



BASIC SECURITY FEATURES OF EVM & VVPAT



DOUBTS CAST ON EVM

How EVMs are registering votes only for BJP: Kejriwal

Continued from page 1
Congress leader Arvind Kejriwal staged a protest on Monday demanding that the Election Commission of India (EC) investigate the alleged tampering of EVMs in Uttar Pradesh. He said that the EC should ensure that every single EVM is checked thoroughly. "If some EVMs can be tampered with, many others may also be tampered with. These reports are shocking and raise doubts about the essence of democracy in this country. This means that if we do not take any matter who gets the vote for the lotus will bloom out of the muck of EVMs," he said. He also said that no checking was done to find the fault in EVMs in Assam and MH. "Who is checking the software and how is it being checked," he said.



Hacked EVM

EC demands to ensure tampering of EVMs

The video also set off a row over EVMs. Arvind Kejriwal, chief Minister of UP, accused the EC of tampering with the state. He said that the EC should ensure that every single EVM is checked thoroughly. "If some EVMs can be tampered with, many others may also be tampered with. These reports are shocking and raise doubts about the essence of democracy in this country. This means that if we do not take any matter who gets the vote for the lotus will bloom out of the muck of EVMs," he said. He also said that no checking was done to find the fault in EVMs in Assam and MH. "Who is checking the software and how is it being checked," he said.

Altered software code

Kejriwal demands to ensure tampering of EVMs

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Remotely Altered Control Unit Display

Kejriwal demands to ensure tampering of EVMs

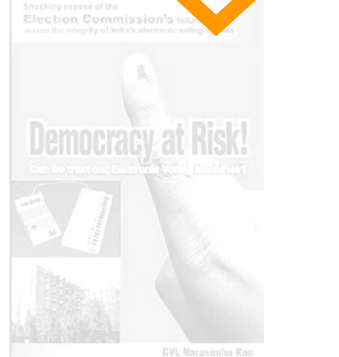
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Replaced Microcontroller or Memory chips

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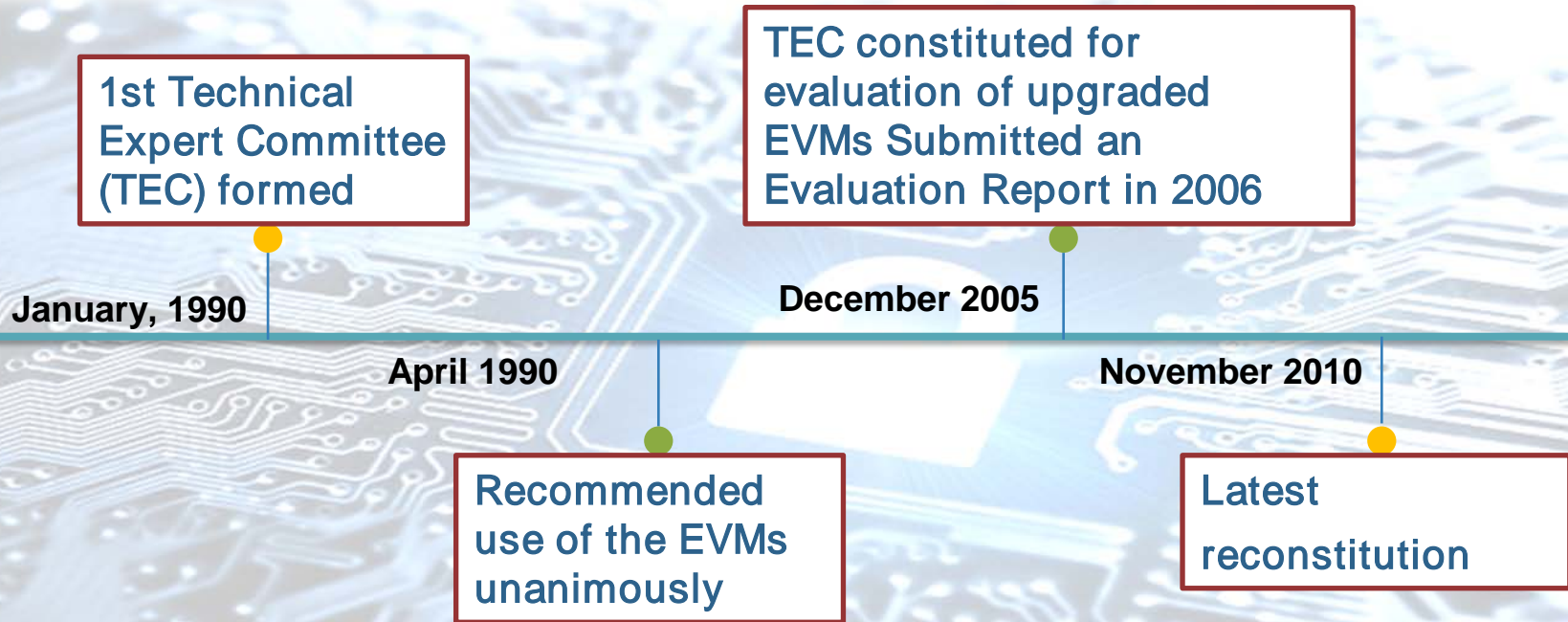
Vote Stuffing after Poll Closure



TECHNICAL EXPERT COMMITTEE

INDEPENDENT EVALUATION

TEC- HISTORY & ROLE



ROLE OF TEC



Give technical advice to build specifications and design of newer versions of EVMs/VVPATs



Examine design proposals of manufacturers on EVMs and offer recommendations for improvement



Mentor design process



Examine concerns raised on EVMs tamperability.



Any other advice or technical work that Commission may seek

TECHNICAL SECURITY

DESIGN, PROCESS, ENVIRONMENT



1. PREMIUM PSU MANUFACTURERS



Under Dept of Atomic Energy

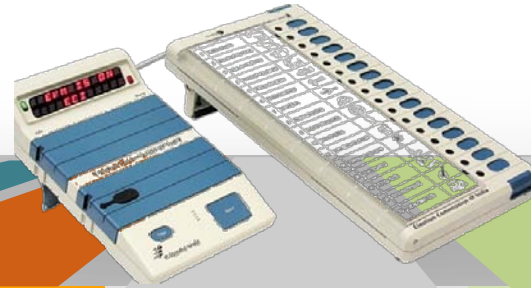


Under Ministry of Defence

Both PSUs deal with manufacturing of sensitive equipment critical to the safety and security of the Nation and have strong security protocols



2. SECURED DESIGN FEATURES



Standalone
Machine

No Radio
Frequency
transmission or
reception
possible- No
wireless
communication
possible

One Time
Programmable (OTP)
chip

Dynamic
Coding
of Key
Press

Real Time Clock
for time and date
stamping key
press

3. SECURE DEVELOPMENT PROCESS



The software is designed/approved by TEC **NEVER subcontracted.**



Software validation is carried out as per the **System Requirement Specification (SRS)**, by an Independent Testing Group.



4. SECURE MANUFACTURING FACILITY

Secure Factory Premises



- Monitored Entry and Exit
- Regular frisking at gates and all important junctions
- CCTV surveillance
- Entry of electronic gadgets like mobile, Laptop, USBs restricted

4. SECURE MANUFACTURING FACILITY



- Physical Security -CCTV surveillance and movement control
- Well defined and calibrated process flow of EVM manufacturing
- 3 Level Physical access to various stages / processes
- Access Data and Process Data logging, alarm and alert generation during manufacturing
- Third Party Testing by STQC as per Standards & Quality Process set by TEC



EVOLUTION OF EVM MODELS



➤ Evolution of **technology**

➤ EVM Models

Pre 2006: M1

2006-2010: M2

From 2013: M3



- One Time Programmable Controller
- Standalone Machine



EVOLUTION OF EVM MODELS



➤ Evolution of **technology**

➤ EVM Models

Pre 2006: M1

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- Dynamic coding of every key press for communication from BU to CU
- Real time clock
- Time stamping of key presses



EVOLUTION OF EVM MODELS



➤ Evolution of **technology**

➤ EVM Models

Pre 2006: M1

2006-2010: M2

From 2013: M3



- Digital certificate based mutual authentication amongst all components
- Automated Self diagnostics
- Battery life predication

DOUBTS CAST- EXPLAINED!

CLARIFICATION OF ALL
DOUBTS



DOUBTS CAST ON EVM

How EVMs are registering votes only for BJP: Kejriwal

Continued from page 1
Congress accused AP staged process understanding that chief electoral officer (CEO) of Andhra Pradesh (Shankar) might be removed. Some have sought report from the chief secretary regarding the officials. The state's chief electoral officer (CEO) of Andhra Pradesh (Shankar) might be removed. Some have sought report from the chief secretary regarding the officials. The state's chief electoral officer (CEO) of Andhra Pradesh (Shankar) might be removed. Some have sought report from the chief secretary regarding the officials.



Hacked EVM

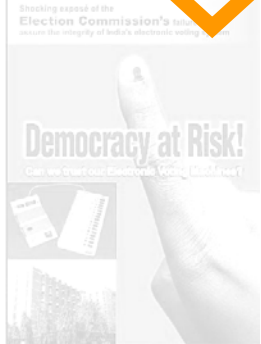
Vote Stuffing after Poll Closure

Remotely Altered Control Unit Display

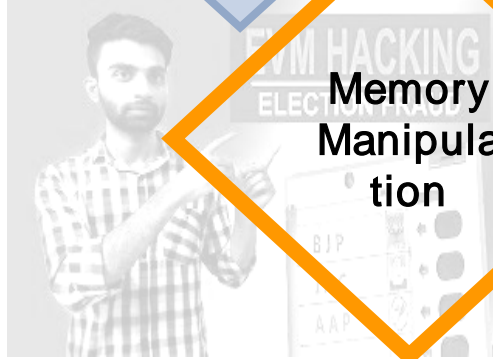
Memory Manipulation

Replaced Microcontroller or Memory chips

Altered software code



GVI Nazaretha Rao



HACKED EVM



Hacking' is unauthorised access to or control over computer network security systems for some illicit purpose

In the case of ECI EVMs, the word 'Hacking' is not applicable for following reasons:

- The EVM is a **stand alone** machine and is not connected to any network through wire or wirelessly
- The SW programme in the OTP Microcontroller can **neither be read nor modified**

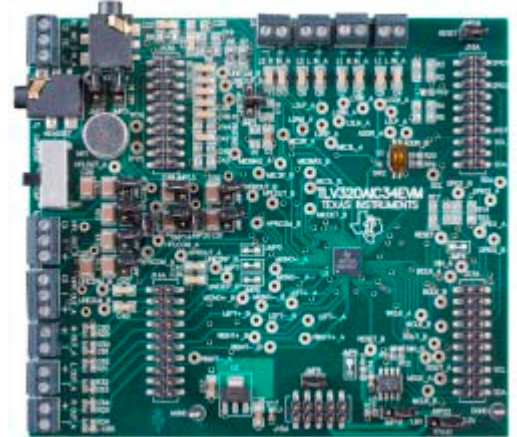
REMOTELY ALTERED CU DISPLAY THROUGH WIRELESS COMMUNICATION

- It is alleged this can be done by either replacing the original display module with another display fitted with a wireless device or inserting an extra circuit board which can communicate with an external unit via a wireless device and tamper the result by controlling the CU display used for declaring the result
- Such a modification would require unfettered access to the EVM after FLC – **Ruled out.**



MEMORY MANIPULATION

- It is alleged that voting data can be altered by clipping a Memory Manipulator IC to the memory chip where Vote data is stored. This would need,
 - Full and free access to CUs after the Polling is over- **Ruled Out !!**
 - Breaking the seals and locks of the strong room in the presence of two layers of security plus the representatives of the candidates camping near the strong room- **Ruled Out !!**



REPLACEMENT OF MICROCONTROLLER/MEMORY CHIP or MOTHERBOARD BEFORE POLL/COUNTING

Administrative Safeguards

- Chip replacement would require access to EVM Warehouses – **Ruled Out**
- Any chip replacement before FLC will get caught during FLC
- Chip Replacement after FLC would require access to Strong Rooms and breaking of EVM Pink Paper seals– **Ruled Out**

Technical Security

- BUs and CUs communicate only amongst themselves and go into error mode if connected to any other machine. Thus, **any modified EVM (with microcontroller /memory changed) would not be usable** even if someone is able to hypothetically bypass security arrangements and modify EVM

TAMPERED SOURCE CODE “TROJAN”

- It is alleged that Trojan can be introduced in following manner
 - by reprogramming the chip, or
 - by the chip manufacturer during fusing of the software.
- Re-programming **Ruled Out** as these are OTP chips.
- Code tampering by the chip manufacturer **Ruled Out** as it will get caught during the code integrity check.



VOTE STUFFING AFTER POLL CLOSURE



Administrative safeguards

- Poll closed by pressing the “CLOSE” button on the CU after last vote, Representatives of candidates who are present signs on the seals
- EVM seals checked on counting day

What if seals broken and votes stuffed while transporting?

- EVM does not accept any votes after CLOSE button pressed in CU

What if CLOSE button not properly pressed and Votes Stuffed while transporting?

- Poll Closure time recorded in the PO’s diary and any votes polled in the EVM after this time can be identified due to time stamping of key presses

ASPERSIONS VS CONFIDENCE

SINCE 11TH MARCH

Sl. No.	Aspersions/ Allegations	Fact Check/ Reality
1.	Unauthorized Access to EVMs	ECI-EVMs inaccessible. Kept in warehouses/ strong rooms under high physical security. Each machine has a unique number. Stolen EVMs cannot re-enter.
2.	Pressing multiple buttons leads to multiple votes	The button pressed at first, followed by a long beep sound, is counted as one vote. Next vote can be cast only after the Presiding Officer presses the ballot button in the Control Unit. No chances of casting multiple votes.
3.	Tampering the Hardware	First Level Check of each and every EVM is done by engineers of ECIL & BEL in presence of political parties' representatives before elections.
4.	The Software Chip	One Time Programmable Chip. No extra port or chances of any network connectivity in ECI-EVMs.
5.	Dishonest Polls, after Honest Mock Polls	At least 1000 votes are cast by political parties' representatives in 5% of randomly chosen EVMs from warehouses. Mock polls are also done in presence of stakeholders.

Sl. No.	Aspersions/ Allegations	Fact Check/ Reality
6.	Low Tech Seals	Security seals from Nasik Printing Press are used. Sealing of EVMs and strong rooms/ warehouses are done in presence of political parties' representatives.
7.	Bhind, Madhya Pradesh, 2017: All buttons allegedly voted BJP	Only during the demo on 31 st March, 4 votes were cast and all 4 correctly went to respective candidates and printed respective slips. However, the VVPAT was used in UP elections 2017 and the memory was not rebooted before being used for the demonstration.
8.	The Dholpur Incident: All buttons allegedly voted BJP	Two EVMs were found defective, but none gave any wrong results.

BHIND FINDINGS

Commission's enquiry found 4 buttons of BU pressed in the following order and VVPAT printed corresponding slips

Button no	Symbol	Name of Candidate
03	Handpump	Raju Pal
04	Lotus	SatyaDev Oanchori
03	Handpump	Raju Pal
01	Hand	Ambuj Shukla

It is pertinent to mention here that is it completely false to say that the multiple times slips of lotus were printed during the demo on 31st March as alleged

DHOLPUR FINDINGS



It was alleged that in 18 EVMs votes went to only one Party irrespective of the buttons pressed. However no specific complaint received till date by the Commission. 10 BUs and 10 CUs found defective and replaced.

INTERNATIONAL EXPERIENCE

INDIAN Vs Foreign EVMs

ECI EVM	Foreign EVM
Standalone	Mostly networked
Manufactured in Premium PSUs	Manufactured entirely by private entities
Verified and certified by an independent Technical Experts Committee	No such robust and independent certification/ checks
Data is stored internally and not transferrable by any device	Voting data recorded in the DRM is transferred by means of CD, etc
Full end to end security protocol and administrative safeguards for the use, storage, transportation and tracking	No such protocols, e.g. in Ireland
Administrative and physical security as per legal framework across the country.	No such legal framework, e.g. in Netherlands
Voter verifiability and auditability of every vote cast	Lack of such facility in the NEDAP machines- un-Constitutional by German Supreme Court as lacked public examinability

PAST JUDGEMENTS

INDIAN Vs Foreign EVMs

JUDGEMENT SUMMARY



Madras High Court 2001

“There is also no question of introducing any virus or bugs for the reason that the EVMs cannot be compared to personal computers.”

Karnataka High Court 1999

‘This invention is undoubtedly a great achievement in the electronic and computer technology and a national pride’.

JUDGEMENT SUMMARY



Kerala High Court 2002

In one EP the High Court recorded its appreciation on the efficiency of the mechanism of detecting votes cast by impersonators. Upheld by the Hon'ble Supreme Court in 2003.

VOTER VERIFIABLE PAPER AUDIT TRAIL (VVPAT)

VVPAT



VVPAT- allows the voters to verify that their votes are cast as intended.

VVPAT



- Voter Verifiable Paper Audit Trail is an independent system, attached with the Electronic Voting Machines, that allows the voters to verify that their votes are cast as intended.
- When a vote is cast, the elector shall be able to view through the transparent window of the VVPAT, the printed paper slip showing the **serial no**, **name** and the **symbol** of the candidate of his choice.
- The slip remains exposed through the window for 7 seconds, after which it automatically gets cut and falls in the sealed drop box of the VVPAT.
- Since 2013 to 12 May 2017, VVPATs are being used in selected constituencies in every Legislative and Parliamentary election.
- Thereafter, VVPATs are being used in every election to Legislative and Parliamentary Constituency.



THANK YOU

