CS Bits & Bytes
Highlighting Innovative Computer Science Research

CS Bits & Bytes is a bi-weekly newsletter highlighting innovative computer science research. It is our hope that you will use CS Bits & Bytes to engage in the multi-faceted world of computer science to become not just a user, but a creator of technology. Please visit our website at: http://www.nsf.gov/cise/csbytes.

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Accessible Voting Enabled by Human-Centered Computing

With the fall comes a season for making your voice heard. A whole new season of American Idol; **who will be America's next favorite singing sensation?** And **who are going to be crowned homecoming queen and king** at your school? Voting is undoubtedly in the air, especially with **the presidential election right around the corner.**

A Clemson Team Member shows a voter how to use the Prime III system so that she can vote on her own. Photo courtesy of Clemson University.

Yet some people with disabilities cannot vote independently because voting technologies, e.g., standard voting machines, do not accommodate their needs. Paper ballots, punch cards and direct recording electronic voting systems without audio alternatives are often not available for disabled individuals. To ensure that the needs of all citizens are met, voting accessibility must consider physical access, integration with individual's assistive technologies, as well as the language and format in which information is presented.

Enter **human-centered computing**, a research area focused on understanding how to make computational technologies more useable. A recent breakthrough in this area now enables ALL voters, regardless of unique usability requirements, to cast their ballot privately and independently on the same machine.

Researchers in the Human-Centered Computing Lab at Clemson University have created Prime III, an accessible voting machine. **Prime III** allows individuals to vote by touch and/or voice through an easy-to-use, intuitive, accessible and secure electronic voting machine. The system works by using a **uniquely designed touch screen** that allows sighted voters to easily cast their ballots by simply touching their selections. Prime III also uses a **headset with a microphone** to allow voters to privately cast their ballots using their voice.

Research on voting technologies, a highly active area, melds the knowledge of state election officials, computer scientists, social scientists, Internet security specialists and experts in voter fraud. All voting technologies must ensure a high level of integrity, including:

- secrecy to ensure confidentiality;
- privacy to prevent voter intimidation;
- accountability to verify authenticity;
- uniqueness to ensure one vote per citizen; and,
- accuracy to record votes correctly.

Voting systems should also be reliable, flexible, convenient and cost-effective.

The Clemson University Prime III Research Team. Photo courtesy of Clemson University.

MUST SEE!

Video: http://www.livescience.com/18798-researcher-studies-people-interact-technology.html. Learn about what inspired Juan Gilbert into computer science!

Who Thinks of this Stuff?! Juan Gilbert, an IDEaS Professor and Chair of the Human-Centered Computing Division at Clemson University, directs the Human Centered Computing Lab. Professor Gilbert won the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring in 2011 and the National Center for Women in Information Technology Research Mentoring Award in 2012. In his leisure time, Gilbert enjoys spending time with his wife and two sons as well as fishing.

Links:

Read more about Juan Gilbert and the Human Centered Computing at: http://HccLab.org/

Learn more about making voting accessible from the Research Alliance for Accessible Voting (http://www.accessiblevoting.org/) or the Verified Voting Foundation (www.verifiedvoting.org/access).

Activity:

Prime III is about creating an interface that is accessible to all people for voting. Interfaces are everywhere in our lives, yet people often don't think about them. For instance, have you ever tried to push open a door, only after realizing that it should have been pulled open. That is an interface that was not presented clearly.

Break students into groups of 6-9. Have one third of the group walk to a desired location within or near the classroom (the water fountain down the hall, the nearest restroom, etc.) and while on their way, create a map for getting there. The rest of the group should not know where they are headed. This map must include clear drawings of all obstacles along the way and should not include any words.

The mapmakers should return and give their map to the second third of the group. Based on the map, they need to write step-by-step instructions for arriving at the desired destination (e.g., not just open a door, but how do you open the door?).

The last third of the group must then take the written instructions and follow them exactly. Do they arrive at the intended location?

After the activity has been completed, bring the groups together to discuss how usability was incorporated in the development of the map and instructions.