Implementation of Electronic Voting Machine using AT89C51 and Proteus

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Abstract- Voting is most vital process of democratic society through which people determine its decision. Nowadays electronic voting machine has become an effective voting tool compare with traditional paper-based voting schemes due to several advantages like security, automatic counting etc. Electronic voting or e-voting, uses electronic systems to aid casting and counting votes. Electronic voting technology can speed the counting of ballots and can provide improved accessibility for disabled voters. In this paper, electronic voting machine presents a way to develop a voting machine which displays the count of votes on a 16x2 LCD interface. This LCD based small scale electronic voting machine is designed for four candidates. A user can get his/her vote register through a set of switches (one for each candidate). After voting is done, the final count can be seen on LCD. This LCD based electronic voting machine is designed for four candidates. The provision of casting votes for the candidates has been provided through four keys of this 3x4 keypad. The result is displayed on 16x2 LCD giving us the final result.

II. COMPONENTS USED FOR THE PROTOTYPE

A. AT89C51:
AT89C51 is an 8-bit microcontroller and belongs to Atmel's 8051 family. ATMEL 89C51 has 4KB of Flash programmable and erasable read only memory (PEROM) and 128 bytes of RAM. It can be erased and program to a maximum of 1000 times. In 40 pin AT89C51, there are four ports designated as P1, P2, P3 and P0. Port P0 and P2 are also used to provide low byte and high byte addresses, respectively, when connected to an external memory. Port 3 has multiplexed pins for special functions like serial communication, hardware interrupts, timer inputs and read/write operation from external memory. [3]

B. 16x2 LCD:
LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. [4][5]

C. 3x4 KEYPAD:
Keypad is organized as a matrix of switches in rows and column. Port P1 is used to scan input from the keypad.
Every time a key is pressed the number is identified by detecting the row and column number of the key pressed. Initially all the rows are set to one by the controller. One by one each row is cleared and the columns are scanned to check if any key is pressed. In case no key is pressed the output of all the columns will be high. Whenever a key is pressed the row and column corresponding to the key will get short, resulting in the output of the corresponding column goes to go low. This gives the column number of the pressed key. [5]

D. L7805CV:
L7805CV is a voltage regulator. A voltage regulator, usually having three legs, converts varying input voltage and produces a constant regulated output voltage. They are available in a variety of outputs. If the input voltage is unnecessarily high, the regulator will overheat. Unless sufficient heat dissipation is provided through heat sinking, the regulator will shut down. [6]

E. POTENTIOMETER:
A potentiometer is a three-terminal resistor with a sliding contact that forms an adjustable voltage divider. Here it is used to control the brightness or contrast of LCD screen. [4]

III. WORKING OF PROTOTYPE AND CIRCUIT DIAGRAM
A 16x2 LCD and 3x4 matrix keypad are interfaced to AT89C51. The circuit diagram shows the connection of keypad and LCD with the controller. Port P2 of the microcontroller is used to send the data for displaying on the LCD. P3.0, P3.1, P3.2 pins of microcontroller is connected to RS (register select), RW (read/write) and EN (enable) pins of LCD respectively. Port P1 is used to scan input from the keypad. The first 2 pins of LCD are connected to Vcc and ground of microcontroller respectively. A potentiometer is connected to first 3 pins of LCD to control contrast or brightness of LCD. A L7850V is used to regulate voltage.

As soon as the LCD is turned on ‘cast vote’ message is displayed on the screen. The count of votes is stored in four different variables. As soon as the user votes for a candidate by pressing one of the 4 keys assigned, the value of the corresponding variable is increased by one and ‘thank you’ message is displayed. If any other key is pressed other than these 4 keys or if the same user tries to cast vote again ‘invalid’ message is displayed. When the stop button is pressed, the next user can cast vote.

This button is assumed to be controlled by some service personnel.

The display button is controlled by the administrator. When it is pressed, the user is prompted to enter a password after which the names of the candidates are displayed along with their vote counts. The total votes are also displayed. If wrong password is entered ‘wrong password’ is displayed.

![Circuit diagram of electronic voting machine](image1)

![Diagram showing the connection of AT89C51 pins to LCD and Keypad](image2)
IV. EXPERIMENTS AND RESULTS

The soldering iron to solder the components in Vero board. Multimeter is used to check the connection of keypad. The program code for electronic voting machine is written in assembly language. Keil uVision3 software is used to compile the program and create the hex file of the program codes and Unipro software to burn the codes into microcontroller AT89C51. For simulation and display of output on software Proteus_v7.8i software is being used.

A. Using microcontroller AT89C51

Initially on switching on LCD ‘cast vote’ is displayed. The user is prompted to cast his vote for one of the candidates. The user should press c1, c2, c3 or c4 button to cast vote. After casting vote thank you message will be displayed. This message conveys to the user that his vote has been registered.

If any other key other than these 4 is pressed, ‘invalid’ will be displayed.
If another user has to cast vote then the stop button should be pressed (assumed to be controlled by the service personnel). ‘Cast vote’ will be displayed again. This mechanism serves the purpose of eliminating multiple attempts at voting by a single user.

If results are to be displayed, then display button should be pressed (controlled by administrator). On doing so, ‘enter password’ will be displayed.

If correct password is entered, ‘*’ will be displayed.

If password is incorrect, ‘wrong password’ will be displayed.

After entering correct password, vote count of each candidate followed by total no of votes will be displayed. Thus the device ensures proper security and efficiency in the computation of votes.

B. Using Proteus Isis Software

In Proteus Isis software, the connections for the same prototype is made using the components available from its library.

When the simulation is active, the microcontroller is reset and ‘cast vote’ message is displayed.

![Figure 7: Figure showing to ‘cast vote’ message](image7)

When the vote is casted for at least one candidate, ‘thank you’ message is displayed.

![Figure 8: Display of ‘thank you’ message](image8)

Display button is pressed for displaying number of votes casted. On doing so, ‘enter password’ message will be displayed on LCD.
When the password is entered, the vote under each individual is displayed and then the total number of votes casted is displayed.

V. CONCLUSION

The electronic voting device is portable and the display of results is instantaneous and accurate. Appropriate message is displayed on the LCD throughout the voting process thus providing a user friendly interface. However the drawback of the device is that it is reset on power off and hence can be used only as long as it is kept powered on, thus being useful only in small scale applications. This small scale voting machine has a lot of advantages such as it is economical, less manpower required, time conscious as less time required for voting & counting, avoids invalid voting, saves transportation cost due to its compact size and convenient on the part of voter.

VII. REFERENCES