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Development of Secure Electronic Voting System with Touch Screen and Finger Print Authentication

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ABSTRACT: The elections are heart and soul of any democracy of a country. In modern era accurately conducting of elections is difficult to Election Commission (EC); especially like India, as it has possessing more than seventy crores voters. It is very primary duty to avoid rigging, malpractice and pack voters. Elimination of these factors improve the efficiency of the election process. Electronic Voting Machines having their own advantage but it also having some disadvantages like not able to avoid in valid votes and rigging. By taking all these points in to consideration, in the present work we proposed to develop Secure Electronic Voting Machine (SEVM) one step ahead to enhance efficiency factor. The proposed SEVM consisting of finger print module, raspberry pi board, Touch based Graphical LCD panel and also it having voter information storage (Thumb impression) and management system. The software is developed in embedded Qt4 GUI with C++ in embedded Linux platform. The developed proposed system is tested and the performance of the SEVM is working successfully and consistently.

KEYWORDS: SEVM, finger print module, touch panel, Embedded Linux, Qt4.

I.INTRODUCTION

Election process in democracy country is an important event and it decides the rulers of the country on which the development of counts will depend. Having such importance it forces to move towards illegal activities by aspirants. It pose the duty to Election Commission (EC) to conduct elections in good accuracy and efficient manner [1]. By avoiding of fake voters, rigging and malpractices in elections improves the accuracy. In present electronic communications development trends gives world became very small. To enhance the quality of election process we adopted these advanced technology trends [2]. This new technology refers to electronic voting systems where the election data is recorded, stored and processed primarily as digital information. In the past, usually information security was used mostly in military and government institutions. But, now need for this type of security is growing in everyday usage. The disadvantage associated with the existing voting system is overcome by the Secure Electronic Voting Machine (SEVM). It ensures people about their vote being secured. It avoids any kind of malpractice and invalid votes and also there kind of system becomes more economical as consequent expenditure incurred on manpower is saved. It is also convenient on the part of voter, as he has to just press on touch screen's button to cast vote to the interested candidate.

Voting machines are the combination of mechanical and electronic equipment including firmware and software is used to define ballots to cast and count votes to report or display election results also [3]. In a traditional biometric recognition system, the biometric template is usually stored on a central server during enrolment. The candidate biometric template captured by the biometric device is sent to the server where the processing and matching steps are performed .The field of biometrics was formed and has since expanded on to many types of physical identification. Still, the human fingerprint remains a very common identifier and the biometric method of choice among law enforcement [4]. These concepts of human identification have led to the development of fingerprint scanners that

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serve to quickly identify individuals and assign access privileges. Finger print recognition, the electronic methods of recording and recognizing an individual finger print, advanced substantially during the last decade of the 21th century. As a result, the use of SEVM that record, store, search, matches and identifies true voters. The present paper describes the SEVM which can be integrated with a microcontroller and other peripheral to form an embedded system is a comprehensive SEVM with voter's identification system.

II.HARDWARE

The block diagram of Secure Electronic Voting Machine (SEVM) shown in Figure-1, having following units. They are:

1). Graphical Touch Screen LCD display
2). Finger print Module
3). Raspberry PI Processor (broad cam 2835)
4). Power Supply
5). Personal Computer

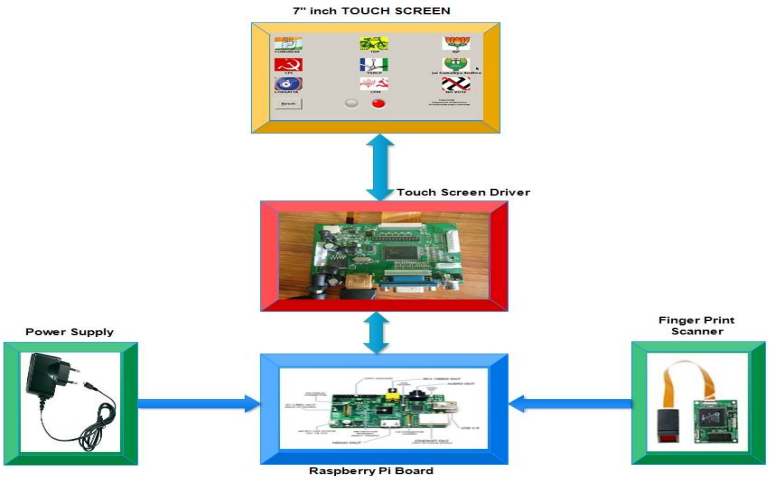

Figure-1 The block diagram of touch screen based SEVM

A. GRAPHICAL LCD DISPLAY (TOUCH SCREEN)

Graphical LCD with touch screen provides good GUI and it works on bases of four - wire resistive technology is the simplest to understand and manufacture. It uses both the upper and lower layers in the touch screen "sandwich" to determine the X and Y coordinates. Typically constructed with uniform resistive coatings of indium tin oxide (ITO) on the inner sides of the layers and silver bus bars along the edges, the combination sets up lines of equal potential in both X and Y [5]. The controller first applies 5V to the back layer. Upon touch, it probes the analog voltage with the coversheet, reading 2.5V, which represents a left-right position or X axis. It then flips the process, applying 5V to the coversheet, and probes from the back layer to calculate an up-down position or Y axis. At any time, only three of the four wires are in use (5V, ground, and probes).

B. FINGER PRINT MODULE

In the present developed system the secure is provided by integrations finger print module with RPI. A fingerprint is an impression of the friction ridges of all or any part of the finger and friction ridge is a raised portion of the epidermis on the pal mar(palm and fingers)or plantar (sole and toes) skin, consisting of one or more connected ridge units of friction ridge skin. These ridges are sometimes known as "dermal ridges" or "dermal papillae". Fingerprint-

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based identification can be placed into two categories depending on the type of parameter used for comparison [6]. First one is Minutiae-based matching (Analyzing the local structure) second is Global pattern matching (Analyzing the global structures). Currently the computer aided fingerprint recognition is using the minutiae-based matching. Minutiae points are local ridge characteristics and appear as either a ridge ending or a ridge bifurcation. In present work The FIM3030N fingerprint module was used**.** General Descriptions FIM30N is a low-price stand-al one Fingerprint Identification Device with many excellent features. It provides benefits such as high identification performance, low power consumption and RS232 serial interface with the various commands for easy integration into a wide range of applications. It is a durable and compact device with fingerprint identification module containing NITGEN® optics-based fingerprint sensor inside.

Raspberry PI (Broadcom 2835)

In 2008 Raspberry Pi Foundation belongs to Eben Upton of the University of Cambridge (England) Computer Laboratory Developed low-cost Commodore-64s and TRS-80s of previous generations that allowed a simple programming platform. It consist of a model A and model B. Both models contain many of the same components including a USB connector, HDMI slot, and a 3.5mmaudio jack. Each version also requires an SD card that the Pi will use to boot with and use for its local persistent storage[7]. The processor is a 700 MHz arm6 chip9. For these same reasons its also a good choice for the Raspberry Pi. It having the ARM11 processor is a 32 bit RISC. 512MB of RAM, Two USB port, Ethernet port, SD card socket, HDMI (hidef digital video/audio) port, Analog sound output, Analog (composite) video output, General purpose digital input/output pins and Media Center / DVR . it using worldwide in thousands of different projects.

SOFTWARE DEVELOPMENT

In the present work the software for the touch screen board SEVM was developed using embedded Linux and its GUI C++ with QT. Linux is one of the few, ever expanding endeavors itself is a kernel, but 'Linux' in day to day terms rarely means so. Embedded Linux generally refers to a complete Linux distribution targeted at embedded devices [8]. There is no Linux kernel specifically targeted at embedded devices, the same source code can be built for a wide range of devices, workstations, embedded systems, and desktops though it allows the configuration of a variety of optional features in the kernel itself. In the embedded development context, there can be an *embedded Linux system* which uses the Linux kernel and other software or an *embedded Linux distribution* which is a prepackaged set of applications meant for embedded systems and is accompanied by device.

QT Programming

The Qt framework first became publicly available in May 1995. It was initially developed by Harvard Nord (Troll tech's CEO) and Eirik Chambe-Eng (Trolltech's Chief Troll).Qt has long been available to non-C++ programmers through the availability of unofficial language bindings, in particular PyQt for Python programmers [9]. Qt's popularity has grown unabated and continues to grow to this day. This success is a reflection both of the quality of Qt and of how enjoyable it is to use. In the past decade, Qt has gone from being a product used by a select few "inthe know" to one that is used daily by thousands of customers and tens of thousands of open source developers all around the World.

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III. RESULTS AND DISCUSSIONS

The SEVM is successfully developed and implemented which is shown in figure-2

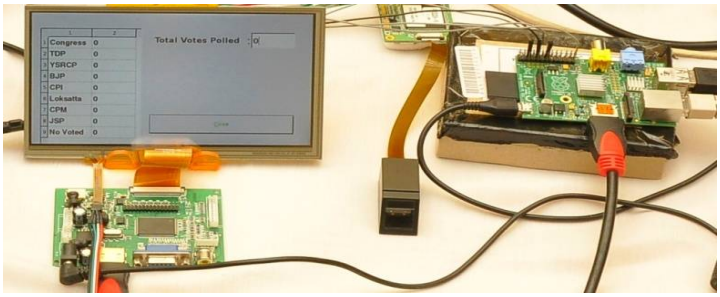

Figure-2 The complete system of a touch based SEVM.

As the present work is focused on the design and development of SEVM, for the authentication of voter. The process of the developed system is presented here in various successive screen shots and it is having more advantages as compared with the traditional and other electronic systems in the points of cost, flexibility, portability and effortless understanding, use and maintenance. The developed touch screen based SEVM is tested for all the functions and observed that the system working very accurately. It gives confidence in voting system; only the legitimate voter is allowed to gain access to voting. The system is user friendly, in the sense that the user can easily understand the system although the user is a first time user. This is because the design is simple, and over all we conclude the SEVM is an emerging field and there is a good scope for research and development to implement more features.

. The software of present work consists of the following menu's shown in figure-3 such as Voter identification, Voting sheet, Counting and Exit. The next screen shot gives the starting condition (zero votes cast) of the voting machine as shown in figure-4.

Figure-3:Main window of Electronic Voting Machine

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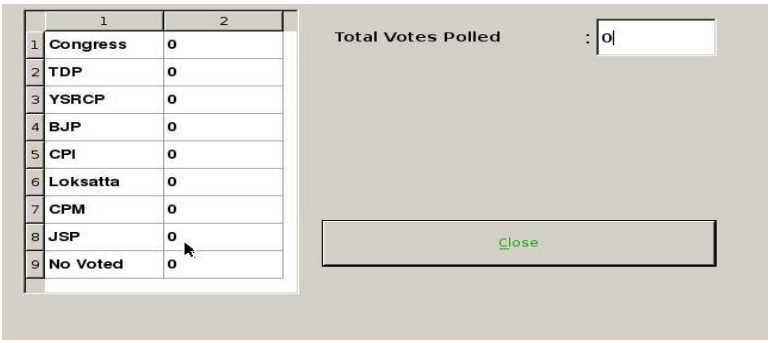

Figure-4: Initial condition status before starting Election process with SEVM.

The next step is Voter identification by SEVM using Finger print module. This unit provides authentication to the actual voter thumb impression. When the thumb is placed on the finger print scanner, the scanner checks the thumb impression already stored in the memory and if displayed on the screen as thumb is matched with it, then a message "access granted", if it doesn't match, the message is "access denied" shown in figure 5.

Figure-5: message window of Access Granted or denied.

The next step involved in voting process is to display voting sheet of this button is selected. It represents the sheet of different party symbols allotted for the different contested candidates. If the voter touch any symbol on the screen then the red indicator changes to green the vote is voted to the interest person by the voter and immediately menu comes the green to voting sheet. After the voting same process is continued up to end time of the voting process and finally machine is sealed and secure box by the electoral personal.

Figure 6: window before and after voting by the voter.

The final step involved in the voting process is counting. The SEVM's stored in process, the BEVM's shows the total votes are store on the "TOTAL VOTES POLLED". To count the votes, we have to touch the option of counting,

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then immediately the BEVM displays the results as given in figure-7. From the above will give all the details pertaining to each party symbol. By pressing EXIT button it come out from the process. Strong room will back to the counting halls and the counting will be done in the presence of all involved in this counting process. When, we press the counting button, the SEVM displays the following results as shown in figure 7.

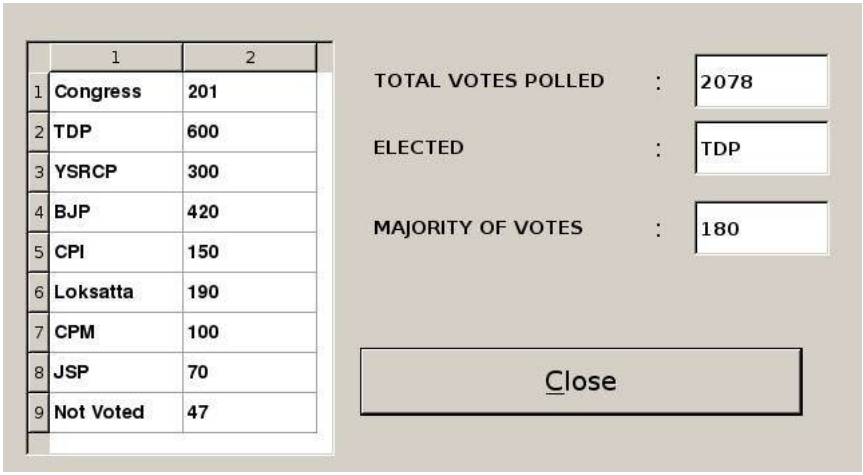

Figure-7: window of counting sheet after polling completed**.**

FUTURE SCOPE OF WORK

As we discussed above, the present work will be enhanced for the future. It present it is limited to only one booth to store all the information about nominated/ elected candidates as per voter. This work can be enhanced in future by storing all the polling booth's information of one constituency in main server by secure and safety system introducing with GSM/WI-FI network systems. There is also possibility to have software attacks on voting machines with the implementation of above technologies. If not implementing with proper security and safety measures can be avoided to hack the information externally.

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