

MTAT.03.323 Seminar on Blockchain Technology

Research project

Blockchain and Disruptive Potential in voting industry

Sofiya Demchuk

The main tasks were performed to initiate a project:

1. Identify companies/startups/ initiatives/projects that focus on applying or using blockchain technology on the voting industry.
2. Explain fairly detailed how they aim at disrupting the industry.
3. Comparison and analysis of the companies (similarities, differences, advantages, disadvantages) of the intended application of blockchain technology.
4. Conclusions and thought about the degree of hype and what components might be valuable and most likely reality in a few years.

Introduction

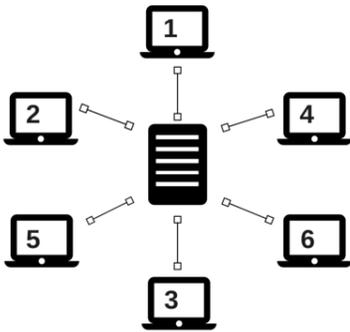
The blockchain technology has been gaining popularity in different industries. It is becoming so popular and disruptive innovation as can guarantee more trust, transparency, secure and anonymity, which is engine for modern world, where, unfortunately, a lot of deception, fraud and manipulation exist. What makes it so rapidly growing industry and perfect applying for voting or decision making? This technology is like distributed ledger that contains blocks in a linear chain. Blocks consist of data that can't be changed or tampered and are cryptographically hashed. An additional visualization of how blockchain works is provided on Picture 1 (followmyvote.com).

A Senior Vice President, Arvind Krishna of the largest industrial research organization in the world, IBM Research that is focused on amendment in security and nimbleness generally in the world arranged by blockchain technology, is saying that “Over the past two decades, the Internet has revolutionized many aspects of business and society—making individuals and organizations more productive. Yet the basic mechanics of how people and organizations execute transactions with one another have not been updated for the 21st century. Blockchain could bring to those processes the openness and efficiency we have come to expect in the Internet Era”. Currently organization is trying to increase the awareness and concern in different areas of this revolutionary technology by IBM Blockchain project.

Blockchain Technology Breakdown

followmyvote.com

Blockchain Technology allows for the secure management of a public ledger or database, where database transactions are verified and securely stored on a network.

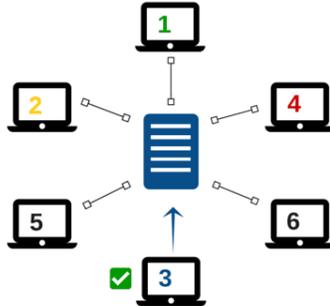


This database, also known as the blockchain, is managed by a network of nodes that all have their own copy of the database.

A node is simply a computer or server that is connected to a network. When a node connects to the network for the first time, it downloads a full copy of the blockchain database.



Nodes take turns pulling from a pool of pending transactions, which have been submitted to the blockchain but have yet to be officially added to the database.



Nodes then analyze the database transactions to determine whether or not they are valid based on a set of rules the network has agreed to.

Valid transactions are grouped together and added to the database in a block, one after the other, in a way that resembles a chain, hence the name blockchain.

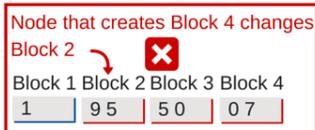
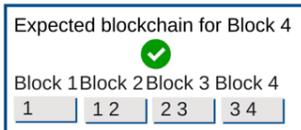
When the first block of a blockchain is created, it is marked with a hash function.



As the second block is created and added to the blockchain, it is also marked with a hash function, which includes part of the first block's hash function.

When a node submits a new block to the blockchain, if the node has changed any of the database transactions included within the previous block(s), the hash function of that block (and every block after) would also be changed.

Here's an example of how blockchain technology would detect and prevent a node from hacking the blockchain and changing database transactions:



When a node submits a blockchain update that contains an altered block, all other nodes will be able to detect that a change has been made and reject the update.

This fundamental functionality of blockchain technology is what makes a blockchain database secure.



Picture 1.

Applying and using of blockchain technology on the voting system

Currently there are a lot of projects, start-ups and ideas regard voting system in the world. For the present, countries are just started to use blockchain in different kinds of voting as this intension is a relatively new as a blockchain itself, because the concept of such database was first drawn up by Satoshi Nakamoto in 2009 for the bitcoin cryptocurrency. Moreover, this concept in voting was outlined more than 1 year ago, so most projects exist for about 1 year and are required a lot of time to research, implement and test to put the new system in force at the national level.

In this paper, I will provide all available information related to the main projects, ideas and proffers that could be allowed to prevail in voting system. Unfortunately, there is not a lot of explanation, just described superficially.

The Problem with nowadays voting system

Existing electronic system is centralized that means that there is someone who controls the database and codebase. In contrast with an open-source blockchain system, it makes less trustworthiness. Additionally, as experience had shown the possibilities of the fraud is greater than ever before, that in comparison with new suggested voting system making is less effective.

One more important issue is that currently with no vote-verified paper records it can't be performed a meaningful recount.

Follow My Vote

The project that exist just from 4th of July in the United States and is a secure online voting platform with aim to achieve greater election transparency with the opportunity to audit the ballot box and follow election progress in results online. This platform offers a lot of features that are making this product comfortable to use. For example, voter can return to system and change his vote on another candidate.

As in other projects that I will consider later, FollowMyVote did an end-to-end verifiable online voting software and cast votes as transactions. Also it says that in plans there are following intended properties such as autonomy, anonymity, fairness and efficiency.

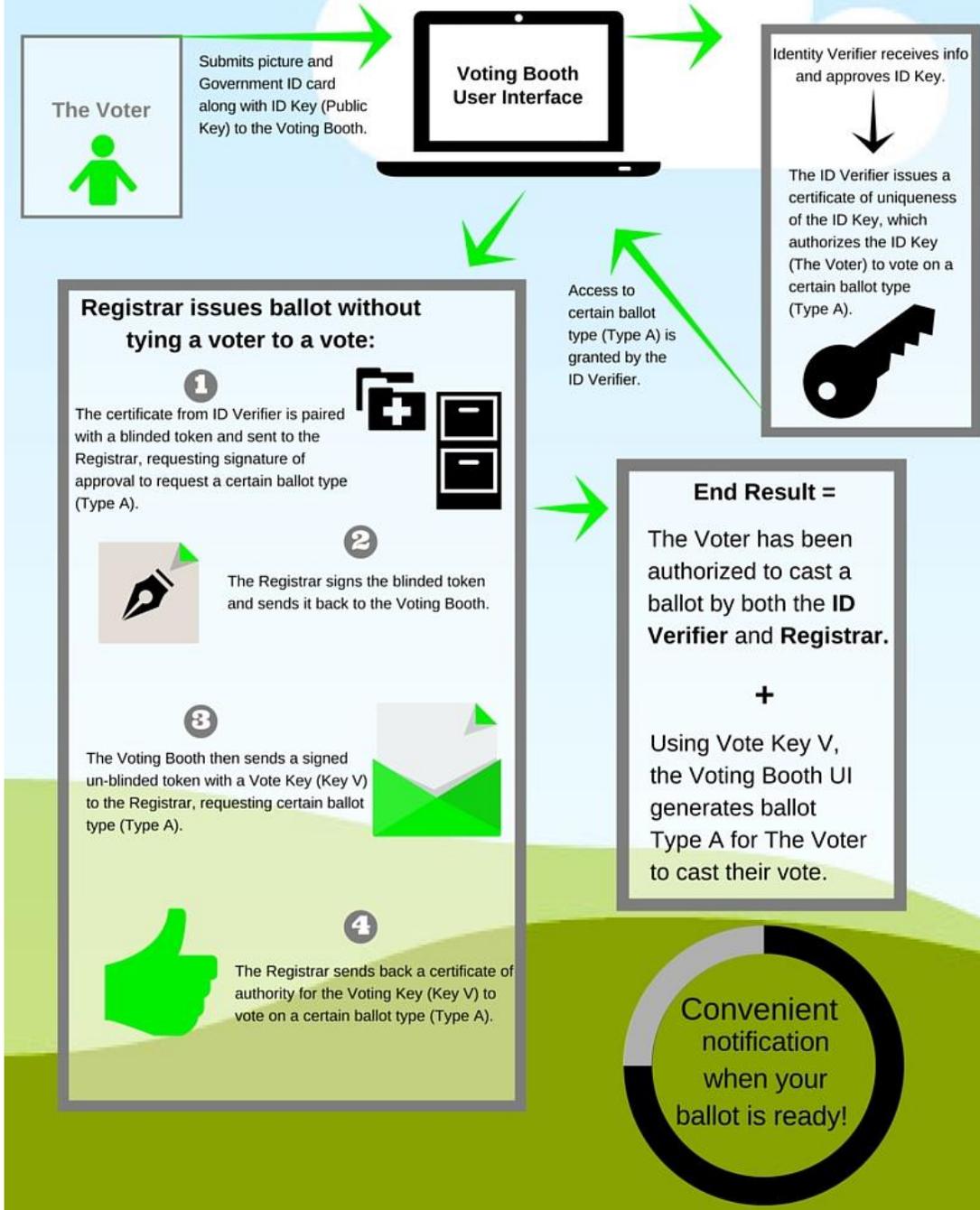
Process of election is a smart contract between legislation/candidate and each voter. Database includes address, private keys and requests, it sends tokens to the address of voter and a counter that goes up on when vote is completed.

Picture 2 and 3 are providing the detailed visualization taken from followmyvote.com about how it works:

Cryptographically Secure Voting

THE FOLLOW MY VOTE WAY

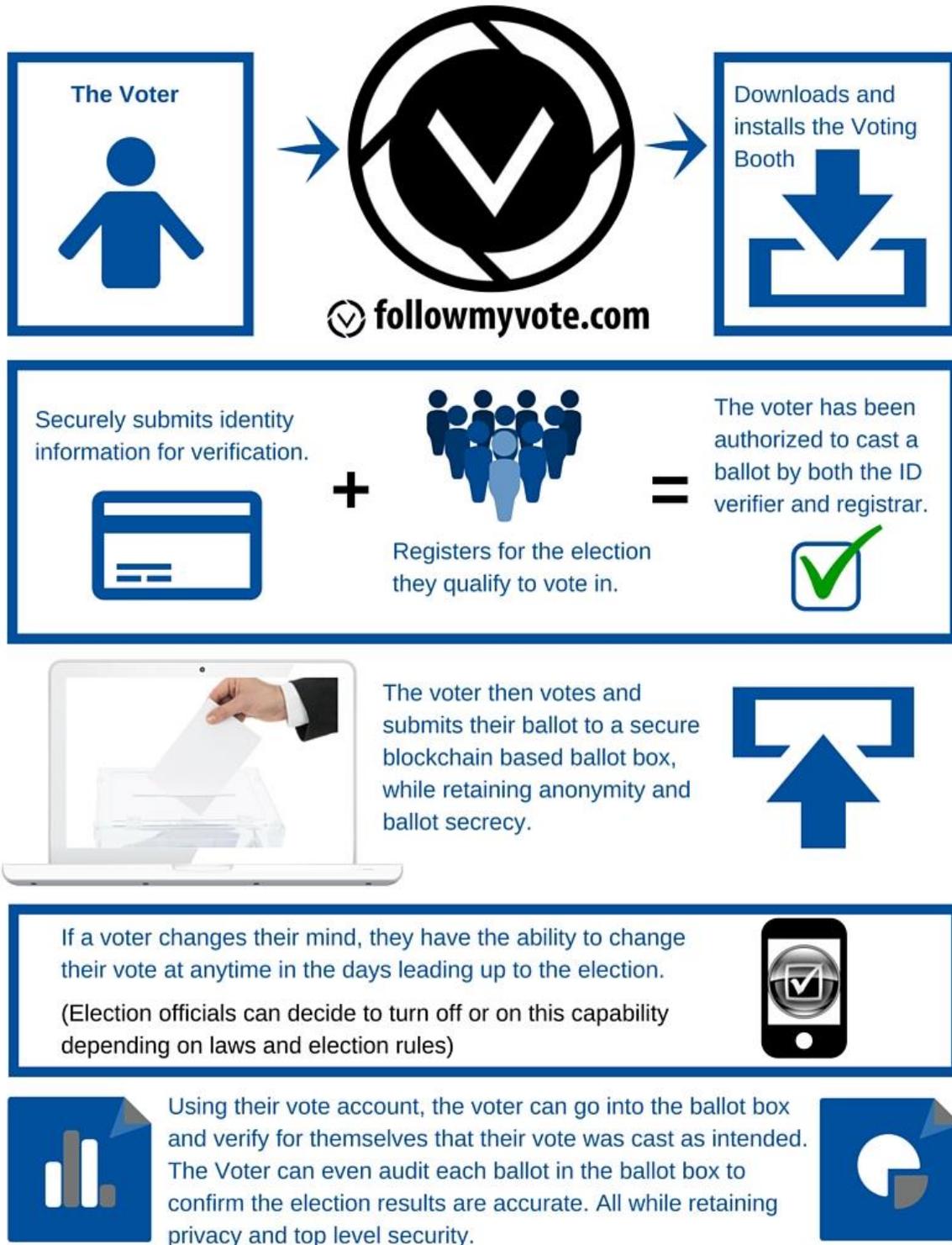
Deep Dive: Identity Verification and Registration



Picture 2

Blockchain Voting

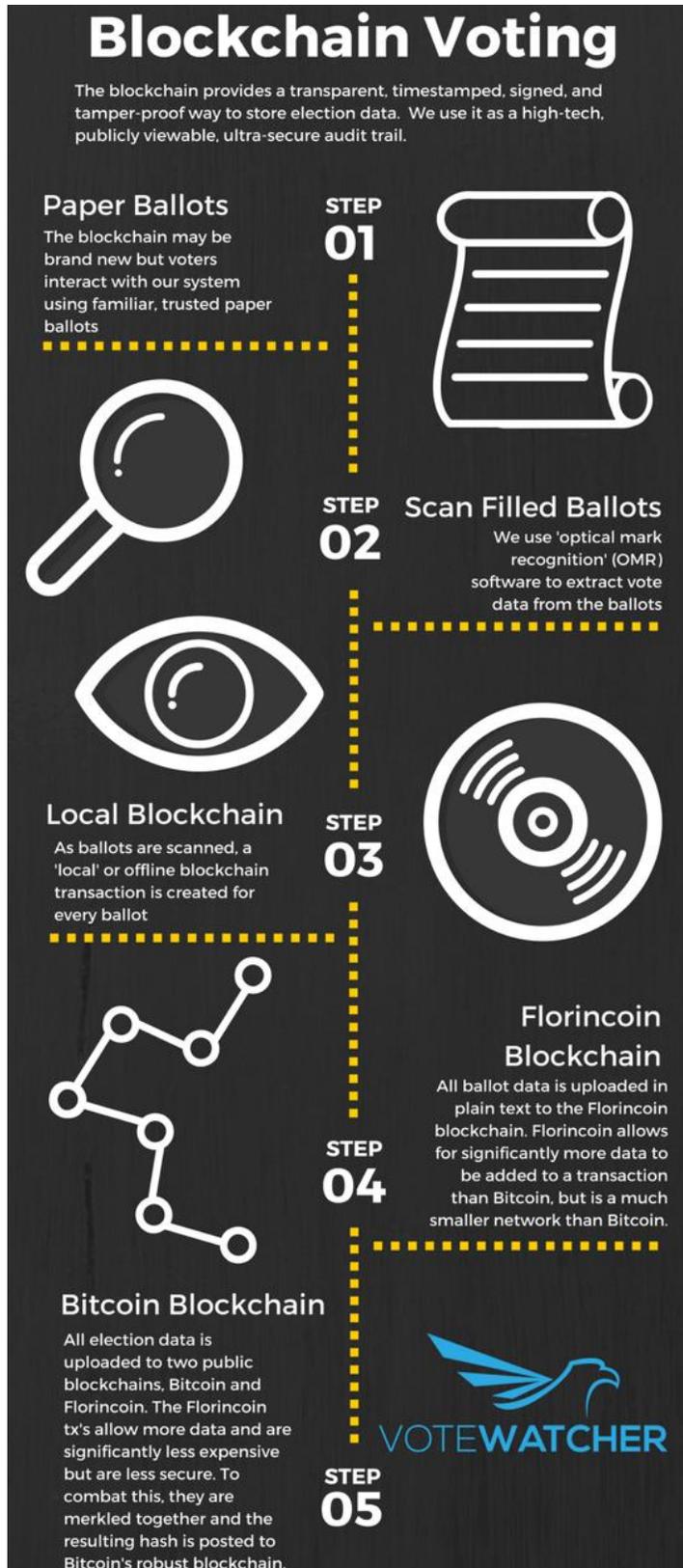
THE FOLLOW MY VOTE WAY



Picture 3

VoteWatcher

VoteWatcher is also voting system launched by Blockchain Technologies Corp. System has open source code on off-the-shelf hardware and available for inspection. To provide more understanding here is infographics of VoteWatcher:



Australia

In Australia there is also plan to use blockchain technology starting from small corporate and civil election, then continue with a full parliamentary elections. They are working towards using iVote system starting from March 2017.

Australia Post said that "We do, however, think the technology has a really good use to creating a lot more control for the citizen; putting citizens in control of their data, and potentially using the two key infrastructure for citizens to jointly encrypt their data with whichever government, department, or corporate that owns that data, so it can only be unlocked with the two keys."

Estonia

Estonia is the first country that launched Internet voting at the national level. There are two ways to identify the voter: by Estonian ID-card and mobile-ID. Also there is an ability to revoke. But Estonian progress never stops on a place and new inventions seem to appear each day, and Estonians are trying to implement blockchain in voting industry.

Ukraine

As it is known, security and transparency in voting in Ukraine is a hot topic, so Ukrainians are trying to stimulate the technological catch-up. Our new project is E-Vox system with different applications such as e-petitions, electronic referenda and voting for various purposes. Every voting decision is signed with digital signature legally recognized in Ukraine to handle the legal status of projects that requires it. Other options for ID verification are passport, bank or mobile ID and fingerprints.

Conclusion

Not a secret that this new technology is a good chance of alternative way of voting process. One of the most advantages is that it is good opportunity to avoid politically-motivated cyberattacks.

Moreover, even with more security, the process with new technology involved is not more onerous for voters and organizations. Also important plus is that ballots with transaction are casted by each voter.

Blockchain technology will revolutionize voting by reducing the costs of election and improving of democracies. According to researches, it will make the voter turnouts higher by ensuring people in security and transparency.

To add, the benefits that matters are the saving of costs and environmentally friendly service, because of reducing of wood, water and energy used.

To be more direct, the proposed platforms will change the paradigm of elections at all.

References

1. Madise, Ü. & Martens, T. (2006). E-voting in Estonia 2005. The first practice of country-wide binding Internet voting in the world. *Electronic Voting*, 86.
2. Neumann, P. G. (1993). *Security Criteria for Electronic Voting*. Baltimore, Maryland.
3. Rubin, A. D. (2002). Security Considerations for Remote Electronic Voting. *Commun. ACM*, 45(12), 39–44
4. <http://www.forbes.com/sites/realspin/2016/08/30/block-the-vote-could-blockchain-technology-cybersecure-elections/2/#2f73a2029483>
5. [http://www.europarl.europa.eu/RegData/etudes/ATAG/2016/581918/EPRS_ATA\(2016\)581918_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/ATAG/2016/581918/EPRS_ATA(2016)581918_EN.pdf)
6. <http://www.zdnet.com/article/australia-post-details-plan-to-use-blockchain-for-voting/>
7. <https://www.gazeta.ru/tech/2016/04/29/8204951/ukraine-blockchain.shtml>
8. <http://e-vox.org/what-are-we-doing/>
9. <https://followmyvote.com/online-voting-technology/blockchain-technology/>
10. <http://www.ibm.com/blockchain/what-is-blockchain.html>