A feedback system using blockchain technology

Md. Mijanur Rahman, Md. Mahmudul Hassan Rifat, Md. Yeasin Tanin & Nazmul Hossain

Department of Computer Science and Engineering, Southeast University, Bangladesh.

mijanur.rahman@seu.eud.bd, mhrifat007@gmail.com, yeasintanin3457@gmail.com, 7hnazmul@gmail.com

Abstract— **Blockchain has emerged as a new light in the digital world. Though this technology is one of the newest inventions, it has widened the doors of security and transparency in the technology-based world. Stakeholder's feedback brings out more opportunities in an organization. But it is not easy to find honest feedback since people may feel hesitation to give an honest review for many reasons like safety, bias, nepotism, etc. Today mostly a database system is used to store the data of feedback, but lack of trust in the database system leads to false feedback or partially compromised feedback. In this paper, a digital feedback system will be used where feedback will be ensured with the anonymity of the users. This system will make sure the trust of users is being stalled when feedback is given. Furthermore, it will give an idea of how the people of an organization think about certain topics. This system can be a game-changer in the corporate world as well.**

Keywords— Blockchain, Feedback System, Cryptography, Privacy, Anonymity

I. Introduction

In the days of globalization, feedback is an essential part of any organization, whether it is based on business or educational purposes. To know the possible solution to any obstacle in organizations, feedback is being maintained. Since the introduction of a feedback system through a database, it has been accepted widely. People thought that it's a solution to the problems of lack of communication among the people in an organization. That is why, the feedback is taken with greater significance. When an employee gives feedback, the Human Resource (HR) department takes the feedback seriously from the employees for future updates. As in this case, some feedback can be negative for certain people in a company. But When the HR department brings the matter in a meeting, they come to know about the feedback that was given by employees. Some people tend to search those who have given them negative feedback and they might know this through the system admin from the database. Thus, the feedback doesn't remain anonymous anymore. In recent years, people find its difficulties to keep it secret. So at this point, it can be said that the feedback system is not anonymous in the database management system[13]. Here we are proposing a feedback system that will give the user the anonymity they all wanted in a feedback related system. We will evaluate the system in detail which will be done using blockchain technology.

A system that ensures the records of information that is almost unlikely to change, break, or cheat is the main concept of the blockchain. A modern ledger of transactions is being duplicated and distributed across the nodes of the network which essentially refers to the blockchain technology[2,9].

In blockchain blocks which are created using a growing list of recorded information are linked through cryptography[10]. The cryptographic hash of the previous block, timestamp, and transition data are contained in each block.

Global supply chains, financial services, healthcare, agriculture, and many other industries use the blockchain as a descriptor. For the betterment of the students, universities are also using a student feedback system that analyzes the performances of teachers on different courses and it is a decentralized platform which is made using blockchain technology.

II. Literature Review

Satoshi Nakamoto invented a digital cryptocurrency named bitcoin back in 2008[1]. A paper was published on blockchain technology to act as the public transaction ledger which led to a cryptocurrency called bitcoin. Based on this technology a new door was opened for various purposes.

A feedback system is largely based on privacy and anonymity. With the help of blockchain technology along with their many fascinating attributes such as anonymity, verifiability, robustness, and even possibly privacy; a feedback system can be created. The feedback is also auditable due to the distributed nature of a blockchain[13].

In the end, it is possible to make a feedback platform using blockchain technology. The platform inherits many desirable blockchain attributes and could be modified or extended to fit the different other business applications in future with similar requirements such as privacy, the form of institutional feedback, or even e-voting[2].

In 2018, Jerome Mizzi and Frankie Inguanez searched for possible solutions for national e-voting systems using modern technology like blockchain[17]. They made a prototype and created a website and used smart contracts on the blockchain. Their main goal was to ensure honesty in the counting of votes as well as maintaining the privacy and safety of the voting. Since the time blockchain was launched to make cryptocurrency, it has now been explored in many innovative ways. In this system, they initiate a system where internal tampering can be nullified and perform a secure trusted voting protocol.

In 2018, Yi Liu and Qi Wang looked for increased honesty in voting where they encrypted the ballot's content with the help of blockchain e-voting and ensured secrecy to the voters so that they can not be marked out[3]. They also ensured the voting speed and security measurements with the help of private blockchain.

In 2019, Chang-Hyun Roh and Im-Yeong Lee looked for increased honesty in voting where they encrypted the ballot's content with the help of the blockchain[16]. They also ensured the voting speed and security measurements with the help of the private blockchain. This system would ensure the following entity- the manager of voting, the voting, and the counting server and they presumed all the participants are in a secure transmission.

In those papers, researchers are interested in an internet-based voting system that ensures data security and the vote casting ensuring. In this research paper, a feedback-based system will be introduced where one can give one's feedback and nobody will know who delivers this feedback which is somewhat similar to the voting system.

III. BLOCKCHAIN

Bitcoin is the first application of blockchain that took place in blockchain technology[1] [2] and changed the outcome of the future of cryptocurrency.

Blockchain is classified and characterized by various kinds. In Table 1 three kinds of classifications and their characteristics are shown.

Table 1: Classifications and characteristics of Blockchain[18]

	Public	Private	Federated
Definition	Anyone join the network	Independent use of an organization	Several organizations join
Control	Anyone	An organization	Multiple organization
Approve	Anyone	Authorities and Supervisors	Authorities and Supervisors
Transaction	Anyone can create	Only those are responsible	Only those are responsible
Characteristics	Public, Distributed	Private, Decentralize	Private, Decentralize
Authority	Changing the first rule is difficult	Changeable according to the decision of an authority	Changeable according to the decision of an authority
Speed	Slow	High	High
Case Example	Bitcoin, Ethereum	EEA, R3CEV	Hyperledger Project

The blockchain contains some important properties which are: distributed data sharing, immutability, data persistence, autonomous code execution, accountability and transparency, data provenance[15].
i) Distributed data sharing: Blockchain data is

distributed across multiple nodes. The protocol ensures that data inserted in a particular node gets synced across all nodes in a timely fashion.

ii) Immutability: Data immutability in blockchain comes from the fact that to change data inserted in a previous block where an attacker must possess either significant computational power, in case of a public blockchain. It also comprises most of the nodes in any type of blockchain.

iii) Data persistence: A distributed system works in a way that data in a blockchain will persist as long as there are enough nodes to execute the protocol in a secure way.

iv) Autonomous code execution: A smart-contract will ease the autonomous code execution without a single point of failure.

v) Accountability and transparency: All permitted entities can verify every single transaction which can make sure accountability and transparency.

vi) Data provenance: Data in a blockchain can only be stored with a signed transaction which ensures data provenance[15].
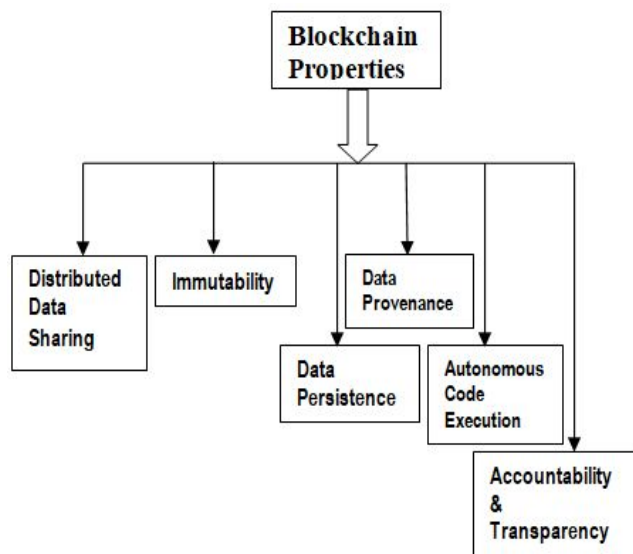

Figure 1. Properties of Blockchain [7]

Since we know blockchain is a distributed network that is decentralized in structure, pointers and linked lists are used in blockchain architecture[14].

i) Pointers: The location of another variable is kept in this variable. This basically points to the position of other variables.

ii) Linked Lists: It refers to a sequence of blocks where each and every block contains some information and links to the next block using a pointer.
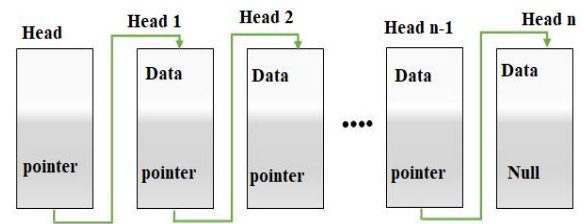

Figure 2. Architecture of Blockchain[7]

For example, bitcoin is being created with this technology. It is mainly a data structure that is ordered and it contains blocks of transactions where every block in the chain is necessarily linked to the block stored before.

The block which is initially kept there is known as the primary block which is the foundation of the stack. New blocks are kept on top of the previous blocks, thus it forms a stack which is known as the blockchain[9,10].

A block mainly consists of data where transactions, hash, previous hash, nonce, timestamp are included. A hash placed on the header identifies each block in the stack. This hash uses the secure hash Algorithm called (SHA-256) which generates the idiosyncratic fixed-size 256-bit hash. Plain text will be used as an input in the algorithm SHA-256 and will be encrypted to a 256-byte binary value.

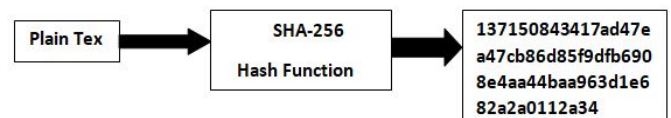Hashing is a one-way function. A figure that describes the basic logic of this encryption is shown below.

Figure 3. Representation of SHA-256 algorithm

The blocks are created when a valid transaction is occurred in the blockchain. Transaction details are updated in each block which is also linked with the hash value of the previous block to establish blocks in the chain.

The encrypted hash in its header is the primary identifier. Another figure which shows a new block creation that contains the hash value is added below. After creating a new block, it is transmitted to the blockchain. The system keeps on tracking the incoming new blocks and updates them on the blockchain.
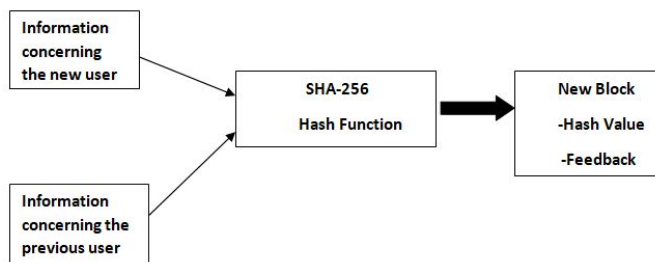
Figure 4. How a new block is being created

IV. SYSTEM FRAMEWORK

The main vision of this system is to give feedback and remain anonymous. The discussion of the requirements and system functionalities are given below.

4.1 System Requirements: This feedback system includes the requirements below:

Authentication: Registered users will get the opportunity to give their feedback.

Anonymity: The system will make sure the anonymity of the identity so that nobody can find the actual person.

Validity: Every feedback must be counted and validate it. Once the feedback is done, it cannot be changed or removed.

Checkable: The system will ensure the right person will get the feedback given to him[1].
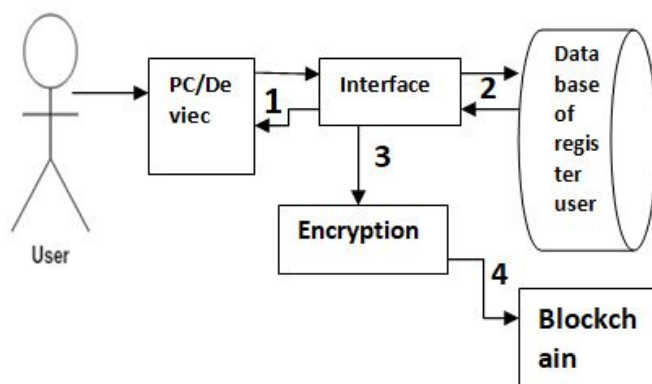
4.2 System Representation:

Figure 5. System Representation

4.2.1 Registration Policy: The user will have to login to the feedback system using his identity number, name, or contact number. The system will check the given information if it is matched with a valid user; the system will give the clearance to enter the feedback system. Our system will not allow self-registration to avoid fake users and their feedback.

4.2.2 Giving Feedback: Users will give their feedback to the given candidate. The interface that will be used here must be user friendly.

4.2.3 Feedback Encryption: When the user will be done with their feedback, the input including the user id number and the name will be generated by the system along with the hash of the previous feedback.

So in this way, the uniqueness of the input as well as the encrypted output will be ensured every single time. The Block header will record the encrypted information. Each block's information will be encrypted by SHA-256 which is a hash function of one way that disallows the reversion or decryption to date. This way of hashing ensures that reverse engineering is impossible so that the user's information is secured and cannot be regained.

4.2.4 Adding the feedback to the Blockchain: After the creation of the block, information of the dependent candidate for feedback is recorded in the corresponding blockchain. Each block is connected with the previous block which is referred to as shackles of blocks. [10]

This system will contain a chain for each user for feedback and orphan blocks will not be a problem for this system since they possess identical information (feedback) like the other block.

V. CONCLUSION

In the end, this research paper talks about the importance of gaining trust among the feedback system's users and making feedback a lot easier and ensuring transparency. It gives the corporate world and institutions a new door of opportunity to understand the user's expectations from their organization. Through this system, feedback will be more honest and reliable to get an opinion on a given candidate. In terms of limitations, we can think of hackers attacking a user's device to manipulate the feedback. Also, feedback can be done once in a period, so that multiple feedback for one candidate can not be possible[1]. This feedback system can be used in Rating based companies like Fico run for the apartment's rent.[11] Even it can be used in educational institution's ratings, share markets, etc.

Even though the feedback system brings out a lot of positivity, it may cause some negativity while giving feedback since every user remains anonymous. Some users can intentionally give negative feedback to ruin the reputation of a candidate. Since our system will be maintained through the blockchain, therefore, the transaction rate will be slow. Even if one node is damaged in a distributive ledger, the entire data of that node will be damaged and can not be retrieved. We also need to remain conscious of memory size, since data will be bigger day by day. In the future, to a greater extent, this research can lead to a feedback-based point system which will pave the way for finding qualities of

several rental services.

REFERENCES

[1] Ahmed bin Ayed, "A conceptual secure blockchain-based electronic voting system 2017", *international journal of network security and its application (Ijnsa)* Vol.9,2No.3 May 2017.

[2] Bitcoin- A peer to Peer Electronic Cash System 2008 by Satoshi Nakamoto.

[3]Yi Liu and Qi wang, "An e-voting protocol based on blockchain"

[4] E.A. Quaglia and B. Smyth, " A short introduction to secrecy verifiability for election", *arXiv preprint arXiv:*1702.03168 (2017).

[5]Blockchain: Backbone of the Review Platform" Sep. 28, 2018. Accessed on: April.28, 2020. [Online] Available: https://medium.com/revain/blockchain-backbone-of-the-review-platform-4f7868e69555

[6] Dr. Gavin Wood, founder, Ethereum & ethcore,gavin@ethcore.io "A secure decentralized generalized transaction ledger-2017" EIP-150 REVISION,30- Sept 2017.

[7] Z. Zheng, S. Xie, H. Dai, X. Chen and H Wang "An overview of blockchain technology: architecture, consensus, and future trends," *in proceedings of 2017 IEEE International Congress on Big Data (Big Data Congress), Honolulu, HI, 2017,* pp 557-564.

[8] G. Z. Qadah and R. Taha, "Electronic voting systems: requirements, design, and implementation." *Computer standards and interface,* volume 29, no.3, pp 376-286,2007.

[9] "What is blockchain?" 30- Aug 2011. Accessed on July 01, 2020. [Online] Available:
https://www.euromoney.com/learning/blockchain-explained/what-is-blockchain

[10] Nathan Reif, "Blockchain explained" 01-Feb,2020. Accessed on 02-July,2020. [Online] Available:
https://www.investopedia.com/terms/b/blockchain.asp

[11] "What is a credit score?" Accessed on 20-April,2020 [Online] Available:
https://www.myfico.com/credit-education/credit-scores

[12] S.M.K.V Pramod Kumar, K. Kiran Kumar, R sai Krishna, P.S.G. Aruna Sri, "Incorporation of blockchain in student management system" *international journal of innovative technology and exploring engineering* (IJITEE), ISSN:2278-3075, vol.8, issue-6, April 2019.

[13] Chandra and Billy"Teaching feedback using blockchain and blind signature", *Nanyang   Technological University,* SCSE19-0196, 2020.

[14] "Blockchain architecture" on January 31, 2019. Accessed on 2-April,2020.[Online] Available:
https://mlsdev.com/blog/156-how-to-build-your-own-blockchain-architecture?fbclid=IwAR23dKnrfiflM1Nl7di1EwMdpMFSsF19ah8R13sHnoEYOFfX4SsatLwY8FI

[15] Daniel Conte de Leon, Antonius Q. Stalick and Ananth A. Jillepalli, Michael A. Haney and Frederick T. Sheldon, "Blockchain: properties and misconceptions" *Asia Pacific Journal of Innovation and Entrepreneurship* Vol. 11 No. 3, 2017, 29 September 2017.

[16]Chang-Hyun Roh and Im-Yeong Lee "A Study on Electronic Voting System Using Private Blockchain", *J Inf Process Syst*, Vol.16, No.2, December 9, 2019.

[17]Jerome Mizzi, Frankie Inguanez"Blockchain-based E-Voting System ",*46 Journal of E - Technology* Volume 9 Number 2 May 2018.

[18]Fran Casino, Constantinos Patsakis, Thomas K. Dasaklis, "A systematic literature review of blockchain-based applications: Current status, classification and open issues", in Telematics and Informatics, Volume 36, March 2019, Pages 55-81.