

Advanced Voting System Using Fingerprint

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Abstract— A Fingerprint is an important identifier for the humans. This paper proposes finger print voting system with Arduino. The majority of the worldwide election were using a paper-based voting rather than using biometric system. The current voting process has safety problems such as authenticity of voters. In proposed system, a voter identity can be proved instantly. All voters' information was stored securely to register in the system. The main objective is to enhance the security in order to prevent duplication and provide a system which reduce the burden for people on conducting a voting. Thus, by implementing this system, user can put their vote with fingerprint instead of paper without doubting about their security. Voting Using Fingerprint reduce the polling time, it provides easy and accurate counting without human labor.

Keywords— Biometric, voting system, Fingerprint, Arduino, identification.

I. INTRODUCTION

Voting is a kind of method for a group such as a meeting or an electorate to make a decision or express an opinion which often following discussions, debates, or election campaigns. (Engineering et al., 2016) Nowadays, plain paper-based voting is widely used method in world wide. Plain paper-based voting systems are such as paper ballot voting systems, punch card voting systems, and optical mark-sense voting systems [1-2]. Biometric is the science and technology of measuring and analysing biological data [3-4]. Biometrics also can be referred to as technologies that can examine and measure human body characteristics such as fingerprint, voice patterns, facial patterns, hand measurement, DNA and eye retinas which for verification purposes. The formed of field of biometrics has been widen since there are many differentiation types of physical identification.

Human fingerprint is a well-known identifier and the type of biometrics that can be as a choice for law enforcement. The human fingerprint also can be used as human biometric system whereby the fingerprint on every individual are different and unique which shows that the fingerprint cannot be duplicated and manipulated. The purpose of using the fingerprint is for user identification and authentication. The facts that fingerprint recognition is being so popular because of the ease of acquisition, established use, and acceptance when compared to other biometrics and also there are many source of this biometrics on every individual [5].

This paper proposes finger print voting system with Arduino which facilitates error free, fast means of voting in elections. The rest of the paper organized as following. In next section, current situation reviewed and existing commercial products are elaborated/investigated and

subsequently compared. In section 3, the methodology and design (hardware and software) of the Fingerprint system is presented. In section 4, results to be discussed. This chapter ends with section 5 conclusion.

II. LITERATURE REVIEW

The majority of the worldwide election were using a paper-based voting rather than using fingerprint election system. The past experience of the electoral process required us to sharpen on the use of the latest technology in the electronic voting process. Nowadays, the current voting process has many safety problems, and it is very tricky to prove even simple security aspects about them. Furthermore, there is some possibility to work in the electronic voting system in terms of the authenticity of voters and to protect the electronic voting machine from offenders [6-9]. According to the current system, there is more opportunity on error happening by counting the votes manually which may lead to missed counting and duplicates counting.

Thus, some votes were even manipulated by any other parties which can be lead to inaccurate vote. The counting for the votes is the most important activity in the voting process. If the vote count is reaching to failure, it could lead impact on people attitude towards the party. so voting counting should be clear, reliable and accurate, then only polling station that has a list of all voters assigned to the station and only those listed may vote in that polling station. In following paragraph's, we overview existing commercial fingerprint readers [10-13].

The FingerTec R3 is the latest fingerprint reader from FingerTec which under company of TimeTec Holding for time attendance and door access. This R3 device comes with multiple verification technique such as fingerprint, card and

password; it comes with 2.4" colour LCD, a touch panel and made durable for frequent usage. It is also coming with huge memory capacity loaded with a sizeable 128 MB SDRAM and 256 MB flash memory capacity that supports up to 100,000 transactions [14].

The FingerTec R3 utilize details matching technology that ensures that only registered users are given access and equipped with TCP/IP connectivity and a USB flash drive is available to transfer transaction logs into the computer when TCP/IP is not available.

The fingerprint scanner ZF10 is from a company called as Dermalog which is suitable for use in variety of application and environments including electronic ID, border control, and passport supply as well as the registration and verification of voter. Thus, it also can be used as security documents like visa. This fingerprint scanner also has a large scanning window ensures easy on processing images. Typically to scan a fingerprint required dry fingerprint, but this fingerprint scanner has an excellent quality that even moist fingerprint can be scanned. It is also can capture fingerprint from a plain tenprints, singleprints and rolled fingerprints [15-16].

Suprema BioLite N2 is an outdoor fingerprint terminal that gives access time and control features which based on Suprema's latest security platform and biometric technology. BioLite N2 also provides top class security and performance with include Suprema's latest fingerprint algorithm. It contains with rugged IP67 housing and added a flexibility in system design with a multi-class RFID reading technology.

This device also provides a high protection against dust, moisture and even liquid. It is also can capture a fingerprint up to ten fingerprints.

BioFlash USB flash drive has a built-in fingerprint file protection so people would not have to worry about losing their important files to other people. Without a proper fingerprint authentication, an unauthorized user cannot access to view the contents of the USB flash drive. Besides protect the files from alteration by unauthorized users, it is also can prevent them from check out the contents within the drive. BioFlash USB flash drive does not need any software installation before using the fingerprint authentication protection feature and can be plug and play device. The capacity storage of the flash drive is fom 128MB to 1GB and can capture only 5 fingerprint maximum.

MorphoWave Compact is a device developed by company name IDEMIA. This device using a touchless 3D fingerprint to capture people fingerprint. In less than one second, MorphoWave Compact have the patented touchless sensor technology scans four to ensures the most reliable and accurate fingerprint matching for maximum security. This ergonomic touch less solution carries an unmatched combination of security, throughput and convenience. It is also have multifactor authentication that supports MiFARE, DESFire cards, PIN code, and also capable of scanning QR codes for visitor management.

TABLE 1
COMPARISON OF FINGERPRINT VOTING SYSTEM

Related Products Features	FingerTec R3	Fingerprint Scanner ZF10	BioLite N2	BioFlash USB Drive	MorphoWave Compact
Technology used	Fingerprint, card, password	Fingerprint	Fingerprint, RFID	Fingerprint	Touchless 3D fingerprint, RFID card
Purpose	Door access	Security documents	For outdoor environment	Save important files	Door or gate access
Number of fingerprint capture	Only one	Up to ten fingerprint once	Only one	Five fingerprint maximum	Four fingerprint maximum
Fingerprint quality	Dry, moist, dust	Dry, moist	Dry, moisture, dust, liquid	Dry	None

III. RESEARCH METHODOLOGY

The tools and hardware is used in order to develop the system. Since there are many available software and

hardware today, so it must be chosen based the requirement. The system consists of fingerprint module, Arduino Uno micro controller board, power supply and LCD screen. Following is a block diagram of the system.

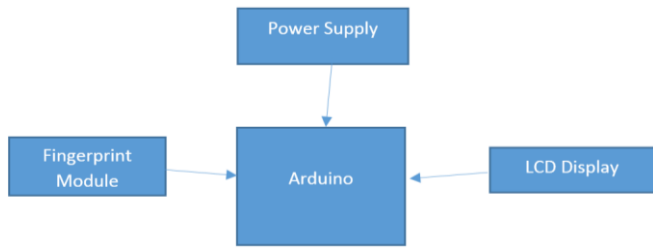


Fig. 1 Block Diagram of Fingerprint voting system

This LCD Display will display any information from the system.



Fig. 4 the LCD Display

1) **Arduino IDE:** is a software, it stands for Integrated Development Environment. It comes with the physical programmable circuit board which known as Arduino Boards. This software is specifically used for write, compile and upload source code into the Arduino devices. Moreover, Arduino IDE is an open source software and available to install and start to compiling the code. It is also support both C and C++ languages which making it understandable and learn it easier.

4) **Interface Design,** Figure 5 depicts the interface of the fingerprint voting system. It consists of the capture of fingerprint, status whether it is failed or succeed, language, save image and match or fingerprint.

2) **The Arduino Uno** a microcontroller board and it is used to make a prototype of the system. It contains 14 digital input or output pins, six analog inputs, a 16MHz crystal oscillator, a power slot, a usb port, an ICSP header and a reset button. To use Arduino Uno is by power it with AC-to-DC adapter or connect it to a computer with a USB cable to get started.

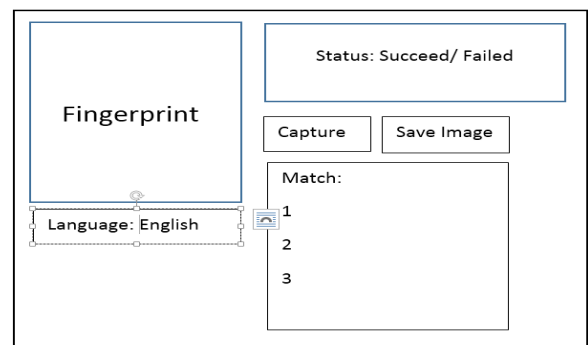


Fig. 5 the LCD Display



Fig. 1 Arduino Uno microcontroller board

3) **Fingerprint module** is an input device which used for fingerprint processing and capturing a digital image of the fingerprint pattern. For fingerprint enrolling process, user needs to enter the finger two times in order for the system generate a template of the finger based on processing results and store the template.

IV. EXPERIMENTS AND RESULTS

The Fingerprint Voting System is to allow user to put their vote on their chosen candidate by using a fingerprint authentication.

The main objective as stated before is to enhance the security in order to prevent duplication and provide a system which reduce the burden for people on conducting a voting. Thus, by implementing this system, user can put their vote with fingerprint instead of paper without doubting about their security.



Fig. 3 Fingerprint input module

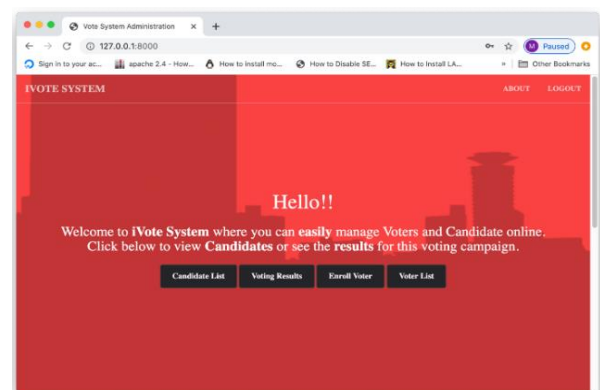


Fig. 6 the user interface

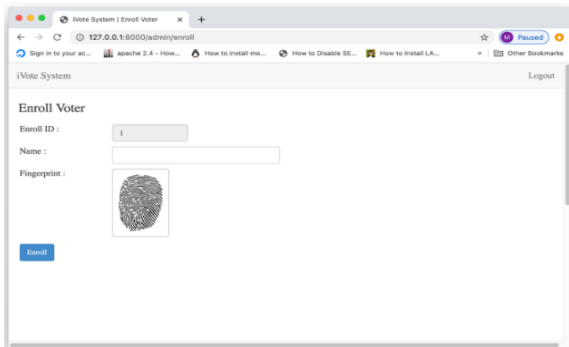


Fig. 7 stored fingerprint image

#	Name	Enroll Date	Action
1	Derrick YY	2017-05-12 14:12:01	Edit
2	Brian III ccc	2017-05-12 14:19:17	Edit
3	Dave	2017-05-12 14:22:22	Edit
4	Allan	2017-05-12 14:34:41	Edit
5	Mike	2017-05-12 15:23:35	Edit
6	Juma	2017-05-12 15:24:10	Edit
7	Gallar	2017-05-12 15:25:19	Edit
8	Mudasi	2017-05-12 15:29:45	Edit
9	Hadii	2017-05-12 15:41:25	Edit
10	Gobby	2017-05-16 12:38:23	Edit
11	Zaid	2020-06-08 17:10:14	Edit
12	Amir	2020-06-08 17:17:12	Edit

Fig. 8 the database of voters

V. CONCLUSIONS

The Fingerprint Voting System is to allow user to put their vote on their chosen candidate by using a fingerprint authentication. The main objective as stated before is to enhance the security in order to prevent duplication and provide a system which reduce the burden for people on conducting a voting. Thus, by implementing this system, user can put their vote with fingerprint instead of paper without doubting about their security.

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