Multifactor Authentication based Electronic Voting Machine

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***Abstract*- Today in India Electronic voting Machines (EVM) are used for voting. Verification is conducted based on voter ID cards. Today's voting machine system not able to prevent multiple votes casting by the same person. But this is illegal according to law. If this happen, fraud cases will be more in election. So it will lead to the unfair elections and quarrel between political parties. The basis of this project is to create an electronic voting machine that will help to prevent frauds in voting by including multiple layers of verifications to ensure the true identity of person and thus ensures that fair election is conducted. This system eliminates the manual verification since it requires more time by introducing new technologies in the present EVM. All details of voter is stored in database. The authentication of voter is done with respect to the data in the database.**

Keywords— Raspberry Pi, Bulk SMS, Webhost server, MFA, OTP

I. INTRODUCTION

E-Voting has been a very controversial topic ever since The Presidential Elections in the U.S. in 2000. Many Security flaws were found. The Standards for the implementation of E-Voting systems were shown to be too weak and many (Scientific) Experts expressed their negative opinions on E-Voting. Nevertheless, efforts are still made to introduce e-voting in Countries that use traditional paper ballots. E-Voting is an Election Method in which the Votes are Cast or Collected electronically. A Computer System whose main element is a Software Component that maps the voting procedure electronically is called an E-Voting System. A Direct Recording Electronic (DRE) Machine is a special case of system which implements all steps in the process of voting, from registration and ballot polling to counting. There are two different forms of voting: Distance and Presence Voting. In present voting system, a voter can cast his/her vote in a polling station under the supervision of the election administrator. Examples for presence voting are conventional elections in polling stations or voting with E-Voting Machines. In Distance Voting, the voter acts without the supervision of the electoral and casts his or her vote from a place [1].

In the existing Electronic Voting Machine security is less. Only voter ID verification exists. Whenever voter comes to polling station, voter is authenticated with only voter ID cards. This proposed voting Electronic voting machine is evolved to provide authentication mechanisms to authorize the true identity of voter. This proposed system has Electronic Voting Machine along with authentication mechanisms. This system prevents frauds in voting by including multiple layers of verifications. In this proposed system voter can be added or deleted from the database in a easy way. This system also consists of online counting system which is not in the existing system.

II. PROBLEM STATEMENT

Today in India or any other countries of the world Electronic Voting Machines (EVM) are used for voting. Verification is conducted based on voter ID cards. The present Electronic voting machine does not have any effective mechanisms to authenticate the voter.

This proposed system has fingerprint matching system and OTP technology [4] as authenticate mechanisms. This two factor authentication makes the voting system more safety. The authenticate mechanisms used here are latest and efficient technologies. The system will unlock voting machine after the authentication of particular voter only. The voting machine will lock again after voting. This will continued for every voter. . So this system has two level verification, which is more reliable and safe.

III. METHODOLOGY

In existing voting system, the security is less. Only voter ID verification exists. The proposed system can overcome this problem by using Multifactor Authentication method. Multi-factor authentication (MFA) is a method of confirming a voter's claimed identity in which a voter is granted access only after successfully presenting two or more pieces of evidence (or factors) to an authentication mechanism. In this project fingerprint verification and OTP technologies will be

used. The database is created on webhost server. OTP will be sent through Bulk SMS server to particular number. First voter has to give his fingerprint. System will compare this fingerprint with the data in database [2]. If it is matching, then it will send OTP (one time password) to that particular voter's number. Voter has to enter that OTP to unlock voting machine. Then voter can vote. And the voting machine will locked again. All these are controlled using a single board Raspberry Pi [3]. Python programming language is to be used to program the Raspberry Pi according to requirement.

IV. BLOCK DIAGRAM

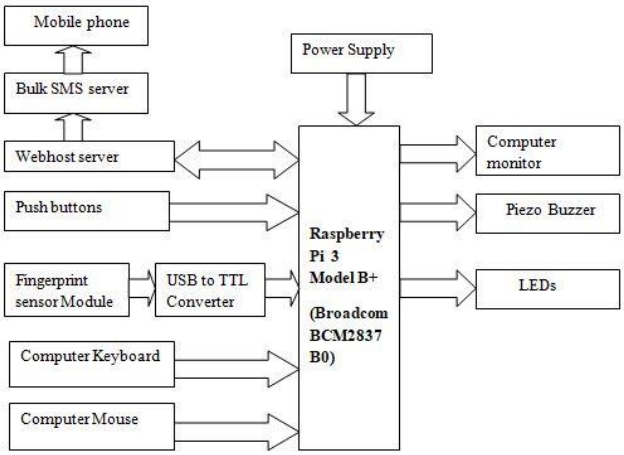

Figure 1: Block Diagram of Multifactor Authentication based Electronic Voting Machine

Power Supply
Every system needs power source to work with it. Raspberry Pi uses adaptor as power source. This power supply adaptor is used for power up the entire system.

Raspberry Pi 3 Model B+
Raspberry Pi 3B+ is the controller in this proposed system. The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz [3] and 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet.

Pushbuttons
A push-button or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. In this project 4 pushbuttons are used. It facilitates the voter to cast the vote.

Fingerprint Sensor Module
The fingerprint sensor used in this project is R307. This sensor works as an optical sensor. In this proposed system it is used to scan the fingerprint of voter when creating database of voter and it is also used at the time of authentication.

USB to TTL Converter
USB to TTL converter used to convert TTL input into USB output or vice versa. Here it is used to convert TTL output of fingerprint sensor into USB output.

Computer Keyboard
Since raspberry pi is a single board computer, it need keyboard to work with it. Here keyboard is used to enter OTP.

Computer Monitor
Since raspberry pi is single board computer, it need monitor to work with it. Here monitor is used as output device.

Piezo buzzer
Piezo buzzer is an electronic device commonly used to produce sound. Here it is used as an indicator. The buzzer will produce sound when voter press the pushbutton.

LEDs
A light-emitting diode is a semiconductor light source that emits light when current flows through it. Here LEDs are also used as indicators. The LED will blink when voter press the pushbutton.

Webhost Server
Webhost Server is a free server and allows to store the data up to 1GB. Here this server used to store the databases of voter.

Bulk SMS Server
Bulk SMS Server provides bulk SMS Service. It sends the messages via internet. Usually bulk SMS Service used when there is need of sending large amount of SMS.

Mobile phone
This represents the mobile phone of voters on which they receive OTP.

V. FLOWCHART

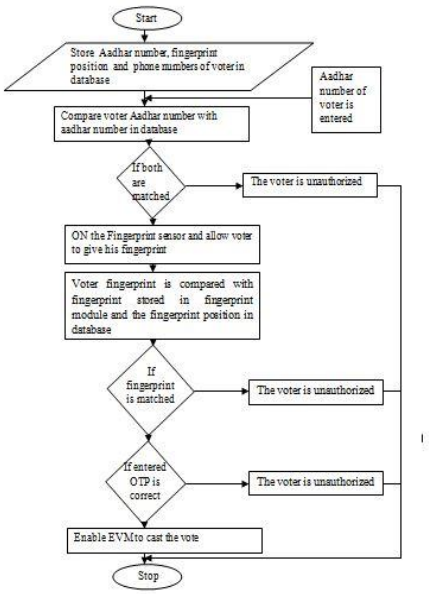

Figure 2: Flowchart of Multifactor Authentication based Electronic Voting Machine operation

VI RESULTS

Figure 3: Working model of Multifactor authentication based electronic voting machine

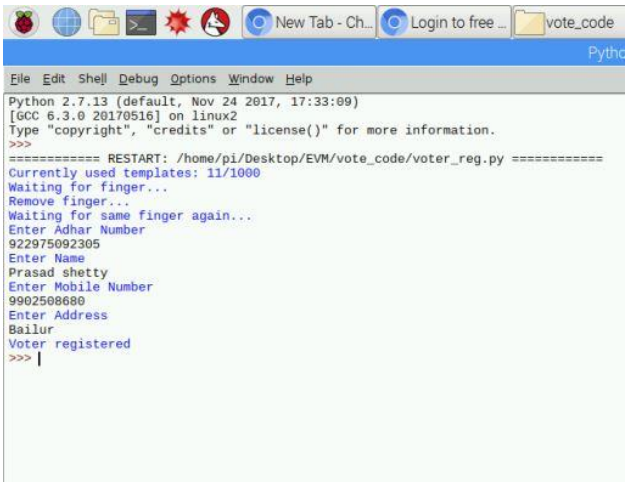

Figure 4: Snapshot of voter Registration

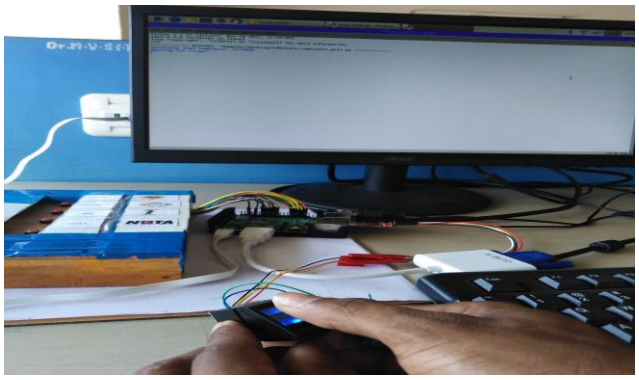

Figure 5: Fingerprint authentication

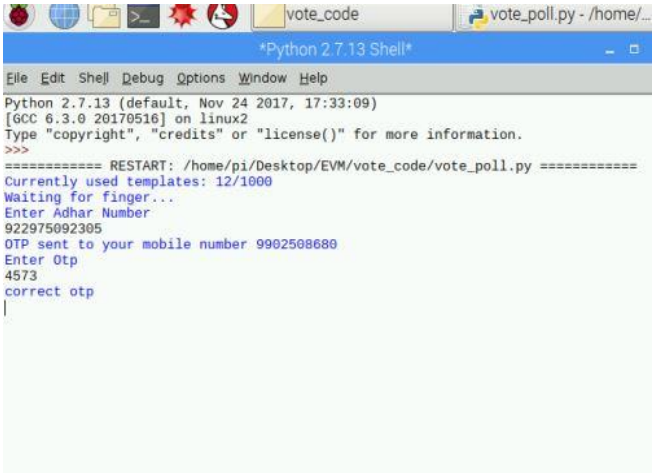

Figure 6: OTP authentication

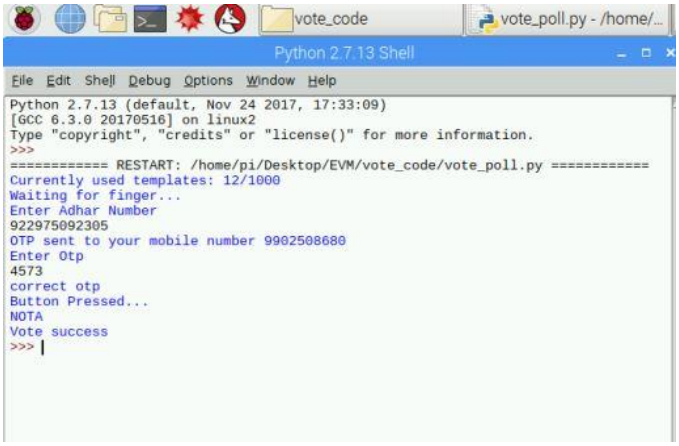

Figure 7: Vote has been placed

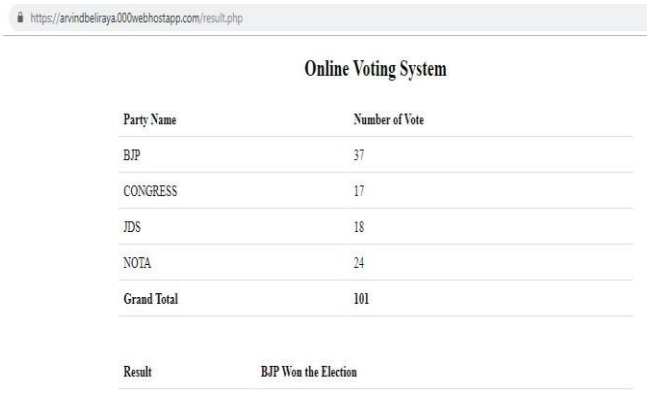

Figure 8: Result in the online counting system

VII APPLICATIONS

- This proposed Electronic Voting Machine can be used for efficient voting.
- This contains Multifactor Authentication mechanisms
- The authentication mechanisms used are Fingerprint technology and OTP which are latest technologies
- These authentication mechanisms makes the voting system more secured.
- This will greatly reduces frauds in voting.
- The authentication of voter is done according to data in database [5]. This is very efficient.
- The automatic counting of vote system is introduced in this project. This will greatly reduces the time taken to count the votes.
- Since this system contains authentication mechanisms, it can replace manual verification of voter ID cards.

VIII ADVANTAGES

- Less hardware requirement
- Online storage is used
- Multi Factor Authentication techniques.
- More efficient authentication mechanisms.
- System is portable
- Flexible
- Low power consumption.
- Automatic counting system
- Time efficient system
- Simple architecture
- Fast Response time

IX CONCLUSION

The intension of this project is to design a Electronic Voting Machine which contains authentication mechanisms to ensure the true identity of voter. This is the best solution to prevent frauds in voting. If present voting system is replaced by this system, it provides a new breakthrough to authorize the voter. The proposed system gives the best solution for minimizing the time taken for identifying the voter.

X FUTURE SCOPE

Some more authentication mechanisms can be added. This proposed system has the ability to count votes from a single voting system. It can be improvised in future by connecting many voting machines to server. So that every vote can be counted. The system can also be made more flexible by adding some mechanisms to run every code in easy way. Since this system requires internet, connectivity can be improved in future.

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