



GSM Based Password Protected EVM Machine Using PLC and SCADA

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Abstract:

Every Indian citizen above 18 years of age is provided right to cast his/her votes. India is a diverse country with different geographical features and political systems. It becomes a challenge to conduct fair elections over each and every area. The Election commission of India is responsible for maintenance, distribution and security of the machines for used for casting votes. The EVM we use has limitations of its own user authentic system to cast vote. Local authorities are responsible for all operations and control of the EVMs. In this work, we have introduced the concept of user authentication through Aadhar card with additional OTP based authentic system. Programmable Logic controllers works as a controller for controlling the votes count and SCADA system has been used for the user interface for the voter to cast their votes. PLC and SCADA forms a very rugged and reliable interface for the same. In our work, design of the system and its working has been presented.

Keywords: EVM, PLC, SCADA, AADHAR CARD

I. INTRODUCTION

Electronic Voting Machines are the electronic devices used to record the votes for the general political elections. In earlier days, the paper ballot were used which proved to very unauthentic and prone to security threats. Since, India is the largest democratic country of the world and with involving such a large mass for casting their votes, it needs digital management and devices that are free from any security threats and manual features needs to be eliminated from the devices. All the focus is laid to develop the digital machine that is based on automation that reduces the human effort and becomes more comfort to manage and maintain.

The device needs to be accurate and user friendly. Also, the machine should be rugged to the environment also. Because, due to the environmental harsh conditions like high temperature, humidity, transportation fatigue etc. the device working and efficiency is deemed to be effected. Similarly, user authentication has always been key feature for the EVM. Earlier different EVMs based on fingerprint, face detection has been proposed. However, these lack the security features for the proper identification also like Voter ID/ Aadhar card etc. Also, since their working has been under continuous improvement. We need more authenticated security features and voter identification. In our proposed model, we will be using database of Aadhar card maintained by government of India to verify the user login information. Also, OTP based security feature has been introduced. The proposed model runs on SCADA and MATLAB-GUI interface to authenticate and user login window. Thus, it is totally efficient for the authentication.

Introduction of PLC and SCADA to this proposed model will increase the reliability, and ruggedness from the environmental conditions – humidity, temperature etc. It f free from cyber-crime and thus its non-hackable

BLOCK DIAGRAM

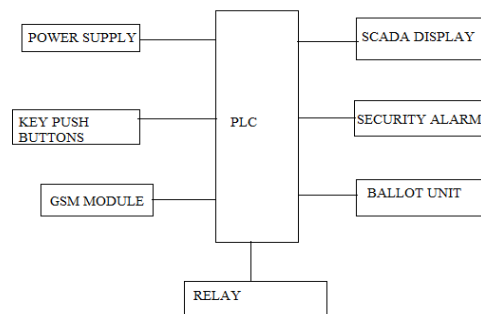


Figure.1. Block Diagram of the proposed EVM Machine

II. HARDWARE DESIGN

The proposed machine consists of the following components:

- 1) PLC – Micrologix 1000 Digital
- 2) Pushbuttons
- 3) GSM Module
- 4) Relays
- 5) SMPS
- 6) Pushbuttons
- 7) Buzzer

1. Programmable Logic Controllers (PLC)



Figure.2. Micrologix 1000 (Allen bradely)

Programmable Logic Controller (PLC) is a digital programmable device that is mostly used for industrial applications. This is microprocessor based device working and capable of controlling multiple inputs and outputs at the same time. It is very immune to the environment conditions like temperature, humidity, pressure etc.

2. GSM MODULE SIM900



Figure.3. GSM Module (SIM900A)

This is a GSM/GPRS-compatible Quad-band module, that works on a frequency of 850/900/1800/1900MHz and can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMSs. Externally, it looks like a big package (0.94 inches x 0.94 inches x 0.12 inches) with L-shaped contacts on four sides so that they can be soldered both on the side and at the bottom. Internally, the module is managed by an AMR926EJ-S processor, which controls phone communication, data communication (through an integrated TCP/IP stack), and (through an UART and a TTL serial interface) the communication with the circuit. The processor is also in charge of a SIM card (3 or 1.8 V) which needs to be attached to the outer wall of the module. In addition, the GSM900 device integrates an analog interface, an A/D converter, an RTC, an SPI bus, an I²C, and a PWM module. The radio section is GSM phase 2/2+ compatible and is either class 4 (2 W) at 850/ 900 MHz or class 1 (1 W) at 1800/1900 MHz. The TTL serial interface is in charge not only of communicating all the data relative to the SMS already received and those that come in during TCP/IP sessions in GPRS (the data-rate is determined by GPRS class 10: max. 85.6 kbps), but also of receiving the circuit commands (in our case, coming from the PIC governing the remote control) that can be either AT standard or AT-enhanced SIMCom type. The module is supplied with continuous energy (between 3.4 and 4.5 V) and absorbs a maximum of 0.8 A during transmission Maintaining the Integrity of the Specifications.

3. Relays

A relay is an electrically operated switch. Many relays use in electromagnet to operate a switching mechanism mechanically, but other operating principle are also used. Relays are used where it is necessary to control a circuit by low power signal or where several circuits must be controlled by one signal

4. Pushbuttons

A push button or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal

5. SMPS(24 v dc-2 amp)

A switched mode power supply is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently

6. Buzzer

A buzzer or beeper is an audio signaling device which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

III.SOFTWARE DESIGN

The interfaces which we have used are as follows:

1. MATLAB (R2013a) – GUI/Instrumentation toolbox
2. SCADA (Intouch- Wonderware)

1. MATLAB

MATLAB (matrix laboratory) is a multi-paradigm numerical computing environment and fourth-generation programming language. A proprietary programming language developed by Math Works, MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs. Although MATLAB is intended primarily for numerical computing, an optional toolbox uses the MuPAD symbolic engine, allowing access to symbolic computing abilities. An additional package, Simulink, adds graphical multi-domain simulation and model-based design for dynamic and embedded systems.

2. SCADA

It is a system operating with coded signals over communication channels so as to provide control of remote equipment. The control system may be combined with a data acquisition system by adding the use of coded signal over communication channel to acquire information about the status of remote equipment for display or for recording functions.

IV. WORKING PROCEDURE

The proposed model of EVM has two software interfaces: MATLAB-GUI (Graphical User interface) for database storage and OTP generation for login into the main EVM interface (SCADA).

(i) MATLAB-GUI

MATLAB-GUI has features of the user application built in for user interface. MATLAB is connected to the GSM module (hardware) for sending the SMS to the user who login into the GUI. First of all, user has to login into MATLAB-GUI using his aadhar number and contact details. The generated OTP is sent to the registered mobile number of the user via the GSM Module (SIM900). The GUI is presented in fig.4. The developed GUI consists of the database, date and time etc. Also, credentials for the entry of the login details.

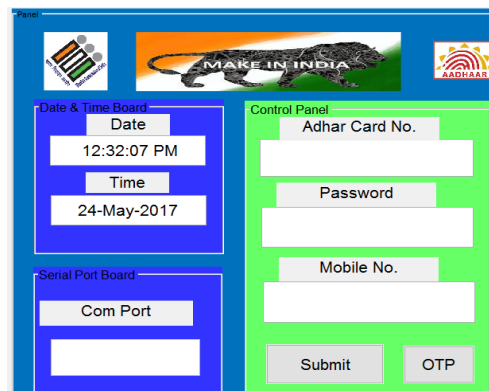


Figure. 4 MATLAB-GUI of the proposed model

(ii) SCADA



Figure.5. Main window of SCADA

Figure 5 shows the main window of the SCADA UI for EVM Machine. It will appear opening the UI by the officer allotted during the voting.

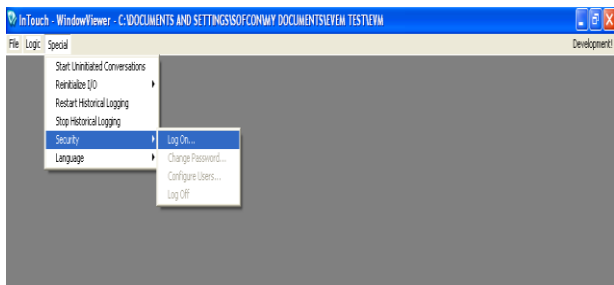


Figure.6. Main Login window of SCADA

Figure 6 shows the logon option once, any one has to appear for voting or for checking results by the election officer.

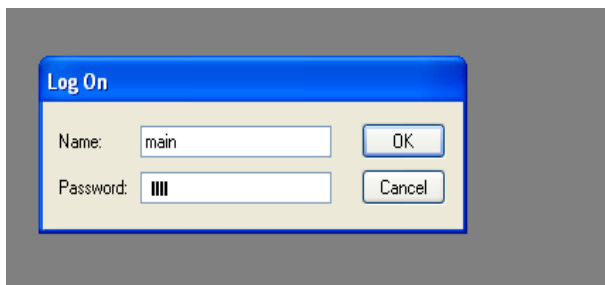


Figure.7. Login UI of SCADA

Figure 7 shows the login of the UI of SCADA. It's the admin login and thus only administrator (local authority/election officer/magistrate) can only login inside.



Figure.8. Menu option in UI of SCADA

Fig.8 shows the menu options once a voter/officer login to the UI after login by the OTP and aadhar number or the admin ID

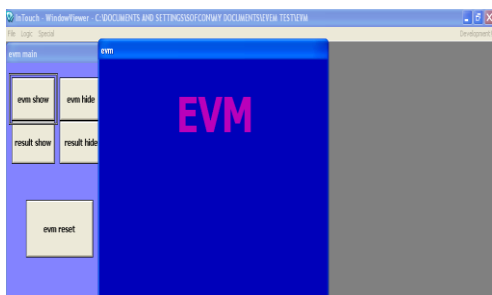


Figure.9. EVM show selection option in UI of SCADA

Voter has to opt from the menu as shown after the login. Fig.9 shows the menu options for the UI.

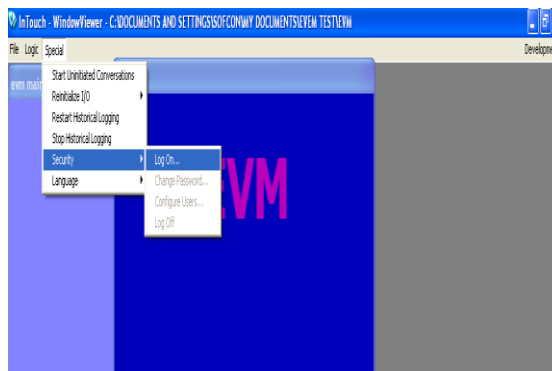


Figure.10. After opting for EVM Menu option in UI of SCADA. After selecting the menu options, the voter has to enter the Aadhar number and OTP as password to login into the UI.

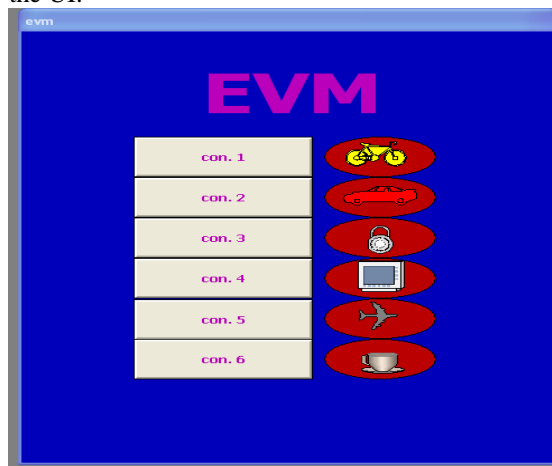


Figure.11. Voting options

The voting option presented for the user. Voter can press the desired pushbutton for casting his desired

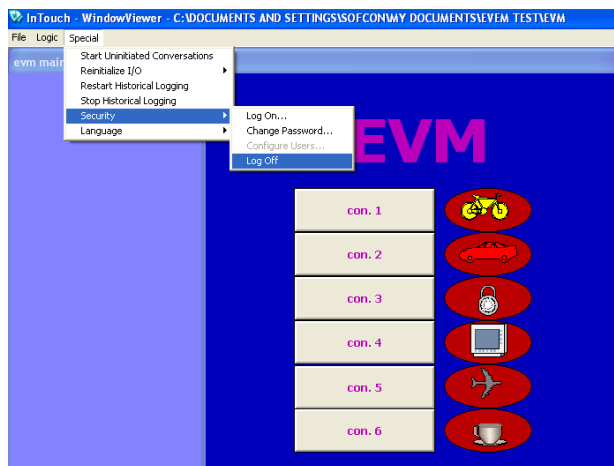


Figure.12. logoff after show Menu option in UI of SCADA

After casting the votes, the voter has to logoff from the menu window

V. CONCLUSION

The proposed system of the EVM is very reliable, fast, authentic and immune to the harsh environment condition, transportation fatigue. It's very and accurate method of the casting vote. It promotes the digital India mission as well and thus digitizing all the means of the opting of the votes.

Thus in this system, we have presented the detailed hardware and software design of the proposed system. We have presented the user interfaces for smart EVM using SCADA and MATLAB. Both of the interfaces, are very authenticated and can be said to be more reliable. The user interface contains the security authentication feature for the user using the Aadhar validation and OTP . It provides separate interfaces for the administrator also, by which he can see the counts of votes or can report as well. Similarly, PLC has been programmed to count of the votes only when user logins through the Aadhar number and password (OTP). PLC is proved to be very reliable under all environmental conditions and transportation fatigue. Thus, our overall system design has been made rugged, more authentic due to aadhar database login and thus any officer deputed directly can verify all the details digitally.

VI. REFERENCES

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VII. BIOGRAPHY



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