

Realtime fingerprint-based voting system

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Abstract:

In this study, the "REAL TIME FINGERPRINT BASED VOTING SYSTEM" is the only method of voting. Security and circumvention of traditional voting system constraints are the primary goals of this approach. The voter's information, including their fingerprint, is saved in the micro controller at the beginning of the registration process. Serial monitors are used as a database in this case. So that an individual's fingerprint can be collected and used for identifying purposes, voters are encouraged to place their fingers on voting booth modules. Afterwards, the impression is delivered to the monitoring unit for verification purposes only." Voter statistics are retrieved by the microcontroller, which then compares them to information that was previously saved in the voter's registration. Voters are authorized to cast their ballots if the numbers are in line with previously established figures. Pushbuttons are used to conduct the voting process manually. The LCD screen displays the welcome information and the names of the parties. When it comes to the results and voter information, they are shown on the screen.

Keywords:

Arduino, Fingerprint, Microcontroller, Voting.

1. Introduction:

Majors with Indian citizenship can vote using the "REALIME FINGERPRINT BASED VOTING SYSTEM" voting method. Traditional paper-based voting methods are no longer as effective as they once were because of the rise of the voting machine. Thus, we came up with the idea of creating a voting machine that may outperform the current system. More secure, non-duplicated votes, and results announced as soon as feasible are the key goals of this project (Pavan M Reddy, 2020). The fingerprint module's EEPROM microcontroller is connected to the Arduino board's microcontroller, which is used in this system. To begin the process of casting a vote and enrolling, the voter must first express their opinion. Fingerprints play an important part in this voting method since they protect voter data and prevent duplicate votes from being cast (Pavan M Reddy, 2020).

1.1. Aim:

The Real time fingerprint voting system is going to be investigated in this study, and Arduino will be used to gather data.

1.2. Objectives:

- 1) To be Voting systems should incorporate an accurate biometric method for preventing voting by an unauthorized party.
- 2) To save time and money by automating the process of counting votes.
- 3) For the purpose of implementing the concept of going paperless.
- 4) To prevent human error in data entry and storage.

1.3. Research questions:

- 1) Using Arduino, how can I receive the results of a vote?
- 2) Do we have the option to vote for more than one candidate in this system?
- 3) How can a voter go about casting his or her ballot quickly and easily?

2. Literature Review:

2.1. Voting systems:

People or a society can vote on who should be elected to a political office through an election, which takes place in accordance with established rules. In modern representative democracies, elections have been the standard method of selection since the 17th century. When it comes to

determining the leadership of a private or public company or even a volunteer organization, elections are a common method used.

Voting systems can be divided into two types, namely:

- 1) The Traditional or Paper – Ballot Voting Systems
- 2) The Electronic Voting Systems

2.1.1. Paper-Ballot Voting Systems:

When it comes to the development of a decent voting system, there are a number of often conflicting factors that must be taken into consideration. It is possible to submit a voter's secure and secretly voted ballot via the computer to election officials using an electronic voting system (Otubu and Coker, 2008). Traditionally, paper ballots have been used to cast votes, and this method is still widely used today. Elections in Nigeria and other countries all over the world are also conducted this way. The day before the election, it distributes paper ballots to qualified voters who show up at their polling place. The voter authenticates himself or herself by searching for as well as ticking his or her identify on the polling unit's voter register. Dropping the pigment on the voter's left thumb fingernail marks an authenticated voter. In order to cast a ballot, the voter must first press his accurate thumb in with an ink imprint and place the inked fingerprint in opposite of the contender of his choice on the ballot paper, besides then he or she must drop the ballot paper into a ballot box that is located in an uncluttered area of the balloting booth (Ahmad, Abdullah and Bt Arshad, 2015).



Figure.1: paper-ballot voting systems [source: (c s, 2019)]

2.1.2. Electronic voting systems:

Electoral systems that use electronic ballots (on-line voting, online balloting) allow voters to communicate their confidential and secure voted ballots to election officials via the computer (Hassan and Anwar, 2018). It was recommended by the Eu commission that "the use of electronically at least the voting of the vote" (e-Voting) be defined (Rudrappa B. Gujanatti, Shiva ram N. Tolanur, Murughendra S. Nemagoud and Shanta S. Reddy, Sangam eshwar Neelagund, 2015). There are many various ways to vote electronically, including digital means of recording a vote & electronic means of determining the outcome.

2.2. Fingerprints:

In biometrics, the ability to recognize a person by their fingerprint is particularly helpful because each person's fingerprints are unique and therefore have long been acknowledged as a reliable means of identification. Biometrics based on a person's fingerprints are commonly used for registration and identification.

It is possible to verify a person's identity through biometric and/or other security measures, such as a password or PIN, by establishing a one-to-one correspondence.

In identification, a person is matched against the complete database enrolled in order to establish one-to-many correspondences. In the identifying mode, fingerprint technology can also be utilized. More than a few countries do fingerprint checks on new recipients of social service benefits to prevent fraud (Pavan M Reddy, 2020).

2.2.1. Advantages of fingerprint based voting system:

- 1) It offers a possibility to avoid votes that are illegitimate.
- 2) It cuts down on the amount of time needed to conduct the election.
- 3) From the polling box, the polling canter can be easily transported.
- 4) Reduce the voting center's workforce.
- 5) It makes precise and convenient counting a breeze.
- 6) Preventive methods for voting

2.3. Arduino UNO:

The Arduino UNO serves as the hub for all of your electronic needs. Many of the most commonly utilized mega chips inside this Arduino is the Atmega328. In addition, the code is stored in an on-chip flash memory. PWM (Pulse Width Modulation) pins account for six of the board's 14 digital input-output pins, with the remaining six pins serving as analogue inputs.

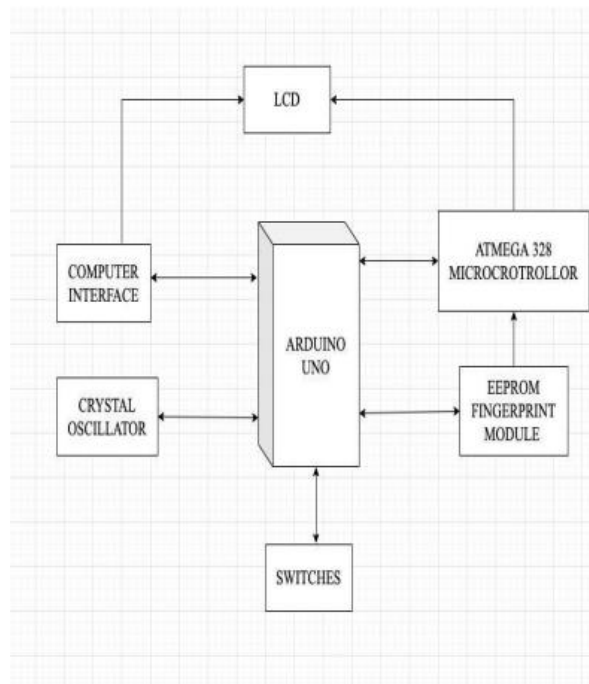


Figure.2: Block diagram of finger print voting system process [source: (shalini, prabha and krithika, 2018)]

2.4. Epprom fingerprint module:

One of the most notable components of the system is the fingerprint module. In order to get a voter's fingerprint, we use this module. R303 is the module in question. The better the image quality, the better the matching will be thanks to this module. Because we can compare every point, whorl, & valley to the fingerprint we previously had, the comparison procedure was extremely time-efficient and accurate.

2.5. Crystal oscillator:

An important component of this project is the crystal oscillator. Execution can continue at a frequency of 16 Mhz thanks to this. The execution time can be estimated using this method. Each stripe of code would take 1/16 microseconds to execute at a frequency of 16 Mhz.

2.6. LCD:

Details are displayed to voters via LCD (Liquid crystal display). There are 16 columns & 2 rows in the LCD screen's dimensions. As part of our election-related display, we're deploying a large-screen LCD to inform voters of their right to cast a ballot. Once a vote has been cast, the voter's choice is displayed on an LCD.

2.7. Computer interface:

The Arduino board provides power to the system. Use it for registration as well. The computer's code will be delivered to Arduino after each enrolment. It tells the voter when they should put or take their finger out of the ballot box.

2.8. Switches:

Push buttons, or manual switches, are used to cast a vote in this paper. To cast a ballot for a particular party, click on the button associated with that party's banner.

3. Methodology:

3.1. Data collection:

The Secondary which sources include books, newspaper stories, journals, published & research reporting, then websites that have secondary data. The unique mark knowledge is safeguarded, stored, and dissected using cutting-edge imaging technology. The first step is to get going and using a fingerprint scanner and the second step in the registration process and the Microcontrollers are used to keep them safe or otherwise, go back to step 3 and try again and the user double-checks their personal information of the Voting is the final step and press a button to select a party from the drop-down menu by Counting the votes and finally Put an end to it.



Figure.3: fingerprint identification and matching [source :(pavan m reddy, 2020)]

3.2. Acquiring Images:

The initial step in the picture identification procedure is to acquire an image because, without it, we cannot proceed. A person must place the fingertip on the sensor in order to obtain an image of their fingerprint. Total internal reflection happens when the voter's finger is placed on one of its ends, allowing us to take a picture of it using a duplicate sensor & lens from another extremity of the optical prism. However, the image that is mined in this phase has not

been treated at all. The finger's position and positioning are critical factors in the impression-making process. We must ensure that perhaps the finger is properly placed on the module in order to enhance the complete internal reflection & capture a high-quality fingerprint.

3.3. Storing the images:

Image segmentation is used to process the raw data from the previous stage. We employ image segmentation in order to remove unnecessary data and noise from collected photos, by dividing the image into a number of smaller sections known as pixels. Image segmentation is used to speed up image analysis. To ensure that all pixels are equal, we normalize the image. Once pixels are homogeneous, an image is formed, and the Gabor filter is used to decrease or eliminate any noise in the image. Threshold values & pixel values are compared, and if the value exceeds the verge, the pixel value is set to 1. Otherwise, it is set to 0. Next, we use the thinning method to reduce the number of pixels in the foreground. As a result, the image is complete.

3.4. Data analysis:

Finally, it reveals from whom the user has voted his or her ballot. We can extract all relevant information from an image using image analysis. Machines powered by electricity typically are used to gather data. To implement this project, we'll use an electrical machine as a fingerprint module. The image's data can be associated to data kept in other storage campaigns enabling identification, substantiation, and other purposes.

3.5. Result:

To begin, an LCD screen displays a greeting: "Welcome to the voting machine." LCD panel displays "ACCESS GRANTED" message after fingerprints are matched.



Figure.4: Result of access granted [source: (pavan m reddy, 2020)]



Figure.5: Result of voters can vote after access [source: (pavan m reddy, 2020)]

The next step is for voters to use the pushbuttons to cast their votes.

4. Conclusion:

An ideal digital voting machine utilizing a microcontroller has been proposed in this research. When compared to the traditional paper-based voting method, this one is more user-friendly, convenient, and cost-effective. Because of its increased security, it might be adopted in place of the current ballot method. It is a major advantage of employing this approach because fingerprints are unique to each individual, hence there is no risk of votes being cast twice.

5. Reference:

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