

Smart Electronic Voting Machine with Face Recognition using Raspberry PI

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Abstract: It is to eliminate the fraudulent votes that are happening during the election procedure and to provide a highly secured data transfer to IOT which produces results who is in the lead for every minute after voting it will show with the help of this smart EVM system. Initially one have to verify their biometrical and they allowed vote in election. The basic idea of this project is to create an electronic voting machine that will help to eradicated fading of the manual voting system. The SEVM employs a user-friendly interface that allows voters to cast their ballots electronically, reducing the potential for human error and improving the overall voting experience. The system maintains a secure database of eligible voters, preventing fraudulent voting and ensuring that each person can vote only once. The core innovation of this system lies in the integration of facial recognition technology. Before casting their votes, voters are required to have their faces scanned by the Raspberry Pi's camera. The system then verifies their identity against the stored database, ensuring that only eligible voters can participate. This adds an extra layer of security to the voting process and minimizes the risk of identity fraud. The SEVM also offers real-time monitoring and reporting capabilities, enabling election officials to track voter turnout and detect irregularities. The results are securely stored and can be quickly tabulated, reducing the time required to announce the election outcomes. The SEVM system combines traditional electronic voting with state-of-the-art facial recognition to ensure secure and transparent elections. The proposed project displays transparency and also carries the feature of being autonomous during the course of operation

Keywords: Raspberry PI, Electronic Voting Machine, Face Recognition, Artificial Intelligence

I. INTRODUCTION

The democracy of any nation lies in VOTE the people cast to elect their leaders. But this system despite high security is still suffering from various issues mainly during verification process and the man power requirement during that process is large. There are chances of intervention of political parties and human errors in this process but yet there are no best solutions to overcome this problem. If this problem is not overcome then it might lead the nation into wrong hands. The security and manpower requirement during the verification process can be overcome by the method used in this paper. Throughout the history different methods and techniques of voting have been adopted. The design parameters of voting system should be chosen in such a way that all concerned parties acting as candidates as well as voters that are polling the votes must be satisfied with the announcement of results after elections have been conducted. Environment of voting and conducting elections basically depends upon the cultural values as well as political policies.[1]

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.[2]

Voting is a fundamental aspect of any democratic society, and ensuring the integrity, security, and accessibility of the voting process is of paramount importance. Traditional paper-based voting systems have been the norm for centuries, but they are not without their flaws, such as the potential for fraud, errors in ballot counting, and limited accessibility for individuals with disabilities. In recent years, there has been a growing interest in leveraging modern technology to enhance the voting process, and one such innovation is the Smart Electronic Voting Machine with Face Recognition using Raspberry Pi. This system represents a significant step towards making the voting process more secure, efficient, and inclusive. It combines the power of a Raspberry Pi, a versatile and cost-effective single-board computer, with advanced facial recognition technology to create a cutting-edge electronic voting machine.[3]

The integration of face recognition technology in this voting machine enhances security and accuracy. Voters' identities are verified by scanning their faces, making it exceedingly difficult for unauthorized individuals to cast fraudulent votes. This technology can also assist in identifying and preventing multiple voting attempts by the same person, thereby enhancing the overall integrity of the electoral process. In this system, the entire voting process becomes more efficient and user-friendly. It can potentially reduce long queues at polling stations, as voters can cast their ballots quickly and securely. The interface can be designed to be user-friendly, even for those with limited technology experience, making it accessible to a wide range of voters.[4]

NEED OF PROJECT

The basic methodology as applied to online voting systems would involve giving voters realistic voting tasks to accomplish using a variety of ballot design. Voting task performance is measured using variables such as accuracy, time and workload. The voting server collects the vote and filters out duplicate or invalid votes. Each voter can then check his vote online to ensure that his vote has been counted.[1]

- Electronic voting machines are designed to eliminate errors in vote counting and reduce the risk of misinterpreted ballots. Adding face recognition ensures that only eligible voters cast their ballots.[2]
- Smart voting machines can process votes more quickly than manual methods. This efficiency can lead to shorter lines at polling stations, faster results, and reduced chances of voting irregularities.
- These systems can be designed to accommodate voters with disabilities. Interfaces can be adapted to support various accessibility needs, such as voice commands or large fonts for visually impaired voters.

II. LITERATURE SURVEY

1) **Smart Voting:** Author: Bhuvanapriya, R.Rozilbabu, international conference on computing and communication technology, Chennai, India, 2017. Using the concepts of biometric and steganographic authentication, proposed a safe online voting system. The homomorphic approach encrypts and decrypts the casted vote during the results process. It is a finger-print-based program that uses the Aadhar card database to compile a list of all people over the age of 18. He or she can vote using his or her Aadhar number. This system is extremely secure. If he tries a second time, he will not be able to vote because this system includes a tracking element. When each voter casts his or her vote, the count is updated in the admin database at the same moment via the server.

2) Smart Electronic Voting System Based On Biometric Identification-Survey: Author: J.Deepika, S.Kalaiselvi, Third International Conference on Science Technology Engineering & Management (ICONSTEM), , Chennai, India, 2017. Some other studies employ different algorithms than the proposed voting system, which uses biometric identification as a major feature. They presented in this paper the idea of getting a voter's fingerprint impression and entering it as an input to the system. The data was then compared to what was available in the database. Access to cast a vote is allowed if the particular pattern matches anyone on the accessible record. The outcome is then instantaneous, and counting is accomplished using IOT. They use the GSM module to improve the voting system's speed and security. Using the GSM module, a message will be delivered to the voter's mobile phone indicating that he has successfully cast his vote, allowing him to confirm his vote without any doubt. The Internet of Things (IoT) is another new technology that is being used here, and it is the most important in this notion. The counted votes can be quickly communicated to the whole database server via IOT, allowing the overall counted votes and the elected party, which is the chosen party, to be easily announced

3) A proposed frame work for Biometric electronic voting system: Author: Md. Mahaboobkarim, Nabila Shahbaz khan, IEEE international conference on telecommunications and photonics(ICTP) They focused on developing a biometric electronic voting machine (BEVM) with fingerprint authentication and a centralized database in their article. For different elections in Bangladesh, numerous BEVMs will be deployed in each polling station based on the total number of voters, which will help to deploy the fingerprint matching task accurately in less time. The suggested system is a biometric e-voting system that is divided into two sections: voter registration and voting control and result calculation. Each user must first register as a voter using the system, which requires biometric (fingerprint) verification. The voter's information will be maintained in a central database.

4) Arduino based Smart Electronic Voting Machine: Author: v. KiruthikaPriya, v. Vimaladevi, international conference on trends in electronics and informatics (ICEI),tirunelveli, India, 2017. Proposes a system with the addition of a biometric fingerprint sensor, in which each voter is only accepted into the system after being identified and compared to a database of registered voters. The voter will be able to choose their preferred candidate from a panel of buttons after the corresponding fingerprint is matched with the information provided. The final vote is then presented on an LCD for voters' enjoyment. The suggested project is transparent, and it also has the capability of being self-contained during operation. They present an idea for avoiding fraud in the procedure for making e-voting a reality in India. Because one human finger print is intrinsically different from another, it increases security and prevents false votes.

Method of Disease Detection

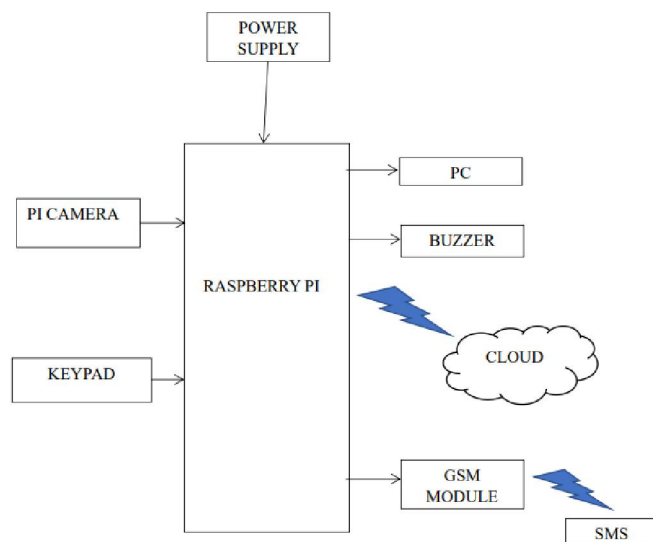


Fig. 1. Block Diagram
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Raspberry pi 3 model B is the earliest model of third- generation raspberry pi. It is a 1.2GHZ Broadcom BCM2837 64 bit CPU. It has four USB 2 ports and CSI camera port for connecting a raspberry pi camera. A micro SD port is available for loading OS and for storing data. These features make this pi 3 to be one of the efficient controllers. The image processing is done with the help of this controller as image has to be in a high clarity. The ATMEGA 329p is also interfaced to this processor. Also pi enables the capturing and verifying the captured image very quickly than other processors. Pi has the ability to work as normal computer. The language which is used in Pi is python. Face detection, object detection algorithm used to identify objects in an image or video. The algorithm is trained to detect a face by Haar features-sequence of square-shaped functions. Then it uses classifiers to detect the face and not a face. This face detection happens in four stages. The first being, detection of Haar features, using integral images; third stage is Adaboost and fourth is the cascade of classifiers. Open CV comes with a trainer as well as a detector. It contains many pre trained classifiers for eyes, face, smile etc. First we need to load the required XML classifiers and then load our input image in grayscale mode. If the faces are found it returns the position of detected faces as rectangle. Once we get the location we can create a ROI for face and eye detection. There are three different processes carried out during face recognition. First the image of the person is captured which uses a dataset program running at the background. Once the program is executed the camera captures image of a person in all possible directions by creating a rectangular block around the face. The captured images are used to train the classifier for face recognition process to be completed. During face recognition phase the, a separate program runs to compare the original face in the classifier and the captured face. The use age of cascade classifier enables to produce effective face recognition and detection.

Raspberry PI

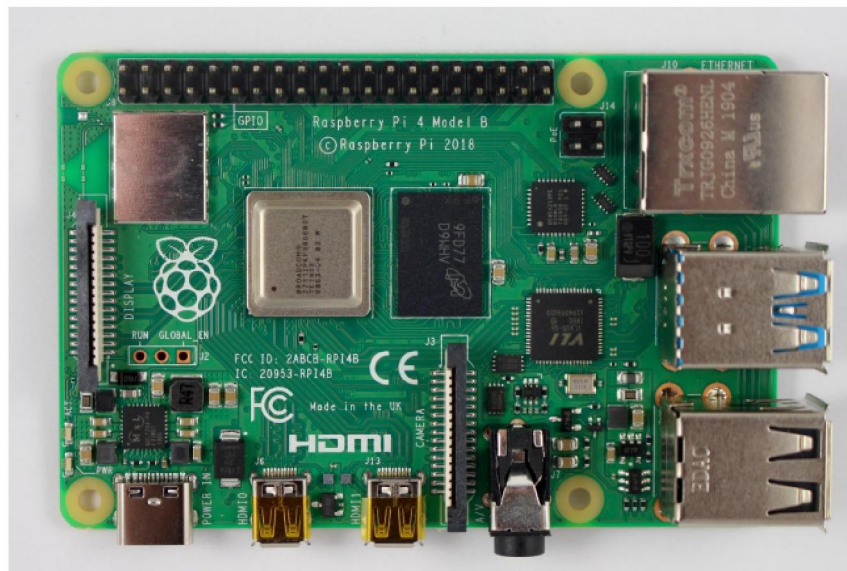


Fig. 2. RaspberryPI

The Raspberry Pi 4 is a single-board computer developed by the Raspberry Pi Foundation. It is the fourth generation of the Raspberry Pi family, and was released in June 2019. The Raspberry Pi 4 is a significant upgrade over previous models, featuring a new Broadcom BCM2711 SoC with a quad-core 1.5 GHz ARM Cortex-A72 CPU, VideoCore VI GPU, and up to 8GB of LPDDR4 RAM. The Raspberry Pi 4 is a popular choice for hobbyists, makers, and educators due to its low cost, flexibility, and open-source nature. It is also used in a variety of commercial applications, such as digital signage, point-of-sale systems, and industrial control systems. Here are some of the key features of the Raspberry Pi 4:

- Quad-core 1.5 GHz ARM Cortex-A72 CPU
- VideoCore VI GPU

- 1GB, 2GB, 4GB, or 8GB LPDDR4 RAM
- Gigabit Ethernet
- Dual micro-HDMI ports with support for 4K UHD video output
- Two USB 3.0 ports
- Two USB 2.0 ports
- Bluetooth 5.0
- 40-pin GPIO header
- Power over Ethernet (PoE) support (with HAT a Memory Card)

A memory card is a type of electronic flash memory device used for storing digital data. Memory cards are commonly used in digital cameras, smartphones, tablets, and other portable electronic devices. They are also used in some desktop and laptop computers to add additional storage capacity. The memory card has the following specification



Fig. 3. Memory Card

PI Cam

The Pi Camera or a webcam can be connected to the Raspberry Pi to capture images and videos. The official Raspberry Pi Camera Module offers high-quality imaging capabilities, making it ideal for projects like surveillance, time-lapse photography, and computer vision applications.



Fig. 4. PI Cam

III. CONCLUSION

This proposed work is related to biometric system considering a right to vote from anywhere system which enables the elector to compute their vote from any place in India by using this biometric system based electronic voting machine using raspberry pi which provides the secure way of voting where a person cannot vote more than once where we consider fingerprint & face recognition system for the security purpose defraudulence is avoided by using this system and high accuracy, time is saved and fair voting process is been carried out.

The project can be worn for voting since it overcome all this draw backs of ordinary voting machine also administer additional surveillance. Its main asset is that the face structure 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.

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