Adhar Based Electronic Voting Machine Using GSM and LPC 2148 Controller

Kotipalli Babitha & S.S.V.Kiranmayi

[1]M-Tech (Embedded Systems) Department of ECE Akula Sri Ramulu College of Engineering and Technology

[2]Assistant Professor, Department of ECE Akula Sri Ramulu College of Engineering and Technology

ABSTRACT

Electronic Voting Machine (EVM) is a device that is used to count ballot votes instead of doing it manually using human resource to record and count votes. The many problems associated with manual counting of votes that it laborious, erroneous and time consuming. This makes the entire system very inefficient. As voting is a sensitive issue, mismanagement can lead to issues as large and complicated as political unrest. The debilitating effect that political unrest can eventually lead to needs no describing. Bangladesh, being a developing nation cannot afford to be held up in its economic development due to mis-management in elections. On the other hand, for a power starved nation like Bangladesh, the gap between demand and supply of electricity remains large. A good majority of the people are deprived of this basic facility.

Over dependency on electronic devices for sensitive purposes might not seem like a viable option either. A adhar based EVM addresses all the above concerns. This paper discusses in detail the design of adhar based EVM prototype with GSM which is efficient and allows the user a relief from the laborious act of vote collection, counting and security. Furthermore, it also removes the errors from the system, since it is a digital device. One of the biggest concerns of EVM is the security system which includes insider threats, network vulnerability and challenges to auditing. To limit these issues the prototype has been developed with a three stage security encryption.

INTRODUCTION

Voting is a method for a group such as a meeting or an electorate to make a decision or express an opinion, usually following discussions, debates or election campaigns. Democratic nations elect holders of high office by voting. In a democracy, a government is chosen by voting in an election: a way for an electorate to elect, i.e. choose, among several candidates for rule. In a representative democracy voting is the method by which the electorate appoints its representatives in its government. In a direct democracy, voting is the method by the electorate directly makes decisions, turn bills into laws, etc.

Like a good majority of the nations in the world, Bangladesh follows democracy, making voting an integral part of our everyday lives. Unfortunately, unlike the developed nations following democracy, political instability is one of the diseases plaguing this country, hindering its economic development. Two years ago, Bangladesh's year started with political turmoil when the opposition party protested, demanding free and fair elections.

Even though the results of the elections, through voting, gave the nations its ruling government party, controversy surrounded the election. As a

result, the economy is still having to bear the brunt in many ways. Many experts, such as The World Bank, Bangladesh Bank etc. have projected the gross domestic product (GDP) to be lower than 6% which is much below the target of 7.2% for FY 2014. [3] It is evident that the political instability has contributed to this situation. This nation has suffered prolonged political crisis since its inception.

Needless to mention that election is one of the major causes of the nation's political instability, the voting mechanism being an integral part of the elections. Votes are cast by citizens by a voting system. A voting system consists of a set of rules which must be followed for a vote to be considered valid, and how votes are counted and aggregated to yield a final result.

Different voting systems have different forms for allowing the individual to express his or her vote. In ranked ballot voting system, voted order the list of options from most to least preferred. In range voting, voters rate each option separately on a scale. In plurality voting voters select only one option, while in approval voting they can select as many as they want The most commonly practiced system in Bangladesh is plurality voting where the voter cast their votes by marking their choice in a piece of paper and dropping the paper in a sealed box. This leaves a large window for error. Theft of vote is yet another problem that the Bangladeshi Election Committee has to face every election, no matter of whichever scale it be. Because the system is pen and paper based, there stays a big scope for felony. The vote counting is also done manually and this allows room for human error. Due to this mismanagement, the election results are often challenged. The mayhem that follows leads to a nationwide unrest.

Different forms of EVM system using different methodologies has been employed around the world based on their requirements. One of the widely used EVM systems is Diebold AccuVote-TS. In the November 2006 general election, these machines were used in 385 countries representing over 10% registered voters . The machine contains a touch screen accompanied by a card reader which the individual voter possesses after contacting the polling officers. However, although accepted widely, recent analysis shows that the system contains numerous flaws and should not be used without further improvements . Another interesting mechanism for EVM system is Biometric EVM in which instead of requesting personal identifications or passwords, the system has the ability to detect individual fingerprints, face, retina, DNA etc. of an individual for easy and convenient verification. The objectives of biometric recognition are user convenience, better security and higher efficiency . However, the data acquired by individuals bio-identification through fingerprints and retinal scans might be used for criminal investigations or other purposed without notification which violates the civil right of a citizen Moreover, power supply of an EVM system is an important element that needs to be fulfilled properly during an ongoing election. This is a bigger concern mostly in developing countries where power outage is frequent due to load shedding. Without proper power supply to the EVM system, data acquired cannot be authentic and questionable. Keeping the erratic power supply position in many places in different countries, the machines have been designed to run on batteries . However, it cannot be the ultimate solution since the capacity of the battery is not unlimited which can cease to provide power supply to the EVM machine after a certain period of time. To our knowledge, no solar power based EVM system has been implemented to overcome the abovementioned problem till date.

ELECTRONIC VOTING MACHINE

The electronic voting technology was introduced to people in 1960. Their first widespread use was in the USA where 7 countries switched to this method for the 1964 presidential election [4]. As the world's dependency increasingly grew on technology, the voting system evolved and adapted with the flow. These days the use of Electronic Voting Machines can be seen across the globe: United States, Canada, Brazil, Australia, United Kingdom among many others. Bangladesh have very recently joined this crowd.

EVMs have been introduced in Bangladesh to modernize the polling process. The features of EVM device includes :

- ➢ Vote casting is very easy
- ➢ Vote counting and result publishing is almost instantaneous and 100% accurate
- ➢ 0% chance of losing data, highly stable memory with 4 backups which can store data up to 100 years
- ➢ Vote records are completely safe and confidential
- ➢ Even if the device gets damaged, on most cases the device is designed such that vote record can be retrieved

GSM

Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service. The standard is used in approx. 85 countries in the world including such locations as Europe, Japan and Australia

PROPOSED EVM SYSTEM ARCHITECTURE

The circuit diagram of the solar powered Electronic Voting Machine (EVM) is provided below
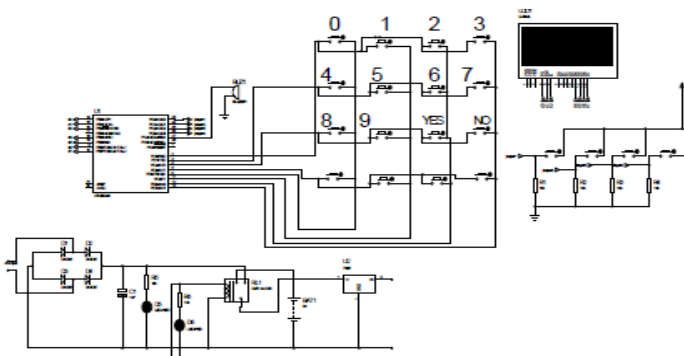
The major component of the EVM is the microcontroller. ARM7 LPC2148 microcontroller has been used in the circuit. Port B was assigned as the output and Ports C & D were the inputs. The output of the microcontroller was connected to the LCD and Buzzer. Rows of keypads were connected to PD0 to PD3 (pins 2, 3, 4 and 5) and columns of keypads were connected to PD4 to PD7 (pins 6, 11, 12 and 13).

Buttons for voting were connected to PC0 to PC3 (pins 23, 24, 25 and 26). The LCD screen was connected to Port B. PB0 (pin 14), PB1 (pin 15) and PB2 (pin 16) is connected to RS pin, R/W pin and E (Enable) pin sequentially of the LCD. The reset button was connected to PC6 (pin 1) and PC4 (pin 27) was connected to the buzzer.

The circuit contains a 12V chargeable battery. A voltage regulator (IC7805) was connected to the

circuit to maintain a constant 5V at the end of the power supply section. This battery is charged using solar power and to increase reliability is also connected to the grid supply. However, the grid supply is only a back-up source in case there is a failure in the solar powered system due to some technical errors. The 220V/12V step down transformer was used with the grid supply connection as the grid voltage is 220 V. A full bridge rectifier converted was kept in the circuit to convert the AC signal to DC.

THE PROPOSED EVM CIRCUIT COMPRISES OF THREE MAJOR PORTIONS

RESULTS AND SUMMERY

Control Section: Control section consists of 2-parts keypad and LCD. The keypads are used for setting and password input whenever password is needed. LCD is necessary for viewing the passwords and whenever author sets them to see whenever any passwords are entered, to see the votes of candidates.

• Ballot Section: Ballot section has buttons for each candidate. By pressing each of the buttons one can give vote to the corresponding candidate

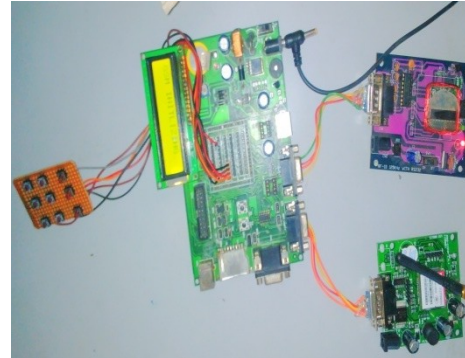• Power Supply Section: The EVM needs 5V DC to operate. The microcontroller and LCD display needs 5V to turn on

The implemented hardware consisted of the ballot unit, control unit and power unit in a single PCB board

RFID MODULE

LPC2148 MODULE

GSM MODULE

TOTAL CIRCUIT

CONCLUSION

The objective of the project was to introduce a design of an ADHAR based Electronic Voting Machine that uses punch card and OTP password protection. A password is sent to registered mobile for unique identification. This reduces reduce the manpower requirement for voting purposes. As polling officers are not required for counting votes. The vote counting is instant, therefore reducing the delay in publishing the result. Furthermore, due to the voting mechanism being electronic there is a significant reduction in errors. As no human factor is involved in vote collection and counting, there will be almost no scope for fraudulent activity. This will allow and facilitate a peaceful voting environment in the country.

REFERENCES

[1] Voting, available at: https://en.wikipedia.org/wiki/Voting [Online] (lastaccessed on 22 July 2016)

[2] Voting System, Available at: https://en.wikipedia.org/wiki/Voting_system [Online] (last accessed on 22 July 2016)

[3] F. Khatun, "Economic Implications of Political Instability", Available at: http://www.thedailystar.net/economic-implications-of-politicalinstability- 7499 [Online] (last accessed on 22 July 2016)

[4] Electronic Voting, Available at: https://en.wikipedia.org/wiki/Electronic_voting [Online] (last accessed on 22 July 2016)

[5] R. Jameel, S.U.Hani, T.Aziz, "Impact Study of Integrating Solar Plant in an 11 kV Urban Distribution System", IEEE Power & Energy Society General Meeting, 2014

[6] "Impact of Large Photovoltaic Integration of Static Voltage Stability of MV Distribution SYstem", Undergraduate Thesis, Dept. Elect. Eng., American Intl. Univ. Bangladesh, 2013

[7] Ariel J. Feldman "Security Analysis of the Diebold AccuVote-TS Voting Machine", Usenix, The Advanced Compuing System Association.

[8] Tadayoshi Kohno, Adam Stubblefield, Aviel D. Rubin, and Dan S. Wallach, " Analysis of an Electronic voting System", In Proc. IEEE Symposium on Security and Privacy, May , 2004.

[9] Ashok Kumar et. All "Electronic Voting Machine-A Review",Proceeding of the international conference on pattern recognition,informatics and Medical engineering, March 21-23, 2012.

[10] Rebecca Mercuri "A better ballot box? New electronic voting system pose risks as well as solutions" IEEE spectrum, October 1, 2002.