

Citizens' Oversight Projects (COPs)

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AuditEngine

"AuditEngine" to Enable Auditing of 2020 General Election Ballot Images

Cloud-based solution can guard elections from hacks or mistakes

Virtual Press Conference / Demo to be held Tuesday, October 6, Noon PT (3pm ET)

SAN DIEGO, CA (Oct 4, 2020) -- Citizens' Oversight Projects (CitizensOversight.org) will conduct a virtual press conference to announce the availability of their new cloud-based ballot-image auditing service, "Audit Engine," for the 2020 General election. A demonstration of the service will be included in the zoom-based press conference.

Ray Lutz, Executive Director at Citizens' Oversight and lead developer of the solution will host the press conference on October 6 at 12pm (Noon) PT (3pm ET) at the following zoom link or by phone.

<https://us02web.zoom.us/j/5747302646>

Dial by your location

+1 669 900 6833 US (San Jose)

+1 253 215 8782 US (Tacoma)

+1 346 248 7799 US (Houston)

+1 312 626 6799 US (Chicago)

+1 646 558 8656 US (New York)

+1 301 715 8592 US (Germantown)

Meeting ID: 574 730 2646

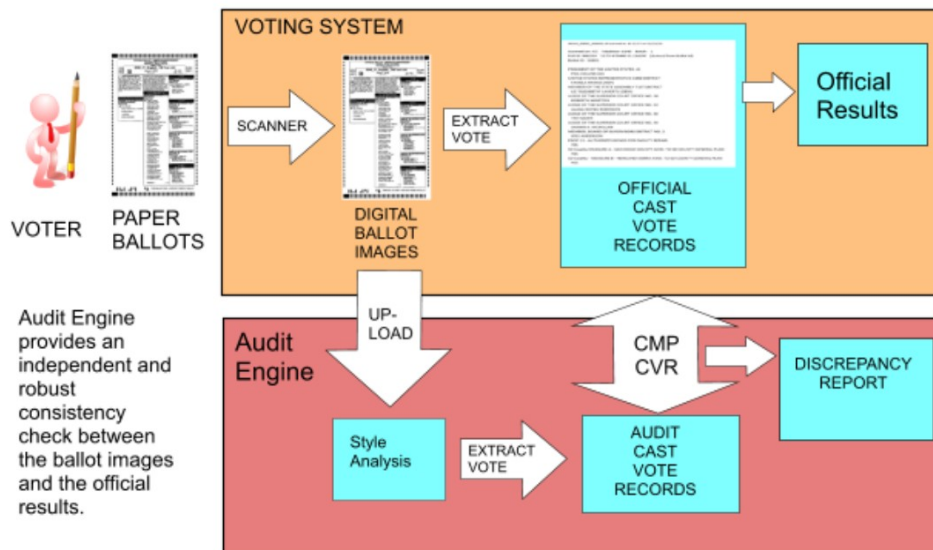
A ballot-image audit simply examines all the ballot images originally created by ballot scanners (in precincts or central office). In the top ten battleground states in the upcoming election, more than 99% of the most populous counties use voting systems that create ballot images. It is essential that ballot images are both created and then preserved by elections officials, so that they can be reviewed by AuditEngine as a full consistency check of the tabulation.

Ray Lutz, Executive Director of Citizens' Oversight Projects comments: "Our experience providing independent oversight of elections and audits has driven us to develop this tool that will help limit the possibility of innocent mistakes or blatant modifications of results. Our solution is independent, and provides an important consistency check between the ballot images -- which are produced by all newer voting systems -- and the official results. This additional check may be an essential part of this 2020 General Election to support voter confidence in the result."

Lutz successfully sued San Diego County in 2016 for omitting 285,000 ballots from the audit, has served as an expert witness in ballot image preservation lawsuits, and has led election oversight teams since 2010.

Mimi Kennedy, Actor and PDA Strategic Advisor, Election Issues, said, "Audit Engine is like a launching the mercury space capsule. This is a game-changer. The public hasn't had this sort of power to audit our elections, and it may be a key component in this 2020 General Election to preserve voter confidence."

John Brakey, Director, AUDIT USA, said, "Audit Engine is the essential tool to bring transparency to our elections. It complements the legal actions our organization has taken to ensure that ballot images are preserved and made available for public review. This may be what holds our country together in this brutal election season." AUDIT USA filed numerous successful lawsuits to prevent ballot images from being deleted by election officials.



Audit Engine fully and independently tabulates the result from each and every ballot for all contests, then compares with the official cast-vote-records and provides a discrepancy report. Unlike audits that consider samples of ballots, a ballot-image audit considers all the ballots and compares every one to the official result. If the number of disagreements is fewer than the margin of victory in votes, then that contest is confirmed by the audit. Otherwise, the images where disagreements have been detected can be reviewed. If the contest is still not confirmed, then a full manual recount is likely the next step. This process can avoid costly recounts if the contestants in the election see the evidence of the Audit Engine ballot image tabulation.

In districts that do not sort ballots by precinct, such as vote-by-mail ballots or ballots completed at voting centers, then it may be very cost prohibitive to locate and recount physical ballots, and statistical audits are also cost prohibitive. Ballot image audits do not have this problem as the ballot images can be easily searched to locate the subset of ballots that apply to the contest in question.

A very important attribute of this type of audit is independence. Because the audit is not conducted by election staff, the opportunity for "innocent fix-up" of the audit is minimal. In contrast, if the auditing staff inappropriately fixes-up the results of a conventional sampling audit so that it comes out clean, that will undermine the audit perhaps 100 times more than if a similar inappropriate correction is performed in an exhaustive audit.

To conduct a ballot-image audit, the election district need only upload the ballot images and cast-vote record files to the cloud where our application can review all the ballot images and produce a result. A single staff member can likely easily handle the steps involved for any election. This secondary check on the results can be an extremely important aspect in this election where so many districts are attempting to move to new equipment to support mail voting.

First, let's consider some of the attributes of this auditing service:

1. **Independent:** Ballot Image Audits use the data already produced by voting equipment and performs an independent and exhaustive tabulation of the results. This independence is essential for any auditing procedure but is normally not the case in election audits.
2. **Comprehensive:** Because we retabulate all of the ballot images, there is no contest that is left out, and you will be alerted to problems in the smallest of contests. This is in contrast with sampling regimens that tend to leave many small and yet consequential contests out of the audit entirely.
3. **Largely Immune to "Innocent Fix-up":** When audits use sampling inspection regimens, such as fixed percentage hand counting of ballots, sometimes the auditing staff attempts to investigate and correct the samples. If these corrections rectify the differences so the audit is "clean," they are inappropriate. Some differences in the interpretation of voter-intent are expected, at a rate of about 0.1% or so. If the audits show absolutely no discrepancies, then the audit staff may be inappropriately correcting the data.

In contrast, a ballot-image audit makes a full report of discrepancies between the audit and the official results. Each discrepancy can be adjudicated and corrected. Because no sampling is used, correcting each discrepancy does not undermine the validity of the audit.

4. **Simple in Concept:** Ballot-image audits are simple in concept and require no math or statistics to understand. The idea is simple: all the ballots are re-tabulated and that result is compared ballot-by-ballot with the official canvass. Elections officials won't need to hire a statistician to conduct the audit or take risks in how much work is required to complete it.

Our system is designed to work with ballot images created in the course of conducting the election. Our system does a very good job of working with the original data, it does not require that elections offices conduct a costly re-scan of all the ballots to create new images. However, we can work with images from such rescans, and a partial rescan of the election to check whether the images are reliable is also supported.

5. **Fast:** We use the latest in image processing, optical character recognition and machine learning, and we also are "cloud-based" which means we can use up to 1,000 computers in parallel to complete the tabulation job. While statistical audits and hand-tallies may take days or weeks and dozens of staff members, a ballot-image audit can be completed quickly, allowing for full review and adjudication in a matter of days, with the main processing taking only minutes after Audit Engine as been configured.
6. **Inexpensive:** Our solution promises to be the lowest cost alternative compared to any other approach, while still providing robust reporting.
7. **Transparent:** It is our goal to maintain records throughout each step of the auditing process so anyone can inspect those records to confirm the result. Our software can be tested at any time by simply modifying one of the ballot images and see if it is reflected in the discrepancy report. We offer an "open-data" approach where the data can be followed and anyone can check whether the result is correct by viewing selected ballot images.
8. **Compatible:** Our solution is designed to work with any ballot type, including those from "Ballot Marking Devices" (BMDs). Unlike voting machines that have limited resources and can't easily perform optical-character recognition, we will interpret the human readable text that is also voter-verifiable rather than relying on the barcodes, and yet still check that the barcodes are consistent.

The AuditEngine service has been in development for about a year, but is still new and is still undergoing testing and improvements. Although simple in concept, standardization is lacking and there are many special cases, and it does take some configuration for each jurisdiction it is applied to, but it is definitely ready to play an important role in the 2020 General Election.

We anticipate that if we detect any serious errors, then a full review of the original paper ballots will be conducted. Audit Engine serves as a consistency check and can save a lot of time and effort to inform candidates and campaign staff regarding the outlook for a judicial contest or recount.

The system has been adapted to process both ES&S and Dominion ballot sets. Future support of Hart Intercivic and Clear Ballot is also planned.

Although we are primarily focused on the top ten battleground states and the top (approx. 25 of the most populous) counties that comprise about 80% of the voters in those states. However, we are looking for election districts anywhere that are interested in trying our service.

Audit Engine can serve as an important check on the results, particularly for districts that are introducing new voting systems and scanners to support a large increase in vote-by-mail ballots in this pandemic election year.

More information is available at:

<https://copswiki.org/Common/AuditEngine>

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SUGGESTIONS TO ELECTION OFFICIALS FOR BALLOT IMAGE AUDIT COMPATIBILITY, AND AN OVERVIEW OF OPERATIONAL STEPS

1. **Use Compatible Ballot Design** -- There are few important things to keep in mind when you create your ballot design:
 - a. Use either black text on white background or white text on black background and do not use gray or pattern backgrounds behind your text.
 - b. Use unique contest names and be consistent between the CVR (cast vote record), ballots and summary reports as much as possible. For example, naming different contests "Question 1" in many areas does not help us insure we are posting votes to the correct contest.
2. **Ballot Images** -- Set your precinct and central-count scanners so they create ballot images for all ballots. You should select "Save All Images," and not "Save No Images," or "Save write-in images only." Transfer these ballot images to your Election Management System (EMS) at the end of the election.
3. **Ballot Image Archives (BIAs)** -- When all ballots have been processed, use your EMS to export ballot images and place them in compressed (ZIP) archives so each is 2GB and up to 5GB in size. This is a handy size based on our experience for uploading and handling. Best to avoid archives larger than 10GB. Each 1GB of ballot image data comprises approximately 15,000 ballots. We accept ballot images in PDF, TIF, or PBM format and can support ES&S and Dominion ballots at this time.
4. **Cast-Vote-Records (CVR) files:** Produce the Cast-Vote-Record file, preferably with one record per ballot, and with records numbered to match the ballot image files. You should include no more than 100,000 records in any one file, and we accept Excel format, such as .xlsx or CSV format, as well as JSON "Common Data Format" files, preferably compressed as ZIP file(s). Please include the "Ballot Style" attribute for each ballot.
5. **Hashcodes File (optional)** -- If you have a hashcodes file that provides the secure-hash digest of the image files, we would appreciate it, but we realize that the standards for creating these files are not yet adopted, so you may not have these files at this time.
6. **Election Information File (EIF)** -- The EIF file will help us to parse your ballots and recognize which contests are shown on each ballot. We especially need the text of any question type contests (referendums, initiatives, etc). For the most part, this file can be derived by processing the CVR combined with human review of ballot images of each style. It is likely that this file does not already exist and will be one of the first steps in submitting your audit.
7. **Upload to Audit Engine** -- The BIA, CVR and EIF files must be uploaded to AuditEngine.org. Depending on your connection speed, the uploading task may take about 30 minutes per 1GB of data. We use AWS S3 storage service and can offer public or non-public buckets.
8. **Ballot Inventory** -- The first phase of the process is to prescan the CVR or ballots, and the ballot image archives, and create an exhaustive inventory of all ballot images and their corresponding cast-vote records, as well as other metadata about each ballot sheet.

- 9. Template Generation and Approval** -- Next, the process will consume the image files to create a set of "redline proofs" for each ballot style that show a ballot of that style with contests and options outlined using colored boxes and text linking them to the official contest and option names. These proofs are reviewed by human reviewers to make sure they are accurate before the vote extraction process is started. If any are incomplete, it may be necessary to provide additional information in the EIF or job control file to allow it to complete.
- 10. Vote Extraction and Reporting** -- After the templates are approved, the main extraction process can be started. This will review all ballots and extract the vote, according the templates for hand-marked style ballots, and will use OCR (optical character recognition) to read the human-readable text on BMD style ballot summaries. This extraction process, that may take days or weeks otherwise, can be accomplished quickly due to parallel processing in the "cloud."
- 11. Report review and adjudication** -- There will always be a few disagreements between the official result and the independent tabulation by AuditEngine. If these disagreements do not rise to the level that a contest may be overturned, then it may not be necessary to engage in detailed review of those disagreements. The ballots where we produce a different result can be reviewed to determine if it is due to a vote-intent issue, or perhaps due to an anomaly of the ballot image, such as a crease or distortion of the image.

For more information, please visit this link: <https://copswiki.org/Common/AuditEngine>

Here is an (extensive) video demonstration: https://youtu.be/_zx6uiJZNcU

--Audit Engine Team.