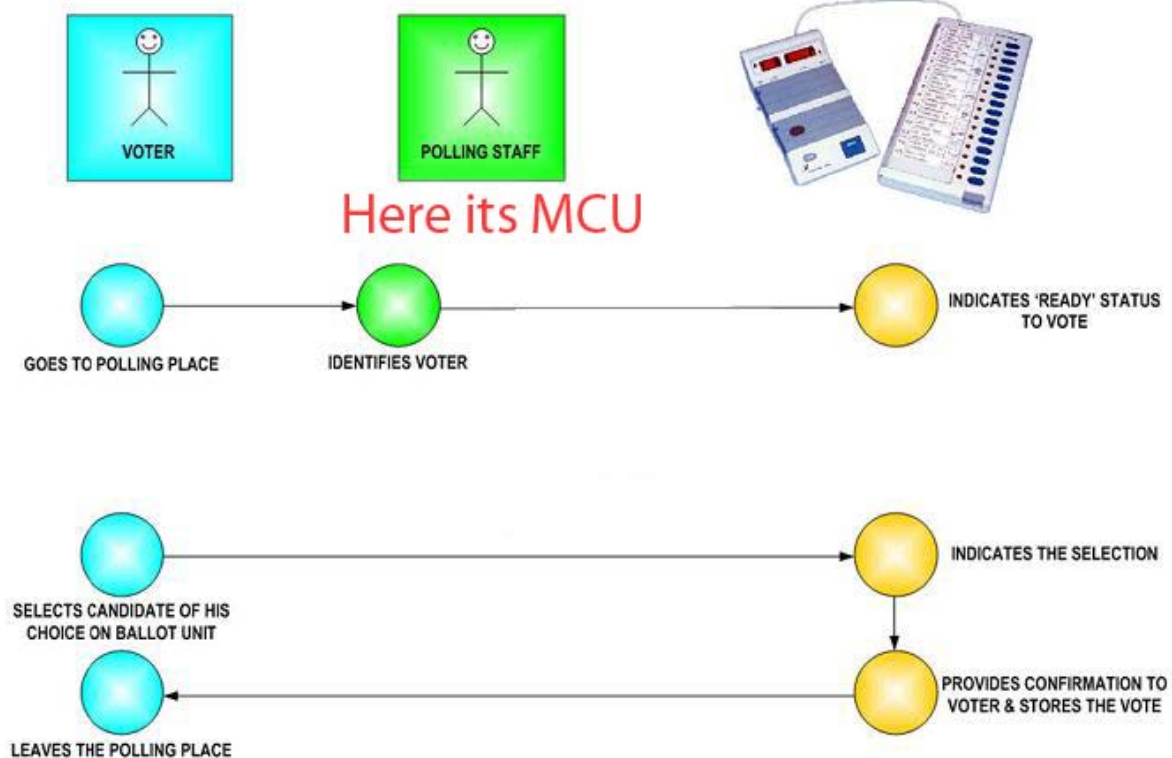
The EVMs were devised and designed by Election Commission of India In collaboration with two Public Sector undertakings Bharat Electronics Limited, Bangalore and Electronics Corporation of India Ltd, Hyderabad.

EVMs were first used in 1982 in the by-election to Parur Assembly Constituency of Kerala for 50 polling stations.

OVERVIEW

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.

Pictorial Depiction of Working of EVM



PROJECT MOTIVATION

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.

COMPONENTS USED

- Atmega 16
- Atmega 8
- 20X4 LCD
- IR LEDs
- TSOP 1738
- Toggle Switches
- 7805 Voltage Regulators
- Adaptors
- USB Connector
- 12 MHz Crystal
- Transistors
- Connectors

MAIN ATTRACTION:

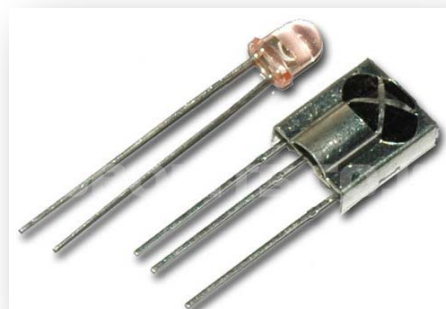
- Voting for more than one post can be done at the same time, saving money and human resources.
- No need to change the program each time before the voting. SET UP function enables the authority to enter the name of Post and candidates for each post just before election, making the voting more secure.
- One can opt for not to vote, if he/she doesn't like anyone of the existing candidates.

PROJECT OUTLINE

In general the EVM consists of two units that can be inter-linked. A ballot unit, which a voter uses to exercise his vote. And the other, a control unit - used by the polling officials. But the EVM prepared by us is totally automated. MCU is acting as the Polling Officer in this EVM.

Ballot Unit

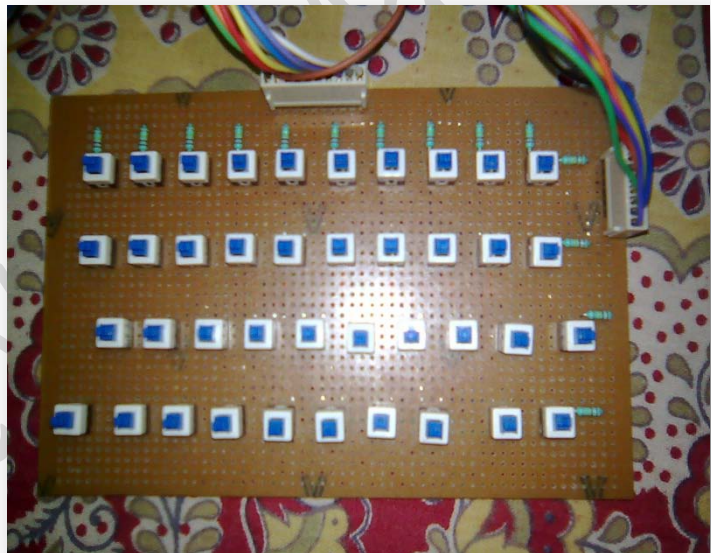
It consists of a 20x4 LCD and 3 sets of TSOP and IR LEDs.



LCD displays the name of the post and candidate for which voting is going on. TSOP and IR LEDs are used as touch switches. For anything which you have to select, put your finger just above the option where it is being displayed on the LCD.

Control Unit

It consists of a MCU and a 40 keys keypad.



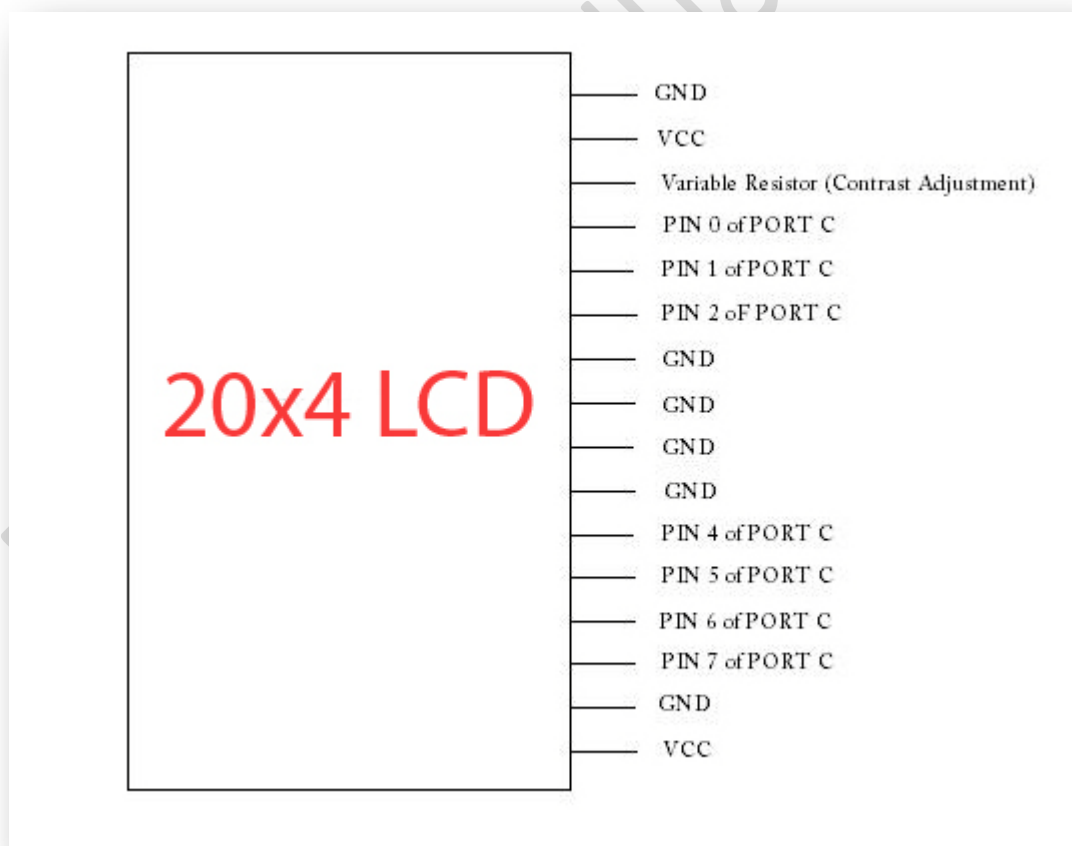
MCU stores the program, run it and also stores the data given by voters. We have made keypad, which can be used to input the name of Posts and the Candidates. By using this we will not have to program the machine each time before any election. One can enter the name of posts and candidates just before the election. This can also prevent programming the EVM to favour any particular candidate.

LCD

LCD stands for Liquid Crystal Display. LCD used by us is a 20x4 LCD (JHD204A). It can be used to show textual information to users. CVAVR can be used to program the LCD. It can display 20 characters in each row and there are 4 such rows. Each display position can be uniquely identified by its DD RAM address, which is nothing but the coordinate of cursor. From left to right X increases and from top to bottom Y increases. DD RAM address of LCD is something like this:

0,0	1,0	2,0																	19,0
0,1																			
0,2																			
0,3																			19,3

Connection of this LCD can be made as in the fig below:



MCU

The microcontroller used in this is Atmega 16. A microcontroller is an integrated chip, which includes a CPU, RAM, ROM, I/O ports and timer. A MCU has 4 ports and each port have 8 pins. Each PINs can act as input as well as output. There is a register called DDR (Data Direction Register), whose value tells MCU which pin is set to be input and which to output. For example, to set Pin no. 0, 1,3,6,7 of Port A to input and other pins to output, code would be

```
DDRA=0b00110100;
```

To read or write data from the pins, there are two register PORT and PIN. To read data from pin 4 of PORT A, code would be

```
X=PINA.4;
```

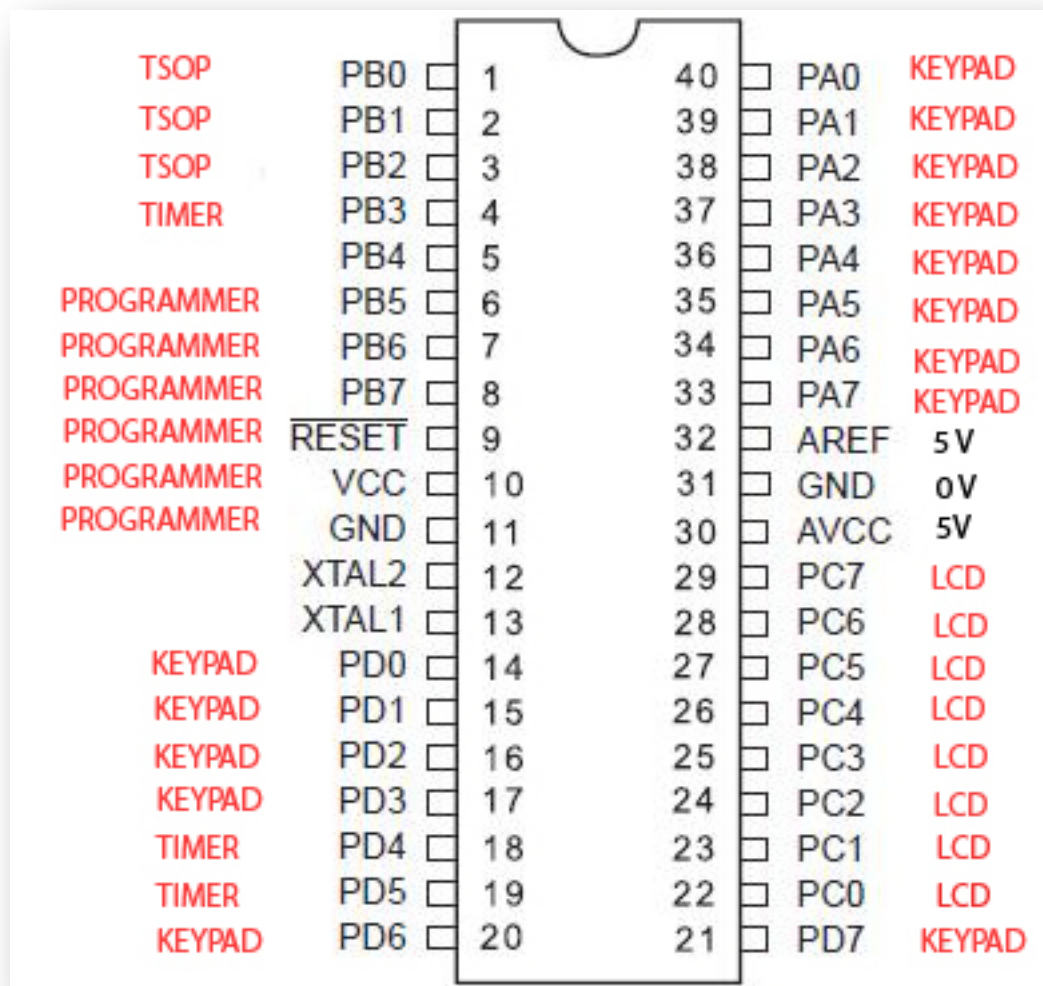
To give an output from a particular pin, PORT register is used. Suppose output from the pin 2 of PORT A is high, then the code would be

```
PORTA.2=1;
```

MCU can be programmed for any specific purpose, using CVAVR. A programmer is used to transfer the hex file to the MCU. This programmer itself contains an ATMEGA8, programmed to transfer data.



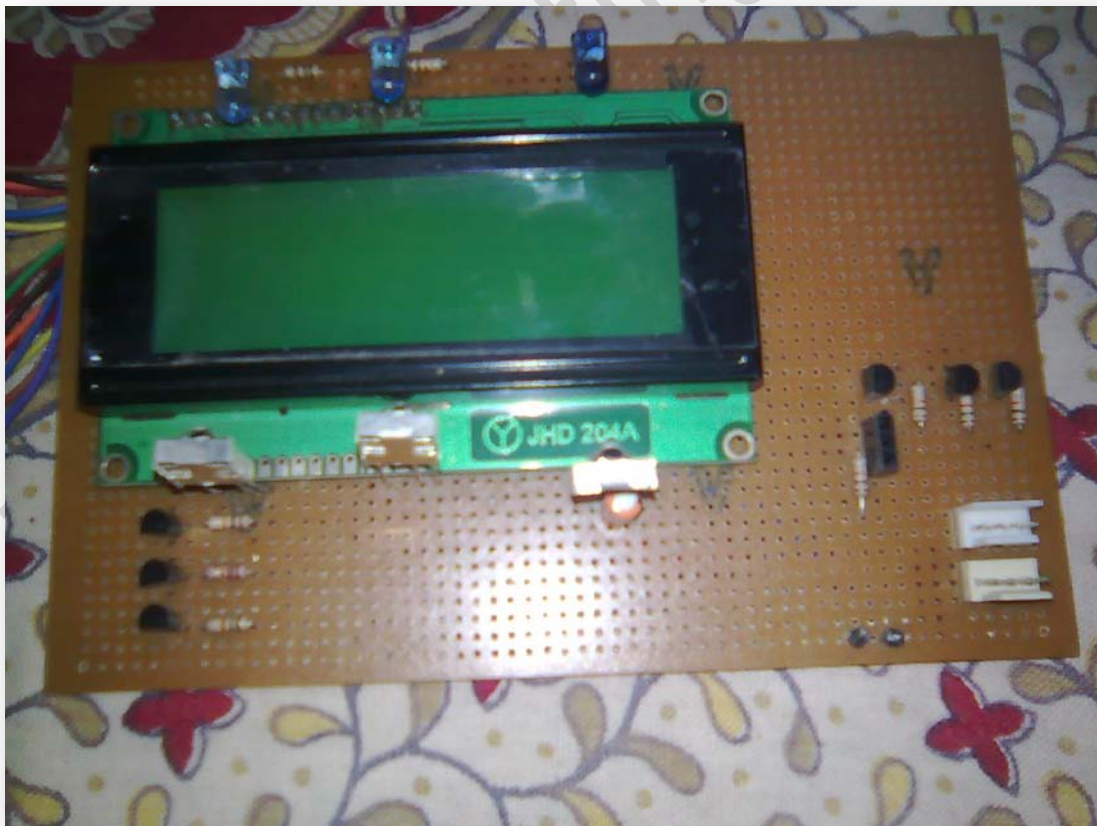
A connection of MCU used in this project is as shown:



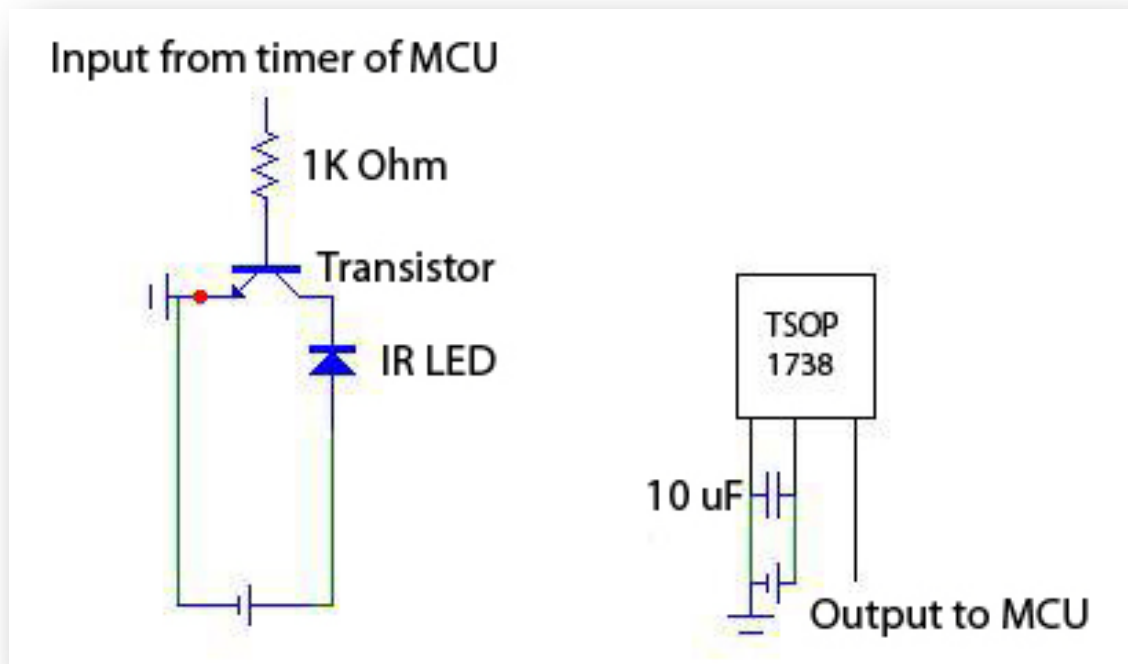
TOUCH SWITCH

Using IR LEDs and TSOP we have tried to make touch switch. TSOP works at a particular frequency of IR radiations. TSOP used by us is 1738. This TSOP will sense the IR radiations which will be coming at a frequency of 38KHz. This is necessary, so as to differentiate between the radiation from the IR LEDs used and the radiation from any other external source. Using timer of MCU we can give input to IR LEDs at this frequency.

Output of TSOP is low when it senses IR radiation. When we block the path of radiation with (let's suppose) our finger, then output of TSOP will go high. This concept can be used in making a switch, TOUCH SWITCH. When one puts his/her figure on the LCD screen between any set of IR LED and TSOP, state of touch switch changes from OFF to ON.

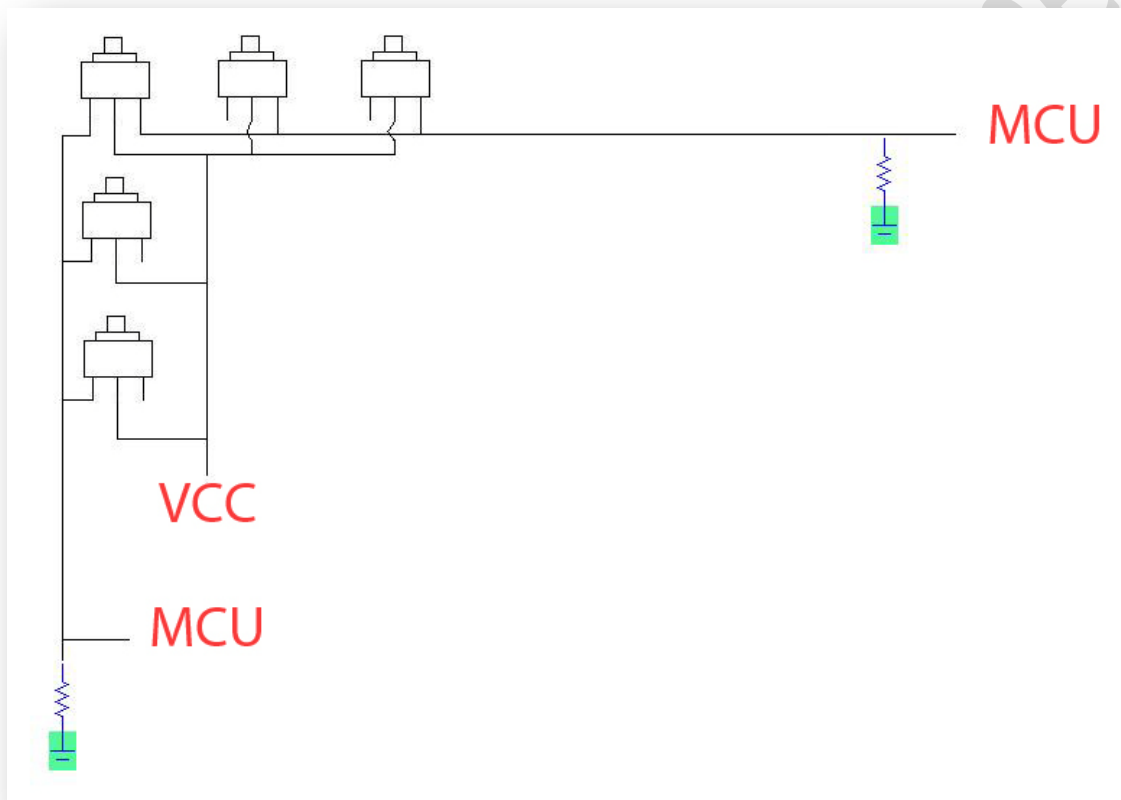


Connection of TSOP and IR LEDs can be seen here:



40 KEYS KEYPAD

In this toggle switches are used. In this type of switch there are 3 pins. In normal case middle pin is short-circuited with one of the pin. When the switch is pressed the middle pin gets short-circuited with the other end pin. Each switch in itself contains two toggle switches. Connections are made as followed:



Both the middle pins of a switch are connected to VCC. Both the pins which will be short-circuited to the middle pins are only used. One of such pin of each switch is short-circuited with same corresponding pins of all other switches in a particular row. This is connected to MCU, as shown in figure. In normal condition all these pins are in hanging position. MCU will receive an input of 0 volt through resistor. But when any of the switches of that row is pressed, input to the MCU goes to 5 volts. Similar connections are made for each column.

When any of the switches is pressed, a particular pair of pins of MCU will go high. From this one can find that which switch was pressed.

PROBLEM FACED:

Most of our summer was spent in making Touch switch and LCD screen work.

- We used 20x4 LCD for our project. We were not able to get the exact Datasheet of LCD we were using. So we were not able to find the correct connection of LCD. Whatever datasheet we got, in that there was different DDRAM convention. Due to this we had lot of trouble in programming, and we were not able to find out whether it was a hardware or programming problem. At last we tried for the conventional DDRAM address as in the case of 16x2 LCD and it worked.
- Second most problematic thing was implementing Touch Switch. In this TSOP was not able to sense the intensity of IR LED for the distance we wanted it to work. Increasing the range of IR LED was a great challenge for us. We knew that to increase the intensity of IR LED, we have to provide more current to it. We tried for different combination of transistor. But none of them worked. At last the problem was solved by providing additional power supply to the IR LED.
- A common problem in all was Soldering. During soldering, due to extensive heating, some of the components stopped working. Second problem with soldering was heat was carried by the wire to be soldered and it caused melting of soldering at the other end, causing short circuit. Due to this only our touch switch stopped working at last moment. While replacing one of the IR LED, on the other end timer got short circuit with output of one of the TSOP.
- Working with Programmer was also a difficult task. Many a time it showed the message that signature of selected doesn't match. We decreased the frequency of this message by avoiding the direct touch of programmer with any of conductor.

MISTAKES DONE:

- We gave much of time in making hardware, take for e.g. the Touch Switch. We should have searched for its alternative initially, like using simple switches and after completing the basic part of the project, we should have come back again to do something for that.
- Poor time management. We were left with very less time to test our program. So, we couldn't implement the program related to the EEPROM, which could have hold result and Candidates names permanently, and Password function for voter and administrator for authentication.

FUTURE SCOPE OF WORK:

- 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.

[WATCH THE VIDEO OF THIS PROJECT](#)