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Smart Voting System Using Face Recognition

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Abstract: The smart voting system is an advanced technological solution that aims to enhance the efficiency, transparency, and integrity of the electoral process. It utilizes cutting-edge technologies such as biometrics, encryption, and digital platforms to improve voter authentication, streamline vote counting, and ensure secure and accurate results.In the smart voting system, biometric authentication methods, such as face recognition, fingerprint scanning, or iris scanning, are employed to verify the identity of voters. This helps to prevent fraud and impersonation, ensuring that only eligible voters can participate in the election.The system also embraces digital platforms and electronic voting methods to replace traditional paper-based ballots. This transition improves the speed and accuracy of result tabulation, reducing the time required for result declaration and minimizing human errors in the vote counting process.

Keywords: raspberry pi,Fingerprint Sensor,USB Camera ,Face Recognition Using Haar Cascade,Pre_Processing of Fingerprint Images,PC

I. INTRODUCTION

The smart voting system represents a revolutionary advancement in the field of electoral processes. Traditional voting systems often suffer from issues such as inefficiencies, inaccuracies, and security vulnerabilities. The smart voting system, powered by advanced technologies, seeks to address these challenges and transform the way we conduct elections.The core concept behind the smart voting system is to leverage technology to improve the transparency, security, and efficiency of the voting process. By integrating various technologies like biometrics, encryption, and digital platforms, this system aims to create a more reliable and accessible voting experience.One key component of the smart voting system is the utilization of biometric authentication methods. Technologies such as face recognition, fingerprint sensors, or iris scanning enable the system to accurately identify and verify the identity of voters. This enhances the security of the electoral process by reducing the risk of fraud and impersonation .

II. LITERATURE SURVEY

Smart Electronic Voting System Based On Biometric Identification,Studies The suggested voting method, which makes use of biometric identification as a key component, uses algorithms that are different from certain other research'. In this essay, they put up the notion of taking a voter's fingerprint impression and entering it as an input. Following that, the information was compared to what was in the database. If the specific pattern corresponds to anyone on the searchable record, access to vote is permitted. Consequently, the result is immediate, and IOT is used to carry out the counting. To increase the voting system's efficiency and security, they deploy the GSM module. The voter can validate his vote without a doubt by receiving a message on his mobile phone via the GSM module letting him know that his vote was successfully cast[1].

Smart Voting A secure online voting system was presented using the concepts of biometric and steganographic authentication. During the results process, the homomorphic method encrypts and decrypts the cast vote. It is a finger-print-based programme that creates a list of everyone over the age of 18 using the Aadhar card database. Using his or her Aadhar number, he or she can cast a ballot. It is very safe to use this system. He won't be able to vote if he tries again because this system has a tracking component. The count is updated simultaneously via the serve in the admin database as each voter casts their ballot[2].

Arduino based Smart Electronic Voting Machine proposes a system that includes a biometric fingerprint sensor, in which every voter must first be verified and checked against a database of registered voters before being allowed to use the system. After the appropriate fingerprint and the data are matched, the voter can select their chosen candidate from a panel of buttons. The final vote is then displayed on an LCD for the pleasure of the voters. The suggested initiative is open to the public and has the potential to operate independently. They put forth a suggestion for preventing fraud in the process of implementing electronic voting in India. It improves security and stops fraudulent voting because each human finger print is fundamentally unique. Approach and analysis that are used[3]

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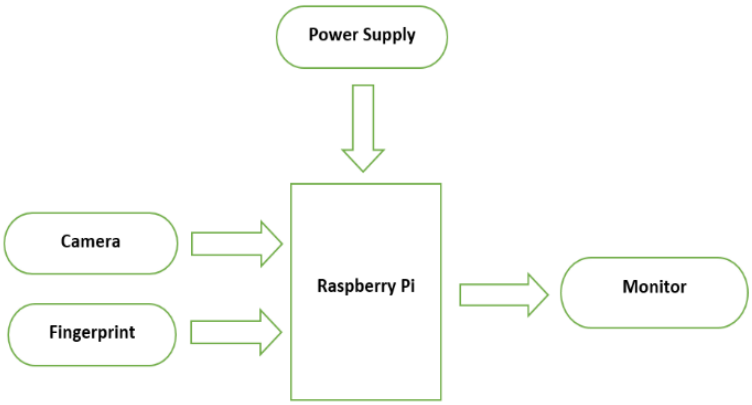
Arduino based Smart Electronic Voting Machine suggests a system that incorporates a biometric fingerprint sensor, in which each voter is only admitted after being recognised and their information compared to a database of registered voters. Following a match between the appropriate fingerprint and the data presented, the voter will be able to select their preferred candidate from a panel of buttons. The results are then shown on an LCD for the voters' satisfaction. The proposed project can operate independently and is transparent. They offer a suggestion on how to prevent fraud when e-voting is implemented in India. It improves security and eliminates fraudulent voting because each human finger print is uniquely different from the next[4].

III. BLOCK DIAGRAM

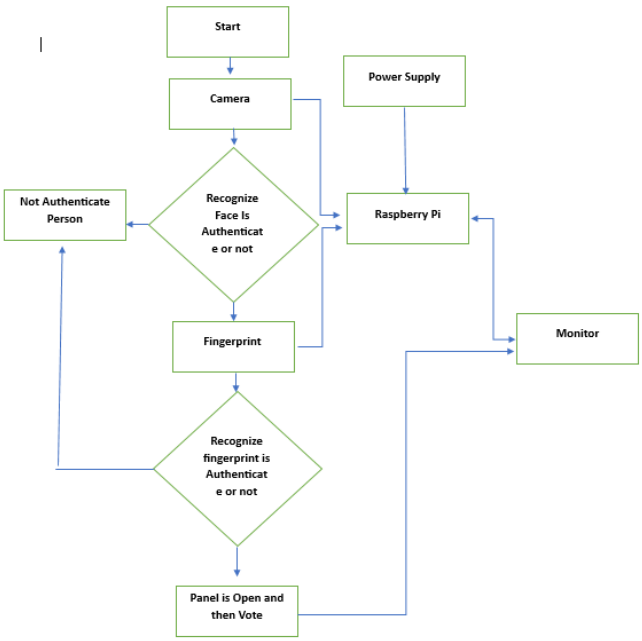


1.**Raspberry pi-** Raspberry Pi can serve as the core processing unit of the smart voting system. It can handle various tasks, such as running algorithms for face recognition, managing database operations, coordinating the authentication process, and controlling the electronic voting interface.

2.**Fingerprint Sensor-** fingerprint are captured using a fingerprint sensor. The sensor scans the surface of the finger, capturing the unique patterns and ridges that make up the fingerprint

3.**Camera-** facial features are captured using a camera sensor. The sensor captures an image of the face, which includes various facial landmarks and features

IV. FLOW CHART



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The registration phase of the procedure begins with the registration of eligible voters in the database. Using the proper tools, such as a face recognition camera and fingerprint sensor, their facial features and fingerprints are taken at this step.For reference and verification in the future, the collected biometric data is safely kept in a centralised database along with other pertinent data. The system starts the authentication procedure when a voter enters a polling place. The voter must appear in front of the face recognition camera so that their facial features can be taken.The technology compares the pre-registered data kept in the database with the facial traits that were collected. It conducts a matching procedure using sophisticated algorithms to ascertain the veracity of the voter's identity. The voter simultaneously presses their finger against the fingerprint reader. The system records fingerprint patterns and compares them to the fingerprint data that is already recorded in the database.The technology combines the outcomes of the face recognition and fingerprint verification processes to confirm the validity of the voter's identity. The voter advances to the following phase if their identity is successfully verified. If not, they are not allowed to participate in the voting process. The voter is given access to the electronic voting system once their identification has been confirmed. They are shown the voting interface, where they can secretly and securely cast their ballots.The system keeps track of the voter's selections and securely archives the voting information to protect the secrecy and integrity of the votes.The system moves on to the result tabulation stage when the voting phase has concluded. By counting the votes, manual vote counting is no longer necessary. By using this method, the counting process is sped up and the likelihood of human error is decreased. The system immediately and properly announces the results after the vote count is complete. The outcomes may be shown on a monitor or disseminated via other suitable ways.

V. COMPONENTS

1. Raspberry Pi:

The Raspberry Pi is a tiny computer the size of a credit card that runs Linux on an ARM processor. This item is a Raspberry Pi 3 Model B+, which includes four USB ports, one GB of RAM, dual-band WiFi, Bluetooth 4.2, Bluetooth Low Energy (BLE), an Ethernet port, HDMI output, audio output, and RCA composite video output (through the 3.5 mm jack). It also has dual-band WiFi, Bluetooth 4.2, Bluetooth Low Energy (BLE), Bluetooth 4.2, Bluetooth 4.1, Bluetooth 5.0, and four USB ports. A microSD card with an operating system on it is necessary for the Raspberry Pi (not provided). The Raspberry Pi is incredibly well-liked, and there are a tonne of example projects and online resources for it.

2. Fingerprint Sensor:

A fingerprint sensor with a TTL UART interface is the R307 fingerprint module. When recognising a person, the user can configure the module to operate in 1:1 or 1: N mode and save the fingerprint data there. The FP module can connect to a microcontroller directly at 3.3 or 5 volts. In order to interface with a PC serial port, a level converter (like MAX232) is necessary. The high-performance fingerprint alignment algorithm, high-capacity FLASH chips, and other hardware and software components make up the R307 Fingerprint Module. It has a simple structure, stable performance, fingerprint entry, image processing, fingerprint matching, search, and other features.

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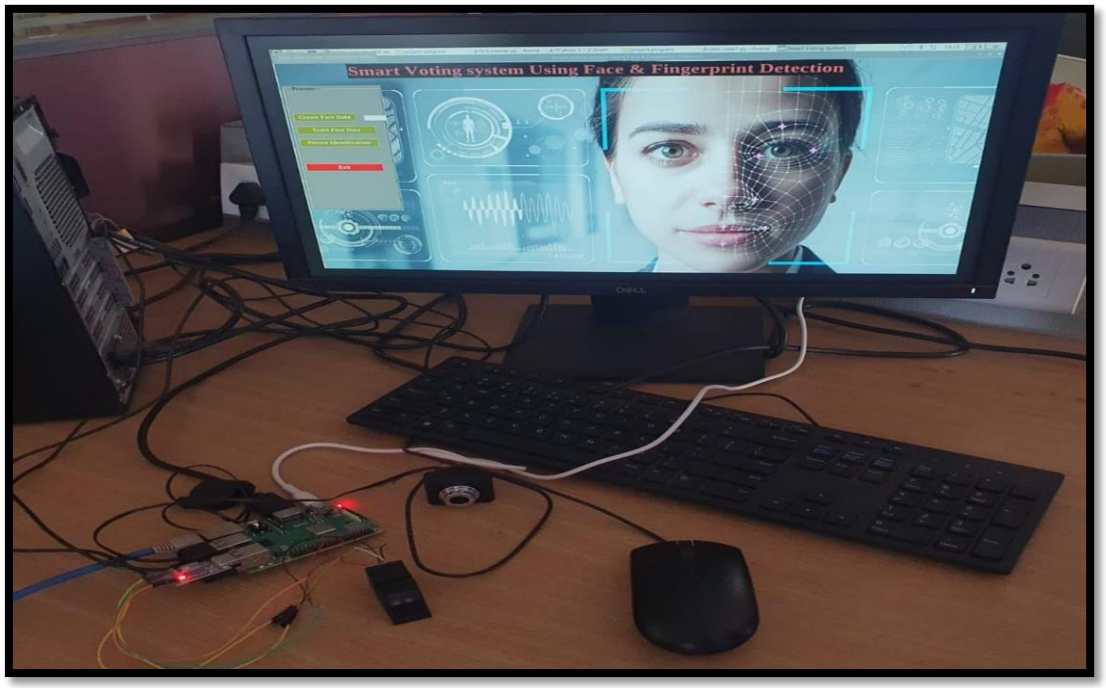
3. CMOS USB Camera:

Compact and portable, the Cmos 640X480 USB Camera with Collapsible Cable for Raspberry Pi has a small size. It offers a retractable USB cable, which makes using it quite convenient. Additionally, it is a plug-and-play gadget that supports 300k pixels and has a USB 2.0 port for ease of operation. Despite being small, it has a maximum resolution of 640 x 480. Therefore, this camera is a great fit for robots, RPi smart cars, etc.

VI. RESULT



Increased security, accuracy, efficiency, and accessibility in the electoral process can result from the use of a smart voting system that incorporates face recognition and fingerprint sensors. These favourable outcomes support public confidence in the fairness of elections and help make democracy more transparent and reliable.

VII. CONCLUSION

An important development in electoral procedures is the use of a smart voting system that incorporates face recognition and fingerprint sensors. The system improves voting process security, accuracy, and efficiency while maintaining the legitimacy of democratic elections by utilising these cutting-edge technology.The use of face recognition and fingerprint sensors offers dependable and strong ways to confirm a voter's identity. The method successfully reduces the risk of fraud and impersonation, preserving the legitimacy of the electoral process, by precisely matching distinctive biometric traits with pre-registered data.The smart voting system also speeds up the identification and verification procedure, which decreases wait times and lines at the polls.

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