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Embedded Based Electronic Voting Machine

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Abstract

Election is the most important process to select leaders of choice of people in a democratic country. Especially in India where population is about 1.32 billion, election is treated as festival for its citizens it becomes a tedious job to conduct the elections efficiently. The bogus vote, its protection, and erroneous counting influenced the requirement of "Electronic Voting Machine" (EVM). Though EVM were used by number of countries from a decade there are still a number of modifications observed. This paper simply reviews the existing embedded based electronic voting machine and some possible enhancements. The embedded system deals with automation of the system which take cares of data to be save within fraction of second, activating the buzzer to indicate that it is voted, showing or announcing for next voters etc. The microcontroller used works as heart and brain of the machine while electronic switches, displays, buzzer, power supply and connecters are treated as body part.

Keywords: EVM, Microcontroller, PC, Display, LCD, Keyboard Matrix, Power Supply, Memory, DRE

Introduction

EVMs are widely used today in election processes and a faithful device to reveal the opinion of people for leaders contesting the election. The use of EVM provides greater efficiency, better scalability, faster speed, lower cost, and more convenience. The term "Electronic Voting Machine" characteristically defines the use of some electronic means in voting system and ensures the security, reliability, guarantee of transparency of the process [1], [2]. Now a day the wide range of application of voting include its use in reality student body elections, shareholder meetings, and the passing of legislation in parliament. Perhaps the most important, influential, publicized, and widespread use of voting is its use in national elections. Compared to its traditional paper-based counterpart, electronic voting is considered to have many greater potential benefits. These benefits include better accuracy by eliminating human error, reduced size, easy portability, increased speed for tally computation, lower operational cost through automated means, and the convenience of voting from any location. In EVMs, electronic databases are used to record voter information, computers are used to count the votes and produce the results. The critical role in determining the outcome of an election, electronic voting systems should be designed and developed with the greatest care. However, a number of recent studies have shown that most of the electronic voting systems being used today are fatally defective [3], [4], [5] and that their quality does not match the importance of the task that they are supposed to carry out. Flaws in current voting systems, which were discovered through testing and other analysis techniques, have stimulated a number of research efforts to mitigate the problems in deployed voting systems. These efforts focused on ameliorating security primitives, such as the storage of votes [6], [7] and auditing [8], and on formally assessing and making procedures more effective [9], [10].

Components

The prototype module of embedded based electronic voting system includes step down transformer, 4 PN-junction diodes, 1000 micro farad electrolytic capacitor, 7805 regulator, 104 value disc capacitor, seven 330 ohms resisters, nine 10 k resistors, 7 switches, two 33 value disc capacitors, AT89S52 that is 8052 microcontroller, 1 pull up resistor, 11.0592 MHz crystal oscillator, 7 LEDs, PNP transistor, 10 micro farad capacitor, 1 preset, buzzer, LCD for

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displaying purpose, connecting wires and 1 power cord.

Architecture

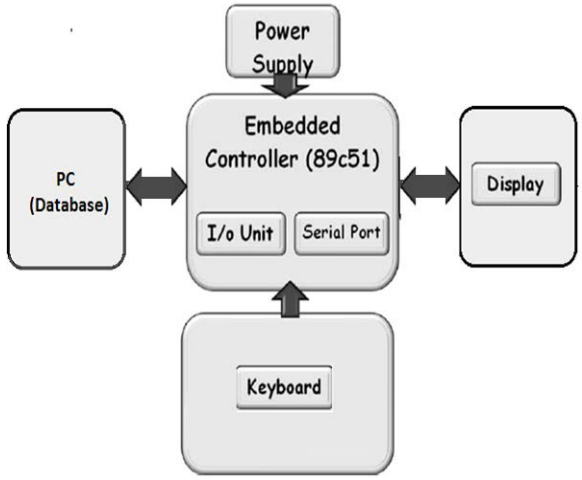

Figure 1: Architecture of Embedded Based Electronic Voting Machine

This is existing general architecture of "Embedded Based Electronic Voting Machine" is shown in figure 1. It has four different sections, one of the most important section is embedded controller unit, second one is keyboard section, third one is display section forth one is power supply, and fifth one is computer interface section.

The **microcontroller** section is responsible for issuing display messages or symbols corresponding to each contestants participating in the election. It continuously monitors the events with keyboard. Whenever any key of the keyboard or switch is pressed the microcontroller recognizes it and match with the listed data within its memory. After matching the data it automatically increment the counts of that contender by one and write back into the memory. Simultaneously the controller issues a signal to buzzer which indicated the person has voted successfully. This process is repeated each time a person pressed the keypad or switch. This paper is based on AT89S52 microcontroller with specifications of The **PC** interface is provided for the purpose of live steaming of data or recovery of data at the time of counting of total votes and result declaration.

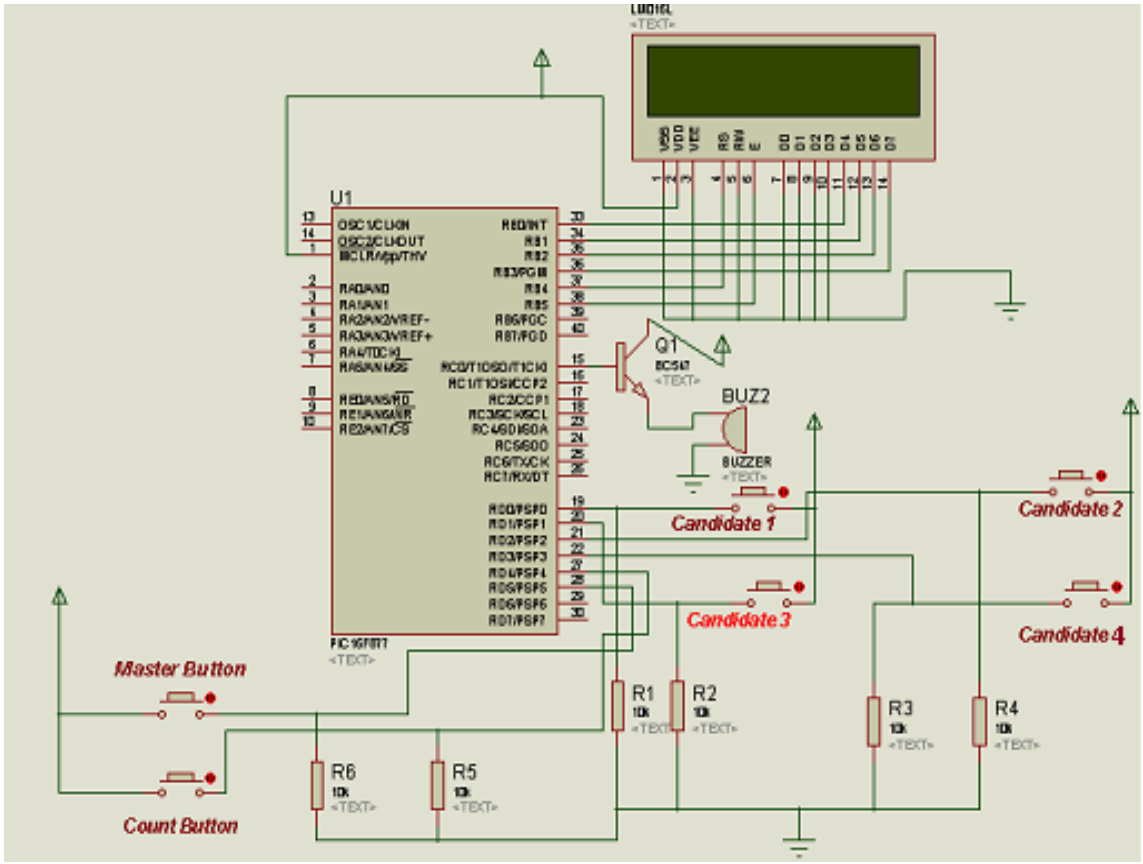

Figure 2: Circuit Diagram of EVM

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Display device used for user interface with machine. An observer can see the information regarding the process and inputs its opinion accordingly. For a proto type system design one can use a 2x16 character LCD (LM016L) display. While in advance and practical version of EVM a torch screen display attracts the attention of people. A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals.

Keyboard or switch is provided for section of contender and so it can be arranged in number of ways, like switches bellow permanent election symbols of contenders which may not be good from application point of view. In such situation, if a new contender participates in new election then the machine required to restricted and hence it affects its endurance. Therefore, usually a display section is used which periodically displays the symbols corresponding to each user with switch number. If a new contestant participated then it becomes easy to reprogram the EVM without any change in hardware.

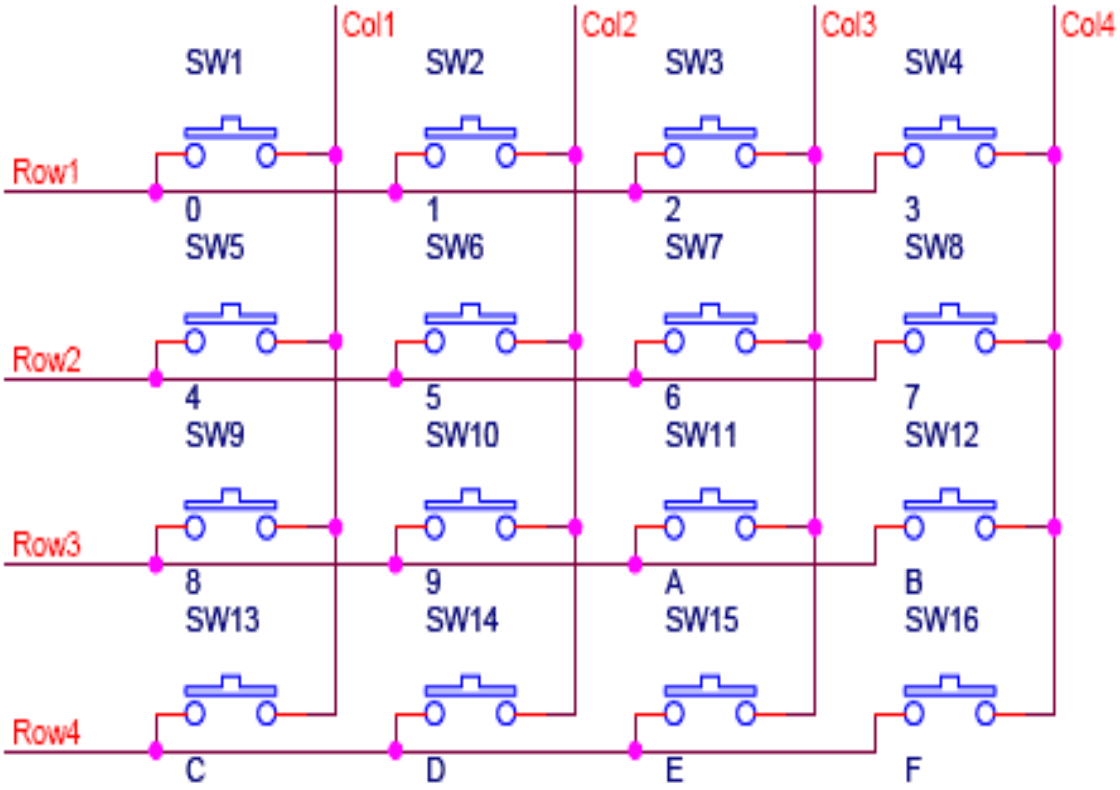

Figure 2: Keyboard Matrix

Buzzer The buzzer produces a same noisy sound irrespective of the voltage variation applied to it. It consists of piezoelectric crystals between two conductors. When a potential is applied across these crystals, they push on one conductor and pull on the other. This, push and pull action, results in a sound wave. Most buzzers produce sound in the range of 2 to 4 kHz. The Red lead is connected to the Input and the Black lead is connected to Ground.

The last and important section of the machine is **power supply** which enables each device to work properly. The microcontroller required a regulated power supply in the range of 3.5V to 5.5V. As there are other circuits and units also interfaced with the microcontroller. Therefore 5V regulated power supply is considered optimum for the system. A voltage regulator generates a fixed output voltage of a preset magnitude that remains constant regardless of changes to its input voltage or load conditions.

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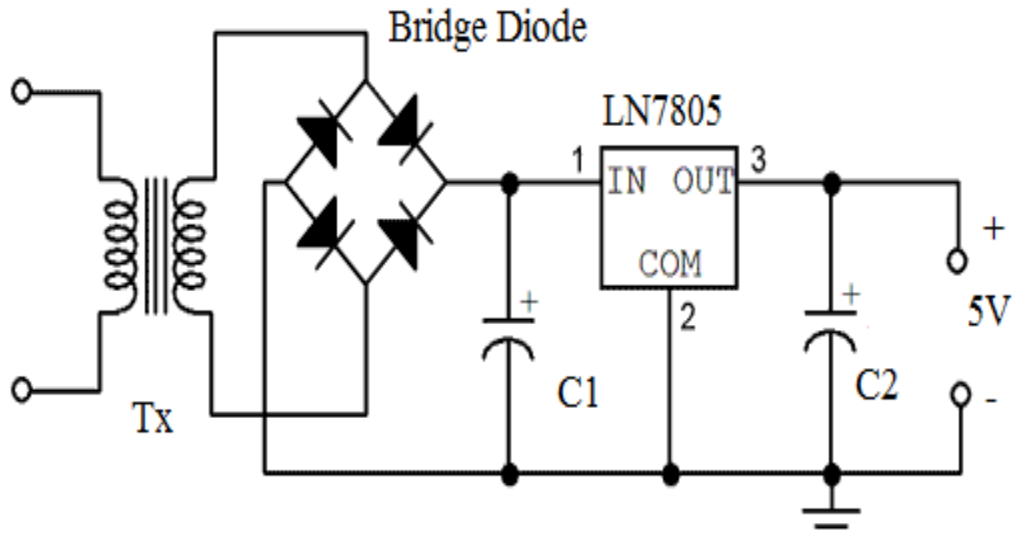

Figure 3: Power Supply

The microcontroller is programmed in such a way that each unit of the system worked in synchronized mode. One can use assembly or high level programming language to program the machine. The selection of microcontroller, IDE, programming languages, etc. depends mutually to each other and the memory required.

Results & Conclusion

In an analysis of numerous elections in various countries it is found that punchcards had the highest rates of uncounted votes, followed by Direct-Recording Electronic voting machines (DREs,) mechanical lever machines, optically scanned ballots, and traditional paper ballots. It is fascinating that the oldest method of voting, by paper ballot, is also the least prone to under voting. Yet the newest voting technology, DRE, is highly prone to under voting, second only to punchcards. Some comparisons are listed in this paper.

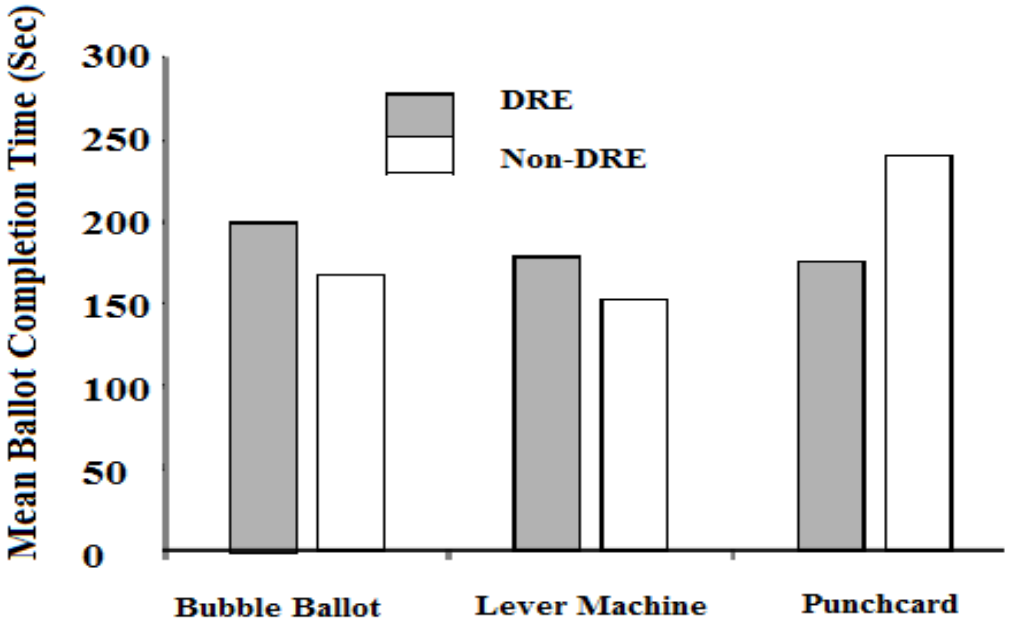

Figure 4: Mean ballot completion times for each DRE/non-DRE pair.

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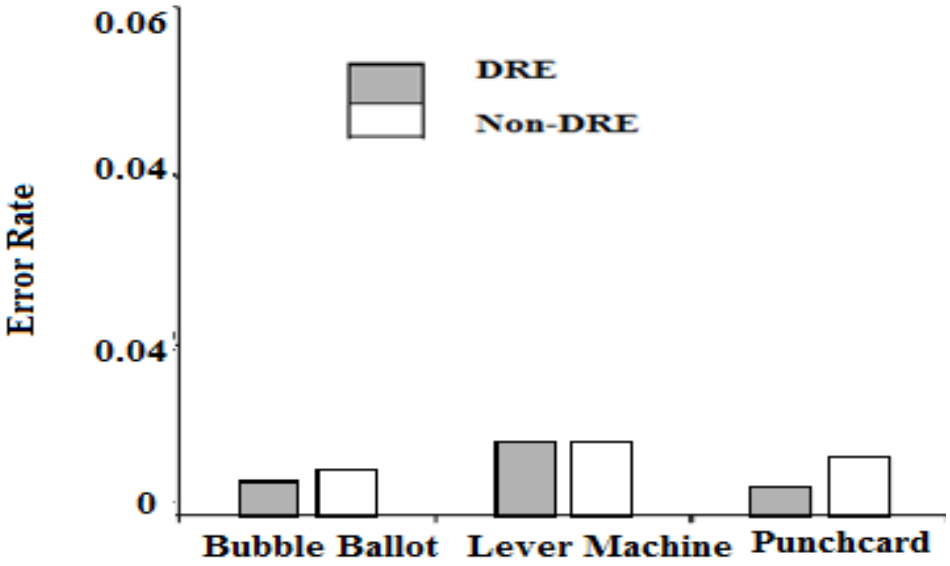

Figure 5: Frequency of ballots containing at least one error

This review paper includes three very basic aspects in the context of testability and robustness of election. First, it discussed the problem of keeping ballot secrecy to a certain extent in the case of a corrupted doting machine or voting authority. To overcome this, an approach is developed where all secret information is encapsulated in the voting machine. Second, it is considered the attack of receipt stealing and manipulation of the corresponding votes. Here we proposed a novel approach of linking all receipts by a hash chain such that each single receipt guards the integrity of all receipts issued previously. Together with a display in the polling place this approach shortens the time window in which an adversary can perform the ballot stealing attack without almost zero risk. Third, it has been discussed the possibility of contesting an election based on the evidence provided by the verifiable election scheme. As compared to the situation for Bingo Voting to the evidence provided by paper based schemes. One can sketched an approach to prove an error or a manipulation in the voting booth without violating ballot secrecy.

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