Characteristics of Contemporary Voting Machines
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The 2000 presidential election stimulated an already active market for voting machine technology. Outdated voting equipment, like that used in Florida as well as in other jurisdictions around the country, caused votes to go unrecorded and raised doubts in the minds of voters concerning the legitimacy of the electoral process. Since 2000, voting technology manufacturers have become increasingly committed to producing modern machines that do not rely on punch cards.

This report presents what we believe to be the first comprehensive list of the characteristics of direct recording electronic (DRE) and optical scan voting machines manufactured in the United States and abroad. Two-thirds of the machines feature DRE technology and one-third use optical scanners. In addition to providing information on voting machine manufacturers, this report also provides information on the machines' hardware, software, and accessibility to voters.

Some information regarding voting machine hardware was obtained from manufacturers' websites. More detailed information regarding machine characteristics and functionality was obtained through e-mail and telephone communication with sales, marketing, and technical support representatives at voting technology manufacturing companies. We have made every attempt to obtain information on all of the machines we list. Missing information indicates that manufacturer representatives did not respond to our request for information.

The information presented here is part of a research project funded by the National Science Foundation, grant number 0306698. The project brings together social and computer scientists from a number of disciplines to study voting technology and ballot design. The research team will use a variety of research designs, data collection methodologies, and analysis techniques, including expert review, laboratory experiments, close-up observation, field tests, and "natural experiments" that occur as local jurisdictions change their voting technology and procedures. The project also will subject the team's "zoomable" voting interface design to the same rigorous evaluation applied to existing systems. Finally, the research team will create a generalized protocol for testing voting technology and ballot formats that will be disseminated nationwide.
More information is available at http://www.capc.umd.edu/rpts/VotingTech_par.html.

The tables contain the following information about DRE and optical scan machines:

I. Company information, including product name and where the company is based.
II. Hardware information, including button functionality, screen size, and display color.
III. Software information, including information on ballot programming and whether write-in votes and undervotes are accepted.
IV. Machine accessibility, including whether or not the machine accommodates audio and Braille.

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Participating Organizations:

The Center for American Politics and Citizenship (CAPC) provides citizens and policy-makers with research on critical issues related to the nation's political institutions, processes, and policies. CAPC is a nonpartisan, non-profit research institution within the Department of Government and Politics of the College of Behavioral and Social Sciences at the University of Maryland. For more information see http://www.capd.umd.edu.

The Human-Computer Interaction Lab (HCIL) at the University of Maryland has a mission to design, implement, and evaluate new interface technologies that are useable, useful, and appealing to a broad cross-section of people. We believe it is critical to understand how the needs and dreams of people can be reflected in our future technologies. To this end, the HCIL develops advanced user interfaces and design methodology. Our primary activities include collaborative research, publication and the sponsorship of open houses, workshops and symposiums. www.cs.umd.edu/hcil

The University of Michigan Institute for Social Research (ISR) is one of the largest and oldest academic survey and social research organizations in the world. The ISR (www.isr.umich.edu/) is dedicated to social science in the public interest. It consists of five centers. The two represented in the Voting Technology project are the Center for Political Studies (http://www.isr.umich.edu/cps/) and the Survey Research Center (www.isr.umich.edu/src/).

Characteristics of Optical Scan Voting Machines

Model Name	Manufacturer	Use in Elections	Type of Optical Scanner	Device Dimensions	Type of Reader	How Mark Is Made	Kind of Mark Voter Makes	Ballot Design	Straight Party Option
Model 100	ES&S	General voting	Precinct	14"x15"x16"	Visible light	Pen or pencil	Blackens a circle	Multiple possibilities[2]	Yes
Model 650	ES&S	General and absentee	Central	28"x25"x23"	Visible light	Pen or pencil	Blackens a circle	Multiple possibilities[2]	Yes
AccuVote-OS	Diebold (Global)	General voting	Precinct and central	14"x16"x3"	Visible light	Pen or Pencil	Blackens a circle	programmable	Yes
[1]	Hart InterCivic	Absentee only	--	--	--	--	--	--	--
[1]	Microvote	Absentee only	--	--	--	--	--	--	--
Optech 400C	Sequoia	Only absentee	Central	48" x 55" x 26"	Infrared	Pen or pencil	Completes a broken arrow	Multiple possibilities[2]	Yes
Optech Eagle	Sequoia	General and absentee	Precinct	17.5"x19"x22.5"	Infrared	Pen or pencil	Completes a broken arrow	Multiple possibilities[2]	Yes
Optech Insight	Sequoia	General and absentee	Precinct	17.5"x19"x22.5"	Visible light	Pen or pencil	Completes a broken arrow	Multiple possibilities[2]	Yes
VS500[1]	Adv. Voting Solutions	General voting	--	--	--	--	--	--	--
Model 1000	Unilect	Absentee only	Central	23”x18”x16”	--	Pencil	Line through rectangle	Programmable	Yes
Model 20	Unilect	Absentee only	Central	7”x5.5”x4”	--	Pencil	Line through rectangle	Programmable	Yes

[1]Information not provided by voting machine manufacturer. In some cases model name not available.

[2] Party column, party line, office block, and programmable.

Characteristics of Optical Scan Voting Machines (continued)										
Model Name	**Voters Must Use Buttons**	**Button Labels**	**Option to Write-in a candidate**	**Vote Review**	**To Change a Vote**	**Audio**	**Braille**	**Curbside Voting**	**Adjustable Screen**	**Scans Front and Back**
Model 100	Yes	Yes	Yes[2]	Yes-Paper-End	New ballot	No	No	Yes	--	--
Model 650	No	N/A	Yes[2]	Yes-Paper-End	New ballot	No	No	Yes	--	--
AccuVote-OS	Yes	Yes	Yes[2]	No	New ballot	No	No	No	Yes	Yes
[1]	--	--	--	--	--	--	--	--	--	--
[1]	--	--	--	--	--	--	--	--	--	--
Optech 400C	No	N/A	Yes[2]	--	New ballot	No	No	No	Yes	Yes
Optech Eagle	No	N/A	Yes[2]	No	New ballot	No	No	No	Yes	Yes
Optech Insight	No	N/A	Yes[2]		New ballot	No	No	No	Yes	Yes
VS500[1]	--	--	--	--	--	--	--	--	--	--
Unilect 1000	No	N/A	Yes	Check Ballot	New ballot	No	No	No	Yes	No
Unilect 20	No	N/A	Yes	Check Ballot	New ballot	No	No	No	Yes	No

[1]Information not provided by voting machine manufacturer. In some cases model name not available.

[2] The machine separates write-in votes.

Characteristics of Optical Scan Voting Machines (continued)					
Model Name	**Overvotes Allowed**	**Undervotes Allowed**	**Ballot Length**	**Scans Front and Back**	**Faulty Ballots**
Model 100	Yes	Yes w/confirmation	Six columns or less	Yes	Not accepted w/explanation of problem- LCD
Model 650	Yes	Yes w/o confirmation	Six columns or less	Yes	Not accepted w/explanation of problem- LCD
AccuVote-OS	No	Yes w/confirmation	Four columns or less	Yes	Not accepted w/explanation of problem- LCD
[1]	--	--	--	--	--
[1]	--	--	--	--	--
Optech 400C	No	Optional	Six columns or less	Yes	Not accepted w/explanation of problem
Optech Eagle	No	Optional	Six columns or less	Yes	Not accepted w/explanation of problem- printed answer
Optech Insight	No	Optional	Six columns or less	Yes	Not accepted w/explanation of problem- printed answer
VS500[1]	--	--	--	--	--
Unilect 1000	No	Yes w/o confirmation	Six columns or less	No	Not accepted w/ explanation of problem-On Monitor
Unilect 20	No	Yes w/o confirmation	Six columns or less	No	Not accepted w/explanation of problem-On Monitor

[1]Information not provided by voting machine manufacturer. In some cases model name not available.

Characteristics of Direct Recording Electronic Voting Machines									
Model Name	**Manufacturer**	**Location**	**Touchscreen**	**Screen Size**	**Dimensions**	**Adjustable Font Size**	**Adjustable Font type**	**Type of Buttons**	**No. of Functions per Button**
Vote-trakker EVC308	Avante	NJ	Yes	14.1"	20"x20"x20"	Yes	Yes	Software-on screen	All serve only one function
Vote-trakker EVC308SPR	Avante	NJ	Yes	14" or 15"	16"x17"x4"	Yes	Yes	Software-on screen	All serve only one function
ELECTronic 1242	Danaher	IL	Yes	--	--	Yes	Yes	Hardware and software	All serve only one function
AccuVote-TS	Diebold	OH	Yes	15"	--	Yes	Yes	Software-on screen	All serve only one function
iVotronic	ES&S	NE	Yes	12.1" or 15"	16.1"x18.5"x2.65"	Yes	Yes	Hardware and software	Multiple functions
[1]	EVS	Intl.	Yes	15"	--	--	--	--	--
EV2000	Fidlar Doubleday	IL	Yes	12"	12"x3"x1"	Yes	Yes	Software-on screen	All serve only one function
eSlate	Hart	TX	No	12.1"	11"17"x3"	Yes	No	Hardware-on device	All serve only one function
Infinity	MicroVote	IN	No	15"	16.25"x13"x2.5"	Yes	Yes	Hardware-on device	All serve only one function
MV-464[1]	MicroVote	IN	--	--	--	--	--	--	--
LibertyVote	Nedap ES	NY	No	24” x 34.5”	36.6”x25”x7.5”	Yes	No	Hardware-on device	All serve only one function
Delta	Safevote	CA	Yes	13” x 17”	14”x17”x1”	Yes	Yes	Software-on screen	All serve only one function
AVC Advantage	Sequoia	NY	No	38" x 27”	47”x72”x50”	No	No	Hardware-on device	All serve only one function
AVC Edge	Sequoia	NY	Yes	15"	26"x17"x10"	Yes	Yes	Software-on screen	All serve only one function
Winvote	Adv. Voting Solutions	TX	Yes	15.1"	14"x16"x2.5"	Yes	Yes	Software-on screen	All serve only one function
SureTouch	SureVote	CA	Yes	15"		Yes	Yes	Software-on screen	All serve only one function
AVS-1000	AccuPoll	CA	Yes	15”	26”x20”x14”	Yes	Yes	Software-on screen	All serve only one function
[1]	VoteHere	--	--	--	--	--	--	--	--
Patriot	Unilect	CA	Yes	15.1"	17"x15"x2.2"	Yes	Yes	Software-on screen	All serve only one function
Voteware 334	Voting Technology Intl.	WI	Yes	15”	15.5”x13”x2.5”	Yes	Yes	Software-on screen	All serve only one function

[1]Information not provided by voting machine manufacturer. In some cases model name not available

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Characteristics of Direct Recording Electronic Voting Machines (continued)

Model Name	Different Buttons for Navigation and Selection	Label on Buttons	Color on Buttons	Color Differentiates Button Functions	Mutli-Colored Display	Candidate Selection	To Change a Vote
Vote-trakker EVC308	Yes	Yes-all buttons are labeled	Yes, more than one color	Yes	Yes	Candidate name or area near name	Either directly push or unselect first
Vote-trakker EVC308SPR	Yes	Yes-all buttons are labeled	Yes, more than one color	Yes	Yes	Candidate name or area near name	Either directly push or unselect first
ELECTronic 1242	N/A[2]	Yes-some but not all	Yes, one color	No	No, two-tone	Screen area near name	Unselect current choice first
AccuVote-TS	Yes	Yes-all buttons are labeled	Yes, more than one color	Yes	Yes	Candidate name or area near name	Unselect current choice first
iVotronic	N/A[3]	Yes-some but not all	Yes, more than one color	Yes	Yes	Candidate name or area near name	Either directly push or unselect first
[1]	--	--	--	--	--	--	--
EV2000	No	Yes-all buttons are labeled	Yes, more than one color	Yes	Yes	Candidate name or area near name	Directly push new choice
eSlate	Yes	Yes-all buttons are labeled	Yes, one color	No	Yes	Hardware button	Directly push new choice
Infinity	No	Yes-some but not all	Yes, one color	No	No, two-tone	Hardware button	Unselect current choice first
MV-464[1]	--	--	--	--	--	--	--
LibertyVote	Yes	Yes-all buttons are labeled	Contrast only	No	No, two-tone	On panel with membrane button	Unselect current choice first
Delta	Yes	Yes-all buttons are labeled	Yes, one color	No	Yes	Candidate name on screen	Either directly push or unselect first
AVC Advantage	N/A	Yes-all buttons are labeled	Yes, one color	No	No	Hardware button	Either directly push or unselect first
AVC Edge	Yes	Yes-all buttons are labeled	No	No	Yes	Candidate name or area near name	Either directly push or unselect first
Winvote	Yes	Yes-all buttons are labeled	Yes, one color	No	Yes	Candidate name or area near name	Unselect current choice first
SureTouch	Yes	Yes-all buttons are labeled	Yes, more than one color	Yes	Yes	Candidate name on screen	Either directly push or unselect first
AVS-1000	Yes	Yes-all buttons are labeled	Yes, more than one color	No	Yes	Candidate near or area near name	Either directly push or unselect first
[1]	--	--	--	--	--	--	--
Patriot	Yes	Yes-all buttons are labeled	Yes, more than one color	Yes	Yes	Candidate name on screen	Unselect current choice first
Voteware 334	Yes	Yes-some but not all	Yes, more than one color	No	Yes	Candidate name or area near name	Directly touch new choice

[1] Information not provided by voting machine manufacturer. In some cases model name not available.

[2] The machine does not have navigation buttons-large display only.

Characteristics of Direct Recording Electronic Voting Machines (continued)

Model name	Option to Write-in a Candidate	Vote Review	Help Function on Machine	Help Function Illustrated	Ballot Page Number Displayed on Screen	Jump to a Specific Page	Audio	Braille	Curbside Voting
Vote-trakker EVC308	Yes-software QWERTY keyboard	Yes-On-Screen-Anytime	No	N/A[3]	Yes	No[5]	Yes	Yes	Yes
Vote-trakker EVC308SPR	Yes-software QWERTY keyboard	Yes-On-Screen-Anytime	No	N/A[3]	Yes	No[5]	Yes	Yes	Yes
ELECTronic 1242	Yes-handwritten on paper	No	No	N/A[3]	All races displayed at once	N/A[6]	No	Yes	No
AccuVote-TS	Yes-software QWERTY keyboard	Yes-On-Screen-End	Yes[2]	Yes	Yes[4]	Yes	Yes	No	Yes
iVotronic	Yes-software ABC keyboard	Yes-On-Screen-End	No	N/A[3]	Yes[4]	Yes	Yes	Yes	Yes
[1]	--	--	--	--	--	--			
EV2000	Yes-software ABC keyboard	Yes-On-Screen-End	No	N/A[3]	Yes[4]	No	No	No	No
eSlate	Yes-hardware ABC keyboard	Yes-On-Screen-End	Yes[2]	Yes	Yes[4]	No	Yes	Yes	Yes
Infinity	Yes-software ABC keyboard	No	No	N/A[3]	Yes[4]	No	Yes	No	Yes
MV-464[1]	--	--	--	--	--	--	--	--	--
LibertyVote	Yes-software QWERTY keyboard	All races displayed at once	Yes	Yes	All races displayed at once	Yes[6]	Yes	Yes	Yes
Delta	Yes-software QWERTY keyboard	Yes-On-Screen-End	Yes	No	Yes	No	Yes	Yes	Yes
AVC Advantage	Yes-software QWERTY keyboard	All races displayed at once	Yes[2]	No	All races displayed at once	N/A[6]	Yes	Yes	No
AVC Edge	Yes-software QWERTY keyboard	Yes-On-Screen-Anytime	Yes[2]	No	Yes[4]	Yes	Yes	Yes	Yes
Winvote	Yes-software ABC keyboard	Yes-On-Screen-End	No	N/A[3]	Yes[4]	No	Yes	No	Yes
SureTouch	Yes-software QWERTY keyboard	Yes-On-Screen-End	Yes[2]	No	No	No	Yes	Yes	No
AVS-1000	Yes-software QWERTY keyboard	Yes-On-Screen-Anytime	Yes	Yes	Yes[4]	Yes	Yes	Yes	Yes
[1]	--	--	--	--	--	--	--	--	--
Patriot	Yes-software ABC keyboard	Yes-On-Screen-End	No	N/A[3]	Yes[4]	No	Yes	No	Yes
Voteware 334	Yes-software ABC keyboard	Yes-On Screen-Anytime	Yes	Yes	Yes	No	Yes	No	Yes

[1] Information not provided by voting machine manufacturer. In some cases model name not available.

[2] Context-sensitive, relevant to current screen.

[3] No help function.

[4] The number of pages completed and left is displayed.

[5] Yes on review page.

[6] All races are displayed on the same page.

Characteristics of Direct Recording Electronic Voting Machines (continued)

Model name	Adjustable Screen	Voter Identification	Overvotes Allowed	Warning for Undervotes	Ballot Display	Straight Party Option	Referenda Display
Vote-trakker EVC308	Yes	Insert card	No	Yes	Office block[2]	Yes	Some/full text w/ arguments pro and con
Vote-trakker EVC308SPR	Yes	Insert card	No	Yes	Office block[2]	Yes	Some/full text w/ arguments pro and con
ELECTronic 1242	Yes	Poll worker controls on/off	No	Yes	Office block[2]	Yes	Some/full text w/ arguments pro and con
AccuVote-TS	Yes	Poll worker controls on/off	No	Yes	Programmable	Yes	Some/full text w/ arguments pro and con
iVotronic	Yes	Poll worker controls on/off	No	Yes	Office block[3]	Yes	Full text of question
[1]	--	--	--	--	--	--	--
EV2000	Yes	Poll worker controls on/off	No	No	Programmable	Yes	Some/full text w/ arguments pro and con
eSlate	Yes	Type ID number	No	Yes	Programmable	Yes	Some/full text w/ arguments pro and con
Infinity	Yes	Insert card	No	No	Programmable	Yes	Some/full text w/ arguments pro and con
MV-464[1]	--	--	--	--	--	--	--
LibertyVote	Yes	Optional	No	Yes	All at once	Yes	Some/full text w/ arguments pro and con
Delta	Yes	Poll worker or type DVC	No	Yes	Programmable	Yes	Some/full text w/ arguments pro and con
AVC Advantage	Yes	Multiple options	No	Yes	Office block[3]	Yes	Full text of question
AVC Edge	Yes	Insert card	No	Yes	Programmable	Yes	Some/full text w/ arguments pro and con
Winvote	Yes	Poll worker controls on/off	No	Yes	Programmable	Yes	Some/full text w/ arguments pro and con
SureTouch	Yes	Type ID number	No	No	Programmable	Yes	Some/full text w/ arguments pro and con
AVS-1000	Yes	Insert card	No	Yes	Office block[2]	Yes	Some/full text w/ arguments pro and con
[1]	--	--	--	--	--	--	--
Patriot	Yes	Poll worker controls	No	Yes	Programmable	Yes	Some/full text w/ arguments pro and con
Voteware 334	Yes	Type PIN number	No	Yes	Programmable	Yes	Full text of question

[1]Information not provided by voting machine manufacturer. In some cases model name not available.

[2] One office displayed at a time.

[3] More than one office displayed.