

# Voting Technology Research – UCONN VoTeR Center



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## UConn VoTeR Center

The University of Connecticut Center for Voting Technology Research was established in 2006 to provide the State of Connecticut with technological expertise on electronic voting technology. The Center is funded by the Office of the Secretary of the State of Connecticut and is responsible for the technological oversight of the electronic voting systems in the State. The Center was involved in the selection of optical scan technology for use in the State at the time when many states were favoring touch-screen voting technology. This decision by the State proved to be the right one as many states realized too late that touch-screen technology is less dependable and not auditable.

Since 2006 the Center performs technological audits for all state-wide elections before and after each election. This partnership between the State of Connecticut and the University of Connecticut is unique in the Nation. The Center personnel includes four faculty members in the Department of Computer Science & Engineering, several graduate and undergraduate students, an engineer, and support staff.

The Center published a number of important research studies in the area of electronic election systems and its work earned it national recognition as one of the leading programs of this kind.

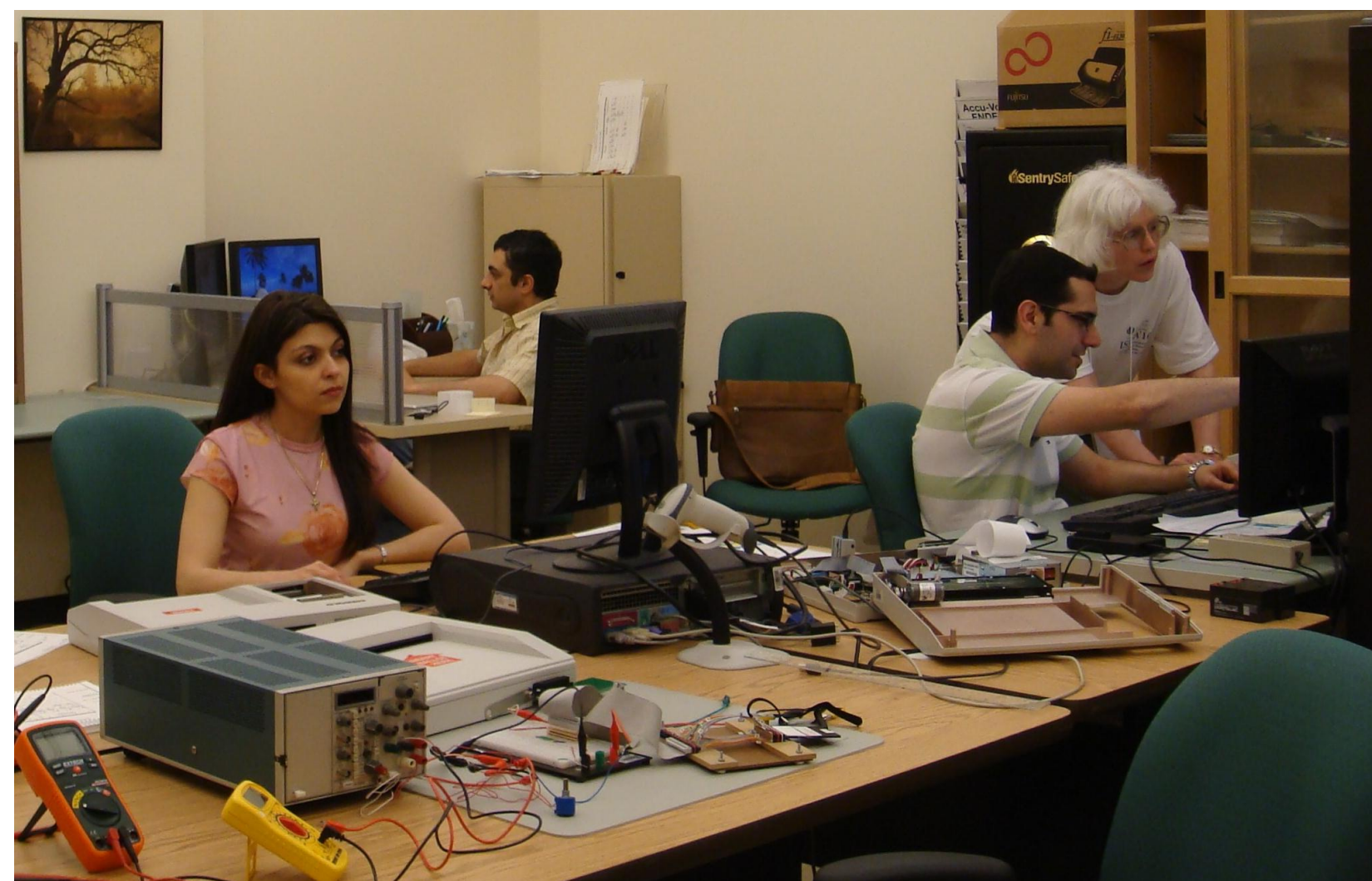
## People at the VoTeR Center

Directed by the team of four faculty members, the VoTeR Center involved over 10 graduate students in recent years, and a number of undergraduates who substantially contributed to the work of the Center.



A. Shvartsman, A. Russell, L. Michel, and A. Kiayias

- Alex Shvartsman, PI
- Aggelos Kiayias, Co-PI
- Laurent Michel, Co-PI
- Alex Russell, Co-PI
- Reda Ammar, Senior personnel
- Tigran Antonyan, Engineer
- Students and Assistants:
  - Graduate assistants: S. Davtyan, D. Lawrence, N. Nicolaou, T. Smith
  - Undergraduate student: E. Kovalev
  - Debra Mielczarek, Administrative Assistant
  - Many graduate and undergraduate students in the past



Seda Davtyan, Tigran Antonyan, Nicolas Nicolaou, and Therese Smith

## Student Involvement

The Center actively involves graduate and undergraduate students in its work.

Over 10 graduate students participated in the work of the Center, performing research, assisting with audits, and coauthoring all published reports.

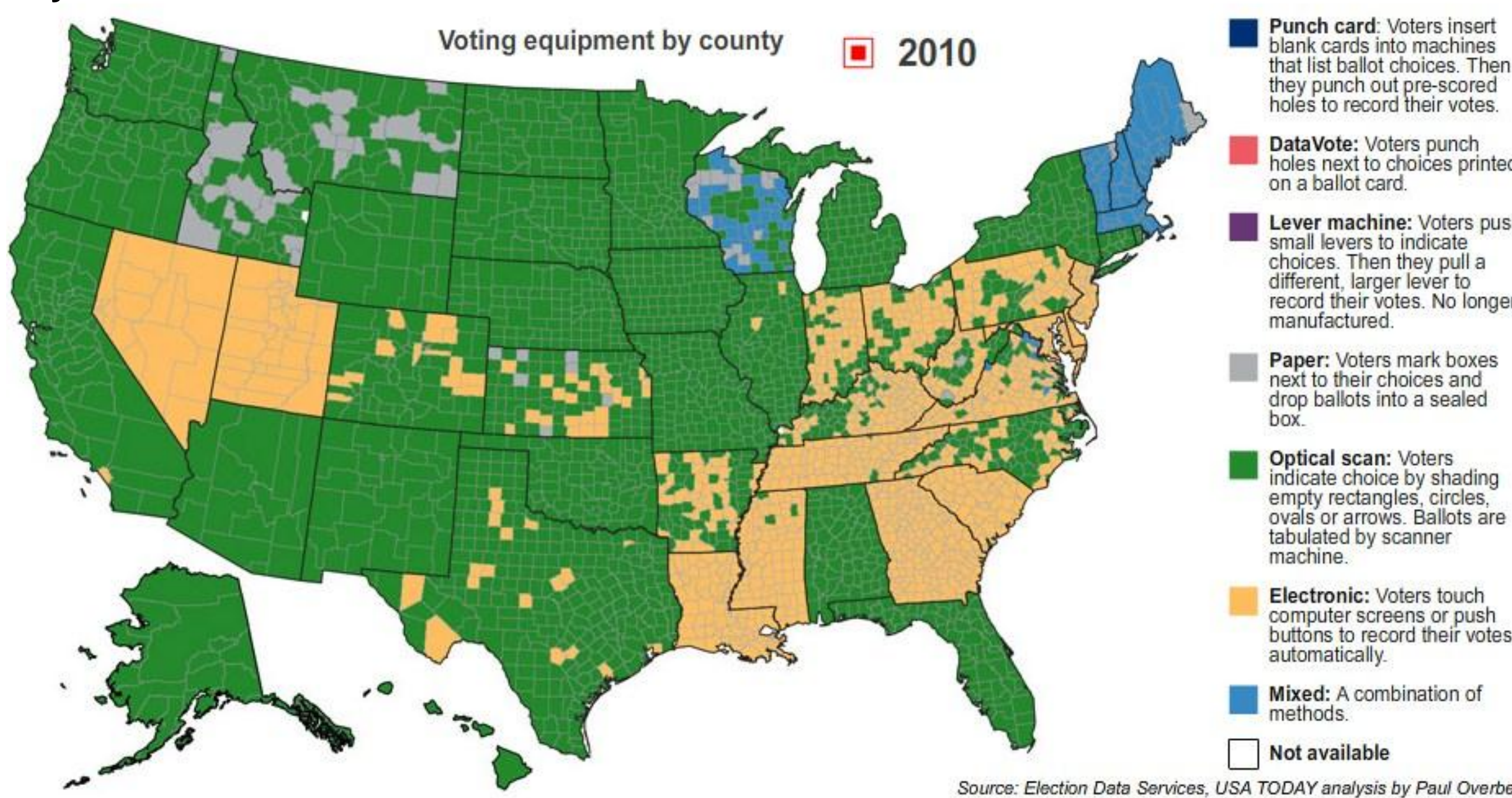
The Center always involves undergraduates in its work. In Spring of 2010, a group of four seniors developed an automated auditing system as a part of their senior design project.

## Help America Vote Act and National Landscape

The 2002 Help America Vote Act (HAVA) aimed to modernize the voting technology used in the elections and improve accessibility and usability of voting systems. One of the unintended results was that a number of states prematurely adopted electronic voting systems that suffered from a variety of problem, such as poor dependability, superficial security, absence of voter-verified paper trail, and inadequate audibility. These shortcomings are especially evident in DRE (direct recording electronic) touch-screen systems.

Connecticut, with advise from the VoTeR Center, chose a more stable and safer technology based on optical scanning. Here the voters mark their selections on paper ballots that are then tabulated by optical scan voting terminals. The paper ballots provide the voter-verified paper audit trail (VVPAT) that allows for manual recounts to take place when required by law, or for the purpose of election audits.

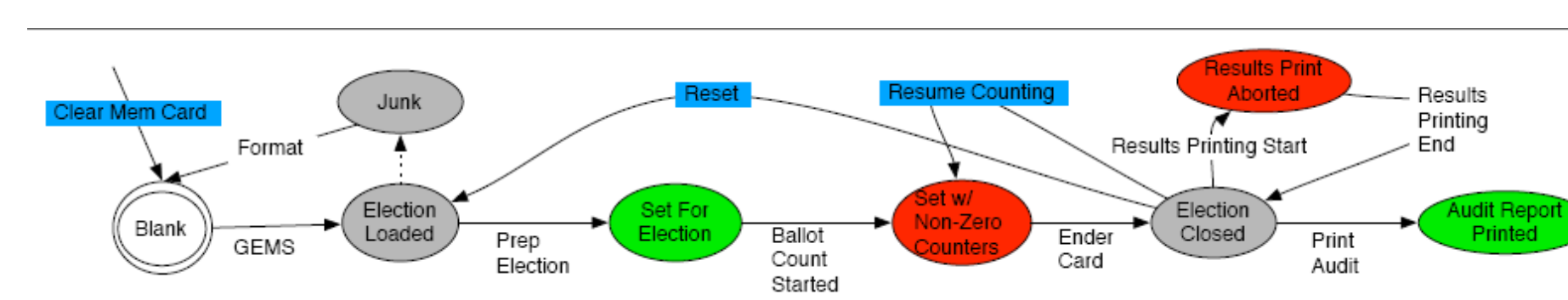
The map below shows various election technologies used in the United States in 2010. The green colored counties use optical scan systems -- about 60% of all counties using such systems. The tan-colored counties use DRE systems, and the use of such systems is on the decline.



## State-Wide Technology Audits in Connecticut

The VoTeR Center identified security vulnerabilities in several existing electronic voting machines. This work received national attention in recent years. Recognizing the need for improving security of voting systems the Connecticut Office of the Secretary of the State adopted several recommendations made by the VoTeR Center and instituted state-wide technological audits of the electronic voting systems. The Center performs such audits before and after each election in Connecticut.

Each voting machine receives district-specific programming for each election. The programs are contained in the memory cards that are inserted in the voting machine. The Center examines the programming and data of random samples of these memory cards. The cards are checked for data integrity and proper programming. After the election the Center examines the memory cards used in the election, again checking for data and program integrity and examining the audit logs to detect any deviations from the expected sequence of events that occur during the electoral process. The Center communicates the results to the Secretary of the State Office, and publishes the audit reports.



## Partnership: State of Connecticut and UConn

The work of the Center represents an effective partnership between the State of Connecticut and UCONN in the area of technological integrity of the electoral process.

The technological audits conducted by the Center and coordinated by the Secretary of the State (SOTS) Office are unique in the nation in terms of their breadth and depth of the audit, helping to ensure technical integrity and security of electoral processes.



The Center contributed to the establishment of safe-use procedures for the optical scan tabulators and developed sophisticated pre- and post-election technological auditing procedures for these machines. The safe-use procedures and audits have been adopted by the Office of the SOTS and have been put into practice. The Center continually refines the audit procedures and performs these technological audits in each Connecticut state-wide election since 2007, providing the state with all needed expertise in electronic voting systems. Additionally, as required under Public Act 07-194, An Act Concerning the Integrity and Security of the Voting Process, the State routinely conducts hand-count audits of 10% of randomly chosen districts; the Center assists the State in performing statistical analysis of the audit returns.

In 2009 several members of the Center were honored by the Secretary of the State with a Public Service Award for *"invaluable contributions to assuring the success of our electoral process."*

## Interaction with Public, Government, Vendors

The Center personnel works with election officials, including personnel at the Connecticut SOTS office and the Registrars of Voters in many municipalities. The Center routinely proposes to SOTS improvements to the technological audits in Connecticut and ways to improve dependable and secure use of voting equipment in the State.

The Center also interacts with civic groups, True Vote Connecticut and CTVotersCount.org, non-partisan organizations of Connecticut voters dedicated to making voting accessible and verified.

The Center also frequently interacts with the vendors who provide equipment, services, and supplies for Connection elections. Here the Center represents the interests of the State in helping improve election logistics.

## Information and Publications

For information on the work of the VoTeR center, please visit our web site at <http://voter.engr.uconn.edu/voter/>. The publications and report of the Center are found at <http://voter.engr.uconn.edu/voter/reports/>.

Over 20 of the Center's reports were submitted by the SOTS Office to the United States Election Assistance Commission (EAC), and are featured at their web site [http://www.eac.gov/testing\\_and\\_certification/voting\\_system\\_reports.aspx](http://www.eac.gov/testing_and_certification/voting_system_reports.aspx).

