Prime III: Where Usable Security and Electronic Voting Meet

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Abstract. Mr. Wilson never votes. He doesn't vote because he is not confident in his reading capabilities; however, he decided that he will vote this year because he heard that blind people will be able to privately cast their vote. He said, "If blind people can vote, then so can I". At the voting precinct, he shows his identification and receives a blank, numbered ballot sheet. He enters a voting booth, placing the ballot into the printer. Using a headset with a microphone, he is able to make his selections by speaking numbers, which gives him confidence that his vote is private. Before printing his ballot, he listens to a summary of his selections. He leaves the voting booth and places his printed ballot into a secure box. Like Mr. Wilson, there are millions of people that don't participate in our electoral process due to disabilities and no confidence in the equipment. Through usable security, Prime III aims to broaden voter participation and confidence.

Keywords: Electronic Voting, Multimodal Interfaces, Human Centered Design.

1 Introduction

America's current voting system is in need of a major overhaul. This became overwhelmingly clear as a result of the 2000 U.S. Presidential election (Celeste et. al., 2005; Rubin, 2006). Accordingly, the federal government has allocated funds for the purchase of modern voting equipment. Electronic voting machines are currently being used in many states. However, the use of these machines has not been without controversy and met with resistance. For example, it has been widely reported that electronic voting machines pose a number of unacceptable risks. These include vulnerability to hackers, malignant workers, faulty code, lack of recount ability, and human error. Therefore, a system must be built that can address the aforementioned issues and instill voter confidence in the electronic voting process. Also, it is no longer sufficient for such a system to simply be secure; the voter must feel confident in the integrity of the system. Additionally, it should be easy to navigate and use for all segments of the voter population. The system should provide security and trust while being easy to use, e.g. *usable security*.

2 Prime III Voting System

The Prime III voting system was developed using a human-centered computing approach. This approach considers the users first and implements the design that accommodates users. As a result, Prime III is a user friendly electronic voting system which encompasses the necessary security, integrity and user satisfaction safeguards that should be required of all electronic voting systems. It is easily integrated into the current voting process and improves upon it significantly. This provides a degree of familiarity and allows the voter to remain comfortable and confident while using an enhanced voting system.

Prime III is easily integrated into the current voting process. The voter enters the voting precinct and checks in with election officials. After checking in, the voter is handed a unique ballot card. The voter then takes the ballot card to an empty voting booth. The voting booth contains an empty single sheet printer, touch screen, and headset. The voter places their ballot card into the printer. When the system begins, the voter will cast his/her vote using a *multimodal* (text-to-speech, speech-to-text, touch) user interface. The multimodal interface allows the voter to cast his/her vote using touch or voice, via the touch screen and headset, or a combination of both. Prime III enables voter interaction regardless of their disposition. Voters with visual, hearing or physical impairments can still participate in the electoral process using Prime III. Essentially, if you can't read, see, hear or if you have a physical disability, i.e. arthritis, you can still vote using Prime III in a private, secure, yet usable environment.

The Prime III system has an integrated automatic speech recognizer (ASR) that is accessed through a headset with a microphone. When a voter uses the ASR, they are prompted through the choice of candidates via the headset. Each candidate is assigned a randomly generated number, from which the voter can select by simply saying the number. The first candidate is assigned a random number and incremental numbers are assigned for each subsequent candidate. This approach ensures voter privacy. Eavesdroppers will here a voter speaking numbers with no indication of the voter's choices. After the voter finishes voting, their selections are displayed on the screen and spoken to them. At this point, the voter is required to confirm their selections using touch or speech. Upon review and confirmation from the voter, the system prints out the corresponding ballot card and records a virtual vote. Additionally, the voter is able to observe the system while it records the vote and prints their ballot card. The printed ballots provide a redundant paper trail of the vote, should there be a need for a recount. Next, the voter exits the voting booth and places their ballot card into the ballot box. This entire process is open to the public and highly visible as the voting area is surrounded by glass walls or simply no walls. The voters can view the machines, the ballot box, guards, and each other. The only hidden aspects of the system are the actual touch screens and printed ballots.

3 Conclusion

Prime III has the requisite capabilities to provide the nation with a private, secure and usable electronic voting system. Prime III can broaden voter participation in the electoral process by enabling people with various impairments to vote, i.e. visual, auditory, and/or physical, just as any other member of society. Prime III addresses usable security by providing voters with increased confidence that their votes are actually counted and privacy while casting their vote. Prime III started as a research project (Cross & Gilbert, 2005); however, it has grown into a viable solution to the nation's woes in electronic voting.

References

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