Biometric Voting Machine Based on Fingerprint Scanner and Arduino

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ABSTRACT

This paper describes design of biometric voting machine using fingerprint scanner and Arduino. In this system, a person has to enrol fingerprint with the system which will be centrally stored in the Arduino. The person has to place finger over fingerprint module, if the fingerprint is matched with the prestored data, then voter can cast a vote. For conformation to voter, the name of the candidate will be displayed on LCD for whom the voter has cast a vote. It has simple hardware design and is easily accessible. It reduces the polling time, easy carry to polling centre from the polling box, Reduce the staff of voting centre, It provides easy and accurate counting without any troubles.

Keywords: Biometric, LCD, EVM, fingerprint, keys.

INTRODUCTION

Biometrics is the science and technology of measuring and analyzing biological data. Biometrics refers to technologies that measure and analyze human body characteristics, such as DNA, fingerprints, eye retinas and irises, voice patterns, facial patterns and hand measurements, for authentication purposes. The field of biometrics was formed and has since expanded on to many types of physical identification. Among the several human fingerprints remain a very common identifier and the biometric method of choice among law enforcement. These concepts of human identification have lead to the development of fingerprint scanners that serve to quickly identify individuals and assign access privileges. The basic point of these devices is also to examine the fingerprint data of an individual and compare it to a database of other fingerprints.

In our project we have used fingerprint for the purpose of voter identification or authentication. As the thumb impression of every individual is unique, it helps in minimizing the error. A database is created containing the fingerprint images of all the voters as required. Illegal votes and repetition of votes is checked for in this system with accurate coding. Hence with the application of this fingerprint based EVM system elections could be made fair and free from rigging. Further that the elections would are no longer a tedious and expensive job

LITERATURE SURVEY

Prof. Sunita Patil, Amish Bansal, Utkarsha Raina, Vaibhavi Pujari, Raushan Kumar, "E-Smart Voting Machine with Secure Data Identification Using Cryptography" This

describes the method and functioning of E-smart voting system (ESVS) that is biometric authentication machine together with OTP primarily based totally verification machine. At first, person have to punch in its Aadhar number in the ESVS. The ESVS makes use of the Aadhar number to authenticate the person via OTP on the way to be obtained on their registered Aadhar related cell number. Issue in receiving OTP because of network issues.

Fridrik P. Hjalmarsson, Gunnlaugur K. Hreidarsson School of Computer Science Reykjavik University, Iceland " Blockchain-Based E-Voting System" This describes evaluating blockchain frameworks that provide blockchain as a service. It a singular digital balloting machine primarily based totally on blockchain. Election method is represented with the aid of using a hard and fast of smart contracts, that are instantiated at the blockchain through the election administrators Each vote is saved as a transaction at the blockchain while every person voter gets the transaction ID for his or her vote for verifying purposes Each transaction at the blockchain holds data approximately whom was voted for, and the region of aforementioned vote. It can be feasible to go into fake information right into a blockchain particularly while the information describes movements outside the web universe, like vote casting.

OBJECTIVE OF RESEARCH

The biometric balloting machine needs the person to enroll fingerprint while vote casting. The project makes use of arduino device and fingerprint generation to layout this utility the primary goal of this project is to layout a machine that ask to person to reveal fingerprint as an identification evidence the machine reads the information from fingerprint and confirm the information saved in database. If the given information suits with database saved in arduino the device lets in the person to cast vote if the given fingerprint does not saved in database the machine will not permit to cast a vote and show protection message.

EXISTING SYSTEM

A ballot paper is a form in which citizens fill out inorder to exercise their proper to vote. Ballot papers listing the applicants running for an election and the voter can mark their choices accordingly, that could taken into consideration as reputable documents.

An EVM is designed with devices specifically manage unit and voting unit that are joined collectively with the aid of using a cable. The manage unit of the EVM is stored with the presiding officer or the polling officer and the voting unit is stored in the balloting compartment for electors to cast their votes.

The disadvantages in these systems are Post-election it takes greater quantity of time to count number and claim results via poll paper machine. Individuals need to be recognized who've already voted.

PROPOSED SYSTEM

We have designed an advanced system using fingerprint module and arduino. In this biometric based voting machine, a person has to register a fingerprint ID with the system which will be centrally stored in Arduino. During the election process person should place a finger, if the fingerprint matches with prestored information then the person is allowed to cast a vote. For confirmation of voter, the name of the candidate will be displayed on LCD for whom the voter has cast a vote. It has simple hardware design and easily accessible

Figure(1) : Block Diagram of Proposed System

REQUIREMENTS

A. Hardware Requirements:

This device is based on idea of biometric identity of voters which requires following components.

➢ Fingerprint sensor R305 - For biometric identity
➢ Arduino Uno - To save information
➢ 16*2 LCD - For showing results
➢ Connecting wires - For connections
➢ Resistors - For controlling quantity of current

HARDWARE DESCRIPTION

FINGERPRINT SENSOR R305

Fingerprint processing particular consists of factors namely enrolment and matching. The fingerprint reader can carry out lesser increase and may be constant into various end products. Fingerprint sensor is an optical kind. Capacity of Storage is 1000,Speed of scanning is 0.5 sec, Speed of verification is 0.3 sec and safety level is 5.

ARDUINO UNO

Arduino Uno board is a microcontoller based on the ATmega328P. It is programmable with the Arduino IDE through a type B USB cable. Arduino Software (IDE)

consists of a serial screen which permits easy textual information to be despatched to and from the board.

16*2 LCD (Liquid Crystal Display)

It is a form of flat panel show which makes use of liquid crystals in its primary form of operation. LCDs have a big and ranging set of use instances for customers and businesses, as they may be usually observed in smartphones, televisions, laptop video display units and tool panels. LCDs have been a huge jump in phrases of the generation , which consist of light-emitting diode (LED) and gas-plasma displays. LCDs allow displays a lot thinner than cathode ray tube (CRT) technology.

POWER SUPPLY

Power supply is a connection with a supply of electrical energy. A device that supplies electricity or different forms of strength to an output load is known as a power supply unit (PSU). This electricity deliver is needed to transform AC signal to DC signal. Reduces the amplitude of the signal.

KEYPAD

A keypad is **a** hard and fast of buttons organized in a block which commonly undergo digits and different symbols however now no longer a whole set of alphabetical letters. Keypads are discovered on many alphanumeric keyboards and on different gadgets which includes calculators, mixture locks and phones which require in large part numeric inpu**t**. An enter tool, now and again a part of a general laptop keyboard, along with a separate grid of numerical and characteristic keys organized for efficient information entry.

B. **Software Requirements**

➢ Embedded C

➢ Arduino compiler

FINGERPRINT ENROLLMENT

First time voter saves their fingerprint in enrolment processing. If the enrolling command is given, the controller waits for input and activates the scanner to accept the fingerprint, displaying "Enrol a fingerprint!" on the LCD display. The candidate's fingerprint is scanned and convert image in the first time place the finger. Then second time ask to voter to place the same finger and create a unique template and check its match with first scan then two fingerprints are matched stored in given id. This unique id is stored in the fingerprint

module memory of the controller for the future reference. After all enrolments the system is ready fo vote cast.

VOTING PROCESS

During voting process, LCD displays "Welcome to voting booth", then presiding officer starts voting process by placing finger then LCD displays "Voting process start". Now, a person can cast vote by placing enrolled finger then "Place finger", "Voter 1 cast vote" will be displayed on LCD if finger is matched. After that respective party key can be pressed BY voter. Then the voter will be successfully completes voting and voted party name will be displayed for voter, this voting process will be continued with other voters. After the voting, presiding officer places finger and the 'voting process end" will be displayed on LCD.
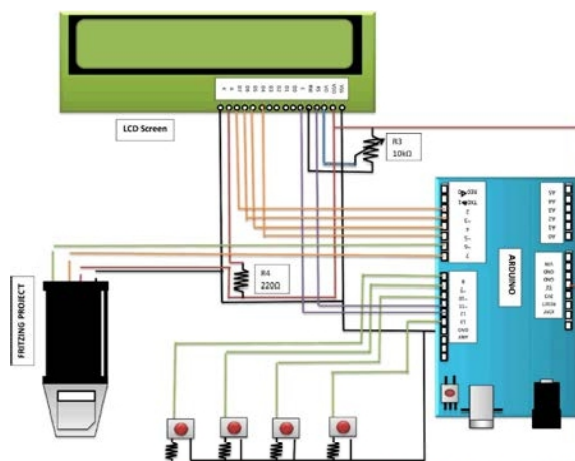
ALGORITHM OF PROPOSED SYSTEM

Step 1: Start

Step 2: Scan your finger

Step 3: Fingerprint matched

Step 4: Cast your vote

Step 5: Press a key from the keypad

Step 6: Party selected

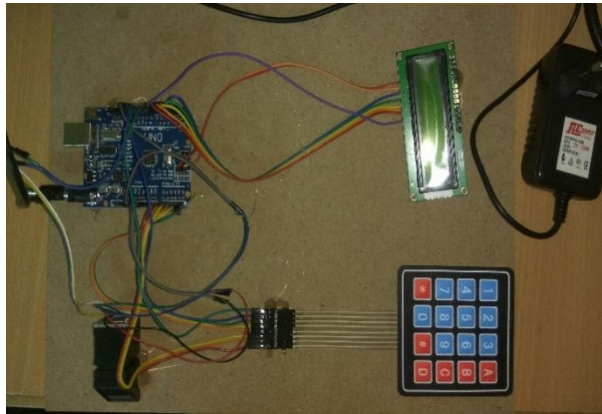**Step 7:** Voted

Step 8: Stop
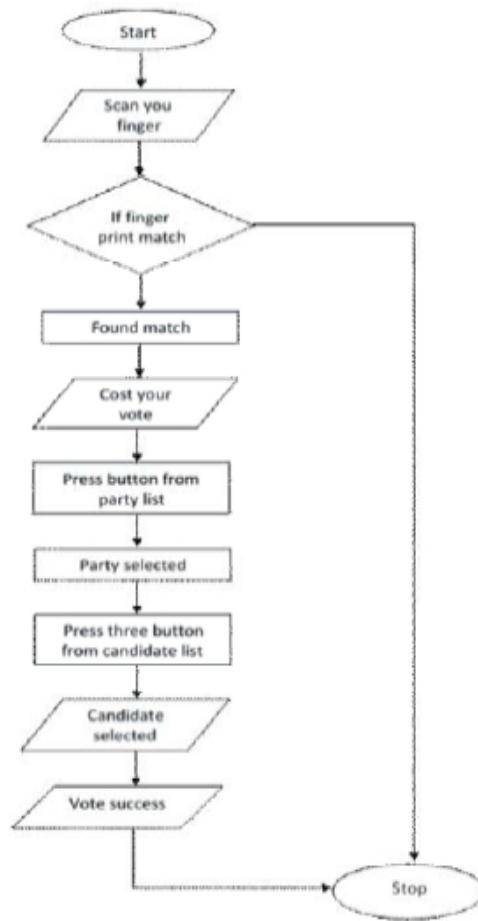
Figure(2): Flowchart of proposed system
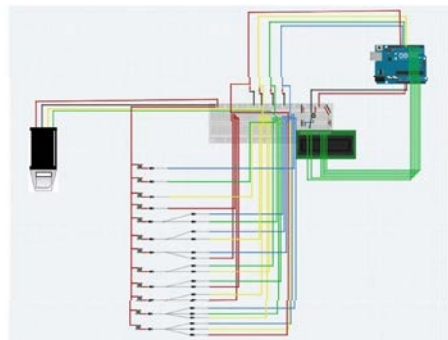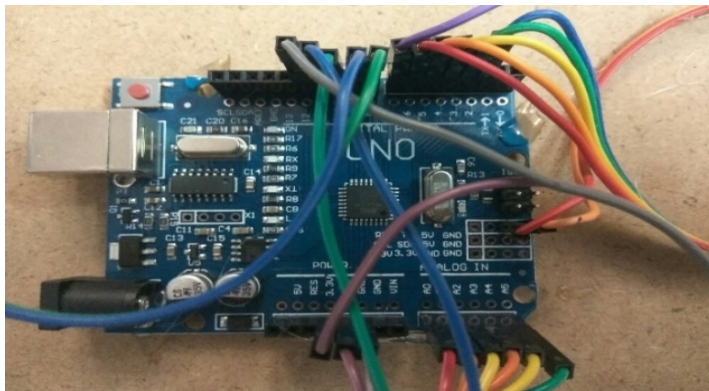

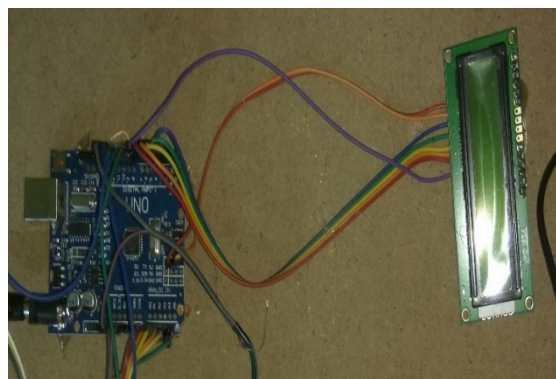**Figure(3):** System Design Schematic diagram

Figure(4): Circuit diagram

Figure(5): Complete system-beginning stage

Figure(6): Arduino Uno

Figure(7): LCD Display

Figure(8): Fingerprint Module

Table 1: Connection of fingerprint module and Arduino

Fingerprint Module	Arduiino Board
Green wire	Digital Pin 2
Yellow wire	Digital Pin 3
Red wire	5V
Black wire	GND

Table 2: LCD Display to Arduino Connection.

LCD Display	Arduino Board
VSS pin	GND pin
VDD pin	5v pin
VO pin	10k potentiometer out pin
RS pin	Digital pin 7
RW pin	GND pin
Enable pin	Digital pin 6
D4 pin	Digital pin 5
D5 pin	Digital pin 4
D6 pin	Digital pin 3

D7 pin	Digital pin 2
Anode pin	5v pin with 10k resistor
Kathode pin	GND pin

CONNECTIONS

We have shown connections of LCD display and Arduino board. VSS and Cathode pins of LCD are connected to GND pin of Arduino and VDD and Anode pins are connected to 5V pin of Arduino to power the LCD to glow. Enable pin of LCD display is given to the Digital pin of Arduino.

We have shown connections of Fingerprint module to Arduino board. For transferring data between Fingerprint module and Arduino board transmission pin TX of Fingerprint module is connected to Receiver pin RXD of Arduino board, and receiver pin RX of Fingerprint module is connected to transmission pin TXD of Arduino board. To provide power supply to Fingerprint module through Arduino GND pin of module is connected to GND pin of Arduino, and VCC pin of module is connected to 5V pin of Arduino.
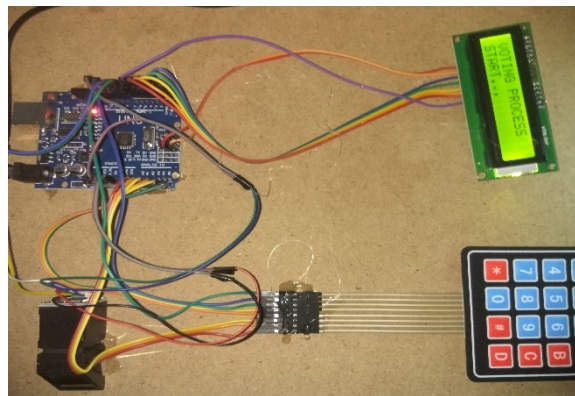
RESULT AND DISCUSSION
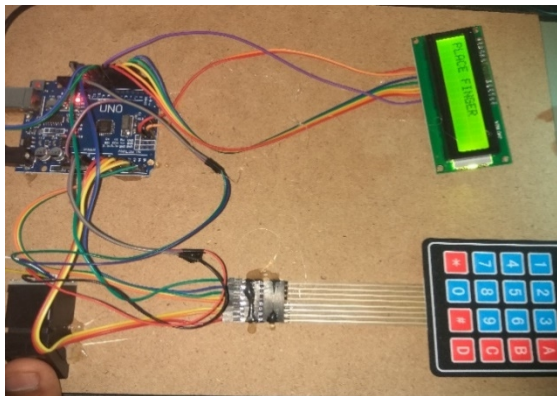
Figure(9): Place finger

Above figure(9) shows LCD displaying "PLACE FINGER". Finger is placeD on the fingerprint module as shown in above figure
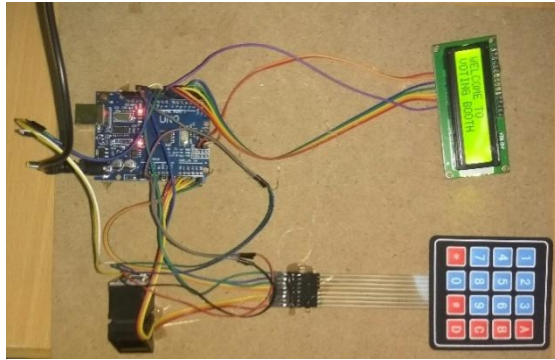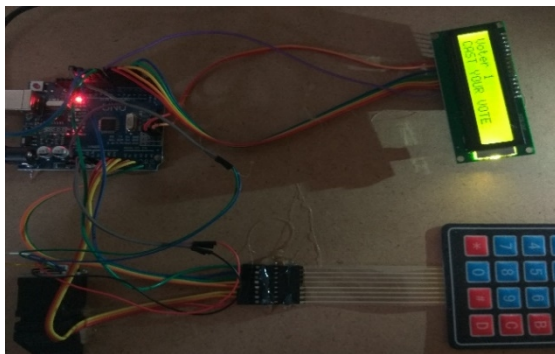
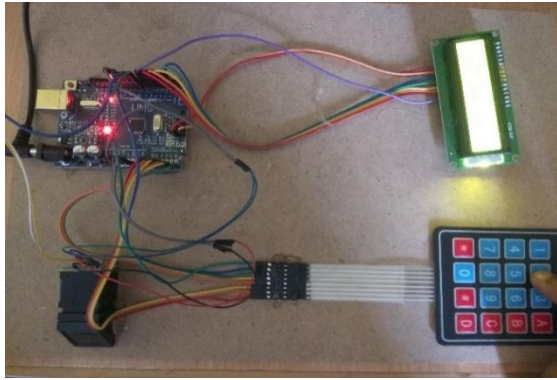**Figure(10):** Welcome to voting booth

Figure(11): Voting Process Start

Above figure(11) is LCD displaying " VOTING PROCESS START" after presiding officer starts voting process by placing finger.
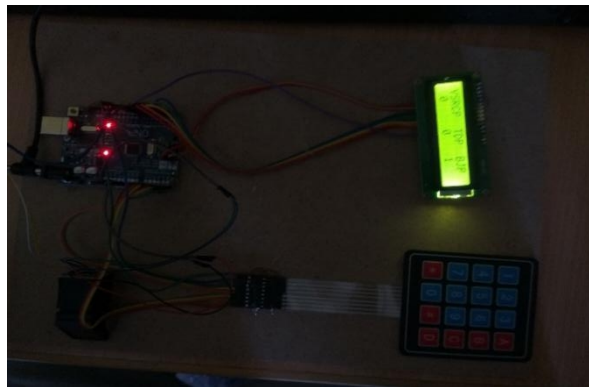

Figure(12): Voter 1 Cast your vote

Above figure(12) is LCD displaying "VOTER 1 CAST YOUR VOTE" when voter 1 fingerprint is matched when placed on fingerprint module.
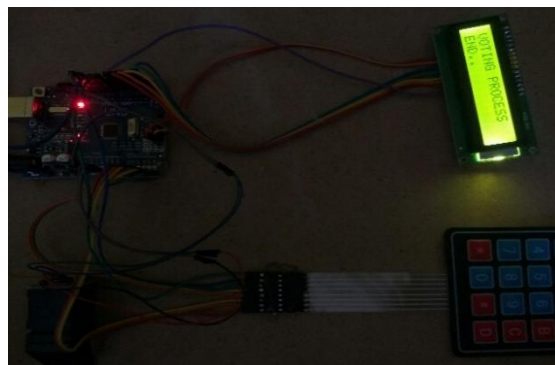
Figure(13): Voter casting a vote using keypad

Figure(14): Voter successfully voted

Above figure(14) is LCD displaying party name for voter conformation and when voter completes vote casting after placing matched and enrolled finger.

Figure(15): Voting Process End

Above figure(158) is LCD displaying "VOTING PROCESS END" after presiding officer places finger. Hence voting process is completed.

ADVANTAGES IN THE PROPOSED SYSTEM

➢ System is easy to operate.

- Arduino is the main controlling system, which operates on +5V DC supply, so less amount of power required.
- Economical feasible.
- Requirement of man power is less
- Ease of transportation due to its size.
- Only authenticated user can vote.

CONCLUSIONS

In total, this machine overcomes maximum of the issues faced at some point of the vote casting period through the paper ballot machine. The performance of this machine relies upon the net interface, its usability. This will truly make certain a more secure balloting technique which could be very a lot what's required for a wholesome increase of a developing nation.

In this paper, the proposed Fingerprint based balloting machine that's higher and quicker than preceding systems. The new machine prevents get entry to unlawful voters, affords ease of use, transparency and keeps integrity of the balloting process. The machine additionally prevents more than one votes through the identical character and tests eligibility of the voter. It additionally lets in someone to vote from everywhere supplied that the voter is inside electoral limits.

Fingerprint based balloting machine has supplied threat to keep away from invalid votes, It reduce the polling time, Easy to carrying to polling center from the polling box, Reduce the team of workers of balloting center, It offer smooth and correct counting without any troubles, Provisioning of vote casting preventive measures.

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