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RFID BASED BIOMETRIC ELECTRONIC VOTING MACHINE

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ABSTRACT
The main objective of this paper is to design and develop a RFID based electronic voting machine and using fingerprint scanner for authentication for sorting out the wired electronic voting problems. The design is based on the microcontroller (ATmega2560), RS232 cable which is used for interfacing between microcontroller and the fingerprint module, Liquid Crystal Display (16X2) for displaying the instructions and voter information, fingerprint module for scanning voter's fingerprint before voting, RFID reader, RFID tag, Buzzer alarm. If Indian government adopt biometric voting system for voting purpose we can easily avoid rigging in election. Database comprising personal details of all voters and fingerprint are stored in microcontroller for comparing and verification during polling. If already vote casted person enters into booth with his RFID tag for second time voting, then buzzer will alert booth level officer. This electronic voting machine will save time and efforts of human. Thus, the proposed EVM system is more fast and reliable as compared to existing electronic voting system. At the end of the polling, just by pressing the button result can be obtained. The security of data, privacy of the voters and the accuracy of the vote are also main aspects that have to be taken into account while building secure electronic voting system. Overcoming the disadvantages of current voting system, this paper provide a secure and reliable voting system.

KEYWORDS: *RFID, Fingerprint module, LCD Display.*

I. INTRODUCTION

Voting is a method by which the voters appoint their representatives. In current voting system whenever a person goes to the polling booth to poll his vote the voter has to show his voter ID card. This process is a time consuming process as the polling officer has to check the voter ID card with the list he has, confirm it as an authorized voter and then allow the voter to poll his vote. Thus, to avoid this kind of problems, we have designed a RFID based biometric voting machine.

In this voting system, the details of the voter will get from the previously stored database. It was a newly developed database which is having all the information about the voter. By using this database we took the voter's information will be stored in the microcontroller. At the time of elections, for finger print accessing we are using finger sensing module. In this project first RFID tag is verified with the database of ATmega2560 to check whether the voter belongs to that particular polling booth or not, and then fingerprint scanner is used to check whether the voter is original or not. If the data matches with the already stored information, the information is displayed on the LCD display and the voter is allow to cast his vote. If the voter is not enroll in the database of microcontroller, or if the finger print doesn't matches with the database then a message is displayed on LCD display as "ACCESS DENIED", and security alarm will ring to inform the polling officer's and the person is not allowed to poll his vote.

The polling process carries out manually using the switches instead of electronic voting machine. In present Indian voting system, EVMs is powered by an ordinary 6 volts battery. This design enables the use of EVMs throughout the country without any problem because several parts of India don't have power supply. But security is lacking in this system. The voting in most cases is not a fair one

because sometimes same voters vote more than once in order please others. This results in large scale fraud. This system overcomes the disadvantages of the present voting system, this paper provides a reliable, microcontroller and fingerprint security based voting system and Figure1 shows the detailed process of this electronic voting system.

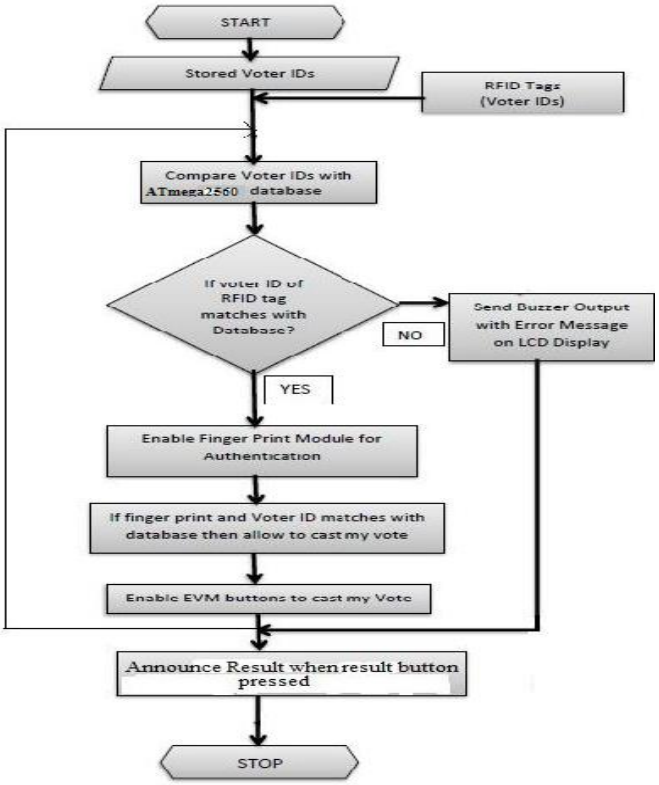

Fig 1. Flow chart of RFID based biometric EVM

II. DESIGN & IMPLEMENTATION

Fig 2. Block diagram of RFID based biometric EVM

The block diagram of RFID based biometric voting machine is shown in the figure 2. The project deals with microcontroller (ATmega2560), fingerprint module, the interfacing unit RS232 that allow the communication between microcontroller and fingerprint module, the RFID module, Buzzer and LCD display for displaying different messages.

When the voter enters the voting place he must have RFID tag that contain the information related to the individual voter. The RFID tag is verified with the database of microcontroller ATmeg2560 to check whether the voter belong to that particular polling booth or not. And then finger print scanner is used to check whether the voter is original or not. If the data matches with the already stored information, the information is displayed on the LCD display and the voter is allow to cast his vote. If the voter is not enroll in the database of microcontroller, or if the finger print doesn't matches with the database then a message is displayed on LCD display as "ACCESS DENIED", and security alarm will ring to inform the polling officer's and the person is not allowed to poll his vote

III. DESCRIPTION

Atmega2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). 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 is compatible with most shields designed for the Arduino Duemilanove or Diecimila. The Mega 2560 is an update to the Arduino Mega, which it replaces. The Mega2560 differs from all preceding boards in that it does not use the FTDI USB-to serial driver chip. Instead, it features the ATmega16U2 (ATmega8U2 in the revision 1 and revision 2 boards) programmed as a USB-to-serial converter. The ATmega2560 is used for controlling purpose and it is used in this project because of the following specification:

Operating Voltage: 5V
Input Voltage (recommended): 7-12V
Input Voltage (limits): 6-20V
Digital I/O Pins: 54 (of which 15 provide PWM output)
Analog Input Pins: 16
DC Current per I/O Pin: 40 mA
DC Current for 3.3V Pin: 50 mA
Flash Memory: 256 KB of which 8 KB used by bootloader
SRAM: 8 KB
EEPROM: 4 KB
Clock Speed: 16 MHz

All other device (like fingerprint scanner, switches, LED, RFID reader) are controlled by the microcontroller. RFID reader reads the data stored in the RFID tag when the voter take his passive RFID tag near the RFID reader. The details of the voter will be displayed on the LCD screen through ATmega2560.The verification of fingerprint of the voter is done inside the microcontroller with the already stored data in its database. The figure given below shows the pin mapping of ATmega2560.

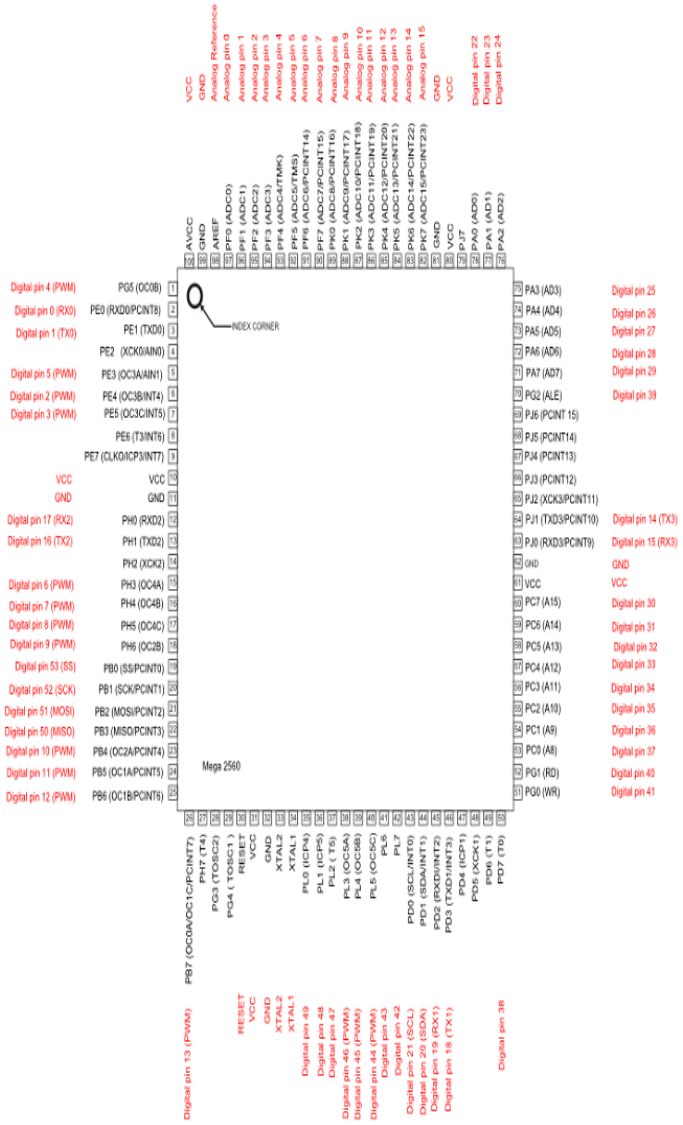

Fig 3: Pin mapping of ATmega2560 and Arduino

Liquid Crystal Display and Buzzer

LCD stand for Liquid Crystal Display. LCD is controlled by the microcontroller. It act as an interface between the user and the microcontroller. The main function of the LCD is to display the different messages i.e "what the user has to do after what". The voter details will be displayed on the LCD screen, when the voter places RFID tag near RFID reader. If RFID tag is not found in the database of ATmega2560 error message will be displayed on the LCD screen as "ID MISMATCHED". If the voter wants to vote twice or if the fingerprints doesn't match with the stored database then message will be displayed on LCD as "ACCES DENIED" and buzzer will ring to inform the higher officer that voter is not valid for voting. And for correct voter it will display "PROCCED", after completion of correct voting process it will display "VOTED SUCCESSFULLY"
The LCD is shown in figure below:

Fig 4: Liquid Crystal Display(16x2)

RFID

A Radio-Frequency Identification system uses tags, or labels attached to the objects to be identified. Two-way radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response. In this project, RFID tag contain the information related to individual voters. Our micro controller ATmega2560 contains the following details such as Name of the voter, voter ID, Date Of Birth of the voter. When RFID tag placed near to RFID reader, RFID reader activate the details of particular information of RFID tag which is preloaded into micro-controller memory. If that RFID tag exists in the database of micro-controller, then biometric authentication process begin. Else, our voting system goes to check next RFID Tag. In this way entire voting process goes on. RFID tags contain at least two parts: an integrated circuit for storing and processing information, modulating and demodulating a radio frequency (RF) signal, collecting DC power from the incident reader signal, and other specialized functions; and an antenna for receiving and transmitting the signal. The tag information is stored in a non-volatile memory. An RFID reader transmits an encoded radio signal to interrogate the tag. The RFID tag receives the message and then responds with its identification and other information. The RFID reader is shown in the figure below:

Fig 5: RFID reader module

Switches

In this project, instead of EVM(Electronic Voting Machine), switches are used to cast vote by voters.. Here four switches have been provided named as SW1, SW2, SW3 and result button. These switches are connected to the LCD and are controlled by microcontroller Each and every switch belongs to different political party except result button. If the person is already enrolled one, then only voter can cast the vote. When voter press a button named as SW1, SW2, SW3 vote is polled for respective political party. This EVM is auto-reset which means when one voter will complete the voting process after few seconds the machine will be reset for the next voter to vote. Like this, entire voting process goes on.

Fingerprint Module

Automated fingerprint identification is the process of automatically matching one or many unknown fingerprints against a database of known and unknown prints. Finger print module is the important part of the EVM. It is used for scanning the finger print of the voter to ensure whether the voter is original or not, before starting the voting process and all the process of scanner is controlled by the ATmega2560. The scanner is connected to the micro-controller through a cable called “MAX232”.

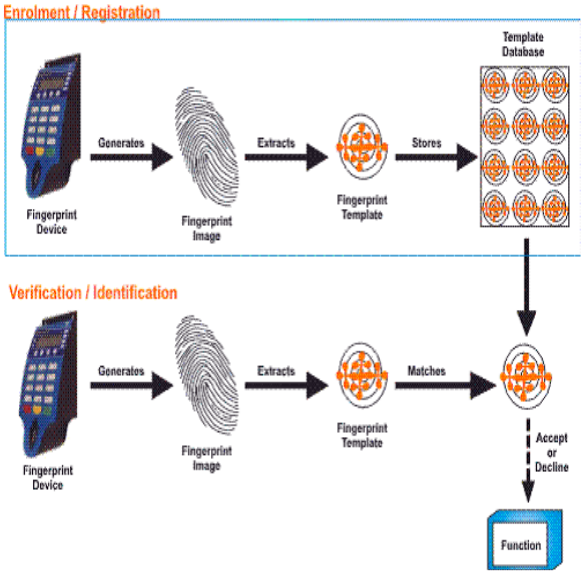

Fig 6: Finger Print Enrolling & Verification

IV. SOFTWARE USED

Arduino

It is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. The Arduino project provides an integrated development environment (IDE) based on the Processing project, which includes support for the C and C++ programming languages. The IDE which is a cross-platform and is written in Java and based on the Processing development environment. The coding of the microcontroller is done using this software. It automatically generates .hex file in the temporary file location of "C drive".

V. CONCLUSION

The Electronic Voting Machine using RFID and fingerprint module has been designed successfully. Database consisting of the details like name, address, age, gender, fingerprint of the people should be updated every time before election. This Electronic voting systems have many advantages over the present voting system. Some of these advantages faster tabulation of results, improved accessibility, greater accuracy, and lower risk of human and mechanical errors. This system affords additional security by allowing voter to vote only once by imparting unique identification i.e fingerprint. It is very difficult to design an ideal e- voting system which allows perfect security and privacy with no compromise.

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BIOGRAPHIES

Narendra Singh Pal Currently working as a Assistant Professor in department of ECE in M.I.T, Moradabad has a teaching experience of 6 years. He received his B.Tech(EC) degree from Moradabad Institute Of Technology in 2006 and also received his M.Tech (VLSI Design (EC)) degree from NIT, Jalandhar(Punjab) in 2011. His area of interest are Solid state devices, Digital VLSI. He presented papers in various conferences.

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