Research Article

Digital Authentication for Indian e-Voting

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Abstract

Voting is one of the important tasks in electing the government of any democratic country. The biometric identification system is secure, reliable and confidential for the purpose of an electronic voting machine. This paper provides the construction of a fingerprint and -based voting machine. The development plan confirms whether the voter has identified and also checks whether the voter is right or not during the election process. This function is intended to replace the validation system used with a biometric authentication system. The development plan also takes into account whether the voter has voted once or more. This program does not require any third-party service for its operation. It is a low-cost, flexible and easy-to-use system. Various components of the advanced system have been tested under operating conditions.

Keywords: Fingerprint; Voting system; Biometric; Authentication; Verification.

Introduction

Election is a feature of democratic government in which people govern themselves and are able to express their choices regarding various issues, such as constitutional amendments, piece of legislation or choosing the right person as their leader [3]. An electoral system is present to layout the rules of the election. Political election is the most common form of election but there are many different fields where election is vital part of their organizational function [3]. Election is the way of democratic world but conducting an election in fair manner has been the challenge of every electoral body especially in the country with high corruption, weak rule or law and less transparency [1]. On the top of that conducting election cost millions and billions of dollars. This study report mainly focuses on developing a prototype of embedded system that deals with fingerprint voting system which can help in progression of election in robust and secure manner [2].

The system integrates different hardware components like micro controller, fingerprint module, LEDs, switches that facilitates a flawless voting system [2]. For the implementation of this system, fingerprint sensor is used to take user finger print image and store in internal memory, these images are further processed and analyzed using Arduino Raspberry PI. Fingerprint recognition technique is most popular technique among all other technique of biometric [6]. Every human has different fingerprint except handicapped person, who has disability related to hand. Every person has a unique fingerprint pattern and also never changes all over the life. Fingerprint recognition is a very complex process; hence it is necessary to build a system easily that automatically recognizes the fingerprint with low computational cost and high level of accuracy. Fingerprint matching is based on the information contained on fingerprint image namely, minutia, delta, shape, core, pores etc. Minutia primarily based matching algorithm is useful in many programs and usually carry out with high accuracy. However, its overall performance additionally depends upon many factors namely, variety of minutia factors, satisfactory of picture, alignment of fingerprint and so forth.

Existing system

In this existing system, the voters as well as political parties who act as candidates to be satisfied after the announcement of the result after elections are held. Voting is a process in which people elect the leader among the participating candidates through elections. In previous years elections were held in the ballot

paper having different symbols of each candidate respectively. Each voter has to keep stamp besides the symbol of their chosen candidate. Now a day's EVM's are used in elections. EVM abbreviated as Electronic Voting Machine, the designed system is effective and efficient than the existing system by its performance and even in terms of mechanism [5]. Using ARM Cortex M3, the features currently available in the EVM are replicated and also included some features like RESET and final vote count display are password protected. Designed EVM software allows a candidate/Person to cast their vote only once. Apart from the digital Security, manual security is also included by marking ink on the fingers. Once the selected candidate button is pressed by the voter the red light will glow near the selected candidate name and the symbol of the candidate thereby ensuring that the next voter can draw in since the previous voter's vote is properly taken into the consideration [5].

Proposed system

The finger-print voting system requires to register their fingerprint at the polling booth. The person can now vote on the Election Day just by verifying their identity using their fingerprint. The system uses Arduino and fingerprint technology. Voting does not only include political but can be also social, business and educational. The EVM is based on the fingerprint and facial recognition has been researched the longest period and shows the most promising future in real world application [6]. Because of their uniqueness and consistency over time, fingerprint and facial recognition have been used for identification over time by using this feature voting system can be made more secured. EVM is faster, efficient, reliable and error free, also easy to operate which reduces the chances of errors. Decisions are shown in few seconds just by pressing a result button after the e-voting has been conducted. Fig. 1 shows the block diagram of Digital authentication for Indian e-voting system.

Description of components

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. The Raspberry Pi is

manufactured in two board configurations. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZFS 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but it uses an SD card for booting and persistent storage [10]. The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language
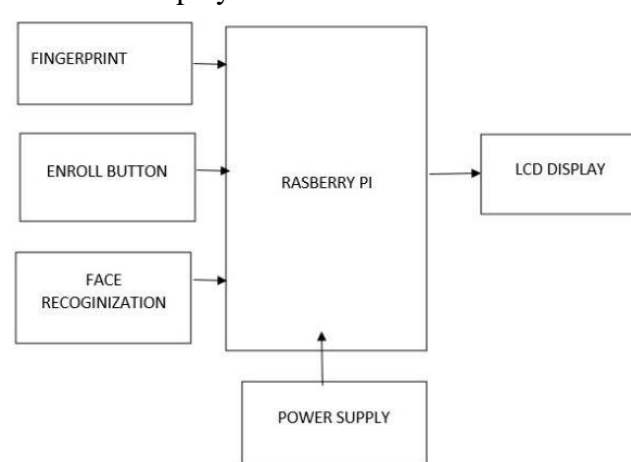4.2 LCD Display:

Fig. 1. Block diagram of Digital authentication for Indian e-voting system

An LCD is a flat-panel display or other electronically modulated optical device that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. The options for selecting automatic and manual mode of the meter are made available on this LCD Display [5]. Once the raspberry pi reads the data, the LCD will display the user data.

Power supply unit

The circuit needs two different voltages, +5V & +12V, to work. These dual voltages are supplied by this specially designed power supply. The power supply, unsung hero of every electronic circuit, plays very important role in smooth running of the connected circuit. The main object of this 'power supply' is, as the name itself implies, to deliver the required amount of stabilized and pure power to the circuit. The stabilization of DC output is achieved by using the three terminal voltage regulator IC. This regulator IC comes in two flavors: 78xx for positive voltage output and 79xx for negative

voltage output. For example, 7812 gives +12V output and 7912 gives 12V stabilized output. These regulator ICs have in-built short-circuit protection and auto-thermal cut-out provisions [8]. If the load current is very high the IC needs 'heat sink' to dissipate the internally generated power.

Fingerprint module

It consists of optical fingerprint sensor, high-speed DSP processor, high-performance fingerprint alignment algorithm, high-capacity FLASH chips and other hardware and software composition, stable performance, simple structure, with fingerprint entry (Fig. 2), image processing, fingerprint matching, search and template storage and other functions. Fingerprint module has two interface TTL UART and USB2.0, USB2.0 interface are often connected to the computer; RS232 interface may be a TTL level, the default baud is 57600, can be changed, ask a communication protocol, microcontroller, like ARM, DSP and other serial devices with a connection, 3.3V-5V microcontroller are often connected directly [5].

Fig. 2. Fingerprint verification

PI Camera

The Raspberry Pi Camera module is connected to CSI port of raspberry pi. This is an 8 Megapixel night vision camera used to broadcast a live stream to webpage through raspberry pi, thus, we can watch live stream of our home from anywhere in the world. This camera is attached to servo motors to rotate (right, left, up and down) the camera [9].

Results and discussion

Electronic voting Machine with fully password protected feature is built here (Fig. 3). The EVM allows the voter to cast the vote and avoids any fraud or mishap that might happen. The designed system has stuffiest flash memory to store the

casted vote. The LCD display shows the final count of the voting (Fig. 4). The features currently available in the EVM are replicated and also included some features like RESET and final vote count display are password protected. Designed EVM software allows a candidate/Person to cast their vote only once. Once the selected candidate button is pressed by the voter the red light will glow near the selected candidate name and the symbol of the candidate thereby ensuring that the next voter can draw in since the previous voter's vote is properly taken into the consideration.

Fig. 3. Experimental setup of Digital authentication for Indian e-voting system

Fig. 4. Result for fingerprint enrolment

Conclusion

The proposed method is to develop a secure internet voting system based on face recognition which tried to overcome all the drawback occurs in traditional or current voting system. The proposed system has many strong features like correctness, verifiability, convenience etc. For this system no requirement of an election officer, paper ballot or any electronic voting machine only the internet connection and Face scanners are required one can vote from anywhere securely. The proposed system gives two different authentication process. First is the face recognition and the other is the fingerprint. In the proposed system no voter can cast their vote twice and also cannot cast someone else vote. The vote is taken into account only when the

details of the voter is matched with their fingerprint and their face d and the respective Facial Patterns stored in data storage will not be matched with the Voter trying to voting with some other person's identity.

Conflict of interest

Authors declared no conflict of interest.

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