Electronic Voting Machine using 8051 Microcontroller

Prof. Dr. Ramesh Mali[1], Anirudha Patel[2]

[1-2]ECE Dept., MIT School of Engineering, Loni-Kalbhor, Pune, Maharashtra, India

---***---

Abstract - *An electronic voting machine is a convenient and quick method of electing a representative in a systematic manner. It's a simple technology that's taken the role of traditional ballot sheets for recording votes. Furthermore, the ballot system failed in big populations, whereas EVMs proved to be successful and dependable. This project is about a real-time voting machine that was created with the AT89C51 microcontroller and an assembly language software programme. It is a real-time operating device with fewer faults and is simple to use. After the votes have been cast, the result can be obtained quickly by pressing the result button.*

Key Words: **Ballot, EVM, Microcontroller, Proteus, programming**

1. INTRODUCTION

India is the world's largest democratic country. The public's active participation in the establishment of the government is an important feature of democratic government. . Elections in a densely populated country like India are tough to organize. It's a trial run for holding elections to select candidates to represent the people of the country at various levels. Even more crucial is the timely release of results. This is necessary for the nation's administration to be stable and its financial growth to be stable. An EVM (electronic voting machine) is a solution to all of these issues. Several governments around the world have expressed an interest in understanding more about the mechanism behind this formidable machine. It has a very user-friendly interface, is tamper-proof, prevents false voting, and has assisted in eliminating the time-consuming task of counting. Furthermore, the EVM aids in maintaining vote confidentiality, and the result is 100% tamperproof. Since its introduction in 1982, electronic voting machines (EVMs) have shown to be quite useful in India, where they have also grown in popularity. It is extremely user-friendly because it provides the outcome with only one button click, and voters only have to press one button to vote.[4] The

a vote is cast. The vote results are acquired using a HyperTerminal in a computer connected to an 8051,

AT89C51 is a high-performance, low-power 8-bit microcontroller with 4K bytes of programmable flash memory. The voting total is saved in EEPROM memory. This memory has the advantage of retaining data even when the power is switched off. The microcontroller has the following capabilities: 128-bit RAM, 32-bit I/O lines, two 16-bit counters/timers, full-duplex UART serial channel, and on-chip oscillator and clock circuit The CPU is turned off in Idle Mode, while the RAM, serial port, timers, and interrupt system continue to work.

2. PROPOSED SYSTEM

The Project Electronic Voting System is a fascinating project that is controlled by an 8051 microcontroller. The competition is for four candidates. Voters can cast their ballots for any of the competitors. One port is allocated to push button switches for four candidates, as well as a master switch for the polling officer in this project. The Microcontroller was used to scan the poll 1 to poll 4 switches in order to cast votes for the candidates. To make the Poll switches available for voting, the Poll control switch must be pressed first. To allow the next contestant to vote, the control switch must be hit every time a
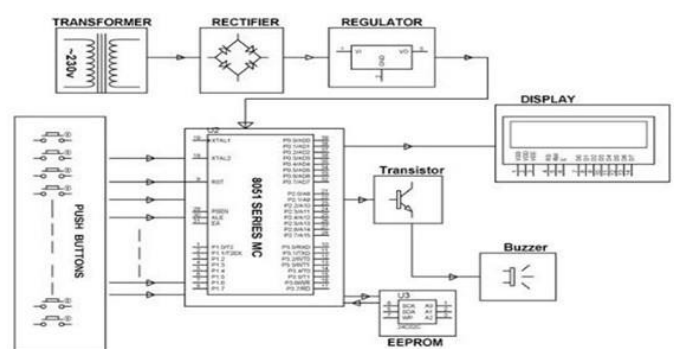

Fig. 1 Block Diagram

vote is cast. This eliminates repeated voting. The Poll control switch was monitored by means of external interrupts. The state of the voting machine is displayed on an LCD, indicating whether it is ready to take the next vote or needed to be initialized by poll control. It will also show the candidate's name when and serial interrupts are used to do so. Any keystroke on the keyboard will cause an interruption, and the results of the vote will be sent to the computer in

order, starting with candidate 1 and ending with candidate 4.

2.1 COMPONENTS:

2.1.1 : AT89C51 Microcontroller:

The Atmel AT89C51 is an 8-bit microcontroller from the 8051 series. The ATMEL 89C51 contains 128 bytes of RAM and 4KB of Flash programmable and erasable read only memory (PEROM). It can be programmed and wiped a total of 1000 times. P1, P2, P3, and P0 are the four ports on the AT89C51's 40 pins. When connected to an external memory, ports P0 and P2 are also used to supply low and high byte addresses, respectively. Special capabilities such as serial transmission, hardware interrupts, timer inputs, and read/write operations from external memory are all supported by multiplexed pins on Port 3.[1]

2.1.2 : EEPROM:

The voting total is saved in EEPROM memory. This memory has the advantage of storing data even when the power is switched off. For communication with EEPROM, the I2C bus protocol's interface is used.[5]

2.1.3 LCD:

LCD (Liquid Crystal Display) screens are electrical display modules that can be used in a variety of ways. A 16x2 LCD can display 16 characters per line on each of its two lines. Each character is presented in a 5x7 pixel matrix on this LCD. Command and Data are the two registers on this LCD. The LCD command instructions are stored in the command register. A command tells the LCD to perform a certain activity, such as initialising it, cleaning its screen, setting the cursor location, managing the display, and so on. The data to be displayed on the LCD is stored in the data register. The ASCII value of the character to be displayed on the LCD is the data.

2.1.4 Push Buttons:

A pushbutton switch is one whose contacts are opened and closed by pressing and releasing a pushbutton on the switch in the direction of its axis.

3. DESIGN DEVELOPMENT AND DRAWING:

There are two switches in this project: one to start the EVM and another to halt the voting process. A user is given a set of switches through which they can vote. The ensuing count can be seen on the LCD display after each vote is cast. The AT89C51 microcontroller is used to control the LCD and switches. Four of these switches on this machine enable the option of casting votes for the candidates. These switches are wired to the controller's pins and made active high. These switches are attached to the microcontroller's port 1. The active level of these switches is set to high. The voting mechanism is started and stopped using the remaining two switches. Both of these switches are set to active low. When the start switch is pressed, the voting system is started, and when the stop switch is pressed, the voting system is stopped and the poll results are displayed on the LCD panel. These two switches should not be controlled by the candidate, but rather by the polling officer. The LCD display device is attached to the microcontroller's port 2.

The AT89C51 microcontroller Is used in this hardware. It is a four-port 8-bit microcontroller. Each port has an 8-bit width. It has a flash memory of 4K bytes, 128 bytes of RAM, and two 16-bit timer/counters. This software Is written in assembly languages. This programme is compiled, and software generates Hex code. A universal ROM burner is used to burn this hex file into the microcontroller. We can store a huge amount of data on this microcontroller because it has some memory space. This microcontroller can also be connected to external RAM to store more data. Six switches are connected to port 1 with this microcontroller.

Six tactile switches are interfaced in this device, and two of these switches are active low. The voting machine is started by one switch. The user is requested to vote when this switch is touched. When the stop button is pressed, the names of the candidates, as well as their vote totals, are displayed. The remaining four switches will be used to select four candidates. After the public selects one of these switches, a thank you message will be presented. We have the choice of selecting one candidate from four with this computerized voting system. We also have the option of increasing the number of candidates. We can enhance the number of switches for candidates by interfacing in 8255 IC. It might be

connected to a printer so that a tangible copy of the result could be printed very quickly from the machine. It might also be connected to a personal computer, with the results being kept on a central server and backed up on other backend servers. Once the result is on the server, it can be communicated to various offices of the election conducting authority over the network.

The Microcontroller was used to scan the poll 1 to Poll 4 switches in order to cast votes for the candidates. To make the Poll switches available for voting, the Poll control switch must be pressed first. As a result, the control switch must be hit each time a vote is cast in order to allow the next contestant to vote. This prevents pollsters from casting multiple votes. External interrupts were used to monitor the Poll control switch.

The state of the voting machine was displayed on an LCD, indicating whether it was ready to take the next vote or needed to be initialised by poll control. It will also show the candidate's name when a vote is cast. The vote results were acquired using a HyperTerminal in a computer connected to an 8051, and serial interrupts were used to do so[3]. Any keystroke on the keyboard will cause an interrupt and the results of the vote will be sent to the computer in order, starting with candidate 1 and ending with candidate 4.
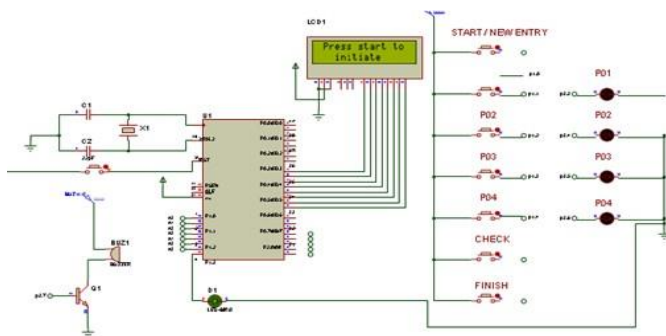

Fig. 2 Circuit Diagram

3. PROPOSED PROTOTYPE:

3.1 IMPORTANT PINS:

3.1.1. Control Pins:
This pin is used by the operator to activate the circuit and make it available to accept votes. Upon pressing this switch the EVM will accept one and only one

vote. After accepting one vote, the circuit will again wait for the operator to activate it.

3.1.2. Count Pin:
The number of votes accepted by the circuit will be displayed when this pin is pressed. Individual votes for each party/candidate will be displayed.

3.1.3. Reset Pin:
Using this button, the competition circuit will be reset, erasing all voter data and making room for a fresh election.

3.2. Programming Logic:
To programme a microcontroller, we must first comprehend how an application function. This project works as follows: we use the sbit command to choose and define all of the pushbuttons, and we define run-time variables (int) for calculating candidate votes. Display a welcome message on the LCD in 4-bit mode. After the message has been displayed, all of the port pins utilized for pushbuttons are set to high. And begin while (1), i.e., an infinite loop. This loop will be executed by the microcontroller until it is reset. We check if any of the push buttons were pressed by looking at whether the port pin went low.[2]
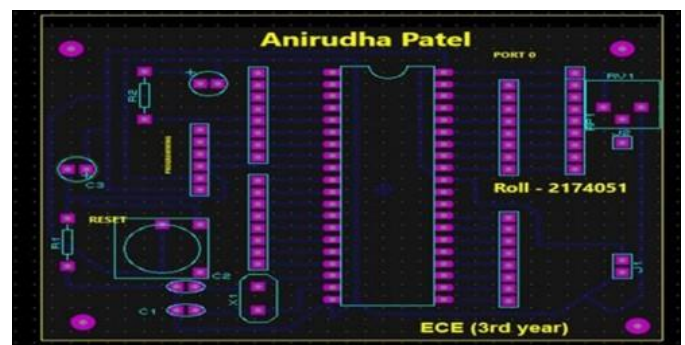

Fig. 3 PCB Design

If any button is pressed within the if loop, the function you defined for it is called

For example, if the control was pressed and the appropriate action was to activate the circuit, the function activate () should be called. Note: activate () is a user-defined function; you can name it whatever you like, but it must contain all of the action commands. As an example, in this project, it must include a command to display the message "Now you can vote" and set the control pin to high, allowing the user to cast only one vote. Write instructions and functions for each action in the same way.
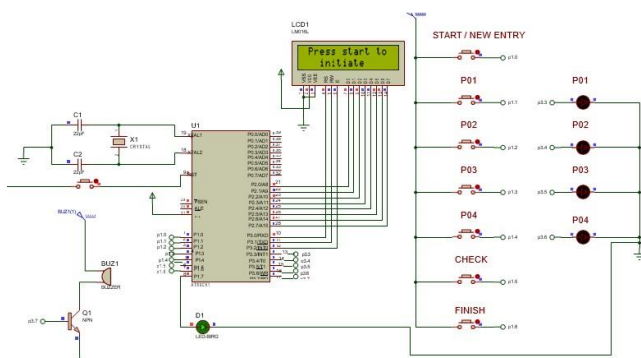
4. RESULTS:

The following is a step-by-step explanation of how this voting system works.

• The Poll Control switch must be initialized before the Microcontroller may accept inputs. The LCD will display the message "CAST YOUR VOTE" when the input switches are pressed.

• Poll switches Poll 1 through Poll 8 can now be used to cast votes.

• After voting, the LCD will display the message "VOTED: CANDIDATE."

• The Poll Control switch must now be pressed once more to allow the next person to vote. enables the Supervisors to exercise control over the votes.
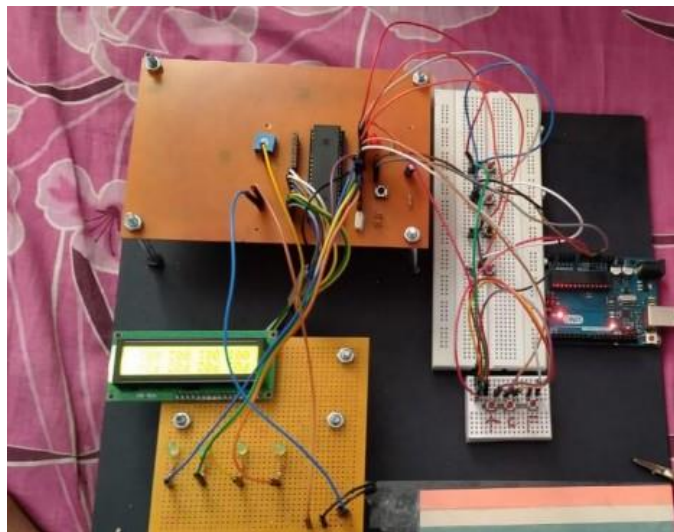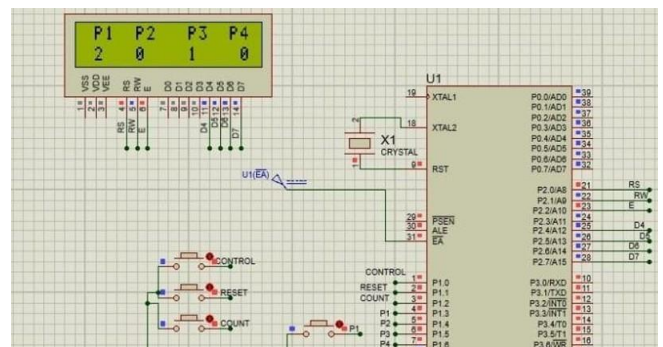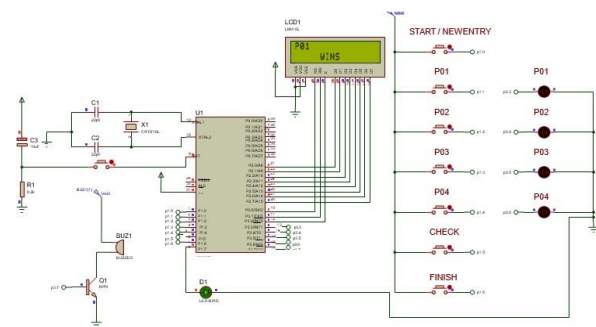

Fig. 4 Prototype Design

Fig. 5.1 Proteus Simulation of output (1)
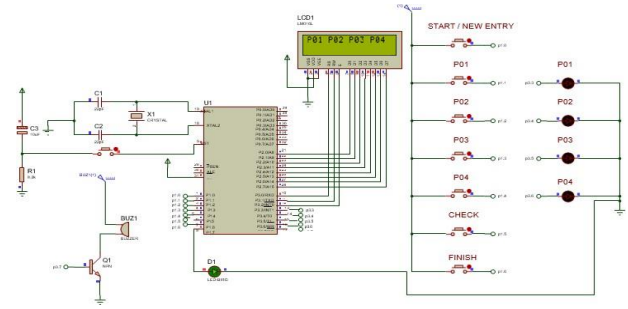
Fig. 5.2 Proteus Simulation of output (2)

Fig. 5.3 Proteus Simulation of output (3)

Fig. 5.4 Proteus Simulation of output (4)

With a single press of any key on the keyboard, the poll results can be displayed on the computer screen. The Microcontroller scanned the poll switches from Poll 1 to Poll 8 in order to cast votes for the candidates. To make the Poll switches available for voting, the Poll control switch must be pressed first. As a result, the control switch must be hit each time a vote is cast in order to allow the next contestant to

vote. This prevents voters from casting multiple votes. External interrupts were used to monitor the Poll control switch. With a single press of any key on the keyboard, the poll results can be displayed on the computer screen. The Microcontroller scanned the poll switches from Poll 1 to Poll 4 in order to cast votes for the candidates. To make the Poll switches available for voting, the Poll control switch must be pressed first. As a result, the control switch must be hit each time a vote is cast in order to allow the next contestant to vote. This prevents voters from casting multiple votes. External interrupts were used to monitor the Poll control switch.

5. CONCLUSION:

One of the best examples of a Microcontroller application is voting or polling devices. This project will teach you how to design and programme a simple, low-cost polling machine that may be used for elections in schools, colleges, or a specific location. The results of the poll may be displayed quickly and monitored from time to time during the polling period, which is a unique feature of this voting system based on 8051 microcontrollers. This voting system was constructed using an 8051 microcontroller and six push buttons. In this arrangement, polls 1 through 4 were allotted to a total of FOUR contestants. To prevent pollers from voting multiple times, a poll control switch was introduced, which should be controlled by the poll supervisor. The candidates for whom they had voted were displayed on an LCD. Finally, utilizing serial communication, HyperTerminal should be utilized with the microcontroller to view poll results. India is the world's largest democracy. A democratic government requires people to actively participate in the establishment of the government. Elections guarantee this. In a populous country like India, holding free and fair elections is a difficult challenge. Conducting elections to select candidates to represent the people of the country at various levels is difficult. Even more crucial is the quick announcement of results. This is required for the nation's governance to be stable and its economy to flourish steadily. We've been conducting business with paper and ballots up until now. The established system's flaws are progressively becoming more apparent.

The established system's flaws are progressively becoming more apparent. It's more vulnerable to booth capturing and manipulation of results. The procedure of counting the votes and declaring the results is even more arduous.

This paper describes the architecture and operation of a microcontroller-based Electronic Voting Machine. This project is cost-effective, and it requires less staff. Its small size saves money on shipping and gets results quickly. EVMs have been successfully implemented with complete legal support. They are quick and assist in the fair conduct of elections.

6. FUTURESCOPE:

A timer may be incorporated, which would automatically halt voting when a certain amount of time has passed. Biometric Verification of voters, so that it can be guaranteed that only one person votes at a time. Sound effects (Speech) can be added to make it more interactive. EEPROM is a type of memory that can be used to retain data indefinitely. If we create multiple EVMs, each to be utilized at different locations and the ultimate result to be the sum of all the results, we may consider linking them to communicate with one another and displaying the final result on one of the LCDs.

7. ACKNOWLEDGEMENT:

REFERENCES:

[1] Mazidi, M. A., Mazidi, J. G., & McKinlay, R. D. (2005). The 8051 microcontroller and embedded systems using assembly and C. Dept. of Computer Science and Information Engineering National Cheng Kung University, TAIWAN

[2] Ali, M. M. (2007). The 8051 Microcontroller and Embedded Systems: Using Assembly and C. Pearson Education India

[3] S. M. Ali et al., "Micro-controller based smart electronic voting machine system," IEEE

International Conference on Electro/Information Technology, 2014, pp. 438-442, doi: 10.1109/EIT.2014.6871804.

[4] S. S. Ramaprasad, R. Swathi, K. N. Shireesha and V. S. Gavannawar, "Convenient and Secured Voting System," 2018 3rd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), 2018, pp. 2 1 4 5 - 2 1 4 9 ,   d o i :   1 0 . 1 1 0 9 / RTEICT42901.2018.9012373.

[5]Anamika Sen, "Improved Electronic Voting Machine with Real Time Data Analysis", *Foundation of Computer Sciences*, 2016.