# VOT-EL: Three Tier Secured State-of-the-Art EVM Design using Pragmatic Fingerprint Detection Annexed with NFC Enabled Voter -ID Card

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*Abstract—* As India is the largest democratic country in the world elections are considered to be the milestones of our country. among the prominent leaders, a representative has to be chosen to run the country, public affairs and amendments. The tiresome and the most responsible task is to maintain transparency in the electoral process. Violent free elections is one of the most critical tasks in the today's state of society, which requires a lot of manual power and hence the cost so that to ensure elections are conducted in a fair manner. Privacy also plays a major role now a day. But recently it is seen that some influenced people are indulging themselves in malpractices like bogus voting, tampering votes and casting more than one vote thus posing a problem in polling results and the actual verdict given by the people. Classical voting system requires a lot of manual labor, cost, misinterpretation of voters and mistakes during the tally of votes. This paper proposes a new electronic voting machine design for election legitimacy and provides an inexpensive solution based on biometrics system along with the inclusion of face recognition and near-far field communication technology.

*Keywords:* Electronics, Privacy, Online Voting System, Three Tier Security, RFID Cards, Biometrics, Face Recognition

## I. INTRODUCTION

Elections are the important characteristics of any country that upholds the idea of democracy. The classical voting system requires labor to tally the votes manually, which is time consuming, prone to errors and fraudulency.

The proposed system helps to avoid the problem of being hacked, provides privacy and is very secure.

The proposed design also includes technology like biometrics and NFC cards which is used to identify the voters, within short range communication through wireless technology. NFC will be the first tier of security level. The NFC card is brought near the reader within 5centimeters or less the communication is possible in a very secured and reliable manner. The NFC card operates at the frequency range of 13.56 MHz and the data rate is 424 Kbits/sec. The main features that distinguish it from other technologies are peer-to-peer communications and auto-coupling. NFC tag is used to store the information relating to the voters like name, gender, age and location which are used to authenticate. When the NFC tag is scanned, the details which are stored are verified with the back-end system. It is to be noted that NFC card provides high security which is ingrained into it. Since the NFC has short range communication any hacker device when brought in the vicinity will be immediately recognized. After the first level of authentication, the voter enters he second level of authentication that is biometric authentication. Biometrics is the science of analyzing the biological information. Since each individual has unique fingerprints, after procuring the fingerprints from the individual it is used to compare the features of the procured data to that of the features that is stored in the database. After the second level of authentication face recognition will be the last tier of security which is used to identify the user using their facial features. Lastly after passing through all these authentications process the voter is allowed to vote and a message will be generated that the particular voter has submitted his/her vote.

## II. LITERATURE SURVEY

The online voting system is also known as e-voting which includes electronic means of counting votes. It also includes punched cards, optical scan voting etc.

The main advantage of electronic voting is to eliminate "queue system" so that the voters can vote whenever in their free time and thus reduces the congestion. Another noteworthy advantage is that it minimizes the error in vote counting. The submitted votes are stored in the database which can be retrieved by the authority to announce the individual with the highest number of votes.

The voter has to be above 18 years of age. The voter has to get registered as a voter which has to be done prior to the voting date so that the database can be updated.

## III. SIGNIFICANCE OF STUDY

The main purposes of online voting system are:
- Fast and convenient voting service is provided.
- No illegal votes can be casted.
- Online voting system will be precise in tallying the number of votes.

### A. Justification of Work

The online voting system enables the voters to vote from any part of the world. It also reduces the time wasted by the voters in standing in long queues. Since the database uses back end system it stores the information about the votes which can be retrieved later which in turn reduces the error in counting the votes.

### B. Scope of Study
- less labors required
- less cost incurred
- increase in the percentage of voting

### C. Requirements
- registration of the voter to be done by Election Commission Of India
- The information stored during registration can be changed at any time if required.
- Voter is given a unique ID and password.
- The database is used to store the information of every user.

## D. Problems Faced with The Existing Voting System

− Errors during the data entry.
− Loss of paper work: Sometimes the registration forms get lost and therefore many remain as unregistered voters.
− Short time provided to view the voter register
− Expensive and time consuming.

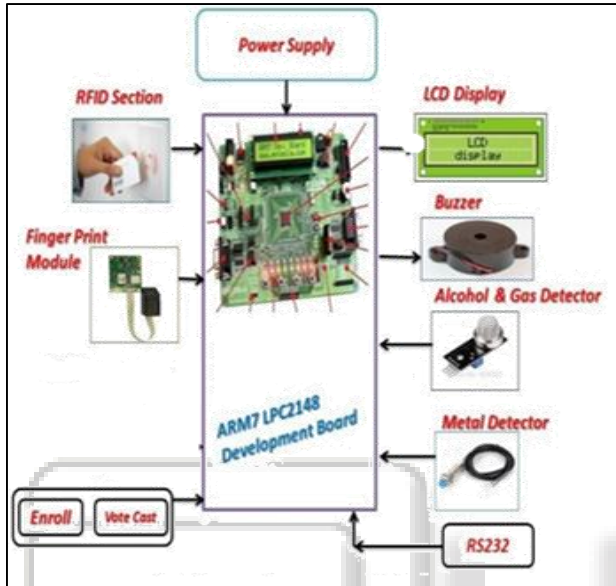## IV. BLOCK DIAGRAM

### A. Components Required



Fig. 1: Block Diagram of Anywhere Voting System

### 1) Hardware Requirements

− ARM LPC2148
− LCD
− Fingerprint sensor
− MQ5 sensor
− RFID unit
− Buzzer
− Metal detector

### 2) Software requirements

− Embedded C
− Keil M vision
− JTAG
− MATLAB

### B. Design Methodology

#### 1) ARM LPC2148

The LPC2148 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU, which provide high speed flash memory at rate 32kB to 512kB.

LPC 2148 belongs to the core of ARM7. When voter brings his RFID tag near

#### 2) Fingerprint Module

In our work, After the authentication of RFID tag, user must go for second authentication. Voter needs to put his thumb finger on fingerprint scanner. If that fingerprint matches with the data stored in the database in LPLC2148 then the voter can cast vote. Fingerprint device is secure.

If a person try to cast his vote for 2nd time a message will be displayed in LCD as YOUR VOITE IS ALREADY REGISTERED.

#### 3) RFID

In this work, four RFID tags are used. Each of the tags contains the voter information. The microcontroller ARM LPC2148 contains the details of voters such as Name of the voter, Date of Birth, AADHAAR ID. When RFID tag is bought near the RFID reader, the reader will activate the details of that particular data of that RFID tag which is already stored in the microcontroller memory.

#### 4) LCD Display

LCD (Liquid Crystal Display) is an electronic display module,16*2 is most used LCD display module.

#### 5) Alcohol Sensor

MQ5 is used for detecting alcoholic person if the sensitivity of MQ5 is adjusted using potentiometer we can get better results.

#### 6) Metal Detector

Metal detector is used to detect a person entering the polling booth with gun or knives.

#### 7) Buzzer

A buzzer is an audio signaling device. The types of buzzers are alarm devices timers etc.

#### 8) Face Recognition

PCA algorithm is used for implementation of face recognition. Here the image is reduced in size to 100*100 pixels. For face recognition database of image will be preprocessed, the processed image is then passed through multiplier unit that reads the eigen vectors from memory and performs the projection using the algorithm. The next stage is passing the eigen space projection into matching block and then performs euclidean distance calculation. At last a decision unit reads these distances and recognizes face.

### C. Methodology

#### 1) The First Stage of Authentication

− The RFID card is scanned by RFID reader.
− The RFID reader activate the details of particular information of RFID tag which is preloaded in to the microcontroller memory.
− The RFID card number is displayed on LCD.

#### 2) The Second Stage of Authentication

− After the RFID authentication, the LCD will display "Please place your finger".
− The voter will be asked to place his finger on the fingerprint scanner.
− The fingerprint of the voter should match to the fingerprint that has been stored in the database.

#### 3) The Third Stage of Authentication

− After the biometrics face recognition is done as the third tier of security.
− The face recognition is done by PCA algorithm.
− The face should be matched to that which is stored in the database.

After passing through all these security tiers the constituency to which the voter belongs to will be displayed along with the candidates who are competing in that particular constituency. The voter can carry along with his voting procedure.

If any of the above mentioned authentication procedure is not fulfilled by the voter, he won't be allowed to cast his vote.

## V. FLOWCHART
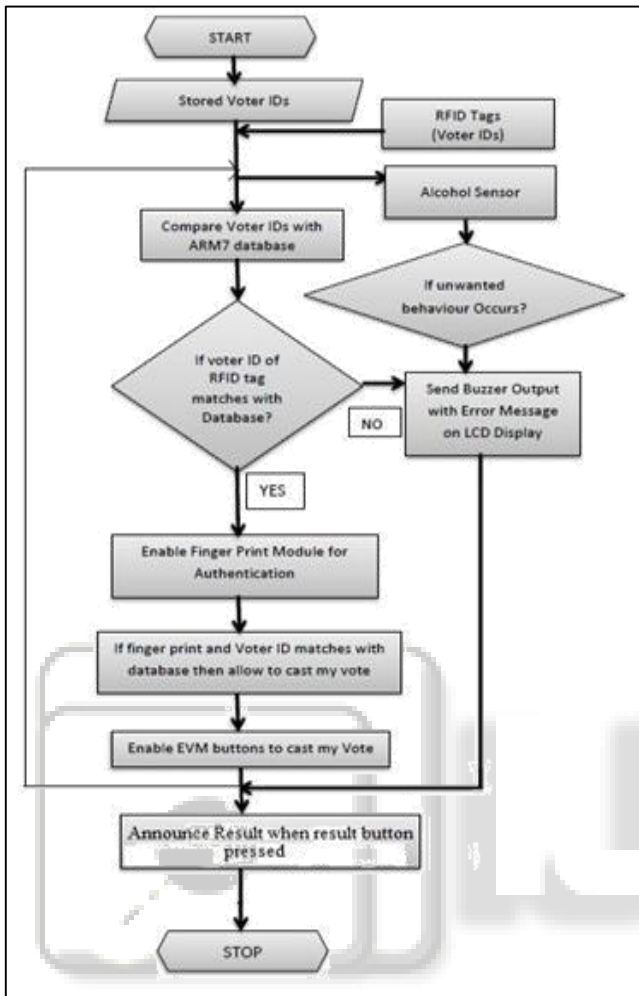


## VI. ADVANTAGES

- The voters cannot perform any tampering during voting.
- The voters cannot do bogus voting as the fingerprint should match the data stored in the database.
- RFID tags provides high security.
- As the fingerprint of each and every person are unique, the design will eliminate illegal voting.

## VII. APPLICATIONS

- For secure and safe voting.
- To detect Moist who tries to enter into polling booth with metals, bombs and guns.
- To detect gas leakage.
- To avoid dummy votes ADHAAR is linked with the RFID tags.

## VIII. CONCLUSION

The best way to decrease the fraudulent is to boost the voting system. This work will provide to vote without going to native place. Hence the voting percentage will increase. It is very safe and secure. This system is efficient and flexible.

The proposed method is to develop a secure internet voting system based on face recognition which tried to overcome all the drawback occur in current voting system. The proposed system provides three phases of authentication. In this system no voter can vote twice because the voter facial patterns will be linked to their Aadhar Card. So that any user tries to vote twice with some other person's RFID card it is not possible due to RFID linked to the Aadhar card and the respective Facial Patterns stored in data storage will not be matched with the voter trying with some other person's RFID. Also the proposed method provides the voter to vote from any region with in India to their Residential Constituency from the nearest Voting Booth with a secure voting process without neglecting to vote.

REFERENCES

[1] International journal of advanced research in computer engineering and technology (IJARCET) volume 2, issue 3, March 2013.
[2] National Conference On Synergetic Trends In Engineering And Technology (STET-2014) International Journal Of Engineering And Technical Research ISSN:2321-0869, Special Issue.
[3] International Journal of Engineering Science and Advanced Technology Volume-4, Issue-2.
[4] www.gfrobot.vom/image/data/SEN130/MQ-5.pdf.
[5] www.techdigest.jhuapl.edu/td/td2501/nelson.pdf.
[6] www.it,com/lit/ds/sym/link/max232.pdf.
[7] Alexander. Stakeholders: Who is your system for? IEEE: Computing and Control Engineering, 14(1):22{26, April 2003}.
[8] programming and Customizing the 8051 Microcontroller-Predko. ]. Alaguvel.R, Gnanavel.G, Jagadhambal.K "Biometrics using Electronic Voting System with Embedded Security".
[9] D.Jennifer, S.K.akshaya, J.ash3, H.swethasalaksshi "Aadhaar based electronic voting system and providing authentication on INTERNET OF THINGS" International Journal of Engineering Science & Advanced Technology, volume-4, Issue-2.
[10] The 8051 Micro controller and Embedded Systems- Muhammad Ali Mazidi and Janice Gillespie Mazidi.
[11] Programming and Customizing the 8051 Microntroller-Predko.
[12] Prof. Pritika, V. Mamankar, Prof. Sonika A, Prof. Rachana S "Face Recognition Using Principal Component Analysis" .IJSER, volume 7, issue2, February-2016.
[13] General information about electronic voting machine.
[14] www.eci.gov.in/Audio_VideoClips/presentation/EVM.ppt
[15] www.indianelections.com/electoralsystem/electricvotingmachine.html