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Smart Electronic Voting Machine Using Raspberry Pi

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ABSTRACT: The basic idea of this project is to create an electronic voting machine that will help to eradicate defrauding of the manual voting system and prior versions of electronic voting by using Raspberry Pi. Here propose a system that include multiple layers of verification to ensure the reliability of the device with include the finger print sensor verification. Each voter is entered into the system only after being recognized and checked with the given data base of enlist voters, once the corresponding finger print is matched with the information provided ,the voter will be allowed to proceed for choosing their preferred candidate from the panel of buttons, The final vote is then displayed onto a LCD for the satisfaction of voters .the proposed project displays transparency and also carries the feature of being autonomous during the course of operation.

KEYWORDS : Electronic voting machine, Raspberry pi, finger print sensor, LCD

I. INTRODUCTION

Election is the act of party casting votes to elect on individual for some type of position, election may involve a public or private vote depending on the position most position in the local, state, and federal governments are voting on in some type of election .in paper based on election. Voters cast their votes by simply depositing their ballots in sealed boxes distributed across the electoral circuits around a given country, when the election period ends, all these boxes are opened and votes are counted manually in presence of the certified officials.

The person at the booth should show his Finger. This Finger print reader reads the details from the tag. This information is passed to the controlling unit for the verification , The controller reads DATA from the reader and compares this data with the already existing data. If the data matches with the already stored information, the person is allowed to poll his vote. If not, a message is displayed on LCD and therefore the person isn't allowed to poll his vote. The polling mechanism carries out manually using the switches. LCD is employed to display the related messages.

Voting is a method by which the electorates appoint their representatives. In current voting system the voter should show his voter ID card whenever an individual goes to the booth to poll one's vote. This process could be a time consuming method as the person needs to check the voter ID card with the list he has, confirm it as an authorized card and then enable the person to poll his vote. Thus,to avoid this type of problems.

The objective of voting is to permit voters to exercise their right to express their choices regarding specific issues, items of legislation, citizen initiatives, constitutional amendments, recalls and/or to decide on their government and political representatives. Technology is being employed additional and more as a tool to help voters to cast their votes. To permit the exercise of this right, the majority voting systems around the world include the following steps: citizen identification and authentication, voting and recording of votes cast, vote counting, publication of election results.

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Voter identification is needed during two phases of the electoral process, first for voter registration so as to determine the right to vote and subsequently, at voting time, to allow a citizen to exercise their right to vote by verifying if the person satisfies all the necessities required to vote

II.HARDWARE PROTOCOL

2.1. Raspberry pi 3 model

The raspberry pi is a minicomputer, it is a closed system hardware and it runs multiple programs at a time, then the candidate can update the details, there are no limitations of program language, and then processor speed is 700 MHz, memory size is 1 GB and above, there is no VGA support. The foundation provides Debian and Arch Linux ARM distributions and also Python as the main programming language, with the support for BBC BASIC, C and Perl.



Fig 2.1 Raspberry Pi 3 Model

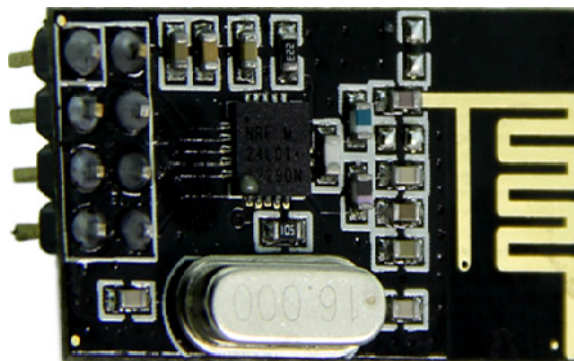


Fig 2.2 NRF Transceiver

A NRF transceiver can communicate with 6 devices at a time as there are 6 different pipe lines each transceiver contains for communication. Each transceiver contains a Rx address and Tx address. But the Rx and Tx address are same. In order to send data to or receive data from the SPI port on the 24L01 the CSN pin on the 24L01 must be high to start out with. Then, bringing the CSN pin low to alert the 24L01 that it is about to receive SPI data. Once transmitted or read all of the bytes that needed, bringing CSN back high. To execute the R_REGISTER



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instruction on TX_ADDR register, which will read the contents of the TX address register out of the 24L01 and into micro

2.2. Fingerprint sensor R305



Fig 2.3 Fingerprint Sensor R305

A finger print sensor is an electronic device used to capture the digital image of the finger print pattern, the capture image is called as live scan,

This is a finger print sensor module with TTL UART interface for direct connection to microcontroller UART or through USB serial cable, the user store the finger print data in module and can configure it in 1:1 or 1:N mode for identifying the person, the finger print module is directly interface with 3v3 or 5v microcontroller . a level of converter required for interfacing with pc serial port ,basic power 8-12 v AC/DC,

It is an good image processing capabilities can successfully capture image up to resolution 500 dpi, and then lower power consumption, low cost ,small in size , the image capture or scanning speed is 0.5 second, and then the verification speed is 0.3 second, it will store the 250 finger print image .

III. VOTING MACHINE

The voting machine consist of the raspberry bi finger print sensor , LCD display ,push button, buzzer, LED, in order to unlock the device and as security a finger print sensor has been attached to the machine. In the proposed system, finger-print based authentication is used to enhance security to EVM. During enrollment phase, the fingerprints and details of the candidate (photo, name, constituency, voter Id) are taken and stored in the remote server. During the voting process, the voter places the finger on finger print module. Then the fingerprint is matched with that of the data base and checks its authenticity. A second check is carried out to verify whether the voter has already voted. If the fingerprint is not validated or if the voter has already voted, then he/she is not allowed to vote. Hence, through these authentication checks, unauthorized voters and second time voting is eliminated and thus the security is ensured. If the voter is voting for the first time and has registered, then the list of parties infray is displayed on ARM LCD through which he can cast his vote. The final polling result can be viewed at central server by an authorized person using an IP address and password.



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3.1. STEPS INVOLVING IN VOTING PROCESS

Step1: Initialization of process.

Step2: It is assumed that the voters have already registered and their finger-prints and voter details are stored in remote server

Step3: Check if the voter I.D is valid or not i.e whether the candidate has registered or not by comparison of his finger with already stored finger-prints from remote server.

Step4: If the voter has not registered or if the card ID is invalid, then display the message that the user is an unauthorized person.

Step5: Else if the card is valid, then go to next step.

Step6: Check if the candidate has already voted or not.

Step7: If he has already casted his vote, then message is displayed that he has already voted and is prevented from voting for the second time.

Step8: Else, if the candidate is voting for the first time, then he is allowed to vote.

Step9: output is displayed on LCD.

Step10: After vote casting the candidate's photo, name, constituency and voter I.D is displayed on LCD.

Step11: The polling results are sent instantaneously to central server which is accessed by an official using I.P address and password.

IV. WORKING PRINCIPAL

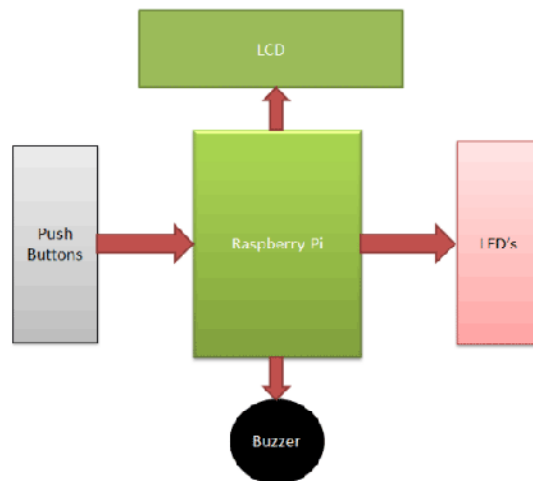


Fig 4.1 Block Diagram

In this project we have used four buttons to vote for four candidates or parties. We can increase the number of candidates, but for better understanding we have only used four here. When a voter presses any of the four buttons then the 'voting count' for the respected party or candidate, is increased by one each time. At the same time LED blinks and buzzer beeps for a second, to indicate that Vote has been given. After the Voting completes, we have a "Result" button, to show the results of the Voting. When we press this button, LCD screen shows the name of the winning Party with the no. of votes given to each party.

4.1. Circuit Explanation:

Circuit Diagram of this EVM using Raspberry Pi is given below. Raspberry Pi controls the whole process like Reading the Button, incrementing the vote count, generating result and display all the things on LCD. Here we have used Raspberry Pi 3 board to perform the all operations in the project and used wiring PiLibrary for selecting and

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controlling the GPIO pins of Raspberry Pi. We can also use Raspberry Pi2 here. Here we have used Five Buttons, in which four have been used to Vote for four different candidates/parties and one button is used for showing the Result on LCD. These five buttons are directly connected to GPIO pins 21 to 25 of RPI3, with respect to ground with 10K pull-up resistor for each one.

A 16x2 LCD is connected with Raspberry Pi. Control pin RS, RW and En are connected to GPIO pin 11, GND and 10. And data pin D4-D7 is connected to GPIO pins 6, 5, 4 and 1 of RPI. A buzzer is also used for beep when any of the buttons is pressed by voter. Here we have used a Green LED (D5) for indicating that system is ready and voter can submit their vote in the machine, by pressing the button. A 10k Pot is used For controlling brightness of LCD.

V. CIRCUIT DIAGRAM

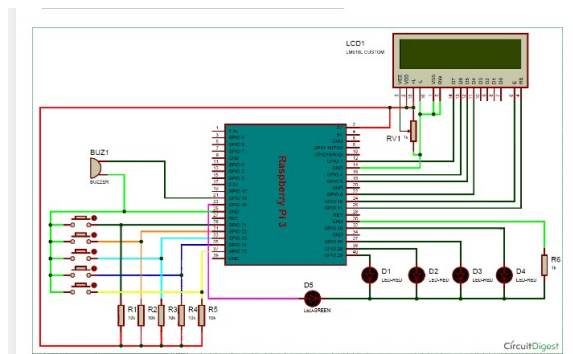


Fig 5.1 Circuit Diagram

VI. PIN DESCRIPTION OF RASPBERRY PI

| Peripherals | GPIO | Particle | Pin # | Pin # | Particle | GPIO | Peripherals |
|-------------|--------|------------|-------|-------|----------|------------|-------------|
| | 3.3V | | 1 | X X | | | 5V |
| I2C | GPIO2 | SDA | 3 | X X | | | 5V |
| | GPIO3 | SCL | 5 | X X | | | GND |
| Digital I/O | GPIO4 | D0 | 7 | X X | 8 | TX | GPIO14 |
| | GND | | 9 | X X | 10 | RX | GPIO15 |
| Digital I/O | GPIO17 | D1 | 11 | X X | 12 | D9/A0 | GPIO18 |
| Digital I/O | GPIO27 | D2 | 13 | X X | 14 | | GND |
| Digital I/O | GPIO22 | D3 | 15 | X X | 16 | D10/A1 | GPIO23 |
| | 3.3V | | 17 | X X | 18 | D11/A2 | GPIO24 |
| SPI | GPIO10 | MOSI | 19 | X X | 20 | | GND |
| | GPIO9 | MISO | 21 | X X | 22 | D12/A3 | GPIO25 |
| | GPIO11 | SCK | 23 | X X | 24 | CE0 | GPIO8 |
| | GND | | 25 | X X | 26 | CE1 | GPIO7 |
| DO NOT USE | ID_SD | DO NOT USE | 27 | X X | 28 | DO NOT USE | ID_SC |
| Digital I/O | GPIO5 | D4 | 29 | X X | 30 | | GND |
| Digital I/O | GPIO6 | D5 | 31 | X X | 32 | D13/A4 | GPIO12 |
| PWM 2 | GPIO13 | D6 | 33 | X X | 34 | | GND |
| PWM 2 | GPIO19 | D7 | 35 | X X | 36 | D14/A5 | GPIO16 |
| Digital I/O | GPIO26 | D8 | 37 | X X | 38 | D15/A6 | GPIO20 |
| | GND | | 39 | X X | 40 | D16/A7 | GPIO21 |

VII. ADVANTAGES

- The system will not allow the voter to vote two or more candidates.
- The system will allow the user to vote for one time for a particular election.
- The system will authenticate the user through his fingerprint so the user is uniquely identified.



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VIII. CONCLUSION

The project can be used for voting since it overcome all This the draw backs of ordinary voting machine also provide additional security. Its main advantage is that since fingerprints of every person is unique and hence this system completely reduces the chance of invalid votes. The system can be manufactured simply as well as cheap and casting vote becomes easier by the process of voting from any place inside Tamil Nadu.

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