Development of Arduino based Cost Effective and Securable Voting Machine

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***Abstract*-The voting machine is widely used all over the world. In few countries the government still uses conventional paper ballot box system. But, majority of the countries are switched over to Electronic Voting Machines. Being the World's largest democratic country, India also uses the Electronic Voting Machines (EVMs). Even though many advanced prototypes and EVM machines are available in the market, the main problem is, most of the machines neither standalone nor have a secured circuit. Those machines are easily connectable to Internet, which may question their security of the vote count. The cost of the EVM in market is above twenty thousand due to the proprietary software and hardware. This even leads to the extra cost of production and service of the machines in future. This paper proposes a cost effective and securable voting machine using ATmega328P microcontroller. The voting process has controller phase, polling phase and counting phase. In the controller phase, the verification of voter's information is performed to permit the voter to vote. During the polling phase, the voter is allowed to record his/her vote only once by pressing the push button adjacent to the logos of party for whom they want to vote. The vote counts of each party will be updated in the internal EEPROM memory of polling machine and also in the cloud database in a secured manner. During the counting phase, the personal computer will be interfaced with polling machine to know the total number of individual party's votes. If any further clarification on vote count is needed the vote count of each party in cloud database will be taken in to account for verification. It can be used for Lok Shaba, Rajya Shaba elections and even for private organisation elections. This system is cost effective, easy to operate and has fast counting capability.**

Keywords— ATmega328P, Cloud, and Voting Machine.

I. INTRODUCTION

The world's largest democratic country India started to conduct its Lok Shaba and Rajya Shaba elections by means of the electronic voting system. This system uses Electronic voting machines (EVMs) manufactured by government owned BEL laboratories situated in Bangalore, Karnataka and Electronics Corporation of India Limited, Hyderabad [1, 5]. The machine was designed under the supervision of well-known writer Sujatha alias Rangarajan. The main reason behind the EVMs is lack of transparency in paper ballot box. The votes in the paper ballot are often being misplaced or hike-counted by the supporting officials. The party loyalist officials do count fake bills. The printed ballots usually cost high and also need manpower in counting billions of papers and this is really not a easy task [2, 3] .This problem grew between the 1950s and 1980s and became a serious and large scale problem in states such as Uttar Pradesh and Bihar, later spreading to Andhra Pradesh, Jammu and Kashmir and West Bengal accompanied with election day violence. Another logistical problem was the printing of paper ballots, transporting and safely storing them, and physically counting hundreds of millions of votes [4]. The ballot tampering cases are proved all over the country it became unstoppable so the government was in a situation to solve this by replacing the complete system with a new one.

II. PROPOSED SYSTEM

The main objective of this work is to provide additional functions to the voting machine which are mandatory in this digital era. Proper security options (i.e), password protection must be enabled at various stages. All these are done with the help of Arduino. Nowadays many privileges are allotted to different officials in election commission; all of them must enter their password to begin the voting process. If wrong password is entered it shows error code only, and also crossing a two level password protection isn't that much simple. The block diagram of the proposed system is shown in Figure 1.

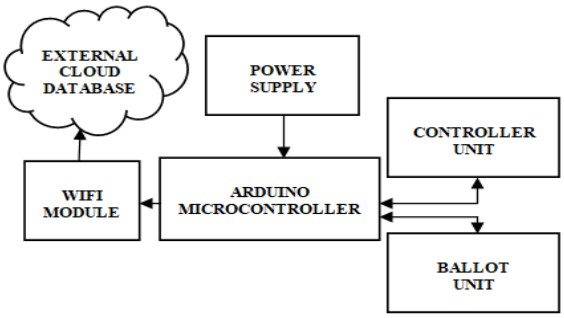


Fig. 1. Block diagram of the proposed system

The voters place their finger on the fingerprint scanner in the controller unit. The fingerprint verification is done by ATmega328P microcontroller. Once the fingerprint is verified successfully, the voter is allowed to record a single vote for any candidate. The vote is recorded by pressing the button in the ballot unit. After recording the vote, the individual votes are stored in the polling machine and also in external cloud database. The cloud database is secured with the password.

A. ARDUINO

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board**.** It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, 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 an AC-to-DC adapter. Arduino Uno has a number of facilities for communicating with a computer, another Arduino board, or other microcontrollers.

B. WIFI MODULE

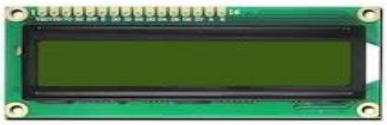
The Node MCU is an open-source firmware and development kit that helps you to prototype your IOT product within a few Lua script lines. The features of a Wi-Fi modules are Open source, Interactive, Programmable, Low cost, Simple, Smart ,WI-FI enabled Arduino-like hardware IO Advanced API for hardware IO, which can dramatically reduce the redundant work for configuring and manipulating hardware.

C. ATMEGA328P

The ATmega328P is present in controller unit is a single chip controller created by Atmel in the mega AVR family (later microchip technology acquired Atmel in 2016). It has a modified hardware architecture 8-bit RISC processor core. The device operates between 1.8-5.5V

D. LCD DISPLAY:

LCD (Liquid Crystal Display) is the technology used for displays in notebook and other smaller computers. Light-emitting diode (LED) and gas-plasma technologies, LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it.



E. FINGER PRINT SCANNER

A fingerprint is an impression of the epidermal ridges of a human fingertip. A hierarchy of three levels of features, namely, Level 1 (pattern), Level 2 (minutiae points) and Level 3 (pores and ridge shape) are used for recognition purposes. Most AFISs employ Level 1 & Level 2 features. Level 1 features refer to the overall pattern shape of the unknown fingerprint-a whorl, loop or some other pattern. Level 2 features refers to specific friction ridge paths-overall flow of the friction ridges and major ridge path deviations.High resolution sensors (~1000dpi) are required for extraction of Level 3 features. EER values are reduced (relatively ~20%) using them along with Level 1 & 2 features. Moreover Level 3 features offer greater success in partial fingerprint recognition.Fingerprint sensing techniques can be of two types – offline scanning and live-scanning. In off-line sensing fingerprints are obtained on paper by "ink technique" which are then scanned using paper scanners to produce the digital image. Most AFISs use live-scanning where the prints are directly obtained using an electronic fingerprint scanner.

F. BALLOT UNIT

The ballot unit is the part in which the voter record their votes by pushing the appropriate buttons aside the party Logo's. It consists of the push buttons soldered on a PCB board.

III. IMPLEMENTATION AND RESULT

The implementation and result of the proposed system is shown in Figure 2.

Fig. 2. Implementation and result of the proposed system

IV. CONCLUSION

This proposed voting system can be used in all kind of elections. This is a cost effective and user friendly machine and at the same time it is very secure. This machine is based on only open source software and hardware.

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