CHAPTER:1

1.1.INTRODUCTION

A voting system or electoral system is a method by which voters make a choice between options, often in an election or on a policy referendum. A voting system enforces rules to ensure valid voting, and how votes are counted and aggregated to yield a final result. Common voting systems are majority rule, proportional representation or plurality voting with a number of variations and methods such as first-past-the-post or preferential voting. The study of formally defined voting systems is called social choice theory a subfield of political science, economics, or mathematics. With majority rule, those who are unfamiliar with voting theory are often surprised that another voting system exists, or that disagreements may exist over the definition of what it means to be supported by a majority.

Biometrics is the science and technology of measuring and analysing biological data. Biometrics refers to technologies that measure and analyse 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 .

1.2.PROBLEM DEFINITION:

Earlier there were ballot voting i.e, casting votes using pen and a paper ,so that malpractices in this system were quite high end there were chances of miss calculation of votes, to over come this the EVM voting system was introduced, in this system the voting was done digitally. In this system there were malpractices such as unauthorised voting as there were no authentication used.

CHAPTER:2

LITERARTURE SURVEY:

Publisher: IEEE-2019 Khadija Hasta; Aditya Date; Aparna Shrivastava; Prajakta Jhade; S. N. Shelke

In the current scenario, most of the countries of the world hold their elections using Electronic Voting Machines, where your vote gets registered electronically with the help of an Electronic Machine without using and wasting ballot paper to vote for elections. As security is a major concern nowadays, ensuring that no person exercises the right to vote twice is the main aspect. We can resolve this issue by introducing Finger Print Based Voting, where a person can be authorized based on his Finger Print. This will put an end to fake voting. The domain of the project is the Internet of Things where we are building Fingerprint Based Biometric Voting Machine using Arduino. We know that IoT is the system of interrelated computing devices, mechanical and digital machines, objects, and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Thus our Fingerprint online module is an application where the user is recognized by his finger pattern. As we know that the minutiae features on a finger of each human being are different, the voter can be easily authenticated. The online system allows the voter to vote through his fingerprint. The fingerprint of the voter is used to uniquely and distinctively identify him/her using the fingerprint module. Also, the system promises the right to vote a candidate only once, thus not allowing the voter to vote for the second time. An admin is assigned to add all the candidates standing for the election. Only the admin has the right to add a candidate name and photo who are nominated. The Admin will also register the voter's name by verifying voter's details. Admin will authenticate the voter by verifying the voter's identity and then admin will register the voter. Once the user has got the voters id and password from the admin the user can log in and vote for the candidates who were nominated. The system will allow the user to vote for only one candidate. In the end, the election result is published by using the election id. Even users can view the election result.

Publisher: IEEE-2020 Samarth Agarwal; Afreen Haider; Abhishek Jamwal; Param Dev; Rajeevan Chandel

India is world's largest democracy and the essence of any democracy lies in the fact that people choose their own representatives. But in present era, the fair election process is facing a lot of problems like booth capturing, rigging, fake voting, tampering with the Electronic Voting Machines (EVMs) etc. Being responsible engineers, it's our duty to do something to curb this menace. In the commonly used EVMs, the voting process takes place electronically and this eliminates the use of ballot paper to cast votes in elections as it is very time consuming and errors might crawl in intentionally or unintentionally. Today authenticity of the voter is a big concern and it also should be made sure that a same voter is not able to vote two times. This issue can be dealt with by introducing biometric based voting system, where the authenticity of a voter is established based on fingerprints. Hence, the principle shall be one person, one authentic vote. In the present work, a prototype fingerprint based biometric voting machine has been developed. It is proposed that a feature that will link the Aadhaar database of Unique Identification Authority of India (UIDAI), Govt. of India, New Delhi; can be embedded. This shall facilitate all the voters to get registered on the portal automatically, which can be classified on the basis of regions and constituencies based on their unique identification i.e. their finger prints. This shall enable the device developed in the present research work, at the national level of application by using it in elections conducted around the country. This shall lead to a significant contribution for the betterment of the Indian election system.

Publisher: IEEE- 2021 R Senthil Ganesh; B Anuradha; S Karthikeyan; P Vijayalakshmi; M Ashok; V Nagaraj

The Electronic Voting Machine (EVM) is a basic electronic contraption that has been used to testify a polling form as opposed to surveying structure credentials and boxes that were previously worn in conformist popularity based organisations. Surveying structure paper, casting a ballot stations, venturing, etc are combined into a fundamental sachet called surveying structure unit of the electronic majority rule machine. Since bio-metric identifiers can't be easily lost, made, or mutual, they are viewed as more strong for singular affirmation than standard slip or data based methodologies. Henceforth, the electronic popularity based system should be additionally evolved subject to the current advances in bio-metric structure. This article analyzes absolute assessment about projecting a voting form devices, topic and relationship among the majority rule procedures and bio-metric EVM. This paper moreover proposes astute and secure popularity based structure subject to cloud technique which prompts speedy reporting of results.

Publisher: IEEE- 2020 Pradeep Kumara V.H.; Ravindra P. Rajput

India is a developing country, where still the electronic voting system is under threat due to the rigging in elections. The future of country is decided mainly by the elections, so the electronic voting machine must be trustworthy. The existing voting system, doesn't have person identification, so that there are chances to misuse the others rights. Fingerprint based authentication for voting is proposed in this paper, which eliminates the misuse in voting. GSM module is incorporated with finger print sensor to collect the data before election. The proposed model is implemented in Arduino for effective authentication and quick process with more flexibility. GSM module is used to transfer the collected information to near by taluk office or district office so that the authorized persons will access the information.

Publisher: IEEE-2019 Atharva Jamkar; Omkar Kulkarni; Aarti Salunke; Anton Pljonkin

This paper describes design of Biometric Voting Machine Using Fingerprint Scanner and Arduino for voting in institutes and organizations. Indian constitution empowers its citizen to exercise right to vote. Election decides the future of country, so that the system used for voting should be trustworthy. The conventional system for voting is ballot paper and Electronic voting machine too, has many flaws and trust issues. To eradicate malpractice and defrauding of the above methods of voting, we have designed an advanced system by using arduino and Fingerprint module. In this system, a person has to register a fingerprint ID with the system which will be centrally stored in arduino. In organizations, educational institutes, a co-operative bank, maximum number of votes elect head of organization that holds the office of public interest. 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 it is easily accessible. In case user wants to remove any of stored ID then the user need to press DEL key, after pressing DEL key, LED will ask to select ID that is to be deleted. After pressing OK key, the selected ID will be deleted and LCD will display that which ID has been deleted successfully. This system is flexible to use.

Publisher: IEEE-2020 N.J. Avinash; R. Chethan; Sowmya Bhat; Renita Pinto

The main building stone in a democratic country are fair elections. In India, the main objective of introducing Electronic voting machine was to reduce mishaps and frauds especially in states which are politically sensitive and are subjected to frequent re-polls due to electoral rigging and imbalance in voting system. The EVM machine currently used by our government requires updated Microcontroller like ARM Cortex M3 which has advanced features like Memory

protection, Accurate Time stamping using Ultra Low power RTC, cost sensitive, efficient interrupt controller (NVIC), a RTOS timer (the SysTick). These features make the software on ARM Cortex M3 much more efficient. In this paper using ARM Cortex M3, this research work has replicated features currently available in the EVM and also included some features like RESET and final vote count display as password protected. Designed EVM system will allow a person to cast his/her vote only once, the casted vote being recorded by the ballot unit which is controlled by control unit. In the process of vote, the person casting the vote would able to watch glowing LED near the candidate party symbol. By this candidate conclude themselves that vote has been recorded. The process followed by enabling the ballot on control unit by the PRO.

Publisher: IEEE-2018 Shashank S Kadam; Ria N Choudhary; Sujay Dandekar; Debjeet Bardhan; Namdeo B Vaidya

Electronic Voting Machine (EVM) retains all the characteristics of voting by ballot papers, while making polling a lot more expedient. Considerable amount of time, man power and money is saved as it is extremely fast and reliable. Voting secrecy is also maintained without use of ballot paper. VVPAT that is currently used for voting machine is much more expensive than EVM to be created. The EVM is 100 per cent tamper proof. Results are available in the end just a click away. But these EVM can be tampered with by changing the hardware connections. Hence a printed acknowledgement is provided to the voter thus assuring him that vote has been casted to candidate voter wanted. ATMEGA 32 microcontroller is used for this purpose.

Publisher: IEEE-2019 A.M. Jagtap; Vishakha Kesarkar; Anagha Supekar

The "Vote from Anywhere" system makes use of advanced technologies so that everyone can take advantage of their voting right. In this voting system, the voter can enter aadhaar card number on LCD display connected to raspberry pi. After that voter is asked to scan his fingerprint, which is compared with the fingerprint library present in the database this is retrieved from aadhaar database. The admin can login to the web portal by using his/her user id and password to insert candidate's information before election. Admin can update and delete candidate's information. Also we have used encryption techniques to provide more secure voting. So, when voter votes for a candidate, the vote count is incremented and encrypted before giving it to central database and user disable request is given to system to avoid multiple voting.

CHAPTER 3:METHODOLOGY AND IMPLEMENTAION

3.1 BLOCK DIAGRAM

fig.3.1.block diagram

3.2.1.PROJECT FLOW

Working of this **Finger Print Based Voting machine** is a little bit complex for beginners. First of all, user needs to enrol finger or voters (in this code max limit of the voter is 25) with the help of push buttons/keys. To do this user need to press ENROLL key and then LCD asks for entering location/ID where finger will be a store. So now user needs to enter ID (Location) by using UP/DOWN keys. After selecting Location/ID user needs to press an OK key (DEL key). Now LCD will ask for placing finger over the finger print module. Now user needs to put his finger over finger print module. Then LCD will ask to remove the finger from finger print module and again ask for placing the finger. Now user needs to put his finger again over finger print module. Now finger print module takes an image and converts it into templates and stores it by selected ID in to the finger print module's memory. Now voter will be registered and he/she can vote. By same method all the voter can be registered into the system.

Now if the user wants to remove or delete any of stored ID then he/she need to press DEL key, after pressing DEL key, LCD will ask for select location means select ID that to be deleted. Now user needs to select ID and press OK key (same DEL key). Now LCD will let you know that finger has been deleted successfully.

3.2.2.VOTING PROCESS:

Now when user wants to vote then he/she needs to press match key and then buzzer will beep and LED will also glow and LCD will ask for place finger over fingerprint module. Now Arduino will give you three attempts to put your finger. After placing a finger over fingerprint module fingerprint module captures finger image find its IDs is present in the system. If finger ID detected then LCD will show authorized Voter. It means the user is authorized to vote. And then the system moves to next stage for voting. Now Green LED will glow it means now voter can vote for their candidates by pressing a related key (from RED bread board in this demonstration). Now if the same voter wants to vote again then the system will show it *'Already Voted'*. Means same voter can't vote again and buzzer will beep for 5 seconds. If any Non-registered user wants to vote then finger print module will not detect its ID into the system and LCD will show 'No Fingerprint Found'.

CAN1, CAN2, CAN3 here represents the Candidate 1, Candidate 2 and Candidate 3, who have stood for election.

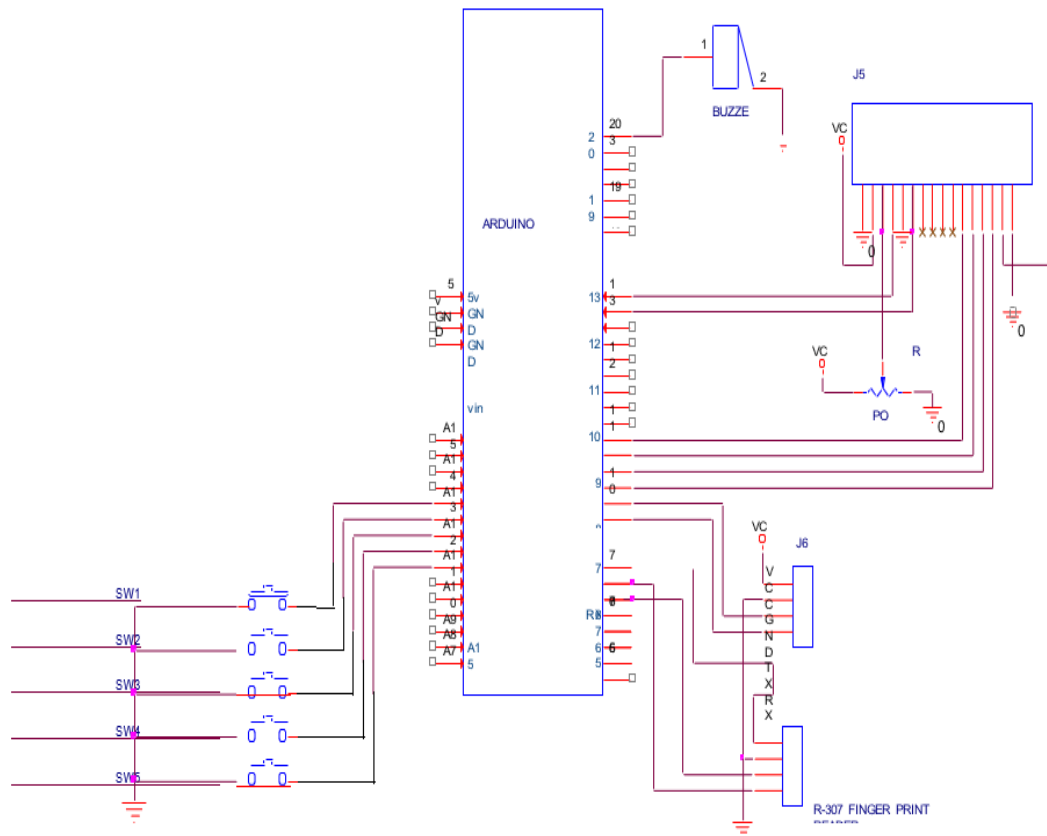## 3.3 HARDWARE ARCHITECTURE

3.3.1 CIRCUIT DIAGRAM

fig.3.2.circuit diagram

3.3.2 COMPONENTS DESCRIPTION

1. Arduino Uno
2. Finger Print Sensor Module
3. Push Buttons
4. LEDs -2
5. Resistor -3
6. Power supply
7. Buzzer
8. 16x2 LCD
9. Bread Board

3.3.2.1. ARDUINO UNO

The Arduino Uno is an open source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.
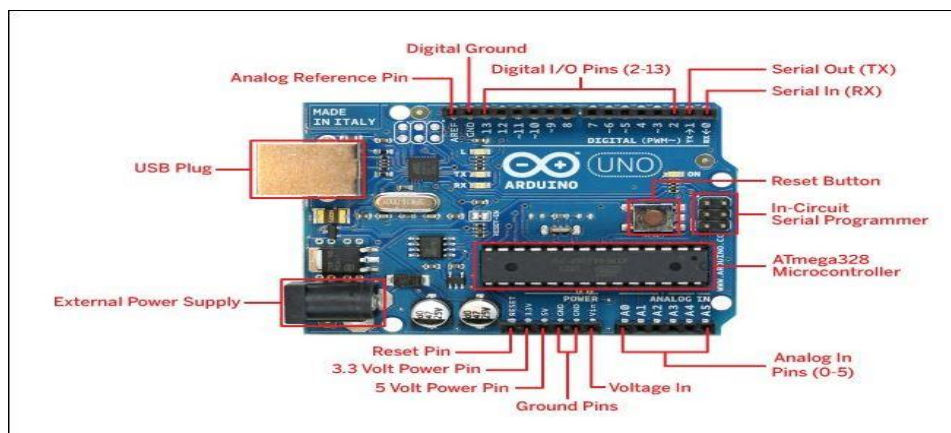

Fig.3.3.arduino uno

SPECIFICATIONS:

- Microcontroller: Microchip ATmega328P

- Operating Voltage: 5 Volts

- Input Voltage: 7 to 20 Volts

- Digital I/O Pins: 14 (of which 6 can provide PWM output)

- PWM Pins: 6 (Pin # 3, 5, 6, 9, 10 and 11)

- UART: 1

- I2C: 1

- SPI: 1

- Analog Input Pins: 6

- DC Current per I/O Pin: 20 mA

- DC Current for 3.3V Pin: 50 mA

- Flash Memory: 32 KB of which 0.5 KB used by bootloader

- SRAM: 2 KB

- EEPROM: 1 KB

- Clock Speed: 16 MHz

- Length: 68.6 mm

- Width: 53.4 mm

- Weight: 25 g

- ICSP Header: Yes

- Power Sources: DC Power Jack & USB Port

3.3.2.2.FINGER PRINT SENSOR MODULE
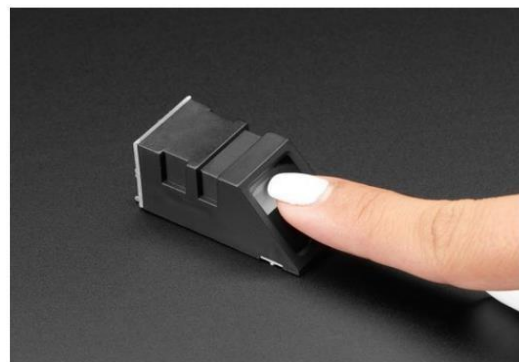
Fig.3.4.fingerprint sensor R307a

Fingerprint Module 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, image processing, fingerprint matching, search and template storage and other functions.

3.3.2.3. PUSH BUTTONS

A push-button (also spelled pushbutton) or simply button is a simple switch mechanism to control some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due to their physical nature) still require a spring to return to their un-pushed state. Terms for the "pushing" of a button include pressing, depressing, mashing.

Fig3.5.pushbutton

3.3.2.4.LEDS

Light Emitting Diodes (LED) is the most commonly used elements for displaying pins digital states. It is as shown in Fig. In this project the LED's are used to denote that vote has been casted. When the particular switch is pressed then the particular LED will blink indicating that vote has been casted correctly.
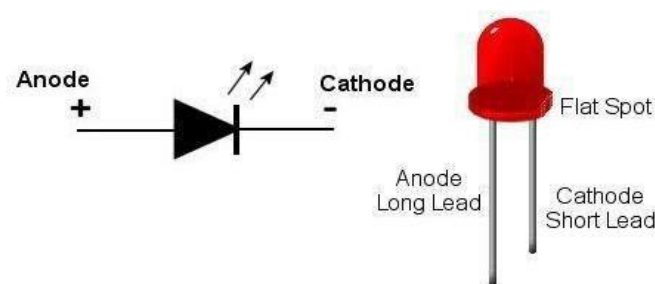

Fig3.6.LED

3.3.2.5. RESISTORS

A resistor is a passive two terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.
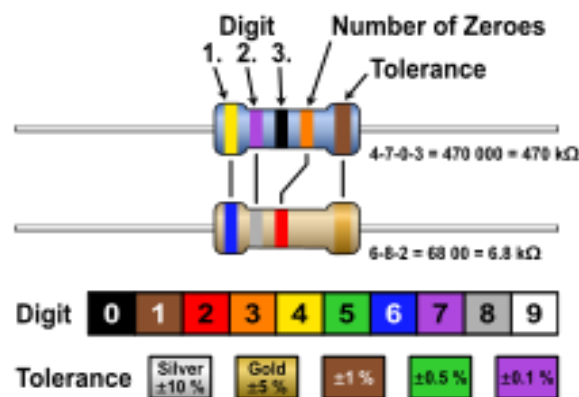

Fig.3.7.Resistors

3.3.2.6. POWER SUPPLY

The power supply can be considered as providing an electrical signal to the circuit. There are many varieties of power supply units. The greater part of them is intended to convert a fitting low voltage supply from high voltage power to circuits and specific gadgets.

Power supply can be divided into sequence of blocks, all of that exhibits a specific purpose. A number of circuits require not only a power supply by means of optimistic and unconstructive outputs also require 0v. It is referred as dual supply unit since it resembles two normal supplies associated together.

The power supply can be considered as providing an electrical signal to the circuit. There are many varieties of power supply units. The greater part of them is intended to convert a fitting low voltage supply from high voltage power to circuits and specific gadgets.
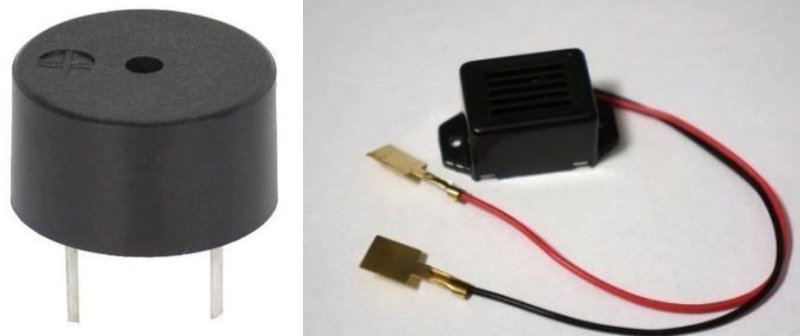
3.3.2.7. BUZZER

Fig3.8.Buzzer

Buzzer/beeper is an audio signing device. It is as shown in Fig. In this project buzzer is used to make sound when invalid cardholder attempts to vote. A buzzer is an audio waving device, which can be present automated, electro mechanicals. Representative uses of beepers and beeper consist the unease devices, regulators, and user input1 such as a mouse click. Piezoelectric beeper, were developed by Japanese manufacture ring and baggy into a wide collection of produces during the 1970s to1980s. This growth was mostly due to cooperative hard work by Japanese construction businesses. In 1951, here cognized the "Barium Titan Request Research Committee", which permitted corporations to bring on many piezoelectric innovations and inventions.

3.3.2.8. 16X2 LCD DISPLAY

The LCDs can add a load to the current app about providing a customer's accommodation, investigating the application or actually giving it a "professional" look. The most popular type of LCD is the Hitachi 44780 which has a similar size. Inexperienced designers do not try to use this approach and program managers because it is tricky to seek intelligent displays at the border, implementing this boundary can be problematic and therefore the protests themselves are expensive.

Fig3.9.16x2 lcd display

After dumping the program onto s, the information's will be displayed on the LCD. LCD has single, double- and four-line displays. Every line has 16 characters. In this project Two-line display is used i.e., 16*2 LCD. 8 pins of LCD are connected to P89V51RD2 for transmitting data and one pin is connected to both registers select and enable. The main application of LCD in this project is to display the modem status, status of sensor etc.

Pin no.	Symbol	External connection	Function
1	Vss		Signal ground for LCM
2	V$_{DD}$	Power supply	Power supply for logic for LCM
3	V$_0$		Contrast adjust
4	RS	MPU	Register select signal
5	R/W	MPU	Read/write select signal
6	E	MPU	Operation (data read/write) enable signal
7~10	DB0~DB3	MPU	Four low order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCM. These four are not used during 4-bit operation.
11~14	DB4~DB7	MPU	Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU
15	LED+	LED BKL power supply	Power supply for BKL
16	LED-		Power supply for BKL

Table3.1.LCD pin description

3.4 SOFTWARE DESCRIPTION

It is an operating system on top of which each and every application necessary for the undertaken project has been cleared. By installing operating system into computer and following the software instructions, can reach software requirements.

Software Used: Arduino

Arduino has Integrated Expansion Environment (IDE) as an IT software package. This package covers a window as text publishing manager for writing the code, text console, message space and toolbars without buttons for performing general functions. The transfer of programs and its communication with other interfaces are done with Arduino.
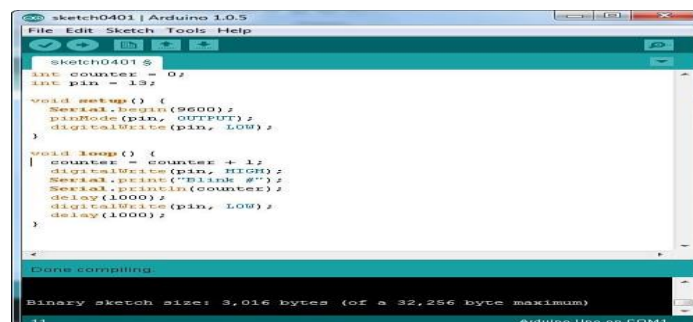

Fig.3.10.Arduino software

CHAPTER 04: RESULTS AND DISCUSSION:

The casting of vote is secured through fingerprint sensor and the result is issued by the end of the elections.

Advantages

> ➢ It avoids making of duplicate IDs and thus fake voting can be avoided.

> ➢ Since the votes are counted by the Arduino uno controller and voting information's is stored.

> ➢ Here is used to count the votes so that the results will be accurate and also requires minimum amount time to calculate and save to money to government also.
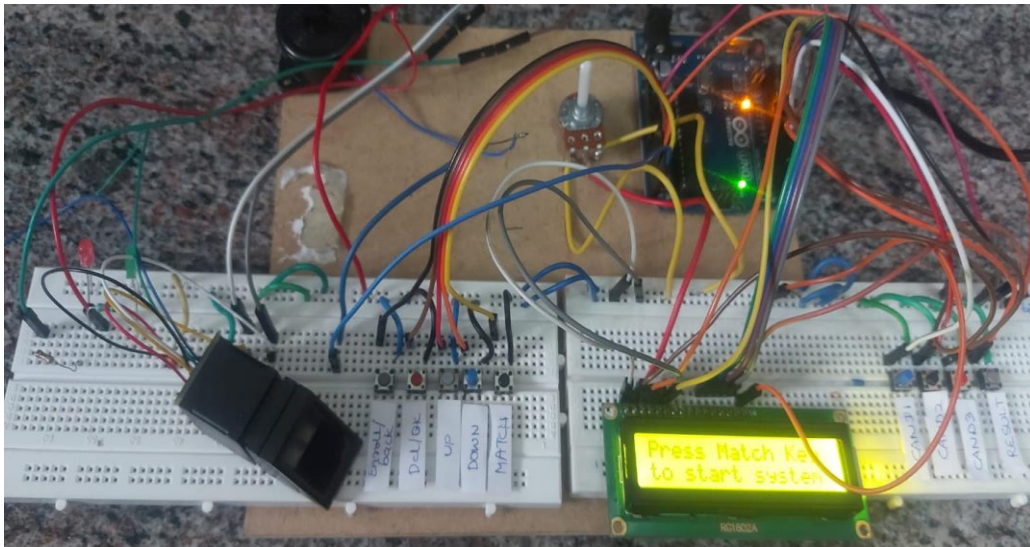

Fig4.1.output

CHAPTER 5: CONCLUSION AND FUTURE WORK

In total, this system overcomes most of the problems faced during the voting period by the paper ballot system. The efficiency of this system depends upon the web interface, its usability. This will surely ensure a safer voting method which is very much what is required for a healthy growth of a developing nation. In this paper, the proposed Fingerprint based voting system which is better and faster than previous systems. The new system prevents access to illegal voters, provides ease of use, transparency and maintains integrity of the voting process. The system also prevents multiple votes by the same person and checks eligibility of the voter. Fingerprint based voting system has provided chance to avoid invalid votes,

Future Scope:

- Implementation of GSM Module in the present system to allow user to vote from nearest ward available.

- Replacement of battery based supply by Solar Panel.

- This system security can be improved using eye-ray scanner, and touch screen systems in future.

- For creating large database, the server-based system can be used. Battery can be used instead of AC supply because battery is a good option in case of power failure while voting.

REFERENCES:

Conference papers:

➢ Khadija Hasta, Aditya Date, Aparna Shrivastava, Prajakta Jhade, S. N. Shelke, "Fingerprint based secured voting", Year: 2019, Publisher: IEEE.

➢ Samarth Agarwal, Afreen Haider, Abhishek Jamwal , Param Dev, Rajeevan Chandel, "Biometric based secured remote electronic voting system", Year: 2020, Publisher: IEEE.

➢ R Senthil Ganesh, B Anuradha, S Karthikeyan, P Vijayalakshmi, M Ashok, V Nagaraj, "Biometric based smart and secured electronic voting machine", Year: 2021, Publisher: IEEE.

➢ Pradeep Kumara V.H., Ravindra P. Rajput, "Design and implementation of convenient and compulsory voting system using fingerprint sensor and GSM technologies", Year: 2020, Publisher: IEEE.

➢ Shashank S Kadam; Ria N Choudhary ,Sujay Dandekar, Debjeet Bardhan, Namdeo B Vaidya, "Electronic voting machine with enhanced security", Year: 2018, Publisher: IEEE.

➢ Atharva Jamkar, Omkar Kulkarni; Aarti Salunke, Anton Pl jonkin,"Biometric voting machine based on fingerprint scanner and arduino", Year: 2019, Publisher: IEEE.