Aadhaar based Secure E-Voting System using Cortex-A15 Processor

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Abstract: This paper introduces Aadhaar based Secured E-Voting system which will be very much suitable for the most sensitive areas in India where there is a large scope for rigging and other malfunctions. In this study, the prototype is built based on secured and trusted framework for Aadhaar based E- voting. The System allows the voters to participate by using username and password. In the proposed system Cortex-A15 Processor is used for authentication. The Aadhaar number issued by Election Commission of India will be the user name and biometric thumb impression taken at the time of Aadhaar enrolments will be the password. Therefore this system provides the convenience to the voter to cast his/her vote from any location of their choice. Proposed system is cost effective and user friendly system and can be used for the secured voting purpose, thus making the counting process less burdened.

Keywords: Aadhaar, E-Voting Machine, Cortex-A15processor.

Introduction

With the growth of modern communications and Internet, information is very easily available and accessible electronically; The Information technology provides security in many aspects. Usages of information technology in the voting process improve the elections in sensitive areas where there is a chance of misuse and riots. This advanced technology is referred as Aadhaar based secure E-voting system. E-Voting is an election method in which the voters cast their votes electronically. In the past years, information security was used only in military and other important applications. But, now there is a need for secured voting. This E-Voting system helps the voter to select their representatives as per their preference without any unnecessary problems. Therefore this system helps in improving the security of voting process and builds trust to the voters. Voting system has more advantages than any other voting process according to the researchers. Advancements in voting systems include live recording using the cameras, webcams and Internet based recordings and cellular Mobile based recording systems are also used in voting processes. The finger impressions and Unique Identification Numbers details of the voters are stored in the database. The amount of data that is stored is in accordance with the central server. The system which is proposed in this paper has the advantage of reduction of physical effort, fast and accuracy. As the voter cast his/her vote the data is stored in the digital format, therefore more secured.

In section II the present existing system is discussed and in section III the proposed system explanation is given. Section IV concentrates on the components required to implement the proposed system where as Section V explains the Algorithm for the proposed system, followed by conclusion in Section VI.

Existing System

The present Electronic voting machine is the inter connection of two systems one is the control unit and other is Ballet unit. These two systems are interconnected via cable of length around five meters the control unit is operated by the Presiding officer who is the in charge of the Polling booth. The Ballet unit is fixed in the designated voting chamber. The current system allows the voter to cast his or her vote of their choice by pressing the appropriate button on the ballet unit. In EVM Control Unit will have a unique ID Number given by election commission and is painted on the unit with a permanent marker [1]. This ID Number will be allowed to be noted by the Polling Agents of various parties and will be recorded in the Register maintained by the Returning Officer as per the Election commission rules. The address tag attached to the Control Unit will also indicate this ID Number. Therefore, there is no question of replacement of any EVM. In the present Election process the voter needs to provide their Election photo identity card or any other card issued by the govt. recognized by the election commission of India. This verification of the photo identity card is done manually by concerned Polling officer and clearance will be given if found genuine. The present process involves lot of manual work which includes time and human effort.

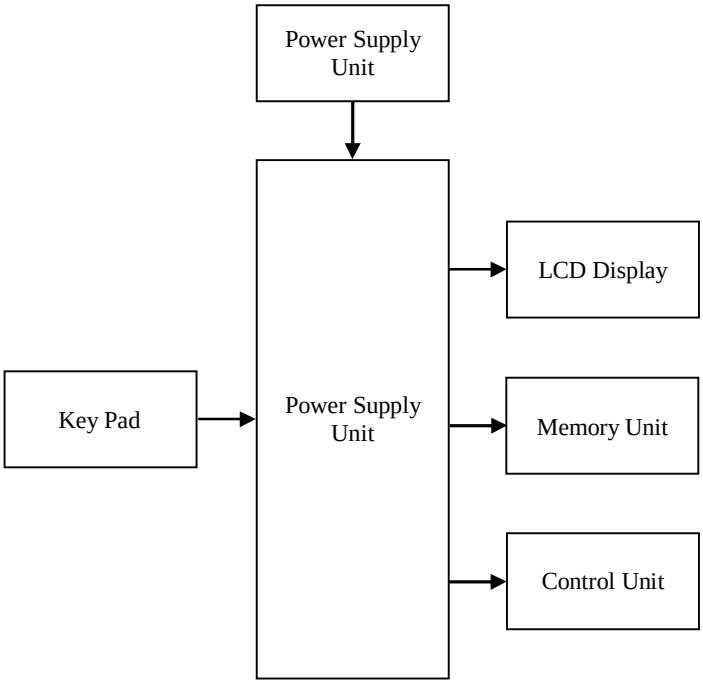

Figure 1. Existing System

Proposed System

In order to reduce the human interference and to overcome the drawbacks of the present system a new system Aadhaar based electronic voting system is proposed. In this system, Aadhaar based authentication is to be used to improve the security levels to the existing EVM. In this system the voter will be able to cast his/her votes with the help of user id and password. Where the user id is the Aadhaar number and password is the biometric finger impressions of the voter. As per the Aadhaar data acquisition system, the demographics and biometrics are captured and packaged at the time of Aadhaar enrollment .This data can be used to check the authenticity, where at the time of voting, the voter places the finger on the finger impression slot [2]. Since this system is linking the EVM with the Aadhaar server it will become more easy and convenient to check and verify whether the vote is casted by the right person and hence duplication of the votes may be avoided. Therefore this system helps in reducing the second time voters and the unauthorized voters to improve the standard of the voting process thus ensuring the security [3]. The Aadhaar identification number which is also known as Unique Identification number is unique for all the citizens of India. The voting process with this system ensures greater security which in turn provides the liberty to the voter to cast his/her vote.

The proposed system consists of a central unit which controls the process and a server unit. The voter can cast his vote by putting his finger in the biometric machine slot and that is encrypted and transmitted to the processor unit. Therefore cortex A-15 processor processes the obtained data and is stored. Then the verification of the data is done with the Aadhaar database via Ethernet.

Components in the Proposed System

Cortex-A15 processor

The Arm Cortex-A15 processor is a high performance engine for high performing flexible devices. Cortex processor carved a niche for itself among the galaxy of many other processors for its reliability and optimum power utilization [6]. Cortex-A15 processor which delivers double the performance is preferred over Cortex-A9 processor which is used in today's smart phones The ARM cortex-A15 processor is a 32-bit processor [7]. Cortex-A15 processor is selected for this project as it is well suited for many biometric applications.

Ballot unit

The ballot unit board is a simple System. It has no processing unit of its own. The processing unit is instead, it uses two electronically programmable logic devices (EPLDs) to interpret signals from the control unit CPU and interface with the

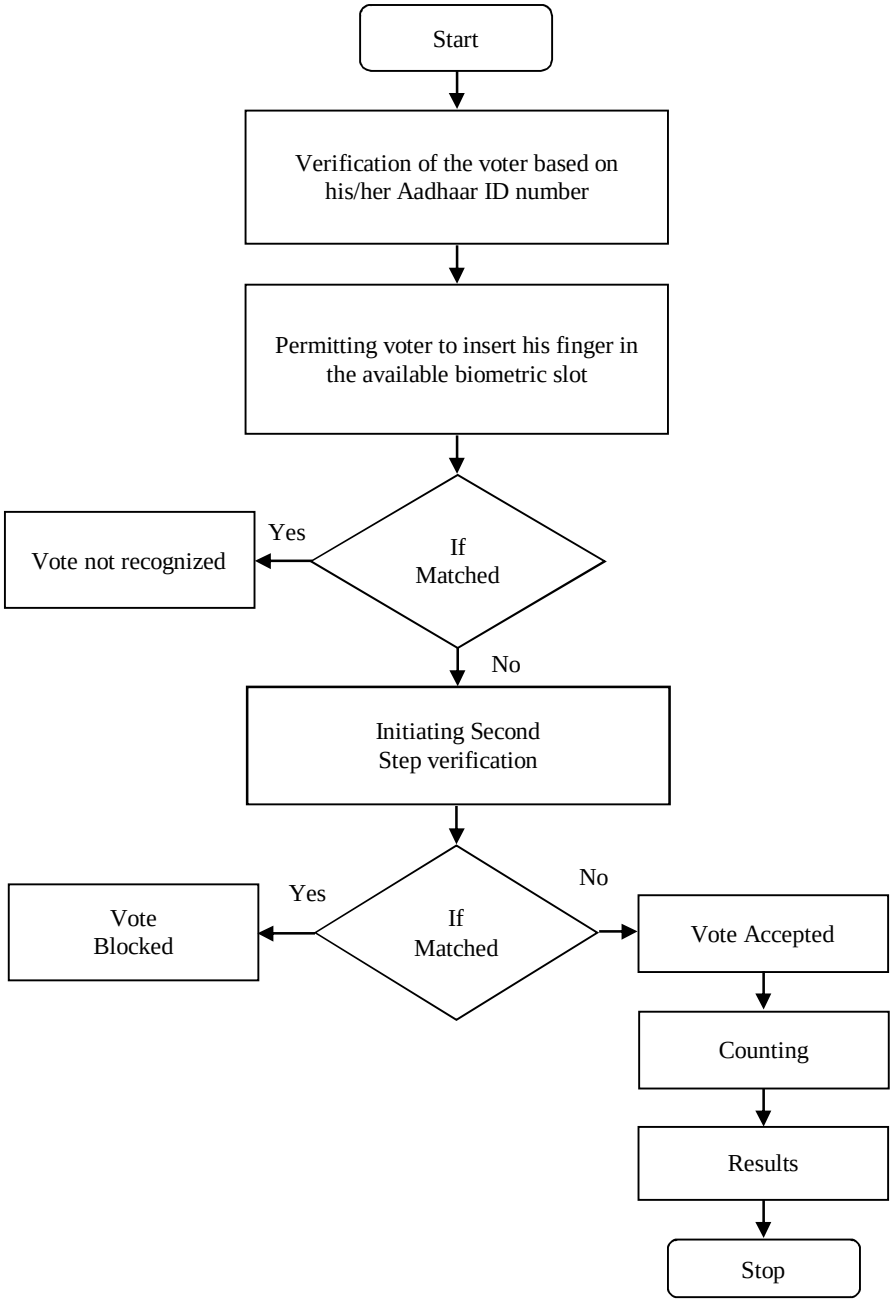

Figure 2. Proposed System

candidate buttons and LEDs on its face [3]. It also contains a four-position switch used to select the ballot unit's position in a multi-unit chain.

Aadhaar Server

The data from citizens is Collected, Organized, Stored and Maintained by Government of India. During the authentication transaction, the voters' record is first selected using the Aadhaar Number and then the demographic/biometric inputs are matched with the database for which the data is provided by the citizens during enrolment/update process [5]. Aadhaar authentication service is exposed as stateless service over hyper text transfer protocol Usage of open data format in XML and widely used protocol such as HTTP allows easy adoption and deployment of Aadhaar authentication.

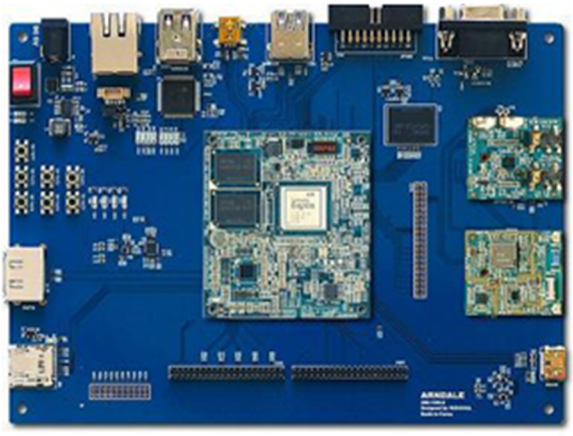

Figure 3. Cortex-A15 processor

Algorithm

Proposed Algorithm:

- Step I: Insert the finger in the provided Biometric slot.
- Step II: If the demographics and biometrics match with the stored data, ballot is released. Voter can cast his/her vote.
- Step III: In case of mismatch of demographics and biometrics, ballot will not be released.
- Step IV: If the Step III is repeated twice, the person will not be allowed to vote.

Conclusion

The inception of the idea Aadhaar based E-voting system is initiated after the current general elections. Keeping in view the bogus voters who exploit the total process, harmony and peace among the society a system which address these problems is developed. As the government of India is making Aadhaar card a mandatory in many sub-systems like driving license, Domestic LPG connections and banking services. Hence people the citizen of the country are motivated towards Aadhaar. The enrollment process of Aadhaar is still under process and expected to achieve 90% enrollment by 2017 positively. Hence this system can be used in the next general elections for the peaceful and secured conduct of polling in Digital India. Based on the design principles and requirement, a prototype of the system for E-voting System has been developed using Cortex-A15 processor. The system has several advantages that had been achieved. The advantages of the system are as follows: i) It gives confidence in voting system, only the genuine voter is allowed to access the voting Machine. ii) The system is user friendly and the user can easily understand the system and can cast his or her vote. The proposed system is fast performing and highly secure there by eradicating the defaulters.

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