CHAPTER 37
IOT Based Man to Machine Communication for Suffrage System

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ABSTRACT

In every election, the election commission is facing a lot of troubles and different type of problems throughout the election. The most familiar issue faced by the election commission is inappropriate confirmation with respect to the arrangement of casting the votes, duplication or illegal casting of votes. Currently used Electronic Voter Machines [EVM], which led to many cases that testified the security of both Electronic Voter Machine (EVM) and the Voter Verified Paper Audit (VVPAT) system. Some cases infer that these machines are tampered and the votes are hacked from one party to another. In this paper, a secure and new voting system is developed to improve the existing voting system using iris recognition. Iris one of the most secure biometric of person identification. The main goal of this article is to avoid duplication of casting votes. This project focuses on sophisticated voting system using finger print and iris. This project focuses on sophisticated voting system using iris and Finger print technologies. The voting process is carried out only if the finger print matches with the stored value and We are scanning individual's iris and storing it in a voter's database by giving appropriate AADHAR card no. If a person comes for voting, then his or her iris is detected and this detected image is compared to image in voter's database. When the iris is detected we get the information about the voter in our PC, then that information is compared to the voter's finger print. If both the details get matched, then the person is allowed to vote. The current voting system is not secure, there are some individuals who give dummy votes or they are registered at more than one place. In this paper the Security of the voter is discussed and in general and the focus is on making the voting system more robust and reliable by eliminating dummy voters. After successful completion of voting the details of voting is stored in cloud using IoT. The data are collected and calculated automatically. The total voting and data are calculated automatically and the result is shown in IoT at the End of the Day itself. It will reduce the storage of voting machine for certain no of days and also reduce change of voting machine by illegal person

Keywords: *E-Voter Machine, Internet of Things (IoT), Cloud Server, Biometric Authentication. etc*

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INTRODUCTION

Voting is the right of each citizen to cast the vote and select their leader. India is a democratic country and each citizen has the right to vote and show their option. People also have the right to change the ruling party in upcoming election by voting for the candidate. Voting is not done to elect the government leaders, but also conducted to elect the leaders in schools, colleges, banks, society, etc. Now day's technology is employed to perform such balloting among the world. To form it secures each electoral system consists of citizen identification and authentication. And further process like voting cast, result of voting are included.In India electronic voting system is used, but is used only tocast voting. To verification of the voter's, man power requires at the polling booth. The process of verification of voter, take much time. To overcome these problems an inbuilt voter verification system is needed in the voting machine.In India, the government started collecting biometric information of public and providing them a unique identification called Aadhaar card. Hence, the database of UIDAI can be used to authenticate the voter. Biometrics is a way used to recognize a person based on his physical nature. The fingerprint, iris, face, voice, etc. are the mainly used biometrics to recognize a person. There are two key functions for biometrics, first is one to one matching and other is one too many matchings. In one to many matching the biometric sample is compared with the already stored samples. Biometric method results in a faster security, and more convenient method for user verification. Biometric method is better than password security. Fingerprint is unique for each individual so it can be used as a mark of signature, verification and authentication.

LITERATURE REVIEW

A literature review was conducted to investigate the history and achievements of application. The source investigated involves the following observations

1. Comparison of Various Segmentation Techniques in Iris Recognition AUTHORS: Prateek Verma, Maheedhar Dubey, PraveenVerma Iris recognition is regarded as the most reliable and accurate biometric identification system available. Iris recognition system captures an image of an individual's eye; the iris in the image is then segmented and normalized for feature extraction process. The performance of iris recognition systems highly depends on segmentation. Segmentation is used to locate the correct iris region in an eye and it should be done accurately and correctly to remove the eyelids, eyelashes, reflection and pupil noises present in iris region. In our book we are comparing two segmentation methods namely, Daugman's algorithm and Hough Transform. Iris images are selected from the CASIA Database, then the iris and pupil boundary are detected from rest of the eye image, removing the noises. The segmented iris region was normalized to eliminate dimensional inconsistencies between iris regions by using Daugman's Rubber Sheet Model. A comparative analysis is made of the two methods to find out the better method.

2. Segmentation Techniques for Iris Recognition System AUTHORS: Surjeet Singh, Kulbir Singh

A biometric system provides automatic identification of an individual based on a unique feature or characteristic possessed by the individual. Iris recognition is regarded as the most reliable and accurate biometric identification system available. Iris recognition systems capture an image of an individual's eye, the iris in the image is then segmented and normalized for feature extraction process. The performance of iris recognition systems highly depends on segmentation and normalization. This paper discusses the performance of segmentation techniques for iris recognition systems to increase the overall accuracy.

3. The Design and Development of Real-Time E-voting System in Nigeria with Emphasis on Security and Result Veracity AUTHORS: Adebayo, O. S, Damian, O., Mohammed, D

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Elections are believed to be the key pillars of democracy and voting is one of the electoral processes that ensure the sustenance of democracy in any civil society. In this paper, we developed an electronic voting system, which will eliminate rigging and manipulation of results to its barest minimum, this problem is mostly associated with the manual system of voting. The implementation of electronic voting system in Nigeria will boost the integrity of INEC and the result they produce. The programs used to develop this system are PHP, MySQL, Java Query, CSS and HTML. These packages make the Graphic Interface User friendly enough for even those with little or no computer knowledge.

4. Secure e-voting system with Biometric and Wavelet Based Watermarking Technique in Ycgcb color space AUTHORS: Gunjal B., and Mali S

Secure Voting System' is heart of any democracy. There are number of nationwide voting system adopted all over the world, but each of them has their own shortfalls. The remote internet voting systems still suffer many problems. These are reasons, why manual voting is still in practice in many developing and developed nations in this internet era also. Thus, complete, strongly secured and user friendly `E-Voting System' is need of time. The aim of this paper is to present multilayer secured, internet based voting system using biometric and wavelet based image watermarking. Strongly secured watermarking technique for voter's color photograph in YCgCb color space is processed by embedding voter's fingerprint as watermark. The watermark embedding is done securely through number of levels. This technique yields Peak Signal to Noise Ratio (PSNR) up to 54.26 and Normalised Correlation (NC) equals to 1 indicating exact recovery of fingerprint. The complete system is maintained `user friendly'

5. E-VOTING SYSTEM USING MOBILE SMS AUTHORS: Dinesh R. Gawade, Amardeep Shirolkar

Electronic voting system has the potential to improve percentage of the voting. In the traditional voting, such as, the electronics voting and paper based voting, percentage of voting is decreasing. Now a day's most of voters are busy in their work and most of the voters are living far away from voting centre. some voters don't like to wait in queues. Thus, due to this, voters don't visit to the polling booth. Thus, percentage of voting is decreasing, which is main and serious drawback of traditional voting scheme. Now a day's some improvement is needed in this field. Thus, in this paper we are introducing such a system, which will eliminate drawback of traditional voting scheme. This new voting scheme is based on SMS. SMS is a key future of the second generation (2G) mobile. In the second generation, GSM (global system for mobile communications) is very famous technology. In next generation of mobile, such as 2.5G, 2.75G, 3G & 4G, SMS is one of the prime features. So we implement a new voting system, based on SMS. Mobile telephony is widely used, there are more than 6,800,000,000 mobile users worldwide and population of the voter in world is 7,012,000,000 that is 96.97% voter use mobile worldwide. In this paper an electronic voting system using SMS is presented but to care of the remaining 212,000,000 voter that is 3.03% of the voter will use the traditional electronic voting machine as it is. Considering the major crowd of mobile users we developed modified voting machine which supports both electronic voting machine and SMS based voting. We are able to exploit existing mobile authentication mechanism and provide enhance voter authentication with mobility while maintaining voter privacy. Now day’s additional problem is of declaring the result of voting, so to declare result normally 8-10 days will be taken. In this day security of voting machine is prime question and very large cost paid for this. In our modified voting machine we can declare result within 1hr of voting and also the voting result send to all registered mobile number developed modified voting machine which supports both electronic voting machine and SMS based voting. We are able to exploit existing mobile authentication mechanism and provide enhance voter authentication with mobility while maintaining voter privacy. Now day’s additional problem is of declaring the result of voting, so to declare result normally 8-10 days will be taken. In this day security of voting machine is prime question and very

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large cost paid for this. In our modified voting machine we can declare result within 1hr of voting and also the voting result send to all registered mobile number.

PROBLEM IDENTIFICATION AND SOLUTION

PROBLEM IDENTIFICATION

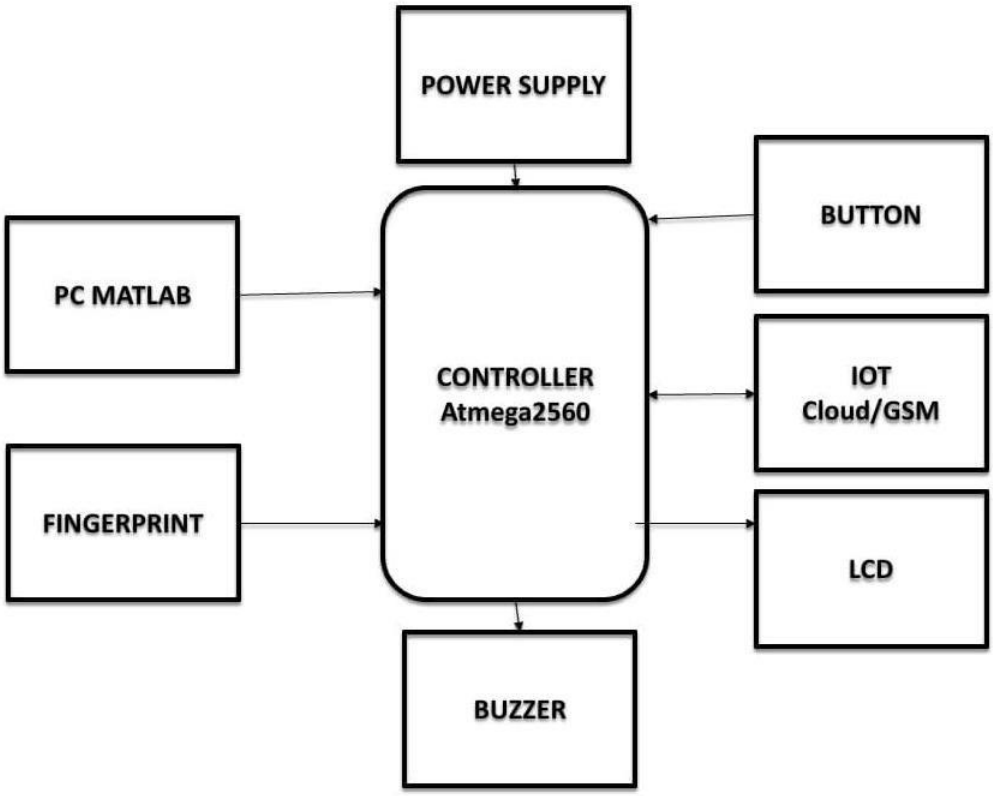

Fig 3.1 Block diagram

Electronic voting (also known as E-voting) is voting using electronic systems to aid casting and counting votes. Voting machines use a two-piece system with a balloting unit presenting the voter with a button for each choice connected by a cable to an electronic ballot box. An EVM consists of two units:

1. Control Unit

2. Balloting Unit

The two units are joined by a five-meter cable. The Control Unit is with the Presiding Officer or a Polling Officer and the Balloting Unit is placed inside the voting compartment. Instead of issuing a ballot paper, the Polling Officer in- charge of the Control Unit will press the Ballot Button. This will enable the voter to cast his vote by pressing the blue button on the Balloting Unit against the candidate and symbol of his choice. The controller used in EVMs has its operating program etched permanently in silicon at the time of manufacturing by the manufacturer.No one can change the program once the controller is manufactured. but this E-voting method is used only to cast voting. For verification of the voters, man power requires at the polling booth. The process of verification of voter takes much time. The main problem of this system is the verification of voters so the duplication and illegal casting of votes exits.

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PROBLEM SOLUTION

METHODOLOGY

In this project Electronic Voting System using Fingerprint scanning and iris recogonisation. A new voting system can be implemented,which requires a fingerprint scan and iris recogonisation to identify the database of the candidate.Valid voters will have their name, fingerprint, and other details in the government database in each state or district. Therefore a this method will ensure that only legitimate voters can cast their vote. This project is very used to improve the security performance in the voting machine. Now day's some person makes the duplicate vote ID card. But in this project human biometric is used for caste the vote. So this project improves the security performance and avoid forgery vote, because naturally one human biometic is different from other human.

SOLUTION

The concept proposed here is a voting system based on IoT. As India is a democratic country, all the citizens have the right to choose a person to lead them. World is becoming completely digitized.As a part of digitization, here voting is also digitized. One of the benefits of this project is that it reduces the time taken to announce the result.Here, the system is made more secure by introducing biometric and verification. This system allows one person to vote only once.This system provide high security, quick to access and easy to maintain all information of voting, highly efficient and reliable

HARDWARE DESCRIPTION

ATmega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

SPECIFICATIONS

- Operating Voltage 5V
- Input Voltage (recommended 7-12V
- Input Voltage (limit) 6-20V
- Digital I/O Pins 54 (of which 15 provide PWM output)
- Analog Input Pins 16
- DC Current per I/O Pin 20 mA
- DC Current for 3.3V Pin 50 mA
- Flash Memory 256KB of 8KB used by bootloader

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- SRAM 8 KB
- EEPROM 4 KB
- Clock Speed Q 16 MHz
- LED_BUILTIN 13

- Length 101.52 mm
- Width 53.3 mm
- Weight 37 g

FINGERPRINT SENSOR MODULE

Fingerprint sensor module used in biometrics for security in fingerprint detection as well as verification. These devices are mainly used in safes where there is a high-powered DSP chip used in the rendering of image, feature- finding, searching and calculation by connecting it to any microcontroller with the help of TTL serial, & send data packets to get photos, notice prints, search and hash. The enrollment of new fingers can be stored directly within the flash memory of on board.

The features of this sensor include the following.

- It includes image collection as well as chip algorithm.
- The fingerprint reader can perform lesser growth and can be fixed into a range of end products.
- Power use is low, excellent performance, small in size, and less cost.
- Optical technology which is used is professional, and exact module developed techniques.
- The capabilities of image processing are good, and can effectively capture pictures up to 500 dpi resolution.

SPECIFICATIONS

- The fingerprint sensor is an optical type
- The interface is USB1.1/ TTL logical level (UART)
- The speed of scanning is 0.5 sec
- The speed of verification is 0.3 sec
- The capacity storage is 1000
- The security level is 5
- The baud rate of RS232 is 4800BPS ~115200BPS variable

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- Current is typical 50 mA, and peak 80mA
- The corresponding technique is 1: N
- Fixed indicators-15KV bright green backlight
- The life of the sensor is 100 million times
- The dimension is 44.1 X 20 X 23.5mm
- The size of the character file is 256 bytes
- The template size is 512 bytes
- The FRR (False Rejection Rate) is <1.0%
- The FAR (False Acceptance Rate) is 0.001%
- Voltage is 4.2 to 6.0 VDC
- Operating surroundings temperature is -20° C to 40° C

GSM

GSM stands for (Global System for Mobile Communication). It is a digital cellular technology used for transmitting mobile voice and data services. GSM digitizes and compresses data, then sends it down through a channel with two other streams of user data, each in its own timeslot.

FEATURES

- Improved spectrum efficiency
- International roaming
- Low-cost mobile sets and base stations (BSs)
- High-quality speech
- Compatibility with Integrated Services Digital Network (ISDN)
- Support for new services

I0T ESP(8266)

The ESP8266 is a system on a chip (SOC) Wi-Fi microchip for Internet of Things (IoT) applications produced by Espressif Systems.The ESP8266 module enables microcontrollers to connect to 2.4 GHz Wi-Fi, using IEEE 802.11 bgn. It can be used with ESP-AT firmware to provide Wi-Fi connectivity to external host MCUs, or it can be used as a self-sufficient MCU by running an RTOS-based SDK. The module has a full TCP/IP stack and provides the ability for data processing, reads and controls of GPIOs.

APPLICATIONS

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- Networking: The module's Wi-Fi antenna enables embedded devices to connect to routers and transmit data

- Data Processing: Includes processing basic inputs from analog and digital sensors for far more complex calculations with an RTOS or Non-OS SDK

- P2P Connectivity: Create direct communication between ESPs and other devices using IoT P2P connectivity

- Web Server: Access pages written in HTML or development languages.

SPECIFICATIONS

- Arquitecture 32 bits
- Clock Xtensa LX106 80-160MHz
- WiFi IEEE802.11 b/g/n support for WPA and WPA2
- Bluetooth No
- RAM 160KB - 64KB Instruction - 96KB Data
- Flash Extern QSPI - 512KB A 4MB
- GPIO 16
- DAC 0
- ADC 1
- Interfaces SPI-I2C-UART-I2S

BUZZER

A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications.

There are two types are buzzers that are commonly available. The one shown here is a simple buzzer which when powered will make a Continuous Beeeeeeppp. sound, the other type is called a readymade buzzer which will look

bulkier than this and will produce a Beep. Beep. Beep. Sound due to the internal oscillating circuit present inside it. But, the one shown here is most widely used because it can be customised with help of other circuits to fit easily in our application.

This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval.

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APPLICATIONS

- Alarming Circuits, where the user has to be alarmed about something
- Communication equipments
- Automobile electronics
- Portable equipments, due to its compact size

SPECIFICATIONS

- Rated Voltage: 6V DC
- Operating Voltage: 4-8V DC
- Rated current: <30mA
- Sound Type: Continuous Beep
- Resonant Frequency: ~2300 Hz
- Small and neat sealed package
- Breadboard and Perf board friendly

LCD DISPLAY

LCD Stands for Liquid Crystal Diode. The type of display we used is 16 X 1 displays. Which means that there is 16 columns and 1 row for character display. It uses yellow LED Back light for display illumination

FEATURES

- Operating Voltage is 4.7V to 5.3V
- Current consumption is 1mA without backlight
- Alphanumeric LCD display module, meaning can display alphabets and numbers
- Consists of two rows and each row can print 16 characters.
- Each character is build by a 5×8 pixel box
- Can work on both 8-bit and 4-bit mode

BUTTON

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.[1] 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,

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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, slapping, hitting, and punching •

SPECIFICATIONS

- Mode of Operation: Tactile feedback
- Power Rating: MAX 50mA 24V DC
- Insulation Resistance: 100Mohm at 100v
- Operating Force: 2.55±0.69 N
- Contact Resistance: MAX 100mOhm
- Operating Temperature Range: -20 to +70 ℃
- Storage Temperature Range: -20 to +70 ℃

FEATURES

- Prevent flux rise by the insert-molded terminal
- Snap-in mount terminal
- Contact Bounce: MAX 5mS
- Crisp clicking by tactile feedback
- Dielectric Withstanding Voltage 250V AC for 1 minute

APPLICATIONS

- Calculators
- Push-button telephones
- Kitchen appliances
- Magnetic locks
- Various other mechanical and electronic devices, home and commercials

PROJECT DESIGN

PROJECT MODEL

- The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system.

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• The data flow diagram (DFD) is one of the most important modeling tools. It is used to model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system.

• DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output.

• DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail

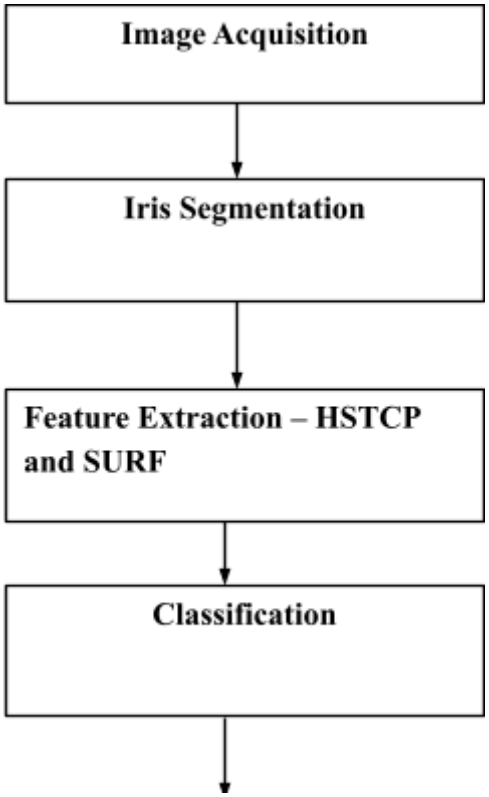

Fig 2 : Data Flow Diagram

USE CASE DIAGRAM:

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

CLASS DIAGRAM:

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes,

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operations (or methods), and the relationships among the classes. It explains which class contains information.

SEQUENCE DIAGRAM

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.

ACTIVITY DIAGRAM:

Activity diagrams are graphical representations of workflows of stepwise activitiesand actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.

OBJECTIVE

- The focus of this project is to design and development of a biometric enabled biometric electronic voting machine.

- The proposed biometric electoral voting system allows the user to scan fingerprint and iris so that his or her credentials can be compared to existing fingerprint and iris images already stored in the system's database.

- Counting is going on right away, making the voting process more efficient, faster and safer.

WORKING PRINCIPLE

In IoT Based Man To Machine Communication for Suffrage System,we use Matlab and Arduino IDE softwares. Matlab is used for the purpose of iris recognition and Arduino IDE is used to trigger Atmega 2560 and other hardware components to do their work without any interrupt. For iris recognition, Matlab is opened and full codes were pasted at command window of the matlab. Coding is allowed to run and also codes for other Hardware components were pasted in Arduino IDE which triggers the Atmega 2560 to work according to the coding. After successful run of coding COMs window will appear.

There are two verifications for a voter to vote. The first verification of voter is iris recognition. In this, Iris image will be captured, then it will be segmented and normalised. Then feature extraction takes place. After the conformation of iris identity with iris database of the voter, he/she allowed to the fingerprint recognition, the next verification process.

After the classification the COMs window will appear and LED will blink in fingerprint scanner. When voter keeps his/her thumb finger in the scanner, Fingerprint will be verified with voter's fingerprint database. Buzzer sounds if his/her fingerprint doesn't match with his/her biometric database. The voter is not allowed to vote. If his/her fingerprint matches with his/her biometric database, Voter can press the button to which party he/she wants to vote. After a successful voting LCD display shows the name of the party voted by the voter. SMS will be sent through GSM to the voter's mobile number Containing the name of the party voted by the voter.

Votes are calculated and collected in IOT data or the cloud storage and so it will be easy to release/announce the results at the end of the election day.

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PROJECT DIMENSIONS

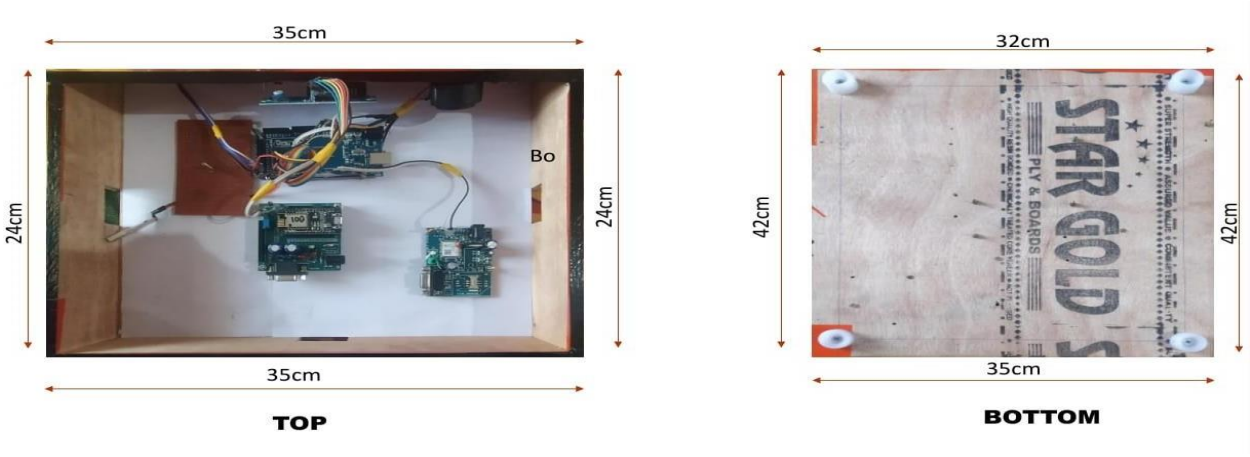

Fig 3: Project Dimensions

FINAL ASSEMBLE OF PROJECT

Fig 5.7 Photocopy of Project

MERITS AND DEMERITS

MERITS

- Iris recognition accuracy
- Convenient device for security instead of Iris act like digital
- passwords that cannot be lost, forgotten or stolen.
- The processing speed is high so it’s has less computational time.

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DEMERITS

- The main drawback of this system is that, voter's id checking process is manual,But iris and fingerprint verification doesn't allow them to vote.

FUTURE SCOPE

- This project is very useful to improve the security performance in the voting machine.
- In this project fingerprint with iris we used for voting purpose.
- Now day's some person makes the duplicate vote ID card. But in this project human iris is used for caste the vote.
- So this project improves the security performance and avoid forgery vote because naturally one human iris is different from other human.

CONCLUSION

The concept proposed here is a voting system based on IoT. As India is a democratic country, all the citizens have the right to choose a person to lead them. World is becoming completely digitized. As a part of digitization, here voting is also digitized. One of the benefits of this project is that it reduces the time taken to announce the result. Here, the system is made more secure by introducing biometric and verification. This system allows one person to vote only once.This system provide high security, quick to access and easy to maintain all information of voting, highly efficient and reliable

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6. Review on Aadhaar Based Voting System using Biometric Scanner AUTHORS: Ravindra Mishra1, Shildarshi Bagde, Tushar Sukhdeve, Prof. J. Shelke

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