Electronic Voting Machine(EVM) Using 8051 Microcontroller

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Declaration

I declare that the project "Electronic Voting Machine (EVM) Using 8051 Microcontroller" is based on our own work carried out during the course of our study under the supervision of Dr. Wasiq Ali and Engr. Irum Shehzadi.
I assert the statements made and conclusions drawn are an outcome of my research work. I further certify that

1. The work contained in the report is original and has been done by us under the general supervision of my supervisors.

2. The work has not been submitted to any other Institution for any other degree/diploma/certificate in this university or any other University of Pakistan or abroad.

3. We have followed the guidelines provided by the university in writing the report.

4. Whenever we have used materials (data, theoretical analysis, and text) from other sources, we have given due credit to them in the text of the report and giving their details in the references.

Dedication

First and foremost we offer our sincerest gratitude to our course instructor, Dr.Wasiq Ali, and Lab instructor, Engr. Irum Shehzadi, Who encouragement, guidance and support from the initial to the final level enabled us to develop an understanding of the subject. Without his guidance and persistent help this project would not have been possible.

To our parents, we would like to thank to them for supporting us in our daily lives, for going to school every day, and having them by our side to guide us always, their prosperity and love for us.

Acknowledgements

Abstract

We can experience fast and sudden changes in the life of human being due to the information technology (IT). Information technology is used individually as well as in business then how it could be exception for election. Information technology is useful in preparing voters list, proper voting and prediction of which candidate will be winner etc[1]. 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 extend. 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.

Electronic Voting Machine(EVM) is a simple electronic device used to record votes in place of ballot papers and boxes which were used earlier in conventional voting system. Fundamental right to vote or simply voting in elections forms the basis of democracy. All earlier elections be it state elections or centre elections a voter used to cast his/her favorite candidate by putting the stamp against his/her name and then folding the ballot paper as per a prescribed method before putting it in the Ballot Box. This is a long, time-consuming process and very much prone to errors. This situation continued till election scene was completely changed by electronic voting machine. No more ballot paper, ballot boxes, stamping, etc.

All this condensed into a simple box called ballot unit of the electronic voting machine. Because biometric identifiers cannot be easily misplaced, forged, or shared, they are considered more reliable for person recognition than traditional token or knowledge based methods. So the Electronic voting system has to be improved based on the current technologies viz., biometric system [2].

Due to EVM following points become possible:

- Fast counting of voting
- Accurate counting of voting
- Avoidance of misbehavior/misconduct

Contents

Chapter 1

Introduction

It is very critical and important to cast and count votes, the electronic voting is a term used to describe the act of voting using electronic systems. Electronic Voting Machine (EVM) is an electronic device used for recording votes. An Electronic Voting Machine consists of two Units first is Control Unit and second is Balloting Unit that are joined by a 5 meter cable. The candidate names and symbol are programmed in the control unit of EVM. The polling officer in-charge of the control unit will release a ballot instead of issuing a ballot paper by pressing the ballot button on the control unit. This mechanism will enable the voter to cast his vote by pressing the blue button on the balloting unit against the candidate and symbol of his choice. [1]
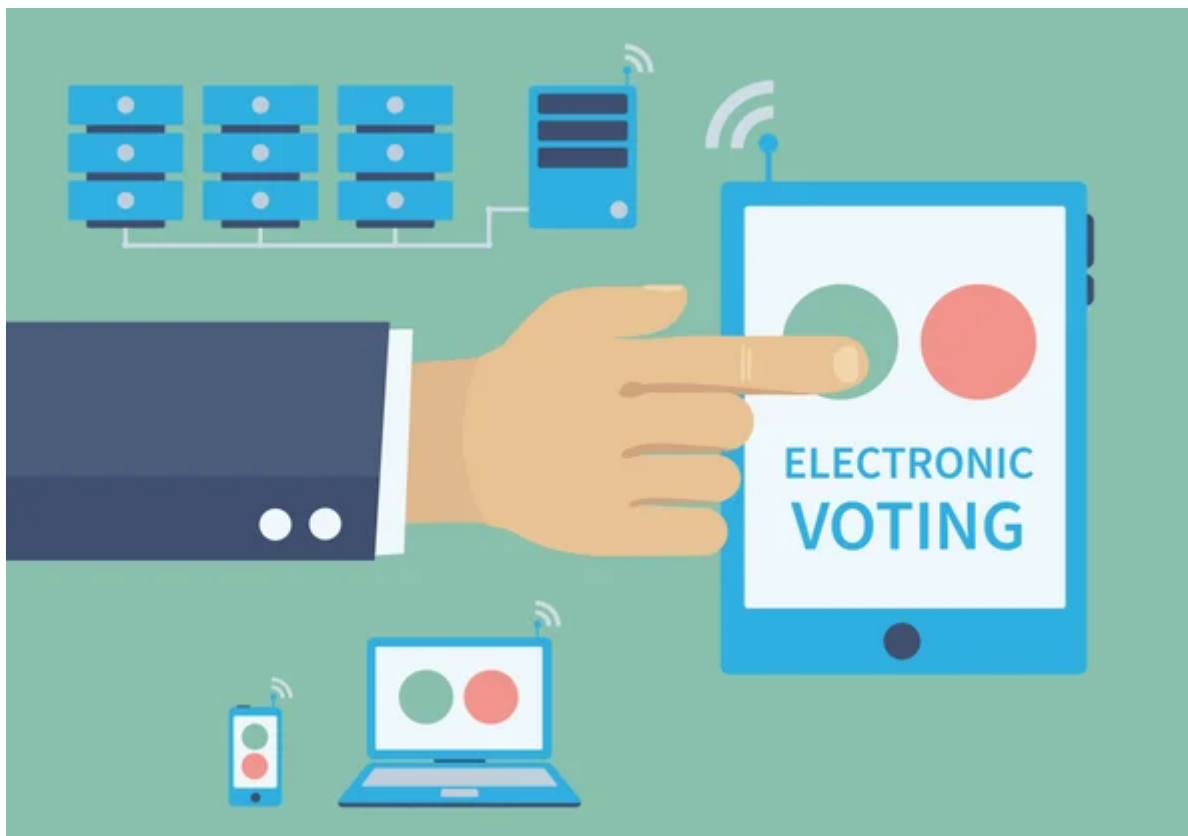

Figure 1.1: Electronic Voting Machine (EVM)

1.1   Objectives

The objectives of this project are:

1. To make elections time efficient and cost efficient.

2. To eliminate the chance of rigging in the elections.

3. To automate the elections.

1.2   Introduction

Elections allow the people 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 of democracy 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. 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[2].

The design of a good voting system, whether electronic or using traditional paper ballots or mechanical devices, must satisfy a number of sometimes competing criteria.

- The anonymity of a voters ballot must be preserved

- both to guarantee the voters safety when voting against a malevolent candidate

- guarantee that voters have no evidence that proves which candidates received their votes
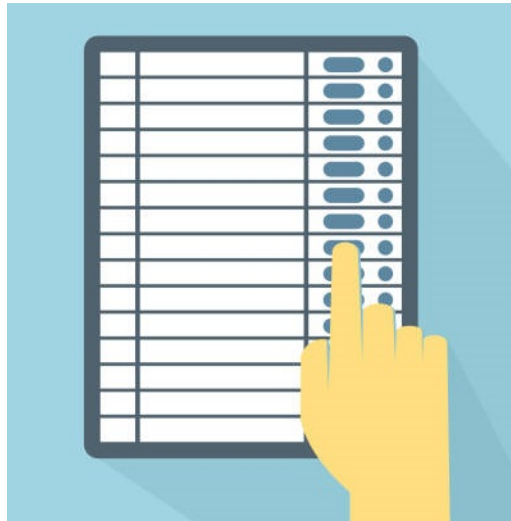

Figure 1.2: EVM

The voting system must also be tamper-resistant to thwart a wide range of attacks, including ballot stuffing by voters and incorrect tallying by insiders. Another factor, as shown by the so-called butterfly ballots in the Florida 2000 presidential election, is the importance of human factors. A voting system must be comprehensible to

and usable by the entire voting population, regardless of age, infirmity, or disability. Providing accessibility to such a diverse population is an important engineering problem and one where, if other security is done well, electronic voting could be a great improvement over current paper systems. Flaws in any of these aspects of a voting system, however, can lead to indecisive or incorrect election results.[3]

1.3   E-Voting Systems

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.[2]

1.4   Challenges

The challenges are even harder because there is little or no training available for voters. The first time most voters ever touch the voting system is the moment they vote. And once they start voting, there is tremendous social pressure to do it without help. With people watching, inadequately trained poll workers, busy people waiting on line, the social importance of voting, and the value placed on secrecy, voters may become anxious and afraid to ask for help. Finally, the systemic issues of how voting machines get purchased and evaluated are problematic as well. State or county purchasers are usually more concerned about cost than usability. And once the systems are purchased, the public has no access to the machines for evaluation. Election workers who design ballots tend not to have experience in usability and screen design. Poll workers who deploy the voting systems have minimal training to cope with the inevitable problems. Electronic voting systems offer promise as well from the opportunity to change font size and language on demand, to offering disabled users customized access, to accurate and fast recording and tabulation of votes. But there are many issues that add up to the risk that voters may become disenfranchised. And this is especially true for the elderly and citizens at the margins of society.[4]

1.4.1   Accountability and Verifiability

Traditionally, votes were cast on paper and counted by hand. 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. In 2000, the U.S. presidential election was particularly contentious because the outcome was extremely close. This resulted in a close examination of the voting and tabulation systems that were used. Many problems were found, especially with one ballot design which became known as the butterfly ballot. This ballot required voters to draw line connecting a candidate with a circle. This was confusing because the circles didn't align well with the candidates and in addition, the circles were shared between two columns of candidates.

The ensuing melee brought a popular awareness of the complexities and flaws in voting systems and there were general calls for reform. Many questions have since been raised. Because they are paperless, systems raise the question:

1. How can one know that when a voter chooses a particular candidate on the screen?

2. Is a vote for that candidate is recorded?

A simple solution to this problem is to provide the user with a printed record of the votes electronically recorded. Before leaving the polling place, the voter would be required to certify the contents of the paper record and place it into a ballot box. The printed records could then be manually counted in the event of a challenge, and this procedure would foil any attempt at falsifying votes internally to the voting system. This approach, however, has not been implemented in any commercial systems that we are aware of[4].

1.5   Report Break Down

The major focus of this report is on the findings of the proposed project i.e. Electronic Voting Machine(EVM) Using 8051 Microcontroller.

This Report is organized as follows:

In chapter 2, literature review is provided in detail about the work which is already been done on Electronic Voting Machine(EVM) Using 8051 Microcontroller and will give a brief details about the articles, papers and literature review.

In Chapter 3, Proposed Methodology is presented in which you will be able to see the method we will work on the designing of a complete project source code to the diagrams.

In Chapter 4, Result and Simulations are being discussed, in which you will see all kind of finding related to the Electronic Voting Machine(EVM) Using 8051 Microcontroller.

In Chapter 5, we have concluded and summarized the project work and also presented few new research ideas for future studies.

Chapter 2

Literature Review

In the chapter 1 we have given the introduction of our project, objectives and a thesis break down. Our introduction chapter is giving a complete overview of this project report. This chapter is about the work which is already been done on Electronic Voting Machine and will give a brief details about the articles, papers and literature review.

2.1 Literature Review

Researchers in the electronic voting field have already reached a consensus pack of following core properties that an electronic voting system should have[2]:

2.1.1 Accuracy

1. It is not possible for a vote to be altered.

2. It is not possible for a validated vote to be eliminated from the final tally.

3. It is not possible for an invalid vote to be counted in the final tally.

2.1.2 Democracy

1. It permits only eligible voters to vote.

2. It ensures that eligible voters vote only once.

2.1.3 Privacy

1. Neither authorities nor anyone else can link any ballot to the voter who cast it.

2. No voter can prove that he voted in a particular way.

2.1.4 Verifiability

1. Anyone can independently verify that all votes have been counted correctly.

2.1.5 Availability

1. The system works properly as long as the poll stands

2. Any voter can have access to it from the beginning to the end of the poll.

2.1.6 Resume Ability

1. The system works properly as long as the poll stands

2. the system allows any voter who had interrupted his/her voting process to resume it or restart it while the poll stands.

2.2 Features

Following are some of the features which an electronic voting machine should have.

- There are no external communication paths hence it is difficult for the hackers to hack the machine and tamper the count numbers, in most of the advanced version of electronic voting machines.

- Electronic voting machines with touch base screen are proven to be advantageous for the physically challenged people. In a paper ballot, these physically challenged people were not able to cast their votes in private. However, with the new EVM in place, even handicapped people can use their right to vote in private.

- Electronic voting machines are cost effective and economical. In the paper ballot, the amount of raw material used is higher. It directly impacts the environment as paper ballot uses papers to cast votes. However, the cost associated with holding elections with EVMs is considered to be negligible.

- One of the advantages of the electronic voting machine is to save the time. EVM machines can cast and count the votes within very less time.

- Bogus voting can be avoided through electronic voting machines hence are quite effective against the bogus votes. Electronic voting machines are programmed to capture a maximum of five votes in a minute, due to which a single vote cannot cast fake votes. In advanced electronic voting machines, a sound of beep comes after one casts their vote which lets the officer on duty know that the vote has been cast by an individual. Electronic voting machines are designed in a way that they keep a track of number and details of votes recorded. The election commission can even save the data for a longer period of time which might be helpful for referencing in future.

- Electronic voting machines are easier to carry and transport from one place to another without any hassle. One single machine can record several votes captured through that machine. Few electronic voting machines also come with a voice support to assist the visually impaired voter. In such cases, the visually challenged person can cast their vote without any problem.

- One can see all the symbols and names in electronic voting machines of the candidates together which makes it easier for the voter to choose among the many and cast their votes.

2.3 Limitations

Following are the problems, error, and challenges of implementing Electronic Voting Machine(EVM)[1].

1. With recent elections in the United States, many software programmers have claimed that the electronic voting machines are vulnerable to malicious programming and if it gets affected then any hacker can hack the machine and can tamper the vote counts easily.

2. The touch base screen is not efficient enough to capture the vote accurately for many physically challenged people as they have complained that. Therefore sometimes it leads to the voter ending up voting for someone else unintentionally.

3. Although it takes the time to count votes that were captured using paper ballot but people fully trust the process as high technology are also vulnerable to hackers attack.

4. The electronic voting machines which were used during the elections are susceptible to damage which will result in loss of data. Therefore biggest change with technology is that no matter how much data it records but a single virus can destroy the entire data storage.

5. The highly humid area and those areas which receive frequent rainfall are not suitable for casting votes using electronic voting machines. As machines are prone to damage due to high humidity level thus usage of electronic voting machines are not advisable in such areas.

6. Most of the electronic voting machines used in the country were foreign manufactured, which means the secret codes that control the electronic voting machines are in foreign hands and they can be used to influence the election results.

7. Fake display units could be installed in the electronic voting machines which would show manipulated numbers but originally fake votes could be generated from the back end. This process does not need any hacker to hack the software. Such fake display units are easily available in the market.

8. Most of the electronic voting machines used in the country do not have any mechanism by which the voter can verify their identity before casting the vote due to which fake voters can cast numerous fake votes.

It is concluded that voting through electronic voting machine is need of time as all developed countries are making use of it. Researchers have been suggested an algorithm and are of opined that if suggested algorithm is strictly followed then there will not be any error in electronic voting procedure, and we will tackle all the mentioned above problems/issues[1].

Chapter 3

Proposed Methodology

In the previous chapter, we have discussed the theories that support this research related to the Electronic Voting Machine . In this chapter we will proposed our methodology for this project.

3.1 Block Diagram

Let us look at the simplified block diagram in Figure 3.1, which illustrates the main components involved in Electronic Voting Machine(EVM) Using 8051 Micro-controller. Switches are used to make choices, resister, capacitor, and oscillator are being used to work the micro-controller properly on the circuits with the help of connecting wires.
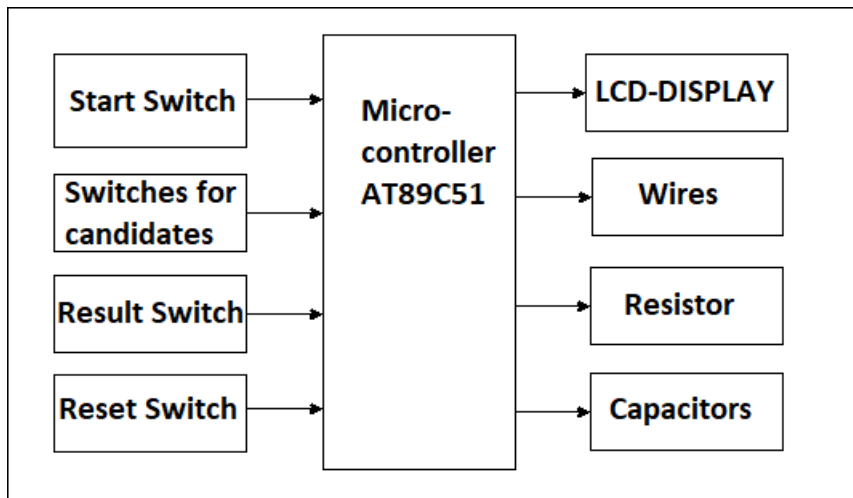
Figure 3.1: Simplified Block Diagram of Electronic Voting Machine(EVM) Using 8051 Microcontroller

3.2 Components Selection

3.2.1 Hardware Components

Following is the components which we have used to implement Electronic Voting Machine(EVM) Using 8051 Microcontroller.

1: AT89C51 Microcontroller

2: Capacitor (10µF)

3: 9V Battery

4: Capacitor (33p)

5: Oscillator (11.0592)
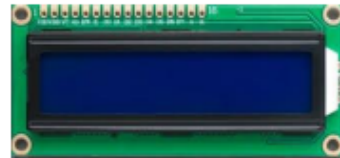
6: Display(LM016L)

7: Variable Resister

8: Switches

9: Resister

10: Connecting Wires

3.2.2 Software Selection

To simulate our project, we have used proteus, the Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

Chapter 4

Simulation and Results

In the previous chapter, we have discussed about our methodology for this project while giving details about block diagram, components selection of this project. In this chapter, we will provide source code, and simulation and results of the project.
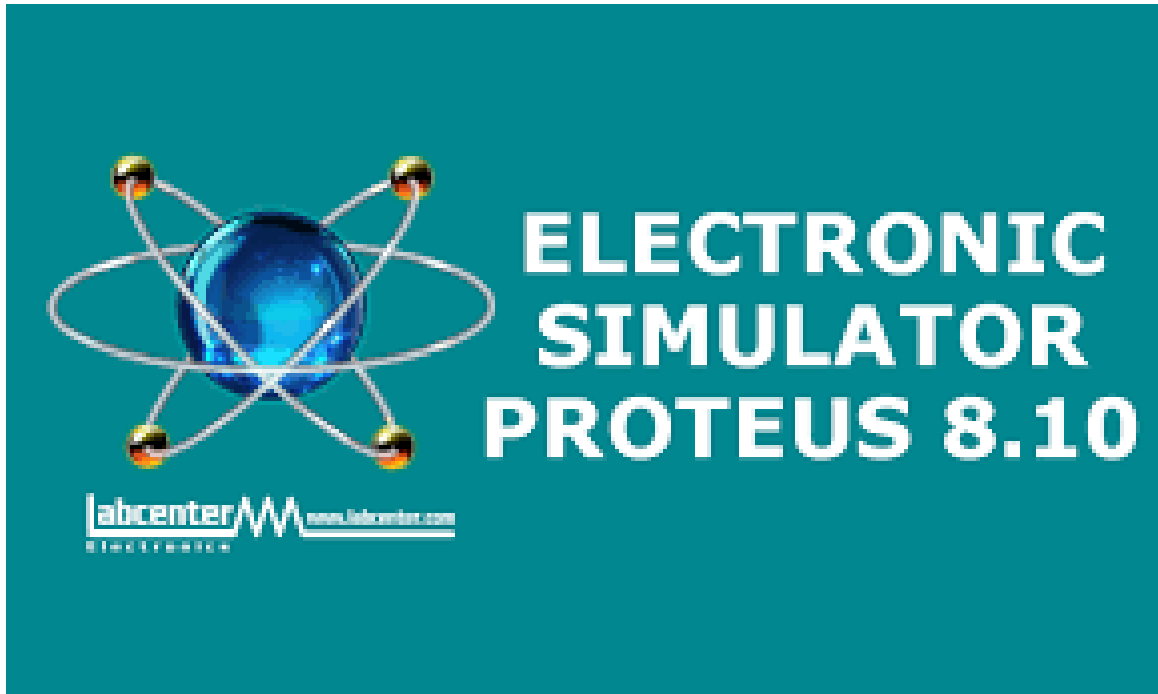
4.1 Simulation Results

As discussed in the previous chapter in the section of software selection, we have used Proteus to simulate our project.

4.2 Circuit Diagram

Figure 4.1 shows circuit diagram of the project, which illustrates the main components involved in Electronic Voting Machine(EVM) Using 8051 Micro-controller. Switches are used to make choices, resister, capacitor, and oscillator are being used to work the micro-controller properly on the circuits with the help of connecting wires.
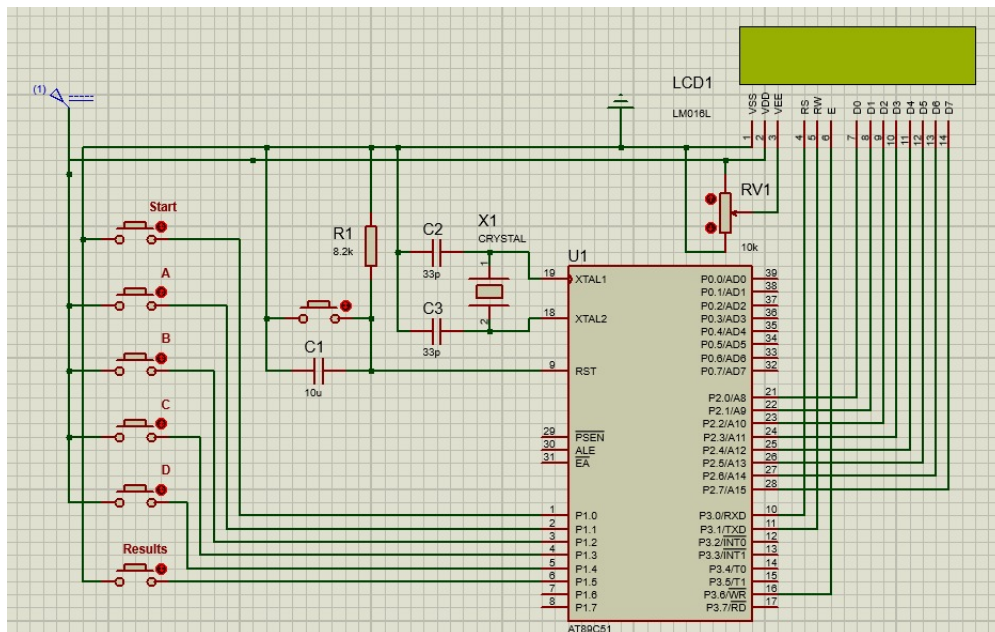

Figure 4.1: Circuit Diagram of Electronic Voting Machine(EVM) Using 8051 Micro-controller

4.3 Source Code

```c
#include<reg51.h>
#define msec 50
#define lcd_data_str_pin P2
sbit rs = P3^0;                        //Register select (RS) pin
    rs=0 command mode, rs=1 datamode
sbit rw = P3^1;                        //Read write(RW) pin rw=0
    write mode, rw=1 read mode
sbit en = P3^6;                        //Enable(EN) pin


sbit ini_pin = P1^0;                   // Start voting pin
sbit stop_pin = P1^5;                  // Stop voting pin
sbit candidate_1=P1^1;                 //Candidate1
sbit candidate_2=P1^2;                 //Candidate2
sbit candidate_3=P1^3;                 //Candidate3
sbit candidate_4=P1^4;                 //Candidate4



int max = 0;
int carry = 0;
int arr[4];                  //arry ofsize 4

int vote_amt[3],j;
unsigned int vote_1,vote_2,vote_3,vote_4;

void delay(int delay_time)                                 // Time
    delay function
{

int j,k;
for(j=0;j<=delay_time;j++)
for(k=0;k<=1275;k++);
}

void lcd_cmd(unsigned char cmd_addr)                       //
    Function to send command to LCD
{
lcd_data_str_pin = cmd_addr;
en = 1;
rs = 0;
rw = 0;
delay(1);
en = 0;
return;
}
```

```
44
45  void lcd_data_str(char str[50])
                                          //Function to send string
46  {
47  int p;
48  for (p=0;str[p]!='\0';p++)
49  {
50  lcd_data_str_pin = str[p];
51  rw = 0;
52  rs = 1;
53  en = 1;
54
55  delay(1);
56  en = 0;
57  }
58  return;
59  }
60
61  void lcd_data_int(unsigned int vote)
        //Function to send 0-9 character values
62  {
63  char dig_ctrl_var;
64  int p;
65  for (j=2;j>=0;j--)
66  {
67  vote_amt[j]=vote%10;
68  vote=vote/10;
69  }
70
71  for (p=0;p<=2;p++)
72  {
73  dig_ctrl_var = vote_amt[p]+48;
74  lcd_data_str_pin = dig_ctrl_var;
75  rw = 0;
76  rs = 1;
77  en = 1;
78  delay(1);
79  en = 0;
80
81  }
82  return;
83  }
84
85  void vote_count()
                                          // Function
        to count votes
86  {
87  while (candidate_1==0 && candidate_2==0 && candidate_3==0 &&
        candidate_4==0);
88  if (candidate_1==1)
```

13

```
89  {
90  while (candidate_1 == 1);
91  {
92  vote_1 = vote_1 + 1;
93  }
94  }

96  if (candidate_2==1)
97  {
98  while (candidate_2 == 1);
99  {
100 vote_2 = vote_2 + 1;
101 }
102 }

104 if (candidate_3==1)
105 {
106 while (candidate_3 == 1);
107 {
108 vote_3 = vote_3 + 1;
109 }
110 }

112 if (candidate_4==1)
113 {
114 while (candidate_4 == 1);
115 {
116 vote_4 = vote_4 + 1;
117 }
118 }
119 }

121 void lcd_ini()
122 {
123 lcd_cmd(0x38);          //5x7 matrix 2 lines
124 delay(msec);
125 lcd_cmd(0x0E);                    //cursor on
126 delay(msec);
127 lcd_cmd(0x01);              //clear screen
128 delay(msec);
129 lcd_cmd(0x81);                    //cursor position to 1st
130 delay(msec);
131 lcd_data_str("welcome here");
132 delay(100);
133 lcd_cmd(0x01);          //clear
134 delay(msec);
135 lcd_cmd(0x80);              //cursor position to 0 of line 1
136 delay(msec);
137 lcd_data_str( "you" );
138 delay(msec);
```

```
139  lcd_cmd(0x14);                           //space between
140  delay(msec);
141  lcd_data_str("can now");
142  delay(msec);
143  delay(msec);
144  lcd_cmd(0xC0);                           // second line
145  delay(msec);
146  lcd_data_str("cast your");
147  delay(msec);
148  lcd_cmd(0x14);                           // space
149  delay(msec);
150  lcd_data_str("vote");
151  delay(100);
152  lcd_cmd(0x01);                           //clear lcd
153  delay(msec);
154  lcd_cmd(0x80);                           //cursor position to 0 of line
         1
155  delay(msec);
156  lcd_data_str("A");
157  delay(msec);
158  lcd_cmd(0x84);                           // 4th col
159  delay(msec);
160  lcd_data_str("B");
161  delay(msec);
162  lcd_cmd(0x88);                           // 8th col
163  delay(msec);
164  lcd_data_str("C");
165  delay(msec);
166  lcd_cmd(0x8C);                           // 12 col
167  delay(msec);
168  lcd_data_str("D");
169  delay(msec);
170  vote_count();
171  lcd_cmd(0x01);                           //clear lcd
172  delay(msec);
173  lcd_cmd(0x83);                           //ist line 3rd col
174  delay(msec);
175  lcd_data_str("thank");
176  delay(msec);
177  lcd_cmd(0x14);                           //space
178  delay(msec);
179  lcd_data_str("you");
180  delay(100);
181  }
182
183  void results()                           // Function to show results
184  {
185  int i;
186  carry = 0;
187  lcd_cmd(0x01);                           //clear lcd
```

```
188  delay(msec);
189  lcd_cmd(0x80);                                        //cursor position to
        0 of line 1
190  delay(msec);
191  lcd_data_str("results");
192  delay(msec);
193  lcd_cmd(0x14);                                //space
194  delay(msec);
195  lcd_data_str("are");
196  delay(msec);
197  lcd_cmd(0x14);                                  //space
198  delay(msec);
199  lcd_data_str("out");
200  delay(msec);
201  lcd_cmd(0x01);                                //clear lcd
202  delay(msec);
203  lcd_cmd(0x80);                                  //cursor position to 0
        of line 1
204  delay(msec);
205  lcd_data_str("A");
206  delay(msec);
207  lcd_cmd(0x84);                                  //4th col
208  delay(msec);
209  lcd_data_str("B");
210  delay(msec);
211  lcd_cmd(0x88);                                  // 8th col
212  delay(msec);
213  lcd_data_str("C");
214  delay(msec);
215  lcd_cmd(0x8C);                                  // 12th col
216  delay(msec);
217  lcd_data_str("D");
218  delay(msec);
219  lcd_cmd(0xC0);                              //second line
220  delay(100);
221
222  lcd_data_int(vote_1);
223  delay(msec);
224  lcd_cmd(0xC4);                                  //jump to 2nd line 4th
        row
225  delay(msec);
226  lcd_data_int(vote_2);
227  delay(msec);
228  lcd_cmd(0xC8);                                  // 2nd line 8th row
229  delay(msec);
230  lcd_data_int(vote_3);
231  delay(msec);
232  lcd_cmd(0xCC);                              // 2nd line 12th row
233  delay(msec);
234  lcd_data_int(vote_4);
```

```
235  delay(300);

236
237  arr[0] = vote_1;                           //arry ofsize 4
238  arr[1] = vote_2;
239  arr[2] = vote_3;
240  arr[3] = vote_4;

241
242  for( i=0; i<4; i++)
243  {
244  if(arr[i]>=max)
245  max = arr[i];
246  }

247
248  if ( (vote_1 == max) && ( vote_2 != max) && (vote_3 != max)&&
         (vote_4 != max) )
249  {

250
251  carry = 1;
252  lcd_cmd(0x01);                 //clear lcd
253  delay(msec);
254  lcd_cmd(0x80);                     //cursor position to 0 of line 1
255  delay(msec);
256  lcd_data_str("congratulations");
257  delay(50);
258  lcd_cmd(0xC4);            //jump to 2nd line 4th col
259  delay(msec);
260  lcd_data_str("A");
261  delay(msec);
262  lcd_cmd(0x14);                    //space
263  delay(msec);
264  lcd_data_str("wins");
265  delay(msec);
266  }

267
268  if ( (vote_2 == max) && ( vote_1 != max) && (vote_3 != max)&&
         (vote_4 != max) )
269  {
270  carry = 1;
271  lcd_cmd(0x01);        //clear lcd
272  delay(msec);
273  lcd_cmd(0x80);                     //cursor position to 0 of line 1
274  delay(msec);
275  lcd_data_str("congratulations");
276  delay(50);
277  lcd_cmd(0xC4);                                    //jump to 2nd
         line 4th col
278  delay(msec);
279  lcd_data_str("B");
280  delay(msec);
281  lcd_cmd(0x14);                      //space
```

17

```c
282  delay(msec);
283  lcd_data_str("wins");
284  delay(msec);
285  }
286
287  if ( (vote_3 == max) && ( vote_2 != max) && (vote_1 != max)&&
         (vote_4 != max) )
288  {
289  carry = 1;
290  lcd_cmd(0x01);                        //clear lcd
291  delay(msec);
292  lcd_cmd(0x80);                                 //cursor position to 0
         of line 1
293  delay(msec);
294  lcd_data_str("congratulations");
295  delay(50);
296  lcd_cmd(0xC4);                                 ////jump to 2nd line
         4th col
297  delay(msec);
298  lcd_data_str("C");
299  delay(msec);
300  lcd_cmd(0x14);                        //space
301  delay(msec);
302  lcd_data_str("wins");
303  delay(msec);
304  }
305
306  if ( (vote_4 == max) && ( vote_2 != max) && (vote_3 != max)&&
         (vote_1 != max) )
307  {
308  carry = 1;
309  lcd_cmd(0x01);        //clear lcd
310  delay(msec);
311  lcd_cmd(0x80);                                 //cursor position to
         0 of line 1
312  delay(msec);
313  lcd_data_str("congratulations");
314  delay(50);
315  lcd_cmd(0xC4);                                 //jump to 2nd line 4th
         col
316  delay(msec);
317  lcd_data_str("D");
318  delay(msec);
319  lcd_cmd(0x14);                        //space
320  delay(msec);
321  lcd_data_str("wins");
322  delay(msec);
323  }
324
325  if (carry==0)
```

```c
326
327 {
328 lcd_cmd(0x01);                    //clear lcd
329 delay(msec);
330 lcd_cmd(0x82);                    //ist line 2nd col
331 delay(msec);
332 lcd_data_str("clash");
333 delay(50);
334 lcd_cmd(0x14);              //space
335 delay(msec);
336 lcd_data_str("between");
337 delay(50);
338 if(vote_1 == max)
339 {
340 lcd_cmd(0xC2);            //2nd line 2nd col
341 lcd_data_str("A");
342 delay(50);
343 }
344 if(vote_2 == max)
345 {
346 lcd_cmd(0xC5);                 //2nd line 5th col
347 lcd_data_str("B");
348 delay(50);
349 }
350 if(vote_3 == max)
351 {
352 lcd_cmd(0xC9);                    //2nd line 9th col
353 lcd_data_str("C");
354 delay(50);
355 }
356 if(vote_4 == max)
357 {
358 lcd_cmd(0xCD);                       //2nd line 12th col
359 lcd_data_str("D");
360 delay(50);
361 }
362 }
363 }
364
365 void main()
366 {
367 ini_pin = stop_pin = 1;
368 vote_1 = vote_2 = vote_3 = vote_4 = 0;
369 candidate_1 = candidate_2 = candidate_3 = candidate_4 = 0;
370 lcd_cmd(0x38);              //5x7 matrix 2 lines
371 delay(msec);
372 lcd_cmd(0x0E);             //cursor on
373 delay(msec);
374 lcd_cmd(0x01);               //clear lcd
375 delay(msec);
```

```
376  lcd_cmd(0x80);                    //cursor to fisrt pos
377  delay(msec);
378  lcd_data_str( "press b1" );
379  delay(msec);
380  lcd_cmd(0x14);                    //sapce
381  delay(msec);
382  lcd_data_str("to");
383  delay(msec);
384  lcd_cmd(0xC0);                     // second line
385  delay(msec);
386  lcd_data_str("start");
387  delay(100);
388  while(1)
389  {
390  while(ini_pin != 0)
391  {
392  if (stop_pin == 0)
393  break;
394  }
395  if (stop_pin == 0)                //result pin
396  {
397  break;
398  }
399  lcd_ini();
400  }
401
402  while(1)
403  {
404  results();
405  }
406  }
```
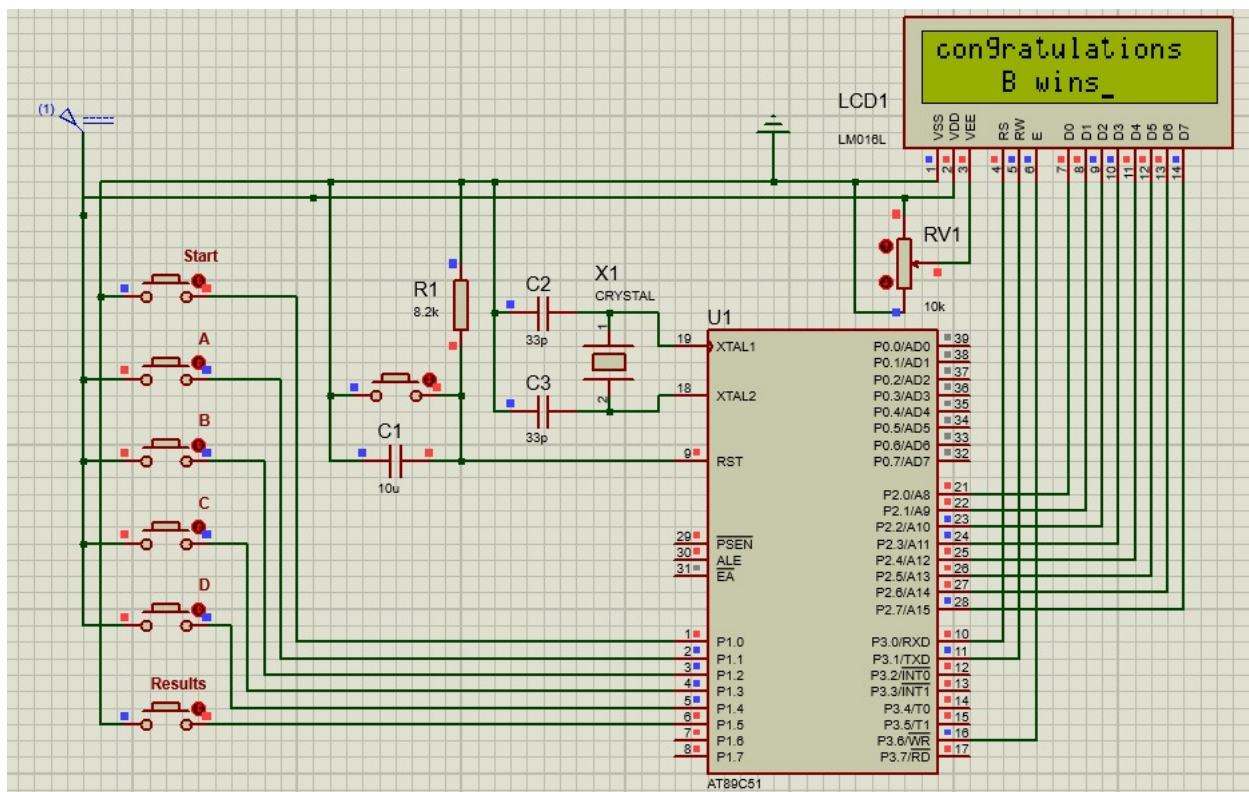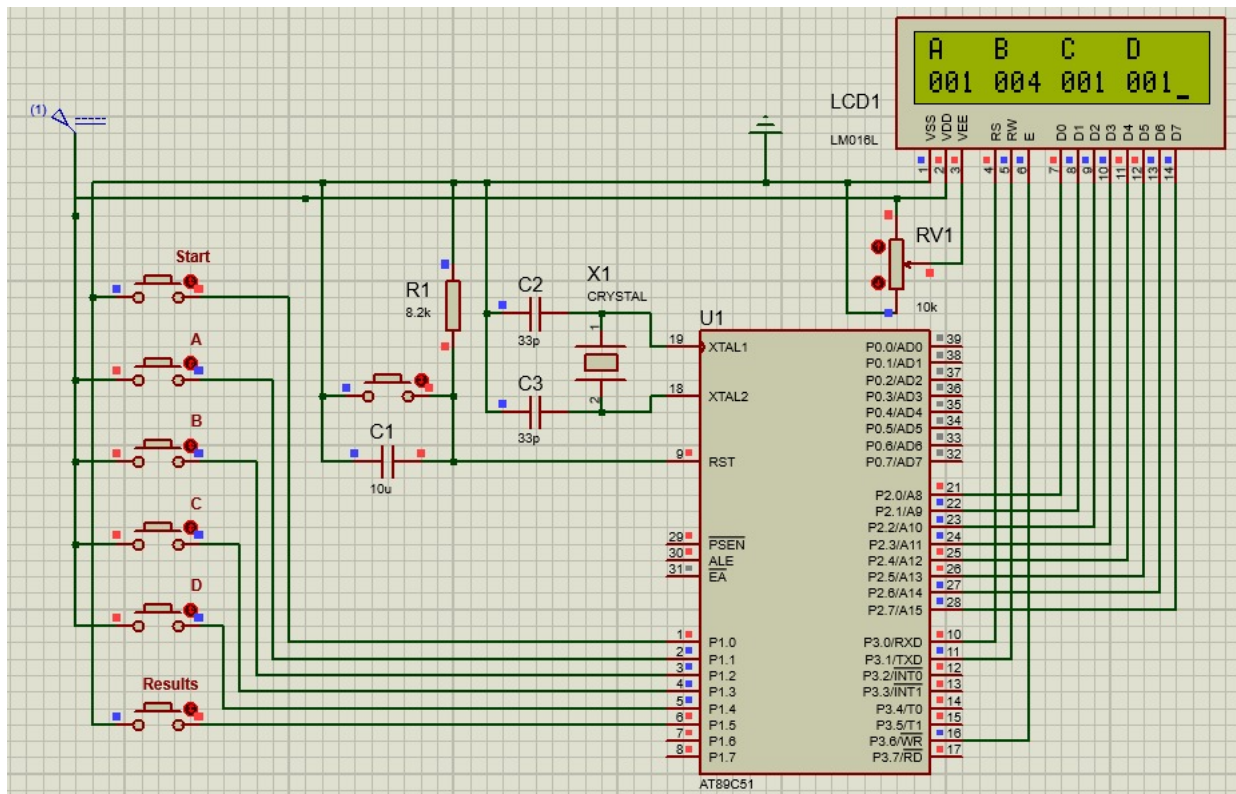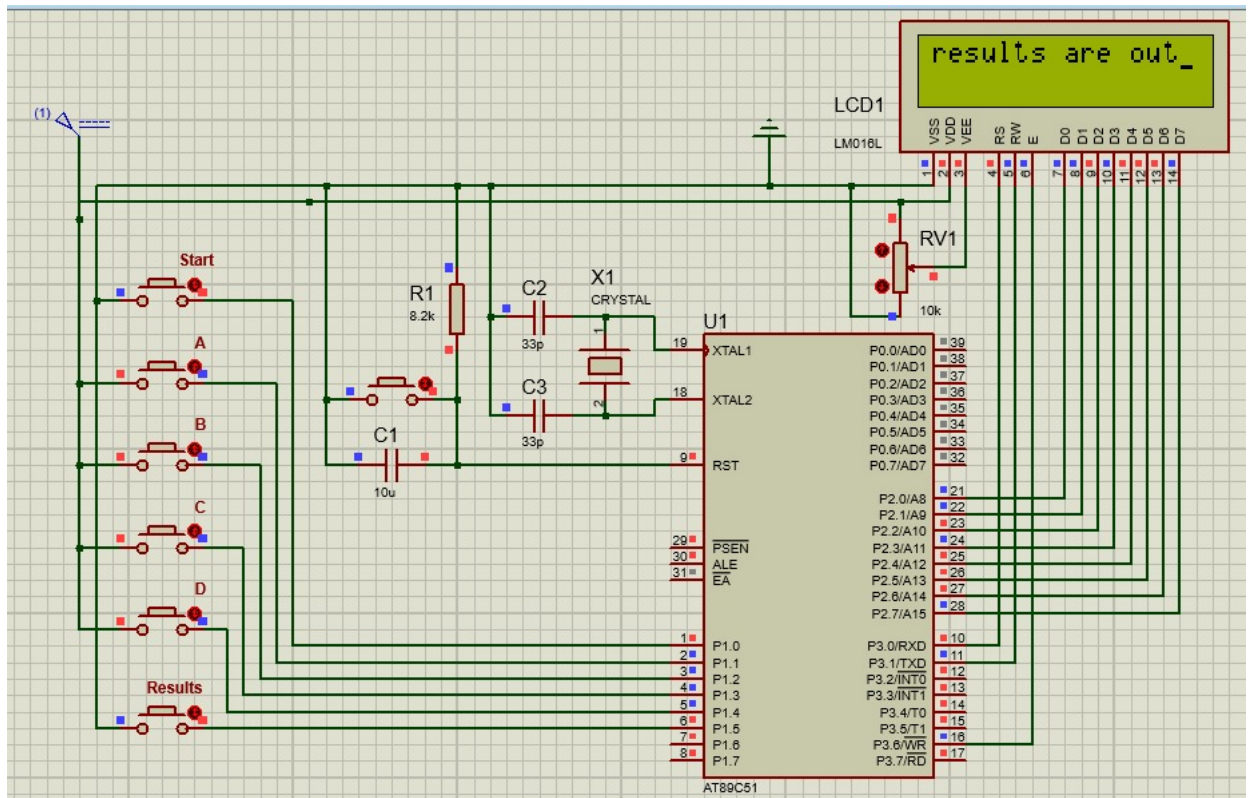
4.4   Results

Following screen shot will show the step wise results which showed up as we run the project.
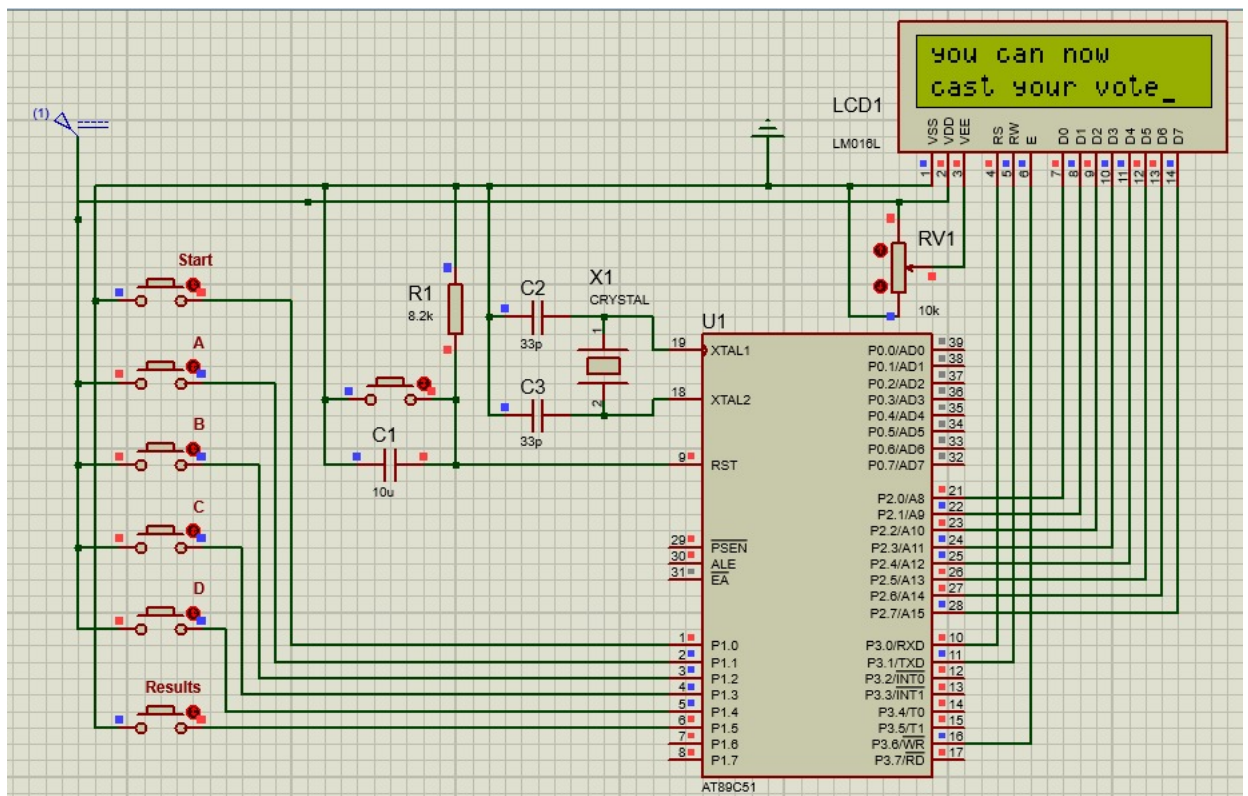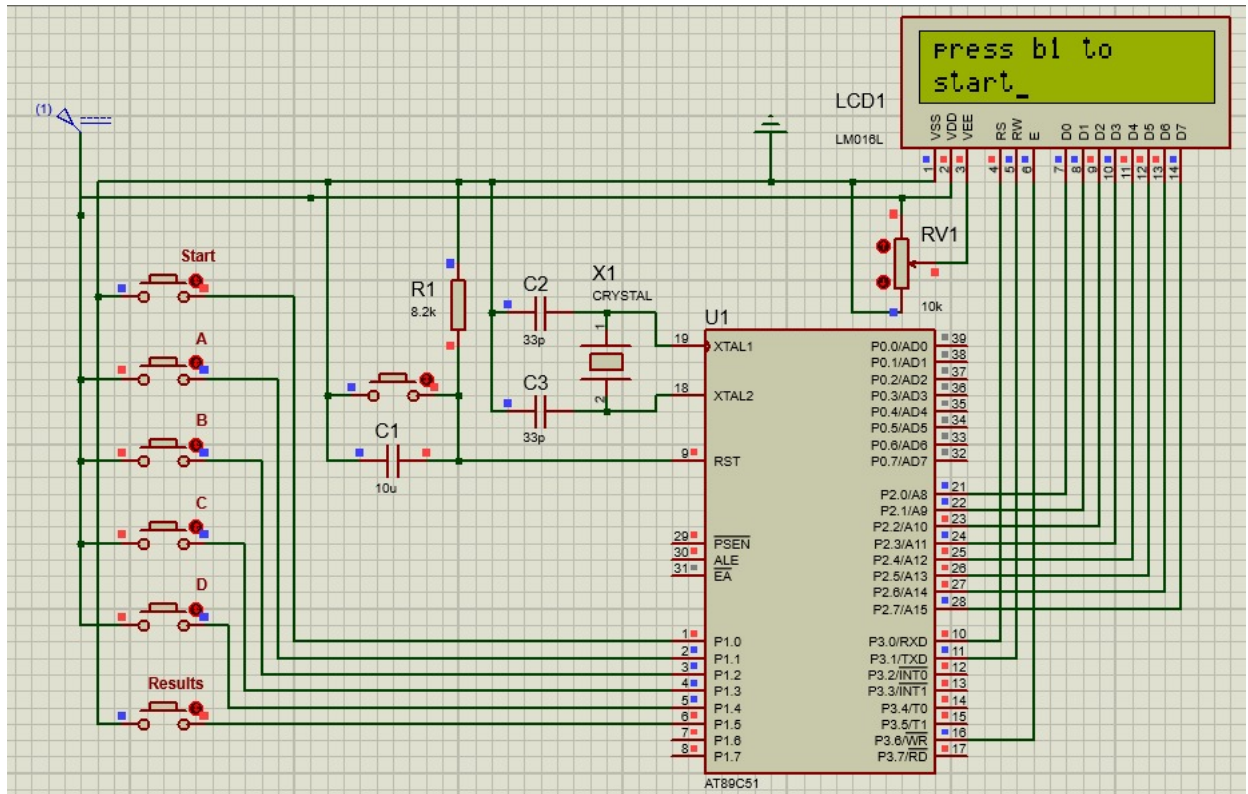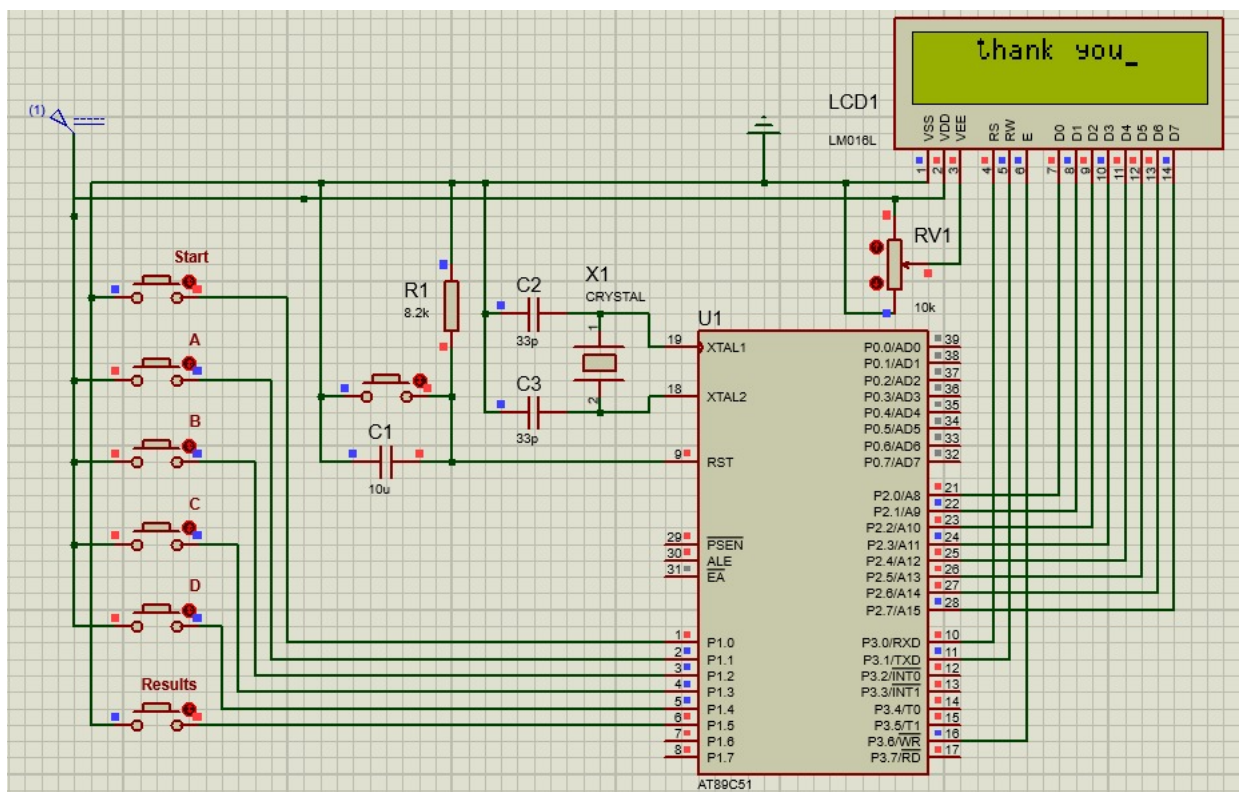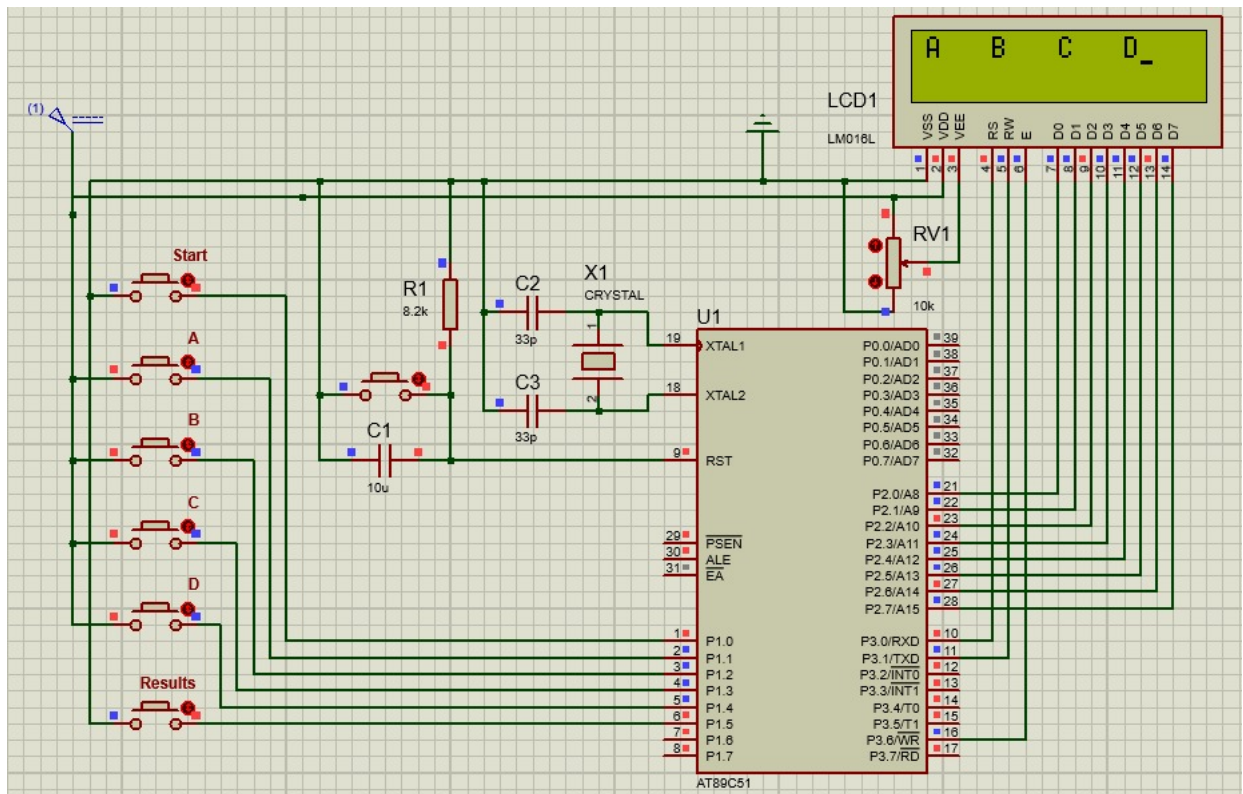
Chapter 5

Conclusion and Future Work

In the previous chapter, we have shown all the simulation and results of our proposed project from introduction, literature review, proposed methodology, result and simulations. In this chapter, we will conclude our project and will give some future works recommendations.

5.1 Conclusion

This work describes the working of Electronic Voting Machine. We have:

1. Lesser chance of rigging in the elections

2. From Ballot paper now elections will be automated

3. The elections will be now time efficient and cost efficient

5.2 Future Work

Electronic Voting Machine can be done in many other ways and the current method/project can be improve in many ways. Following are the some of the things we can try to improve this system:

1. Different microcontroller can be used to improve it.

2. Can work on this to improve the system accuracy.

3. Can use fingerprint, or face recognition technique to better person identification.

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