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Secure Voting System Using Fingerprint Module

Mrs A.S.Lavanya[1], P.Lakshmi Pathi[2], K.Nanditha Chowdary[3], A.Nithin Sai[4], S.Munjeera Kousar[5]
Assistant Professor, Student,Department of ECE,AITS,Tirupati

Abstract
This paper deals with design and development of secure voting system using biometric information. Here fingerprint is used as biometric information. Elections play an important role in our democratic country as people can select a person as a leader for the government. This paper was about a new proposed methodology having a highly secured process. This consists of mainly biometric fingerprint recognition for security and for safe and immediate results. This proposed system is having a voice over that will help for blind people that whom they have voted. It has automatic counting of votes, highly data secured system, sending of data immediately and safe voting. In this project we have used Arduino UNO, biometric module to cast the vote, push buttons to select the political party and lcd display to display the information.
Keywords: *Arduino, LCD(16x2), fingerprint sensor(R307), Push buttons.*

I. INTRODUCTION

The objective of voting system is to allow voters to choose their government and to elect their political representatives. There are many methods to implement this voting process. Every method includes voting identification and authentication, voting and recording of votes cast, vote counting, publication of election results. The method that we have proposed is the most secured method to carry all the steps safely and more securely. As the fingerprints are unique for every born individual this method uses fingerprint to identify the voter. By using the fingerprint identification process the casting of fake votes is not possible. The proposed voting system provides immediate vote counting and it blinks led corresponding to the push button about the respective political party they had voted for.

II. EXISTING MODEL

a. There are several existing models for a voting system that use a fingerprint module, but the security varies from model to model.
b. The existing models does not give immediate voting count.
c. To overcome this draw back we are introducing secure voting system using fingerprint module which is more secure and high in accuracy of vote counting.

III. PROPOSED MODEL

- Initially, when the power supply is given to the circuit then the user can enroll their fingerprint in the system by pressing on the "enrolling push button".
- Once the enrollment is successful the data will be securely stored with a unique id number.
- Then the identification is initiated by long pressing on the "identifying push button".
- If the enrolled fingerprint and the identified fingerprint are same the authentication is successful.
- Now the candidate has to select the respective party's push button to use their vote.
- Whenever the candidate presses the respective push button the corresponding led to that particular push button blinks.
- The casted vote will be accounted into the respective party's data and reflects in the results whenever the "result push button" is pressed.
- Also, the result will be displayed on a cloud platform called Thing Speak.

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ADVANTAGES:

- It provides chance to avoid invalid votes.
- LED blinks for easy identification of casted vote to respective nominee.
- Minimizes man power.
- Immediate casted votes count.
- Reduces the time taken by the voting process.

BLOCK DIAGRAM

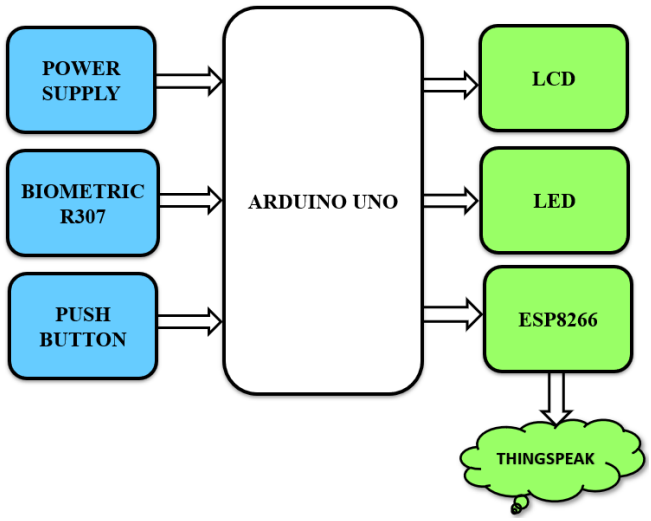

Fig: Block diagram of proposed model

IV. LITERATURE SURVEY

A. *Electronic Voting in India*

The Election Commission of India developed the country's EVMs in partnership with two government-owned companies, the Electronics Corporation of India (ECIL) and Bharat Electronics Limited (BEL). Though these companies

are owned by the Indian government, they are not under the administrative control of the Election Commission. They are profit-seeking vendors that are attempting to market EVMs globally. The first Indian EVMs were developed in the early 1980s by ECIL. They were used in certain parts of the country, but were never adopted nationwide. They introduced the style of system used to this day, including the separate control and ballot units and the layout of both components. These first-generation EVMs were based on Hitachi 6305 microcontrollers and used firmware stored in external Erasable PROMs along with 64kb EEPROMs for storing votes. Second-generation models were introduced in 2000 by both ECIL and BEL. These machines moved the firmware into the CPU and upgraded other components. They were gradually deployed in greater numbers and used nationwide beginning in 2004. In 2006, the manufacturers adopted a third-generation design incorporating additional changes suggested by the Election Commission. According to Election Commission statistics, there were 1,378,352 EVMs in use in July 2009. Of these, 448,000 were third-generation machines manufactured from 2006 to 2009, with 253,400 from BEL and 194,600 from ECIL. The remaining 930,352 were the second-generation models manufactured from 2000 to 2005, with 440,146 from BEL and 490,206 from ECIL. (The first generation machines are deemed too risky to use in national elections because their 15-year service life has expired, though they are apparently still used in certain state and local contests.) In the 2009 parliamentary election, there were 417,156,494 votes cast, for an average of 302 votes per machine.

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B. ***Evaluation of Voting Equipment***

In the recent years, voting equipment which were widely adopted may be divided into five types.

1) Paper-based voting: The voter gets a blank ballot and use a pen or a marker to indicate he want to vote for which candidate. Hand counted ballots is a time and labor consuming process, but it is easy to manufacture paper ballots and the ballots can be retained for verifying, this type is still the most common way to vote.

2) Lever voting machine: Lever machine is peculiar equipment, and each lever is assigned for a corresponding candidate. The voter pulls the lever to poll for his favorite candidate. This kind of voting machine can count up the ballots automatically. Because its interface is not user-friendly enough, giving some training to voters is necessa*ry*.

3) Direct recording electronic voting machine: This type, which is abbreviated to DRE, integrates with keyboard, touchscreen, or buttons for the voter press to poll. Some of them lay in voting records and counting the votes is very quickly. But the other DRE without keep voting records are doubted about its accuracy.

4) Punch card: The voter uses metallic hole-punch to punch a hole on the blank ballot. It can count votes automatically, but if the voters perforation is incomplete, the result is probably determined wrongfully.

5) Optical voting machine: After each voter fills a circle correspond to their favorite candidate on the blank ballot, this machine selects the darkest mark on each ballot for the vote then computes the total result. This kind of machine counts up ballots rapidly. However, if the voter fills over the circle, it will lead to the error result of optical scan.

V. REQUIREMENTS

(a) Arduino Uno

Arduino UNO is a low cost, flexible, and easy to use programmable opensource microcontroller board that can be integrated into a variety of electronic projects.

The board has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header, and a reset button. It can be programmed using the Arduino IDE (Integrated Development Environment), which is an easy-to-use software platform that allows users to write, compile, and upload code to the board.

Arduino Uno can be used for a variety of projects, such as robotics, home automation, data logging, and many more. Its ease of use and availability of a vast range of sensors and components make it an excellent choice for beginners and experienced makers alike.

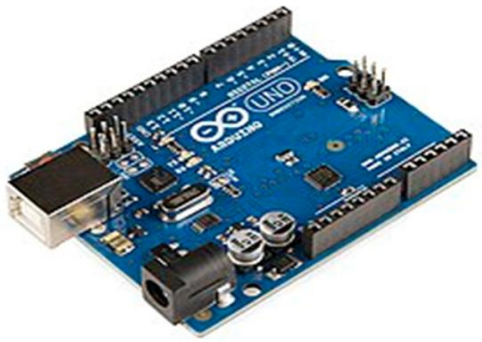

Fig 2: Arduino Uno

(b**) Biometric Sensor R307**

“passive” in the term “passive infrared” refers to the It is used for identity verification and authentication purposes by capturing and analyzing the unique patterns in an individual's fingerprint.

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The captured fingerprint data is stored in the device and compared to the information stored in a database to verify the identity of the user.
The R307 is a biometric fingerprint module that can be used for various applications such as access control, time attendance systems, and other security-related applications. It is a small and easy-to-use module that is based on the optical fingerprint sensor technology.
The R307 module consists of a high-quality optical sensor, a microcontroller, and an algorithm for processing and storing the fingerprint templates. It has a compact size of 37mm x 27mm x 14.5mm, making it easy to integrate into different systems.

Fig 3: Biometric Module R307

(d) ESP8266 Node MCU
ESP8266 is a low-cost Wi-Fi microcontroller chip that is often used for IoT applications and can be programmed using the Arduino IDE software. The ESP8266 can be used to create a Wi-Fi network, connect to existing networks, or act as an access point for other devices to connect.
The ESP8266 microchip is very popular among hobbyists and makers because it is easy to use and relatively inexpensive. It can be programmed using the Arduino IDE or other programming environments and supports a variety of programming languages, including C++ and Micro Python.
The ESP8266 microchip is widely used in IoT projects such as home automation, smart devices, and data logging. It can be used to connect sensors, switches, and other devices to the internet, making it possible to remotely control and monitor them.

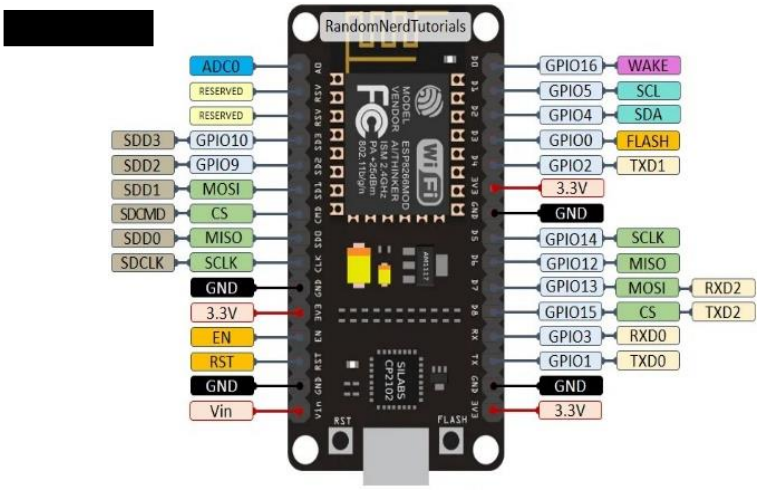

Fig 5: ESP8266 Node MCU

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VI.RESULTS

Step 1: Power on the supply and press enrollment button to enroll the fingerprint first.

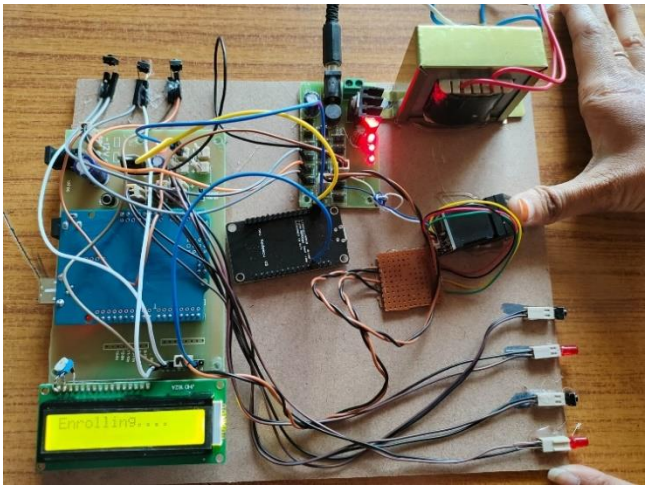

Fig 6: While candidate is enrolling

Step 2: After the enrollment is completed, press the identify push button to perform identification.

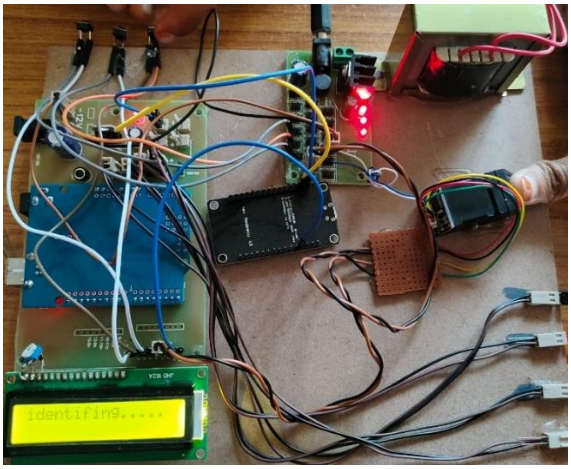

Fig 7: The process of identification

Step 3: If the enrolled fingerprint and identified fingerprint are matched then the authentication is successful and the candidate will be assigned with a unique id number.

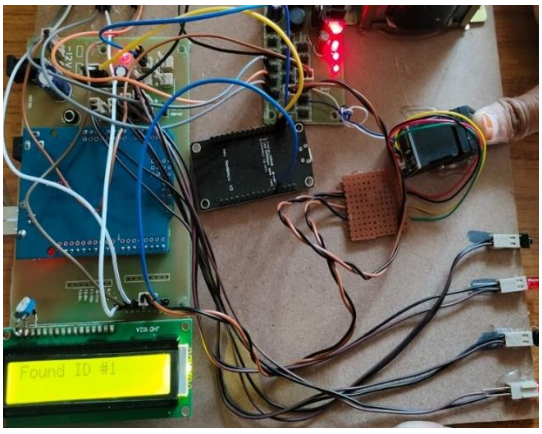

Fig 8: When the candidate's identification is successful

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Step 4: After the authentication is successful, the candidate is eligible to utilize his/her vote.

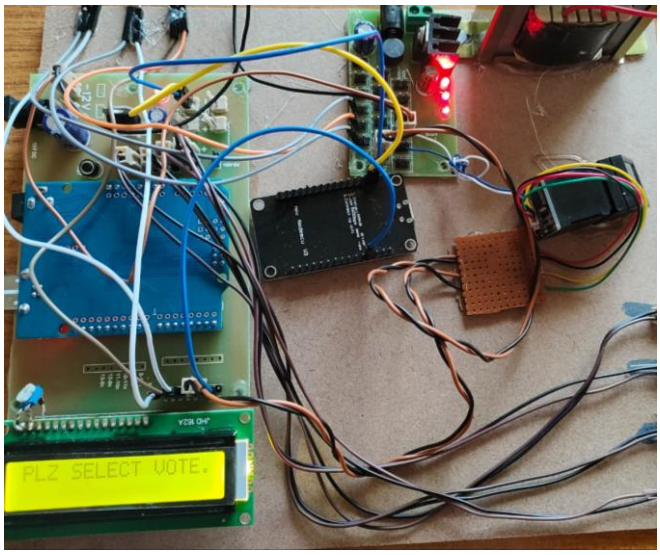


Fig 9: To select vote

Step 5: The selected party name will be displayed on the LCD display.

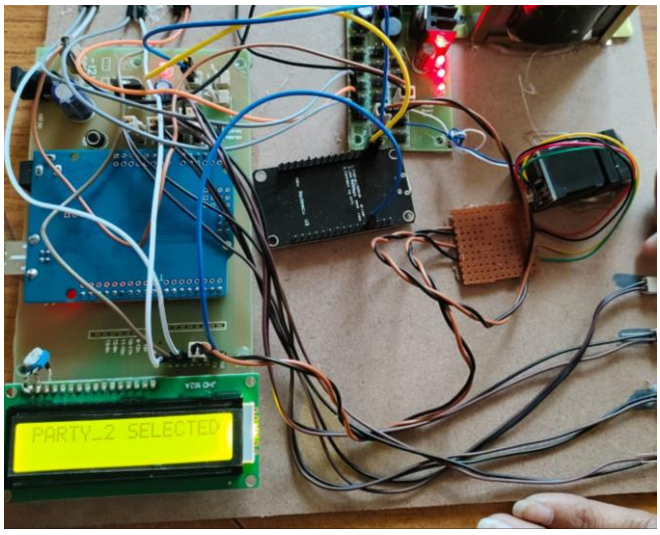
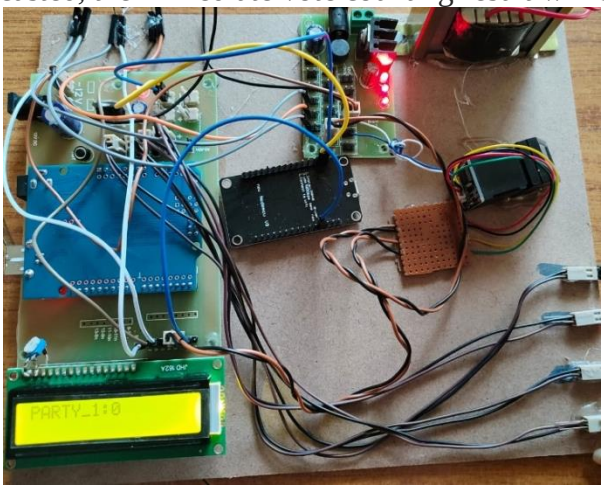


Fig 10: When the candidate selects party_2

Step 6: After the votes are casted, the immediate vote counting result will be displayed as follows.



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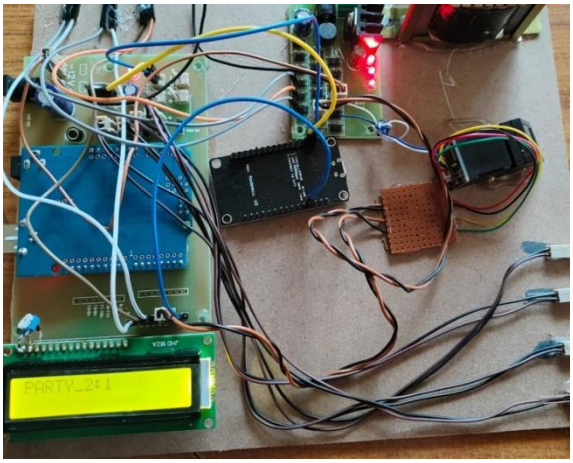

Fig 11: The count of casted votes for party_1 is : 0

VII. CONCLUSION

Hence, the proposed model is simple, cost effective, accurate solution for biased and less secure voting systems which are being currently used. The additional feature present in the proposed system unlike the existing systems is immediate results.

VIII. REFERENCES

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