



Research Paper

## RFID Based Electronic Voting Machine Using OTP and Bio-Metric Verification

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**ABSTRACT:** As India is a democratic country, the main aspect is VOTE, through which people elect their leader to rule the country. So due to illegal practices, the ruling of the country will be given to the wrong hands, to avoid this illegal practices government took a lot of methods but the untouched method is verification during voting. So to avoid this illegal practice of voting we came up with a voting system that contains a three-step verification process. The data of all individuals will be stored in the database and every individual will be given an RFID card that contains all the details of the person. In the three-step verification process, the first step is RFID card scanning, if the data in the card matches with the data in the database then the person will be eligible for the second step is biometric authentication if the bio-metrics of the person matched with previous database fingerprints then an OTP will be sent to the registered mobile number. If the OTP matches then the person will be eligible to vote. If the person belongs to the special category that is physically challenged then that individual person will be directly moved to OTP verification after RFID tag verification. This process will reduce the rigging of elections and the repetition of voting.

**KEY WORDS:** RFID, Biometric verification, OTP.

Received 22 Apr, 2022; Revised 02 May, 2022; Accepted 05 May, 2022 © The author(s) 2022.

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### I. INTRODUCTION

Voting systems have changed from counting hands in the early days to punching papers and systems. The voting machines that are used nowadays have some characteristics different from traditional methods that make them unique and more accurate than the previous voting methods but also contain drawbacks like a time-consuming large volume of paperwork and also rigging. These drawbacks can be overcome by our three-step verification process which contains biometric verification and also OTP verification through this process all the data of the individual will be stored in the database. The voter can cast his vote from any voting booth in the country makes voting rigging free and also increases the percentage of voting also used to stop the violence during voting.

### II. OBJECTIVES OF THE PROJECT

The main objective of the project is that a voter can cast his vote from anywhere in the country. So that the percentage of voting in the country increases. Through this three-step verification process security and accuracy of voting thus there will be rigging free elections.

### **III. LITERATURE SURVEY**

The first system Electronic smart voting system with secured data identification using cryptography introduced in the year 2018 author name Sunita patil, Amish Bansal, Utkarsh Raina. This paper describes the Function of ESVS which is used with the biometric authentication system along with the OTP based on the verification process of voting system. The ESVS utilize the aadhar number and identification of voter.

The second paper is about the Location free voting system with the help of IOT technology introduced in the year 2018. The authors Qasim Abbas, Tariq Ali, Hussnain Abbas the description of this paper is the internet of things(IOT) is becoming the faster which connect to the many things. The voters to vote in any location without any restriction all over the world which consider privacy and security.

Third paper represented as the Application for online voting system using android device introduced in the year 2018. The author Himanshu Vinod Purandare the descriptive pattern represent that the election should decide which candidate is capable for the future of the country. This system has the high level security, but the existing system has the flaw that the vote has to wait in queue for casting their vote has lesser security in the present time.

The fourth paper which is Design of Secured of E voting system introduced in the year 2013, the author are Hanady Hussien. This system is able to spread through widespread. Security is the problem in such system. The This E voting system requires the system to fulfill the security. The system employees RFID to store all condition that comply with the rule of government to check voter eligibility.

### **IV. EXISTING METHODOLOGY**

An electronic voting system is a voting system in which the election data is recorded, stored and processed primarily as digital information. E-voting is referred as “electronic voting” and defined as any voting process where an electronic means is used for votes casting and results counting. E-voting is an election system that allows a voter to record their ballots in an electrically secured method. A number of electronic voting systems are used in large applications like optical scanners which read manually marked ballots to entirely electronic touchscreen voting systems. Specialized voting systems like DRE (direct recording electronic) voting systems, RFID, national IDs, the Internet, computer networks, and cellular systems are also used in voting process.

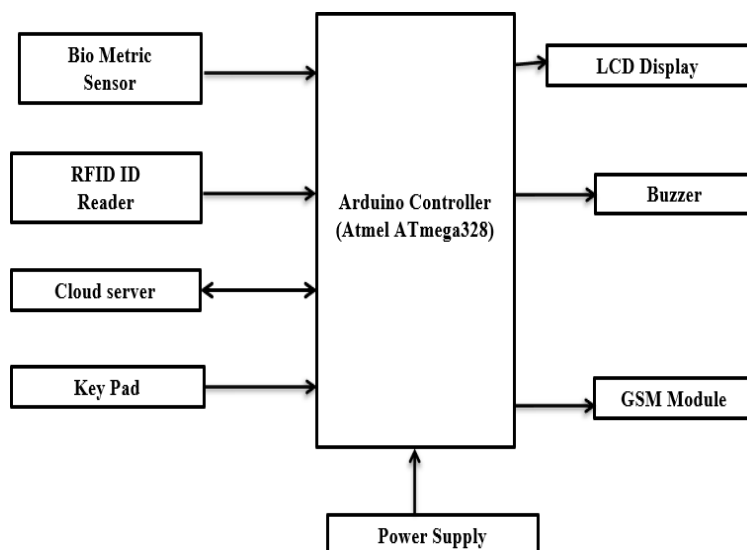
### **V. PROPOSED METHODOLOGY**

The proposed system is based on the verification process on the Election Day. The system has a database which is pre-recorded and contains the details about the individuals who are above 18 years. These details include the biometric and personal details. The voter ID card is replaced with a RFID card which serves as an access to the individual on the day of voting. During the day of voting the voter undergoes a three step verification process. The first step is one in wherein the voter has to show his RFID card and it is read by a RFID reader module. The reader module senses the card and displays the details of the individual on the LCD screen.

If the individual is normal category without any disability then after the details are displayed the voter is asked to place his/her registered finger on the fingerprint sensor. The sensor module verifies the fingerprint with the existing database and permits the user to next level of verification process if the details matches else the LCD displays “wrong user”. Once after the fingerprint matches, the OTP matches it with the existing database of ballot booth opens for the voter to cast his vote and the votes are simultaneously on the monitor.

If an individual is having any disability it will be displayed on lcd after scanning RFID tag then it means that the person belongs to the special category that is that individual is physically challenged and that person will be directly moved to the next step that is OTP verification, if the entered OTP and given OTP matches then that person is allowed to cast vote directly. Thus this process provides a much secured three level verification process and the illegal practices during the day of voting are also avoided.

## VI. BLOCK DIAGRAM



**Figure 1:** RFID based electronic voting machine using OTP and biometric verification.

The block diagram of RFID based electronic voting machine using OTP and biometric verification is shown in the figure 1. The project deals with microcontroller (ATmega328), fingerprint module, the RFID module, the GSM module, Buzzer and LCD display for displaying different messages.

When the voter enters the voting place he must have RFID tag that contain the information related to the individual voter. The RFID tag is verified with the database of microcontroller ATmega328 to check whether the voter belong to that particular polling booth or not. And then finger print scanner is used to check whether the voter is original or not. If the data matches with the already stored information, the information is displayed on the LCD display and in the next step an OTP will be sent to the registered mobile number of the voter and after entering the correct OTP the voter is allow to cast his vote. If the voter is not enroll in the database of microcontroller, or if the finger print doesn't matches with the database then a message is displayed on LCD display as "ACCESS DENIED", and security alarm will ring to inform the polling officer's and the person is not allowed to poll his vote..

## VII. ALGORITHM AND FLOW CHART

The voting machine process is shown in following step that how to vote and how it has been cast.

Step 1: Start

Step 2: Using RFID tag store the voters information in the database.

Step 3: RFID reader scans the RFID tag.

Step 4: Checks whether the candidate is physically handicapped or not.

Step 5: If the candidate is physically handicapped, it activates the special category and directly enters into the OTP section. Or else follows the normal category and enters the fingerprint section.

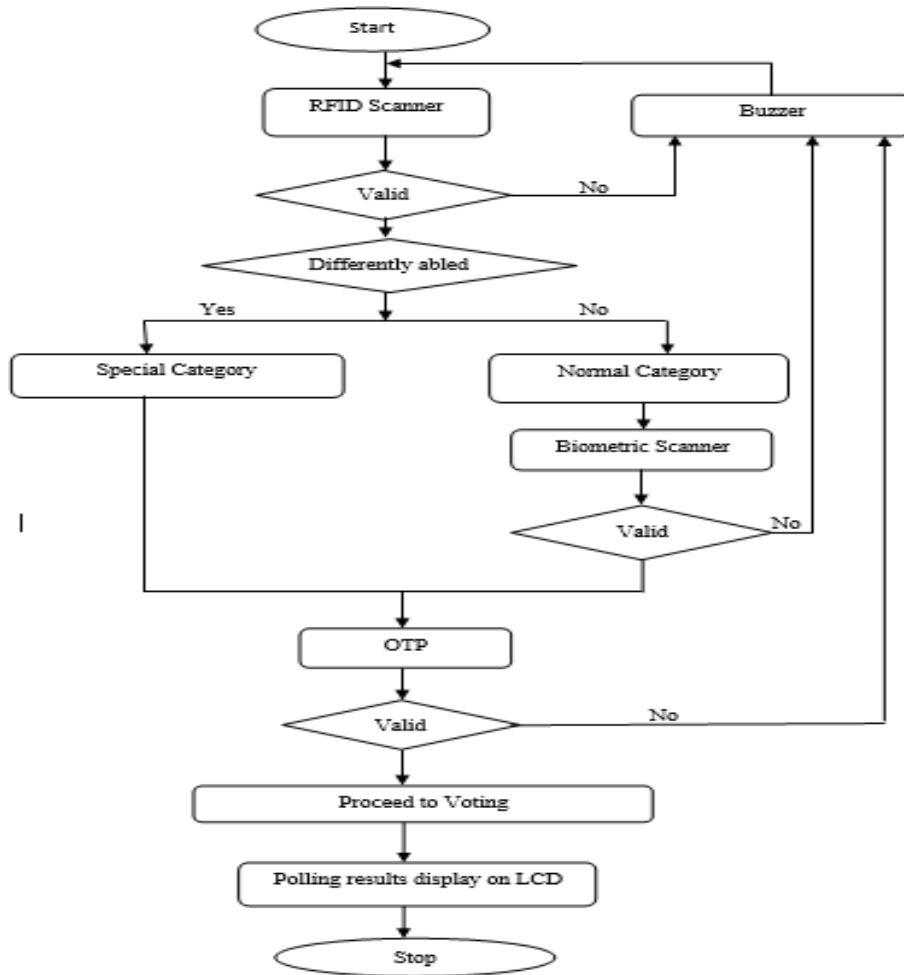
Step 6: Scan the finger on the fingerprint sensor

Step 7: The LCD display shows that the person is matched or not.

Step 8: If the fingerprint matches the user authenticate can able to undergo next step verification that is OTP verification.

Step 9: If the OTP matches, the user will be able to cast their vote.

Step 10: If it doesn't match the buzzer will turn ON. Step 11: Stop.



## VIII. HARDWARE AND ITS DETAILS

### 8.1.ARDUINO MEGA 328 :

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



Figure 2: MQ2 Sensor

### 8.2.RFID MODULE:

A Radio-Frequency Identification system uses tags, or labels attached to the objects to be identified. Two-way radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response. In this project, RFID tag contain the information related to individual voters. Our microcontroller ATmega2560 contains the following details such as Name of the voter, voter ID, Date Of Birth of the voter.

RFID tags contain at least two parts: an integrated circuit for storing and processing information, modulating and demodulating a radio frequency (RF) signal, collecting DC power from the incident reader signal, and other specialized functions; and an antenna for receiving and transmitting the signal. The tag information is stored in a non-volatile memory. An RFID reader transmits an encoded radio signal to interrogate the tag. The RFID tag receives the message and then responds with its identification and other information. The RFID reader is shown in the figure below:



**Figure 3 : SIM 900A GSM Module**

### **8.3.16×2 LCD MODULE :**

LCD (Liquid Crystal Display) is the innovation utilized in scratch pad shows and other littler PCs. Like innovation for light-producing diode (LED) and gas-plasma, LCDs permit presentations to be a lot slenderer than innovation for cathode beam tube (CRT). LCDs expend considerably less power than LED shows and gas shows since they work as opposed to emanating it on the guideline of blocking light.

LCD is either made with an uninvolved lattice or a showcase network for dynamic framework show. Likewise alluded to as a meagre film transistor (TFT) show is the dynamic framework LCD. The uninvolved LCD lattice has a matrix of conductors at every crossing point of the network with pixels. Two conductors on the lattice send a current to requiring the light for any pixel. A functioning framework has a transistor situated at every pixel crossing point, requiring less current to control the luminance of a pixel.



**Figure 4: LCD Display**

### **8.4.BUZZER**

The buzzer will be used to emit sounds to alert users during leakage. A buzzer or beeper is a signalling device usually electronics, that is most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a pre-set time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong.



Figure 5: Buzzer

### 8.5.FINGERPRINT MODULE:

The Automated fingerprint identification is the process of automatically matching one or many unknown fingerprints against a database of known and unknown prints. Finger print module is the important part of the EVM. It is used for scanning the finger print of the voter to ensure whether the voter is original or not, before starting the voting process and all the process of scanner is controlled by the ATmega328. The scanner is connected to the micro-controller through a cable called "MAX232".



Figure 6: Fingerprint sensor

### 8.6.GSM MODULE:

A GSM modem is a specialized kind of modulator- demodulator in which a SIM card is accepted and it can be operated over a subscription to the mobile operator. GSM module is used when a communication between a computer and a GSM system is required. In many countries it is used as architecture for mobile communication. GSM module consists of a GSM modem and communication interfaces like RS-232, USB along with a power supply circuit for computer. GSM modem communicates over the mobile network when connected to a computer . GSM modems are also used to send and receive SMS and MMS messages. A GSM can be easily interfaced with the microcontroller system and uses serial communication for data transfer. The GSM module is shown in below figure:

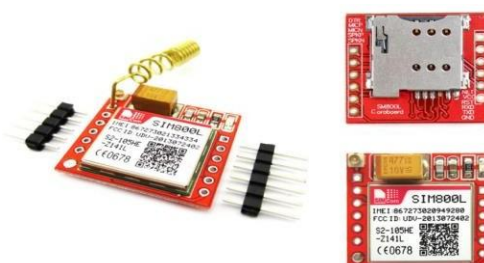


Figure 7: GSM module

### 8.7.KEYPAD:

A keypad is a set of buttons arranged in a block or "pad" which usually bear digits, symbols and usually a complete set of alphabetical letters. If it mostly contains numbers then it can also be called a numeric keypad. Keypads are found on many alphanumeric keyboards and on other devices such as calculators, push-button telephones, combination locks, digital door locks, which require mainly numeric input. Keypad is used to enter the OTP and cast the vote .

## **IX. SOFTWARE AND ITS DETAILS**

### **9.1. ARDUINO IDE**

Arduino IDE where IDE stands for Integrated Development Environment – An official software introduced by Arduino.cc, that is mainly used for writing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go.

Arduino IDE is an open-source software that is mainly used for writing and compiling the code into the Arduino Module. It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows, and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment. A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more. Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board. The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module. This environment supports both C and C++ languages. How to install Arduino IDE: You can download the Software from Arduino main website.

## **X. CONCLUSION**

The RFID-based Electronic Voting Machine using OTP and Biometric verification has been designed successfully. A database consisting of the details like name, address, age, mobile number, gender, a fingerprint of the people should be updated every time before an election. This Electronic voting systems have many advantages over the present voting system. Some of these advantages are a faster tabulation of results, improved accessibility, greater accuracy, and lower risk of human and mechanical errors. This system affords additional security by allowing voters to vote only once by imparting unique identification i.e fingerprint. It is very difficult to design an ideal e-voting system that allows perfect security and privacy with no compromise.

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