



EDEM 2009

**Paper Records and Electronic Audits: A Step
Towards Regaining Voter Trust**

Mohammed Awad

Ernst L. Leiss

University of Houston



Outline

- Voting in the United States (2000-2008)
- Paper Ballots (MN Senate race)
- E-voting and VVPRS (pros and cons)
- Our Proposed System (General Description)



Voting in the United States

- Voting issues in Florida (2000)
- Help America Vote Act (HAVA)
- Direct Recording Electronics (DREs) in 2004
- 2008 General Elections
- Electronic Voting and Internet Voting

MN Senate Race 2008

- Candidates:
 - Norm Coleman (Republican Party)
 - Al Franken (Democratic Party)
- 2,920,214 Voter
- Coleman won by 215 votes (0.0075%)
- 3 weeks recount, Coleman won by 188 votes
- Over 6,500 challenged ballots

Actual Challenged Ballots I

40 [redacted]

[Handwritten signature]

54 [redacted]

WRITE-IN, IF ANY

U.S. SENATOR
VOTE FOR ONE

DEAN BARKLEY
Independence

NORM COLEMAN
Republican

AL FRANKEN
Democratic-Farmer-Labor

CHARLES ALDRICH
Libertarian

JAMES NIEMACKL
Constitution

WRITE-IN, IF ANY

U.S. REPRESENTATIVE
DISTRICT 5
VOTE FOR ONE

JEFFREY A. BECK

WRITE-IN, IF ANY

*I really do
want to
vote for
Coleman*

Actual Challenged Ballots II

UNITED STATES SENATOR		VOTE FOR ONE
<input type="radio"/>	DEAN BARKLEY <i>Independence</i>	
<input checked="" type="radio"/>	NORM COLEMAN <i>Republican</i>	ND
<input checked="" type="radio"/>	AL FRANKEN <i>Democratic-Farmer-Labor</i>	S
<input type="radio"/>	CHARLES ALDRICH <i>Libertarian</i>	
<input type="radio"/>	JAMES NIEMACKL <i>Constitution</i>	
<input type="radio"/>	<i>write-in, if any</i>	
UNITED STATES REPRESENTATIVE		

Actual Challenged Ballots III

<input type="radio"/>	CHUCK BALDWIN AND DARRELL CASTLE Constitution	dedicate fur sources; to wetlands, p wildlife hab heritage; to protect, en streams, a sales and three-eight until the y
<input checked="" type="radio"/>	Lizard People write-in, if any	
U.S. SENATOR VOTE FOR ONE		<input checked="" type="radio"/>
<input type="radio"/>	DEAN BARKLEY Independence	<input type="radio"/>
<input type="radio"/>	NORM COLEMAN Republican	
<input checked="" type="radio"/>	AL FRANKEN Democratic-Farmer-Labor	SOI
<input type="radio"/>	CHARLES ALDRICH Libertarian	
<input type="radio"/>	JAMES NIEMACKL Constitution	<input type="radio"/>
<input type="radio"/>	Lizard People write-in, if any	<input checked="" type="radio"/>
U.S. REPRESENTATIVE DISTRICT 7 VOTE FOR ONE		SO

Actual Challenged Ballots IV

	write-in, if any	<input type="radio"/>	<u>KARL H.</u>
		<input type="radio"/>	<u>write-in, if any</u>
<input type="radio"/>	DEAN BARKLEY Independence		
<input type="radio"/>	NORM COLEMAN Republican		
<input checked="" type="radio"/>	AL FRANKEN Democratic-Farmer-Labor		<i>Just because he is on democratic ticket</i>
<input type="radio"/>	CHARLES ALDRICH Libertarian		
<input type="radio"/>	JAMES NIEMACKL Constitution		
<input type="radio"/>	write-in, if any		

Actual Challenged Ballots V



MN Senate Race 2008 Cont.

- Challenged ballots reduced
- On January 5th 2009; Franken ahead by 255 votes
- On January 6th 2009; Coleman filed for an election contest (trial announced Franken win by 312 votes)
- Coleman appealed to the MN supreme court.
- MN supreme court rejected the appeal on June 30th 2009.

E-Voting Machines

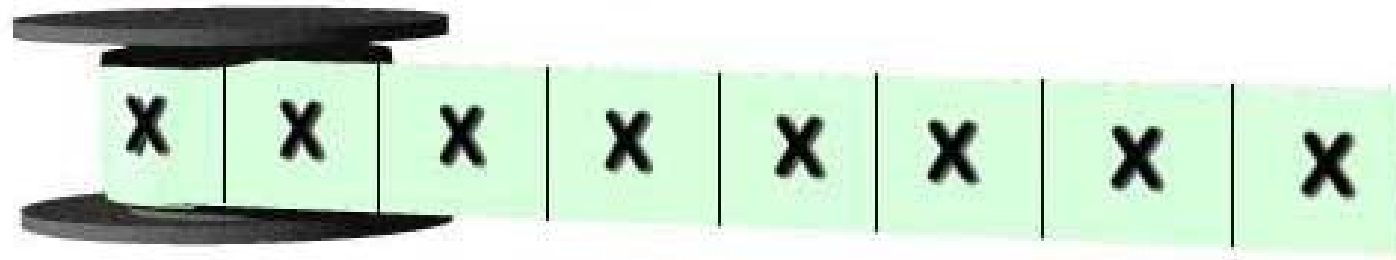
- Fast, but same recounts
- Add paper audit trails
- Still have problems !
- 63% of voters fail to notice mismatches



Our System I

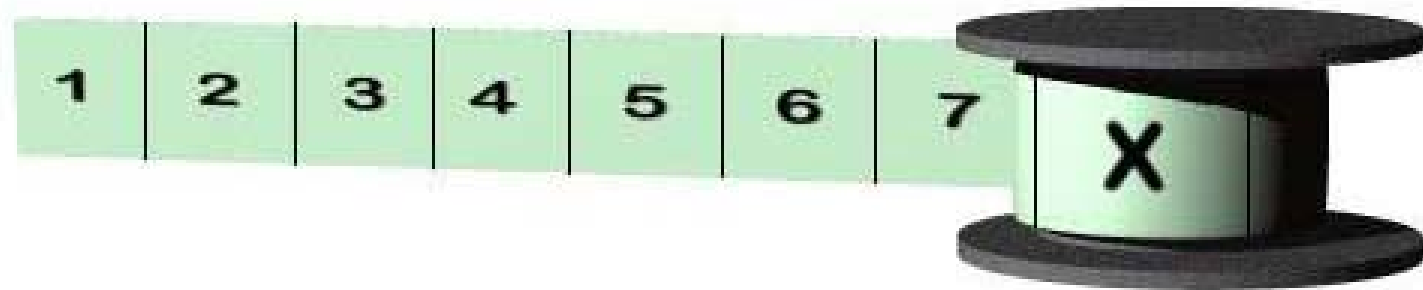
- Justifications for our approach
- System Components:
 - Mechanical part
 - Spools
 - Marker (sprayer)
 - Electronic part
 - Electronic screen (to interact with the voter)
 - Buttons (to make selections)

Our System II



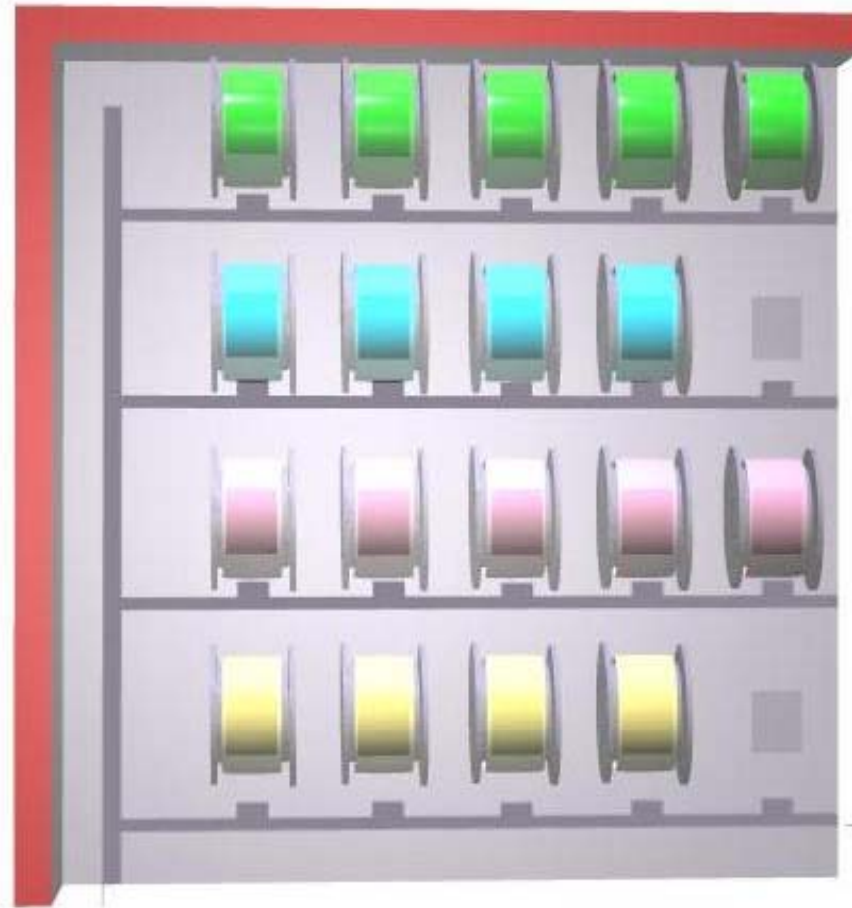
A Spool for Candidate X

Our System III



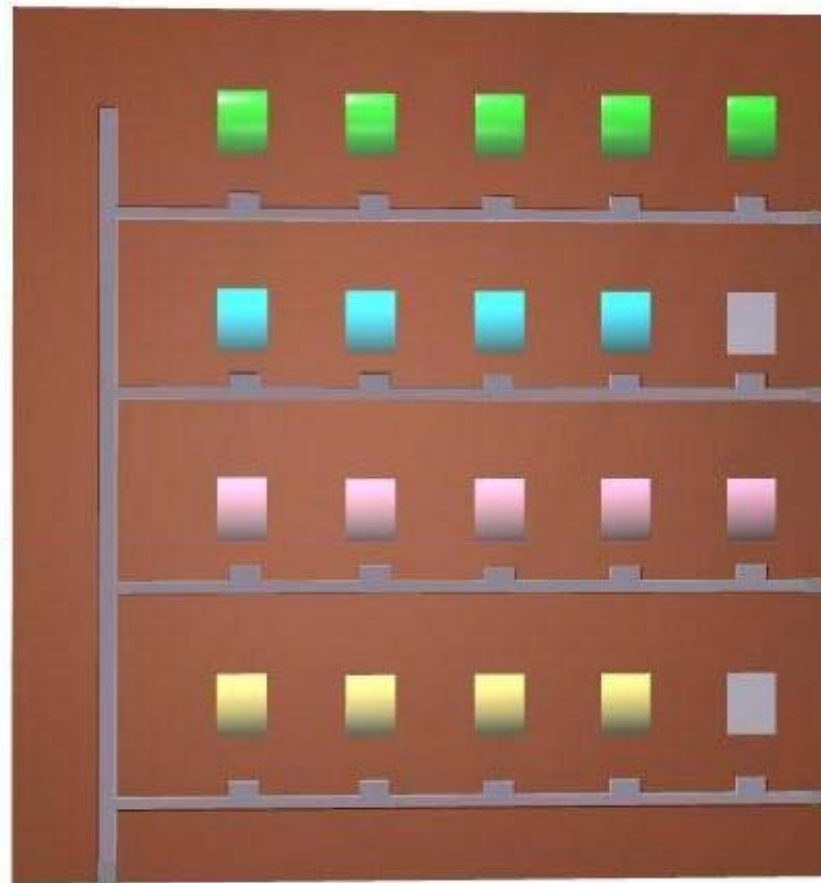
The Back of Candidate X Spool

Our System IV



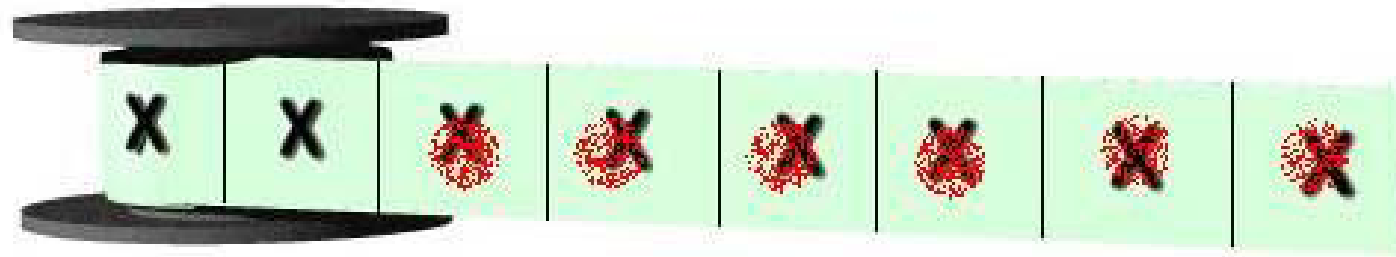
Illustrative View

Our System V



The Voter Actual View

Our System VI



Candidate X Spool with 6 Votes on it



Requirements and Thoughts

- Technicalities (spool size, etc.)
- Election Day scenario.
- Meeting the requirements.
- Straight ticket option.

Conclusion

- Paper ballots have their own flaws too.
- Current E-voting methods are not very popular in the U.S.
- Paper trails did not solve much.



Questions ?