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ELECTRONIC VOTING MACHINE USING RFID AND FINGERPRINT

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Abstract **- This project is about a voting machine with fingerprint verification. The main aim of this project is to make voting secure using fingerprint verification and RFID which is used to reduce malpractices. The details of the voter along with their fingerprint are stored in a database. If the RFID matches with the stored database, the system checks the fingerprint of the user and if authenticated, it checks if multiple votes have been cast. Results can be obtained using LCD. When malpractice occurs, an "Already voted" message will be displayed. The Arduino IDE is used for programming the board and the LCD are used to display the ballot card. The system provides an alert on malpractice and only an authorized voter can cast the vote. This project safeguards the citizen's right to vote and guarantees a fair election.**

Keywords *– IoT, Arduino, Fingerprint, RFID, Embedded C, E-voting.*

1. Introduction

India is a democratic country and each citizen has the right to vote and show their option. People also have the right to change the ruling party in upcoming election by voting for the candidate.

Traditionally voting was done by marking with stamp casting vote for the corresponding candidate and then dropping the paper to a ballot box. To calculate the number of vote each vote must be calculated in each ballot box and then sum all the votes for each candidate and candidate who secured largest vote will be selected as the winner.

Biometrics is a way used to recognize a person based on his physical nature. The fingerprint, iris, face, voice, etc. are the mainly used biometrics to recognize a person. There are two key functions for biometrics, first is one to one matching and other is one too many matchings. In one to many matching the biometric sample is compared with the already stored samples. In one-to-one matching, it compares with the previously stored sample.

Fingerprint is the biometric which is used in this project. Finger-print will be different for each individual. In this project, fingerprint and RFID is used for the authentication of the user and allows him to cast vote based on his fingerprint image. Finger-print matching can be divided into three types: correlation-based matching, minutiae-based matching, pattern-based (or image-based) matching.

Fingerprint and RFID details of each candidate eligible for voting is enrolled and saved in the system. The stored fingerprint and the RFID are matched with the stored database. It provides verification of the voter. It also checks whether that voter has voted more than one time for the same election. If the verified voter it trying to vote for more than one time then an alert will be produced. Here we are using a buzzer sound to know that a malpractice has occurred.

2. Existing System

Electronic voting machine is used nowadays for polling vote. Electronic voting machine consists of two parts: one is control unit and other is balloting unit. The control unit is controlled by the presiding officer and after the verification; voter will be allowed to poll his vote. The balloting unit is inside the voting compartment. When the verification is completed by the presiding officer, he presses the ballot button then the voter can cast his vote. Voter use the button against name of candidate which he wants to vote. In the existing system voter needs to carry his ID card for verification. The presiding officer will check with the list and ID card for verifying of the voter. This is time consuming. At the end of voting all the EVM will collected and submitted to counting center and the selected government employees will count the vote and finally publish the result.

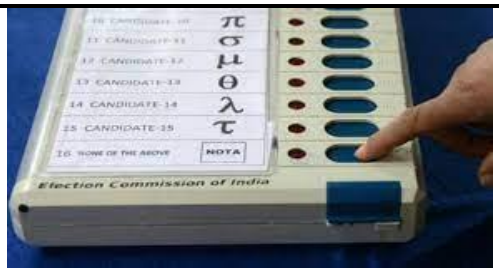


Figure 2.1: Electronic Voting Machine (present)

There are some problems with this existing system. One problem is neither authority nor anyone else can link any ballot to the voter. Another problem is (verifiability) independently verification of that all votes have been counted correctly. Availability is another problem the system works properly as long as the poll stands and any voter can have access to it from the beginning to the end of the poll. One candidate casts the votes of all the members or few amounts of members in the electoral list illegally is also one of the problems in existing system.

3. BLOCK DIAGRAM

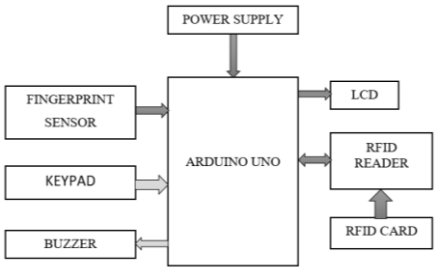


Figure 3.1: Block diagram of electronic voting machine using RFID and fingerprint

The system of the e-voting machine with fingerprint verification consists of controller, fingerprint module, keypad, RFID module, power supply and LCD display. The controller used in this system is Arduino UNO. Power is given to the system from the power supply (i.e., adapter). Keypad is used to poll the vote. Message regarding the system instructions and any malpractice will be displayed on the LCD display.

3.1 Arduino UNO with Atmega328P microcontroller

The ATmega328/P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. This empowers the system designed to optimize the device for power consumption versus processing speed. It has 32K Bytes of In-System Self-Programmable Flash program Memory, 1K Bytes EEPROM, 2K Bytes Internal SRAM and Write/Erase Cycles of 10,000 Flash/100,000 capable EEPROM. It can be programmed using the Arduino IDE.

3.2 RFID Card and Reader

RFID (Radio Frequency Identification) is wireless system and it contains two components; RFID tags and readers. Reader is a device which emits and receives radio waves. RFID tags use radio waves to communicate their identity and other information to the reader. There are two types of tags, first Passive RFID tags and another one is Active RFID tags. Passive RFID tags do not have batteries, whereas Active RFID tags have their own power supply.

3.3 Fingerprint Sensor

This sensor is one of the sensors used for verification of identity. It is used in computers, mobile phones, electronic door locks, access control systems, security safes etc., It has LED to emit light, and it passes through specific plate and scan the fingerprint pattern. It uses UART interface to communicate with Arduino board. Microcontroller of the Arduino executes image signal processing with particular algorithm to complete high-speed fingerprint sampling, identification and other operations.

4. METHODOLOGY

The RFID module is used to scan the voter ID. Once the voter ID is scanned, the details of the voter is displayed on the LCD. The voter can verify his details and further continue the fingerprint authentication. Fingerprint module is used to place the finger; it is used to store the database of the voter's fingerprint. Fingerprint module identifies the fingerprint of each user with the fingerprint in the database and displays a message if it belongs to an authenticated person. It will display the result of matching on the LCD display.

Since this system is not allowed to cast vote multiple times, warning system is also used. Buzzer is used as an alert when a person votes for the second time.

Here both voting unit and the authentication unit is both done in a single microcontroller.

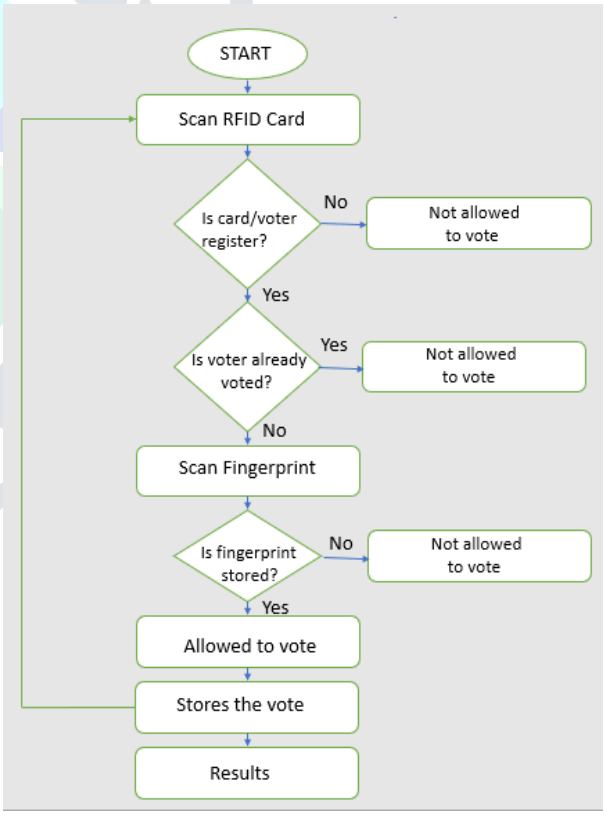


Figure 4.1: Flowchart of the working of the e-voting machine

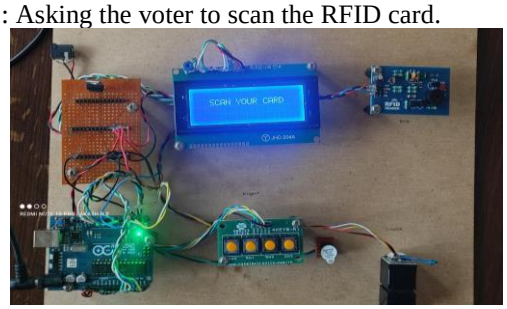
The RFID module is used to scan the voter ID. Once the voter ID is scanned, the voter can continue the fingerprint authentication. Fingerprint module identifies the fingerprint of each user with the fingerprint in the database and displays a message if it belongs to an authenticated person or not. Then after verification voter is allowed to choose their leader which is displayed on LCD.

After voting, finally the result can be seen by a particular person with the same two step verification. And result csn be announced on spot.

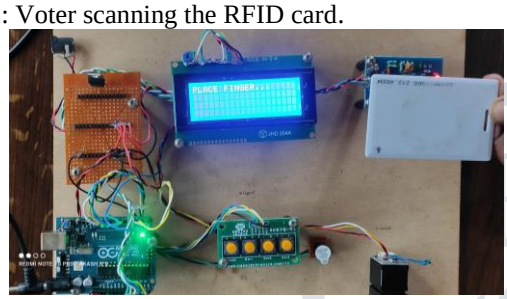
5. RESULTS

We are successfully completed the project; the results are shown below.

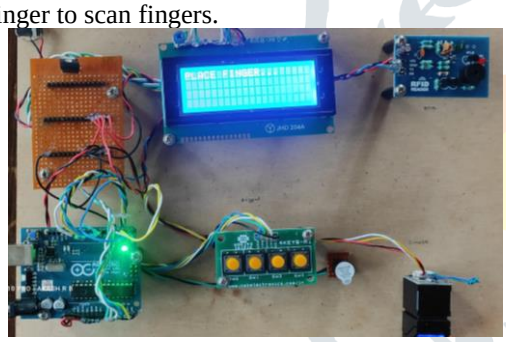
Step-1: Asking the voter to scan the RFID card.



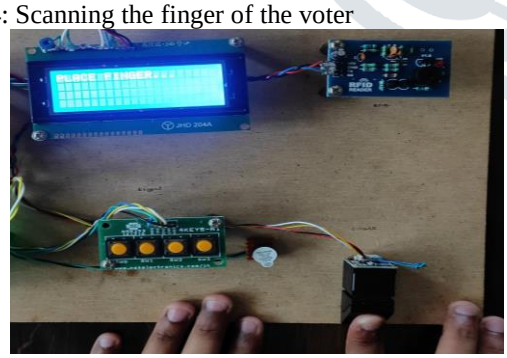
Step-2: Voter scanning the RFID card.



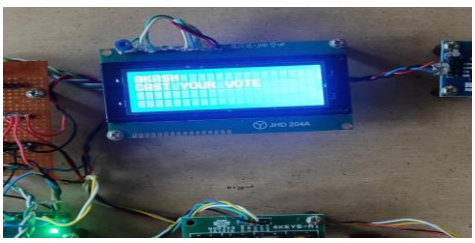
Step-3: After verification of RFID, Asking the voter to place their finger to scan fingers.



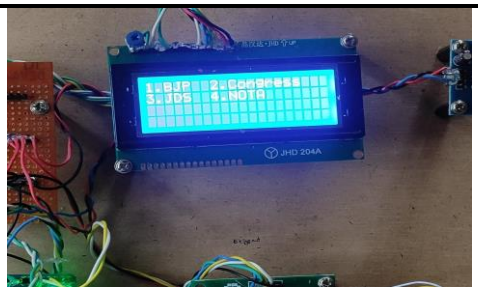
Step-4: Scanning the finger of the voter



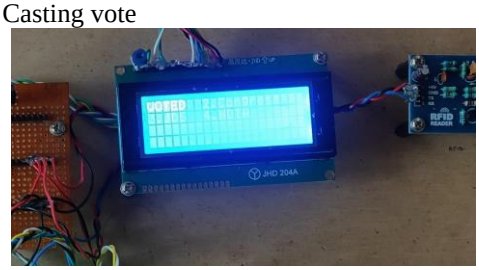
Step-5: After verification of voter displaying information of voter



Step-6: Displaying the party's name

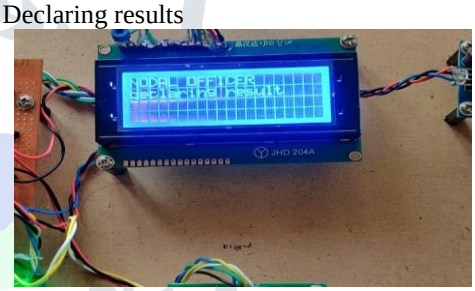


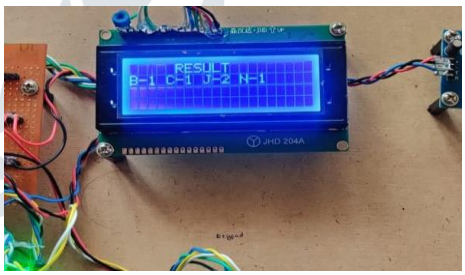
Step-7: Casting vote



Step-8: If voter tries to vote again give warning

Step-9: Declaring results





6. CONCLUSION

World is becoming completely digitized. As a part of digitization, here voting is also digitized. One of the benefits of this project is that it reduces the time taken to announce the result. Here, the system is made more secure by introducing two-step verification. This system allows one person to vote only once. Multiple voting is not allowed.

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