Paper, in the form of hand- or machine-marked ballots, can play a fundamental role in guaranteeing safe and secure elections. The processing of such records raises its own set of issues, however, which span broad technical and social boundaries. Our work is aimed at making paper less of a nuisance and more of an integral component in election systems.

**User Studies**
- Study human bias in hand recounts.
- Identify factors that affect voter trust.

**Mark Characterization**
- Ballot mark characterization for consistent op-scan specification, testing, and certification.

**Whole Ballot Recognition**
- Voter intent is better modeled by evaluating all marks on same ballot together (context-sensitivity).

**“Blind” Auditing**
- Bias-free method for semi-automating hand recounts of op-scan ballots.

**Homogeneous Class Display**
- Marks grouped as “vote” or “non-vote” based on software classification.
- Makes it easier to identify anomalous results by quick inspection.

Any marking is potentially a valid vote. We are analyzing how mark shapes, sizes, and intensities inform the ability of automated systems to locate and identify marks as votes. Creation of a public database of ballots (marked, classified, ground-truthed) is an essential part of our infrastructure effort.

FROM A LEGAL STANDPOINT, VOTER INTENT IS KEY!