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RFID and Fingerprint Based Electronic Voting System

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ABSTRACT: Voting is an integral a part of a democratic society of selecting leaders and contributes towards the betterment of the country. It's deciding mechanism, where security, transparent and accurate are important .The objective of the project is to enhance the prevailing electoral system which will be accurate, transparent and faster and can ensure one vote for one person .Our proposed system is to style a RFID and Fingerprint based electronic voting device. Each user is provided a voter's id within the sort of RFID tag .The hardware design features a Fingerprint scanning sensor which is employed to compare the finger print of the user with pre stored finger print of the user .During the voting, both the fingerprints are checked for matching and if doesn't match then display authentication failed, if a person attempt to vote second time then display the warning message .Push buttons are used for choosing the voting preferences. LCD is employed to display the corresponding data for every key to the user .Thus; illegal voting can't be done since print is exclusive for every person .The voting process is administered as long as the finger print matches with stored value.

KEYWORDS: Raspberry Pi, RFID module, Finger print module, Push Buttons,LCD

I. INTRODUCTION

In our system we have developed a two-tier verification system by using Raspberry pi. This two-tier verification is divided in two process. The first process involves in the verification of user's identity which is provided to him by the government, which may be his aadhar identity or voter ID our idea is to make the identification card upon the RFID tag which is the basic component for one of our verification system. This RFID tag is verified through RFID reader for first step of verification.

In the second step of our verification we are getting to affect the Biometric characteristic of the human body which is nothing but the fingerprint. That is the impressions taken from the ridge of the skin of the finger. This has been used as the form of identity for the person for over centuries in human history.

By combining the previous two step of verification we offer an authentication system for allowing only the appropriate verified used to cast their vote.

II. PROPOSED SYSTEM

In our proposed system we introduce two tier verification system by making unique ID verification and biometric verification for each voter using Raspberry pi which is more standard.

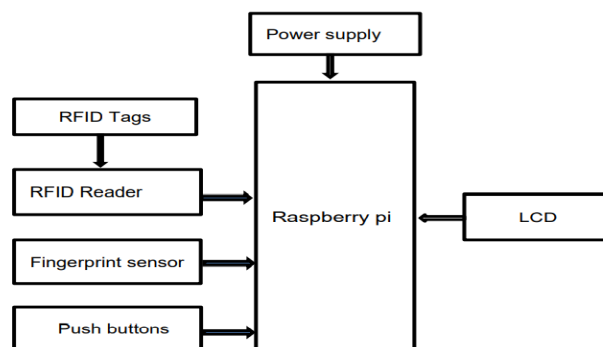Block diagram our proposed is given below

Fig. 1.Block Diagram

The basic components in the proposed system are as follows

- Raspberry pi
- RFID module
- Fingerprint sensor

Fig. 2. System Design.

Raspberry Pi

The Raspberry Pi is the Broadcom system on a chip with an integrated ARM of well-suited Central Processing Unit with on-chip Graphics Processing Unit . The Processor speed ranges from 700 MHz to 1.2 GHz for the Pi 3 and on board memory range from 256 MB to 1 GB RAM. The Secure Digital cards are used to store the operating system and program memory in either SDHC or Micro SDHC sizes. The boards have either a single USB port or up to four USB ports depending on the model. The system supports the HDMI and composite video, with a standard 3.5 mm phono jack for audio output. Lower level output is provided by a number of GPIO pins which support common protocols.

Fig. 3. Raspberry Pi board

RFID module

A radio frequency identification reader (RFID reader) is a device used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader. The RFID Reader Moduleare often utilized in a good sort of hobbyist and commercial applications, including access control, automatic identification, robotics, navigation, inventory tracking, payment systems, and car immobilization. Radio Frequency waves are used to transfer data from the tag to a reader. The RFID tag it must be within the range of an RFID reader, in order to be read. RFID technology allows several items to be quickly scanned and enables fast identification of a particular product, even when it is surrounded by several other items.Radio frequency identification (RFID) is one method for Automatic Identification and Data Capture. An RFID system consists of three components: an antenna and transceiver and a transponder. The antenna uses radio frequency waves to transmit a signal that activates the transponder. When activated, the tag transmits data back to the antenna. An RFID reader's function is to interrogate
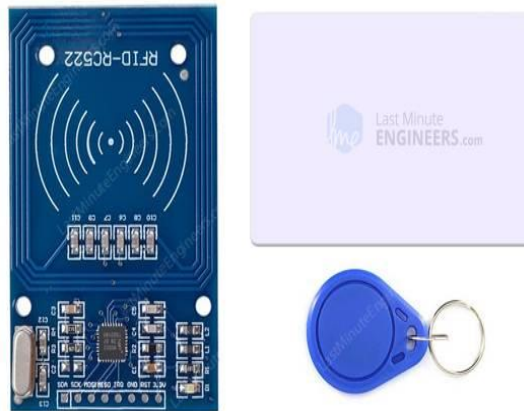
Fig. 4.RFID module

Finger printsensor

R307 Fingerprint Module consists of optical fingerprint sensors, a fast DSP processor, a highperformance algorithm for aligning fingerprints, high-capacity FLASH fingerprints, and other composition of hardware and software, stability, simple layout, fingerprint entry, image processing, fingerprint matching, searching for and storage template and other functions. It is used to detect and verification of fingerprints. The fingerprint of the voter is already stored in the database which is matched at the time of voting using this module. High powered DSP chip is used for detection and verification by connecting it to the microcontroller with TTL serial. It sends data packets of fingerprints for detection. As every person has a unique finger image, a secured method is used for authentication of the voter at a low cost. The fingerprint processing unit has two functions: fingerprint enrolment and matching. The user can configure and store fingerprints in 1:1 or 1: N mode for the person and which is used at the voting period for identification of a person with multiple fingerprints also. In 1:1, comparison, this module compares the live finger to a specific template stored in the file, while in 1: N searching and matching, the module can consider a full image library for matching finger.

Fig. 5.Fingerprint module

III. **WORKING PROCESS**

Our two tier verification system working can be explained as two process. First we are going to see about the working principle of RFID verification .The RFID tag is started with the data of the user such as Name, Aadhar ID etc. Each RFID tag will be given with a separate unique data. These stored data can be verified only by the RFID Reader. This RFID reader will read the data in RFID tag and it can be verified with the user provided data on spot direct by the officer. In the second step of verification process each user's fingerprint Will be started either in the system or fingerprint sensor R307.These fingerprint data are simply available with the Government of India they can effortlessly access it form Aadhar data's .Now the data for fingerprint will arrive and it will be verified by the IOT with RFID data and will allow the appropriate user if they match. If they doesn't match with each other then warning message display on LCD to indicate that user provided data's doesn't match.
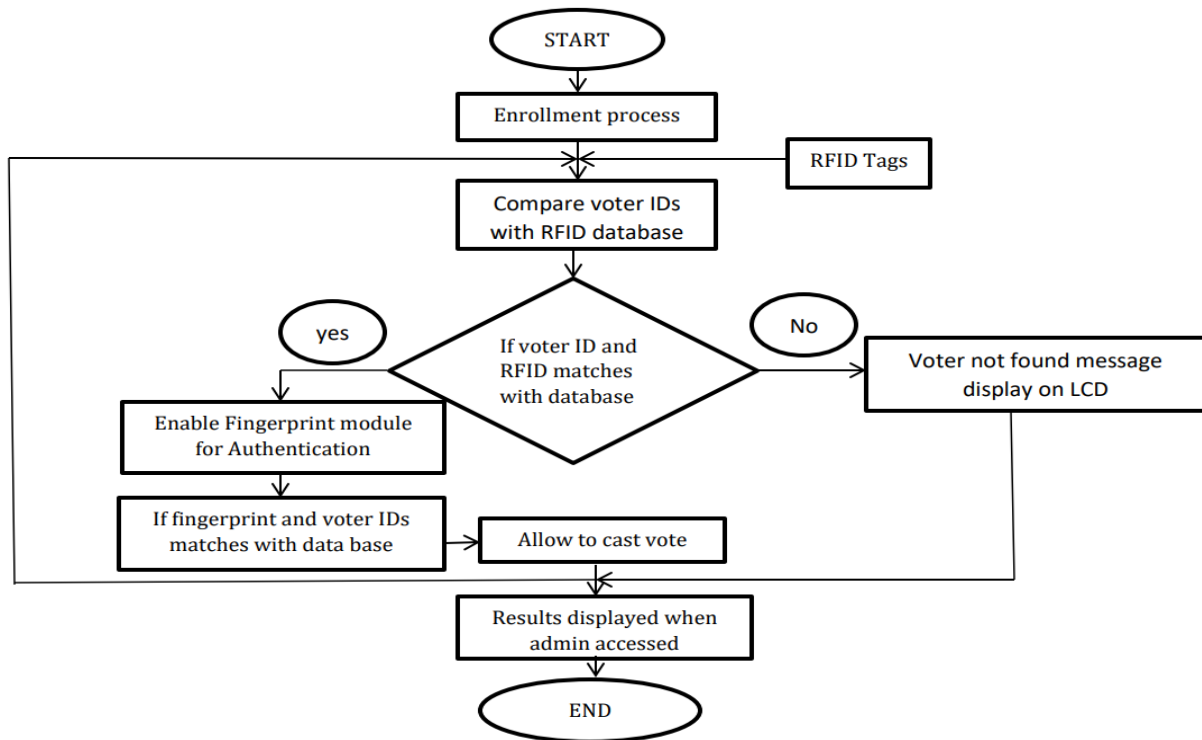
Fig. 6.Flow Chart

The flow chart explains the following process of the system which the connect to the circuit diagram. The RFID tag which stores the information of the voter. Then the RFID reader used to read the RFID tag.

Algorithm

The voting machine process is shown in following step that how to vote and how it has been cast.

Step 1: Start

Step 2:Upload the program code to the Raspberry pi.

Step 3:By using code RFID tag and corresponding finger print are registered

Step 4:RFID reader scans the RFID tag.

Step 5:Place the finger to the fingerprint sensor

Step 6:The LCD display shows that the person is matched or not

Step 7:If the fingerprint matches the user authenticate can able to vote their cast

Step 8:If it doesn't match then displayed Authentication failed. In case any voter tries to cast second time then warning already voted message will be displayed on LCD

Step 9: Using admin access result will be displayed

Step 10:Stop

The first 3 steps are using the RFID reader and tag collects the voter ID and their information. And the forth coming steps are upload the program source code and voter's information.

The last 3 steps that checks that whether the following fingerprint match with the person or not .The fingerprint matches with the person is allow to continue to vote and if not matches the fingerprint LCD display shows that the person is not verified thus the process of voting has the two tier verification system. IOT is also used in the system shows the whether the user is authenticate and matches with fingerprint with time to check the count of voting also used in the following system. The unauthenticated user is also shows with the fingerprint not matches in the display.

Voting process and output display

The RFID tag which stores the information of the voter. Then the RFID reader used to read the RFID tag. If it is valid then display valid voter.After that Press the finger to the fingerprint sensor. If it matched display matched proceed to vote.After than by using pushbuttons cast vote to our interested party.

Fig. 7. Messages display during voting process

Authentication checking and output display

The RFID tag which stores the information of the voter. Then the RFID reader used to read the RFID tag. If it is not valid then display voter not found.After that Press the finger to the fingerprint sensor. If it doesn't match then display authentication failed .In case any voter tries to vote second time then warning already voted message will be displayed.
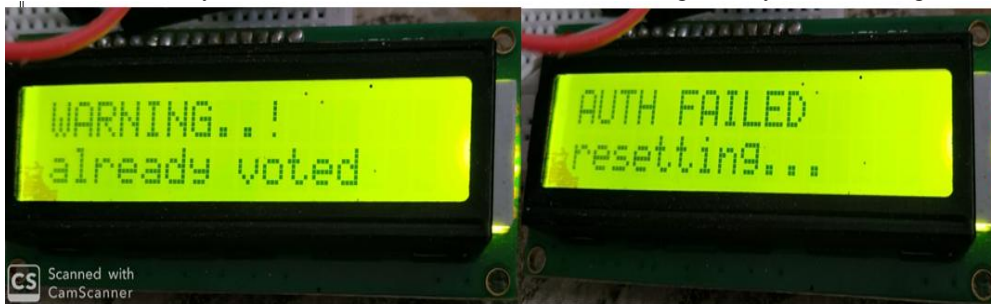

Fig. 8. Messages display during authentication process

IV. **DISPLAY OF RESULT**

The Result will be seen only by admin .Here we introduce admin card to access admin.When the admin card place before the RFID module then display the admin accessed fetching results and results will be displayed on LCD as shown in below figures
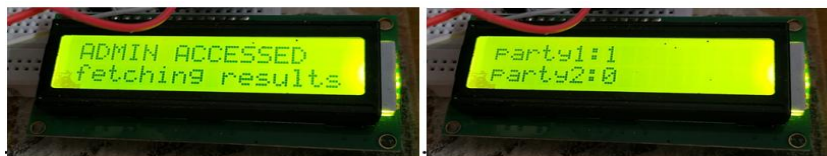

Fig. 9. Display of results

V. **CONCLUSION AND FUTURE SCOPE**

To summarize, the prototype device was successfully able to enroll and store the RFID voter Id's and corresponding fingerprint of the voters in fingerprint module R307 flash memory, verify the status of voters (registration and multiple voting), matching the new RFID Id's fingerprint input with saved fingerprint template, authorize the voter to cast the vote and was able to generate result.
In this method, the process of verification involves of ID and fingerprint from the database. This is faster and secured way of holding elections. The system interlinked with voter ID or Aadhar card and biometric authentication
The security was the main concern of our project. So it is better than other traditional method. By using this system, the national voting system will be more secure, faster, easy to use and more economical. The system also consumes

very low power. To conclude, the device is great alternative to assure more transparency and accuracy in electronic voting system.

Further improvement of the prototype device could be done at the later development stage. For instance, an addition of WIFI module could help send result wirelessly to host computer and adding external memory space could help store any amount of fingerprint data and also use UIDAI for Voter Id's

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