

Balloting: speeding up the voting process

Clemson University
Human Centered Computing

ABSTRACT

In the 2012 November elections, voters across the United States faced long lines and waiting times during both the early voting period and on Election Day. In Massachusetts, some voters waited 2 hours to vote [5]. In Colorado, Virginia, and Texas, voters waited in line for up to 4 hours [2,4]. Voters in the state of Florida experienced anywhere from 5 to 8 hour [3] wait times at certain precincts. Although the recent election's wait times set a record in states such as Florida, long lines and wait times have been an issue for years. Long lines and wait times discourage and prevent people from voting as evident in the recent presidential elections where certain precincts reported voters leaving polls without casting their ballots [3]. These long wait times are a form of voter disenfranchisement and can dramatically affect election results, especially in close races such as the 2000 presidential elections in Florida where 5,801,000 votes were cast and a 537 vote margin determined the winner [1].

To address the issue of long lines and wait times, *Balloting* is presented as an option to speed up the voting process. *Balloting* allows a voter to fill out a ballot via an automated phone or online system prior to Election Day or casting a ballot. The *Balloting* process gives the voter an opportunity to (1) read, (2) understand, (3) fill out, (4) review, and (5) print the completed ballot in the form of a QR code at his/her convenience and prior to going to the polls. On Election Day, the voting machine is used to scan the voter's QR code, which brings up the voter's prior completed ballot for review and modification before officially submitting it. When the voter submits the ballot, it will print on the voting machine where the voter can verify the ballot. Since a voter would already be familiar with the ballot and have fully or partially completed the ballot, the hypothesis was that *Balloting* would reduce the voting time and errors in the voting process compared to other methods of voting .

To test this hypothesis, a pilot study was conducted to measure the efficiency of *Balloting* compared to other methods of voting. The pilot study used a 2012 ballot from Broward County, Florida to measure the time it took each participant to vote via a (1) paper ballot, (2) electronic voting system, and (3) *Balloting*. The study revealed that *Balloting* significantly reduced the total voting time, with an average of 48 seconds across 23 participants compared to 3.8 minutes and 4.5 minutes for the electronic voting machine and paper ballots respectively. In addition to analyzing the experiment data, queuing models were developed based on the data to model average wait times as a function of the total number of voting machines, voter

arrival rate, and other variables. The queuing models showed that while *Balloting* reduces voting times, it consequently reduces queue wait times.

Future studies are being developed to further explore the efficiency of the *Balloting* concept. Privacy and security concerns will also be explored in this phase.

REFERENCES

1. Belenky, Alexander S., and Richard C. Larson. "To Queue or Not to Queue?" Operations Research Management Science - Voting Queues. Lionheart Publishing, Inc., June 2006. Web. 25 Nov. 2012. <<http://www.orms-today.org/orms-6-06/queues.html>>.
2. Bronner, Ethan. "Long Lines, Demands for ID and Provisional Ballots Mar Voting for Some." The New York Times Politics. The New York Times, 07 Nov. 2012. Web. 25 Nov. 2012. <<http://www.nytimes.com/2012/11/07/us/politics/long-lines-id-demands-and-provisional-ballots-mar-voting.html?adxnnl=1>>.
3. Campbell, Janie. "Emergency Lawsuit Filed In Florida Over Long Lines At Early Voting." Huffpost Miami. The Huffington Post, 04 Nov. 2012. Web. 25 Nov. 2012. <http://www.huffingtonpost.com/2012/11/04/florida-early-voting-lawsuit_n_2072435.html>.
4. Osher, Christopher N., and Ryan Parker. "Metro Voters Experience Long Waits in Colorado." The Denver Post. The Denver Post, 06 Nov. 2012. Web. 25 Nov. 2012. <http://www.denverpost.com/breakingnews/ci_21939411/election-day-voting-begins-swing-state-colorado>.
5. Werthmann, Melissa M., Patrick D. Rosso, Jessica Bartlett, Matt Carroll, and Maria Sacchetti. "Voters Face Long Lines and Chilly Temperatures." MetroDesk. Boston.com, 25 Nov. 2012. Web. 25 Nov. 2012. <<http://www.boston.com/metrodesk/2012/11/06/voters-face-long-lines-and-freezing-temperatures/AxiIAXKL8efZwxIfP0anJP/story.html>>