

# BIOMETRIC BASED ELECTRONIC VOTING MACHINE (EVM) USING ARDUINO IDE

Meena Chavan<sup>1</sup>, Devanshu Saxena<sup>2</sup>, Mayank Mukherjee<sup>3</sup>, Udhav Varma<sup>4</sup>

<sup>1</sup>Assistant Professor, Dept. of Electronics, Bharti Vidyapeeth College of Engineering, Pune, Maharashtra, India

<sup>2,3,4</sup>UG Student, Dept. of Electronics, Bharti Vidyapeeth College of Engineering, Pune, Maharashtra, India

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**Abstract:-** There are loads of techniques to keep away from fraudulence in balloting systems, however we are no longer capable to eradicate it completely. The goal of this venture is to enhance the security overall performance in the vote casting computer as properly as to provide convenient access to forged the vote by the use of finger print. Fingerprint is one of the special identities of a human being which is being used in the Aadhar system. By using Arduino software and by way of the use of image processing we capture the finger print of each and every person and the face of the person is being captured. The polling of the vote is transmitted to PC through Arduino communication. Fingerprint of the character is captured with the assist of fingerprint sensor. We additionally understand about person people full important points in the non-public computer. In future, it may want to also be applied the use of eye trace which will give greater correct outcomes.

## INTRODUCTION

Biometrics is the science and technological know-how of measuring and examining biological data. Biometrics refers to technologies that measure and analyze human body characteristics, such as DNA, fingerprints, eye retinas and irises, voice patterns, facial patterns and hand measurements, for authentication purposes. The area of biometrics was fashioned and has due to the fact that increased on too many kinds of physical identification. Among the quite a few human fingerprints remain a very frequent identifier and the biometric approach of choice amongst regulation enforcement. These standards of human identification have led to the development of fingerprint scanners that serve to shortly become aware of individuals and assign access privileges. The primary factor of these units is also to have a look at the fingerprint records of a person and compare it to a database of different fingerprints. In our undertaking we have used fingerprint for the reason of voter identification or authentication. As the thumb effect of each and every man or woman is unique, it helps in minimizing the error. A database is created containing the fingerprint photos of all the voters as required. Illegal votes and repetition of votes is checked for in this device with correct coding. Hence with the utility of this fingerprint based EVM (Electronic

Voting Machine) device elections ought to be made honest and free from rigging. Further that the elections would are no longer a tedious and highly-priced job. This will assist in fending off the fraud that happens in the course of the casting of the elections with ballot paper and even after the invention of EVM by means of the government there used to be many issues associated to the casting of vote. With this undertaking the voters whose fingerprints are pre-registered can solely cast the vote and i.e. once for all.

## SURVEY

The Election Commission of India developed the country's EVMs in partnership with two government-owned companies, the Electronics Corporation of India (ECIL) and Bharat Electronics Limited (BEL). Though these organizations are owned by way of the Indian government, they are not beneath the administrative control of the Election Commission. They are profit-seeking carriers that are attempting to market EVMs globally. The first Indian EVMs have been developed in the early 1980s through ECIL. They had been used in positive parts of the country, however have been by no means adopted nationwide.

- These first-generation EVMs were based totally on Hitachi 6305 microcontrollers and used firmware saved in exterior Erasable PROMs alongside with 64kb EEPROMs for storing votes.
- Second-generation models had been introduced in 2000 via each ECIL and BEL. These machines moved the firmware into the CPU and upgraded other components. They were gradually deployed in greater numbers and used nationwide starting in 2004.
- In 2006, the producers adopted a third-generation layout incorporating extra modifications cautioned through the Election Commission.

According to Election Commission statistics, there have been 1,378,352 EVMs in use in July 2009. Of these, 448,000 were third-generation machines manufactured from 2006 to 2009, with 253,400 from BEL and 194,600 from ECIL. The remaining 930,352 had been the second-generation models manufactured from 2000 to 2005, with 440,146 from BEL and 490,206 from ECIL. NOTE: The first-generation machines are deemed too risky to use in national elections because their 15-year provider

lifestyles has expired even though they are curiously still used in positive country and nearby contests.

Evaluation of Voting Equipment In the recent years the voting tools which have been widely used are categorized as follows:

**• Paper-based voting:**

The voter gets a blank ballot and use a pen or a marker to point out he choose to vote for which candidate. Hand counted ballots is a time and labor eating process, however it is convenient to manufacture paper ballots and the ballots can be retained for verifying, this type is nevertheless the most frequent way to vote.

**• Lever vote casting machine:**

Lever laptop is strange equipment, and every lever is assigned for a corresponding candidate. The voter pulls the lever to ballot for his favored candidate. This variety of voting computing device can be counted up the ballots automatically. Because its interface is now not undemanding enough, giving some education to voters is necessary.

**• Direct recording digital balloting machine:**

This type, which is abbreviated to DRE, integrates with keyboard, touchscreen, or buttons for the voter press to poll. Some of them lay in vote casting files and counting the votes is very quickly. But the other DRE besides maintain balloting archives are doubted about its accuracy.

**• Punch card:**

The voter makes use of metallic hole-punch to punch a gap on the blank ballot. It can depend votes automatically, but if the voter's perforation is incomplete, the end result is in all likelihood decided wrongfully.

**• Optical balloting machine:**

After every voter fills a circle correspond to their favored candidate on the blank ballot, this computing device selects the darkest mark on each ballot for the vote then computes the whole result. This form of laptop counts up ballots rapidly. However, if the voter fills over the circle, it will lead to the error result of optical scan.

**BLOCK DIAGRAM**

The system aims at developing a fingerprint based advanced EVM using Arduino which helps in free and fair way of conducting elections which are basis for democratic country like India. The system consists of step-down transformer, a bridge rectifier, fingerprint sensor, filter, GSM module, microcontroller Atmega 328U IC, LCD display, Arduino software and voting keypad.

**• Fingerprint module:**

The device is the most popular among all the identification devices because of its ease in acquisition, and also the number of sources that are available for its data collection. It has found its vast use in law enforcement and immigration purposes. The module used here is R305. In this module the scanned image is compared with an earlier existing finger print of yours to get the correct identity.

**• Transformer:**

A step-down transformer is used which converts 230V 50Hz AC to 12V 50Hz AC which is the input supply for bridge rectifier and to power the GSM module.

**• Microcontroller Atmega 328U IC:**

It is a low power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the Atmega 328 achieves throughputs close to 1MIPS per MHz. This empowers system designer to optimize the device for power consumption versus processing speed.

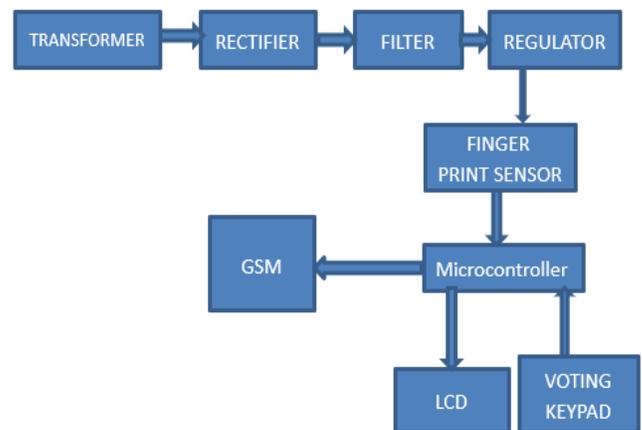


Figure 1 block diagram of biometric based EVM using Arduino

- **Bridge Rectifier:**

A Bridge rectifier is an Alternating Current (AC) to Direct Current (DC) converter that rectifies mains AC input to DC output. Bridge Rectifiers are widely used in power supplies that provide necessary DC voltage for the electronic components or devices.

- **GSM module:**

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- **Filter:**

This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 A of output current. The internal current-limiting and thermal-shutdown features of these regulators essentially make them immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents, and also can be used as the power-pass element in precision regulators.

- **LCD Display:**

It is a 16\*2 LCD display with 5\*8 dots with cursor. It has 16 characters with 2 lines of display. It is a 4-bit or 8-bit MPY interfaces with built-in controller, display mode and backlight variations.

- **Arduino Software:**

The software which is used to do the coding of the Atmega328U IC in which the number of voters and the number of candidates and their name is being stored in the IC and the phone numbers of the voters to whom the result through GSM module will be sent via SMS. The number of voters and candidates mentioned in the coding, only that number of voters can register and cast their votes to the candidates shown with their names.

- **Voting keypad:**

It has a crisp clicking by tactical feedback. It prevents flux rise by insert molded terminal. Ground terminal is attached and snap in mount terminal. It has an operating temperature range of -20~+70 °C. it has a tactile feedback type of operation and push-on momentary circuit configuration i.e., 1 pole-1 throw.

- **Enroll button:**

It is used to enroll or register new finger print of the voter.

- **Reset button:**

This button is used to reset the whole system so that it can be configured for next election.

#### **WORKING:**

- **Power supply:**

The input to the circuit is applied from the regulated power supply. The AC input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to the bridge rectifier. The main function of bridge rectifier is to convert the AC supply into pure DC voltage. The output obtained from the rectifier is pulsating DC voltage. So, in order to get pure DC voltage, the output voltage from the rectifier is fed to a filter to remove any AC component present even after rectification. This DC voltage is then fed to the polarized capacitor which filter out the ripples (if any) and then this 12V pure DC is input to the pin 1 of the voltage regulator IC 7805. When the IC7805 receives 12V DC supply the output pin i.e., pin 3 gives constant 5V DC. This output pin of regulator is connected to another capacitor to remove the ripples (if any) after conversion of 12V DC to constant 5V DC supply. This 5V constant DC supply is given to LCD display, ATmega 328 microcontroller and all the tact buttons and the fingerprint sensor also run on the same voltage. The GSM module SIM800 requires 12V DC supply which is directly from the bridge rectifier. The message will be sent by the GSM module then only after the serial communication is being used.

1. **Voter enrollment:**

- When we switch on the circuit board, the two buttons as explained in voting keypad except for casting votes to the candidates

we have enrollment button and reset button.

- When the enrollment button is pressed the message is displayed on the screen to scan finger.
- Once the finger is scanned the message displayed “the id registered” and is stored in the Atmega 328U IC and at the same time the phone no. of the voter is also stored in the Arduino coding in order to send the end result through GSM module via SMS.
- All the enrollment of the voters and the admin with which the vote casting will start and the admin which sends the end result to each voter via SMS through GSM module.

## 2. Vote Casting:

- After all the enrollments the Admin will scan his fingerprint in the scanner to allow the voters to cast vote.
- All the voters will scan their fingerprints in the scanner which is already stored at the time of enrollment.
- When the ID matches, the message will be displayed on the 16\*2 LCD display “found ID no.” and if the scanning is not done properly then message displayed is “wrong attempt”. After three wrong attempts the result displayed is “fail” and need to restart the whole circuit.
- If the voter ID matches, then the message displayed on the screen “register your vote”. The button is pressed till the buzzer sound is heard which indicates that the vote of the voter for the desired candidate is registered.
- If the voter again tries to cast vote, he can't as the message will be displayed “your vote is already registered”.
- After the voting is being done the admin will scan his finger to stop the voting and show the results. The message displayed on the LCD display is “send allow”, which means the result will be sent to each voter via SMS with the help of GSM module.



Figure 2 biometric EVM using Arduino Software

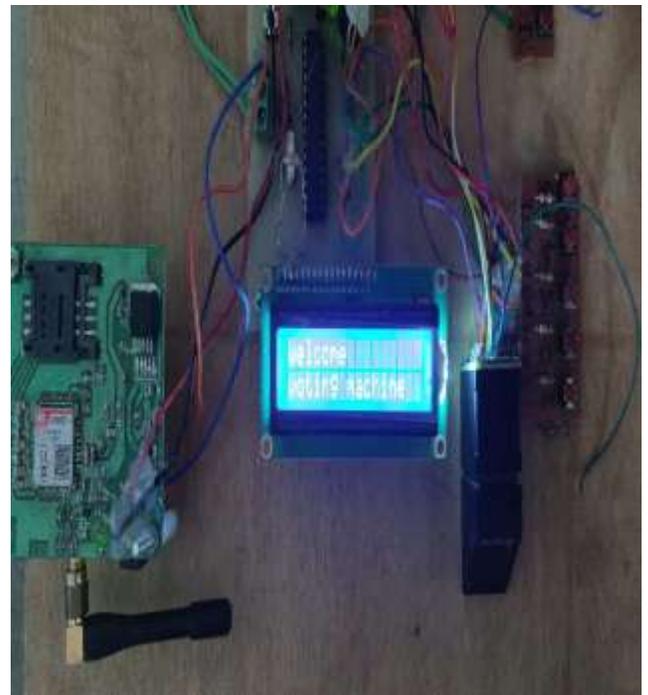


Figure 3 the welcome message when the circuit is switched ON

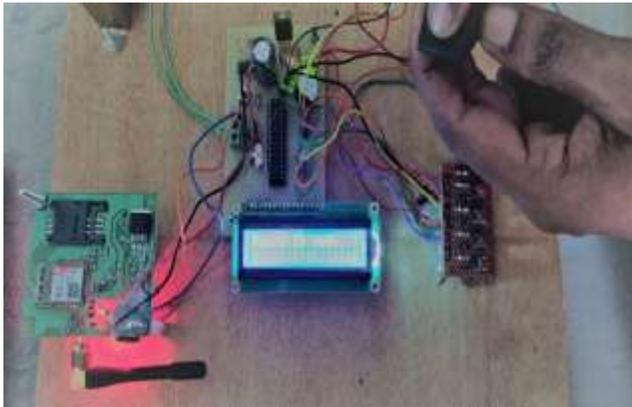


Figure 4 when the registered fingerprint is detected of admin

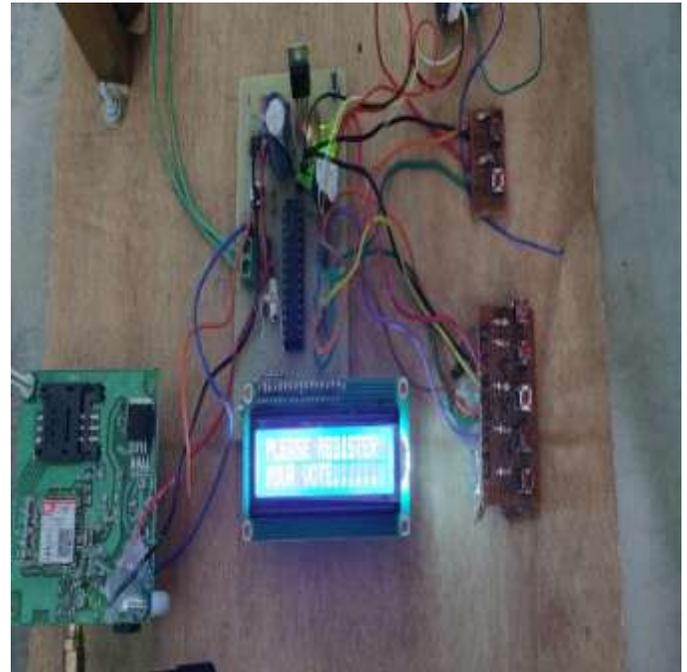


Figure 7 register your vote



Figure 5 while casting a vote

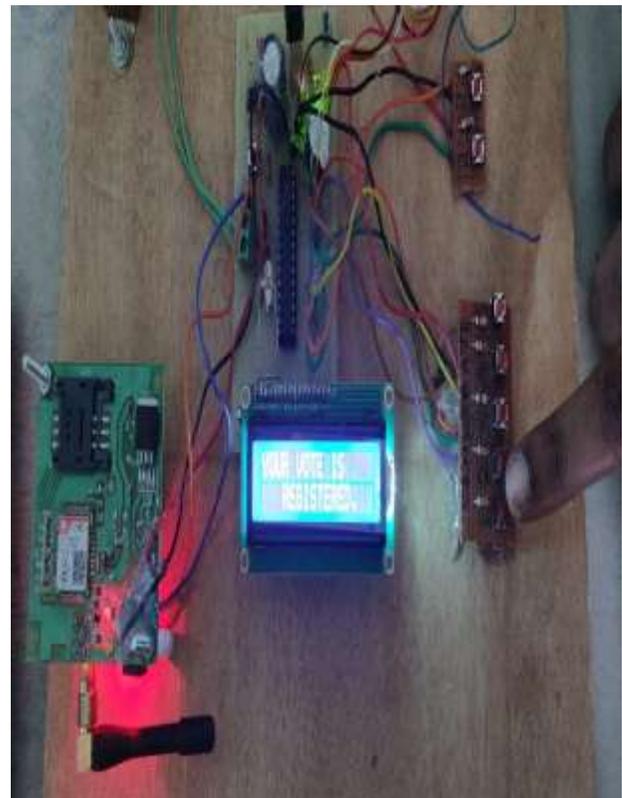


Figure 8 when vote is registered to the desired candidate



Figure 6 allows to vote after detection of registered fingerprint

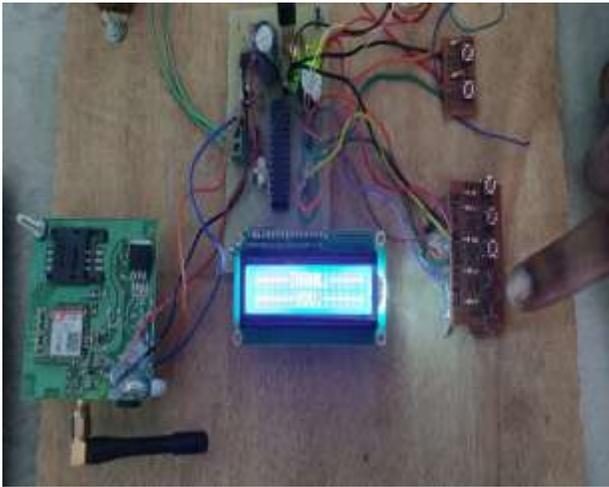


Figure 9 thank you message

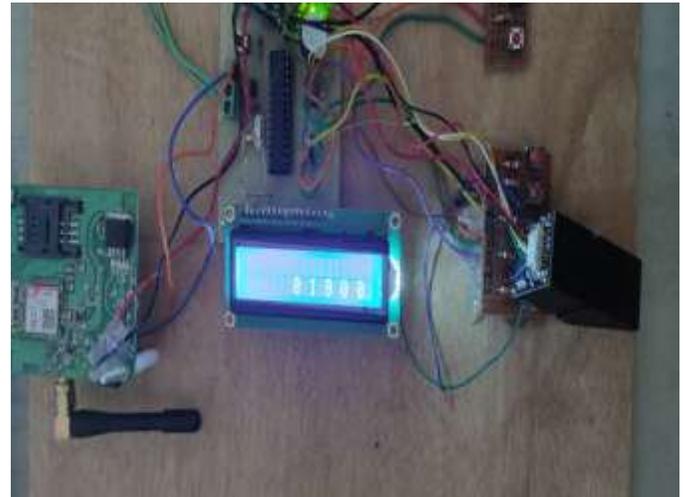


Figure 12 final result



Figure 10 if attempted to vote again



Figure:13 Result by SMS

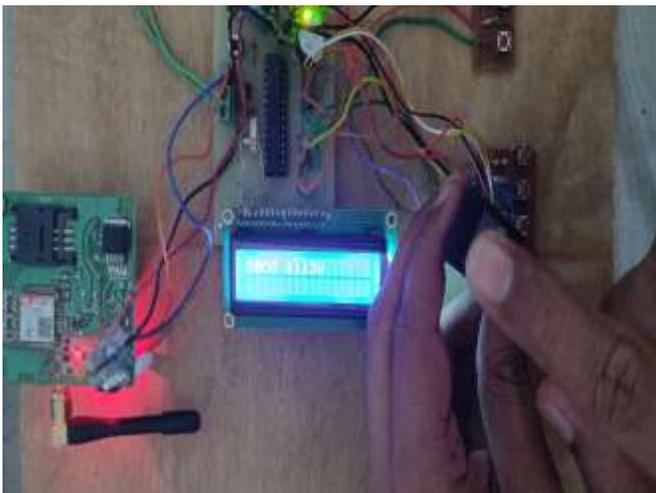


Figure 11 admin allow for display of result

**ADVANTAGES:**

- Cost effective.
- The system allows only authenticated voting then the existing equipment as the person is identified based on his Fingerprint which is unique to each individual.
- Low power consumption.
- It is economical
- Less manpower required
- Time conscious, less time required for voting & counting
- Avoids invalid voting as it prevents unregistered voters from voting.
- Ease of transportation due to its compact size.
- Convenient on the part of voter.

**DISADVANTAGES:**

- Before voting the user has to enroll first.
- Sensitivity of finger print module causes sometimes Combine character error.

**APPLICATIONS:**

This project can be used as a voting machine to prevent rigging, during the elections in the polling booths.

- Fast track voting which could be used in small scale elections, like resident welfare association, “panchayat” level election and other society level elections, where results can be instantaneous.
- It could also be used to conduct opinion polls during annual shareholders meeting.
- It could also be used to conduct general assembly elections where number of candidates are less than or equal to eight in the current situation, on a small-scale basis.

**CONCLUSION:**

The project “Biometric Based Voting Machine using Arduino” was mainly intended to develop a fingerprint based advanced Electronic Voting Machine (EVM) which helps in free and fair way of conducting elections which are basis for democratic country like India.

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