Study of Smart Voting Machine

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Abstract- **The main objective of the democracy is "vote" by which the people can elect the candidates for forming an efficient government to satisfy their needs and requests such that their standard living can be improved. In developing countries like "INDIA" the election commission follows manual voting mechanism which is done by electronic voting machine. The conventional voting mechanisms follow the issue of voter id and other details which is generated manually. So, there are chances of parallax errors. Moreover the electronic voting machine may be devised in a such a way that people whatever and whomever they vote, will be converted into some other's party or candidates. It may be misused. To avoid this automation had been developed. Many organizations and developed countries have accepted the automated system.**

Index terms- **Automated System, Election Commission, Electronic Voting Machine, Vote.**

I.INTRODUCTION

Democracy principles depends upon the people's decision. So, to have great vision we need to take correct decision. This can be made by "voting". The conventional voting mechanisms follows the issue of voter id and other details which is generated manually. So, there are chances of parallax errors. Moreover the electronic voting machine may be devised in a such a way that people whatever and whomever they vote, will be converted into some other's party or candidates. It may be misused. To avoid this system had been developed. As we all know that are India is a democracy nation. In our country government build on the process of election. The voting is done on the normal electronic voting machine. But on that the drawback is fake voting to avoid that we have design this system. There has been a new record set by India for voter turnout at 66.38 % for the General Election 2014 and awareness to vote is rising .Since then the need of project to create an electronic voting system which is

centralized i.e. the voter can vote from any region and data will be automatically uploaded on a centralized server has become a necessity. Number of voters increases day-by-day as time and population in developing countries increase in decades. In day to day practice, majority of voters are busy or occupied to go for work and most of the voter's homes are situated far away from the voting centers, also voters don't like to wait in queues as their time is also valuable. Because of such reasons voter don't visit the polling booth and percentage of voting is decreasing. Centralized server based voting system is very similar for the amendment of this percentage of voting, which is every person's right. In ancient voting systems such as the electronic voting and paper based voting, there were issues of security and also the time taken to count the votes were more. Some improvements are needed in this field. The idea of Centralized Electronic Voting System can prove very useful to solve these problems. I.e. Rigging and Security problems are reduced as compared to old system. Because of the Centralized Electronic Voting System the problem of Rigging i.e. Fake Voting and security issues are solved. The voter can cast his vote from any region because of this there is no need to go to particular region for voting and due to this time is saved. As well as the simultaneous counting can be done in this system and because of this time required to display results is less.

II. LITERATURE SURVEY

In a Centralized Electronic Voting System [2] there has been a new record set by India for voter turnout at 66.38% for the General Election 2014 and awareness to vote is rising .Since then the need of project to create an electronic voting system which is centralized i.e. the voter can vote from any region and data will be automatically uploaded on a centralized server has become a necessity. Number of

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In Smart Voting [3] the main objective of the democracy is "vote" by which the people can elect the candidates for forming an efficient government to satisfy their needs and requests such that their standard living can be improved. In developing countries like "INDIA" the election commission follows manual voting mechanism which is done by electronic voting machine. This machine is placed in the poll booth center and is monitored by higher officials. Due to some illegal activities the polling center are misused and people's vote to right has been denied. This seldom occurs in rural areas as well as in urban cities because the educated people are not interested in casting their votes to candidates who represent their respective areas. To ensure 100 % voting automation came into play. But this automated system have been approved only on some developed countries since security have not been ensured to a large extent. Our main aim of the proposed system is to develop a compatible voting machine with high security. The proposed system is mainly designed for our country. It has three phases. First the details of the persons who are above 18

years are extracted from aadhar card database since it had become mandatory in present scenario. Automatically a new voter id with necessary details will be created and an intimation will be given to the persons through their e-mail. At the time of voting, the user can specify their id and password. To ensure more security, finger prints of the voter is used as the main authentication resource. Since the finger pattern of each human being is different, the voter can be easily authenticated. The system allow the voter to vote through his fingerprint. Finger print is used to uniquely identify the user. The finger print minutiae features are different for each human being. Finger print is used as an authentication of the voters. As soon as they cast their vote, their voter id and other details will be erased automatically and the aadhar card details which they used will be tracked and will be locked to access. This is done to preserve the security. When people cast their vote the results will be updated automatically and on the same day of election, the results will also be published. Also our proposed system supports the on-line voting too.

Drawbacks:
1. System was not reliable.
2. Security was not provided.

In E-Smart Voting System with Secure Data Identification Using Cryptography [4] the strategy and functioning of E-smart voting system (ESVS) which is highly secure, biometric authentication system along with OTP based verification system to improve the voting process during election. Further the vote caste by a user is encrypted before storing in database. ESVS utilizes Aadhar number of user for identification and verification of voter. With smart voting system, voter can cast their vote with mobile phone and avoid all kind of queues at polling booth. At first, user must punch in its Aadhar number in the ESVS. The ESVS utilizes the Aadhar number to authenticate the user through OTP which will be received on their registered Aadhar linked mobile number. People without Smart phones can vote through ESVS with an additional step of authentication through highly sophisticated Aadhar based biometric authentication. Smart Voting System successfully allows people to vote using smart phones thus reduces the queues piled up at polling booth. Also, it provides a highly reliable biometric authentication mechanism for people who do not

want vote using smart phones thus prevent electoral fraud.

Drawbacks:
1. System is complicated.
2. Not user friendly.

In a Smart E-voting System Using RFID Authentication Method for a Campus Electoral [8] a Smart Election System (SES) is an electronic election system (e-voting) for a campus election. The system is based on a client-server system. The application is developed using Microsoft Visual Basic (VB6) and SQL as the database. The system is integrated with an RFID system for the voter's authentication purpose. Students would have to register their profiles. Moreover they would be provided with one RFID tag each before they can use the voting system. The system consists of two application programs. First, the management program which is to be used by the administrator while the other one is the voting terminal program for voters to cast their votes. All information on students and vote counts are stored in the database. The SES Manager is an application that would be used by the administrator to control the voting process. The SES Manager's functions include, but not limited to create voting sessions, add/remove candidate's information, add/view voter's profile and set several voting parameters. The SES Manager is also linked to the database to update, create or remove data stored on it. The prototype of the SES system has been successfully developed and tested. A simulation on the prototype shows that the system meets the requirement for a smart campus electoral system.

III. PROBLEM STATEMENT

Existing system of voting has many issues of security and authentication proposed system gives a better solution of security by using biometric authentication system and additional provides a facility to user to cast a vote using mobile phones. To less chance of water forging and maintenance cost of poll booth smart voting system is introduced. It presents high security through a 10 ticketing a water and also maintains the privacy by encrypting the casted vote. It offers the facility of online voting and save individual time while standing in the queue.

IV. EXISTING SYSTEM

Electronic Voting is the standard means of conducting elections using Electronic Voting Machine, sometimes called "EVMs" in India. The use of EVMs and electronic voting was developed and tested by the state-owned Electronics Corporation of India and Bharat Electronics in the 1990s. They were introduced in Indian elections between 1998 and 2001, in a phased manner. The electronic voting machines have been used in all general and state assembly elections of India since 2004.

An EVM consists of two units, a control unit, and the balloting unit. The two units are joined by a five-meter cable. Balloting unit facilitates voting by a voter via labeled buttons while the control unit controls the ballot units, stores voting counts and displays the results on 7 segment LED displays. The controller used in EVMs has its operating program etched permanently in silicon at the time of manufacturing by the manufacturer. No one (including the manufacturer) can change the program once the controller is manufactured. The control unit is operated by one of the polling booth officers, while the balloting unit is operated by the voter in privacy. The officer confirms the voter's identification then electronically activates the ballot unit to accept a new vote. Once the voter enters the vote, the balloting unit displays the vote to the voter, records it in its memory. A "close" command issued from the control unit by the polling booth officer registers the vote, relocks the unit to prevent multiple votes. The process is repeated when the next voter with a new voter ID arrives before the polling booth officer. EVMs are powered by an ordinary 6 volt alkaline battery manufactured by Bharat Electronics Limited, Bangalore and Electronics Corporation of India Limited, Hyderabad. This design enables the use of EVMs throughout the country without interruptions

because several parts of India do not have the power supply and/or erratic power supply. The two units cannot work without the other. After a poll closes on a particular election day, the units are separated and the control units moved and stored separately in locked and guarded premises.

Both units have numerous tamper-proof protocols. Their hardware, by design, can only be programmed once at the time of their manufacture and they cannot be reprogrammed. They do not have any wireless communication components inside, nor any internet interface and related hardware. The balloting unit has an internal real-time clock and a protocol by which it records every input-output event with a timestamp whenever they are connected to a battery pack. The designers intentionally opted for battery power, to prevent the possibility that the power cables might be used to interfere with the reliable functioning of an EVM.

An EVM can record a maximum of 3840 (now 2000) votes and can cater to a maximum of 64 candidates. There is provision for 16 candidates in a single balloting unit and up to a maximum of 4 balloting units with 64 candidate names and the respective party symbols can be connected in parallel to the control unit. If there are more than 64 candidates, the conventional ballot paper/box method of polling is deployed by the Election Commission. After a 2013 upgrade, an Indian EVM can cater to a maximum of 384 candidates plus "None of the Above" option (NOTA).

The current electronic voting machines in India are the M3 version with VVPAT capability, the older versions being M1 and M2. They are built and encoded with once-write software (read-only masked memory) at the state-owned and high-security premises of the Bharat Electronics Limited and the Electronics Corporation of India Limited. The inventory of election EVMs is securely tracked by the Election Commission of India on a real-time basis with EVM Tracking Software (ETS). This system tracks its digital verification identity and physical presence. The M3 EVMs has embedded hardware and software that enables only a particular control unit to work with a particular voting unit issued by the Election Commission, as another layer of tamper-proofing. Additional means of tamper proofing the machines include several layers of seals. Indian EVMs are stand-alone non-networked machines.

The control unit is with the presiding officer or a polling officer and the balloting Unit is placed inside the voting compartment. The balloting unit presents the voter with blue buttons (momentary switch) horizontally labeled with corresponding party symbol and candidate names. The Control Unit, on the other hand, provides the officer-in-charge with a "Ballot" marked button to proceed to the next voter, instead of issuing a ballot paper to them. This activates the ballot unit for a single vote from the next voter in the queue. The voter has to cast his vote by once pressing the blue button on the balloting unit against the candidate and symbol of his choice.

As soon as the last voter has voted, the Polling Officer-in-charge of the Control Unit will press the 'Close' Button. Thereafter, the EVM will not accept any votes. Further, after the close of the poll, the Balloting Unit is disconnected from the Control Unit and kept separately. Votes can be recorded only through the Balloting Unit. Again the Presiding officer, at the close of the poll, will hand over to each polling agent present an account of votes recorded. At the time of counting of votes, the total will be tallied with this account and if there is any discrepancy, this will be pointed out by the Counting Agents. During the counting of votes, the results are displayed by pressing the 'Result' button. There are two safeguards to prevent the 'Result' button from being pressed before the counting of votes officially begins.

a. This button cannot be pressed till the 'Close' button is pressed by the Polling Officer-in-charge at the end of the voting process in the polling booth.
b. This button is hidden and sealed; this can be broken only at the counting center in the presence of a designated office.

A candidate can know how many people from a polling station voted for him. This is a significant issue particularly if lop-sided votes for/against a candidate are cast in individual polling stations and the winning candidate might show favoritism or hold a grudge on specific areas. The Election Commission of India has stated that the manufacturers of the EVMs have developed a Totalizer unit which can connect several balloting units and would display only the overall results from an Assembly or a Lok Sabha constituency instead of votes from individual polling stations.

1. EVM Software Isn't Safe

The electronic voting machines are safe and secure only if the source code used in the EVMs is genuine. Shockingly, the EVM manufacturers, the BEL and ECIL have shared the 'top secret' EVM software program with two foreign companies, Microchip (USA) and Renesas (Japan) to copy it onto microcontrollers used in EVMs. This process could have been done securely in-house by the Indian manufacturers.

2. EVM hardware isn't Safe

The danger for EVM manipulations is not just from its software. Even the hardware isn't safe. Dr. Alex Haldeman, professor of computer science in the University of Michigan says, "EVMs used in the West require software attacks as they are sophisticated voting machines and their hardware cannot be replaced cheaply. In contrast, the Indian EVMs can easily be replaced either in part or as wholesale units." One crucial part that can be faked is microcontrollers used in the EVMs in which the software is copied. EVM manufacturers have greatly facilitated fraud by using generic microcontrollers rather than more secure ASIC or FPGA microcontrollers.

3.Vulnerability to hacking: The Indian EVMs can be hacked both before and after elections to alter election results. Apart from manipulating the EVM software and replacing many hardware parts discussed above, Indian EVMs can be hacked in many ways.

V. SYSTEM DESCRIPTION

Our Proposed System is a finger-print based application that enhances our country with a better voting system to ensure 100% voting. Since the existing voting system is not having high security our project will overcome this major drawback. Our digital voting system generates the list of all the people in the state above 18 years from the database which is similar like aadhar card database, since it is made mandatory in our country today From the generated list our system will automatically generates a voter id for people above the age of 18.Hence by this way nobody will be left out without getting their right to vote which fails in the existing system. Therefore 100% voting will be achieved.
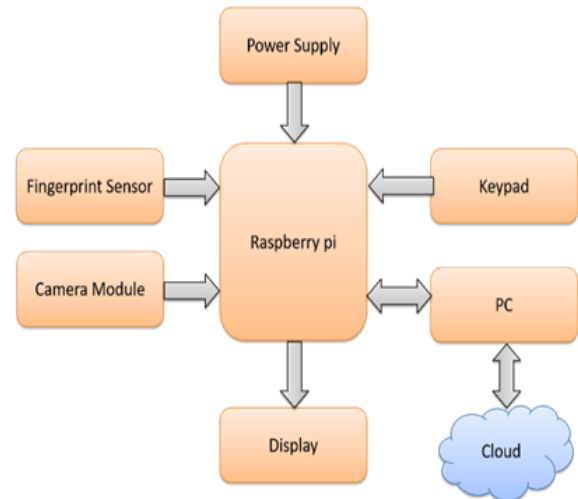
We can design this system using different types of controller like Arduino or by ARM processors or by raspberry pi. In this many times issue is arriving like memory problem or any interfacing problems. Many controllers are not compatible with many interfacing devices. Basically for are system we mostly prefers the Arduino or raspberry pi. Here we are going to use raspberry pi due to some drawbacks of Arduino that are as follows:

1. Having only one USB input whereas raspberry pi has 4 USB ports.
2. Arduino has only 14 digital pins.
3. Having less memory not reliable. To overcome all the drawbacks and with some basic Advantages we are selecting the raspberry pi. Raspberry pi has its own os.

Hardware Requirement

Raspberry Pi

It is a mini computer with Raspbian OS. It can run multiple programs at a time.

It is easy to power using a USB cable.

The Recommended programming language is python but C, C++, Python, ruby are pre-installed. It is reliable.

Raspberry Pi can be easily connected to the internet using Ethernet port and USB Wi-Fi dongles.

Raspberry Pi did not have storage on board. It provides an SD card port. Hence it has more memory than Arduino.

Raspberry Pi has 4 USB ports to connect different devices.

The processor used is from ARM family.

This should be properly shut-down otherwise there is a risk of files corruption and software problems. This is a just plug and play device. If power is connected it starts running the program and if disconnected it simply stops.

1. Fingerprint Sensor

The fingerprint sensor is one kind of sensor which is used in a fingerprint detection device. These devices are mainly inbuilt in the fingerprint detection module. The main features of this device mainly include accuracy, better performance, robustness based on exclusive fingerprint biometric technology. Both fingerprint scanner otherwise reader are an extremely safe & suitable device for safety instead of a secret word. Because the password is easy to scan and also it is hard to keep in mind. So, better to use USB based fingerprint reader or scanner using biometric software for verification, identification, and authentication, that allow your fingerprints to perform similar to digital passwords. These passwords cannot be forgotten, lost otherwise stolen. Features of Fingerprint Sensor:

1. It includes image collection as well as chip algorithm.
2. The fingerprint reader can perform lesser growth and can be fixed into a range of end products.
3. Low power use, excellent performance, small in size, and less cost.
4. Optical technology which is used is professional, and exact module developed techniques
5. The capabilities of image processing are good, and can effectively capture pictures up to 500 dpi resolution.

2. Camera Module

To provide an extra layer of privacy to Aadhaar, UIDAI has introduced an updated 'QR code' that holds non-sensitive details like name, address, photo, and date of birth, and can be used for off-line user verification without the 12-digit ID number. With Aadhaar increasingly becoming the nationally-accepted ID for all kinds of work, the new QR code, which now comes with photo, can be used in off-line mode in a way that will safeguard against any tempering of documents.

UIDAI will provide SHA-1 and SHA-256 for verification. Both QR codes of e-Aadhaar contain demographic details of resident like Name, Address, Date of Birth, Gender and Masked Aadhaar Number. In addition, the larger QR code contains photograph also. QR Code Model 1 and 2: This is the QR Code we see on a daily basis. There are more than 10 different types of QR codes that can be created for business or personal use. Some of these QR codes are more suited to a particular QR code use case whereas some can help your QR code marketing endeavors. Some of the most common types of QR codes include a. URL QR Code b. PDF QR Code c. Image gallery QR Code d. vCard QR Code e. Goggle Maps QR code The largest version of Model 1 is 14 (73x73 modules) and is capable of storing 1,167 numerals. Module 2s largest version is 40 (177x177 modules) capable of storing 7089 numerals. Micro QR Code: This QR code is usually found on product packaging. It only has one orientation making it easier to print on smaller surfaces. This code is viable even as a 2 module whereas a QR code requires at least 4 modules. The largest version of this QR code is M4 (17x17 modules) and is capable of storing 35 modules.

QR Code: This can be printed as a square or a rectangular QR Code. It can be printed as dot pattern code, inversion code or a turned over code. The maximum version is 61 (422x422 modules) which can store about 40,000 numerals. SQRC Code: This looks like a regular QR code except it is restricted and is used to store confidential information. Frame QR: This type of QR code has a frame area wherein you can place letters and images and is used for promotional activities. HCC2D Code: The High Capacity Colored 2-Dimensional (HCC2D) Code is still in the prototyping phase and has been proposed by researchers to preserve QR robustness to distortions. It uses colors to increase data density and to cope with chromatic distortions, HCC2D codes use an additional field called Color Palette Pattern.

3. Keypad

Keypad is essential for the project. A voter wants to vote their candidate. By selecting specific keys, a voter can give vote to their candidate on keypad. Hence, when number of respective candidate is pressed the count in the database will increase by one.

4. Power Supply

The first, recommended and easiest way to power the Raspberry Pi is via the Micro USB port on the side of the unit. The recommended input voltage is 5V, and the recommended input current is 2A. Our standard power supply for the Raspberry Pi is 5.1V @ 2.5A.

5. Display

Display is used to show the running condition. Authentication, Validation, Voters Information, Candidates List, Confirmation, etc. are displayed on display. Raspberry pi has HDMI port which can connect display. Also touchscreen display can also attached raspberry pi.

Flow of System

A voter can scan his any one of his/her fingerprint by fingerprint scanner or QR code by QR code scanner i.e. UID identity. System will detect this fingerprint or QR Code through scanners and then this fingerprint is match with database stored on cloud. Display is use to display the session for voting is started or also for unsuccessful scan of fingerprint or for showing voted candidate. Keypads which are connected to Raspberry pi are used to select the candidate shown on screen and to add or remove the fingerprint from database. Using computer we can save our database on off line storage as well as cloud storage. When a voter scans there any one of fingerprint system will detect the fingerprint and will matched with database stored at cloud. If the scanned fingerprint is valid the next process will start but if it is not matched then by re-scan or scanning QR code a voter can be identified. When a voter get identified LCD will display the voter is identified. And system will give the access to vote for their candidates in their respected region. By pressing number voter can vote their candidate.

A. DATABASE Creation:

Firstly we have to create database which is similar to aadhar card database. This database has information of people from all age. It includes name, address, fingerprint and it will create QR code of respective data. This database will be stored on cloud and can be available offline also.
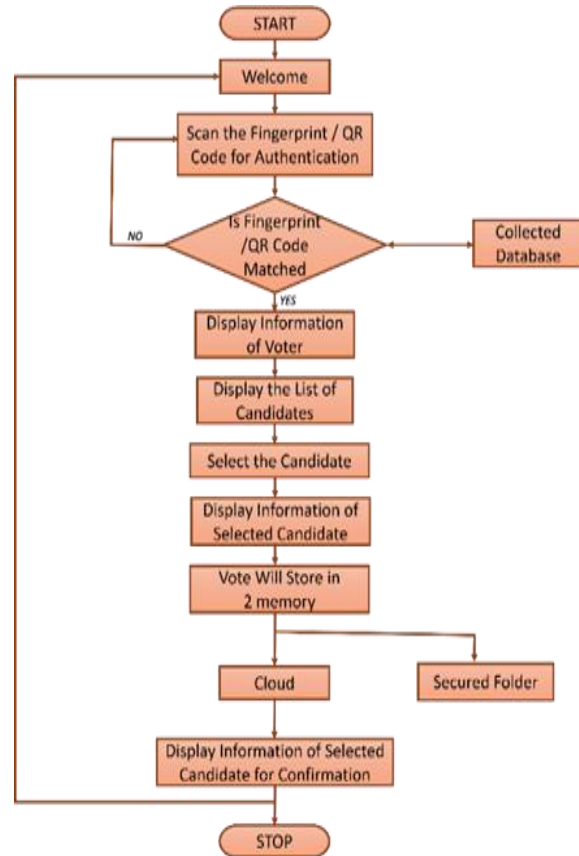
B. DATABASE Creation:

Firstly we have to create database which is similar to aadhar card database. This database has information of people from all age. It includes name, address, fingerprint and it will create QR code of respective data. This database will be stored on cloud and can be available offline also.

C. Authentication

For voting existing system voter need to verify his/her identity two or three times and need to inked the finger. This system will automatically verify the voter and no need to be inked the nail. The authentication will done using the fingerprint scanner which is placed at the main door of booth. Voter has already created his/her id in the database previously discussed. Voter will scan his/her fingerprint and it will be verified with database by fingerprint sensor which is placed at booth. If fingerprint is not detected then voter can verify its identity by QR code scanning. The QR code will be available on his/her voter id card.

D. Voting Process:

When voter verified his/her identity by fingerprint or QR code scanning candidate list will appear on screen or display. The candidate list will be respective to their area. The voter can vote candidate by pressing buttons on keypad. After confirming the candidate, voter will see again the voted candidate on display. After this system will be end with the thank you display and will be start again for next voter. The vote will be save online on cloud as well as offline in memory provided and this information will be stored in database. By this the same voter will not be able to vote again.

Result: The result for the election will be declared on online i.e. cloud as well as offline on booth center also in a very short time like within an hour.

VI. MERITS

- Automated voter id generation
- Reduces manual work
- Transparent voting system
- Secure voting system
- Digital voting

VII. CONCLUSION

As we all know that are India is a democracy nation. In our country government build on the process of election. The voting is done on the normal electronic voting machine. But on that the drawback is fake voting to avoid that we have design this system. As we are the engineers of our society we have right towards the society that we have to make the product that help us for society. By taking the motivation from that we have decided to design this system. We have selected Raspberry pi 3 B+ other than other controllers due to its advantages like separate OS, directly plug and play concept and user friendly. A voting machine with tracking, scanning, etc. will be developed and a computer will be attached to that machine through USB cables. The user has to first login into the system through the fingerprint. Authentication is being granted from the aadhar finger print database. If it matches, the voter will be allowed to enter their voter id and cast their vote for their interested party. People trying to vote second time is not being allowed as once the finger print is granted authentication the login is being denied for the user. The caste vote is being updated at each instance of time in the database. The election results can be published at the same day with high accuracy and efficiency. Also, people who are voting through on-line will also go through some authentication process.

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