

SMART VOTING SYSTEM WITH FINGER PRINT VERIFICATION USING AADHAAR CARD DATABASE

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Abstract - An Electronic Voting Machine (EVM) is an electronic device that is used for casting votes in an electoral process. The Electronic Voting Machine was first introduced in 1982 in the Kerala elections. The main source of power supply for Electronic Voting Machine is battery and does not require current supply. The maximum number of votes that can be recorded in the EVM is 2000 votes. If the Electronic Voting Machine stops working it is replaced by a new EVM and the votes recorded in the previous EVM is safely stored in the control unit. Presently, India is transforming into digital trends by adopting various technologies which make our lives easier. One of them is having a unique identity card which holds people's biometric details. This makes verification easier in most of the cases. One which provides security with all mandatory information is Aadhaar card, which is a twelve digit number for identification provided for all residents in India. Aadhaar card provides verification of demographic information in a cost effective way by online and this will be a great technique to identify fake votes, since every individual's biometric data is with the government the existing feature (EVM) is not capable of working with aadhaar card database online. Hence, we are going for Smart Voting Machine (SVM) which is capable of working with some features like IoT, cloud storage, location free work stations etc.

uses fingerprint scanning technology and cloud based verification software using Aadhaar database(API).

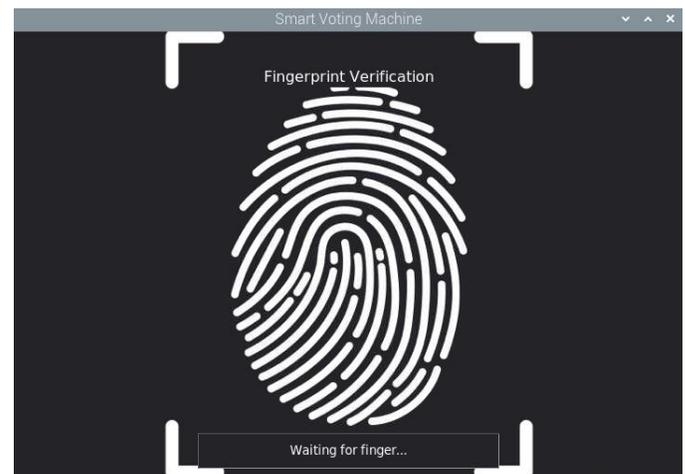


Fig-1: Finger Print Authentication using SVM

Key words: Smart Voting Machine(SVM), Electronic Voting Machine(EVM), Fingerprint Sensor, Aadhaar Card Data Base

1.INTRODUCTION

Election is the process of selecting a person, which the decision is taken by certain population, where it must be processed with fair means to make people decision justify. The ultimate aim of the Smart Voting Machine is to make sure 100% voter equality exist which mean the goal of the Smart Voting Machine is to eliminate the fraudulent votes. The other objectives of the Smart Voting Machine is to restrict the labour involved in conducting an election , that is reduce the staff at the polling booths. The secondary objective is to ensure that every voter can vote any constituency in the country without the need to travel to his constituency thereby reducing the voters difficulty. It also aims to reduce the cost of conducting an election by creating a cheaper alternative. The Smart Voting Machine

This in turn tries to eliminate any fraudulent practices in the election process. There is a chance that the votes stored in database can be hacked. But this will not be a big issue in upcoming digital India. Since, Cyber security norms and techniques are increasing to protect people digital welfare. There is a possibility that a single malicious Electronic Voting Machine might produce a mistake or falsify millions of votes. If people have the accessibility to the machines and know the working of the Electronic Voting Machine they can alter or replace the control unit of the EVM and can also create a virus that can produce fake votes or tamper with the cast votes. The other main disadvantage of the Electronic Voting Machine is is that any damage that occurs to it can cause loss of votes.

1.1. Existing System

The voter needs to bring the voter's identity card to vote for the election. The voter's identity card is compared manually hard copy database by the booth election officers. After manual verification, the voter is allowed to vote for the election. The voter is allowed to vote their decision by pressing the button in the candidate keypad module. After completing the process, the voter is marked with ink on forefinger to not caste the bogus vote. The

Electronic Voting Machine is incapable of finding a double vote or repeated votes. There is also a possibility of using false identity to cast the vote. The EVM does not have the capacity to find if the voter has already registered his vote.

1.2. Proposed System

In this Smart Voting Machine there are two levels of verification-The first step involves the verification of Aadhaar number, the second step is the verification of the fingerprint which is stored in the Aadhaar database. The Smart Voting Machine will send the aadhaar number along with the fingerprint to the aadhaar API.

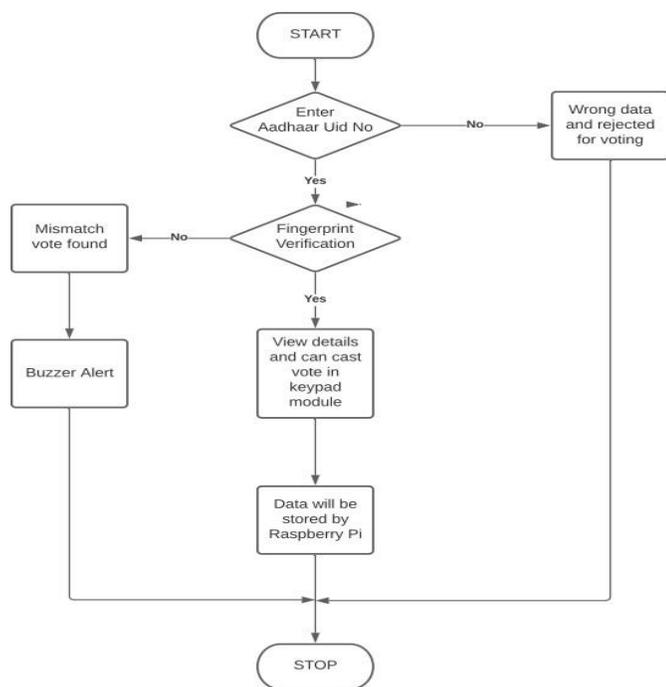


Fig-2: Flow chart of Smart Voting System

If the detail matches with the aadhaar database, the person will be allowed to vote. This helps us to identify bogus votes. The Isolated database will be maintained by the election commission to hold data of voters and non voters which will help them restrict every individual to have only one vote. If the voted voter again comes for voting, it will warn them that they have already voted if the fingerprint for the Aadhaar number matches correctly. If the fingerprint doesn't match then it intimates the bogus vote alert message. If the fraudulent vote is detected by the Smart Voting Machine, it uses a buzzer sound to alert the polling booth officer. These are the processes involved in the casting of the vote in the Smart Voting Machine. As observed in the above process we can make sure that the fraudulent votes do not get through to the election result and the person who committed the malpractice shall be

penalized and not allowed to escape. In the case of Smart Voting Machine due to the storage of the votes or voting detail and the candidate details in the cloud storage, therefore there is no limit to the number of votes that can be cast in a particular constituency.

2.HARDWARE

2.1. Control Unit

The main control unit of this project is Raspberry Pi 4B which is a single board computer featuring an Broadcom system on a chip(SOC) with an integrated ARM Cortex A72 processor. Raspberry Pi is a mini version of computer we can expect all type of executions from the raspberry pi as the computer do so. It is a low cost device. The size of this device is small just like credit card. The raspberry pi in this project is used to create the virtual network. In our project smart voting machine firstly the network will be modified to raspberry pi virtually and for the display we are connecting it to the PC screen. We can use the raspberry pi as a mini personalized computer by connecting different hardware peripherals like mouse, keyboard,display,etc. For simulating a system as described above will need a computer or laptop to run our software . This may increase the cost. Raspberry pi helps us to overcome this issue by providing a Linux based OS to run our software. The Raspberry pi may be connected to a LCD touch display. So our hardware for each polling booth will be a raspberry pi,LCD touchscreen, power supply. This reduces the cost of setup to a higher extent._The main software of the Raspberry pi is the Debian based Raspbian Operating System and it is completely free to install and use. The Raspberry pi acts much more than a computer due to the presence of an on board chip set and it also has an ARM based Broadcom processor as well as an Graphical processing unit. It is powered by a 1.4 GHz Broadcom 2711, 64 bit quad core Cortex-A72 processor. It uses LDDR-2400 SDRAM. It can also support a 4K display along with true gigabit LAN and high speed DUAL band wireless technology. The bogus votes when identified by our software, Raspberry pi triggers a signal to make the buzzer HIGH and the details will be updated to the admin. The main advantage of using Raspberry Pi in Smart Voting Machine is the cost and its portability. Since the Raspberry Pi can act as Small computer it eliminates the use of the modern personal computer system. It's small size and reduced carbon footprint helps in way transportation. It also significantly reduces the overall cost of Smart Voting Machine.

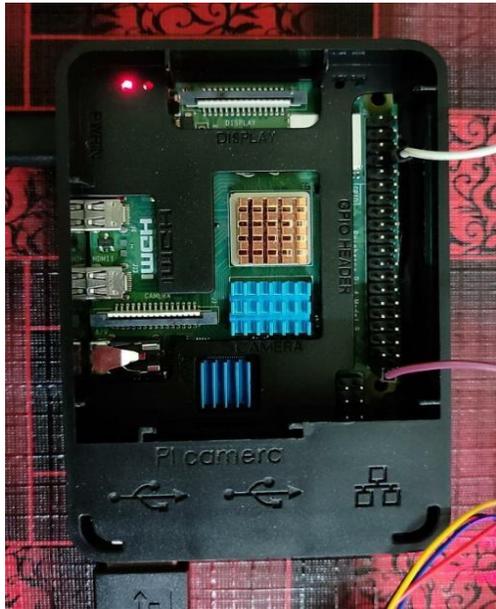


Fig-3: Raspberry Pi 4B-ARM Cortex A72

2.2. Fingerprint Sensor

In this project, R304 Red Digital Persona Fingerprint Sensor (835831) is used. Since, it uses an R304 fingerprint identification module with TTL(Time to Live),UART(Universal Asynchronous Receiver-Transmitter) to Microcontroller or PC through USB serial adapter. In this fingerprint scanning module, the user can store the fingerprint data and can configure it in the following two methods 1:1mode or 1:N from which we can easily identify the person. The R304 fingerprint module has exceptional image processing abilities and it has maximum resolution capability up to 400dpi.It is an optical type fingerprint sensor. The fingerprint module interface is USB 1.1/TTL logical level. The scanning speed is 0.4 seconds. The verification speed is 0.3 seconds. The storage capacity is 1000.The security level is 4.The baud rate of RS232 is 4800 BPS. The required current is 40mA.The corresponding technique is 1:N.Fixed indicators -14KV bright green backlight. Voltage is 4.2 to 6 VDC. The operating temperature is between -20C to 40C.The FAR(False Acceptance Rate) is 0.001%.The FRR(False Rejection Rate) is < 1.0%.The character file size is 246 bytes. The size of the template is 412 byte. For 1:1 fingerprint matching, the system will process the fingerprint with an precise pattern which is already available in the module. Similarly in the case of 1:N matching the scanning system will search for the complete fingerprint records for fingerprint matching. One of the main features of this R304 fingerprint identification module is that it uses the Integrated image collection and algorithm chip together. The fingerprint module can be embedded into a different number or variety of products and it can also support

secondary development.

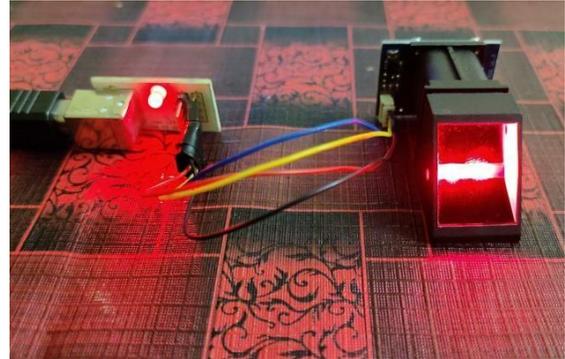


Fig - 4: R304 Red Digital Persona Finger Print Sensor (835831)

The R304 fingerprint identification module has low power consumption, low cost, small size and great performance and accuracy. The security level of the R304 fingerprint is 4.The fingerprint sensor has an array to store upto 240 fingerprints. In this project, the fingerprints are stored in the array and holds an index for each fingerprint. For testing purpose, the array indices are stored in the database and used to verify. In real time, the aadhaar card API will take care of the fingerprint matching functionality.

2.3. Buzzer

In this project the bogus votes will be pointed out with the help of buzzer only.

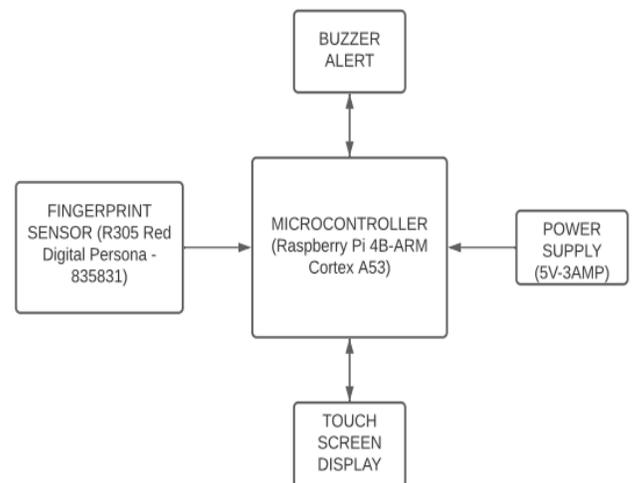


Fig-5: Block Diagram of Smart Voting System

It is a sound producing device where the audio signals will be converted into sound signals. When the software recognizes the bogus vote it will send the signal to the raspberry pi therefore the audio signal will be finally produced as sound by buzzer such as alarm, music etc. In smart voting machine the buzzer will be connected

through raspberry pi, where in the 8th pin for Vcc and 39th pin for ground. When the power supply is switched-on the audio signal generated will be processed through oscillator and produces the sound signal.

3. SOFTWARE:

3.1 Python

Python is a High Level Programming language. It is easy and simple to implement the program. Python supports various operating system like windows, Mac, Linux systems. The python Tkinter is a type of graphical user interface (GUI). The main use of the Python Tkinter in the Smart Voting Machine is the creation of the Keypad Module which acts as a graphical user interface (GUI). The Python Tkinter helps in the creation of the window which serves as the keypad module which serves as an interface by which the voter can cast the vote in the Smart Voting Machine. In our design, the first window of the graphical user interface created by using the Python Tkinter consists of a module which requests user for their aadhaar uid number. The second window or the next step created by using the python Tkinter verify the fingerprint and displays the detail of the voter which is available in the Aadhaar database. The third window and the next step involved in the touch screen keypad module created by using python Tkinter in the Smart Voting Machine displays the candidate list in a Radio button like module, which asks the voter to cast his or her vote to his favourite representative of his or her constituency. The next window created in the Smart Voting Machine in Python Tkinter is the confirmation window where it asks the voter to confirm his or her vote. One of the main advantages of the Python Tkinter is the free availability of the interface as it is already available in the Python software as a built-in interface. The next important advantage involving python Tkinter is the accessibility of the interface as it is already readily available in the Python software. As the Graphical User Interface Python Tkinter is free and built-in the Python software it considerably reduces the cost of the Smart Voting Machine. Python Tkinter allows the customer to interact with the software by the use of a variety of visual effects or indicators such as buttons, icons, menus and much more. The Python Tkinter is already built within the Python and is used to create a graphical interface with the customer or user. The Python Tkinter is open source available software and comes under the Python license agreement.

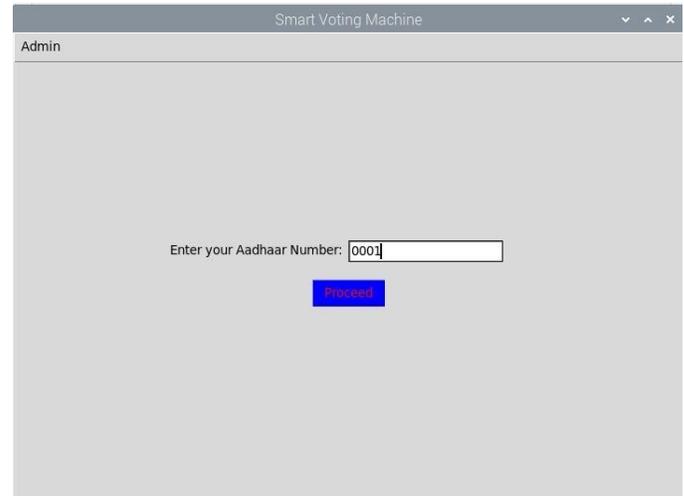


Fig-6: Aadhaar Entry widget using Python tkinter

3.2 PostgreSQL

Database is a crucial resource since it holds the details of voters and votes cast by them. In this project, data can be stored on Heroku server (trial version) and the data can be accessed only by the API. Psql is used as database server. Psql also known as PostgreSQL is one of the most important relational database management system(RDBMS) which is used to build many applications. It has many advanced features like data protection, easy access, privacy and capability of storing big data. Since database security and authentication plays a most important role, Psql has high level of security since it has ROW LEVEL SECURITY SYSTEM. Psql is popularly known for its data integrity and extensibility. One major advantage of Psql is support of geographic objects . It can be used to store geographical data and location based services. Therefore while processing the database of voters list we can able to process the voters database in many areas of the country smoothly without any confusions.

4. CONCLUSION:

The final outcome is to build a smart voting system with fingerprint verification, which it allows the voter to cast their vote using aadhaar card database. Since it provides fingerprint authentication, voter cannot vote twice because of the database linked in their aadhaar card and bogus votes can be identified at the instant spot by providing the alert sound by the buzzer. Hence the fraudulent vote can be identified easily. The Smart Voting Machine also reduces the cost considerably when compared to the Electronic Voting Machine. This is due to use of cloud technology which enables remote storage of data. Since the votes are stored remotely in cloud, any

damage to the machine cannot harm the cast votes. The other main advantage of the Smart Voting Machine is the location from which the votes can be cast. Since The Smart Voting Machine is based on Aadhaar database which contains the fingerprint records and is stored in the cloud database, this allows the voter to vote from any location in the country unlike Electronic Voting Machine. Final result of the vote will be declared instant, since the vote cast will be counted at real time automatically.

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