

BIOMETRIC BASED E-VOTING SYSTEM

¹Pancham S, ²Praveen BM, ³Rakshith K, ⁴Shridhar M Joshi, ⁵Manjunatha B

¹Student, B.E IV Year, ²Student, B.E IV Year, ³Student, B.E IV Year, ⁴Student, B.E IV Year, ⁵Asst. Prof. EEE Dept.

¹Dept. of Electrical and Electronics

¹Vidya Vikas Institute of Engineering and Technology, Mysore, India.

Abstract

India has the largest democracy in the world. Where, elections play's a very important role in the development of a nation. This project work aims at resolving the problem. The current solution for this problem is provide a unique identification for every voter i.e., FINGERPRINT and AADHAR NO. As the unique identification. Which serves the purpose of the election. The voter can access this system without any hesitation as the system provides information about the confirmation of his vote, error statuses. This project proposes a secure online e-voting system that uses UIDAI or Aadhar based as its backend the system ensures the authentication of an individual by matching fingerprints and eligibility is checked by calculating the age of voter thus making the existing voting card redundant. This project also aims to reduce the human errors and increase the speed of operation. This system also prevents multiple voting of an individual. The design of the system will make voting process more convenient and may therefore lead to improve the turnout.

1. Introduction

This project examines policy regarding the electronic approaches and developments towards electronic data storage and transmission. 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 software application and the hardware implementation help the microcontroller read the data from the Finger print verify the data with the already stored data and take the next action. The system is totally designed using Finger print module and embedded systems technology.

The Controlling unit has an application program to allow the microcontroller interface with the Finger print module, the reader reads the data from the tag, passes the data to the microcontroller and the controller verifies this data with the already existing data in the controller's memory and then implement the commands directed by the controller section.

1.1 Literature Survey

- Khasawneh, M., Malkawi, M., & Al-Jarrah, O. (2008). "A Biometric-Secure e-Voting System for Election Process". Proceeding of the 5th International Symposium on Mechatronics and its Applications (ISMA08). Amman, Jordan. - 'It is proposed to use Aadhar Card and Biometric means to conduct Elections in India. The main idea is to introduce the biometric voting system with the linkage of UID. Nowadays UID became inevitable and all the data of the people like finger prints and irises are already collected at the time of enrolment.
- UIDAI. (2012). "Role of Biometric Technology in Aadhaar Authentication"- ' This report focuses on findings of a series of Proof of Concept (PoC) studies carried out by UIDAI from Jan 2011 to Jan 2012 on Aadhaar biometric authentication. The PoC studies focused on fingerprint biometric and its impact on authentication accuracy in the Indian context. This report describes the series of proof of concept (PoC) studies conducted, the design framework of these studies, the analysis of the data obtained from the studies, specific techniques, processes and methods that can improve the authentication accuracy and concludes with a set of recommendations for the Aadhaar Authentication system.

2. Problem Statement and objective

- Multiple voting by an individual during voting process.
- Chances of underage voting.
- Speed of operation is low.
- Chances of human errors.
- Mismatch of votes.

The project demands the user to submit his Finger print at the polling booth. 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 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.

2.1. Methodology and Technology Used

The aim and the objective are clearer due to the data and information has been gathered from the previous literatures. The design model is the result of the hardware and software integration. The design model shows the prototypes, elements, architecture and components of the system. However in order to make this project successful the hardware and the software must be well integrated and organized. Finding the answers to some possible questions that may come up in the primary research is the aim of the secondary research.

An embedded system can be defined as a computing device that does a specific focused job. Appliances such as the air-conditioner, VCD player, DVD player, printer, fax machine, mobile phone etc. are examples of embedded systems. Each of these appliances will have a processor and special hardware to meet the specific requirement of the application along with the embedded software that is executed by the processor for meeting that specific requirement.

The embedded software is also called “firm ware”. The desktop/laptop computer is a general purpose computer. You can use it for a variety of applications such as playing games, wordprocessing, accounting, software development and soon.

Following are the advantages of Embedded Systems:

- They are designed to do a specific task and have real time performance constraints which must be met.
- They allow the system hardware to be simplified so costs are reduced.
- They are usually in the form of small computerized parts in larger devices which serve a general purpose.
- The program instructions for embedded systems run with limited computer hardware resources, little memory and small or even non-existent keyboard or screen.

3. Proposed System

The implementation of the project design can be divided in two parts.

- Hardware implementation
- Firmware implementation

Hardware implementation deals in drawing the schematic on the plane paper according to the application, testing the schematic design over the breadboard using the various IC's to find if the design meets the objective, carrying out the PCB layout of the schematic tested on breadboard, finally preparing the board and testing the designed hardware.

The firmware part deals in programming the microcontroller so that it can control the operation of the IC's used in the implementation. In the present work, we have used the ORcad design software for PCB circuit design, the embedded C software development tool to write and compile the source code, which has been written in the C language. The firmware implementation is explained in the next chapter.

The project design and principle are explained in this chapter using the block diagram and circuit diagram. The block diagram discusses about the required components of the design and working condition is explained using circuit diagram and system wiring diagram.

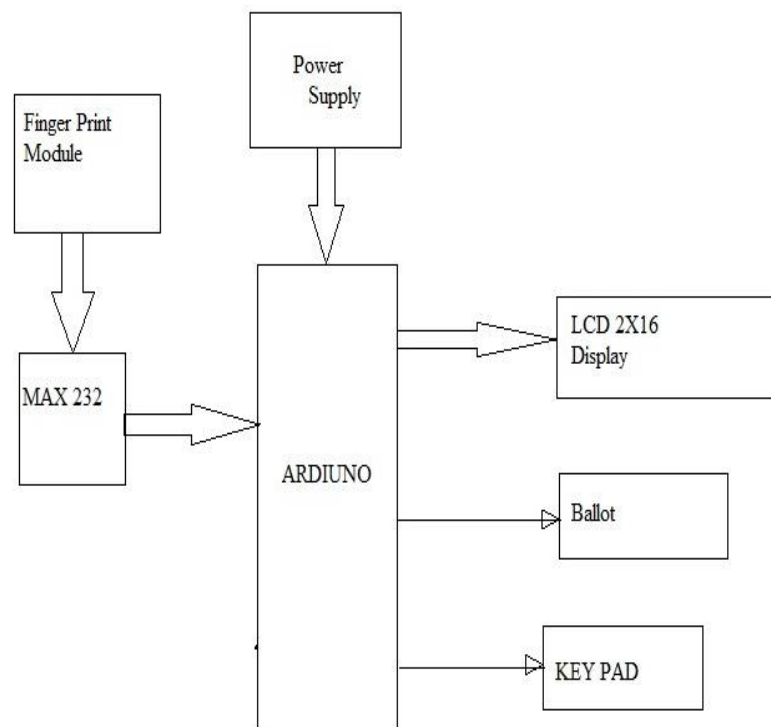


Fig.1. block diagram of the proposed system

3.1 Working Procedure

Voting machine using Finger print is basically an embedded system that makes the things easy in the polling booths during the time of elections. The project Finger print technology and Embedded systems to implement the application.

The user, who wants to poll his vote, has to submit the identity proof at the counter at the polling booth. In this project, the necessary and, up to an extent, the sufficient material, the user no need to carry with him is the Voter card.

Voter card is nothing but a Finger Print which stores the details of the person like the name of the user, location of place, mobile number for contact etc. When the user is asked to show his Finger print. The Finger print module reads the data present.

The working of our EVM a be explained in three modes

1. Enrolling mode
2. Identification and vote casting mode
3. Results

When the power of Ballot unit is turned on, the ballot unit awaits a “READY SIGNAL” from controller. After getting “READY SIGNAL”, ballot unit displays its “welcome to EVM” message on LCD indicating that the machine is ready and waits for user input. The mode of operation depends on command given by the user from the switches.

Enrolling Mode

If enrolling mode command is given, the controller waits for input and activates the scanner to accept the finger print, displaying “Enrolling...” on the LCD display. The candidate’s finger print is scanned and generates a unique characters code. During the character code generation, “GENRATING CHARACTER CODE...” is displayed on LCD. This unique code is stored in the EEPROM memory of the controller for the future reference. After all enrolments the system is ready for vote cast.

Identification and vote casting mode

Before casting the vote the candidate has to check for validity .so after user pressing the identify button the controller displays “identifying...” message. During this mode the fingerprint of the candidate casting the vote is compared with the finger prints already enrolled in the memory. If it is matched a message “PLEASE VOTE.....” will be displayed on LCD. Once the voter presses the button corresponding to the candidate of her/his choice, a four-bit code is generated and sent to the control unit. Once the casting is over message is

displayed to whom they voted for. "No ACCESS." message will be displayed if the same user tries to cast again. The machine returns to the identifying mode and starts all over again for next voting.

RESULTS MODE

The contestant name and the secured votes will be displayed on the LCD when the controller receives results instruction through the switches.

4. Arduino UNO R3

An Arduino is actually a microcontroller based kit which can be either used directly by purchasing from the vendor or can be made at home using the components, owing to its open source hardware feature. It is basically used in communications and in controlling or operating many devices.

Arduino Architecture:

Arduino's processor basically uses the Harvard architecture where the program code and program data have separate memory. It consists of two memories- Program memory and the data memory. The code is stored in the flash program memory, whereas the data is stored in the data memory. The Atmega328 has 32 KB of flash memory for storing code (of which 0.5 KB is used for the boot loader), 2 KB of SRAM and 1 KB of EEPROM and operates with a clock speed of 16MHz

Pin Diagram of Arduino

Arduino Uno consists of 15 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

Power Jack: Arduino can be power either from the pc through a USB or through external source like adaptor or a battery. It can operate on an external supply of 7 to 12V. Power can be applied externally through the pin VIN or by giving voltage reference through the IOREf pin.

Digital Inputs: It consists of 15 digital inputs/output pins, each of which provide or take up 50mA current. Some of them have special functions like pins 0 and 1, which act as Rx and Tx respectively, for serial communication, pins 2 and 3-which are external interrupts, pins 3,5,6,9,11 which provides PWM output and pin 13 where LED is connected.

Analog inputs: It has 6 analog input/output pins, each providing a resolution of 10 bits.

AREf: It provides reference to the analog inputs

Reset: It resets the microcontroller when low.

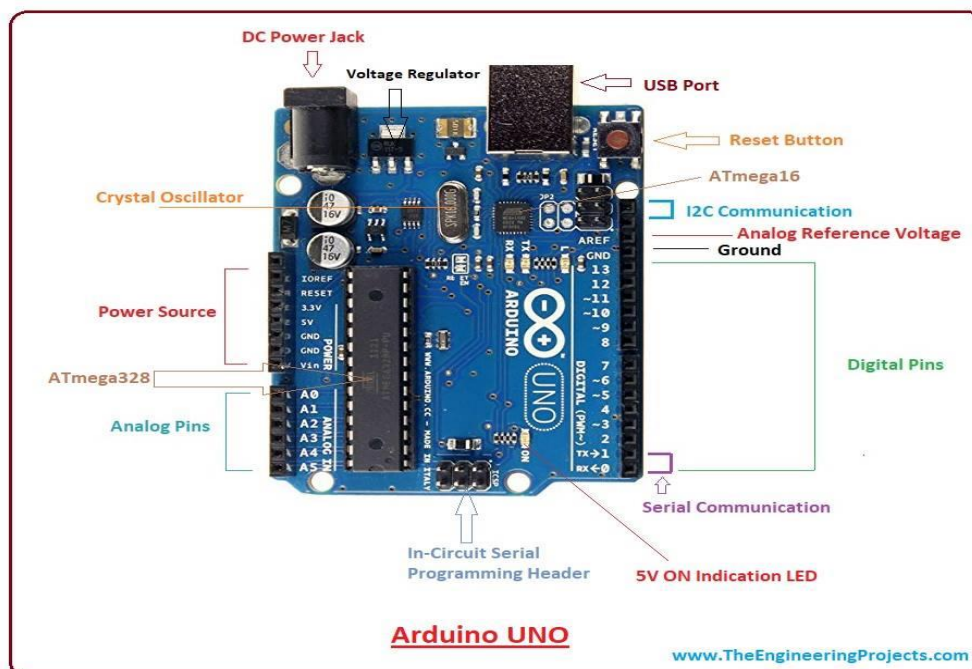


Fig.2 pin diagram of arduino uno r3

5. Conclusion

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.

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.

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.

6 Results and Discussions

In total, the complete system (including all the hardware components and software routines) is working as per the initial specifications and requirements of our project. Because of the creative nature of the design, and due to lack of time, some features could not be fine-tuned and are not working properly. So certain aspects of the system can be modified as operational experience is gained with it. As the users work with the system, they develop various new ideas for the development and enhancement of the project

6.1 Advantages

- 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

6.2 Applications

- This project can be used as a 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 shareholders 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.

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