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Research paper

Implementation of electronic voting system using aadhaar

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Abstract

The present voting system in India is a time consuming process and not so secured. Our project proposes and implements a simple and secured method of polling vote using aadhaar information. Over a period of time there have been many improvisations in the field of voting which aim at increasing the flexibility, reliability, security, scalability and less time consumption to announce the results. In this system the user has to use his finger print to poll the vote.
The fingerprints available in the aadhaar database are used for the candidature verification, which will be stored in the computer through which the further process is carried out. The voter need not carry his/her voter ID to the polling booth. A finger print module is used for accessing fingerprints. Once the user gives the finger print it will be compared with the existing data and if it is a genuine user it will be verified else the user is barred from voting and also if a user attempts to vote for the second time it will not be allowed. Once the voting process is finished the authoritative officer accesses the results immediately using a unique PIN provided to him.

Keywords:*Aadhaar, Voter Id, Polling Booth, Finger Prints*

1. Introduction

This paper examines policy regarding the electronic approaches and developments towards electronic data storage and transmission. Finger print devices for voting machines and different existing identity documents are mentioned and enforced during this project. The user needs to show the voter ID card whenever at the booth to poll his vote. This is often a time consuming method because the person needs to check the voter ID card with the list he has, make sure it as an authorized card and then enable the person to poll his vote. Thus, to avoid this type of issues, aadhaar based voting machine is designed where the individuals no ought to carry his ID which contains his entire details. The person at the polling booth should place the finger on the module. 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 existing information, the person is allowed to poll his vote. If not, a message is displayed on the monitor and therefore the person isn't allowed to poll their vote. If a person attempts to vote multiple times the system displays error and the user is barred from voting. The polling mechanism is carried out manually using mouse or a touch screen. Monitor is employed to display the related messages. The input given to the system is stored in the memory, which is obtained only by the authorized user who has a unique password with which the stored data is accessed, and the results are announced immediately after the voting process is finished.

2. Existing system

In the recent years, voting equipment which were widely adopted may be divided into five types.

2.1. Paper-based voting

The voter gets a blank ballot and use a pen or a marker to indicate he want to vote for which candidate. Hand counted ballots is a time and labor consuming process, but it is easy to manufacture paper ballots and the ballots can be retained for verifying, this type is still the most common way to vote.

2.2. Lever voting machine

Lever machine is peculiar equipment, and each lever is assigned for a corresponding candidate. The voter pulls the lever to poll for his favorite candidate. This kind of voting machine can count up the ballots automatically. Because its interface is not user-friendly enough, giving some training to voters is necessary.

2.3. Direct recording electronic voting machine

This type, which is abbreviated to DRE, integrates with keyboard, touch screen, or buttons for the voter press to poll. Some of them lay in voting records and counting the votes is very quickly. But the other DRE without keep voting records are doubted about its accuracy.

2.4. Punch card

The voter uses metallic hole-punch to punch a hole on the blank ballot. It can count votes automatically, but if the voter's perforation is incomplete, the result is probably determined wrongfully.
2.5 Optical voting machine: After each voter fills a circle correspond to their favorite candidate on the blank ballot, this machine selects the darkest mark on each ballot for the vote then computes the total result. This kind of machine counts up ballots rapidly. However, if the voter fills over the circle, it will lead to the error result of optical scan.

3. Proposed system

With the aim of conducting democratic elections, we proposed the system to endeavor to improve the easy usage of voting machine with finger print authentication using Aadhaar database. All the voters must reach the polling booths allotted to them. In the polling the voter should select his respective ward and place his finger on the sensor for verification. If it is a genuine user then next window opens in which the name of the parties are displayed to vote. If the user selects the wrong ward other than the one allotted to them, then their finger print is not verified and they cannot vote. Also if a user tries to vote more than one time the system pops out an error message and they are not allowed to vote. In case of any handicapped person who cannot access through their finger need to inform the election commission beforehand. In such cases the user is given a unique password with respect to his aadhaar number. In the polling booth they need to enter their aadhaar number and the password given to them to complete the verification process. In this way one after the other all the voters can utilize their Right to Vote in a simple, secured and fastest way. After the voting process is completed the election officer enters their unique password to see the results. Since the whole process is carried out by the system it doesn't take much time for counting the votes and announce the results. Since, we are using the data from aadhaar there is no chance of discrepancy in the data available and rigging, cheating can be avoided resulting in safe voting process.

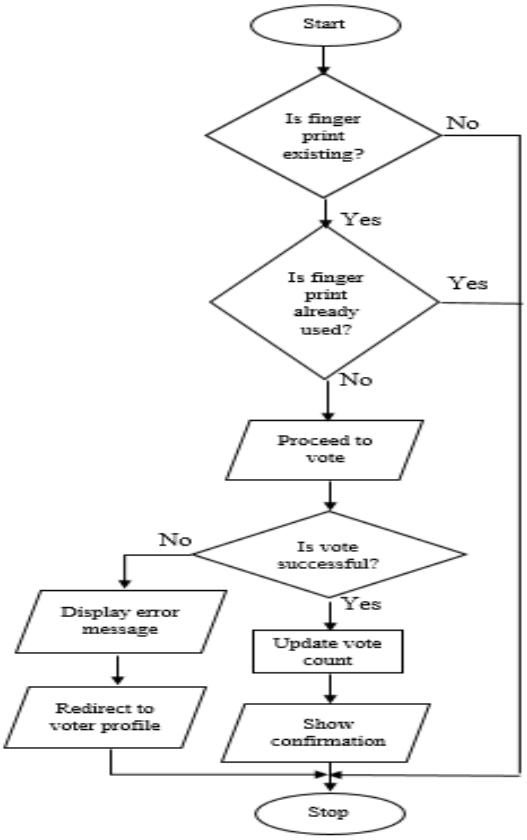

Fig. 1: Flowchart.

3.1 Block diagram

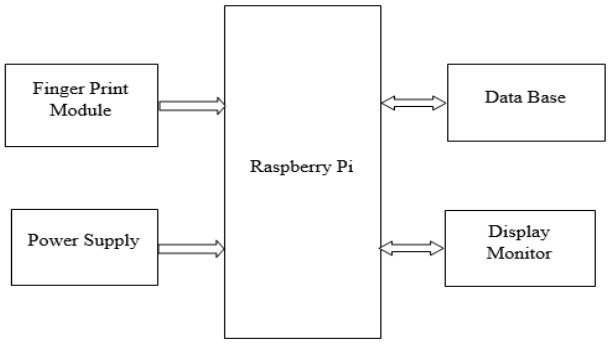

Fig. 2: Block Diagram.

The voter needs to place the finger on the finger print module for verification. The sensor captures the finger print as an image template and compares it with the already existing data in the database. When the finger print is verified it is displayed on the monitor and proceeds to the next step. Raspberry is the control unit for this process which is powered by a 5V power supply. The user interfaces with the system using a mouse and a keyboard or touch screen.

3.2. Hardware components

3.2.1. Raspberry PI

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools.

Fig. 3: Raspberry PI Model.

The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. However, Raspberry Pi 3 model-B is provided with 1GB RAM. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and persistent storage.
The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, with support for BBC BASIC (via the RISC OS image or the Brandy Basic clone for Linux),C, Java and Perl.
SoC: Broadcom BCM2837
CPU: ARM Cortex-A53, 1.2GHz
GPU: Broadcom Video Core IV
RAM: 1GB LPDDR2 (900 MHz)
Networking: 10/100 Ethernet, 2.4GHz 802.11n wireless
Bluetooth: Bluetooth 4.1 Classic, Bluetooth Low Energy
Storage: microSD
GPIO: 40-pin header, populated
Ports: HDMI, 3.5mm analogue audio-video jack, 4× USB 2.0, Ethernet, Camera Serial Interface (CSI), Display Serial Interface (DSI)

3.2.2. Finger print module

The principle of the fingerprint module is based on the processing which includes two parts: fingerprint enrollment and fingerprint matching (the matching can be 1:1 or 1: N).When enrolling, user needs to place the finger on the sensor two times. The system will process the two finger images and generates a template of the finger based on processing results if the matching percentage of both the fingers is greater than 63% and store the template. When matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library and returns an acknowledgement based on the result.

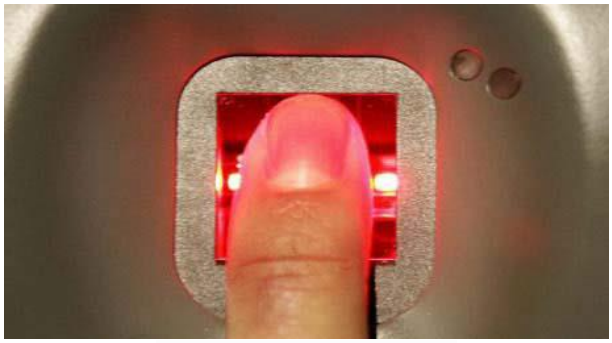

Fig. 4: Finger Print Sensor Device.

The features of the module are as follows:

- Fingerprint sensor type: Optical
- Interface: USB1.1/UART(TTL logical level)
- Image Capture Surface: 15—18(mm)
- Verification Speed: 0.3 sec
- Scanning Speed: 0.5 sec
- Character file size: 256 bytes
- Template size: 512 bytes
- Storage capacity: 250
- Voltage: 3.6-6.0 VDC
- Matching Method: 1: N

3.3. Software requirements

3.3.1. Linux OS

Linux or GNU/Linux is a free and open source software operating system for computers. The operating system is a collection of the basic instructions that tell the electronic parts of the computer what to do and how to work. Free and open source software (FOSS) means that everyone has the freedom to use it, see how it works, and changes it.
Linux supports multiuser interface at a time for a single system when compared to windows which supports only a single user at time. Also it uses the hard disk space very efficiently and doesn't require any external device drivers to interface with various hardware devices and treats the hardware component just as a file which makes it easier to communicate. Due to the above reasons we adopt Linux OS for the project leaving behind the counterparts.

3.3.2. QT creator

Qt is a cross-platform application framework that is widely used for developing application software with a graphical user interface (GUI) (in which cases Qt is classified as a widget toolkit), and also used for developing non-GUI programs such as command-line tools and consoles for servers. Qtusesstandard C++ but makes extensive use of a special code generator (called the Meta Object Compiler, or moc) together with several macros to enrich the language.Qt can also be used in several other programming languages via language bindings. It runs on the major desktop platforms and some of the mobile platforms. Non-GUI features include SQL database access, XML parsing; thread management, network support, and a unified cross platform application programming interface for file handling.

4. Results

1) The first step in this electronic voting process wherein the voter needs to select their respective ward in the polling booth allotted by the election commission.

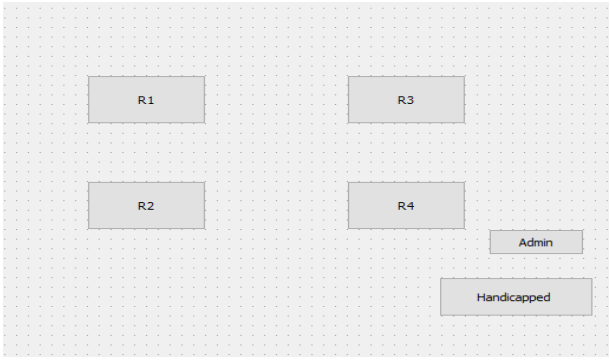

Fig. 5: Selection of Ward.

2) The second step is to place the finger on the finger print module which verifies the input with available database and generates three cases i.e., i) Verified ii) Not verified/ Finger not found iii) You are already done.

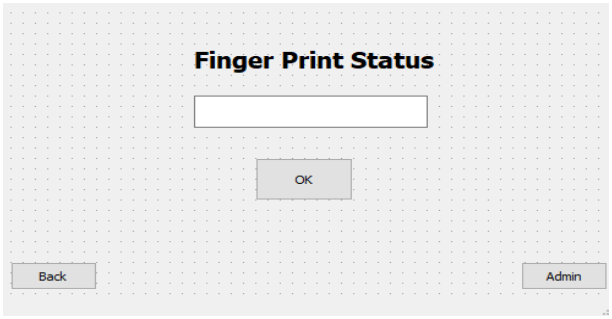

Fig. 6: Voter Finger Print Status.

3) The persons with physical disability are given a unique password with respect to their aadhaar number with which the verification is carried out.

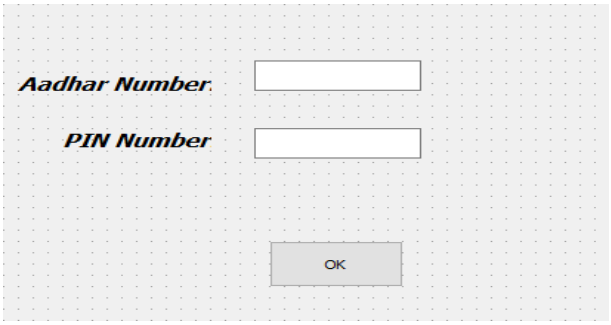

Fig. 7: Physically Disability Voter Identifiacation Status.

4) After the voter is verified, he/she is allowed to vote for their favorite parties by clicking on the respective button which updates the count.

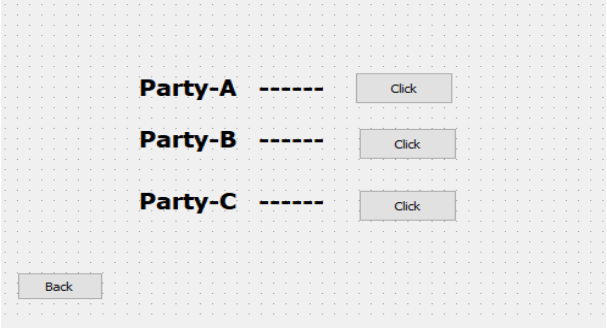

Fig. 8: Cast The Vote to Particular Party.

5) Once the voting is completed the chief officer of the booth enters his/her unique PIN and announces the results as the count is automatically incremented for each vote.

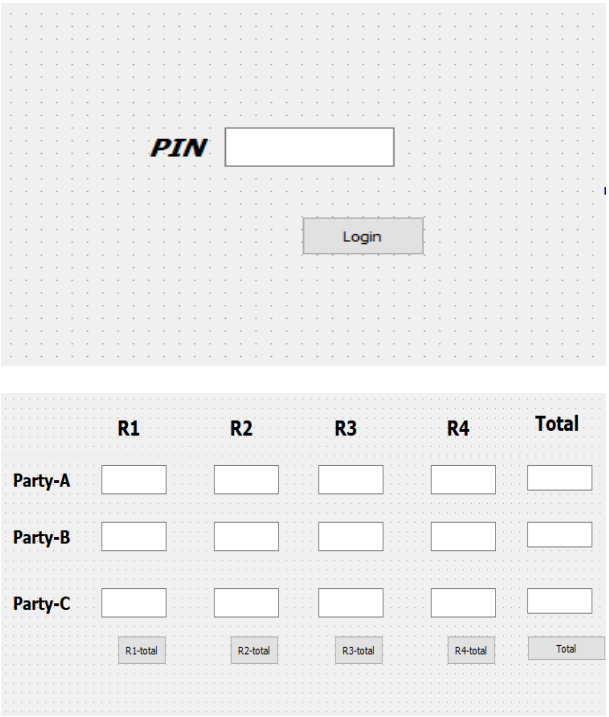

Fig. 9: Count the Votes by Chief Officer.

The results are seen in the fig.9 in which the total votes obtained by each party in a particular ward are displayed and the total votes obtained by each party for all the wards combined is calculated automatically. Through this the result of the winning party can be announced immediately.

5. Conclusion

This project aims for secured and reliable voting process. It is less time consuming and reduces human efforts to a large extent as it is developed using a Raspberry-Pi system which uses ARM architecture. There will be no discrepancy in the verification process as it uses the Aadhaar database and can be further improved by adding Iris recognition method for secured voting. The announcement of results are also immediate, accurate and no discrepancy.

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