Blockchain and its Application

Smita Ghosh[1], Neeraj Kumar Singh[2]

[1]West Bengal School Department, Manonmaniam Sundaranar University, Tirunelveli Rd, Tamil Nadu, India
[2]Kharagpur IIT, Computer Science and Engineering, Kharagpur, India
smitaghosh04@gmail.com[1], neerajneeraj1983@gmail.com[2]

Abstract

In this research investigation into Blockchain Technology, its current use and other possible implementation of this protocol are explored. Blockchain offers opportunities for developing advanced digital services. While current research on this becoming the most important issue which must be well addressed. As part of the fourth industrial revolution since the invention of the steam engine, electricity, information technology, Blockchain Technology has been applied in many areas such as finance, judiciary, and commerce. In this current paper, we focused on its potential Voting Application and explore how Blockchain Technology can be used to solve Health Care Issues, Land Registry, Any Financial Sector, etc. Some innovative applications of using blockchain technology for different sectors we also discussed.

Keywords

1. Introduction

Role of Money
- Medium of Exchange
- Store of Value
- Unit of Account

As first let's know some history of exchange policies:

Credit card Term 'Credit Card' used by "Edward Bellamy's" science fiction "Looking Backward" in 1887.

- Charge plates and credit coins [late 1880s-1960s]
- First Bank Card Charge it first National Bank Brooklyn, 1946

- Merchant Credit Cards [late 1920s-2000s]

Now what is blockchain?

- Blockchain is the core technology to create "Cryptocurrency" like Bitcoin, through the maintenance of immutable distributed ledgers in thousands of nodes proposed by "Satoshi Nakamoto" in 2008.
- "_____a way for one internet user to transfer a unique piece of digital property to another internet user, such that the transfer is guaranteed to be safe and secure, everyone know that the transfer has taken place and nobody can challenge the legitimacy of the transfer_____"

Cryptographic Protocol

SSL/TLS – 1996
HTTP -1990

TCP/IP – 1974

Ethernet – 1974

Amazon	1994

CISCO	1984

3COM	1979

2. Fundamental of Blockchain Technology

The technology of Block chain, like the internet, offers a global infrastructure of secure network that may allow the users to make transaction in a way that may allow the users to make transaction in a way that the middleman may be evicted and this making the cost of any transaction to come down. The whole structure of block chain enables a digital ledger of information to be shared within a network, between the distributed nodes.

2.1 How blockchain works

Database: a database is an organized collection of data. A relation database more restrictively is a collection of schemas, table, quires, reports, views and other elements.

Clients ➡ server ➡ database (It's master copy)

Table 1. Encryption Key

1.Private key Cryptography	2.P2p network	3.Program(the block chain protocol)
Cash vs plastic	Tree falls in a forest	Tragedy of the commons
Identity	System of record	Platform

Bitcoin ≠ Blockchain
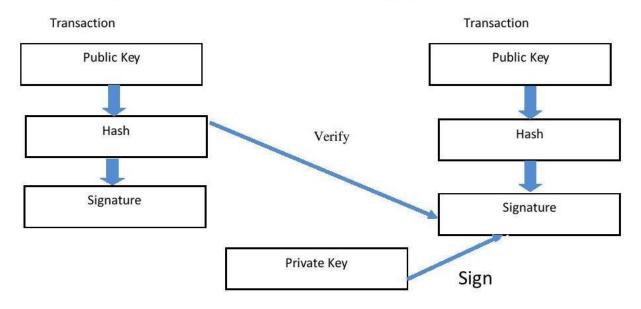Online distributing system . Data stores in # is used for identifying any property.

Figure 1. Bitcoin ≠ Blockchain

2.2 Which Blockchain should I use?

- **"Ethereum"**

  "Ethereum" is global, open-source platform for decentralizes applications on "Ethereum" you can write code that control digital value, runs exactly as programmed and it accessible anywhere in the world.

  Which programming language for block chain?
  - ➢ Solidity c
  - ➢ java script
  - ➢ Python
  - ➢ Go
  - ➢ Rust
  - ➢ C++

Solidity: solidity was influenced by c++, python and java script and it is designed to target the Ethereum virtual machine [evm] solidity is statically typed, supports inheritance, libraries and complex used-defined types among other features with solidity you can create contracts for user such as voting, crowd funding, blind auctions and multi-signature wallets.

We deploy contracts, you should use the latest released version of solidity this is because breaking changes as well as new features and bug fixed are introduced regularly. We current is use a o.x version number to indicates the fast pace of change.

2.3 Why use blockchain?

- ➢ Transparency/verifiability
- ➢ Trust less
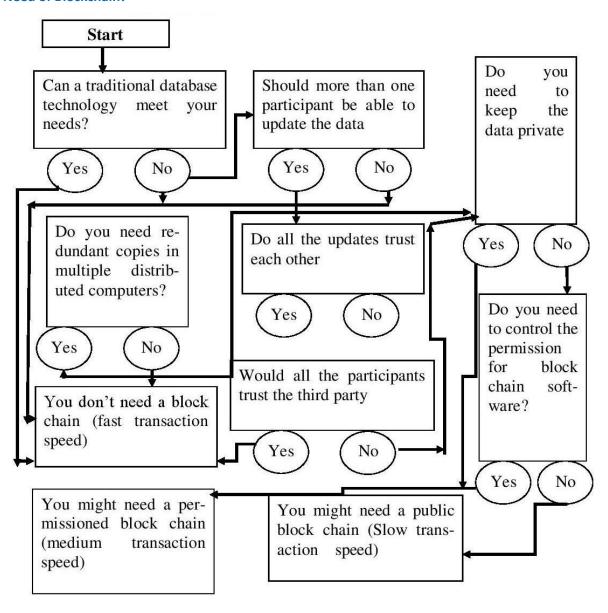- ➢ Secure

2.4 Need of Blockchain?

Figure 2. Flowchart of Blockchain
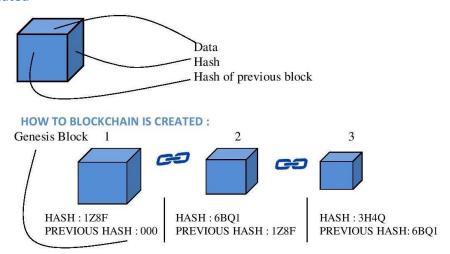
2.5 How Block is Created

Figure 3. Creation of Blockchain

Genesis block computer this day are very fast and can calculate 100-1000 of # per second. In "Bitcoin" case it take about 10 min to calculate the required proof of work and a new block to the chain. So, let check the process

a. A cryptographic puzzle must be solved, thus creating block

b. The computer that solves the puzzle shares the solution to all the other computers on the network. This is call proof – of – work.
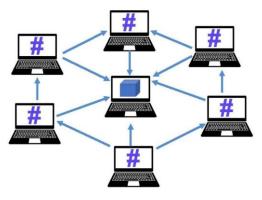

Figure 4. Networks

c. The network verified the proof – of – work. If correct, the block will be added to the chain.

The combination of these complex math puzzles is verified by many computers ensures that we can trust each and every block on the chain because the network does the trust building for us, we now have opportunity to interact directly without data in real-time and that brings us to the third reason blockchain technology is such a game changer: no more intermediaries.

3.Blockchain Application

What do people use blockchain for?
- ➢ Finance
  - • Crypto currency
  - • Payment
  - • Defi
- ➢ Supply chain
- ➢ Digital estate
- ➢ Real estate
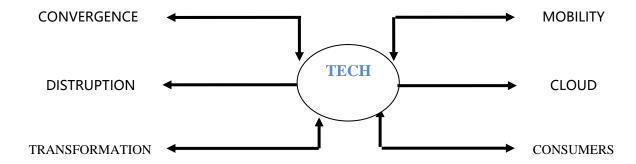- ➢ Health care
- ➢ More!

3.1 Finance

- • **Financial sector challenges**
  - o Blockchain potential opportunities
  - o Repeated crises and instability
  - o Fiat currency instabilities associated with unsound policies
  - o Centralized intermediaries concentrate risk and economic rents.
  - o Clearing and settlement costs and counterparty risks
  - o Financial inclusion
  - o Pay stem costs: ½ - 1% global G.D.P.
  - o Financial sector costs: 7½ % of us G.D.P.

- • **Permissioned block chain Vs Permission less blockchain**
  - o Known set of participants
  - o No proof of work mining
  - o No need for a native currency
  - o Distributed database technology

CONVERGENCE   MOBILITY

TECH

DISTRUPTION   CLOUD

TRANSFORMATION   CONSUMERS

- • **Transformation**
  Blockchain technology is revolutionizing the financial services landscape are creating opportunities for both new and established players.
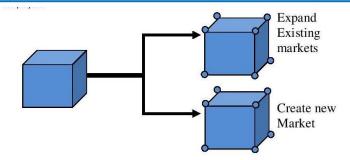
Figure 5. Blockchain Technology (transformation)

3.2 Blockchain Voting

In the current system, Voting is generally done either by writing your opinion on the paper or by electronic voting machine. Replacement of this traditional system is necessary to limit the voting Froude and to make the voting as well as the counting process more transparent. Further a system is required the make voting containment for the voters a system that minimizes the cost of conducting elections as money spent on the national election is huge. A system which allows us to vote even when we travelling abroad or are not present in our home state. We are now a

Society that prefers to live online right from ordering food, to booking Cabs, to booking Cabs, to shopping our daily groceries and even finding our life partners. Then why can't we cost our votes ad select our click on a screen? Why can't there be a system where we can vote online through the comfort of our homes. Though many on time voting solution have been proposed in the past but we don't see them in reality. There such online e-voting or remade voting system faces. Let us first have a look at these challenges—Remote electronic voting requires stringent measures for the voting process. Because in this case risk of large-scale manipulation is simply too high. There is a risk of hacking activities by hackers who could directly infect and hack the servers. Block chain can help to implement and electronic voting system that is immutable, transparent and cannot be hacked into
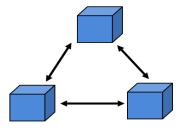

Figure 6. Voting

In order to change the results Blockchain voting is an effective means and foremost step in this block chain-based voting system is to validate the identity of the voter at is very important to ensure that someone's identity is not being faked because here every vote count and is epually important. To keep a check this voter needs to download the remote voting booth on his mobile, laptop or any other smart advice. After that, he needs to submit his identity information which gets verified by the organization conducting these elections. The organization will refer to the details of the registered voters and verified it the person is registered on their database and is eligible to vote. Then all the information of the voter blockchain. After his identities verified, a smart contract will be executed that will issue a ballot so that he can vote and submit it to the ballot box. Blockchain based voting system will ensure that a user does not vote multiple times.

Many countries and states are running a pilot to adopt Blockchain Technology for a secure voting system. For example, West Virginia, Sierra Leone tested mobile voting through Black chain in 2018. Apart from states elections, this Block chain-based voting system could also facilitate, voting processes inside private companies' organizations and college elections.

"In democracy was designed with today's technology, what would it look like?" A firm "horizon state" launched a unique solution to answer the question. The company is currently preparing an ICO. Horizon's secure digital ballot box represents a cost

– effective and smart solution to the problems inherent in today's voting procedures.
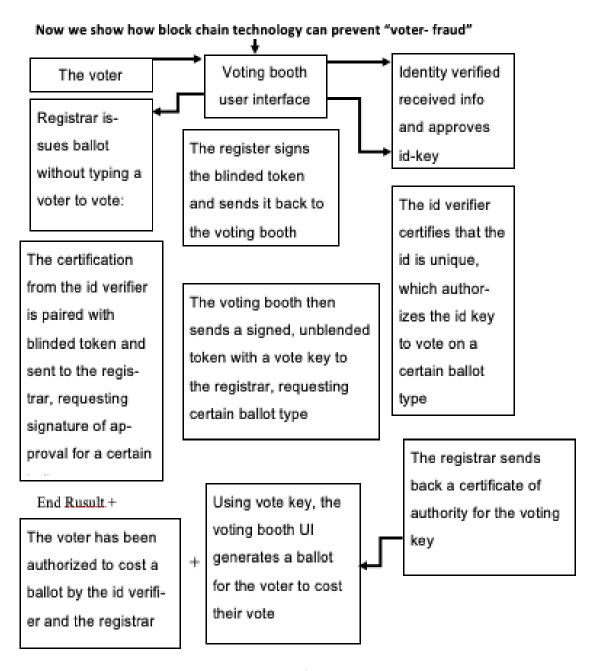
Now we show how block chain technology can prevent "voter- fraud"

The voter

Voting booth user interface

Identity verified received info and approves id-key

Registrar issues ballot without typing a voter to vote:

The register signs the blinded token and sends it back to the voting booth

The id verifier certifies that the id is unique, which authorizes the id key to vote on a certain ballot type

The certification from the id verifier is paired with blinded token and sent to the registrar, requesting signature of approval for a certain

The voting booth then sends a signed, unblended token with a vote key to the registrar, requesting certain ballot type

The registrar sends back a certificate of authority for the voting key

End Rusult +

The voter has been authorized to cost a ballot by the id verifier and the registrar

+ Using vote key, the voting booth UI generates a ballot for the voter to cost their vote

Figure 7. Prevention from Voter-block

Convenient notification is sent when your ballot is ready, for our design we tried to create a system that does not entirely replace the current voting but rather integrates within a current system. We decided to do this to allow for as many different ways to vote as possible, this is so voting can be accessed by the majority of the population.

3.3 Block chain in healthcare

In the world of healthcare today, there are two major focuses that must be addressed:

- Data security and data ownership
- Sensitive medical records currently lack a secure structure Leading to data breaches with severe consequences. research about block chain and healthcare system is currently limited, but block chain is on the brink of transforming the healthcare system
- The healthcare system is losing $300 billion each year in poor data integration

"Statistics show that up to one in five patient records are not accurately matched even within the same healthcare system as many as half of the patient records are mismatched when data are transferred between the healthcare" – Shaun Grannis

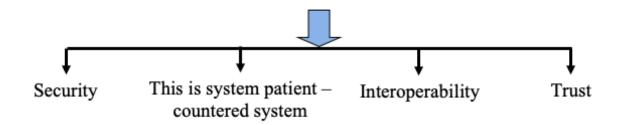**Why do we care and what do we want?**

- Data at right time and place (intro-probability)
- Improve personal treatment outcome
- Advance medical research by enabling precision medicine and AI – driven healthcare
- Patient's privacy guaranteed

Challenges

- Achieving interoperability and privacy simultaneously seems contradictory
- How to ensure data availability and exchange when required while letting patients to control who can access their data for which purpose
- How to effectively prove that patients have given their consent?

Demo: scenario

- Healthcare providers collect information from the patients
- The data is stored in exiciting database
- A "hash" is created from each source of data and is redirected to the block chain
- The patient decides who has access to this medical record
- Healthcare stakeholder can query the block chain to access to the information

Security   This is system patient – countered system   Interoperability   Trust

3.4 Block chain in Land Registry

Indian land record system is still inspired by the one introduced by Raja Todarmal (one of the 9 gems in the court of akbar). This land record maintenance numerous records, each of which would potentially be records could be mutated without the consent of the owner niti aayog recently announced that "block chain technology" will bring out a discussion paper on leveraging this technology for land record management. Andhra Pradesh is currently working with the private firms to secure land records in its new capital, Amaravati using Block Chain.

Exonum platform is a leading block chain framework designed to bring efficiency and security to your operations.
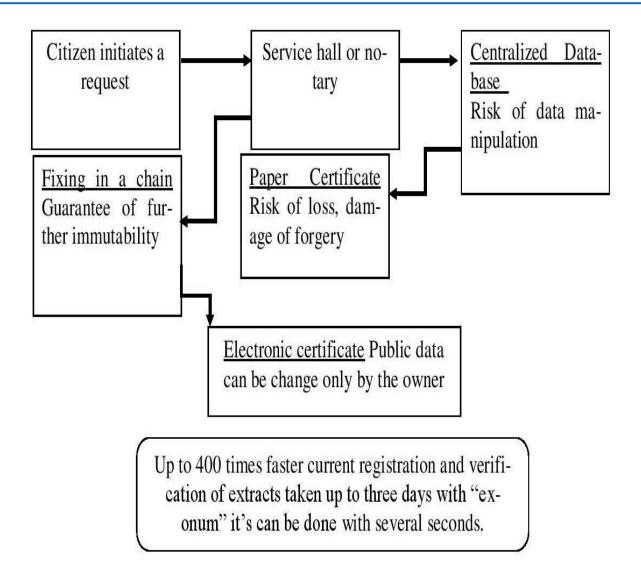
Figure 8. Blockchain Land Registry

Therefore, Land Registry (Record from National Agency of Public Registry Republic of Georgea)

BEFORE

- 1-3 days to register property
- Up to $80 cost of transaction
- 10 days for property transfer
- Risk of data loss or modification.

AFTER

- < 3 minutes to register property
- $8 new transaction cost reduction
- Online property transfers digital certificate
- Stored on public blockchain

Key – outcomes

3000	3 min	90%
Transaction processed	Per transaction	Cost optimization

Therefore, we may say, making future title searches faster and more efficient with block chain technology.

Title in the USA-conveyance

- "peer to peer" + notary
- No government participation
- Not include → Taxes
  → Lines
  → Recording
- Related to but separate from payment / value exchange Escrow.

Title in the USA – Recording

- "public notice"
- Govt. County recorder or clerk line and other encumbrances and Optional, sort of
- Often combined with transfer tax and other fees or taxes.

Action steps

- Buy bit coin on coin base or cash app.
- Send to wallet (s)
- Mobile - samouri (android) green address (ios)
- Desktop (electrum)
- Hardware (trazor or ledger)
- Get active in IBREA

4. Out Comes of review and research directions

4.1 Some Remarks

With blockchain, we can imagine a world in which contracts are embedded in digital code and stored in transparent, shared database, where they are protected from deletion, tampering and revision. The parallels between blockchain and TCP/IP are clear. Just as e-mail enabled bilateral massaging bit coin enable bilateral financial transactions. The development and maintenance of block chain is open, distributed and shared just TCP/IP's. A team of volunteers around the world maintains the core software [Harvard business review]. Block chain already has many varied applications, and here's some examples:

1. Bitcoin
2. Spotify
3. Maersky
4. Aeternity
5. Match pool
6. Siemens
7. Loyyal
8. Simply vital health
9. De beers
10. Circle
11. BASF
12. Bit Give
13. Ubiquity
14. Medi Ledger
15. AIA insurance
16. Guts

5. Conclusion

Our study has recognized some limitations. First, this paper only analyzed the literature in web of science core collection data-base (WOS), which may lead to incompleteness of the relevant liter nature. Second, we filter our literature base on the subject category in wos. In this process, we may have omitted some relevant research. Third, our recommendation has subjective limitations. We hope to initiate more research and discussions to address these paints in the future. Furthermore, we indicated the security and privacy issues have been a central research topic. The technology of blockchain first emerged during the 2008 financial crises, at a time when people's trust in institutions, in particular financial institutions, was very low, and it came to prominence as the technology underpinning bitcoin cryptocurrency. Now the term 'block chain' itself hides a complex reality.

Reference

[1]. S. Cao, Y. Cao, X. Wang, et al.," A review of research on blockchain," In Wuhan International Conference on e-Business, Association For Information Systems, https://aisel.aisnet.org/whiceb2017/57 ,2017.

[2]. M. Risius, & K. Spohrer," A blockchain research framework, "Business & Information Systems Engineering, vol.59, no.6, 385-409, 2017.

[3]. V. Filimonau and E. Naumova, "The blockchain technology and the scope of its application in hospitality operations," Int. J. Hosp. Manag., vol. 87, no. 102383, 2020.

[4]. R.H. Weber, and B. Rainer.," Internationale Entwicklungen in der Crypto-Asset-Regulierung (ICO/Token)," vol. 18., Jusletter del, 2019.

[5]. D.M. Goltz, B. Piniuta,E. Hubener, et al., "Spectroscopic approaches for studying faint text on a wooden tally from Invincible (1758)." 2013.

[6]. G. S. Soreghan, L. Beccaletto, K.C. Benison, et al., "Report on ICDP Deep Dust workshops: probing continental climate of the late Paleozoic icehouse–greenhouse transition and beyond," Sci. Drill., vol. 28, pp. 93–112, 2020.

[7]. L. Linghao, L. Peng, W. Qibing, et al., "dr0 'DgjcII etteet of~ irrer, mt age Castanopsis eyrei stands at Wuyl Mountains." Ying Yong Sheng tai xue bao= The Journal of Applied Ecology, vol. 9, no.1, pp.18-22, 1998.

[8]. P. Singhal, P. Sharma, and B. Hazela, "End-to-end message authentication using CoAP over IoT," in International Conference on Innovative Computing and Communications, Singapore: Springer Singapore, pp. 279–288,2019,

[9]. Z. Bashir and M. E. E. Hawary, "Short term load forecasting by using wavelet neural networks," *Canadian Conference on Electrical and Computer Engineering. Conference Proceedings. Navigating to a New Era (Cat. No.00TH8492)*, vol.1 pp. 163-166, 2000.

[10]. P. Singhal, P. Singh, and A. Vidyarthi, "Interpretation and localization of Thorax diseases using DCNN in Chest X-Ray, "Journal of Informatics Electrical and Electronics Engineering, vol.1, no.1, pp.1-7,2020.

[11]. M. Vinny, & P. Singh," Review on the Artificial Brain Technology: BlueBrain. Journal of Informatics Electrical and Electronics Engineering, vol.1, no.1, pp.1-11,2020.

[12]. A. Sahani, P. Singh, and A. Kumar," Introduction to Blockchain," Journal of Informatics Electrical and Electronics Engineering, vol.1, no.1, pp.1-9,2020.