

Leveraging Today's Technology to Make Voting Systems Usable, Accessible, and Secure

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Abstract

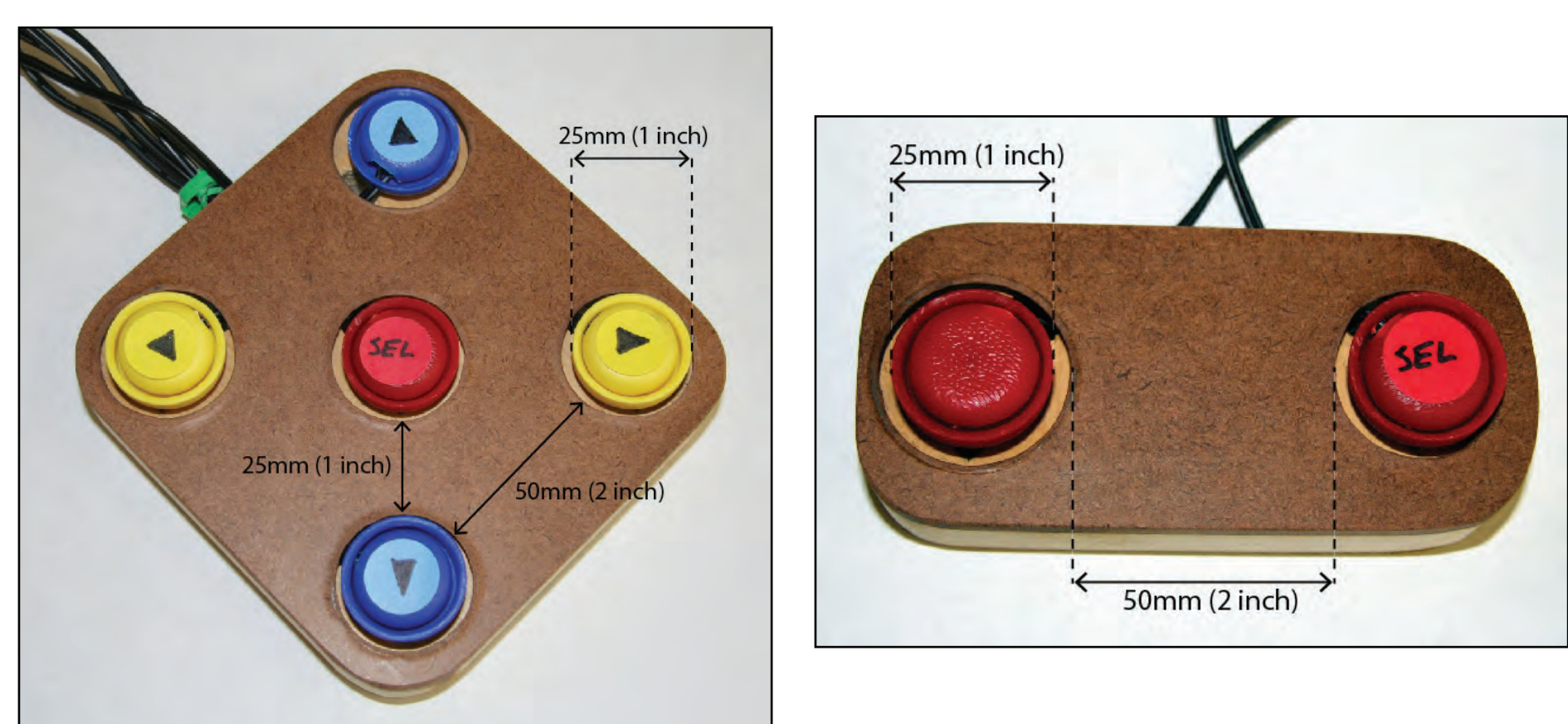
Several concerns surround paper absentee ballots, including concerns with voter privacy, voter errors and slow recounts. Furthermore, paper absentee ballots are not usable and accessible to individuals with disabilities such as vision impairments, cognitive deficits and physical limitations. Today's technologies, such as tablet computers with integrated screen reading capabilities, may be viable for use as accessible ballot marking devices or voting systems.

The Georgia Tech Research Institute (GTRI) has designed a flexible voting application testbed that runs on any mobile device. The purpose of this testbed is to provide researchers with a means to investigate specific questions and concerns with the use of mobile technology as part of future voting systems. Two studies have been conducted using the testbed: a comparison of 2-, and 5-button control interfaces, and a comparison of multi-column, multi-page and scrolling ballot layouts. The results from these studies revealed that the preferred configuration would be a 3-button control interface with a multi-column ballot layout.

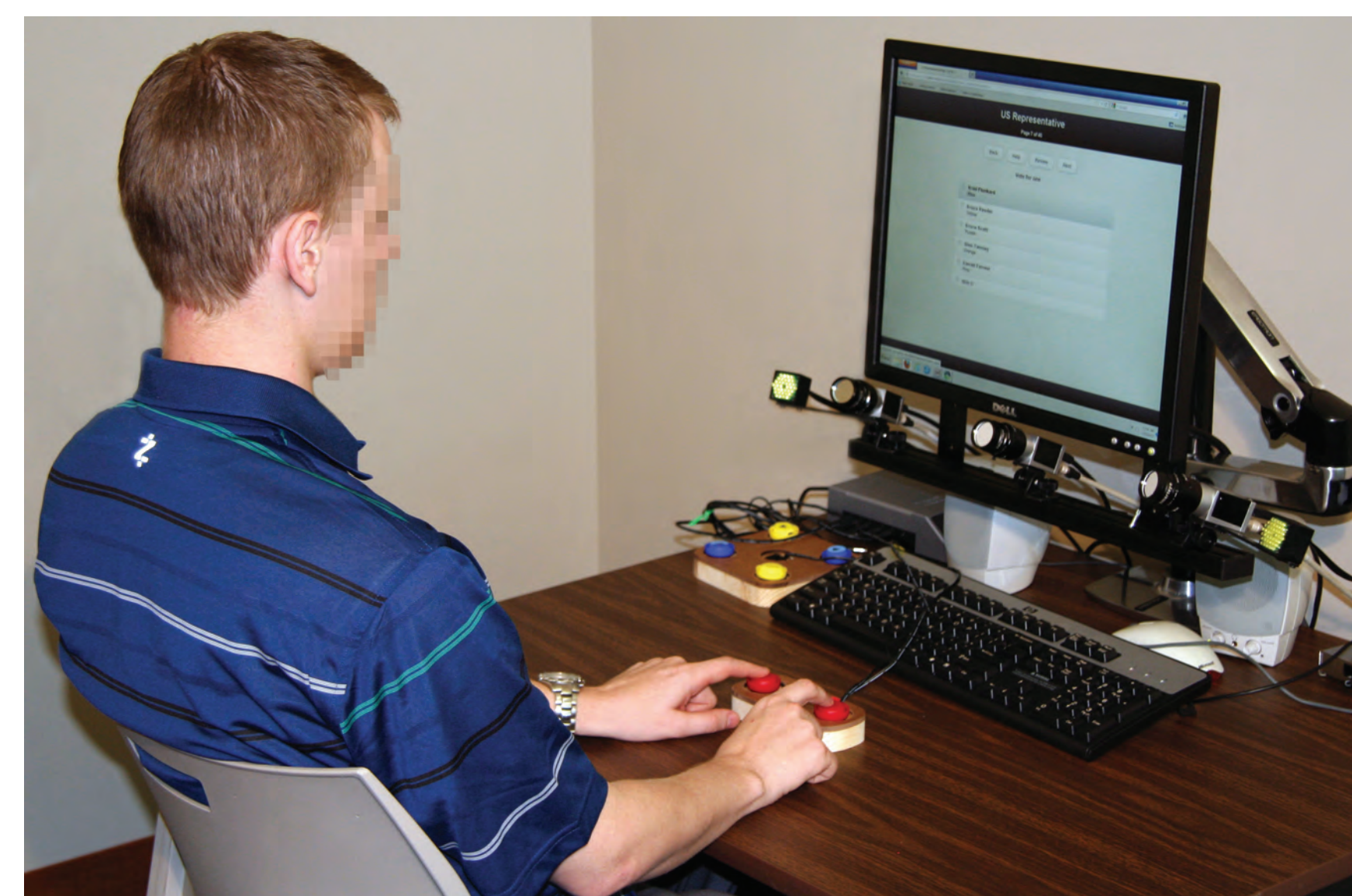
These findings have been incorporated into the newest version of the voting application testbed, which includes a custom case for an iPad that incorporates hardware buttons into an integrated, portable system. The system uses a Komodo Tecla Shield switch interface to allow users to connect their specific assistive devices to the iPad. The poster and demonstration will present the results from the studies, the evolution of the testbed, and a preliminary prototype of the new system.

Testbed Studies

The study consisted of 18 participants (26±13 years, 12 males and 6 females). Participants were 18 years of age or older and considered to be healthy.



5-button vs. 2-button

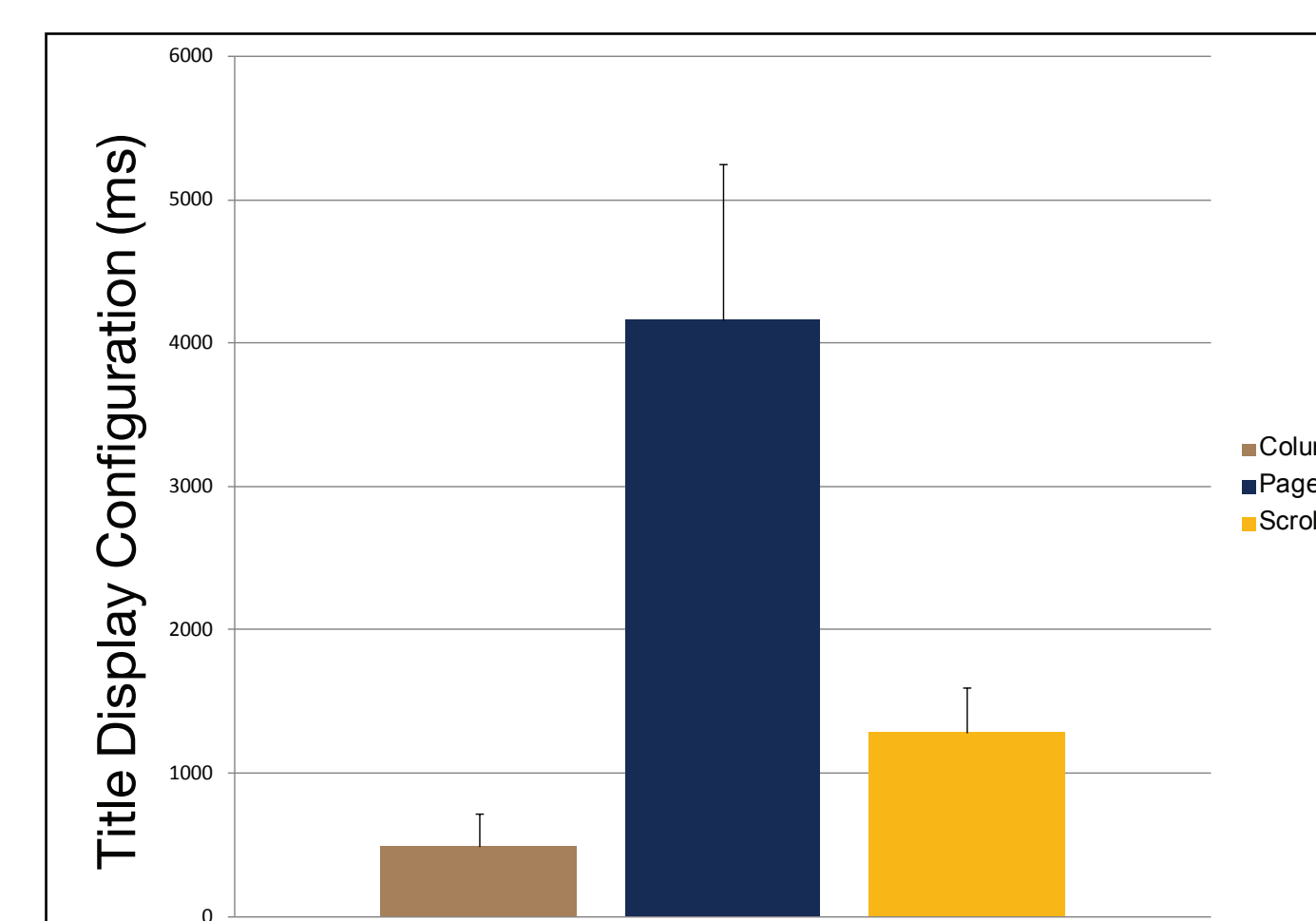


Collected eye-tracking, timing, and selection data, as well as a system usability survey

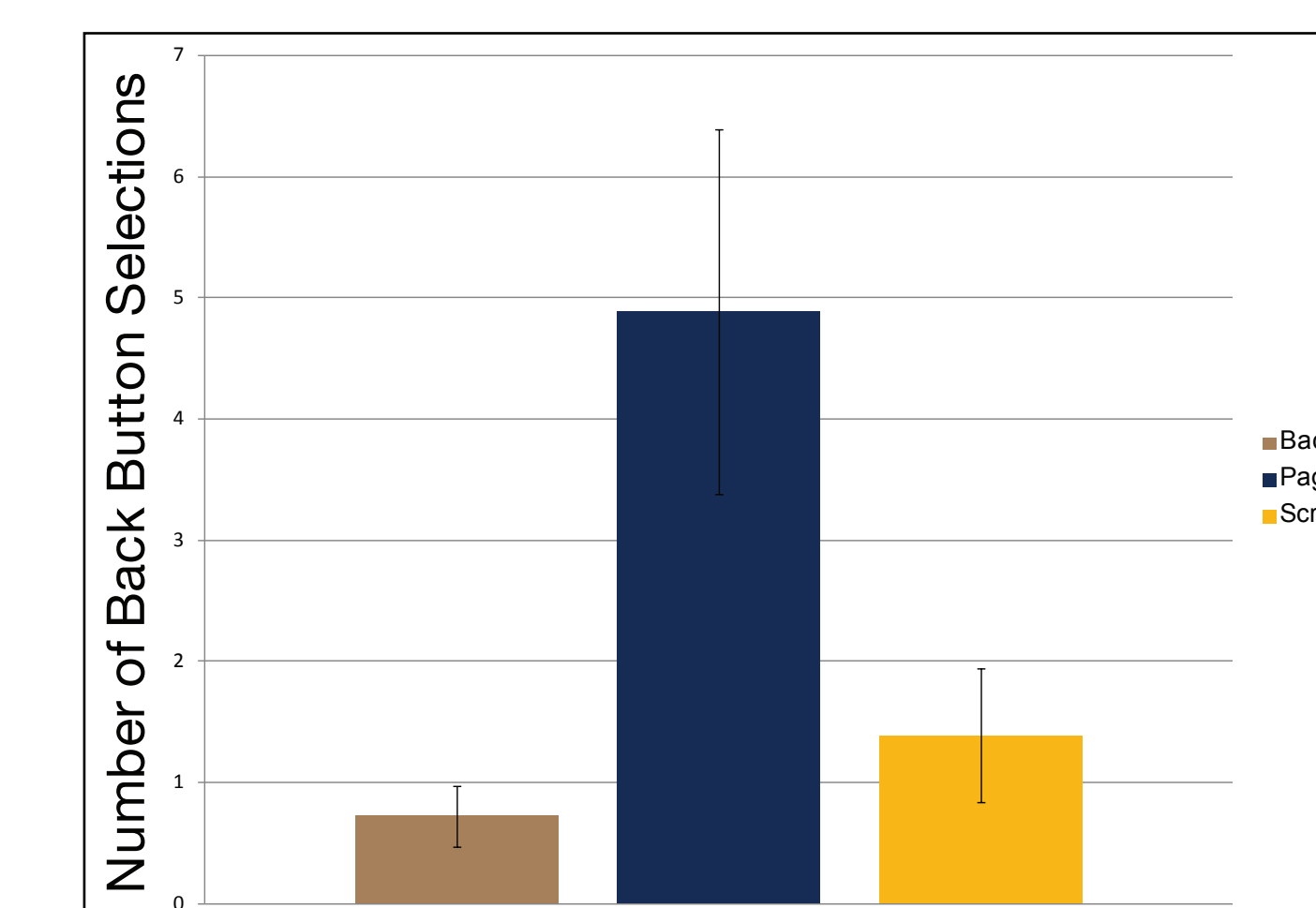


Scroll vs. Column vs. Multi-page

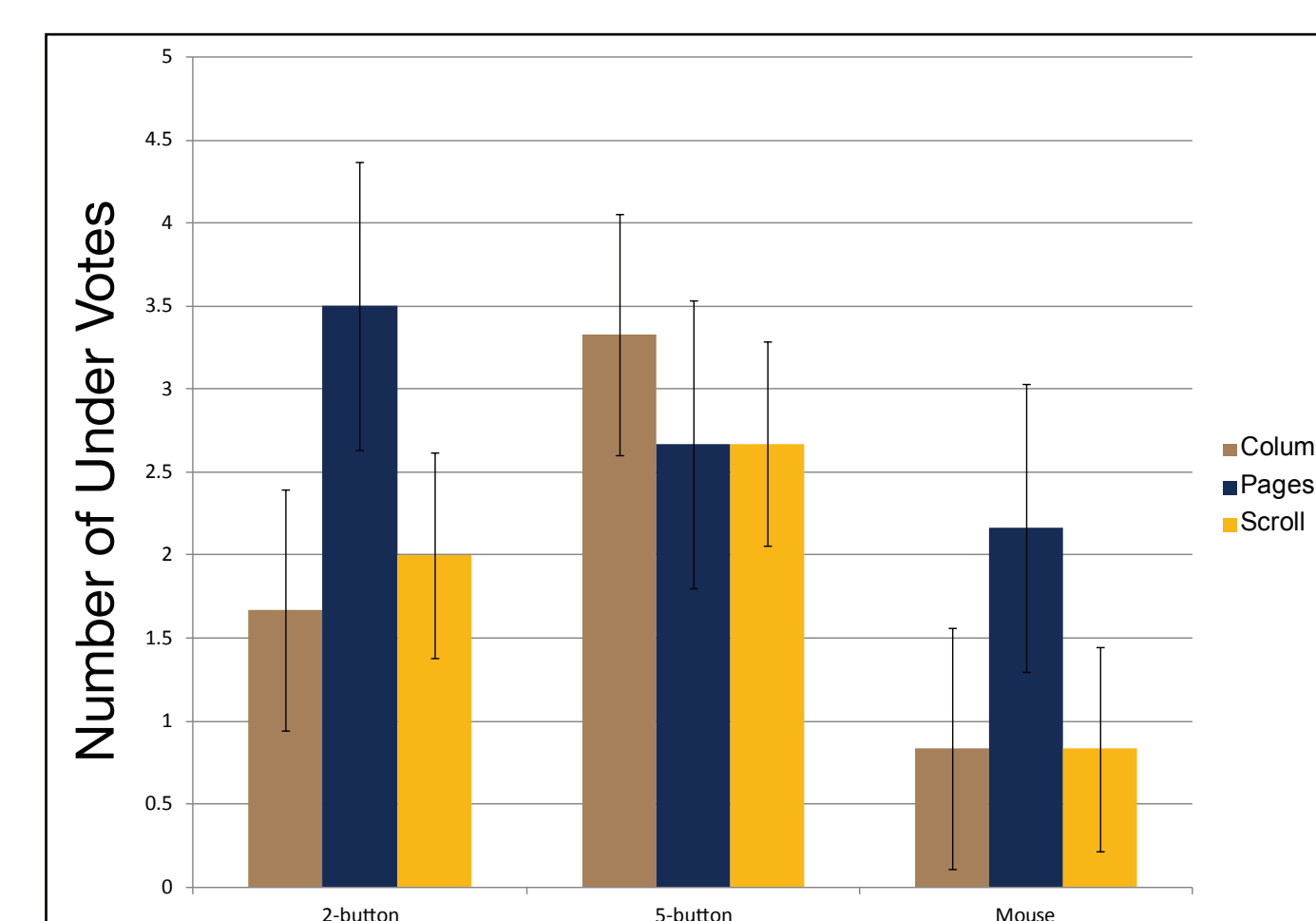
Results



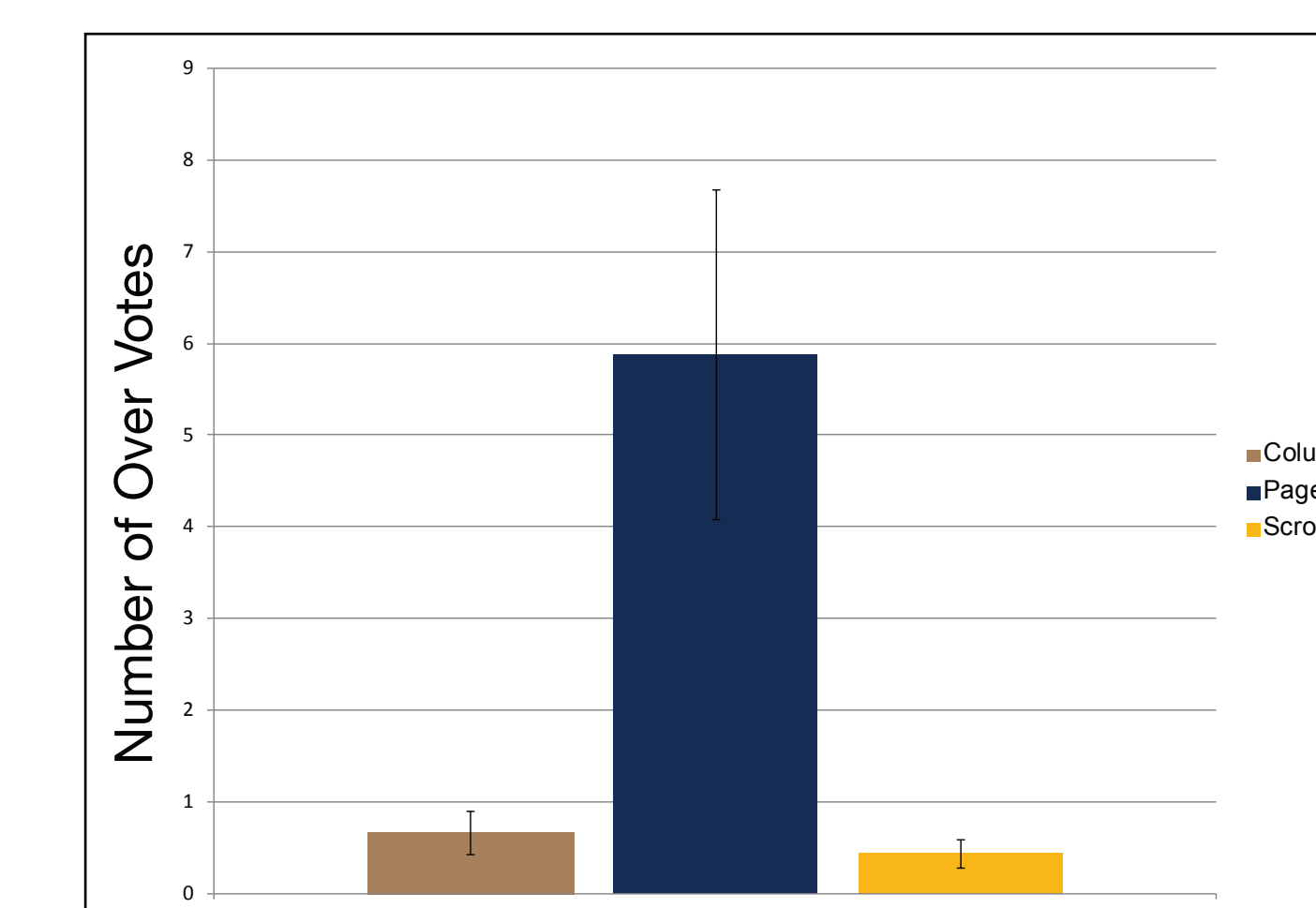
The amount of time that people took to read the title and directions on each page. The multi-page configuration was significantly more time consuming. The type of controller used did not influence these results



Back and Next buttons were hit much more frequently for the pages layout than for column and scroll. The type of controller used did not influence these results

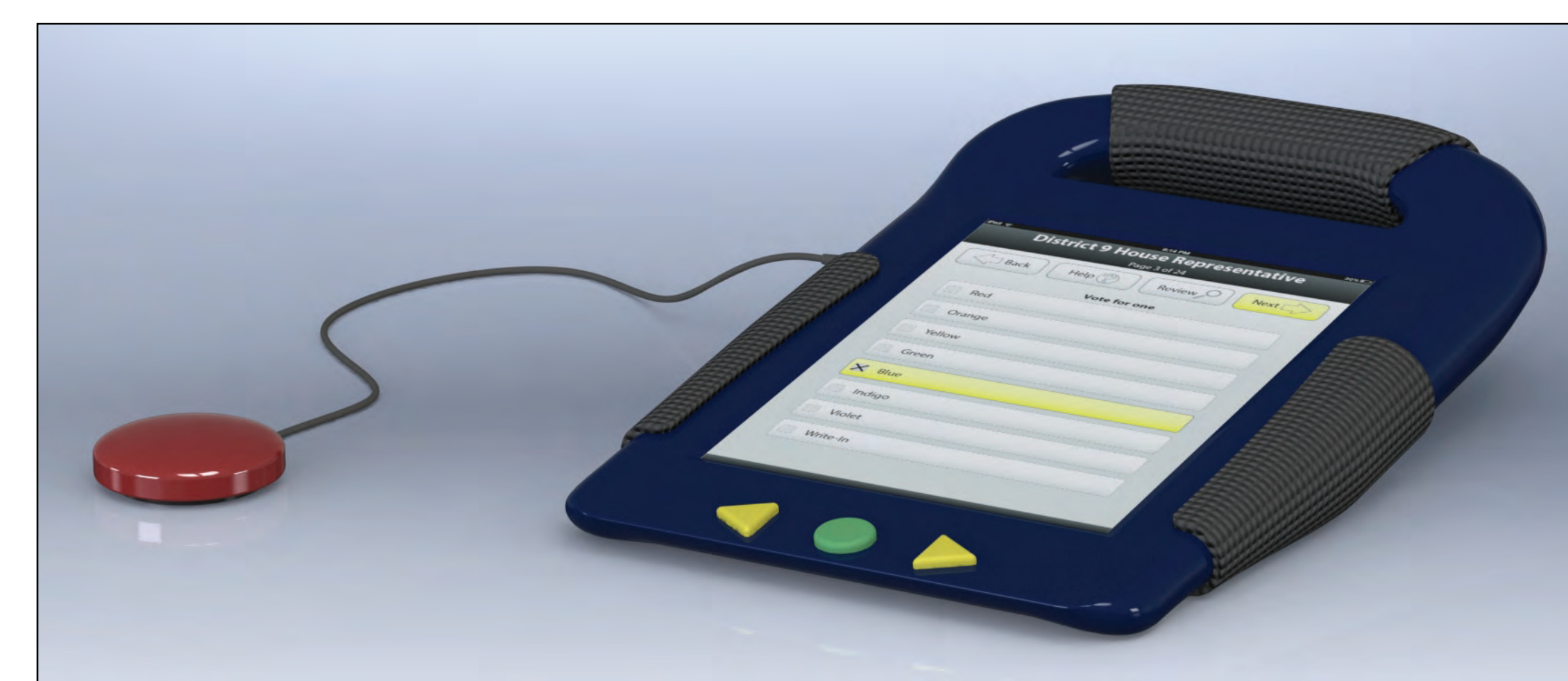


The multi-page display configuration resulted in many more under and over votes occurring compared to both the scrolling and column layout.

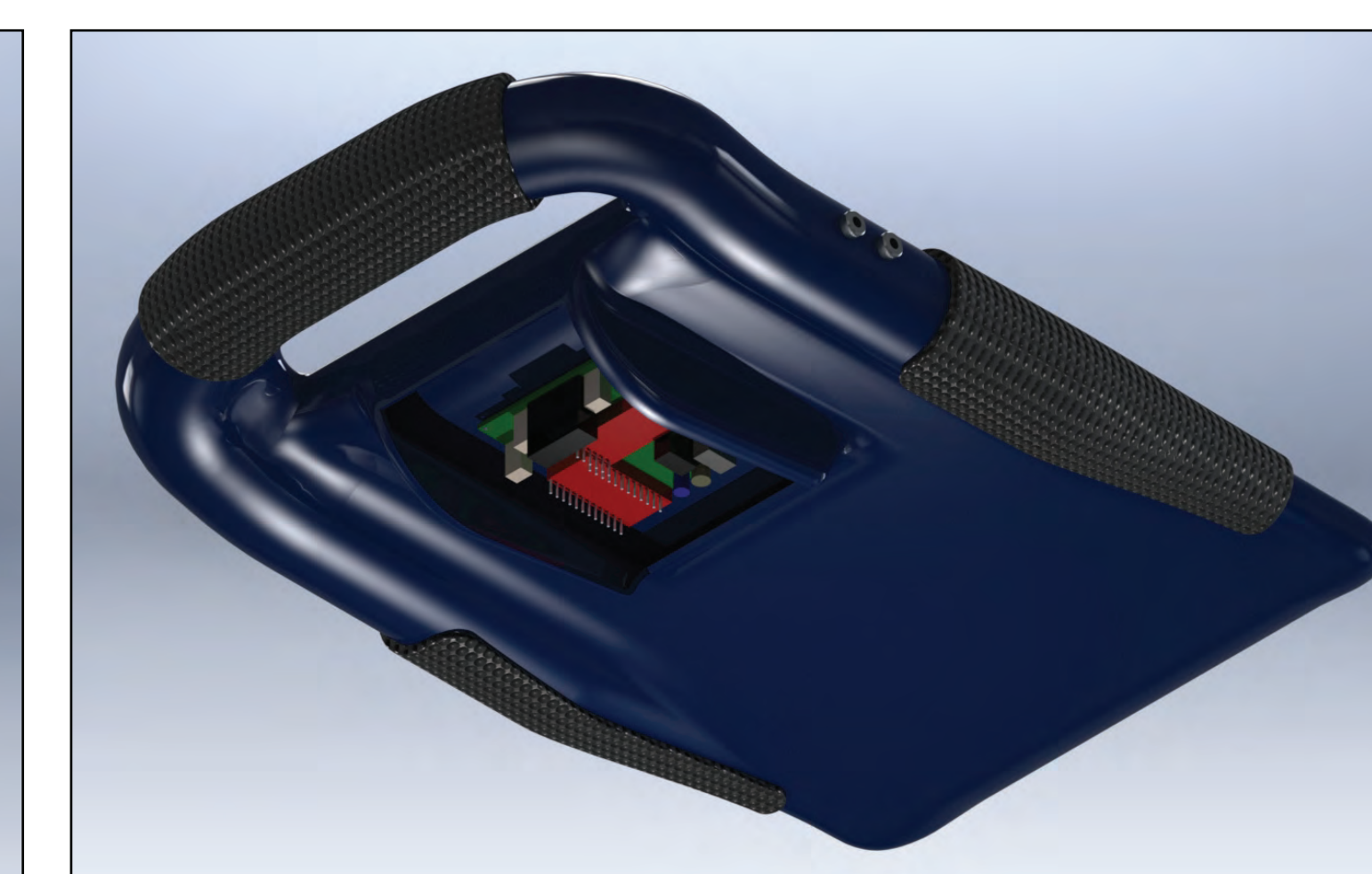


Future Work

Currently, a ballot marking device is under development that will incorporate the built-in accessibility features of the iPad and further expand these capabilities by utilizing the Komodo Tecla Shield chip to interact with the iPad via external devices.



A concept ballot-marking case containing an iPad, shown with voting testbed and attached accessibility switch.



Rear view of the concept case, with back panel removed to show Komodo chip.