

# ***Biometric Electronic Voting Machine Using Fingerprint Sensor***

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## **ABSTRACT**

Election is essential and unavoidable part of democratic country and also it is a right of each and every person in the country. Everyone is responsible for secure and valid vote during the election. Government plays a major role during the election to achieve a successful election. Electronic voting machine is currently employed during election also it is possible to do misuse and man power is required to verify the details of the voter. This paper overcomes the cons of the existing method using biometric verification. This system ensures more secure, reliable and less manpower than the existing method.

**Keywords-** Electronic voting machine, fingerprint sensor, database, matching, verification, Arduino.

## **I. INTRODUCTION**

In ancient history election happens like voter poll their votes by paper for choosing a leader. People designate respective parties which are broached in the paper and sealed the boxes. During the vote counting day the election commission people open the boxes and count the casted vote by manually. After few years counting will be done in automatically by using electronic voting machine. This electronic voting machine also has some Pons. They are count votes can be avoided and also more secure than the existing method called paper election. The paper chew over about the verification during the election by using the electronic voting machine. Electronic voting machine is uncomplicated design. It is easy to hack by hardware as well as software for changing the voting counts. In election manpower is needed to verify the vote on election. The proposed method will be avoiding the existing method disadvantages. The proposed system will be more secure because in this proposed method implemented biometric verification to verify the voter [1]

In the middle of all biometric technique eye and fingerprint recognition are popular technique since it is solitary for each and every person. So, proposed method is integrates with hardware components like Arduino, fingerprint sensor, liquid crystal display and infrared sensors. Detailed information about the components and working of proposed system will be discussed in this article. Among all biometric technique eye and fingerprint recognition are popular technique because it is unique for each and every person. So, the proposed method is implemented by fingerprint sensors. The proposed system integrates hardware components like Arduino, fingerprint module, LCDs and IR sensors. IR sensors to choose the parties and LCD are used to display the status [2]

## II. METHODS AND MATERIAL

The proposed system is a biometric electronic voting machine using a fingerprint sensor. In this project, an Arduino Uno, an asynchronous serial interface device or universal asynchronous receiver and transmitter, a flat panel display or liquid crystal oscillator, a fingerprint module, and also an infrared sensor are used. This block diagram illustrates the fingerprint electronic voting machine. The fingerprint template is verified against an already stored database. If it matches the given voter's fingerprint, the proposed voting machine will permit the voter to vote in an election; otherwise, it will show an error on the given flat panel display (LCD). Before casting the vote, the voter needs to enroll their finger as a template on a personal computer [3]. This module scans the fingerprint twice, and if it matches the database, it allows the voters to vote. During the verification process, the voter needs to enroll their fingerprint on a personal computer. This process is called enrollment. This is about the voting of the proposed method. The entire details about the components are discussed in further titles [4].

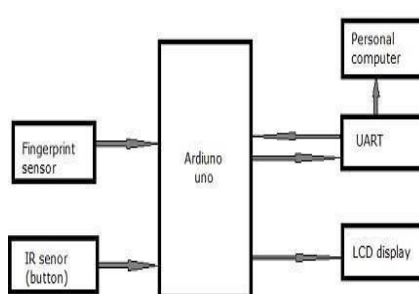


Fig.1 Block diagram of proposed system.

A. Universal asynchronous receiver and transmitter The first component is an asynchronous serial interface device which is used in the proposed method. It is also a frenzied hardware it is used for a serial communication. Interface with a personal computer and a fingerprint sensor and gives a response in the proposed system. In the modern era, an asynchronous serial interface is used in many applications like Bluetooth module, GPS receiver as well as a wireless communication system.

B. Arduino Arduino Uno is a microcontroller board, that has some features [3]. Each and every pin has separate functionality, out of which 6 pins are often used as a pulse with modulation outputs. Six pins are analog inputs and also one USB connection, a power jack, 16 MHz crystal oscillator. The Arduino is interface with a personal computer. The Arduino is composed of two essential parts: they are Arduino hardware and IDE. Arduino IDE (integrated development environment) is a program software using sketches. The biggest Pons of Arduino is that the Arduino can use structure. Each and every pin has a unique functionality. During the Arduino programming, a USB cable is employed. It is a very useful feature of Arduino. The Arduino can run any operating system. In this project, ATMEGA328 Arduino is employed. Supply voltage for given Arduino will be 5 volts. Operating voltage is nearly 7 to 12 volts; these are the specifications of the employed Arduino Uno. Uno means one [4]. It tells about the version 1.0.



Fig .2 Arduino

### C. Liquid Crystal Oscillator

Flat panel display is one of most essential components in this projected system. It is used to display the status of the voting during the election. The flat panel display can capable to hold 16 character\*2-line show. The main use of the flat panel display is for interface between user and microcontroller. The flat panel display comprises of many layers and also it has a pair of polarized panel filter along with electrodes [6]. Totally flat panel display comprises of 14 pins. Each and every pin has unique functions. Pin-No.1 is for Vss to ground, pinNo. 2 is for Vcc to 5V supply and pin-No. 3 is Vee to ground, pin-No. 5 is for read and writes to ground, finally Pin-No.4, 11,12,13,14 is used to connect with Pin-No.12,11,10,9,8 of Arduino Uno device respectively.



Fig .3 Liquid Crystal Oscillator

### C. Fingerprint Module

Fingerprint module is main component in this projected method because it is used to get the fingerprint form user and also to verify fingerprint template which got from fingerprint sensor. Using Arduino Uno programming code the fingerprint is stored. Using fingerprint module may store 162 fingerprints template [4]. Fingerprint identification is additionally referred to as Dactyloscopy. Fingerprint identification is the method of comparison 2 samples of friction ridge skin impression from human fingers, palm or toes. Fingerprint identification is the method of comparison 2 samples of friction ridge skin impression from human fingers, palm or toes. These days fingerprints area unit thought-about being one among the oldest and widespread among alternative biometric technologies. The major hardware used in this method includes of fingerprint device as shown in figure three, conjointly called biometric authentication module [5]. Fig .4 Fingerprint Sensor There is some specification on fingerprint sensor. They are supply voltage will be 3.6to-6.0-volt DC supply; operating current will be 120mA, finally full dimension of the fingerprint module 56\*20\*21.5 cm. The major hardware employed in this methodology includes of fingerprint device as shown in figure 3, collectively referred to as identity verification module.

### D. Infrared Sensor

An infrared sensor is used to detect infrared radiation in the surrounding environment. Infrared sensor contains led and receiver. When the supply is given the light emitting diode will glow. If any object comes closer to the IR sensor the light emitting diode will reflects and the object will be detected by the receiver. This is the working of infrared sensor. It is a sensor which is used to detect an object. In this projected system infrared sensor is used as a button. When the voter's hand comes closer to the infrared sensor it will detect and give the vote for respective candidate.



**Fig .4 Fingerprint Sensor**

In infrared sensor light emitting diode and photo diode are the important part in infrared sensor. The object is detected by diode when the object comes closer to the infrared sensor.

**Comparison of Existing System and Proposed System**

Attributes	Existing system	Proposed system
Voter Registration:	Voter registration can be completed with basic personal details and photo identification.	Requires the collection of biometric data during voter registration.
Security:	While EVMs are generally secure, they rely on the integrity of the manual identification process.	Enhances security by linking the voting process directly to unique biometric identifiers.
Accuracy and Fraud Prevention:	Accuracy depends on the honesty and efficiency of election officials and the integrity of the voter list.	Provides higher accuracy in voter identification and greatly reduces the risk of voter fraud, as it ensures that each vote is cast by the legitimate, registered voter.
Cost:	Generally less expensive.	Higher initial costs due to the need for biometric sensors.

The proposed method starting stage of voting process is all eligible voters’ details are required so it has to store in database. Once the voter’s fingerprint is registered that voter is eligible to vote so, voter can vote for desired candidate in election. The above figure is clearly explained the flow of proposed method [1]. To store the fingerprint details of voter Arduino LED light has to be high. Then for store a fingerprint number has to set for fingerprint template. The template stored in DY50 Flash memory. This is the enrollment process. Finally, registered voter is eligible to vote [5]. LCD screen display the instruction for guide the voter to make a successful election. 4 IRs are fixed in hardware instead of button. Infrared sensor is for selecting desired candidate during the election. After giving vote in the election the voter was not allowed to vote again. If it’s happened the display will show invalid or it won’t show candidates in the display [2]. Simultaneously the number of voters count will increase and also it will store in EEPORM memory of Arduino. This is the whole process of proposed method [3]

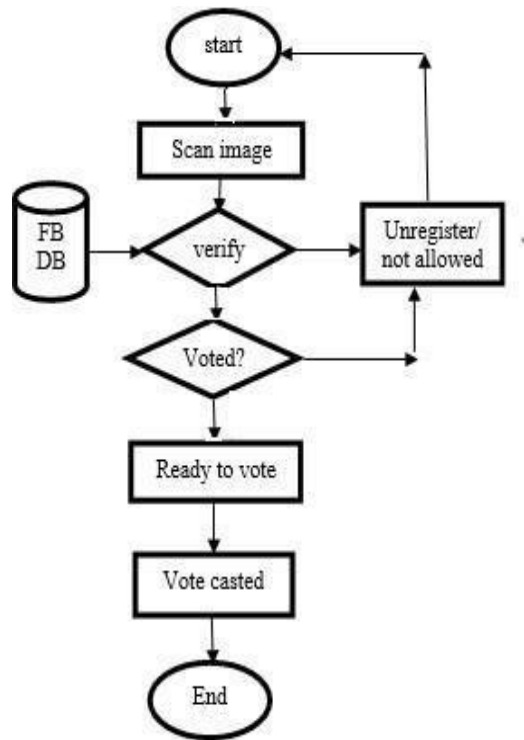


Fig .5 Flow chart of proposed system

### III. RESULTS AND DISCUSSION

The results for the proposed method are given figures.



Fig .6 Hardware results



Fig .7 Enrollment Results





**Fig .8 Ready for Vote**



**Fig.9 Valid Vote Result**



**Fig .10 Invalid Vote Result**

The proposed method has executed in figure 6 – figure 9. Biometric identification and verification are one of the secure methods, using these methods the voting machine results has been taken. From fig (6) the voter's figure has enrolled successfully. So that voter is eligible to vote. Hence the developed model of fingerprint electronic voting machine will execute with security and privacy. Fig (10) shows the results of invalid. If the voter is already voted or else the voter will not be the eligible candidate that means it will show us invalid vote.

After storing the fingerprint user can vote. Voter has to give the fingerprint in fingerprint module then scanned fingerprint will match with database. If it is successfully matched with database it will allow the user to vote. Now, the voter can vote for candidates The proposed method has executed in figure 6 – figure 9. Biometric identification and verification are one of the secure methods, using these methods the voting machine results has been taken. From fig (6) the voter's figure has enrolled successfully. So that voter is eligible to vote. For biometric verification fingerprint is used in this proposed method, this will not applicable for handicapped and aged persons so future scope of this project will be eye recognition instead of fingerprint biometric verification. Fig (10) shows the results of invalid. If the voter is already voted or else the voter will not be the eligible candidate that means it will show us invalid vote.

#### IV. CONCLUSION

The credibility of the elector is additionally monitored with supported trivialities matching. The prohibited ballot by the invalid elector is totally eliminated. The projected system can execute an electronic voting machine with security and privacy. From fig 4.2, fig 4.3, the projected methodology has executed. Biometric identification and verification are one among the secure strategies, victimization these strategies the mechanical device results have been taken. From fig 4.2 the voter's figure has registered with success so citizen is eligible to vote. Therefore, the developed model of fingerprint electronic voting machine can execute with security and privacy. For biometric verification fingerprint is employed in this projected methodology, this may not applicable for incapacitated and aged persons therefore future scope of this project are eye recognition rather than fingerprint biometric verification.

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