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I-Voting – Raspberry Pi Based Anywhere Voting System

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***Abstract*:**
In this current era of modernization, a huge percentage of the population can still not vote to form a government in a democracy. This is mainly because the person who wants to cast their vote is not present in their home constituency due to his work or studies. It is nearly impossible for that person to leave his/her job or studies just to cast a vote. In this proposed system, a voter can cast his vote from anywhere in the country by going to his nearest polling booth. We have two layers of verification for the voter, i.e., face recognition and fingerprint verification which ensures the voter's authenticity. When the voter is verified, then the candidates of his home constituency are displayed, and there is an increment in vote count when he casts a vote for his favorite candidate. For this, we are using Raspberry pi 3 and a camera module and fingerprint module. To create the database and to show the final winner of each constituency, we are using MySql.

Keywords — *Camera, Face Recognition, Fingerprint recognition, Raspberry Pi.*

I. INTRODUCTION

India is the largest democracy in the world. The definition of a democracy is a government that is formed by the people, for the people. Hence in a country like India, which is huge, demographically, and population-wise, elections play a very important role[2]. The candidate elected represents its people and their problems and demands in front of the parliament.

Even when the elections are an integral part of a citizen's role, many eligible voters cannot cast their votes as they are not present in the constituency where their names are registered. Secondly, there is a huge percentage of fake or bogus voting, which occurs in every election procedure [1].

Hence in the proposed system, these crucial problems regarding the elections are eradicated, and there is an increase in the legitimate voting percentage by the general public.

II. EXISTING SYSTEM

The current existing system is of the Electronic Voting Machines. EVM is a highly complex system of voting used by developed countries. In earlier times, the voting process was carried out using the paper ballot, where the voter used to write his choice of candidate's name on a piece of paper and put it in a ballot box. As there came an advancement in technology, the voting machines were developed by government organizations like Electronic Corporation of India Limited (ECIL) at Hyderabad and Bharat Electronics Limited (BEL) in Bangalore. The present electronic voting machines have two integral segments: the Control Segment and the Ballot Segment. They are separated by a distance of a few meters and are connected using a cable [4]. The authorized election officers take charge of the Control Segment while the voters use the Ballot Segment to cast their votes. The voter shows his Voter ID to the election officer, and then he is verified in the list of voters for that constituency present at the polling booth[3].

There are many disadvantages in the current system of the EVM, which are-

- Even when someone who does not have a Voter ID card can come and cast their vote with the help of the malicious election officers present at the polling booth. Hence there can be bogus voting as well as multiple voting using the same ID.
- Too much security by the police requires carrying the EVMs to a centralized location to count the votes. During this process, the EVMs can be hacked.
- A person should physically be present in his/her home constituency to cast their vote; otherwise, they are not eligible to go to their nearest polling booth as the election officials would not have his/her name on the voter's list.

III. PROPOSED SYSTEM

The proposed system is to be used with integration with the EVM. In this system, we are using two-tier verification processes, which are fingerprint verification and face Recognition.

Authentication leads to a better way of providing security to voting procedure. The face recognition, which is done using open cv python, captures the voter's image and verifies the voter, and after a complete match, he has proceeded for the second level of verification, which is fingerprint using fingerprint module. Each voter's fingerprint and retina information is created by the government while creating the Aadhar database.

Even when the voter is not present in his home constituency, he can vote at his nearest polling booth. As soon as he is verified, his constituency candidates are displayed in front of him, and the vote is counted at his home constituency.

IV. CONSTRUCTION OF THE PROPOSED SYSTEM

A. Hardware

The main hardware components of our proposed system are –

a) Raspberry pi 3:

The raspberry pi 3 is a mini-computer capable of exploring computing and learning how to program in languages like Python. It can do anything a desktop computer does from browsing the internet, playing high-definition video, making spreadsheets, playing games. It is just like a card-sized computer that fits into a computer monitor and TV and uses a standard keyboard and mouse.

b) Fingerprint module R305:

It is a serial fingerprint scanner that can be directly connected to Pc's COM port. It can store as well as compare the fingerprint accordingly and give the desired output. When the user wants to enroll, they have to enter two times then the system will generate the template based on the processing result and store the template.

c) CP2102:

CP2102 chip is a single-chip USB to UART bridge IC from SiLabs. Minimal external components are required for its working. CP2102 is used to transfer basic serial port-based devices to USB. Designers can use it as a robust tool to make all types of PC interfaced projects. This module is used with RS232, a Serial Communication protocol, to build USB devices efficiently.

d) Buzzer:

A buzzer is an audio signaling tool. It can be either electromechanical, piezoelectric, or mechanical. Buzzers are used in devices like alarms and timers. It is also used to indicate confirmation of user input, such as a mouse click or keystroke. It gives out a consistent single tone sound just by applying D.C. voltage.

e) Camera:

We used a 25MP night vision webcam with some advanced features like brightness control, sharpness control, and adjusts to get the expected high-quality image output. With the CMOS sensor incorporated in this webcam, the images are rendered with supreme quality.

B. Software

The software parts include the following-

Python 2.7- It is the latest version of the python series. Its features mainly match with the earlier Python 3.1. While as we compare it to the earlier version of Python, it has a legacy library, uses ASCII, and rounds off the calculation. In it, we have used three main libraries, which are-

a) Open CV library:

Open CV is a library of programming functions mainly aimed at real-time computer vision. It is used for image processing. It has functions like color scale conversion, gaussian blur, thresholding, finding contour, an arithmetic parameter.

b) Pi fingerprint:

These sensors were mainly developed for Arduino and can be read through UART. Almost 1000 different fingerprints can be stores. Similarly, a finger can be used many times. It can be stored in a different position for more quick and clear detection.

c) XLWT library:

It is a library in Python that developers use to make spreadsheets to store the data. It is compatible with most versions of Microsoft Excel, from version 95 to 2003. This package is completely independent, as it has no dependencies on modules or packages which are not part of the Python distribution.

V. BLOCK DIAGRAM

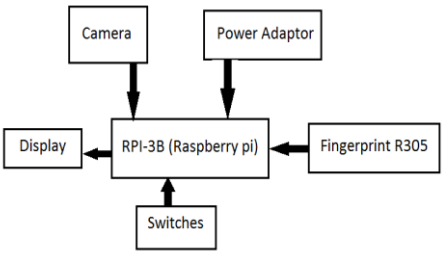

Fig. 1: Block diagram of the Proposed System.

- The power adaptor is connected to the electricity board or external power supply to give the raspberry pi module power.
- Switches are made up of power resistors and are connected to the configuration pins of the raspberry pi.
- The display is where the code is to be run. Here various messages for the election officer are also displayed.
- Working on the fingerprint, camera, and raspberry pi modules are already discussed in the previous section.

VI. RESULT

After arranging the proposed system, we get the output as shown in the pictures below.

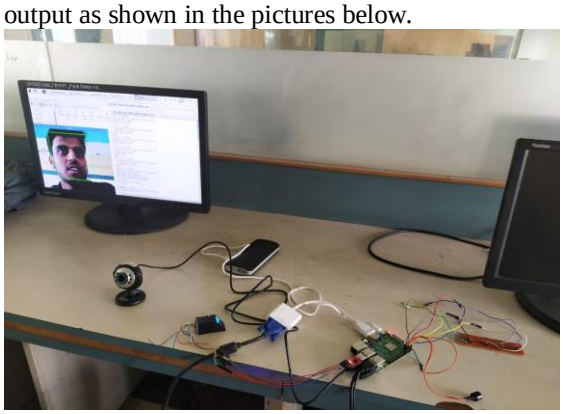

Fig 2: Arrangement of the proposed system.

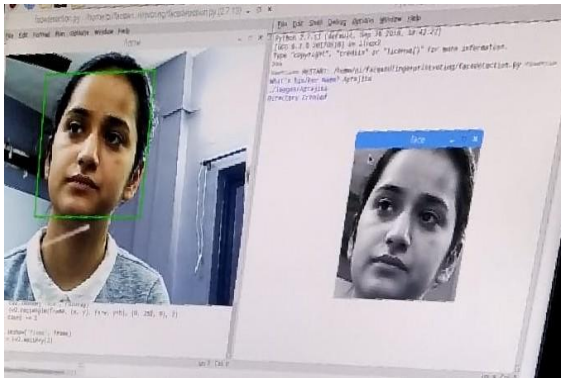

Fig 3: Face Recognition of the voter.

The code works in the following order, leading to the desired result-

- Firstly, the code asks for face recognition. When the face is recognized, it displays the person's name and then asks for a fingerprint.
- When both these things are matched, only then is the voter asked to vote. If not, then it displays the message "unauthorized user."
- The parties of their constituency are displayed, and they vote by pressing the switches beside the name of their preferred party.
- After the switch is pressed, the buzzer indicates to the voter that voting is complete.
- In the database, the increment is seen on the party for which the vote has been cast.
- After the final voting, the database is checked, and the party with the highest votes is the winner.

Disadvantages-

1) The voter's face and fingerprint data should be present in the database beforehand.
2) The fingerprint sensor sometimes displays low sensitivity and may not recognize the voter on the first try.

VII. CONCLUSION

The i-Voting system can be used as an extension to the already existing EVMs. It is not feasible for all the people in the country to vote to their nearest polling booths without traveling miles to their home constituency.

Hence increasing the percentage of voting taking place in the country.

Further enhancements which can be done in the proposed system are related to its security. It can be made more secure so that no person can hack the database and manipulate the votes.

Another tier of security can also be added to the system, for example, RFID detection, to make it more secure.

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