



## IOT RFID ELECTRONIC VOTING MACHINE

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### ABSTRACT

This paper describes the design and operation of Smart Electronic Voting Machine using Arduino UNO, RFID, to improve the election process by avoiding electoral fraud and to ensure safety, security, reliability, and smooth conduct of elections in the country. This paper talks about an innovative approach for the voting process where the device communicates with the RFID tag, which is embedded in the voter ID card. When the voter scans his card, the controller checks the ID, and if it matches, the LCD displays the result in IOT as well.

**Keywords:** Electronic voting machine, RFID, arduino.

### 1. INTRODUCTION

The focus of the democracy is a ballot by which the people can elect the candidates for forming an efficient government to satisfy their needs and requests, and their standard of living can be improved. The general elections were just finished in India. Many different technologies were employed to ensure a good voting process. In our project We have developed a smart and intelligent system that can authenticate users easily and make the process hassle-free. This paper mainly focuses on this approach. The main advantage of this system is the voter is using the Radio frequency identification tag, which is embedded in the voter ID card. In any other case, the electronic voting machine would reject access to the voter. This makes the election process more reliable, safe, secure and also protects from frauds, rigging, and also from malpractices.

India is a democratic nation wherein the people are directly involved in electing the candidates for the parliament. It is difficult to practice direct democracy in countries like India, China and several other highly populated States. Elections are a rampart of people's liberty and it is a process of putting a check on undemocratic tendencies. Elections are the backbone of a democratic system; therefore, it is necessary to employ efficient methods of conducting elections. Paper ballot employs uniform official ballots on which names of various parties are printed, voters can come and select the required party. The paper ballot was first adopted in Australian state of Victoria, it thereafter became popular as 'Australian Ballot'. The major drawback in this process is lack of efficiency in counting the votes, dependency on human resource and entertains tampering of votes. To overcome these flaws electronic voting machine is being used. Electronic voting machine is more efficient than paper ballot process in terms of cost effectiveness since latter uses more usage of paper. EVMs are user friendly as voting process is made easy through push buttons. Votes casted in different centers using EVMs can be



uploaded onto a single central unit which makes easier to announce the results. Even this e-voting machine has a lot of disadvantages. Several security analysts have rejected EVMs as they are vulnerable to hackers which challenge the efficiency of the machine. Vote of no confidence is another disadvantage, where the voter is ignorant about his vote. Button jamming, cross voting are various other drawbacks in this system. Here in this paper, we present a voting machine which uses Radio Frequency Identification technology which helps to overcome the drawbacks of the above-mentioned systems. RFID uses electromagnetic fields to track and detect objects. RFID reader transmits an encoded radio signal to detect the tag, emitting unique electronic product code.

## 2. LITERATURE SURVEY

SurendraRao et al., 2019 [1] explained about a RFFID based smart voting system to reduce dishonest voting and manual switches. The system is easy to use with less cost. Voter identification is not a burden. The system included microcontroller, RFID, global system for mobile communications (GSM) technology to eliminate dishonest voting by ensuring security and transparency. Kiruthika et al., 2017 [2] developed a voting machine will eradicate defrauding of the manual voting systems. Abdulkadir et al., 2019 [3] explained their work with Arduino Mega which was interfaced with GSM and personal computer. Sudhakar et al., 2015 [4] used ARM9 microcontroller for developing their low cost and simple EVM with fingerprint module. An electronic voting machine is stored with voters' details. The processing after voting is done digitally. Prasad et al., 2016 [5] included a liquid crystal display with Arduino board. They used internet to link the authentication to Indian citizen database. Every citizen has got an identification number. Venkateswarlu et al., 2014 [6] developed their system with fingerprint module with GSM. Kumar et al., 2016 [7] linked the authentication to Indian citizen database using zigbee. Prabha et al., 2016 [8] developed a system with microcontroller activating the fingerprint module. Database is stored in personal computer. In [9] and [10] the authors explained about GSM. In [11] the authors explained the fingerprint authentication. In [12] the sensor networks are explained by the authors. In [13] GSM technology is explained for security purpose. In the proposed work four voters are considered for database. In practical the number of voters is high. So, for data storage, database management system is adopted. An external memory is necessary to save the huge data. EVM must be in power on mode till the end of the election process. Microcontroller uses the volatile memory. So, the temporary data will be lost. The total number of votes will be taken but the details such as who voted and who has not voted will be lost if power fails. During polling the voter has to show his voter ID which was already issued, to the polling officer. Polling officer will have a list in hand and will check the voter ID of confirm. He has to permit the voter to poll. This process consumes more time. So, a new voting machine is proposed to reduce time consumption. RFID tag is compared with the database stored in microcontroller to check that the voter belongs to the same polling booth. At the same time the fingerprint module tells that the voter is original or not by comparing with the stored



details. If the voter is original then the match is displayed in LCD to allow the voter to vote. If the fingerprint of the voter does not match with the stored information, then LCD displays “ACCESS DENIED”. An alarm will ring so that the polling officer may remove the person from voting. Manual switches are used in the voting process. The existing systems require six volts battery only but the security is not assured. Present voting systems are completely based on manual process. Before elections, different persons who are on election duty will come to home and they will hand over a voter id paper. During the time of elections, every individual should carry their voter ID card as shown in Fig. 1 to the election booth and the duty officer will manually check individual person in their records. If both the data get matched then the person can vote otherwise, he cannot vote. Electronic voting (also known as E-voting) is voting using electronic systems to aid casting and counting votes. Electronic voting technology can include punched cards, optical scan voting systems and specialized voting kiosks (including self-contained direct-recording electronic voting systems, or DRE). It can also involve transmission of ballots and votes via telephones, private computer networks, or the Internet. In general, two main types of E-voting can be identified – e-voting which is physically supervised by representatives of governmental or independent electoral authorities (e.g. electronic voting machines located at polling stations); – remote E-voting where voting is performed within the voter's sole influence, and is not physically supervised by representatives of governmental authorities (e.g. voting from one's personal computer, mobile phone, television via the internet (also called I-voting). Electronic voting technology can speed the counting of ballots and can provide improved accessibility for disabled voters. Electronic voting machine has now days become an effective tool for voting. It ensures flawless voting and thus has become more widespread. It ensures people about their vote being secured. It avoids any kind of malpractice and invalid votes. Also, such kind of system becomes more economical as consequent expenditure incurred on manpower is saved. It is also convenient on the part of voter, as he has to just press one key whichever belongs to his candidates. Voting machines use a two-piece system with a balloting unit presenting the voter with a button for each choice connected by a cable to an electronic ballot box. An EVM consists of two units: – Control Unit – Balloting Unit. The two units are joined by a five-meter cable. The Control Unit is with the Presiding Officer or a Polling Officer and the Balloting Unit is placed inside the voting compartment. Instead of issuing a ballot paper, the Polling Officer in-charge of the Control Unit will press the Ballot Button. This will enable the voter to cast his vote by pressing the blue button on the Balloting Unit against the candidate and symbol of his choice. The controller used in EVMs has its operating program etched permanently in silicon at the time of manufacturing by the manufacturer. No one can change the program once the controller is manufactured. The main drawback of this system is that, voter's id checking process is manual hence possibilities of illegal voting by a wrong candidate. And also, possibility of multiple votes by same person.

### 3. PROPOSED SYSTEM

Radio frequency identification (RFID) based electronic voting machine (EVM) overcomes the challenges of wired electronic voting. In this Proposed the system is constructed with microcontroller, Liquid Crystal Display (LCD), RS232 cable, RFID reader, RFID tag, and buzzer alarm. Dishonest voting will be avoided if the government uses the biometric based system. The details of all voters with their RFID will be stored in the database. Database is kept in microcontroller. Microcontroller verifies the voter by comparing the database during polling. If a person with RFID comes for second time voting, immediately the buzzer gives sound. The RFID base EVM will reduce time consumption. When compared to the existing voting system, the system in this paper is expected to be fast and reliable. The voters' details will not be revealed out. For every polling end, the button should be pressed for getting the number of votes polled.

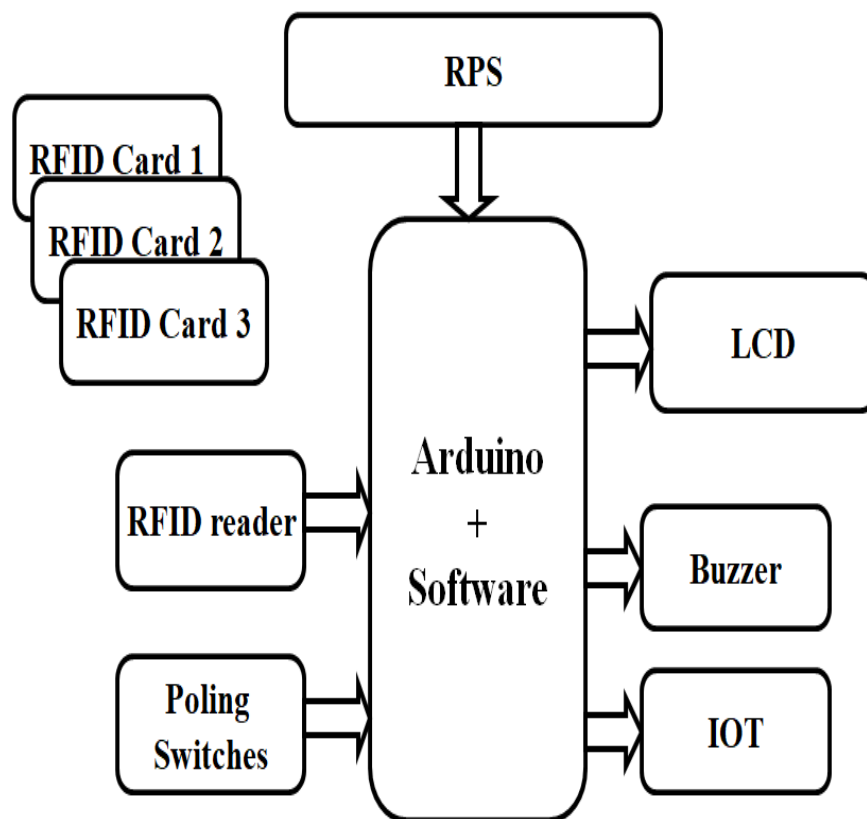


Fig. 1: Block diagram of proposed system.

The related system is implemented to make the election process more effective and secure. To avoid electoral fraud, we implemented the EVM Machine by using RFID, LCD display, Arduino





UNO, Buzzer. It reduces the manual work on the ballot. If the voter has cast a vote already then, the buzzer alarm is activated. If not, then the voter can cast his/her vote in EVM. This system is much better protected and works with higher efficiency than the system that is already present. If the Voter ID is not matched with the IDs that are stored in the electronic voting machine database, then the buzzer will alert the electoral officers, and the person will not be permitted to access the machine. The information can be displayed on the LCD

In the proposed system, the student automation system project has been developed as an important application in order to maintain the attendance automatically using RFID. Our proposed system consists mainly 16X2 LCD, RFID reader, RFID tag, Arduino uno buzzer & momentum switches. Initially LCD Display unit showing five options to start the process. These are 1: Enrollment, 2: Attendance, 3: Deleting All Records & 4: Results. So, in our proposed model firstly we have to enroll the students or we can link the database to its adhaar database and then we can start the making attendance. In enrollment firstly student/employee information are saved to the database. After then student can make the attendance

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## **4. RESULTS**

### **4.1 Arduino IDE**

#### **What is Arduino IDE?**

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

A program for Arduino hardware may be written in any programming language with compilers that produce binary machine code for the target processor. Atmel provides a development environment for their 8-bit AVR and 32-bit ARM Cortex-M based microcontrollers: AVR Studio (older) and Atmel Studio (newer).

## 4.2 Schematic diagram

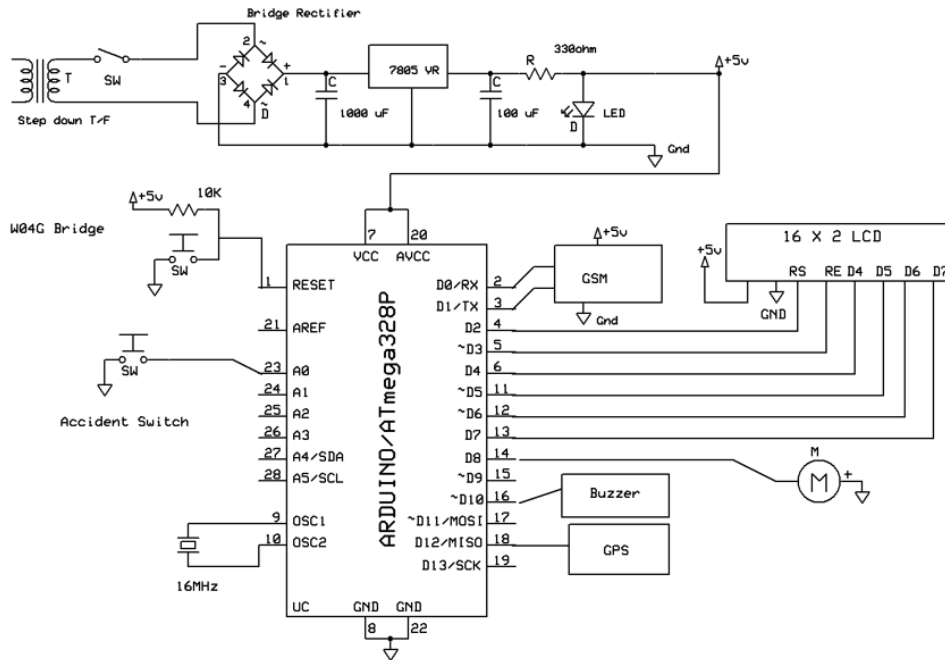
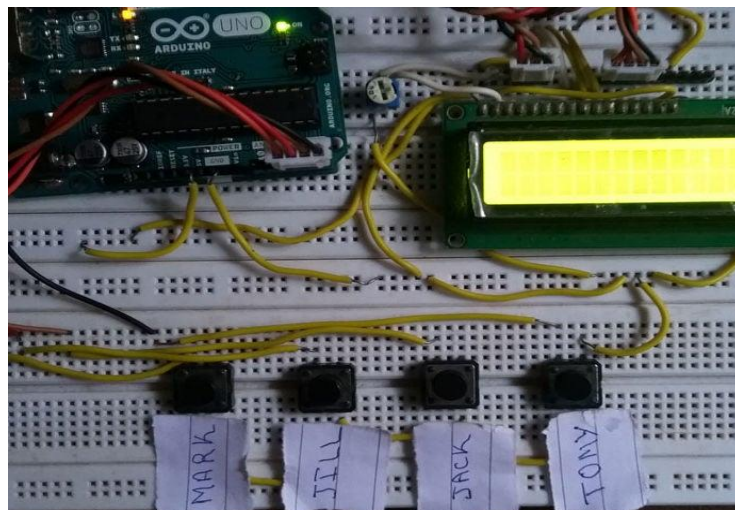
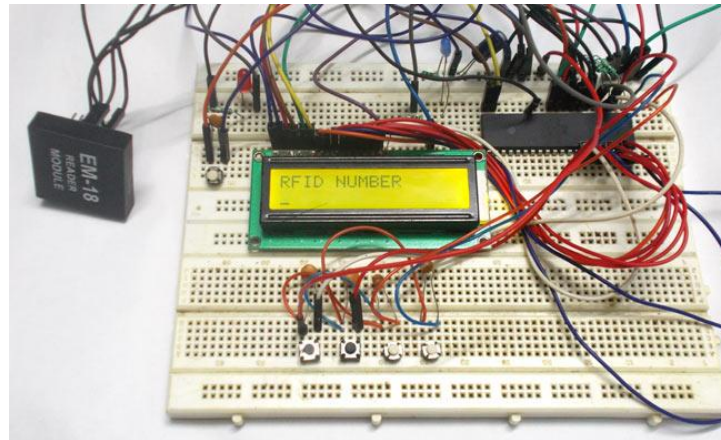


Fig. 2: Schematic diagram of proposed system.

## 4.3 Hardware implementation





## 5. CONCLUSION

Radio frequency identification (RFID) based electronic voting machine (EVM) with fingerprint module overcomes the challenges of wired electronic voting. RFID module is to authenticate the voters. In this paper the system is constructed with microcontroller, Liquid Crystal Display (LCD), RS232 cable, RFID reader, RFID tag, fingerprint module and buzzer alarm. Dishonest voting will be avoided. The details of all voters with their RFID will be stored in the database. Database is kept in microcontroller. Microcontroller verifies the voter by comparing the database during polling. If a person with RFID comes for second time voting, immediately the buzzer gives sound. The RFID base EVM will reduce time consumption. When compared to the existing voting system, the system in this paper is expected to be fast and reliable. The voters' details will not be revealed out. For every polling end, the button should be pressed for getting the number of votes polled. In future we can integrate the Biometric module aslo to accurate security of elections.

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