

Biometrics Based Voter Verification System

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Abstract: In Democratic countries like India, the voting system plays a major role during elections. The electronic voting machines are used for voting, but still, the voter verification is done manually which is more time consuming. To avoid misconceptions during elections, a lot of advanced techniques are being proposed. A solution is proposed for the voting system using biometrics. Various algorithms and techniques provided are based on the multimodal biometric identification. This principle is about the concept of getting the fingerprint impression of a voter which is entered as input to the system. If the fingerprint pattern matches with anyone in the record, then an access to vote is granted for the voter. Use of biometrics verification makes voter identification more reliable and through the process more time can be saved. The SMS notification is helpful to find out the illegal vote casting of a person. This result is instantaneous, and counting is done within the system.

Key Words: voter, biometrics, fingerprint, identification.

1. INTRODUCTION:

Voting is done to express an opinion or to make a collective decision. In a country, government is elected by means of voting. In the early days the voters used to cast their vote by using paper, punch card, mechanical lever and optical scan machine. It later got evolved from that traditional voting system to using electronic voting machines. The traditional system also had issues about accuracy, flexibility, privacy, verifiability, security. The electronic voting system overcomes all those issues. So, currently the electronic voting system is being used in India.

The voter cannot choose the voting centre or city of his or her preference. This means that if a person wants to vote in the election then he or she can vote from only specified voting centre from his locality and if the voter is out of town due to some reason, he or she cannot exercise the voting right. This is the biggest disadvantage of the current voting system. As per recent voting system of Indian election the average voting is 60 to 70% because the person is unable to vote from anywhere.

2. LITERATURE REVIEW:

A Novel and Secure Methodology for Voting using Encryption and Biometrics

It is ensured about the integrity and confidentiality of voting. Their whole system is implemented using Raspberry Pi 3 and python language. Smart card which is made of metal or plastic material contains an embedded chip which stores the details of voters. They also used R305 fingerprint sensor module, so before proceeding to further election process the system checks the template of fingerprint with the one in smart card and their voting system database. And after that the vote is encrypted and stored in database. Hence, confidentiality is provided, and people can vote from any election booth which increases the voting rate of the country.

Online Voting System Using Android Application

In Online Voting System Using Android Application, they have said that they have made an application which can be used in android devices. By using this application, the user will be able to vote from anywhere. He just need to enrol or register in that application by inserting his details and his image for identification which will be stored in the central database present at server side. After that when the voting date gets fixed, the user will get the notification through GCM, he must open the application which will then authenticate his face and generate an OTP and send it to his mail if he is a valid user. Then he can vote by clicking on submit button and then he can logout. His vote will be counted and saved in database.

An Online Voting System Using Biometric Fingerprint and Aadhaar Card

It provides quality performance and also enhanced security to the voting system, The paper deals with the architecture and progress of a voting system (mainly web-based) using fingerprint and Aadhaar card. The prior aim is to make the voting system more pragmatic. The system permits the user to scan his fingerprint which is then checked

with the database for ambiguity. The voting system is made as lucid as possible and the prerequisites are- the user must login by his Aadhaar card number and password provided, and then click on his favourite candidate to give the vote. It will augment the percentage of voting in India thereby reducing the cost of voting process. The use of biometric fingerprint delivers much security thereby reducing biased votes.

Offline and Online E-Voting System with Embedded Security for Real Time Application

An electronic voting (e-voting) system is a voting system in which the election data is recorded, stored and processed primarily as digital information. There are two types of e-voting: On-Line and Offline. On-line, e.g. via Internet, and offline, by using a voting machine or an electronic polling booth. Authentication of Voters, Security of voting process, securing voted data are the main challenge of e-voting. This is the reason why designing a secure e-voting system is very important. In many proposals, the security of the system relies mainly on the black box voting machine. But security of data, privacy of the voters and the accuracy of the vote are also main aspects that have to be taken into consideration while building secure e-voting system. In this project the authenticating voters and polling data security aspects for e-voting systems was discussed. It ensures that vote casting cannot be altered by unauthorized person. The voter authentication in online e-voting process can be done by formal registration through administrators and by entering GSM One-time password. In Offline e-voting process authentication can be done using facial recognition, finger vein sensing and RFID (smartcards) which enables the electronic ballot reset for allowing voters to cast their votes. Also, the voted data and voters' details can be sent to the nearby Database Administration unit in a timely manner using GSM System with cryptography technique.

3. HARWARE REQUIREMENTS:

3.1. ARDUINO R3:

The Arduino UNO R3 is most widely used microcontroller board in the family of an Arduino. This is the latest version of an Arduino board and released in the year 2011. The main advantage of this board is that a mistake made in the program could be easily changed in the microcontroller on the board. The main features of this board mainly include, it is available in DIP (dual-inline-package), detachable and ATmega328 microcontroller. The programming of this board can easily be loaded by using an Arduino computer program. It comprises 14-digit I/O pins. From the 14 pins, 6-pins can be used like PWM outputs. This board includes 14 digital input/output pins, Analog inputs-6, a USB connection, quartz crystal-16 MHz, a power jack, a USB connection, resonator-16Mhz, a power jack, an ICSP header an RST button.

Input and Output:

An Arduino Uno R3 includes 14-digital pins which can be used as an input otherwise output by using the functions like pin Mode (), digital Read(), and digital Write(). These 14 pins can function with 5V, and every digital pin can give or receive 20mA, & includes a 20k to 50k ohm pull up resistor.

3.2. GSM SIM-900:

GSM SIM-900 is the more compact wireless module. The SIM900A is a Dual-band GSM/GPRS solution. It is used in the SMT module which can be embedded in various applications. The SIM900A provides GSM/GPRS 900/1800MHz performance measure in the specifications such as voice, SMS, Data, and Fax with low power consumption. The small dimensional measure of 24mmx24mmx3mm, makes SIM900A to fit in almost all the space requirements in all needed user application.

3.3. FINGERPRINT SENSOR:

Fingerprint sensor modules makes fingerprint recognition more easy to access. This indicates that it involves having very less efforts to make fingerprint collection, registration, comparison and search. The Fingerprint sensor modules would have FLASH memory to store the fingerprints. The Fingerprint sensor can work with any microcontroller or system with TTL serial. The Fingerprint Sensor module has the capability of storing 127 different fingerprint patterns. The Fingerprint Sensor used in the system is AS606 Fingerprint Sensor.

3.4. Wi-Fi ESP8266

ESP8266 is Wi-Fi enabled system on chip (SoC) module developed by Espressif system. ESP8266 has a 64 KB boot ROM along with 64 KB instruction RAM and 96 KB data RAM. SPI is used to access the external memory. ESP8266 plays a very important role in Endpoint IoT development. A set of AT Commands has been used by the microcontroller in order to communicate with the Wi-Fi Module. Specified Baud rates are used for communication with ESP8266-01 Wi-Fi Module.

3.5 BUZZER

A buzzer is always referred to as the audio signaling device. It has an input supply voltage of 5V direct current. The oscillating frequency of buzzer ranges between 3.0 ± 0.5 KHz. The buzzer sound pressure level is around 85dB min. The buzzer has a current consumption of 9.0mA max.

The applications of buzzer are almost in all fields. Few important areas include confirmation of user's input, Electronic metronomes, Judging Panels and Annunciator panels.

4. SOFTWARE REQUIREMENTS

4.1 ARDUINO IDE

The Arduino Integrated Development Environment is a cross-organize application, written in limits from dialects of C and C++. It is utilized to compose and transfer projects to Arduino perfect sheets, yet in addition, with the assistance of outsider centres, other seller improvement sheets.

The Arduino IDE bolsters the dialects C and C++ utilizing extraordinary standards of code organizing. The Arduino IDE supplies an item library from the Wiring adventure, which gives various essential information and yield strategies. Client composed code just requires two essential capacities, for beginning the sketch and the principle program circle, that are arranged and connected with a program stub fundamental() into an executable cyclic official program with the GNU toolchain, likewise included with the IDE conveyance. The Arduino IDE utilizes the program avrdude to change over the executable code into a book document in hexadecimal encoding that is stacked into the Arduino board by a loader program in the board's firmware.

4.2 FIREBASE:

- Firebase gives an ongoing database and backend as a help. The administration gives application engineers an API that permits application information to be synchronized across customers and put away on Firebase's cloud.
- Firebase Analytics is a without cost application estimation arrangement that gives knowledge into application use and client commitment. Firebase offers help for disconnected tasks.
- Database activities are composed locally and synchronized with the Firebase database when arrange availability is set up. The firebase database was structured and associated in a manner where the information is naturally pushed and pulled from the database.

5. PROPOSED SYSTEM:

The current voting system in India is Electronic voting system. The Electronic Voting Machines (“EVM”) is designed by Bharat Electronics Limited (BEL) which is located in Bangalore and Electronics Corporation of India Limited (ECIL) in collaboration with Election commission of India. The machines are as of now delivered with two endeavours. It comprises of two units,

- I) Balloting
- II) Control

These two units are present in the voting machine. The first unit balloting unit is located inside the balloting compartment and the control unit is present at the Polling Officer and these units are connected by a link of five meter. system provides an efficient time-saving and provides safety to the public.

6. IMPLEMENTATION:

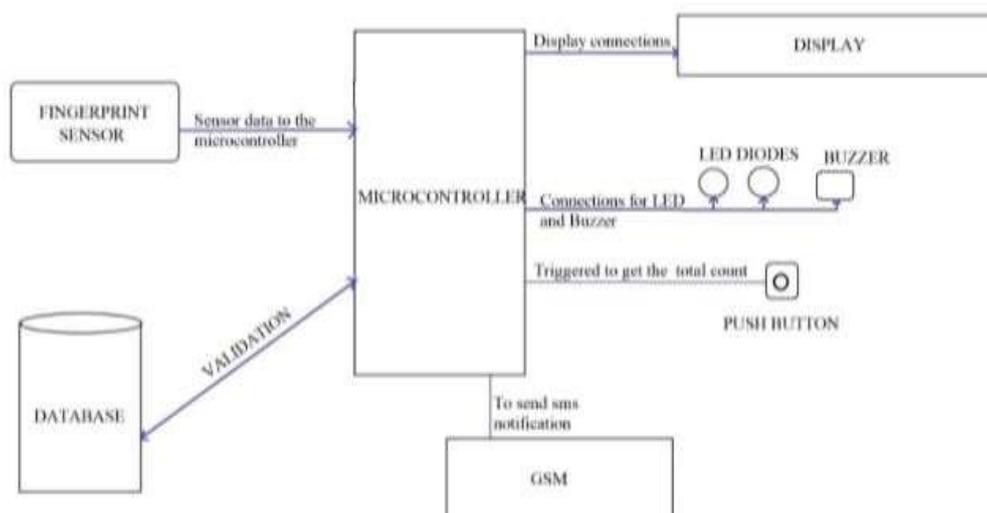


Fig 1: Work Flow of Proposed System

Fig 1 represents the workflow of the proposed system. To overcome the drawbacks of existing system, the Proposed System is Vote from anywhere with biometric fingerprint using Aadhaar card is introduced. The system provides the flexibility to vote from anywhere in India, where voter is able to vote from any authentic voting booth.

In this system, the combination of hardware and software is used. Arduino UNO is a hardware device connected to the Fingerprint Scanner. It stores the information on the cloud.

The voter will enter the Aadhaar-id and then fingerprint of voter will be scanned that will be matched with database stored on the cloud. If it matches, then only further process will start. The user has to select his region. Now, voter is able to cast his vote.

After casting the vote, the vote count of that candidate will be incremented. The vote count is encrypted and stored temporarily in the device memory. Encrypted vote count is then stored on the cloud.

After vote count increment, the user disable request will be given to database, so as to avoid the multiple voting. Once the voting is casted, then the SMS to each voter is sent individually for the contact number stored in the Aadhar database.

7. METHODOLOGY:

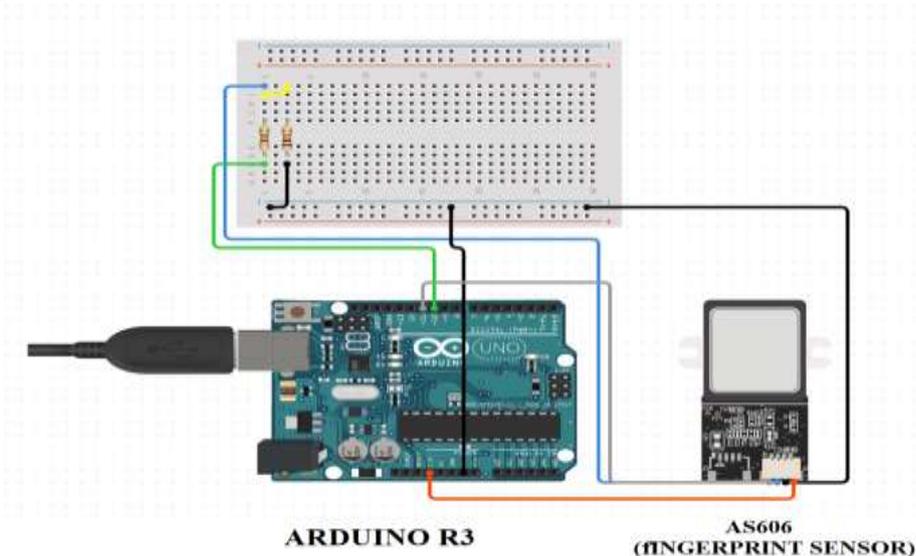


Fig 2 : Circuit Diagram

The above Fig 2 is the circuit diagram of biometric based voter verification system. Therefore, given are the connections between the fingerprint sensor module and the Arduino R3. When the fingerprint sensor scans the users data, during verification the data stored in the Arduino is used to compare the given voter's details.

8. RESULT



Fig 3: Voter Details Display

From the above Fig 3, the output results by displaying the voter details such as voter name, id and address given in the Aadhar database.

9. DISCUSSION:

The proposed system is used to perform the comparison of voter's profile and stores the total number of counts in the particular election booth. Therefore, it works upon three different techniques, they are

- Validation

- Indication
- Messaging

9.1 VALIDATION

- The validation technique performs by comparing the user's Aadhar database with the fingerprint data stored in the database.
- Each user has a unique fingerprint which can be helpful for reducing complexity of finding the voter name and voter id.
- When the user's fingerprint successfully matches with the given Aadhar database, then the user is eligible and allowed to cast the vote.

9.2 INDICATION

- Indication technique is the process by which the action performed could be notified.
- The indication is done automatically after validating the voter's database on comparison with the fingerprint given.
- The indication is performed by using the LED diodes showing green for positive result and red for negative result. Setting an alarm buzzer that indicates the either the vote is eligible or prohibited for the voter.

9.3 MESSAGING

- Generally, Messaging is the process of communication by which the person or voter could be able to communicate from one place to another.
- In this project, a messaging technique is added to provide the voter a confirmation message that notifies by giving an SMS to the number provided in Aadhar database.
- Once the vote of an individual voter has been entered, the message for the given voter will also be sent through the help of GSM technology with a message "Dear voter! Your vote has been casted".

10. CONCLUSION:

Therefore, the project conveys that the technology development of voting system summarizes that the reduction of human efficiency in voter validation is possible when the biometric based verification is implemented. In conventional method the polling may take long period with every person's profile checking but here it takes a short period of time for displaying voter's details. This method increases the approximation of results, the belief of people among the voting system increases and the election commission of India makes a step ahead to use this biometric verification for people welfare. The main advantage of this method is providing easy way for voter identity and reduces the time for checking.

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