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DEVELOPMENT OF ELECTRONIC VOTING MACHINE WITH INCLUSION OF NEAR FIELD COMMUNICATION AND BIOMETRIC FINGERPRINT IDENTIFIER

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Abstract - *Voting is one of the fundamental rights of every citizen of a democratic country. By utilizing the right of the voting, people elect their most suitable leader who will lead them. In this modern era where technology is being used in every aspect of life, election is a place to apply the best technology. In this project, we have developed a system which will be suitable for elections in countries like Bangladesh. The usual system for voting in India is a ballot paper-based voting system, where voting is sometimes unfair. In this proposed system we have used an Arduino and Fingerprint Scanner that can identify each voter, count votes and can prevent fake votes.*

The proposed system is more digital, technology-based and secured system.

Key word: Fingerprint based voting, digitalized, Arduino, highly secured, OPT.

I. INTRODUCTION

Electronic Voting is the standard means of conducting elections using Electronic Voting Machines, sometimes called "EVMs" in India.

Prior to the introduction of electronic voting, India used paper ballots and manual counting. The paper ballots method was widely criticised because of fraudulent voting and booth capturing, where party loyalists captured booths and stuffed them with pre-filled fake ballots.

Embedded EVM features such as "electronically limiting the rate of casting votes to five per minute", a security "lock-close" feature, an electronic database of "voting signatures and thumb impressions" to confirm the identity of the voter, conducting elections in phases over several weeks while deploying extensive security personnel at each booth have helped reduce electoral fraud and abuse, eliminate booth capturing and create more competitive and fairer elections. Indian EVMs are stand-alone machines built with once write, read only memory The EVMs are produced with secure manufacturing practices, and by design, are self-contained, battery-powered and lack any networking capability.

II. LITERATURE SURVEY

[1].G.Kalaiyarasi, K. Balaj, T.Narmadha, V.Naveen propose in the paper **"E-Voting System In Smart Phone Using Mobile Application", 2020.** The development in the web technologies given growth to the new application that will make the voting process very easy and proficient. The E-voting helps in providing convenient, capture and count the votes in an election. This project provides the description about e-voting using an Android platform. The proposed e-voting system helps the user to cast the vote without visiting the polling booth. The application provides authentication measures in order to avoid fraud voters using the OTP. Once the voting process is finished the results will be available within a fraction of seconds. All the casted vote count is encrypted using the AES256 algorithm and stored in the database in order to avoid any outbreaks and revelation of results by third person other than the administrator. The percentage of people those who cast votes get increased since this E voting application is available in the play store so that they no need to travel for the purpose of casting the votes which is registered in their native. The transportation charge will be decreased for carrying the electronic voting machine to polling booths. The human resources for conducting the election and counting the votes will be reduced. The burden of government employees and police protection will be reduced by using E voting application. The problem arising conflicts between the candidate and the election parties can be ignored by this E –voting mobile application.

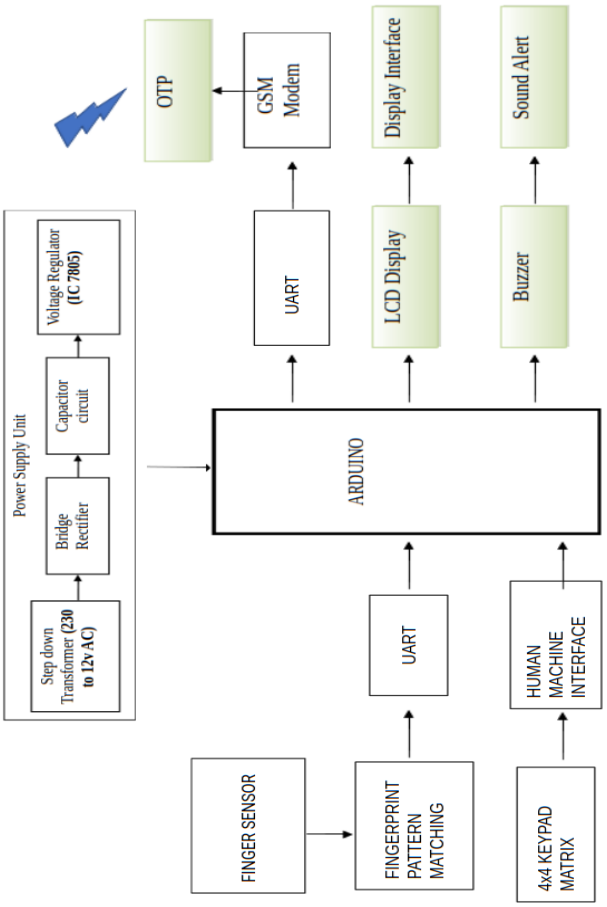
[2].**Md. Mahiuddin** developed the concept **"Design a Secure Voting System Using Smart Card and Iris Recognition ", 2019.** Security is the main concern of existing voting systems. Sometimes an unauthorized person gives a vote. Some politicians try to follow illegal methods to win the election. In paper ballots and EVM systems needed more manpower. These existing systems are much more time consuming and also slow. In the proposed system, we use Irish patterns and smart cards. Hence the proposed voting system is more secure than the existing system. Smart card is a card in which a

microprocessor and a memory chip are attached used for processing and storing information respectively. Secure exchange between the reader and the card is performed in the card more easily. Smart card has the capacity to store and access data. It also provides an immediate exchange of necessary information. We can store a person's iris data and personal information in a smart card. With the increasing population day by day, the improvement of the voting system is necessary. Undoubtedly the proposed voting system is good. We have used iris recognition and smart cards for improving this system. Many biometric methods are available but iris recognition has a high accuracy rate. Using the smart card, it is likely to poll from any polling booth rather than the particular polling booth. The iris pattern of the person is obviously unique. It reduces the polling time which is most important. It totally rules out the chance of invalid vote. Bangladesh is one of the countries which introduced a voting system in parliamentary and assembly polls. But in every election, the election commission is facing a lot of troubles and various types of problems throughout the election. The most familiar issue faced by the election commission is improper confirmation with respect to the arrangement of casting the votes, duplication or illegal casting of votes. In this paper, a secure and new voting system is developed to improve the existing voting system using smartcard and iris recognition. Iris is one of the most secure biometrics of person identification. The main goal of this article is to avoid the duplication of casting votes.

III. PROPOSED SYSTEM

We planned to interface a biometric fingerprint sensor with an Arduino microcontroller, also interface GSM. The fingerprint sensor helps to detect the biometric fingerprint of each and every person. Once fingerprint sensor provide proper value to controller. Then the control will send the OTP (One Time Password) to registered mobile number. We need this OTP to proceed next. Once the OTP is enter properly, the system will provide opportunity to put Vote for any party. Once a person register his vote, the system will not allow to next chance. Here the LCD display will help to display the details of voting stages. The keypad device will help to communicate to the system with human. Buzzer alert will get if any abnormal activities like second time vot attempt.

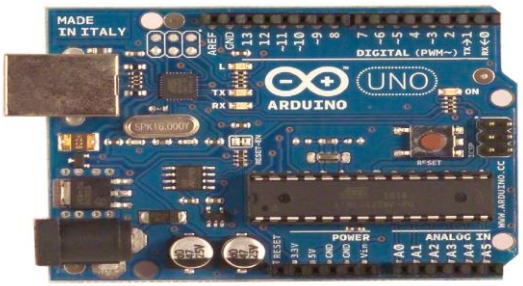
V. BLOCK DIAGRAM



V.HARDWARE DESCRIPTION

5.1. Arduino Uno

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.



5.2. Fingerprint Sensor

This all-in-one optical fingerprint sensor will make adding fingerprint detection and verification super simple. These modules are typically used in safes - there's a high powered DSP chip AS601 that does the image rendering, calculation, feature-finding and searching.

Features

1. Communication: UART(TTL)
2. Fingerprint number: 120 on default
3. Can set the security level and baud rate flexibility
4. WorkingCurrent@Voltage: <120mA@DC3.6~6V
5. 5.Temprature: -20 - +50 degrees

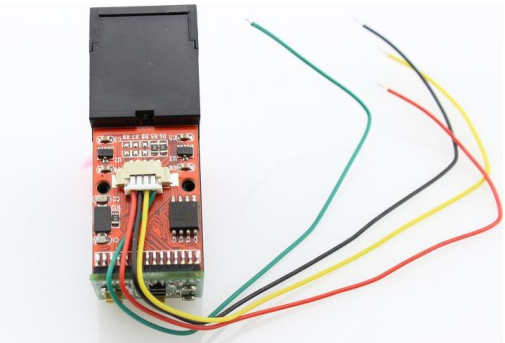


Fig 5.2.1 Fingerprint sensor PCB

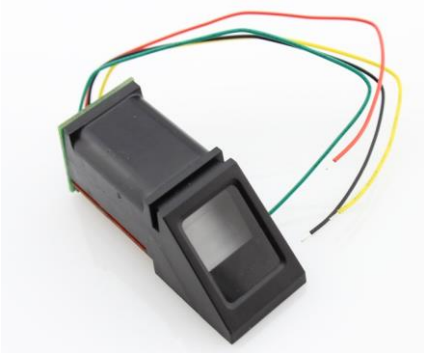


Fig 5.2.2 Fingerprint Scanner

5.3. GSM Modem

They are essentially identical to an ordinary mobile phone, including the need for a SIM to identify themselves to the network.

5.4. UART Protocol

UART stands for Universal Asynchronous Receiver/Transmitter. It's not a communication protocol like SPI and I2C, but a physical circuit in a microcontroller, or a stand-alone IC. A UART's main purpose is to transmit and receive serial data.

5.5.4X4 Keypad Matrix

The 4*4 matrix keypad usually is used as input in a project. It has 16 keys in total, which means the same input values.

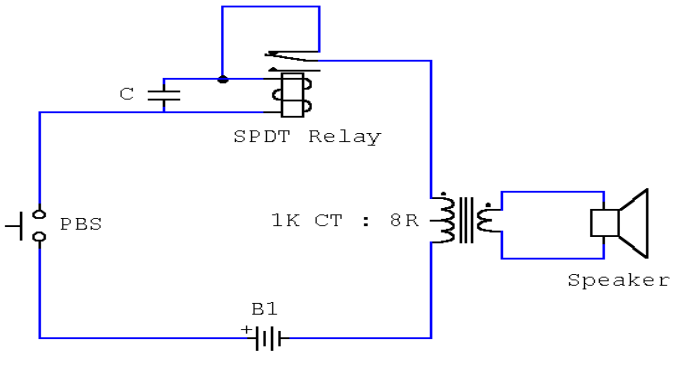
The keys of each row and column are connected through the pins outside – pin Y1-Y4 as labeled beside control the rows, when X1-X4, the columns.

5.6. LCD Display

Liquid crystal cell displays (LCDs) are used in similar applications where LEDs are used. These applications are display of numeric and alphanumeric characters in dot matrix and segmental displays.

5.7. BUZZER

A **buzzer** or **beeper** is a signaling device, The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep



VI. SOFTWARE DESCRIPTION

6.1. ARDUINO IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

6.2. Embedded C

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.

6.3. PROTEUS SOFTWARE

Proteus is a fully functional, procedural programming language created in 1998 by Simone Zanella. Proteus incorporates many functions derived from several other languages: C, BASIC, Assembly, Clipper/dBase; it is especially versatile in dealing with strings, having hundreds of dedicate functions; this makes it one of the richest languages for text manipulation.

VII. CONCLUSION

Our fingerprint-based secured voting mechanism, it is safe to say that, this system has managed to overcome most of the problems faced during the voting period by the EVM system. The efficiency of the system depends on the User Interface design and the flexibility that it provides as well as the usability for it. This ensures a safer voting method which is totally required for the healthy growth of a developing nation. In this paper, the proposed online voting system using biometrics that is the fingerprint scanner is better and faster than the previous system. The online voting system using a fingerprint scanner will provide a chance to avoid invalid votes. In this system, only an authenticated and registered person will be able to vote. As a challenging field in the area of biometrics, fingerprint analysis is one of the emerging techniques used for verification and identification of an individual. Automatic minutiae extraction is an awfully decisive process. The fingerprint verification stage works by comparing two fingerprints and recognizes if they belong to the same person. Though several approaches have been proposed in the literature so far, each has its own strengths and weaknesses. This project focuses on dealing with most of them and provides a better solution.

VIII. FUTURE SCOPE

Based on the work presented in this thesis, there are several advanced features that we can add to the system. Feature combinations in multimodal biometric can be worked upon by various combinations of features. The proposed method can be extended further using other biometrics such as irises, DNA and gait. We could work on devising an algorithm which can predict the minutiae points, gender and the precise age of the person to whom the fingerprint belongs. When a fingerprint is given as input, it should display the minutiae points, the gender and the precise age in the output GUI. The proposed algorithm for the minutiae identification, gender classification and age classification could be tried on noisy fingerprint images. The algorithms which are used in this thesis could be tried out on the fingerprints collected from the crime scene. Thus it can help in catching the criminals fast and easily. The relationship between fingerprints and gaits can be examined in the near future. Fuzzy Logic and Genetic are some of the renowned soft computing techniques which can be used here. Programming can be incorporated with Neural Network and SVM to obtain more precise output. To increase the performance, this fingerprint biometrics can be combined with other biometric techniques in the future.

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