

A NOVEL AND SECURE METHODOLOGY FOR VOTING USING ENCRYPTION AND BIOMETRIC AUTHENTICATION

Sarga Ajithan¹, Sradha Mary Jose², Sarath Krishna K³, Sonu Simon⁴, Juby Jose⁵, Bineesh M⁶

^{1,2,3,4,5} B. tech Final Year Students, Computer Science Department, Jyothi Engineering College

⁶ Asst. Professor, Dept. of Computer Science and Engineering, Jyothi Engineering college, Kerala, India

Abstract - A autonomous country like India needs a high immune system of election to choose the leader for the society. With this rapid growth in technical world, there is a need of making the voting system more secure, to keep the election fair and non-vulnerable. There are several methods that being used by the government to protect the integrity and confidentiality of the voting. Our project is to preserve these qualities during the election which is implemented using the Raspberry Pi 3. Our project has a smart card where the details of each voters is stored. During the time of election, the fingerprint (R305 Fingerprint module) is taken in real time and checked with the details in the smartcard as well as with the details in the voting machine database. Thus, our system can be made more secure and preserves the integrity. By using an encryption technique each vote that poll is encrypted and stored in the database. Thus, the confidentiality of the voting is also preserved. There is an extra feature added in our system that any voter can poll their vote from any election booth, by registering their name earlier in the given website.

Key Words: Smartcard Voting, Raspberry Pi 3, Vote anywhere, R305 fingerprint Module authentication, Aadhar database, secure voting.

1. INTRODUCTION

India is a very large democratic country in the world have a impartial way of electing leaders for the society. India have been using electronic voting machine since 1989 by replacing the traditional method of paper election. Electronic voting machines for election was manufactured in the time of 1989, were used on experimental basis for the first time in Assembly Constituencies in the States of Madhya Pradesh, Rajasthan and NCT of Delhi at the General Elections for the respective Legislative Assemblies held in November, 1998. An Electronic Voting Machine consists of two Units first it's a Control Unit and next a Balloting Unit. They are joined together by a five-meter cable.

The Control Unit is with the Officer and the Balloting Unit is placed within the voting box. Instead of issuing a ballot paper, the Polling Officer who is in charge of the

election procedures and that the Control Unit, will be pressing the Ballot Button. This will enable the voter to cast his own vote by pressing the button in the Balloting Unit against the candidate's symbol, with his own choice. There exists possibility of misusing the authentication details by the people assisting in election during polling. One of the existing solution for these problems are marking ink on finger. But still exists the possibility of masquerading and making false votes in the election. An optimal solution for eliminating these problems is to apply fingerprint authentication in real time.

Our system ensures a three-level security for the voters. When the voter reaches the counter after the verifications of documents manually they can move to electronic voting machine. Thereafter he can insert the smart card into the card's slot and then place the finger to fingerprint slot. Fingerprint encryption is done using SHA algorithm. Once the user is verified, he can proceed to election process. Commands for election will be displayed and he can poll the vote. A false in the authentication process may lead to invalid vote attempt and buzzer will make sound in order to inform the officers in charge.

2. LITERATURE SURVEY

The paper [1] Fingerprint Recognition Based Electronic Voting Machine system. this project will be implemented with biometric system i.e. finger print scanning method. This method thus used to ensure the security and to avoid fake, repeated voting etc. false attempts in voting. It also enhances the accuracy and speed of the voting.

The system uses thumb impression(fingerprint) for voter identification as we know that the fingerprint impression of every human being has a unique pattern is made used. The purpose of this system mainly is to ensure that the voting rights are accessed only by a eligible user and no one else. In this, creation of a database consisting of the fingerprint detail of all the eligible voters is done as a pre-poll procedure. During elections, the thump fingerprint of a voter is entered as input to the system. This is then compared with

the available records in the database of the election commission. If the particular pattern matches with anyone in the available record, access to cast a vote is granted as true. But in case if the pattern is not matching with the records of the database or in case of repetition, access to cast a vote is denied or the vote gets rejected. The advantage of this system is the result is instantaneous and the counting is done. Thus, the overall cost for conducting elections gets reduced and so does the maintenance cost of the systems.

In the paper [2], Author proposes a fingerprint matching method, which is depend on standardized fingerprint model to manufacture fingerprint from original real time taken data. From the fingerprint templates in the database, here they select one as the mean images and apply Genetic Algorithms to find the conversions among them. Then, according to these transformations fingerprints are analyzed in all ways. Finally, a matching is done to show that the authentication procedure came to true. the use of the genetic algorithm is more discussed in this paper.

The paper [3] The impressive smart card based electronic voting system is introduced to ensure secure voting procedures and the voting counts during the election. This idea avoids the illegal acts against the voting process and provides the voter authentication in a more secure and effective manner. This proposal plans to provide an integrity for each and every vote. It entirely changes the methods of the election procedure and ensures the integrity of electoral system. The primary idea of this paper is to make the voters as to have a faith and trust in election through the methods of taking fingerprint and providing a smart card to each user and thus promise their uniqueness in the voting process and reduces the work of election committee. At the same time the main highlight of this system is that result of the election process will be automatically declared to the public. With the help of this method, the person can vote from any election booth easily.

3. IMPLEMENTATION

3.1 Raspberry Pi 3

This third-generation Raspberry pi with low power consumption is used for implementing the voting system. It's a full-fledged and having a credit card sized computer, and have a full Linux based operating system and has hardware support for SPI, I2C and Serial And this have an ability to run different programs.

Hence the entire System is implemented using Raspberry Pi 3 and the python language



Fig -1: Raspberry Pi 3

3.2 Authentication Using R305 Fingerprint module

Authentication is the important process in our project, through which the smart voting system confirms the claim of a person to use a particular identity by the use of credentials in the smart card. Biometrics is authentications is based on some of the physical characteristics of the human body. Here its used the fingerprint to authenticate a user since fingerprint is unique and also it is cheap to setup [4].

R305 is a finger print sensor module having the TTL UART interface for direct connections to the microcontroller UART or to the PC through MAX232 / USB-Serial adapter. The user can thus store the finger print data in the module and can configure it into either 1:1 or 1: N mode for identifying the person's detail. The Fingerprint module can also be directly interfaced with the 3v3 or the 5v Microcontroller. A level converter is required for interfacing with PC serial port. This optical biometric fingerprint reader having a great feature can also be embedded into a variety of end products, such as: access controlling and attendance or safety deposit box.

3.3 Features of the R305 are

- Integrated images being collected and the algorithm chip all are in one.
- It can be thus embedded into a variety of end services and products.
- Lower power consumption, and lower cost
- Have a small size and have an excellent performance.
- It has a professional optical technology.
- This is having a good image processing capabilities, can capture image up to resolution 500 dpi.
- It encrypts the template of finger using Simple Hashing.

Then the fingerprint processing is done using R305 module, here it consists mainly two phases: fingerprint enrollment and next fingerprint matching. While enrolling, voter needs to enter the fingers one time. The system, after processing

the fingerprint images, it will generate a template of the fingerprint based on the processing results and then stores the template and correlate it with templates in the smart card data. If the images get matched it again checks the image template with the stored data details in the database of electronic voting machine. After crosschecking these if there is a perfect match only the system shows the commands to proceed the election procedures.



Fig -2: R305 Fingerprint Module

3.4 Smart card

A smart card is a security token that has an embedded chip. Smart cards are typically the same size as a driver's license or other like ATM cards and can be made out of metal or plastic materials [5]. These smart cards having the embedded chip will carry the details of the voter. Each individual who is eligible for voting will get this smart card, by embedding his personal details into it. This card has to be used as the one authentication factor during the election. Smart card reader will be provided in order to read the smart card details.

Voting:

After the successful completion of the authentication, the voting is done in the electronic voting machine. The count of the vote is saved in the database by encrypting each vote into another format. Thus, the system of voting gets more secure and valid. Only one person can vote only once, thus no false voting or malpractice will be allowed [6].

3. CONCLUSIONS

Here, we use Fingerprint authentication, smart card verification, encryption using RSA algorithm etc. are some of the technology which helps in designing a secure way election in polling booths.

The more the secure the election becomes the fairer it become to elect the leader candidate to our society. This paper conducts a detailed study on these technologies. Various types of biometric authentication systems were analyzed.

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