

## RFID BASED SMART VOTING SYSTEM

B. SurendraRao<sup>1</sup>, E. Prasanth<sup>2</sup>, R. Siva Sai Teja<sup>3</sup>, Y. Sandeep<sup>4</sup>

<sup>1,2,3,4</sup>Student, Pragati Engineering College, Surampalem, Andhra Pradesh, INDIA

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**Abstract** - This paper describes the design, operation of smart EVM using microcontroller, RFID, GSM technology to improve the election process by avoiding the electoral fraud and to ensure safety, security, reliability, guarantee and transparency and smooth conduct of elections in the country as the voting is of crucial importance in the society where people determine its government. This paper talks about an innovative approach for voting process where the device communicates with the RFID tag which is embed in the voter ID card. When the voter scans his card, the controller checks the ID and if it matches, the vote can be accessed. The voter inserts the password through keypad and if the password is confirmed then the person is allowed to vote and this process is repeated for every person.

**Key Words:** Arduino UNO, RFID Reader, EVM, GSM, Transformer, Electrolyte Capacitor

### 1. INTRODUCTION

Voting is a method for a group, such as a meeting or an electorate, in order to make a collective decision or express an opinion, usually following discussions, debates or election campaigns. Democracies elect holders of high office by voting. Residents of a place represented by an elected official are called "constituents", and those constituents who cast a ballot for their chosen candidate are called "voters". There are different systems for collecting votes.

#### 1.1 ELECTROL VOTING

Different voting systems use different types of votes. Plurality voting does not require the winner to achieve a vote majority, or more than fifty percent of the total votes cast. In a voting system that uses a single vote per race, when more than two candidates run, the winner may commonly have less than fifty percent of the vote. A side effect of a single vote per race is vote splitting, which tends to elect candidates that do not support centrism, and tends to produce a two-party system. An alternative to a single-vote system is approval voting.

#### 1.2 VOTING MACHINE

Voting machines have different levels of usability, security, efficiency and accuracy. Certain systems may be more or less accessible to all voters, or not accessible to those voters with certain types of disabilities. They can also have an effect on the public's ability to oversee elections.

When there was ambiguity over the election results recently regarding faults in EVM, losing parties asked for traditional paper ballot voting process. In a country like India where the election process happens over a long period of time care should be taken that votes are preserved till the results are announced. If traditional paper ballot process is employed, there are chances of manipulation in various ways. In order to overcome this drawback, EVM was developed which again has many issues like mechanical faults, overwriting the stored data, vote of no confidence. The major drawback in this process is lack of efficiency in counting the votes, dependency on human resource and entertains tampering of votes. 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.



Fig -1: Electronic Voting Machine

### 2. PROBLEM FORMULATION

Ballot papers may be used to discourage votes for a particular party or candidate, using the design or other features which confuse voters into voting for a different candidate. The ballot design was most harmed by voter errors, because of this design. Poor or misleading design is usually not illegal and therefore not technically election fraud, but it can nevertheless subvert the principles of democracy. Another method of confusing people into voting for a different candidate than intended is to run candidates or create political parties with similar names or symbols as

an existing candidate or party. The goal is to mislead voters into voting for the false candidate or party to influence the results. Such tactics may be particularly effective when a large proportion of voters have limited literacy in the language used on the ballot. Again, such tactics are usually not illegal but often work against the principles of democracy.



**Fig -2:** Ballot unit (left), Control unit (right)

An EVM consists of two units, a control unit, and the balloting unit. The two units are joined by a five-meter cable. Balloting unit facilitates voting by a voter via labeled buttons while the control unit controls the ballot units, stores voting counts and displays the results on 7 segment LED displays. The controller used in EVMs has its operating program etched permanently in silicon at the time of manufacturing by the manufacturer. No one (including the manufacturer) can change the program once the controller is manufactured. EVMs are powered by an ordinary 6 volt alkaline battery. This design enables the use of EVMs throughout the country without interruptions because several parts of India do not have the power supply and/or erratic power supply.

### 2.1 Existing Technology

In EVM's, the existing technology is having some flaws, such as mis-recording of votes leading to unscrupulous officials or 'helpers' to record an elector's vote differently from their intentions. Voters who require assistance to cast their votes are particularly vulnerable to having their votes stolen in this way. This is similar to the misuse of proxy votes; however, in this case, the voter will be under the impression that they have voted with the assistance of the other person, rather than having the other person voting on their behalf. Where votes are recorded through electronic or mechanical means, the voting machinery may be altered so that a vote intended for one candidate is recorded for another. Proxy voting is particularly vulnerable to election fraud, due to the amount of trust placed in the person who casts the vote. In several countries, there have been

allegations of retirement home residents being asked to fill out 'absentee voter' forms. When the forms are signed and gathered, they are secretly rewritten as applications for proxy votes, naming party activists or their friends and relatives as the proxies. These people, unknown to the voter, cast the vote for the party of their choice. One of the simplest methods of electoral fraud is to destroy ballots for an opposing candidate or party. While mass destruction of ballots can be difficult to execute without drawing attention, in a very close election, it may be possible to destroy a very small number of ballot papers without detection, thereby changing the overall result. Blatant destruction of ballot papers can render an election invalid and force it to be re-run. If a party can improve its vote on the re-run election, it can benefit from such destruction as long as it is not linked to it. Tampering with electronic voting machines leads to all voting systems face threats of some form of electoral fraud. The types of threats that affect voting machines vary.

### 2.2 Proposed Technology

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. The main purpose of our project is to design an efficient and cost effective voting system. This system reduces the complications in e-voting machine and voting process is made more transparent. Here we use a RFID reader module which senses the RFID tags with unique identity. RFID tags with unique identity are allotted for different candidates in the election.

### 3. Hardware Implementation

It consist of Arduino UNO, LCD 2x16 Module, RFID Reader, 12V Transformer, Voltage Regulators, Filter Capacitors, Buzzer, Switches—to cast votes Other Misc Components. The RFID module is interfaced with the arduino controller to count and store the votes casted. Display unit is incorporated to display the casted vote along with the candidate's identity to the voter. In order to end the voting process and display the results a separate RFID tag is dedicated which will be under the custody of the Officer in charge. LED and Buzzer are used to indicate the vote casted. A switch has been used to prevent multiple voting. This system thus provides efficient and unambiguous voting process. The power supply setup of the system contains a step down transformer of 230/12V, used to step down the voltage to 12VAC. To convert it to DC, a bridge rectifier is used. Capacitive filter is used to remove ripple from DC Supply. 7805 voltage regulator is used to regulate input 8voltage to +5V and 7812 is used to regulated input voltage to 12V DC. 5V DC is used by LCD Module and Reader Module and 12V DC is used Arduino UNO and Other Misc circuits.

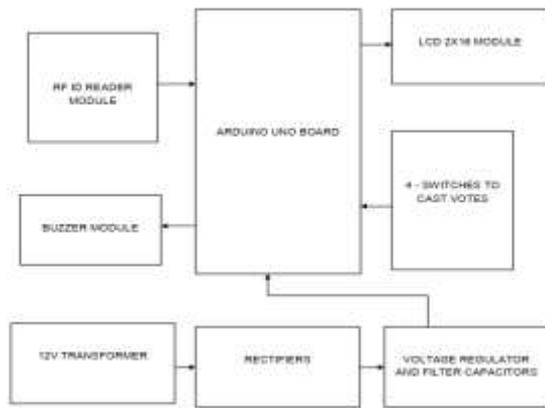


Fig -3: Block Diagram

### 3.1 Aurdino UNO

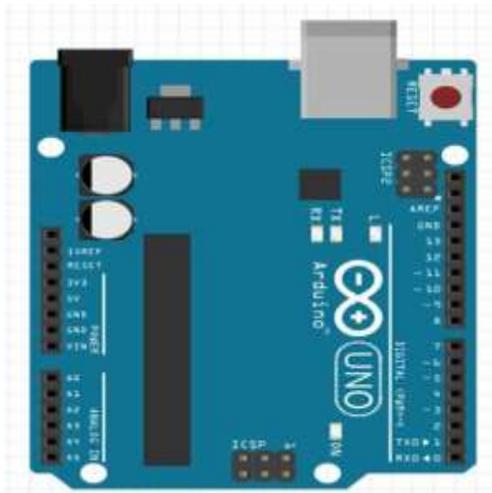


Fig -3: Aurdino UNO

The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog I/O pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Aurdino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++. Aurdino programs may be written in any programming language with a compiler that produces binary machine code. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio.

### 3.2 RFID Reader

Radio-Frequency Identification (RFID) is the use of radio waves to read and capture information stored on a tag attached to an object. A tag can be read from up to several

feet away and does not need to be within direct line-of-sight of the reader to be tracked. A RFID system is made up of two parts: a tag or label and a reader. RFID tags or labels are embedded with a transmitter and a receiver. The RFID component on the tags has two parts: a microchip that stores and processes information, and an antenna to receive and transmit a signal. The tag contains the specific serial number for one specific object. To read the information encoded on a tag, a two-way radio transmitter-receiver called an interrogator or reader emits a signal to the tag using an antenna. The tag responds with the information written in its memory bank. The interrogator will then transmit the read results to an RFID computer program. There are two types of RFID tags: passive and battery powered. A passive RFID tag will use the interrogator's radio wave energy to relay its stored information back to the interrogator. A batter powered RFID tag is embedded with a small battery that powers the relay of information.

### 3.3 VOLTAGE REGULATORS

A voltage regulator is designed to automatically maintain a constant voltage level. A voltage regulator may be a simple "feed-forward" design or may include negative feedback control loops. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages. Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and central power station generator plants, voltage regulators control the output of the plant. In an electric power distribution system, voltage regulators may be installed at a substation or along distribution lines so that all customers receive steady voltage independent of how much power is drawn from the line.

7805 is a voltage regulator integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage.

### 4. RESULTS

In this project we have shown the implementation of a system that minimizes the possibility of rigging in elections and eliminates the need to do manual work. Cost of the EVM system is low and the system is convenient to use. It reduces the burden of the polling officers to identifying the voter. We have used database of 4 voters as a sample. In the real scenario, the number of voters will be quite large. In that

case, storing them as array of strings might not work. We may need to employ a database management system to hold the record and retrieve the data quickly. Besides that, external memory will be required to hold such database.



**Fig -4:** Output

## 5. CONCLUSION

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## 6. Future Scope

Anyone can carry the RFID card of someone being an imposter. To curb the menace of these imposters, an additional mechanism would be required to identify the voters like integrating the voting machine with fingerprint matching or face recognition. Another improvement that can be done is instead of storing the database locally on the EVM, the information of the voter can be retrieved from the server, where the server holds the database of all the registered users. This will allow any of the registered voters to vote from any polling booth.

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