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Hardware Implementation of an Eco-friendly Electronic Voting Machine

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Abstract

India is country of different cultures, economies, religion, social disparities and still India is world's largest democratic country. According to Indian democracy every person has the fundamental right to cast his/her vote to person of his/her choice. Before the use of voting machine people in India use to cast their vote (whether it is centre election or state election) by putting stamp in front of candidate's name and photo of their own choice, and then as per the prescribed format the ballot paper is folded and put into the Ballot box. This method takes lots of time in casting and even in counting of votes and also less secure and lots of errors are there. But introduction of Electronic Voting Machine (EVM) changed the whole procedure of casting a vote. EVM completely changed the voting procedure as there was no use of ballot boxes, ballot papers, and stamps, these all things converted to a Ballot unit of EVM. Thus EVM saved cost spend on transportation of large no of ballot boxes, cost spends on papers, cost spends on stamps etc. EVM is easy to store, maintain and transport. Errors of previous voting methods are removed like that of Invalid votes, time taken to casting votes reduced, thus very less problem compared to previous method of voting. Now counting is accurate within much lesser time and no mischief on counting centre. This EVM is also eco-friendly in the sense it requires low voltage to operate and also replaces the tradition system which requires lots of paper work and manual operation. Keil uVision3 and Proteus software are used for this EVM.

Keywords: Buzzer, LCD, Microcontroller, Server

1. Introduction

In India marking system for voting was introduced to make it easy for the people who were not literate so that they can choose their favourite candidates among the several preferences. In the past years, there is tremendous increase in the amount of work means lakhs of ballot boxes are made and millions of ballot papers were printed and transported to another places and all kept in store that needs security and amount of storage, in short all this process takes lots of time as well as money so to overcome these problems, ECIL, Hyderabad, and BEL, Bangalore, developed the EVM in 1981. It was a major step to introduce EVMs for any country where voting is done and it is now a modern way of deciding governance. Introduction of EVMs also introduce many benefits like improved in accuracy, counting speed increased and results are given in much lesser time. But this benefit comes at the cost of, limited transparency, some associated risks and most important one is EVMs are expensive (manufacturing cost). Sometimes results can be manipulated by changing the code of the controller which results in faculty result. Instead of having these problems switching to EVMs is purely technical.

2. The Electronic Voting Machine

Electronic Voting Machine (EVM) can be divided into two parts i) Control Unit ii) Ballot Unit Control Unit and Ballot unit are connected via cable of about 5m. Control Unit as the name suggests contains the controlling part, it

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is with the Presiding officer present at the polling station (different polling station has different Presiding Officer). A single Ballot unit consists of 16 candidates with their name, and sign of the party with name. Such four Ballot units can be connected together so that 64 candidates can be assigned to a single control unit which is more than enough for one polling station. This Ballot unit is small box in which each candidate's party symbol and name is written. Against each and every candidate a blue button and a LED (Red) is provided. To cast a vote blue button against the candidate of voter's choice is pressed and then a red LED is glows with the sound of a beep. Prescribing officer press start and stop button from the control unit when button pressed and released respectively.

3. Working Modes of EVM

It includes five steps which are as follows:-

- **Voting mode:** Voting mode is displayed on the LCD when toggle switch is in voting mode, then please wait for the administrative switch is displayed when a vote is casted and then again start button is pressed by prescribing officer to cast another vote.
- **Counting mode:** Counting mode is displayed on the LCD when toggle switch is in voting mode, to any candidate total no of votes can be displayed on the LCD just by pressing the key assigned to particular candidate at any time of polling.
- **Clear mode:** Clear button is pressed before voting is started. It is necessary to press clear button in order to erase any previous votes if exists in the EVM.
- **Buzzer indication:** When a vote is casted in voting mode a buzzer beeps which indicated that a vote is being casted.
- **Controller switch:** This switch is in control of prescribing officer; it enables and disables the keypad in the voting machine.

Figure 1. Electronic Voting Machine (EVM).

4. Procedure of Building the Electronic Voting Machine

Steps of building Electronic Voting Machine (EVM) are:-

- Layout and block diagram of the required system is designed first and then finalized.
- As mentioned in abstract all components needed and software platform which are to be used are selected.
- Now all components are soldered using soldering iron, soldering wire and soldering flux on the printed circuit board and all connections are done.
- Flow chart is decided according to decision of the whole flow (process) system.
- Using the assembly language code is written on the keil uVision 3 and tested on proteus where circuit is being made, this all done keeping in mind the process steps of flow chart.
- The program is created with hex code and output destination, and then hex code is burn into the flash memory of microcontroller used.
- To test the working condition of machine and mode testing is done at various levels and the at last all things are finalized.

5. Using the Electronic Voting Machine

On the basis of the status read from accumulator the CU goes into either in result mode or voting mode. Let us assume that machine enters the voting mode.

5.1 Voting Mode

- Now the LCD displays "VOTING MODE STARTING….."
- The "status LED" on the CU glows to indicate it is ready for polling procedure.
- Machine waits for the "Ballot Button" to be pressed. If the ballet button is pressed then CU sends a "READY SIGNAL" which is active low.
- Now the CU waits for the four-bit code from ballot unit.
- After getting "READY SIGNAL", ballot unit glows its "MACHINE READY LED" indicating that the machine is ready to accept a new vote from its candidate panel.
- A 4-bit code is generated when a voter presses a button corresponding to his/her favourite candidate and after that it is send to the control unit.

- "MACHINE READY LED" is turned off by the ballot unit after accepting the vote and the ballot unit waits for the "vote signal" to become low from control unit,
- On the basis of the code received by the CU, the memory location where the selected candidate's vote count is stored is accessed and count is incremented.
- After that, CU sends a LOW "vote signal" to ballot unit to turn on "VOTE CAST LED" and generate buzzer beep, after sometime, "vote signal" is made HIGH.
- After "VOTE SIGNAL" goes low, the ballet unit glows the "VOTE CAST LED" on the vote cast panel for the corresponding candidate whose vote is being cast.
- At this time, the buzzer also generates a beep sound. This indicates to the voter that her/his vote has been processed.
- Then program control goes to step viii.
- After the voting is complete, i.e. the last voter has cast his/her vote or in case of booth capture, the "CLOSE" button is pressed.

5.2 Result Mode

- Now the LCD displays "RESULT MODE STRARTING….."
- The LCD displays "CANDIDATE #1 VOTES:" Now it waits for the result button to be pressed, the result of next candidate is displayed.
- Step ii is repeated to get result of all the candidates.

6. Results & Discussion

The results through Proteus are shown below in listed snapshots. All the operating modes are working correctly with little glitch in tuning of some components. Although, it hardly effects the accuracy of system. However, it replaces all the manual intervention and paper work. This makes this EVM ECO friendly for nature and environment.

7. Conclusion

The EVM consists of a LED, 16×2 LCD display, LED, push buttons, relay, microcontroller and a buzzer. In voting mode, the voting mode switch is in on condition. When vote button is pressed and led is on EVM is ready for voting. The led turns off after a vote is casted along with a buzzer. Counting votes for each candidate is done simultaneously along with the voting and number of votes (total votes) which are casted to an individual can be checked at any instance. When machine is in resulting mode voting mode is being switched off. Whenever the Result button is pressed for the corresponding individual machine is in result mode and shows the no of votes casted for individual candidate. As per the requirement and initial specification, complete system (both hardware and software) is working. Some features are not working properly because of lack of time and creative nature of design. So it is necessary to modify certain aspects in order to remove the errors caused in the EVM. Users develop various new ideas for the enhancement and development of the system, as they work on the system. Through honesty and sincerity corruption can be minimized. Thus for fair election this EVM is a small contribution. But, if there is no sincerity corruption in voting system can't be erased through this EVM system.

7.1 Proteus Snapshots

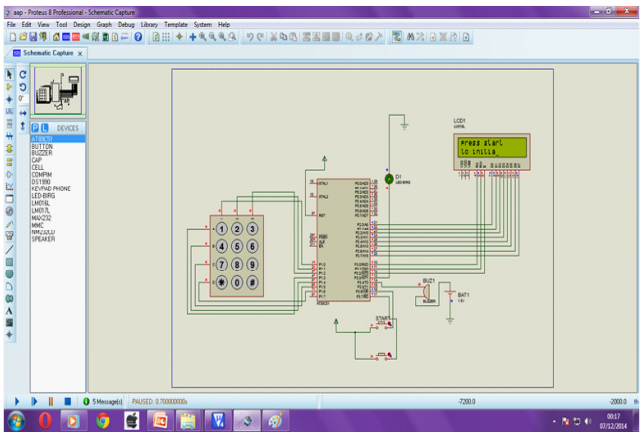

Figure 2. When no button is pressed.

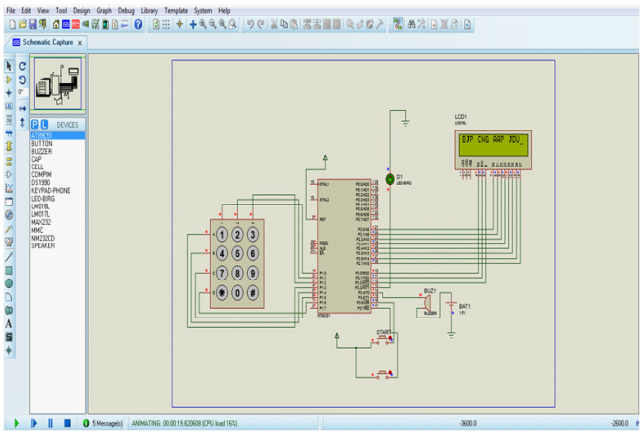

Figure 3. When start button is pressed.

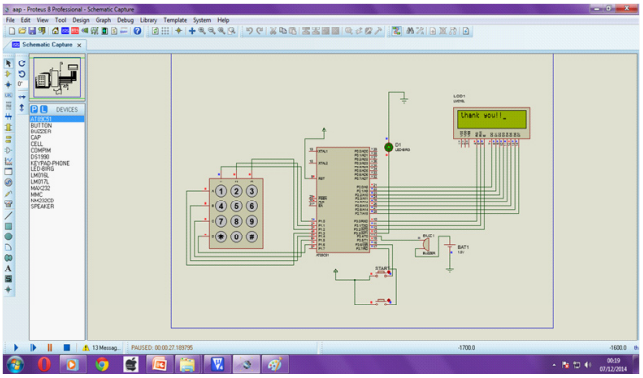

Figure 4. When vote is casted

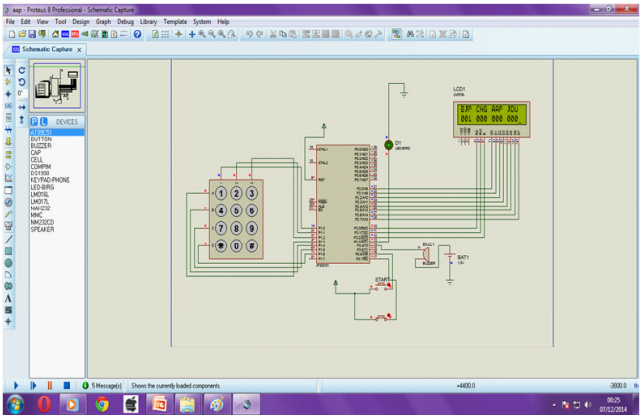

Figure 5. When total vote button is pressed.

7.2 Hardware Snapshot

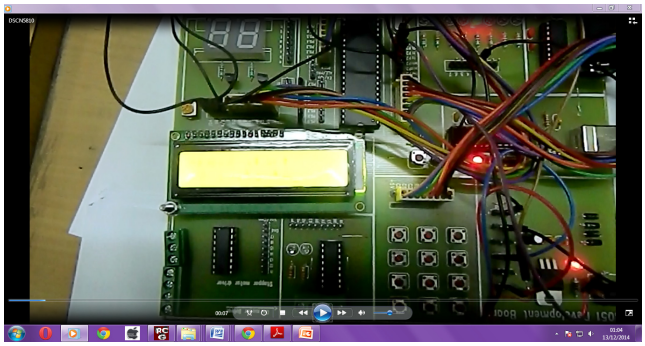

Figure 6. Hardware Implementation of EVM.

8. Future Scope

It get the hardcopy of the result from the machine, result can also be send to printer for printing the results means EVM can be interfaced with the printer. Backup of results can be taken by storing the results in the Personal Computer (PC) from where it can be saved to central server and on Internet using IOTs, which makes the result more secure, in this way it can also be interfaced with PC. Again, result can be transferred to networks once it is on the servers from where it can also be send to various election offices of election commission who are conducting the elections in the country. Thus this result can be made available in every corner of the world within few seconds.

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