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ELECTRONIC VOTING MACHINE USING RASPBERRY PI

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A PROJECT REPORT

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BONAFIDE CERTIFICATE

The undersigned certify that this final year project titled **"ELECTRONIC VOTING MACHINE USING RASPBERRY PI"** is the bonafide work of **ALISHA THAPA (740403), ASHISH SHRESTHA (740409), GAURAV MAHARJAN (740415), KESHAV MISHRA (740417) & RUPA THAPA MAGAR (740431)** for the partial fulfillment of the degree of Bachelor in Electronics and Communication Engineering.

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ABSTRACT

"A voting machine is a machine used to record or tally votes". Electronic voting (also known as e-voting) is voting that uses electronic means to either aid or take care of casting and counting votes. All earlier elections be it state elections or center elections a voter used to cast his/her favorite candidate by putting the stamp against his/her name and then folding the ballot paper as per a prescribed method before putting it in the Ballot Box. This is a long, time-consuming process and very much prone to errors. This situation can be completely changed by electronic voting machines.

The main aim of our project is to build an "Electronic Voting System" for counting fast and fair votes. Our project minimizes human resources, cost that are spent on elections. No more ballot paper, ballot boxes, stamping, etc. all condensed into a simple box called the ballot unit of the electronic voting machine. Because biometric identifiers cannot be easily misplaced, forged, or shared, they are considered more reliable for person recognition than traditional token or knowledge-based methods. All the information is stored in a database and made digital with more security that includes biometric identifier, QR code scanners. This project discusses a complete review about the voting system, issues comparison among the voting methods and biometric EVM.

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CHAPTER 1: INTRODUCTION

1.1 Background

“A voting machine is a machine used to record or tally votes”. Electronic voting (also known as e-voting) is voting that uses electronic means to either aid or take care of casting and counting votes. In 1881, Anthony Beranek of Chicago patented the first voting machine appropriate for use in a general election in the United States. Beranek's machine presented an array of push buttons to the voter, with one row per office on the ballot, and one column per party.

In general, two main types of e-voting can be identified:

1. E-voting which is physically supervised by representatives of governmental or independent electoral authorities (e.g. electronic voting machines located at polling stations);

2. Remote e-voting via the Internet (also called i-voting) where the voter submits his or her vote electronically to the election authorities, from any location.

Electronic voting in polling stations is in place in some of the world’s largest democracies, and Internet voting is used in some, initially mainly small and historically conflict-free, countries. Many countries are currently considering introducing e-voting systems with the aim of improving various aspects of the electoral process.

E-voting is often seen as a tool for advancing democracy, building trust in electoral management, adding credibility to election results and increasing the overall efficiency of the electoral process. The technology is evolving fast and election managers, observers, international organizations, vendors and standardization bodies are continuously updating their methodologies and approaches.

Properly implemented, e-voting solutions can eliminate certain common avenues of fraud, speed up the processing of results, increase accessibility and make voting more convenient for citizens—in some cases, when used over a series of electoral events, possibly even reducing the cost of elections or referendums in the long term.

Unfortunately, not all e-voting projects succeed in delivering on such high promises. The current e-voting technology is not problem-free. Legislative and technical challenges have arisen in some cases; in others, there has been skepticism about or opposition to the introduction of new voting technologies.

The inherent challenges of e-voting are considerable and linked to the complexities of electronic systems and procedures. Many e-voting solutions lack transparency for voters and even for election administrators.

Most e-voting solutions are only fully understood by a small number of experts and the integrity of the electoral process relies largely on a small group of system operators instead of thousands of poll workers. If not carefully planned and designed, the introduction of e-voting can undermine confidence in the whole electoral process.

It is therefore important to devote adequate time and resources to considering its introduction and looking at previous experiences of electronic voting.

1.2 Problem Statement

- Manual authentication of voters via ink in thumb and visual identity is a factor of risk
- There is a lot of time consuming and human resources involvement during the process of vote count
- There is a high risk of vote fraud during the centralization of voter's paper during travel
- High chance of buying votes from opposing party as vote is counted on limited person supervision

1.3 Objectives

- To build a system for an electronic voting machine using Raspberry pi

1.3.1 Specific Objectives

- To build a system for fair vote
- To build a system that counts votes fast

1.4 Scope and Limitation

- Electronic Voting Machine for counting fast and fair votes
- High chances of data hacking
- Possibility of error in database
- More power consumption by solenoid

CHAPTER 2: LITERATURE REVIEW

The paper titled "Arduino based smart electronic voting machine "Published in: 2017 International Conference on Trends in Electronics and Informatics (ICEI) provides the information to create an electronic voting machine that will help to eradicate defrauding of the manual voting systems and prior versions of electronic voting.

The MIT/Caltech researchers “see a promising future for electronic voting, despite its problems today” (under a few conditions). They advocate using the methods currently in use which result in the lowest average numbers of “uncounted, unmarked, and spoiled ballots” like in-precinct optical scanning. Their report even proposes a framework for a new voting system with a decentralized, modular design

Other researchers have done work in electronic voting; while they may not explicitly mention voting from remote poll sites, their work is nonetheless relevant to any effort at designing or implementing a remote poll site voting system. Lorrie Cranor could be classified, like the Caltech/MIT researchers, as a cautious optimist. She acknowledges the problems inherent in each kind of voting apparatus, but doesn't make an overt recommendation on her site for one technology over the rest

Neumann gives a list of suggestions for "generic voting criteria" which suggests that voting systems should be so hard to tamper with and so resistant to failure that no commercial system is likely to ever meet the requirements, and developing a suitable custom system would be extremely difficult and prohibitively expensive.

Rebecca Mercuri invented the “Mercuri method” for electronic voting. A critical component of this method is very similar to the Caltech/MIT proposal: a voting machine must produce human-readable hardcopy paper results, which can be verified by the voter before the vote is cast, and manually recounted later if necessary. Her philosophy and Neumann's are very similar; in fact, they've written papers together on the subject.

The project titled “Online voting system project” gives the information about He\She has to fill a registration form to register himself\herself. All the entries are checked by the DATABASE which already has all information about the voter. If all the entries are correct then a USER ID and PASSWORD is given to the voter, by using that ID and PASSWORD he\she can use his\her vote. If conditions are wrong then the entry will be discarded.

Smita B. Khairnar, P. Sanyasi Naidu, Reena Kharat, "Secure authentication for online voting system", Computing Communication Control and automation (ICCUBEA) 2016 International Conference in 2016.

David Chaum presents a very interesting scheme, whereby voters could get receipts for their votes. This receipt would allow them to know if their votes were included in the final tally or not, and to prove that they voted without revealing any information about how they voted. The security of this scheme depends on visual cryptography developed by Naor and Shamir, and on voters randomly choosing one of two pieces of paper. Mercuri and Neumann advocate the use of this technique in electronic voting systems.

Dr. Michael Shamos of CMU provides a sharp counterpoint to Neumann and Mercuri's views. While his “Six Commandments” summary of requirements for a voting system is very similar to others' requirements, he's less afraid of the catastrophic failures and sweeping fraud made possible by imperfections in electronic voting machines actually occurring in a real election. Shamos is also much less impressed with paper ballots than Neumann and Mercuri. He places a great deal of faith in decentralization to make fraud difficult to commit and easy to detect. Dr. Shamos even likes DRE machines.

An untraceable, universally verifiable voting scheme” presents a remote voting scheme that applies the technique of blinded signature to a voter's ballot so that it is impossible for anyone to trace the ballot back to the voter. They achieve the desired properties of privacy, universal verifiability, convenience and untrace ability, but at the expense of receipt-freeness.

CHAPTER 3: METHODOLOGY

3.1 Architecture of Electronic Voting Machine

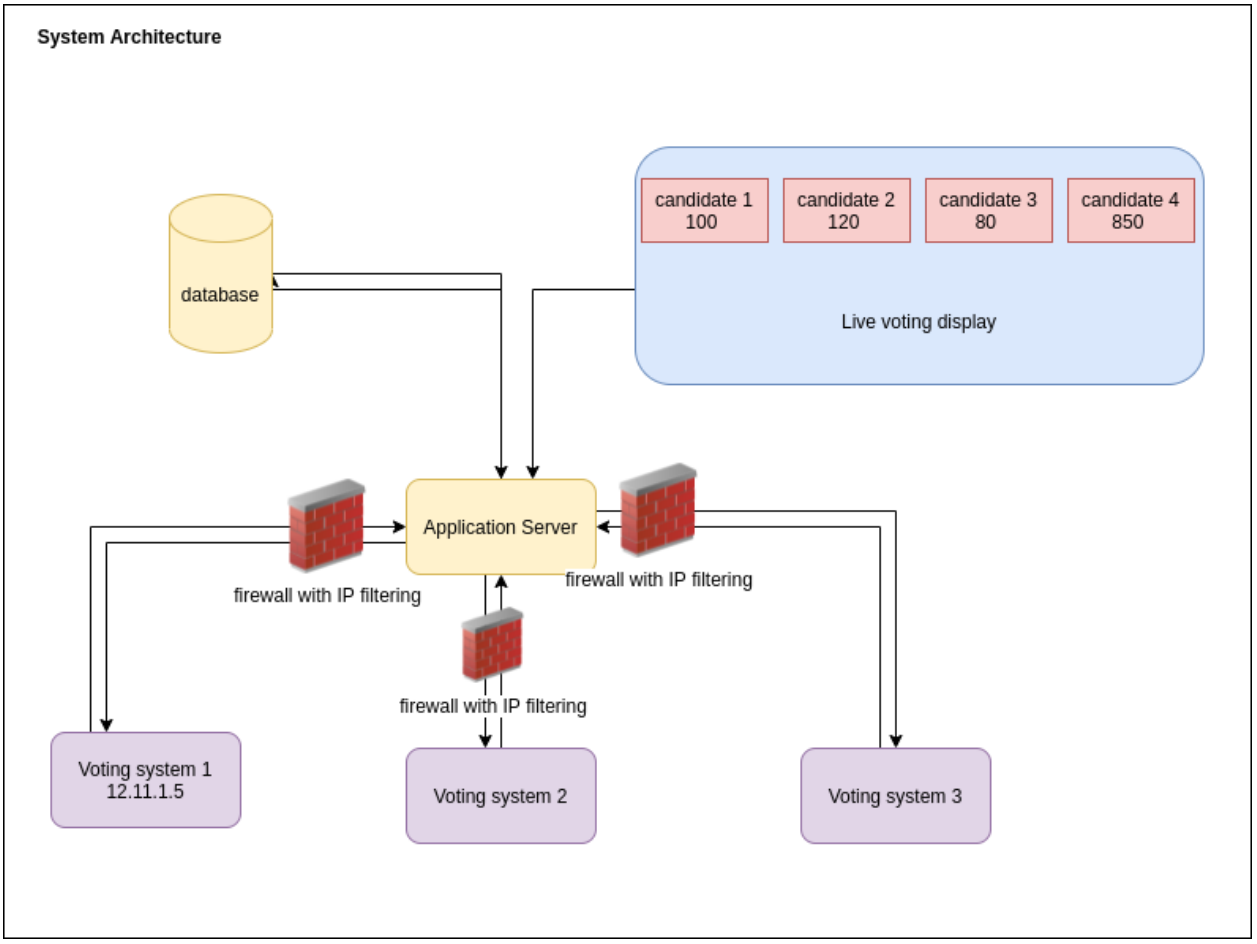

Figure 1: Architecture of Electronic Voting Machine

There will be different sub-station (local stations) at different places. In order to secure data, a Firewall is created before the main station. Firewall is a network security device that monitors and filters incoming and outgoing network traffic based on an organization's previously established security policies. The purpose of the firewall here is that it monitors attempts to gain access to our operating system and blocks unwanted traffic or recognized sources. All the data from local stations (voting system 1, voting system 2, voting system 3) will go to the application server. From all these three locations request access is sent to a centralized application server. An application is a type of server design to install, operate and host applications and associated services for end users IT services and organizations. Then at the main station data obtained from local stations (voting system 1, voting system 2, voting system 3) will be saved inside the database and results will be displayed as shown in the above figure.

3.2 Block Diagram of Voting Process

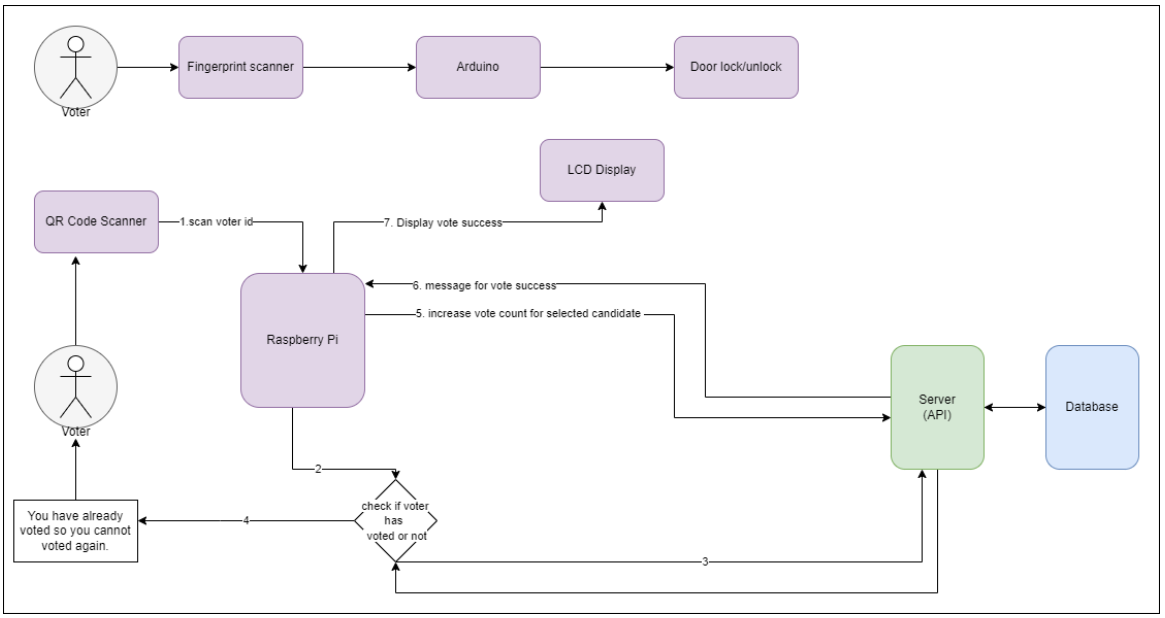

Figure 2: Block Diagram of voting process

First of all, the person has to go through the solenoid door. Fingerprint scanner is placed in the door. The fingerprint scanner scans the fingerprint of the person. And if the fingerprint matches then the door gets unlocked for a few seconds. We can adjust the timing. But if the fingerprint doesn't match the door gets locked. Similarly, for qr code scanning. Authentication process happens within the server (API) & database by the help of qr code. First of all, the voter goes with the voter card which has a qr code in it. The qr code is generated when the voter registration takes place.

The qr code is in the voter id along with the other information. Now when the voter goes for voting the qr code is scanned. Here we scan the voter id with the help of the pi camera. The pi camera scans the voter id and shows the information. And allows the voter to vote. If a voter has voted before, then the voter cannot vote again & display the message like “You have already voted so you cannot vote again”.

If the voter did not vote before then the voter can use the Push Button for giving a vote for the candidate. Then, server counts & increased the vote for selected candidates & display it in LCD Display.

3.3 Block Diagram of Province Wise Voting System

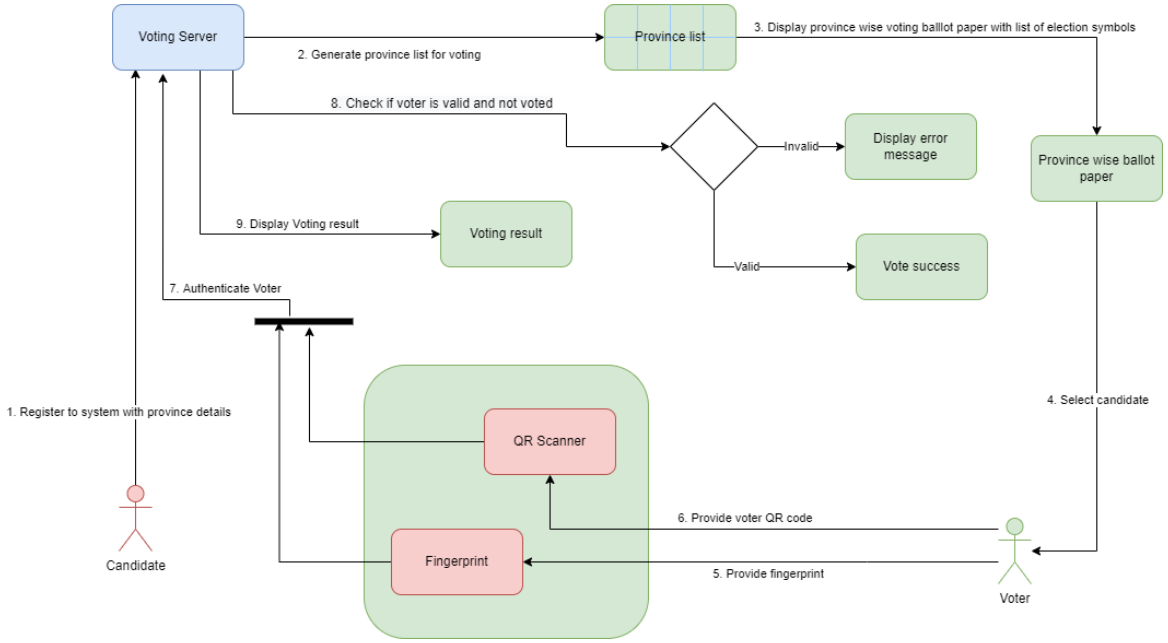

Figure 3: Block Diagram of Province wise Voting System

Here we worked on Province wise electronic-voting systems. In the previous semester we had only one province for e-voting. Here in Nepal, we have seven provinces so we designed our system accordingly. Firstly, the voter goes to the registration office in which his/her information including his province details is registered. The information is stored in the server. Then it generates a province list.

Inside the province wise there appears ballot paper. The ballot paper differs province wise. Then the voter with the qr code which is in voter id goes for scanning qr code which is connected to Raspberry pi. The Raspberry Pi (Opens in a new window) is a tiny computer about the size of a deck of cards. It uses what's called a system on a chip (Opens in a new window), which integrates the CPU and GPU in a single integrated circuit, with the RAM, USB ports, and other components soldered onto the board for an all-in-one package. Then the qr code shows the voter id and checks inside the server if the voter is valid and not voted. If the voter is valid, it allows them to vote. If the voter is invalid it displays an error message. Province wise Voting system helps to vote even if the voter is in a different province due to work reasons, study or many more. It minimizes the cost of traveling as one don't have to travel to their respective provinces to vote

3.4 Block Diagram of Sending Message System.

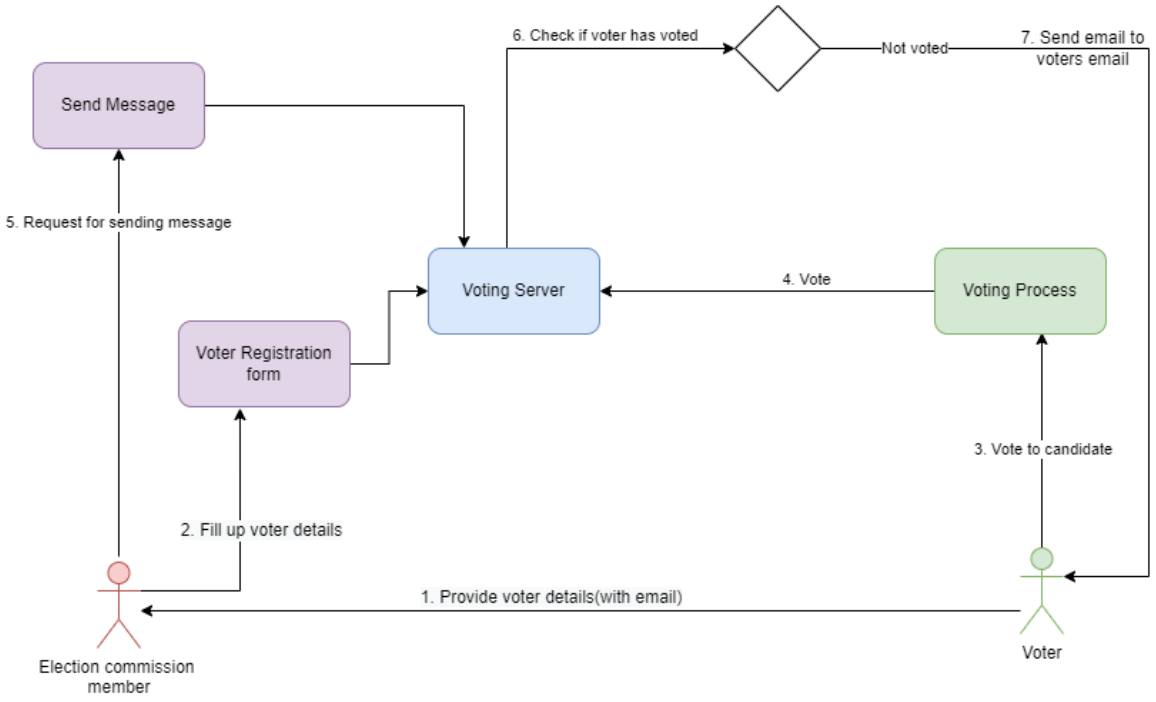

Figure 4: Block Diagram of Sending Message System

Here the sending message system means sending a g-mail message as a reminder. Google Gmail is an email service developed by the company Google. This is characterized by being totally free and multi-device**,** so that we can access it from any device as long as we have an Internet connection. First of all, the Gmail of every voter is taken during the registration process. If the voters don't have any Gmail, then one is created during the registration process. The voter will go to vote during the election and then when the election is over. It checks inside the list of voters who were absent during the election.

Then through the SMTP protocol (Simple Mail Transfer Protocol). It is a basic protocol for sending emails via servers between two computers on a TCP / IP network. It is part of the TCP / IP protocol application level, which makes it easy to deliver email messages to one or more recipients over the network. Then the Gmail message is sent to all those voters who were absent during the election. Here in our system the Gmail message is

"Hello, let's go vote in time".

3.5 Working of Door Lock System.

We are using an Arduino nano microcontroller. The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package.

It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one. First of all, we upload enrollment program from the Arduino IDE application in which the voters or the public enroll their fingerprint to store their fingerprint template and after all the voters have save their fingerprint template then finally the second code is uploaded to scan or to find the fingerprint of the voter if they are authorized or not.

We are using the R305 fingerprint scanner module with TTL UART interface which is connected to the UART i.e. 2, 3 pins of the microcontroller. The user can store the fingerprint data in the module and can configure it in 1:1 or 1:n mode for identifying the person.

The fingerprint sensing process typically consists of capturing the fingerprint image, extracting the distinguishing features of the fingerprint and then storing a digital template of the fingerprint or comparing the current image with the stored fingerprint templates.

We are using 16*2 LCD displays which display whether the door is locked or unlocked. A potentiometer is a manually adjustable variable resistor with 3 terminals. Two of the terminals are connected to the opposite ends of a resistive element, and the third terminal connects to a sliding contact, called a wiper, moving over the resistive element. Potentiometer is to control the contrast of the display

When the fingerprint matches the relay gets triggered and it turns on the solenoid door lock. Solenoid door lock is connected to the relay and 12volt power supply.

For exit we used an Ultrasonic Sensor (As the name indicates, ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception) that opens the door whenever the voter goes near to it.

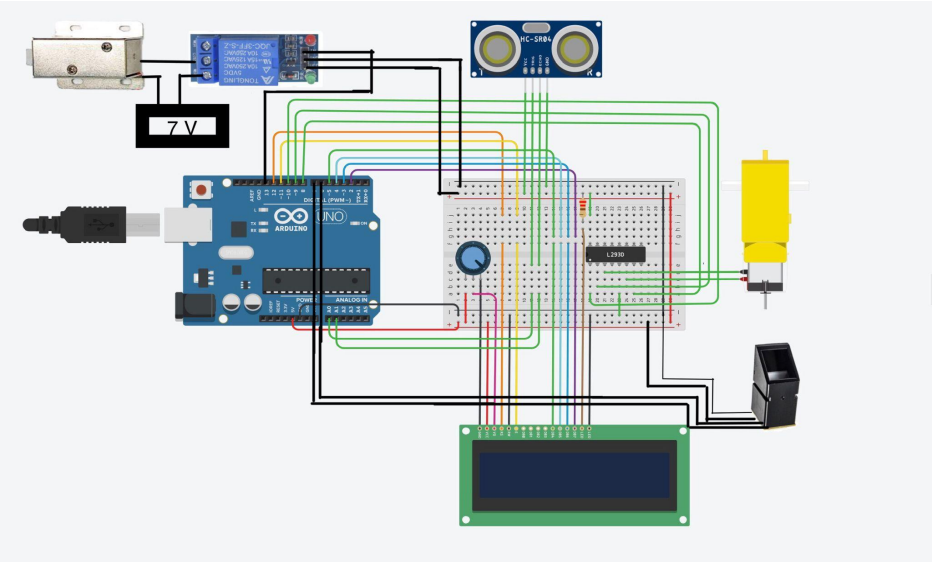

Figure 5: Door lock system setup

3.6 Working of QR Code Detection

QR stands for "Quick Response". While they may look simple, QR codes are capable of storing lots of data. But no matter how much they contain, when scanned, the QR code should allow the user to access information instantly – hence why it's called a Quick Response code.

Here QR code is generated when we download the voter registration form. For scanning the qr code here we use a pi camera. The Pi camera module is a portable lightweight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects.

The pi camera is connected to the Raspberry pi. For enabling the pi camera, we first go to the application menu and inside the application menu there we find preferences. Then we click raspberry pi configuration. Then a tab appears. Then after we interface it and enable the camera

Figure 6: QR Code and pi camera

3.7 Tools Used:

3.7.1 Hardware Used:

a. Raspberry Pi:

The Raspberry Pi used in our project is a little device that enables people of all ages to explore computing. It is a computer that plugs into a computer monitor or TV. The major differences between the raspberry pi and a regular computer are in the construction, size, price, connectivity, memory and storage. A good quality 2.5A power supply can be used if downstream USB peripherals consume less than 500mA in total.

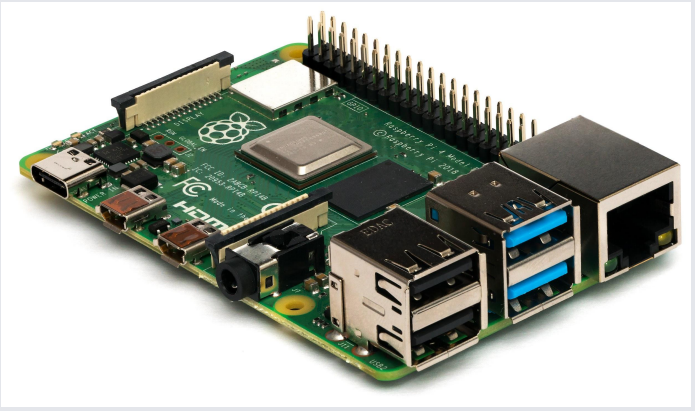

Figure 7: Raspberry pi

b. Pi Camera:

The Pi camera module is a portable lightweight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial.

It is commonly used in surveillance drones since the payload of the camera is very less. Apart from these modules Pi can also use normal USB webcams that are used along with computers.

The camera consists of a small (25mm by 20mm by 9mm) circuit board, which connects to the Raspberry Pi's Camera Serial Interface (CSI) bus connector via a flexible ribbon cable. The camera's image sensor has a native resolution of five megapixels and has a fixed focus lens.

The software for the camera supports full resolution still images up to 2592x1944 and video resolutions of 1080p30, 720p60 and 640x480p60/90. The camera module is shown below:

Here in our project, we used a pi camera for scanning the generated qr code.

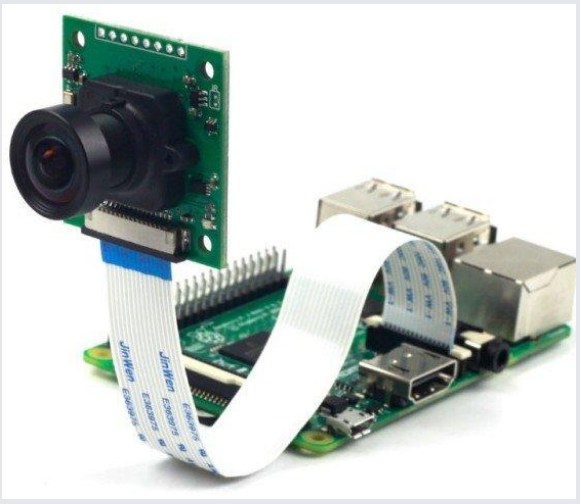

Figure 8: Pi Camera

c. LCD:

LCD stands for Liquid Crystal Display. This technology works at the time when electrical current causes the liquid crystal molecules to align to allow varying levels of light to pass through the substrate and creates the color and images that we can see.

LCDs replace the various technologies which include light-emitting diodes and gas-plasma display. LCD allows displays to be much thinner than cathode ray technology (CRT).

LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it. Where an LED emits light, the liquid crystals in an LCD produces an image using a backlight.

In our project we used LCD display to show information like “welcome voters”, “place your fingerprint on sensor”, “Door unlocked” and “Door locked”

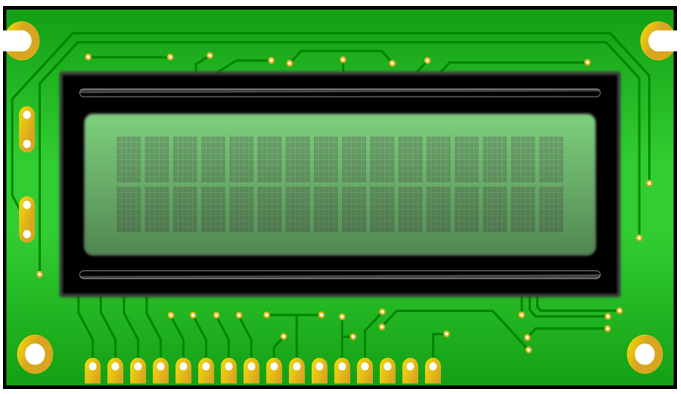

Figure 9: LCD

d. Fingerprint Scanner:

A fingerprint scanner is a type of technology that identifies and authenticates the fingerprints of an individual in order to grant or deny access to a computer system or a physical facility.

A fingerprint scanner typically works by first recording fingerprint scans of all authorized individuals for a particular system or facility. These scans are saved within a database. The user requiring access puts their finger on a hardware scanner, which scans and copies the input from the individual and looks for any similarity within the already-stored scans. If there is a positive match, the individual is granted access.

Fingerprint scanners most commonly use an individual's thumbprint as identification.

It is a type of biometric security technology that utilizes the combination of hardware and software techniques to identify the fingerprint scans of an individual.

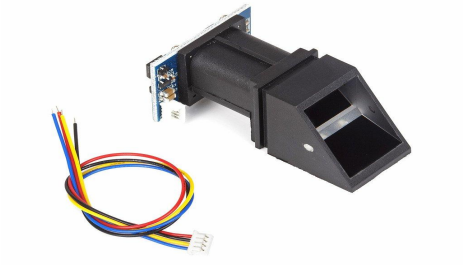

Figure 10: Fingerprint Scanner

e. Arduino NANO:

The Arduino Nano used in our project is a tiny, complete, and breadboard-friendly board. It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

The Arduino Nano is equipped with 30 male I/O headers, in a DIP-30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline. The board can be powered through a type-B mini-USB cable or from a 9 V battery. For our project it is the main brain for door security which is connected to fingerprint scanner, l298n motor and ultrasonic sensor.

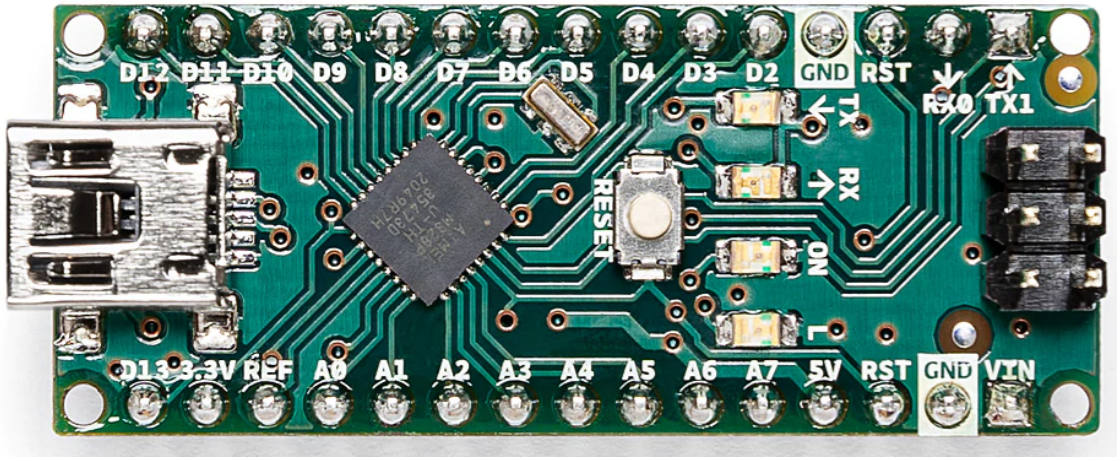

Figure 11: Arduino NANO

f. Solenoid:

A solenoid door lock is a door locking mechanism that latches or opens by means of an electromagnetic solenoid. In most cases, the actual locking mechanism of a solenoid door lock will be identical to a conventional key-operated example. The only difference between the two is the inclusion of a low-voltage solenoid in the mechanism, which pulls the latch back into the door when a push button or other controller is activated.

The latch will then be retained in the door for as long as the button is pushed, or, in the case of a latching solenoid, indefinitely until the button or controller is activated again. These types of door locks are used extensively in remote security access and automotive doors.

In the case of our project, the solenoid door lock will remain active for five seconds courtesy of a built-in delay circuit allowing time for the door to be opened. At this time the voter has to enter through the door. The solenoid door opens only when the fingerprint matches else the door will be closed. It may also be kept active by an operator holding down the control button until the door is opened. When the power is cut to the solenoid, the latch resets and the door locks again when closed. If the door is unlocked and is open and at the same time if the power is cut off then it will remain open.

Figure 12: Solenoid

g. Ultrasonic Sensor:

As the name indicates, ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception.

An optical sensor has a transmitter and receiver, whereas an ultrasonic sensor uses a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic waves alternately. This enables miniaturization of the sensor head.

Here in our project an ultrasonic sensor is used as an exit door, whenever person goes near it the door gets open and then it closes automatically.

Figure 13: Ultrasonic Sensor

h. L298N Motor:

The L298N is a motor driver module that controls the speed and direction of a motor which consists of an L298 Motor Driver IC, 78M05 Voltage Regulator, resistors, capacitor, Power LED, 5V jumper in an integrated circuit.

78M05 Voltage regulator will be enabled only when the jumper is placed. When the power supply is less than or equal to 12V, then the internal circuitry will be powered by the voltage regulator and the 5V pin can be used as an output pin to power the microcontroller. The jumper should not be placed when the power supply is greater than 12V and separate 5V should be given through a 5V terminal to power the internal circuitry.

ENA & ENB pins are speed control pins for Motor A and Motor B while IN1& IN2 and IN3 & IN4 are direction control pins for Motor A and Motor B

Here in our project L298N is used to control the speed of the motor and give direction.

Figure 14: L298N Motor

i. Geared Motor:

A geared motor is a motor whose mechanism adjusts the speed of the motor, leading them to operate at a certain speed. Geared motors have the ability to deliver high torque at low speeds, as the gearhead functions as a torque multiplier and can allow small motors to generate higher speeds.

A geared motor can also be defined as a gear reducer because essentially, it is a combination of a speed reducer with a motor typically functioning as a gearbox, to reduce speed making more torque available.

A geared motor can be classified based on the motor they are paired with, including bevel, helical, hypoid, spur and worm gears.

Each of these gears have advantages and disadvantages. For example, helical gears possess more torque capacity than spur gears, hence, generating less noise. Worm gears work efficiently in the low torque angle and are good for high-speed reductions.

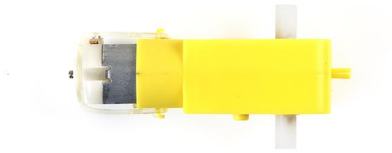

Figure 15: Gear Motor

3.7.2 Software Used:

a. Php:

PHP (Hypertext Preprocessor) is known as a general-purpose scripting language that can be used to develop dynamic and interactive websites. It was among the first server-side languages that could be embedded into HTML, making it easier to add functionality to web pages without needing to call external files for data.

One of the main reasons PHP became so commonplace is that it is relatively simple to get started with. The syntax is simple and command functions are easy to learn, meaning the barriers to entry with PHP are lower than with many other languages. It's open source (and therefore free! This also helps developers get started with PHP.

It can be installed quickly and at zero cost. It's versatile: One of the major benefits of PHP is that it is platform independent, meaning it can be used on Mac OS, Windows, Linux and supports most web browsers. It is well connected with databases: PHP makes it easy to connect securely with almost any kind of database.

b. JavaScript:

JavaScript is a lightweight, cross-platform, and interpreted scripting language. It is well-known for the development of web pages; many non-browser environments also use it. JavaScript can be used for Client-side developments as well as Server-side developments. JavaScript contains a standard library of objects, like Array, Date, and Math, and a core set of language elements like operators, control structures, and statements.

c. HTML / CSS:

HTML stands for Hypertext Markup Language. It is used to design web pages using a markup language. HTML is the combination of Hypertext and Markup language. Hypertext defines the link between the web pages. A markup language is used to define the text document within a tag which defines the structure of web pages.

Cascading Style Sheets, fondly referred to as CSS, is a simply designed language intended to simplify the process of making web pages presentable.

d. Python:

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built-in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Often, programmers fall in love with Python because of the increased productivity it provides. Since there is no compilation step, the edit-test-debug cycle is incredibly fast. Debugging Python programs is easy: a bug or bad input will never cause a segmentation fault. Instead, when the interpreter discovers an error, it raises an exception. When the program doesn't catch the exception, the interpreter prints a stack trace.

A source level debugger allows inspection of local and global variables, evaluation of arbitrary expressions, setting breakpoints, stepping through the code a line at a time, and so on. The debugger is written in Python itself, testifying to Python's introspective power. On the other hand, often the quickest way to debug a program is to add a few print statements to the source: the fast edit-test-debug cycle makes this simple approach very effective.

CHAPTER 4: RESULT AND DISCUSSION

4.1 Result

4.1.1. Political Party Registration

First of all, the details (i.e. fingerprint, name, address, age, etc.) of the political party will be taken. Then the given details will be checked with the database through the help of the application server. If the details are already matched in the database, then the political party will not be registered. Then the details of the user will be fetched from the application server and the existing data will be printed in the voter card.

If the details are not found then political party details will be saved in Database and the new voter card will be printed.

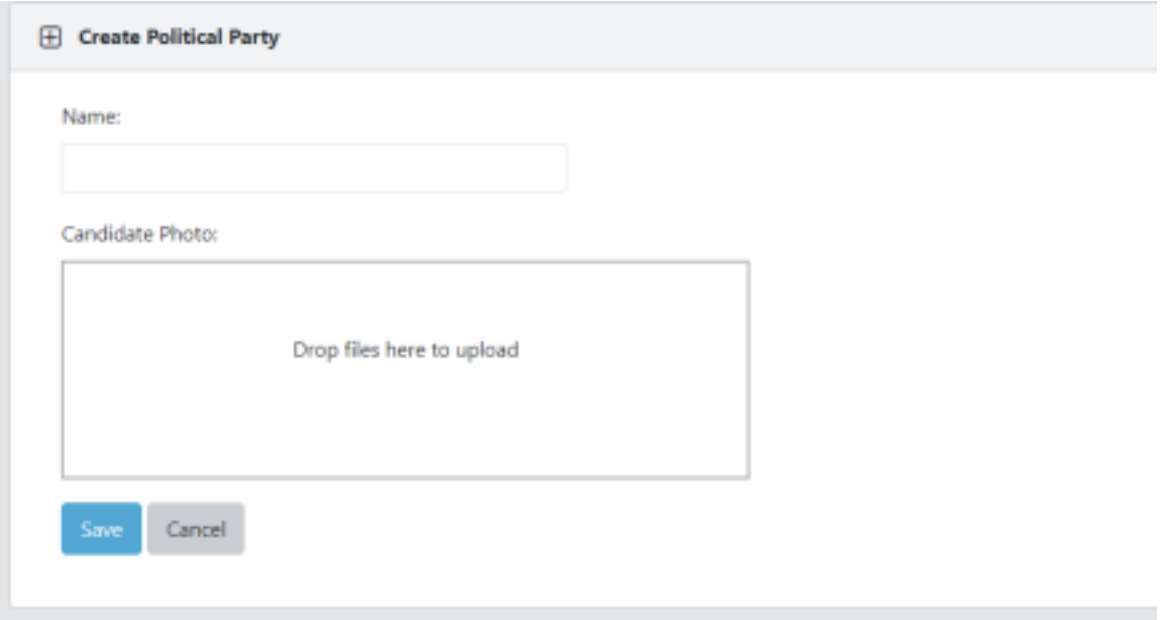

Figure 16: Political Party Registration

4.1.2. Candidate Registration

Then after, the details (i.e fingerprint, name, address, age, etc.) of the candidate will be taken. Then the given data will be checked in the database through the help of the application server. If the details are found in the database, then the candidate will not be registered and a message will be displayed that the candidate has already been registered.

If the details of the candidate are not found then candidate details are saved in Database then display candidate registration success message will be shown.

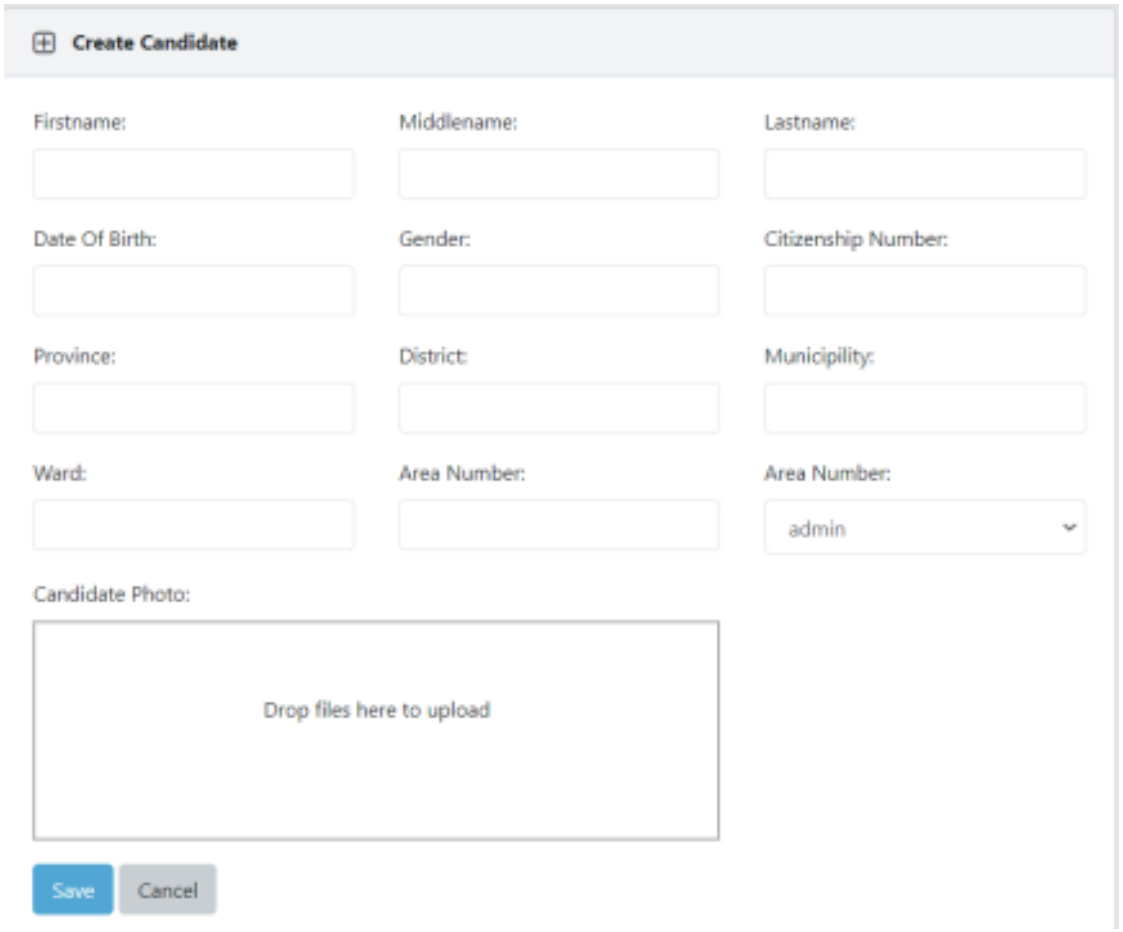

Figure 17: Candidate Registration

4.1.3. Voter Registration

First of all, the details (i.e. fingerprint, name, address, age, etc.) of the voter will be taken. Then the given details will be checked with the database through the help of the application server. If the details are already matched in the database, then the voter will not be registered. Then the details of the user will be fetched from the application server and the existing data will be printed on the voter card.

If the details are not found then voter details will be saved in the Database and the new voter card will be printed. If people under the age of 18 are trying to get a voter card that will be rejected.

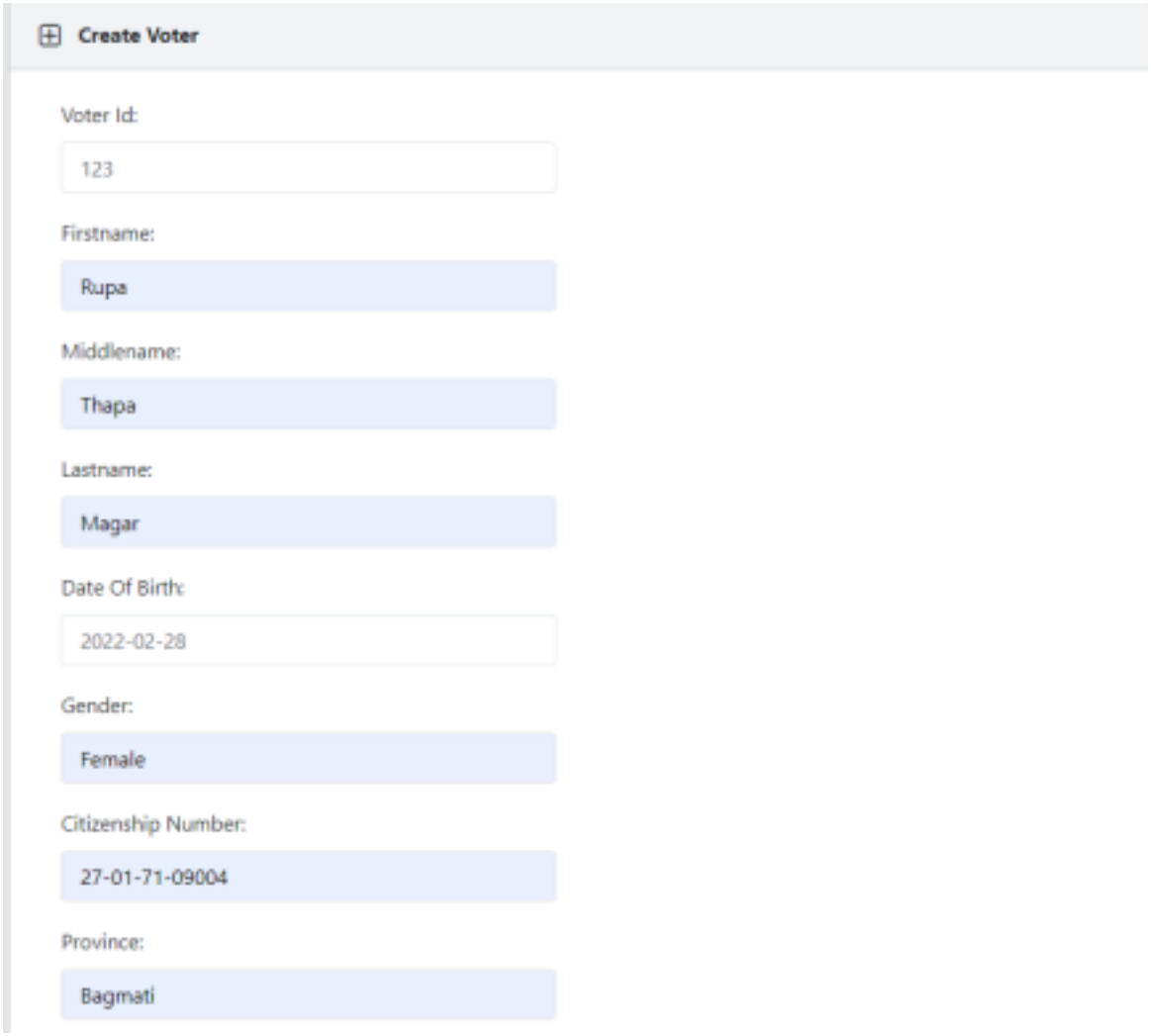

Figure 18: Voter Registration

4.1.4. Voting Platform

In the voting platform, voters can vote once. Multiple votes from single people are declining. Finally, in live display votes are counted and incrementation is shown simultaneously.

Figure19: Voting Platform

Finally, all the registration of political parties, candidates, and voters was successfully registered. A voting platform was created where voters can vote and the result is shown in live display. Also, a single voter cannot vote multiple times, if found doing so it displays the message "sorry, you have already voted" else it will display the result as shown in figure below.

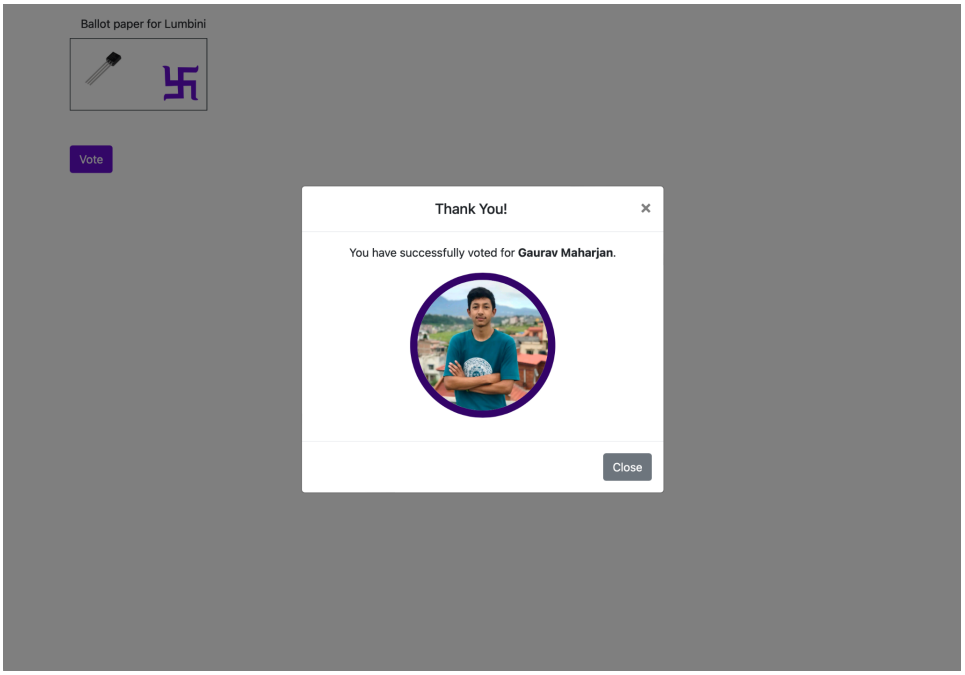

Figure 20: Sample of voter votes for candidates

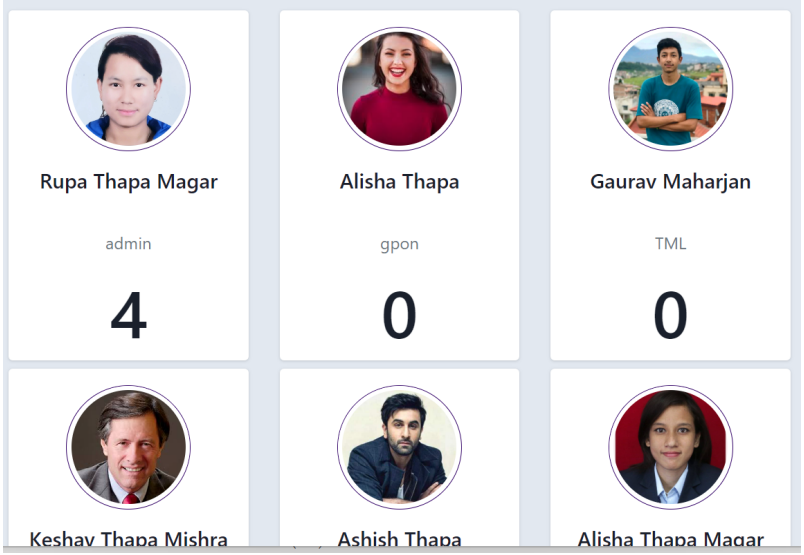

Figure 21: Sample of Result After Voter Votes for Candidate

4.1.5. Province Wise Voting System

In the eighth semester we completed creating a system for province wise detail. Seven provinces exactly like in Nepal. Inside each province there will be ballot paper with different symbols. One can vote their favorite party which symbol will be shown sidewise

Bagmati	Gandaki	Lumbini	Province 2	province1	Sudhur Paschim
Karnali					

Figure 22: Province wise voting system

Then we created a system for sending messages to those voters who were absent during the election. The Gmail will be sent to every voter who was absent during the election. We tried as a demo on our mobile phone and the following Gmail message was shown in our Gmail.

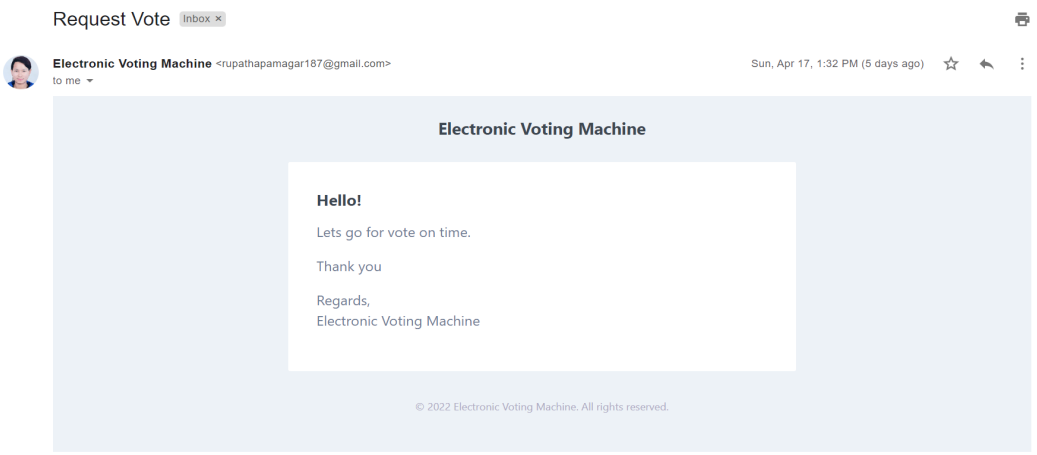

Figure 23: Gmail message

4.1.6. Fingerprint And Door Lock

Then we created a door lock system. First of all, the lc display shows “welcome voters” and then it shows “place your finger on the scanner”. The fingerprints are pre-taken during the registration process. When a voter comes to vote the fingerprint scanner is placed. Then the fingerprint scanner scans the fingerprint voter.

If the fingerprint is authorized the lac display shows “Door unlocked” and the door is unlocked. But if the fingerprint doesn't match then it shows “Access denied” and the door remains closed.

We can also manage the time for door unlock, like for in this project our door remains open for 10 seconds and in that 10 second the voters should go inside or else the door will be closed again.

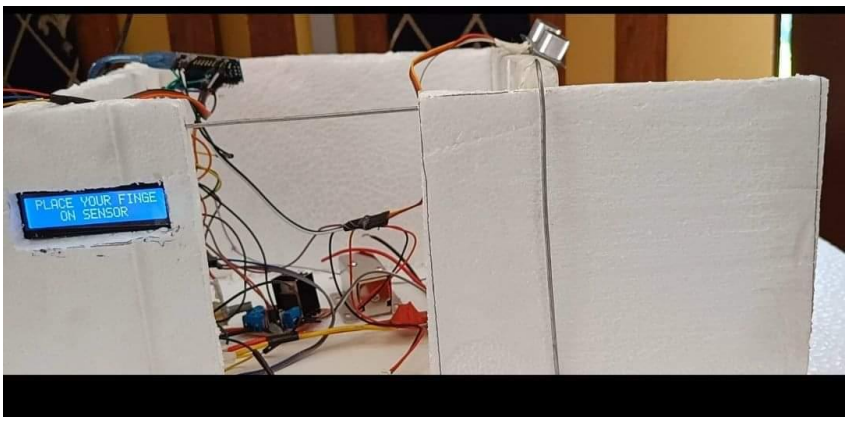

Figure 24: Arrangement of door lock and fingerprint

4.1.6. QR Code Detection

Here QR code is generated when we download the voter registration form. For scanning the qr code here we use a pi camera. The Pi camera module is a portable lightweight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects.

The pi camera is connected to the Raspberry pi. For enabling the pi camera, we first go to the application menu inside the application menu there we find preferences. Then we click raspberry pi configuration. Then a tab appears. Then after we interface it and enable the camera

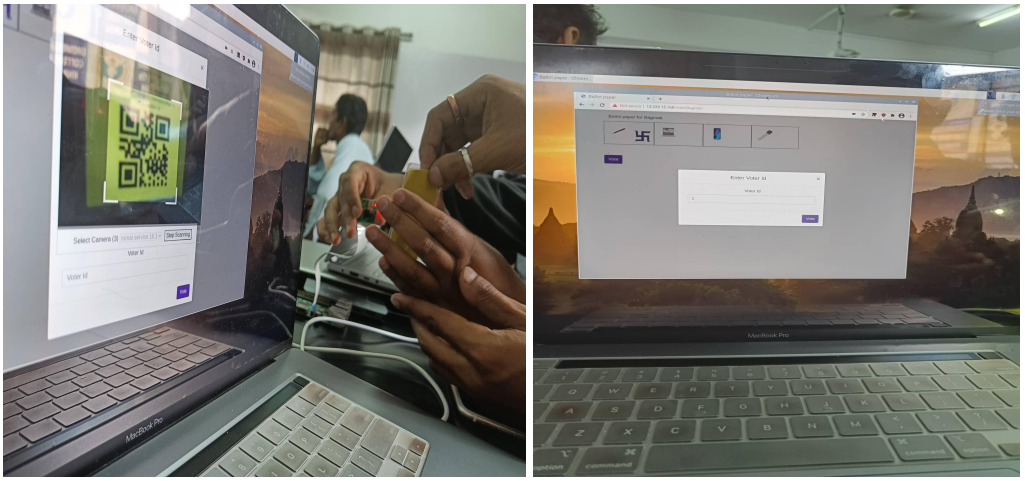

Figure 25: QR Code Detection

4.2 Discussion

The main motive of our project is to make an e-voting system that overcomes the problem of the existing voting system. In order to achieve this goal, we tried to design our system accordingly. The problem in our current voting system is that it requires a lot of resources, manpower, money and so much more. Our voting system overcomes the existing problem, since it is e voting not much of manpower money or resources will be required.

The aim of the project along with it to make it e-voting also includes fast and fair vote count. Here in our system we have also taken the CIA seriously which is (confidentiality, integrity and availability). Our system is password protected and there are various ip filtering for extra security.

Also, the ip is available only to the authorized person or organisation.in our system a person has to get the voter card which has qr code in it and also register fingerprint during registration process, then the person has to go through a door which gets unlocked only after the fingerprint matches.

Then the person goes inside the door and scans the qr code. The pi camera detects the qr code and shows the information and if he/she is authorized they are able to vote. If not then they are not able to do so. Then after the provinces appear in front of them, they select the respective provinces and inside that appears a list of ballots with a symbol.

The voter chooses their favorite party election symbol and clicks on the vote menu, if the person has voted already, it shows a message like “sorry you have already voted”. The vote count is shown after a while. In this way our project tries to overcome the current problem with modern technology.

5.1 Conclusion

To conclude we successfully created a system using different hardware and software. HTML/JavaScript were used in the front end and in the backend, we used php. Voting platform for voting was successfully done and message sending through Gmail was also done.

Hardware like fingerprint scanner and qr code detection were used for the authorization and it worked completely when we used it in demo

5.2 Recommendation

In this project followings are recommended

1. The use of the fingerprint capturing machines as a mechanism to identify the voters at the polling station Cleveland to prevent double voting should be postponed until a proper and secure identification program to provide all citizens of new ID cards in place
2. During the implementation, consideration should be given to enhance individual states' efforts in training poll workers to manage new voting equipment, by releasing additional federal funding for training activities. Such measures have also the potential to further accelerate processing of voters on election day.
3. The e-voting system and equipment should be tested by an independent body which performs tests based on publicly available technical standards and specifications. Any Modifications of e-voting system components, in either hardware or software, should be documented, and separately and integrally tested and certified based on publicly available technical standards and specifications

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