BIOMETRIC AND IOT BASED INNOVATIVE VOTING MACHINE

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ABSTRACT

The embedded system based voting machine which includes the developments towards electronic data storage and transmission. Finger print devices for Voting machines and other existing identity documents are discussed and implemented in this project. The user has to show his voter ID card whenever he goes to the polling booth to poll his vote. This is a time consuming process as the person has to check the voter ID card with the list he has, confirm it as an authorized card and then allow the person to poll his vote. Thus, to avoid this kind of problems, we have designed a finger print based voting machine where the person no need to carry his ID which contains his entire details. The person at the polling booth has to show his Finger. This Finger print reader reads the details from the tag. This data is passed to the controlling unit for the verification. The controller reads the data from the reader and compares this data with the already existing data. If the data matches with the already stored information, the person is allowed to poll his vote. If not, a message is displayed on LCD and the person is not allowed to poll his vote. The polling mechanism carries out manually using the switches. LCD is used to display the related messages. And also live monitoring of the voting process can be achieved using the Wi-Fi module.

Keyword: *-Proteus simulations, Avr microcontroller, EEPROM memory, wifi module, Fingerprint sensor*

1. INTRODUCTION

The project uses the Finger print technology and Embedded Systems to design this application. The main objective of this project is to design a system that asks the user to show his Finger print as an identity proof. The user to submit his Finger print at the polling booth. The system reads the data from the Finger print and verifies this data with the already stored data in its database. If the details present in the data base it matches with the stored data, the system allows the person to enter into and poll his vote. If the details of the Finger do not match with the stored data, the system immediately activates the display and the security authorities can come and take the further action.The device that collects data from the tag and codes the data into a format that can be understood by the controlling section. This system also collects information from the master device and implements commands that are directed by the master. The objective of the project is to develop a microcontroller based security and alert system. It consists of a Finger print reader, microcontroller, the interfacing unit to allow the communication between the microcontroller and Finger print module, and the LCD.For a high security two memory is used which is local memory and cloud memory. Local memory is achieved by EEPROM and cloud memory is achieved by wifi module.The result will be announced in the same day of election.

2. PROPOSED SYSTEM

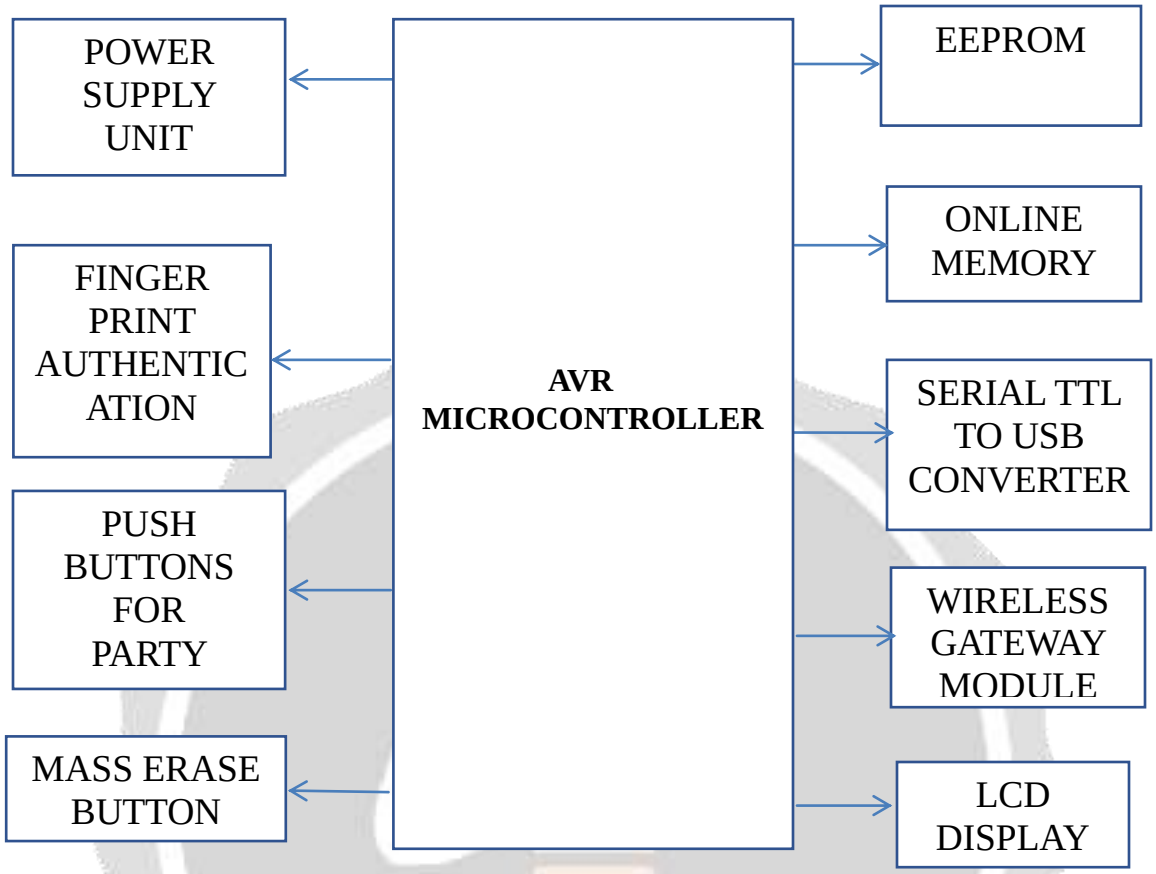

Fig-1:Block Diagram of Voting Machine

FingerPrint Voting Machine Circuit, we have used Finger Print Sensor Module to authenticate true voter by taking their finger input in the system. Here we are using 5 push buttons to Match, Enroll/back, Delete/OK, UP and Down. Enroll key is used for enrolling new finger impression into the system and back function as well. Means when the user wants to enroll new finger then he/she needs to press enroll key then LCD asks for the ID or Location where user wants to store the finger print output. Now if at this time user do not want to proceed further then he/she can press enroll key again to go back (this time enroll key behave as Back key). Means enroll key has both enrollment and back function. DEL/OK key also has same double function like when user enrolls new finger then he/she need to select finger ID or Location by using another two key namely UP AND DOWN now user needs to press DEL/OK key to proceed with selected ID or Location. Match key is used for whenever voter wants to vote then he/she needs to authenticate first for true voter by keeping finger on Finger Print Sensor, if he/she passed in this authentication then he/she can vote.

2.1 Power supply

The power supply circuit consists of step-down transformer which is230v step down to 12v. In this circuit 4diodes are used to form bridge rectifier which delivers pulsating dc voltage & then fed to capacitor filter the output voltage from rectifier is fed to filter to eliminate any a.c. components present even after rectification.The filtered DC voltage is given to regulator to produce 12v constant DC voltage. 230V AC power is converted into 12V AC (12V RMS value where in the peak value is around 17V), but the required power is 5V DC; for this purpose, 17V AC power must be primarily converted into DC power then it can be stepped down to the 5V DC. AC power can be converted into DC using one of the power electronic converters called as Rectifier. There are different types of rectifiers, such as half-wave rectifier, full-wave rectifier and bridge rectifier.Due to the

advantages of the bridge rectifier over the half and full wave rectifier, the bridge rectifier is frequently used for converting AC to DC. The following fig shows the circuit of a power supply that converts an ac source source.

2.2 Proteus simulation

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and electronic technicians to create electronic schematics and electronic prints for manufacturing printed circuit boards. It was developed in Yorkshire, England by Lab center Electronics Ltd and is available in English, French, Spanish and Chinese languages.

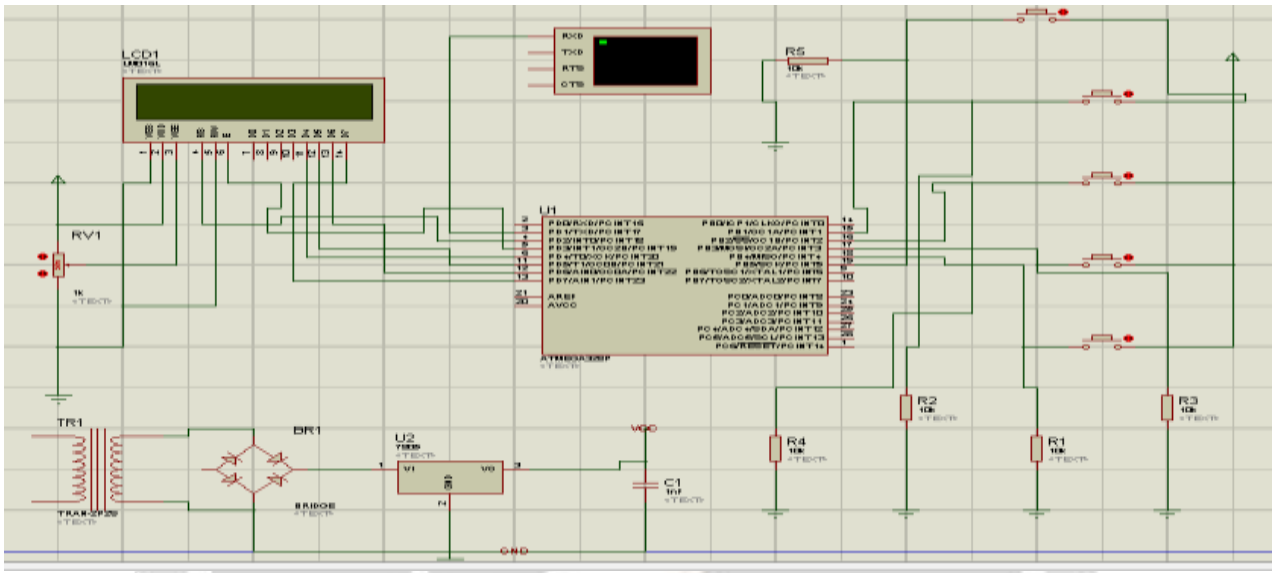

Fig-2: Simulation Diagram of Voting Machine

2.3 CodeVision AVR

CodeVision AVR is a C cross-compiler, Integrated Development Environment and Automatic Program Generator designed for the Atmel AVR family of microcontrollers. The program is designed to run under the Windows 98, Me, NT 4, 2000, XP and Vista 32bit operating systems. The C cross-compiler implements nearly all the elements of the ANSI C language, as allowed by the AVR architecture, with some features added to take advantage of specificity of the AVR architecture and the embedded system needs. The compiled COFF object files can be C source level debugged, with variable watching, using the Atmel AVR Studio debugger. The Integrated Development Environment (IDE) has built-in AVR Chip In-System Programmer software that enables the automatical transfer of the program to the microcontroller chip after successful compilation/assembly.

2.4 Microcontroller AVR

AVR is a family of microcontrollers developed by Atmel beginning in 1996. These are modified Harvard architecture 8-bit RISC single-chip microcontrollers. AVR was one of the first microcontroller families to use on-chip flash memory for program storage, EPROM,or EEPROM used by other microcontrollers at the time.

The AVR architecture was conceived by two students at the Norwegian Institute of Technology (NTH), Alf-Egil Bogen and Vegard Wollan. The original AVR MCU was developed at a local ASIC house in Trondheim, Norway, called Nordic VLSI at the time, now Nordic Semiconductor, where Bogen and Wollan were working as students. It was known as a µRISC (Micro RISC and was available as silicon IP/building block from Nordic VLSI. When the technology was sold to Atmel from Nordic VLSI, the internal architecture was further developed by Bogen and Wollan at Atmel Norway, a subsidiary of Atmel. The designers worked closely with compiler writers at IAR Systems to ensure that the AVR instruction set provided efficient compilation of high-level languages

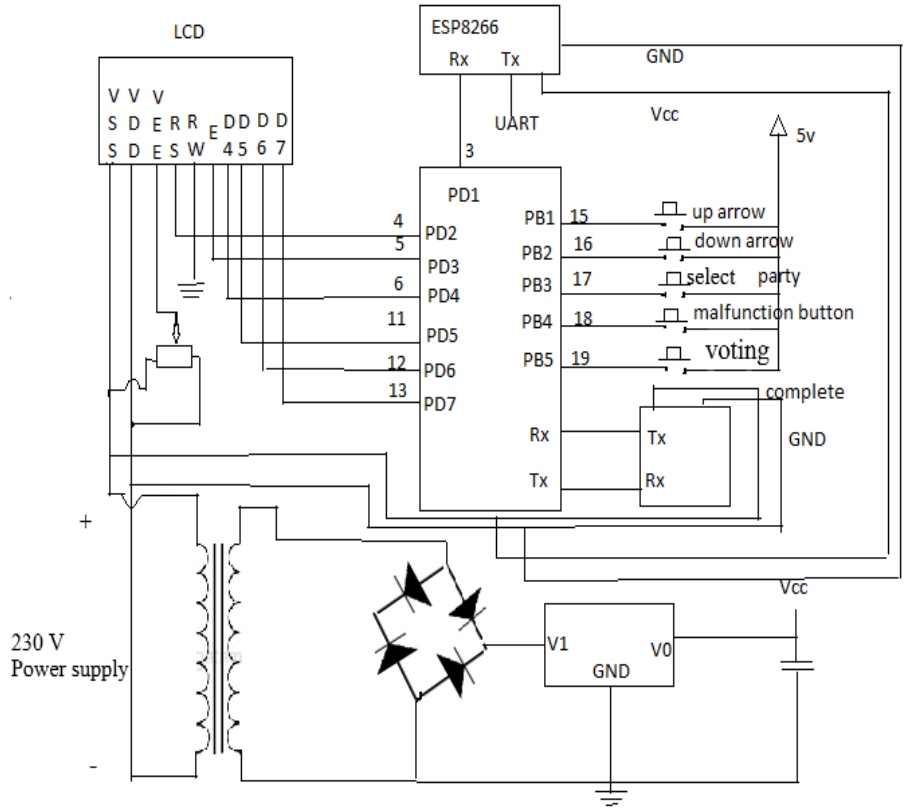

Fig-3: Overall Circit Diagram

Atmel says that the name AVR is not an acronym and does not stand for anything in particular. The creators of the AVR give no definitive answer as to what the term "AVR" stands for However, it is commonly accepted that AVR stands for Alf and Vegard's RISC processor, Note that the use of "AVR" in this article generally refers to the 8-bit RISC line of Atmel AVR Microcontrollers

2.5 Push Button

A Push Button is a type of switch work on a simple mechanism called “Push-to-make”. Initially, it remains in off state or normally open state but when it is pressed, it allows the current to pass through it or we can say it makes the circuit when pressed. Normally their body is made up of plastic or metal in some types.Push Button structure has four legs, two on one side and other two on another side. So, we can operate two lines of the circuit by single Push Button**.**

Normally-Off

With the normally-off switch, there's no connection till you push the button. Most push button switches are used this way. Examples include doorbell buttons, cell phone keys and garage door openers.

Normally-On

Here the switch conducts normally, but interrupts the circuit when you press on it. This is more specialized, and may be used in conjunction with a wiring trick shows in figure 4.9. For example, connecting a normally-on switch in parallel with a light bulb will light the bulb when the button's pushed; otherwise, current will flow through the switch, leaving the bulb off.

2.6 Fingerprint Sensor

R307 is a finger print sensor module with TTL UART interface. The user can store the finger print data in the module and can configure it in 1:1 or 1: N mode for identifying the person.The FP module can directly interface with 3v3 Microcontroller. A level converter (like MAX232) is required for interfacing with PC.The R307 fingerprint module has two interface TTL UART and USB2.0, USB2.0 interface can be connected to the computer; RS232 interface is a TTL level, the default baud rate is 57600 , can be changed, refer to a communication protocol ; can And microcontroller, such as ARM, DSP and other serial devices with a connection, 3.3V 5V microcontroller can be connected directly**.**

2.7 LCD display

Liquid crystals are a phase of matter whose order is intermediate between that of a liquid and that of a crystal. The molecules are typically rod shaped organic matters about 25 Angstroms in length and their ordering is a function of temperature. The molecular orientation can be controlled with applied electric fields. LCD is made up of two sheets of polarizing material with the liquid crystal solution between them. An electric current passed through the liquid causes the crystals to align so that light cannot pass through them, which results in display of character as per the applied voltage in its data lines. The driver is provided to drive the LCD. It stores the display data transferred from the microcontroller in the internal display RAM and generates dot matrix liquid crystal driving signals. Each bit data of display RAM corresponds to on/off state of a dot of a liquid crystal display.

VCC, GND AND V0 - While VCC and VSS provide +5V and ground, respectively;

1. V0 is used for controlling LCD contrast.
2. RS (Register Select) - If RS = 0, the instruction command code register is selected, allowing the user to send a command such as clear display, cursor at home, etc.

If RS = 1, the data register is selected, allowing the user to send data to be displayed on the LCD.

3. RW (Read/Write) - RW allows the user to write information to the LCD or read information from it. RW=1 when reading; RW=0 when writing.
4. EN (Enable) - The LCD to latch information presented to its data pins uses the enable pin. When data is supplied to data pins, a high to low pulse must be applied to this pin in order for the LCD to latch in the data present at the data pins.
5. D0 – D7 - The 8-bit data pins, are used to send information to the LCD or read the contents of the LCD's internal registers. To display letters and numbers, we send ASCII codes for the letters A-Z, a-z, and numbers 0-9 to these pins while making RS = 1.

2.8 ESP2866 Module

The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (microcontroller unit) capability produced by Shanghai-based Chinese manufacturer, Espresso. The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer, AI-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation. The ESP8285 is an ESP8266 with 1 MiB of built-in flash, figure 4.12 reprsent the allowing for single-chip devices capable of connecting to Wi-Fi.

3. RESULTS

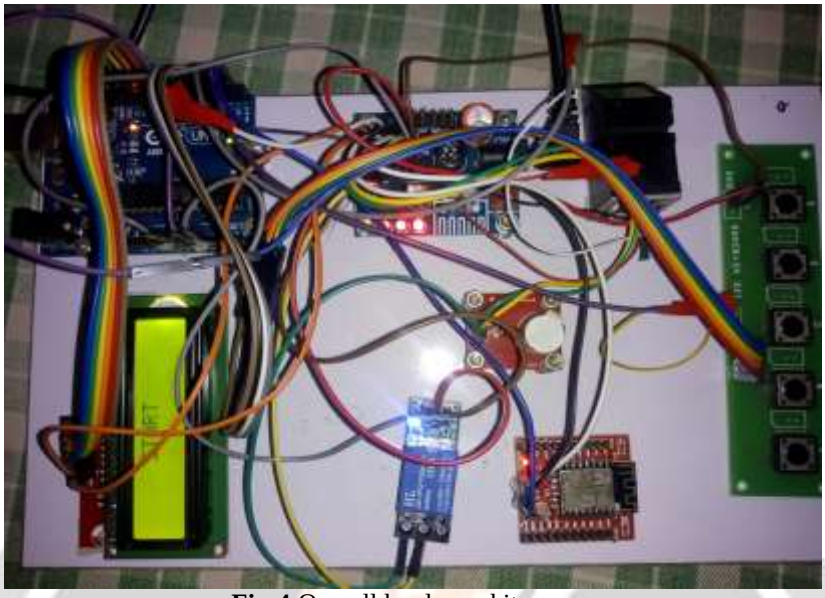

Fig-4:Overall hardware kit

The person is allowed to vote in fig-4

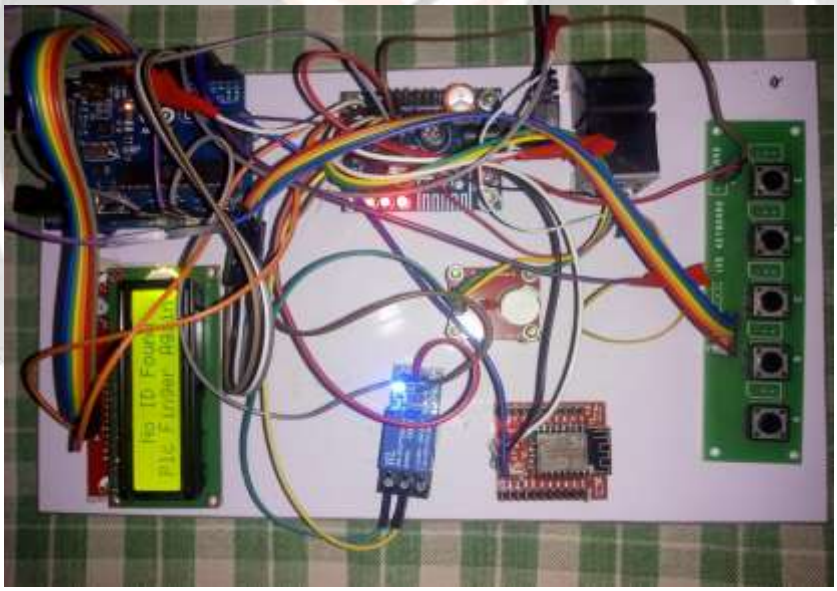

Fig-5:Place the finger to vote

The party is selected by placing the finger to vote (refer fig-5).

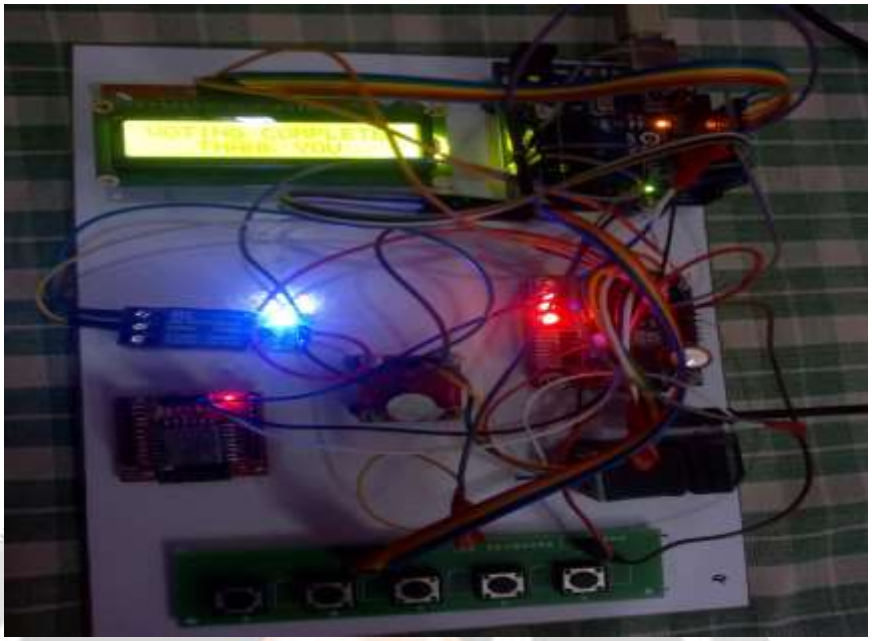

Fig-6:Voting Completed

The Fig-6 shows the after the completion of voting process displays as voting completed

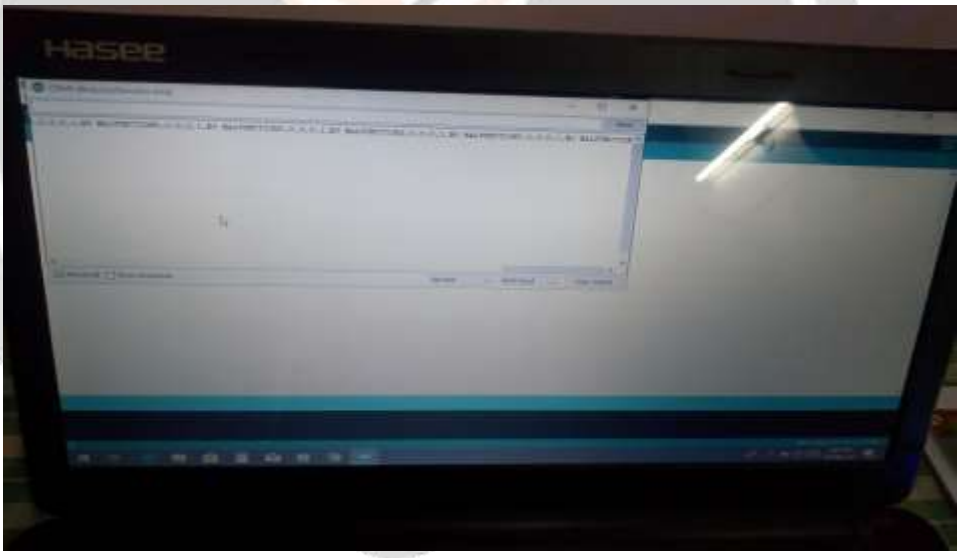

Fig-7:Display the result

In Fig-7 result will be displayed on big screen which is connected to USB.

Now the data stored in the controller is compared with the local memory and cloud memory. If it is same then there is no malfunction is detected can be identified. By using MQTT dashboard the result will be announced by higher officials. High security is achieved.

4. CONCLUSIONS

The implementation of Finger print based voting machine using microcontroller is done successfully. The communication is properly done without any interference between different modules in the design. Design is done to meet all the specifications and requirements. Software tools like Keil Uvision Simulator, Flash Magic to dump the source code into the microcontroller, Orcad Lite for the schematic diagram have been used to develop the software code before realizing the hardware.

The performance of the system is more efficient. Reading the Data and verifying the information with the already stored data and perform the specified task is the main job of the microcontroller. The mechanism is controlled by the microcontroller.

Circuit is implemented in Orcad and implemented on the microcontroller board. The performance has been verified both in software simulator and hardware design. The total circuit is completely verified functionally and is following the application software. It can be concluded that the design implemented in the present work provide portability, flexibility and the data transmission is also done with low power consumption.

- Cost effective
- Low power consumption
- It is economical
- Less manpower required
- Time conscious, as less time required for voting & counting
- Avoids invalid voting
- Saves transportation cost due to its compact size
- Convenient on the part of voter

This project can be used as an voting machine that can prevent rigging during the elections in the polling booths.

- Fast track voting which could be used in small scale elections, like resident

welfare association, “panchayat” level election and other society level elections.

- It could also be used to conduct opinion polls during annual share holders meeting.

- It could also be used to conduct general assembly elections where number of candidates are less than or equal to eight in the current situation

5. FUTURE ENHANCEMENT

- Number of candidates could be increased.
- It could be interfaced with printer to get the hard copy of the result almost instantly from the machine itself.
- It could also be interfaced with the personal computer and result could be stored in the central server and its backup could be taken on the other backend servers.
- Again, once the result is on the server it could be relayed on the network to various offices of the election conducting authority. Thus our project could make the result available any corner of the world in a matter of seconds

6. REFERENCES

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