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GSM Based Voting Machine System

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Abstract

Electronic voting systems have the potential to improve traditional voting procedures by providing added convenience and flexibility to the voter. In the traditional voting, such as, the electronics voting and paper based voting, percentage of voting is decreasing.Numerous electronic voting schemes have been proposed in the past, but most of them have failed to provide voter authentication in an efficient and transparent way. On the other hand, GSM (Global System for Mobile communications) is the most widely used mobile networking standard. There are more than one billion GSM users worldwide that represent a large user potential, not just for mobile telephony, but also for other mobile applications that exploit the mature GSM infrastructure. By integrating an electronic voting scheme with the GSM infrastructure, we are able to exploit existing GSM authentication mechanisms and provide enhanced voter authentication and mobility while maintaining voter privacy.

Keywords: GSM, Microcontroller, Voting Machine,

1.Introduction

Voting is a vital part of the democratic process. As such, the efficiency, reliability, and security of the Technologies involved are critical. Traditional voting technologies include hand-counted paper ballots. These paper-based systems can result in a number of problems, including: Unacceptable percentages of lost, stolen, or miscounted ballots, Votes lost through unclear or invalid ballot marks, Limited accommodations for people with disabilities today, the development and widespread use of information technologies is changing the way people view voting processes and, ultimately, the way they vote.In democratic societies, voting is an important toll to Collect and reflect people's opinions. Traditionally, voting is conducted in centralized or distributed places called voting booths. Voters go to voting booths and cast their votes under the supervision of authorized parities.

The votes are then counted manually once the election has finished. With the rapid development of computer technology and cryptographic methods, electronic voting systems can be employed that replace the inefficient and most importantly error-prone human component. To increase the efficiency and accuracy voting procedures, computerized voting systems were developed to help colleting and counting the votes. These include lever voting machines, punched cards for voting, optical mark-sense scanners and direct recording electronic (DRE) voting systems. For a variety of reasons voters may be unable to attend voting booths physically, but need to vote remotely, for example, from home or while travelling abroad. Hence, there is grade demand for remote voting procedures that are easy, transparent and most importantly, secure. Today, the most common way for remote voting is postal voting, where voters their votes by post. However, it lacks proper authentication and involves a time-consuming procedure. To improve mobility, address security problems of remote voting procedures and systems. We present an electronic voting using GSM. With more than one billon users, the GSM authentication

infrastructure is the most widely authentication mechanism by far.

2.Evaluation of Voting Equipment

In the recent years, voting equipments 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. Handcounted 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 necessary.

(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 voter's 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.

3. Comparison of E-voting System:

Besides many vendors to develop and sell commercial electronic election machines, there are various open source E-voting systems. We cite some examples as following:

(1) AccuVote-TS: AccuVote-TS's vendor is Diebold Election Systems. This system includes touchscreen, card reader, keyboard, headphone, and paper tape printer. The voter selects his favorite candidate on touchscreen, and the vote will be printed on the paper tape. Its design balances the policy, electoral procedure and technology. But all the electoral information (including identity authentication, audit, or counting of votes) are stored in Microsoft Access database without setting password so there are high risks of attack.

(2) iVotronic: The vendor of iVotronic is Election Systems and Software (ES&S). iVotronic provides multi-language, and uses flash memory to save voting records. Electoral workers use PEB (Personal Electronic Ballot, a device which is similar to disk) to start polling machine up. When the election is finished, the workers use PEB to access voting records in the polling machine, then delivers PEB to electoral center or transmits data from network. Because the PEB's password is only three characters, the risk of password breaking exists. This system have made mistake in the past elections, such as the number of voters is not corresponding between master server and backup server, the candidate selected on the ballot is not the voter's selection, and so forth.

(3) eSlate 3000 Hart: InterCivic invented eSlate 3000. The voter gets a personal identity number (PIN) as four digits from electoral workers, then goes to the booth to input the PIN into polling machine to login. He can rotate selector wheel to select the candidate whom he want to poll for. Each terminal connects to the server which is named JBC (Judges Booth Controller). Counting of votes will send to JBC from every terminal by network, then

save it in MBB (Mobile Ballot Box). This system doesn't encrypt voting data, so there are some risks of data security. Furthermore, the electoral functions are not protected with password, anyone, even the voter, can finish the election.

(4) AVC Edge AVC: Edge is a multi-language polling machine which is manufactured from Sequoia Voting Systems. This machine includes touchscreen and flash memory for saving voting recorded, and its electoral procedure is similar to a foregoing E-voting machine, Accu VoteTS. There were some stumbles when this machine operated in the elections. For example, the E-voting system crashes when the user chose language; the counting of votes is not correct; and the ballot became blank because of the system breakdown.

Flow Chart Of Gsm Based Voting Machine

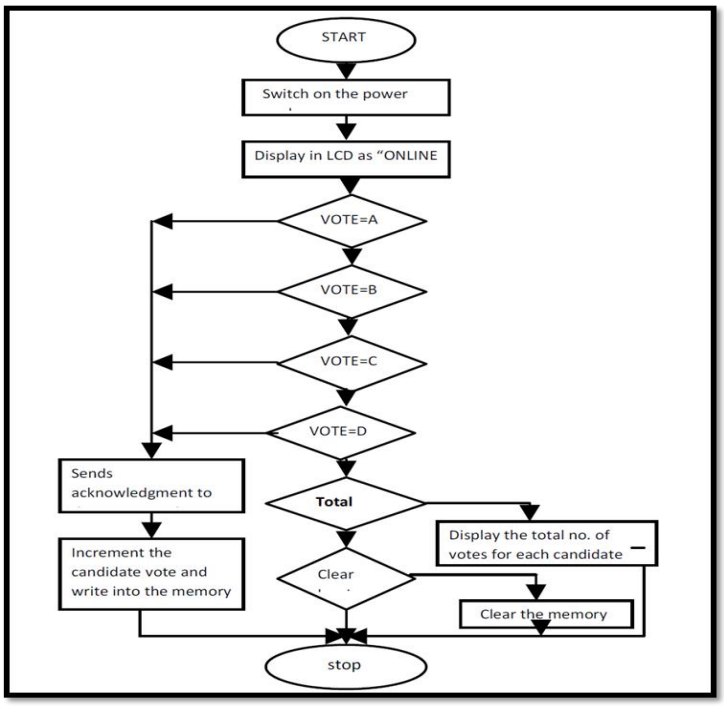

Fig 1: Flow Chart of GSM Based voting system

4. Hardware Description

GSM MODEM: Global System for Mobile Communication (GSM) is an open, digital cellular technology used for transmitting mobile voice and data services, along with the transmission of SMS (Short Message Service). GSM modem is a mobile phone without any display, keypad and speakers. It accepts a SIM card and operates over a subscription to a mobile operator and is capable of operation in four different frequency bands but the most common are 900 and 1800 MHz. The transmission rate of GSM is 9.6 kbps. The GSM modem has capacitors and resistors for their proper working and LEDs for indicating the network status. The network status pin does depict the status of accessing network right away when we turn the circuit "ON". To represent it we used a green LED whose status will be that it will blink rapidly when like to acquire network and blink slowly after the assessment of network. The protocol used by GSM modem for setup and control is based on the Hayes AT- Command set. AT is the abbreviation of Attention. GSM AT commands are extension commands. For example, +CMGS (Send SMS message), +CMGL (List SMS messages), and +CMGR (Read SMS messages) are extended commands. The main objective of this application is whenever accident occurs it will send message and location of vehicle which is accessed using GPS to pre-programmed number. GSM(Global System Mobile) is a digital communication system which has rapidly gained acceptance and market sheared worldwide. Mobile services based on GSM technology were first launched in Finland. GSM, together with other technologies, is part of the evolution of wireless mobile telecommunications that includes High-Speed Circuit-Switched Data (HCSD), General Packet Radio System (GPRS), Enhanced Data GSM Environment (EDGE), and Universal Mobile Telecommunications Service (UMTS). GSM is a digital wireless communication protocol for mobile phones. It is provided with many other useful features such as security, authentication and the ability to

switch phones without the need to reconfigure the phone with the existence of the SIM card. The GSM network can be divided into three parts. Mobile Station Base Station Network Subsystem

Fig.No2: GSM Modem

LCD DISPLAY:l6*2 LCD is used in 8 bit data mode to display the current status of vehicle. It takes a 5V supply to power up the circuit. All the data pins of LCD from DB0 to DB7 are connected to the Port B of the microcontroller. The control pins i.e. RS, R/W and E are connected to the Port A of ATmega 16.

INFRARED SENSORS Infrared (IR) sensor is an electronic device consisting of transmitter and receiver LED. The transmitter LED continuously emits IR rays and when an object is close to the sensor, the rays bounce off the object and received into the receiver LED. Infrared sensors are generally used in IR imaging devices, gas analyzers, and radiation thermometers. IR sensors are used in this system to track the voter count which is used at later stage for analysis of polling results. 3.3. Liquid Crystal Display A Liquid Crystal Display is dot matrix display that displays alphanumeric characters and symbols. Liquid crystal displays are used in battery-powered devices, such as digital watches, calculators, digital thermometers etc. 16X2 LCD has been used in the modeled system to display the candidate information and polling results.

POWER SUPPLY Five volts power supply w.r.t ground is required for the operation of the microcontroller. Fig. 3 shows the circuit for the power supply used in the system. Figure 3: Power Supply The step down transformer steps down the ac supply from the mains and bridge rectifier converts it into dc. This dc is passed through filter circuit to get a more smoothened waveform. Voltage regulator produces a fixed output voltage that remains constant irrespective of changes in its input voltage and load conditions. 7805 voltage regulator is used here, which gives +5 V outputs which is then given to microcontroller for its operation.

CRYSTAL OSCILLATOR: It is an oscillator circuit that deploys the property of mechanical resonance of the piezoelectric crystals for creating an accurate electrical signal. The frequency of the crystal by keeping a track of time, provides clock signal to the microcontroller. Quartz crystal of frequency 4 MHz is used in the proposed system. Quartz crystals are used in wrist watches, calculators, counters, signal generators, and oscilloscopes.

MICRO CONTROLLER PIC18F4520: Circumstances that we find ourselves in today in the field of microcontrollers had their beginnings in the development of technology of integrated circuits. This development has made it possible to store hundreds of thousands of transistors into one chip. That was a prerequisite for production of microprocessors, and the first computers were made by adding external peripherals such as memory, input-output lines, timers and other. Further increasing of the volume of the package resulted in creation of integrated circuits. These integrated circuits contained both processor and peripherals. That is how the first chip containing a microcomputer, or what would later be known as a microcontroller came about.

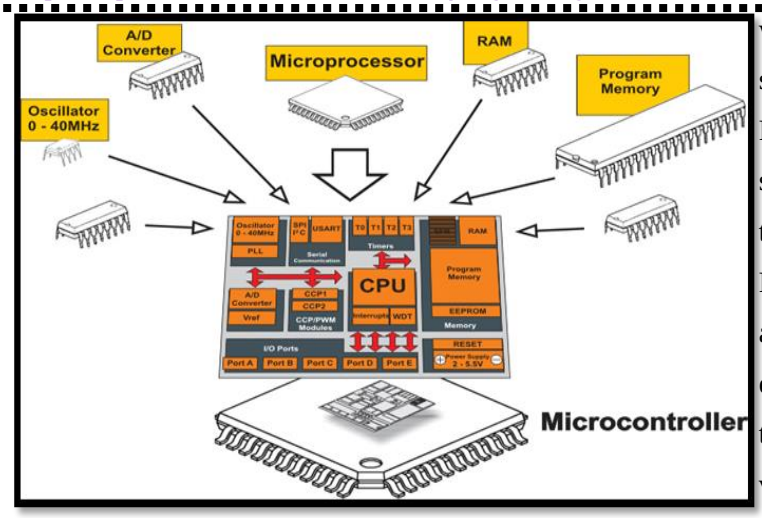

Fig.No3:Assembly of IC.

5. Software Description

1.PROTEUS

PROTEUS is free PCB software and is a snap to learn and use. Designing circuit boards is simple for the beginner and efficient for the professional. The board manufacturing service makes top quality two and four layer PCBs.

2.**EMBEDDED C**

Embedded C is used for microcontroller programming. There is a large and growing – international demand for programmers with 'embedded' skills, and many desktop developers are starting to move into this important area. Because most embedded projects have severe cost constraints, they tend to use low-cost processors like the 8051 family of devices considered in this paper.

3.MPLAB 8.84

MPLAB development tools for the PIC16F877A Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. The Keil 8051 Development Tools are designed to solve the complex problems facing embedded software developers.

4.**CONCLUSIONS:**A GSM based voting machine design with voter tracking has been proposed in this system which is found to be appropriate. The software of the system has been written in Embedded C language and Proteus Professional Software has been used for simulating the behavior of the machine. The simulation of the machine is working properly under normal conditions. Polling switches are used to give votes to the candidates and infrared sensors have been used to track the voter entries. The count of the voter entries previously stored in the register is matched with the total votes casted and votes rejected to avoid any mistakes thus making the system more protected. After the voting process has been over, the results are displayed on the machine LCD by entering the correct password and sent to the monitoring station via GSM for analysis and the declaration of the final verdict. Table 1 shows the comparative study of different voting systems. The design presented here is cost effective, highly secured and appropriate according to the modern day requirements

6. Future Scope

The design of the GSM based electronic voting machine with voter tracking proposed in this paper is accurate and it can be further improved in terms of power consumption using advanced VLSI application.

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