

Global Electronic Indigenous Voting System

Author: Dr. Gulzar Singh

Multi Electroni-Cal Systems Co., India

Correspondence: gulzarindri@gmail.com

DOI: 10.26821/IJSHRE.13.05.2025.130502

Abstract: *The invention is related to development of a secure, tamperproof, expandable, configurable electronic product for conducting fair polls compared to exiting polling methods. The invented system has been named as Indigenous Voting System (IVS). IVS is composed of the electronic Indigenous Voting Machine (IVM) and Operational Methodology (OM). IVM is an ensemble of electronic products (A Computer, Control Unit, Configurable Ballot Unit(s), Detachable Secure Data Storage Devices, External Display and Connecting Cables), Firmware and special Computer Application compatible to Microsoft Windows®. OM is a sequence of randomized steps for candidates and polling authorities to avoid pre-poll, in-poll and post-poll biasing. The invention has been applied for patent at Indian Patent Office, Delhi, through application number 202411015723 and International Patent through PCT application PCT/IN2024/052217 – 202411015723.*

Keywords: IVS; IVM; OM; EVM

1. Introduction

Various polling methods have been adopted in past to elect the leader out of competitive opponents. The mostly used in past, and presently being used is the “Ballot Paper” method to ensure “One Vote One Post”. Due to booth capturing and false “Vote Post” incidents, the Electronic Voting Machine (EVM) was developed and used in many countries few decades ago. Despite use of advanced technology in EVM, it failed to win the global faith and trust. Most of the countries rejected EVM method and returned back to “Ballot Paper” method. At present, only India, conducts polls using natively developed EVM. But, people raise voices against and in favor of EVM with their clues. So, from this social– political– technical global and national situation about EVM, it is required to develop a voting system which has the advantages of “Ballot Paper” & EVM both, and

is free from the respective disadvantages. The development of IVS serves this purpose.

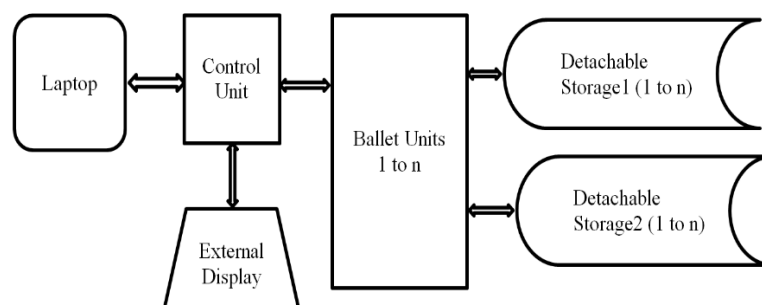
2. Previous Work

Different poll methods like survey forms and formats, ballot paper, postal methods have been adopted in past times. As well, various Electronic Voting Machines (EVMs) have been developed in past decades. The ease of polls operations, fail-proof and data security has been the most concerned objectives in the EVM. ¹[IN299/CHE/2004] introduces an EVM using Microcontroller with multiple function keys and on board data storage. ²[IN854/DEL/2010] invented Electronic Preferential Voting Machine having Control Unit, Ballot Unit, Display, and Buttons. ⁴³[KR1020010077348] invented an EVM to cast vote using automatic Ballot paper dispensing and counting after voter verification. ³[WO2002093503] invented an electronic voting machine as a compact electro-mechanical structure. ⁴²[IN4250/CHE/2013] introduce a voting machine with real time parallel behaviour evaluation of whole system. ⁴[JP2003109059] invented the voting method to verify the vote and the count by the system. ⁵[US20040046021] invented a voting concept to use different methods to store and count the votes ⁶[US20050133596] used pen-like bar code scanner to scan the candidates by the voters and hen cast vote. ⁷[US20070012767] invented a voting machine using a large display to show multiple options to voter for selection. ⁸[US20070007340] voting machine used touch pad for each candidate, all connected to a host. ⁹[US20090072030] introduce a paper-free voting system comprising EVM, verification blocks, data storage and security. ¹⁰[WO2010048612] with Computer as a central Host and EVMs clients introduced a network based voting concept. ¹¹[US20140052505] invented voting machine using smart display and al features being configurable. ¹⁵[US20150356804] used Optical Mark Reader based technology to ensure

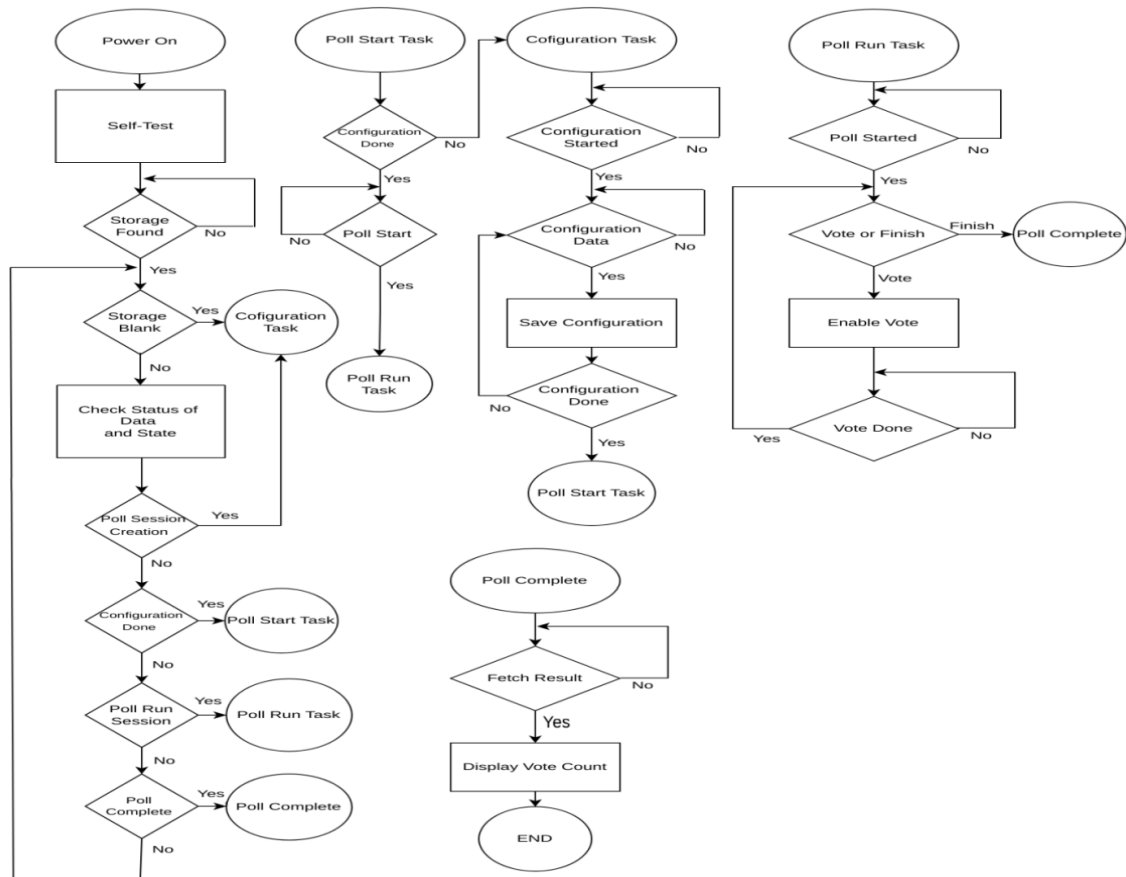
safe vote cast. [IN201721016937] invented a machine to capture the image of vote cast event. [CN108460893] invented a structure of voting machine to ease the transportation, assembling and operation. [IN201621008275] introduces a voting machine with Geo Tracking capabilities to prevent frauds. [IN201621037561] invented a method to securely transmit data from EVM to storage destination. [IN201741000831] introduces a voting machine with bar-code on Adhar Card and wireless connectivity to a data server and has been designed based on STM32 microcontroller. [IN201741017395] invented an EVM with ballot paper like vote cast features. [IN201841046856] introduces an electronic voting machine comprising bar-code, wireless 433 MHz transmitter, Microcontroller Control Unit, Ballot Unit, GSM connectivity and LED display. [IN201821014646] invented a voting machine with bar-code or QR scanning capabilities, Adhar Card verification and fraudulent re-use prevention. [IN201841002146] unvented an enhanced Electronic Voting Machine (eEVM) featured with enhancement in security, self-diagnosis and external Printer-Cum-Auxiliary-Display. [IN201811023532] invented a voting method and machine based on balls collection a tank dropped by voter after control enabled by administrator. [IN201841010850] introduced VVPAT for vote verification by showing the Symbol of selected candidate by the voter. [US20180218553] invented a method using Unique Voter Number with Signature Letter against the candidate. [US20190057567] invented a method for fast verification of voters and to transmit the decrypted poll data from multiple parallel ballot units to data stores under the surveillance of more than one admins and authorities. [IN201911027762] invented a cloud based EVM for security, data transmission and storage. [IN201921018727] invented an electronic

voting machine with Irish eye reading for automated vote cast. [IN201921028243] invented a machine called as Faithful EVM comprising of a Mechatronic Testing Unit with capability to make different models. [IN201931006947] introduce a biometric based voting machine to avoid duplicate voting. [IN201943032715] introduced a voting machine with bar code scanner, bar code printer, microcontroller unit, ballot unit, LED display, wireless transmitter. [CN220137734] invented a structure to easily assemble, transport and use the voting machines safely. [CN218384077] invented a voting machine comprising 3 boxes, a visual component, a keyboard and two printers to perform the voting activities fast and securely. [IN202011045602] invented a voting method and system comprising camera, Irish scanner, UIDAI data base server, EVM, computing unit for fats voting and data secure data storage. [IN202011044380] introduce a voting concept using neural network processing. [US20200273278] invented a Kiosk type voting machine. [IN202141045771] invented an electronic machine to cast vote using ATM cards and Block chain technology. [IN202041051872] invents a temper-proof machine comprising of a camera, control unit, ballot unit, display and printer. [JP2021189867] invented a method for voting machine to prevent the vote cast by someone else in place of actual voter even after initial identification and verification of voter. [WO2021154485] used voting balls placed on canisters to cast vote. [WO202132804] invented lightweight, thin, short and small ultra-compact ballot unit which can be used for voting. [IN202211049866] invented a fingerprint based voter authentication technology. [US11263853] developed a method of voter registration verification using multiple biological data samples including Palm Vein Scan, DNA.

Block Diagram of IVM



Flow Chart of IVM



Comparison Table

IVS vs EVM vs Ballot Paper			
Function	Ballot Paper	EVM	IVS
Individual Isolated Storage	No	No	Yes
Individual Isolated Processing Unit	None	No	Yes
Individual Isolated Display	None	No	Yes
Individual Isolated Result Display Option	None	No	Yes
External Real Time Booth Vote Display	None	No	Yes
On Booth Data Copy Deliver to Candidate	None	No	Yes
Self/Mutual Data Safeguarding Opportunity to Candidates	No	No	Yes
Manually Counting	Yes	No	No
Post Poll Battery Back-Up Requirement	None	Yes	No
Upload to Internet from Laptop only (IVM isn't connected to any network)	No	No	Yes
Online Multiple Comparison Records Display Option	No	No	Yes
Multistage Randomness	Lowest	Intermediate	Highest
Security risk	Highest	Ambiguous	Lowest
Fast and Smart Level	None	Intermediate	Highest
Vote Record Print	Stamp	Cut Print Slip	Un-cut Print
Result Validation Copies	None	VVPAT (if used),	Multiple Printed and

		Otherwise None	Digitally Secured
Shuffle / Temper Probability	Highest (Due to Manually Shuffling/ Tempering/ Replacement activities)	Ambiguous (Due to Single Box Used for Whole Data Storage, Processing and Display)	None (Due to Individual Box used for Data Storage, Processing and Display)

IVS Comparison with Indian EVM

1. The EVM method does not clearly indicate separate storage of candidate's data. Whereas IVS method stores and displays the data of every candidate individually.
2. The EVM method does not provide the candidate the opportunity to arbitrarily select the ballot unit as his/her property. IVS method provides this opportunity.
3. After completion of voting in EVM method, EVM needs battery backup. Ballot units in IVS method do not require battery back-up.
4. In the EVM method, no secure copy of the data is given to the candidate immediately after the voting is over. In IVS method, the secured original copy of the data is given to each candidate individually and the second original copy is distributed among the candidates.
5. EVM method does not give the candidate the opportunity to safeguard own and others' data. In IVS method, candidates are given the opportunity to safeguard own and others' data.
6. In EVM method, the security of data depends only on the security protocols of transport and strong-room. In IVS system, security responsibilities are assigned to many people at different places.
7. EVM method does not provide the opportunity of arbitrary selection to the candidate. The IVS method provides an opportunity to the candidate for arbitrary selection in several stages.
8. There is a provision of VVPAT mechanism for vote tallying in EVMs and all printed vote records are collected in a shared enclosure. IVS prepares un-cut uniquely printed sequential record on a paper roll for each candidate separately and as well provides option for un-cut uniquely sequential printed shared record on a paper roll.

9. Votes can be tallied only where VVPAT is installed. IVS provides options for result validation through multiple printed and secure digital copies.
10. In the EVM method, voting data is stored only inside the EVM and there is no option for alternative secure data storage. In IVS method multiple copies are created.
11. In the EVM method, the secured booth data is not uploaded to Govt. website just after poll completion, which causes delay in poll percentage calculation and declaration. The IVS method provides option to upload booth data file just after poll completion and removal of CU from laptop.

Conclusion

IVS has the potential as an alternate to existing Ballot Paper or EVM methods, and thus has global market potential. The IVS has unique features to win the faith and being adopted as the futuristic global polling method.

References

1. Nachiappan Arun Kumar, "Analysis, Design & Real-time Implementation of Temper-proof Electronic Voting Machine", https://patentscope.wipo.int/search/en/detail.jsf?docId=IN211524598&_cid=P20-M2VMT1-61192.
2. Sharma Manoj Kumar, "Electronic Preferential Voting Machine", https://patentscope.wipo.int/search/en/detail.jsf?docId=IN211602259&_cid=P20-M2VN7A-73088-1.
3. Gadde, Raya Koteswara Rao, Electronics Corporation of India, "Electronic Voting Machine", https://patentscope.wipo.int/search/en/detail.jsf?docId=IN211602259&_cid=P20-M2VN7A-73088-1.

4. Saito Ryo, Victor Co of Japan, *Electronic Voting Machine*, https://patentscope.wipo.int/search/en/detail.jsf?docId=JP269459191&_cid=P20-M2VR3F-88787-1.
5. Chung Kewin Kwong-Tai, Avante International Technology, “*Electronic Voting Apparatus, System and Method*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=US40652912&_cid=P20-M2VRAH-94481-1.
6. Mugica Antonio, “*Portable Electronic Voting Device Improved ballot and Improved Voting Method*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=US41061072&_cid=P20-M2VRDQ-97125-1.
7. Homwood John, Sequoia Voting System Inc, “*Systems and Methods for providing security in voting machine*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=US41783282&_cid=P20-M2VRWE-10968-1.
8. Mugica Antonio, SmartMatic International Corporation, “*Electronic Voting Pad Device, System and Method*”. https://patentscope.wipo.int/search/en/detail.jsf?docId=US41777867&_cid=P11-M2W1UO-14525-1.
9. Cardon Richard J., IBM Corporation, T.J.Watson Reseach Center, ”*System For Paper-Free Variable Electronic Voting*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=US43002314&_cid=P11-M2W1ZY-18156-1.
10. Arano, Sequio Voting Systems Inc, “*System For Configuring Voting Machines, Docking Device for Voting Machines, Warehouse Support and Asset Tracking for Voting Machines*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2010048612&_cid=P11-M2W2AX-25410-1.
11. James M. Canter, Hart Intercivic Inc, “*Multipurpose Configurable Voting System*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=US95981887&_cid=P11-M2W2RT-36268-1.
12. Zhao Lingjun, Shenzen Emperor Technology Company, “*Electronic Voting Machine*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=CN225659120&_cid=P11-M2W2XC-40251-1.
13. Sonavane Shefali Partap, Walchand College of Engineering, Sangli, “*A Method and A System for Identifying Frauds in an Electronic Voting Machine*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=IN211825684&_cid=P11-M2W331-44054-1.
14. Roshan Sodi, “*A System and Method for Transmission of Recorded Data from Electronic Voting Machine*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=IN275761425&_cid=P11-M2W37Y-50578-1.
15. Jules T. Mitchel, “*VOTE CERTIFICATION SOFTWARE AND PROCESS*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=US153446623&_cid=P11-M2WKUJ-68418-1.
16. K.GANESH, VELTECH Dr. RR & Dr. SR UNIVERSITY, “*WIRELESS ELECTRONIC VOTING MACHINE*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=IN211793573&_cid=P11-M2WL1C-72036-1.
17. Aashutos Kumar , “*ELECTRONIC VOTING MACHINE (EVM) WITH BALLOT PAPER LIKE FUNCTIONALITY TOO*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=IN234238823&_cid=P11-M2WL6R-74689-1.
18. Kannan Paramalai, ”*A NOVEL ELECTRONIC VOTING MACHINE*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=IN296579783&_cid=P11-M2WLAG-76635-1.
19. Anand Pramod Mishrikotkar, ” *ELECTRONIC VOTING MACHINE USING FINGERPRINT SCANNER*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=IN219623948&_cid=P11-M2WLEK-78606-1.
20. P., Ramadevi , M/S. Bharat Electronics Limited, ” *ELECTRONIC VOTING MACHINE*”, https://patentscope.wipo.int/search/en/detail.jsf?docId=IN219623948&_cid=P11-M2WLEK-78606-1.

- <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN275743985& cid=P11-M2WLHO-79954-1>.
21. RAJESH KUMAR VERMA, "BALL VOTING MACHINE", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN283284163& cid=P11-M2WLL2-81527-1>.
22. P., Ramadevi, M/S. Bharat Electronics Limited," VOTER VERIFIED PAPER AUDIT TRAIL", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN275760521& cid=P11-M2WLP8-83497-1>.
23. Zhenxiang Zhang, "Method of verifiable and anonymous voter receipt for electronic voting system", <https://patentscope.wipo.int/search/en/detail.jsf?docId=US224109671& cid=P11-M2WLSP-84993-1>.
24. Thomas Underhill, Oracle International Corporation, "Associating voting sessions with tabulation machines in electronic voting", <https://patentscope.wipo.int/search/en/detail.jsf?docId=US237652318& cid=P11-M2WLVO-86364-1>.
25. Amit Bhansali, "CLOUD-BASED E-VOTING SYSTEM", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN335043813& cid=P11-M2WLZE-88247-1>.
26. NAIR, Gopakumar Gopalan, "ELECTRONIC VOTING MACHINE INCORPORATED WITH AN ELECTRONIC EYE", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN311134979& cid=P11-M2WM2L-89742-1>.
27. Mr. Sambhaji Namdeo Kadam, Sai Vision Innovative Technology Private Limited, "FAITHFUL ELECTRONIC VOTING MACHINE (FEVM) WITH MECHATRONICS TESTING UNITS (MTU)", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN346037558& cid=P11-M2WM5P-90955-1>.
28. Rakesh Seal, INSTITUTE OF ENGINEERING AND MANAGEMENT, "BIOMETRICALLY SECURED SMART ELECTRONIC VOTING MACHINE", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN306149098& cid=P11-M2WM9N-93031-1>.
29. Kannan Paramalai, "AN IMPROVED ELECTRONIC VOTING MACHINE", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN318462413& cid=P11-M2WMEU-95330-1>.
30. LI YAN, HANQING DATA CONSULTING CO., LTD., "Intelligent electronic voting machine", <https://patentscope.wipo.int/search/en/detail.jsf?docId=CN417541117& cid=P11-M2WMHI-96418-1>.
31. DAI LIFENG, GUANGZHOU ZONERICH BUSINESS MACHINE CO., "Electronic voting machine", <https://patentscope.wipo.int/search/en/detail.jsf?docId=CN391176384& cid=P11-M2WML4-97996-1>.
32. GUPTA, Lovi Raj, Lovely Professional University, "SYSTEM AND METHOD FOR SECURE ELECTRONIC VOTING", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN311132802& cid=P11-M2WMO3-99530-1>.
33. Dr. Sanjay Kumar, Galgotias University, "AN ELECTRONIC VOTING SYSTEM", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN358056247& cid=P11-M2WMRD-01173-1>.
34. Nicholas G. Sotereanos, "INFORMATION KIOSK STYLE VOTING MACHINE", <https://patentscope.wipo.int/search/en/detail.jsf?docId=US304657305& cid=P11-M2WMW3-03571-1>.
35. Dr. Amit Kumar Tyagi, "Implementing Blockchain Technology in Automated Teller Machine (ATM) based Electronic Voting Machine", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN395677790& cid=P11-M2WMYZ-05001-1>.
36. Group Captain Syed Mohammed Ghouse, "TAMPERPROOF VOTING MACHINE", <https://patentscope.wipo.int/search/en/detail.jsf?docId=IN373405195& cid=P11-M2WN1Z-06538-1>.
37. NAKANO NAOYA, NEC PLATFORMS LTD, "ELECTRONIC VOTING SYSTEM, ELECTRONIC VOTING METHOD, AND

- ELECTRONIC VOTING PROGRAM*”,
https://patentscope.wipo.int/search/en/detail.jsf?docId=JP345001917&_cid=P11-M2WN4S-08237-1.
38. HENRY, George, “*IMPROVED VOTING MACHINE*”,
https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2021154485&_cid=P11-M2WN7S-09712-1.
39. VON BLANCKENHAGEN, Bernhard, “*SPECTACLE LENS WITH FILTER EFFECT FOR BLUE LIGHT AND SPECTACLES*”,
https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2021032804&_cid=P11-M2WNBV-11696-1.
40. Sajal Gupta, GLA University, Mathura, “*SMART ELECTRONIC VOTING MACHINE*”,
https://patentscope.wipo.int/search/en/detail.jsf?docId=IN374030480&_cid=P11-M2WNFT-14013-1.
41. Michael Eugene McKinzy, “Electronic voting identity authentication system and method”,
https://patentscope.wipo.int/search/en/detail.jsf?docId=US352197083&_cid=P11-M2WNJI-15420-1.
42. ESWARI, Centre for Development of Advanced Computing, “*ELECTRONIC VOTING APPARATUS AND SYSTEM THEREOF*”,
https://patentscope.wipo.int/search/en/detail.jsf?docId=IN211602811&_cid=P11-M2WS1M-86431-1.
43. RA, JONG GUK, HAN TL CO., LTD., “*METHOD FOR RECOGNIZING BALLOT PAPER IN AUTOMATIC BALLOT COUNTING SYSTEM*”,
https://patentscope.wipo.int/search/en/detail.jsf?docId=KR512210&_cid=P11-M2WVBS-41716-1.