Jon Sanford
Georgia Institute of Technology
jon.sanford@coa.gatech.edu

EZ Ballot: One Voting System for All

Current accessible voting machines require many voters with visual, cognitive and dexterity limitations to vote with assistance, if they can vote at all. To facilitate voting for these individuals as well as voters without disabilities, EZ Ballot uses universal design principles to integrate a simplified, linear ballot structure with multimodal input and output (I/O) interfaces on a touch screen (e.g., IPaD or Microsoft Surface) device.

The structure of EZ Ballot breaks down the voting process (e.g., contests, candidates, review of the ballot) into simple, easy to understand questions and consistent responses that require users to respond to yes and no questions rather than presenting them with several choices. Each screen contains only one question that is presented both visually and verbally. The question itself serves as a prompt to can remind and orient voters to the task. The linear, rather than hierarchical information structure provides a directed guide with sequential steps that facilitates navigation and use by voters who are unfamiliar with voting systems, as well as those with low-literacy and cognitive disabilities. In addition, the nature of the linear structure resembles that of a typical audio interface for visually-impaired individuals, which, by its very nature, is linear. As a result, the visual and audio interfaces of EZ ballot have the same structure, which provides equal access to both sighted and non-sighted users.

EZ ballot was also designed with integrated multimodal inputs and outputs to provide perceptibility, flexibility, redundancy, and tolerance for error for users with different abilities. For example, to register "yes" and "no" responses, physical, touch input and speech inputs are provided. For navigating contests and candidates, users can either touch the visual arrow or perform the swiping gesture. For entering a write-in candidate, users can either touch the visual arrow to move one letter at a time or move a slider left or right to advance more quickly through the alphabet. Similarly, for changing the text size, users can either move the slider left and right or spread and pinch the fingers.

Multimodal, redundant outputs include visual, speech, and non-speech sound to indicate that an action has occurred. Visual outputs provide redundant color, symbol, and text cuing. For example, input interfaces are color-coded with high contrast green, red, yellow, and blue visual output as well as being differentiated by text and symbols. In addition, rather than providing either a visual or audio interface, which is characteristic of current DRE systems,. EZ Ballot integrates visual and audio interfaces so they can be used separately or synchronized. Thus, EZ Ballot can present each screen both visually and verbally without having a separate audio system and keypad. In addition to the visual output, sounds, such as clicks or pings, provide redundant information to indicate that an action has been accomplished.

The next phase of development includes usability studies to evaluate design features and refine the design. A total of 40 participants, including 10 participants with visual, dexterity, and cognitive impairments and ten without disabilities, will be recruited. Four sample ballots covering a range of contest types (e.g., choose one, choose three, write-in, referendum) will be designed that require no more than 10 minutes each to complete. Quantitative measures of task performance will include task completion, task success (accuracy of voting), number of assists required (asking for help), and the number of errors made (incorrect inputs). Following each trial, participants will be asked to complete a post-trial interview to elicit in-depth, qualitative feedback about the usability of each of feature and their satisfaction with EZ Ballot.