Original Research Article

Secure Payment System in Blockchain

***Abstract*—In the present age, online payment system is a very simple practice. But many people use this system to manipulate people's money. Many are trying for finding a variety of solutions. But there is no way to stop that crime. Blockchain's yoke is a blessing. Using blockchain is a very easy way to complete a payment without making any mistakes. Hacker will never find a way to do their work in this kind of system. Our System is full worked with Blockchain. Basically, we choose blockchain as our project because it is the most secure way to do a transaction in every online system. The central business model is based on a database management system. Once accomplished the security of the transaction can no longer be guaranteed. On the other hand, it is really expensive to resolve possible fraud transactions by a middle man. Aiming at solving issues concerning security and worthlessness, There is a proposal of a model which is completely made of blockchain system. In Our system there are many blocks of information of each and every transaction. We have proposed an algorithm. The algorithm will make consumers able to transact through cryptocurrency in blockchain networks. It is totally different from the fiat system where consumers will be able to transact without the help of third parties and vendors can also be relieved with their transaction. This type of transaction will be very comfortable for both consumers and vendors. Consumers along with vendors can see the whole transaction date, time and everything that they dealt with when the transaction was held.**

***Index Terms*—Blockchain, Secure Transaction, electronic Payment, Cryptocurrency, Bitcoin**

I. Introduction

Promoting the throughput of blockchain systems like bitcoin and cryptocurrency has been an important research problem. Again, in this era off-chain systems of payment are the most pledging technologies to accept this challenge. Considering the overall situations of payment system blockchain has made a tremendous change. Once cash was the primary way of transaction. People would buy and sell everything using hard cash. Then debit and credit cards became popular. People can easily buy and sell their products using debit or credit card but for this consumer along with vendors need to pay an amount of fees to the bank. Sometimes the address can be changed from unauthorized threats. That is a risk of payment transaction. There has been a massive change in the payment system for a few years. Now the most common and the most impressive part of the payments system is the cryptocurrency. It brings a massive change in this site. Day by day people are very interested in this system. This can store payment transaction. But though the most common using site is debit or credit card system to transfer money for education site and others. Our propose model is all about blockchain related works. Our main aim is to make a secure payment system where one can easily transact their usual transaction. We have developed the system. The system will fully be managed by some minors who validates the transaction. The transaction is built into a block. And the transaction is broadcasted across the whole network. And then the block is added to the chain. Each block is added through a process that is called POW (proof-of- work) which acquires permission on blockchain network for confirming the transaction or adding new block into the chain. There is a hash function which is conducted in this model. And the hash function is used which takes a transaction input and returns it into the output of the fixed length. Using this hash function to transact the data ,that is the process of hashing. And the transactional output of the given hash function that is called hash. Hashing uses SHA-256 algorithm.

That is the process of completing the transaction. Then our system enforces to secure this that is actually reliable for the user. At first Certificate Authority will produce two types of keys,public key and private key. They are used for encryption and decryption. And private key is to generate the digital signature that makes the transaction more secure. And the miner validates the transaction. Actually Blockchain technology is an innovation idea for payment transaction. It can prevent the transaction from an unauthorized access and can store the whole transaction securely.

Every user will get their personal signature and miner will check the signatures if there any problem then the minor could stop the transaction. by these key minors make users signature. The Enacting empiric outcomes via the well-known digital wallet and bitcoin has make our system much secure.

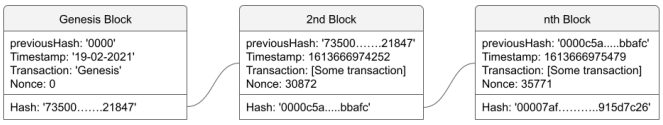

Fig. 1. Securely hashing data flow in blocks of blockchain

II. Existing Work & Limitation

Nowadays technology has enriched each and every sector in many ways.In this recent world everything is automated like E-voting [1], [2], supply chain management [3],robotics [4], vehicle registration [5],national identity card management [6],sentiment analysis [7],applications for own security [8] and so more.Many researchers have been conducted on blockchain and its application.There is a secure and efficient payment solution for MOOC environment in blockchain technology. MOOC is actually an online education platform. It is based on the database management system [9]. There is a distributed payment system based on payments token. It can protect the consumer from identity theft [12]. Thing-to-thing payments are a key enabler in the IOT. It allows for devices to pay each other for services without any human interaction [16]. When a transaction is done by an IOT device, it takes a long time to verify when transactions are done in two places using the same blockchain wallet transaction. To resolve this problem, they have made a prototype which is FastPay where it takes only 9 second to solve it. In FastPay prototype, there is a special user named Broker who works in the middle between payer and payee. To do a transaction using FastPay prototype, 4 steps should be done [11]. In this paper they have developed a solution designed to solve the problem of latency in Blockchain networks in relation with the capability of running real-time services monetized through cryptocurrency. They have developed a solution that runs off-chain which facilitates agreements between vendors and customers. It manages late payments. A transaction represents a cryptocurrency transfer between two nodes executed within the main network. In this paper they develop LATENT TRANSACTION ALGORITHM. It executes all the latent transactions recorded on the ledger until that time [13]. There is a cost saving approach which reduces the transaction time and storage for small amount of time. Electronic coin is represented by the chain of digital signature [17]. Each block records a set of transaction and the associated metadata. Satoshi Nakamota first perceive the blockchain as a peer to peer money exchange system. Nakamota refer a transactional token as bitcoin [18]. A peer-to-peer version of electronic cash system allows online payments to transact directly one party to another party without the help of a trusted third party. There is a solution to the double spending problem using a peer-to-peer network. Transactions which are impractical to reverse would protect sellers from fraud. In this, electronic coin is defined as a chain of digital signature. Each owner transfers the coin to the next by signing a hash of the previous transaction and the public key of the next owner. Payee can verify the signature to verify the chain of the ownership [10].In order to construct a concrete DCAP system, we first design a Condition Anonymous Payment (CAP) scheme (based on our proposed signature of knowledge), whose security can be demonstrated under the defined formal semantic and security models. The conditional anonymous payment scheme is required to provide the traceability of the transaction in order to identify the long-term address of the sender of a malicious transaction. The current value-added tax (VAT) administration system acts as a centralized server, which consists of high risk attacks by hackers. Only a few countries use the digital technology to calculate and manage VAT. By combining Decentralized Storage Network (DSN) with Smart Compact (SC), a new model is offered based on blockchain technology for authentication of the transaction, calculate and approve VAT [15]. Embedded secure bitcoin payment module is designed realize the automatic payment. There is crypto chip in the module can provide crypto algorithm to protect the transaction and there is security protocol which deals with transaction process. Data deduplication is one of the important technologies to reduce the storage cost of cloud storage system. In a cloud storage system with deduplication technology, the client can outsource the data files to the cloud storage server and pay for them [19].There is a paper of Improving Banking Transactions Using Blockchain Technology. The majority of banks offer various online services to their customers that focus specifically on domestic and international banking transactions. Banks use enough time to conduct bank transactions from one bank account to another, some of which take more than a week [20]. In paper [14] there is a payment system DCAP. DCAP is decentralized conditional anonymous payment. Since all bitcoin transaction are publicly available so the real identity of the user attack the network analysis, address clustering and transaction graph. The transaction anonymity of CAP scheme is integrated into the DCAP system, in order to prevent the users' real identities from being disclosed. Transactions chained in the DCAP system refer to a SPK proof, which is generated by the anonymous private key (corresponding to the sender's anonymous address). Verification of these transactions only involves the anonymous addresses of sender and receiver, rather than their long-term address. Apart from these anonymous addresses, no related identity information can be obtained from the transactions. But In this paper, there are some limitations like they do not provide users digital signature which can ensure their security. Users and administrators on this system will not be able to see the balance from users accounts by which they can ensure whether

attackers are trying to hack the system or not.

In the existing system, the system sends a request to the sender before the receiver. The sender then verifies the request with the certificate authority. The certificate authority executes all the work. In this, the system blocks his account when he unknowingly makes a transaction. The existing system immediately blocks the user and cancels the transaction in case of any suspicious transaction. This is the limitation of the existing system. In our system , we have tried to solve this problem.

III. Fundamental of transaction Process

A. Blockchain

Blockchain could be a system of recording data in a way that produces it difficult or inconceivable to alter, hack, or deceive the framework. It could be a particular sort of database. Distinctive sorts of data can be put away on a blockchain but the foremost common utilize so distant has been as a record for exchanges. In Bitcoin's case, blockchain is utilized in a decentralized way so that no single individual or gather has control—rather, all clients collectively hold control.

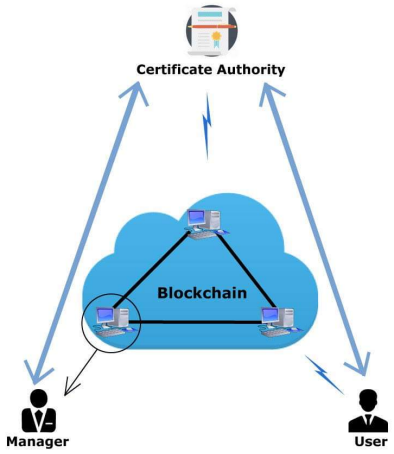

Fig. 2. Blockchain

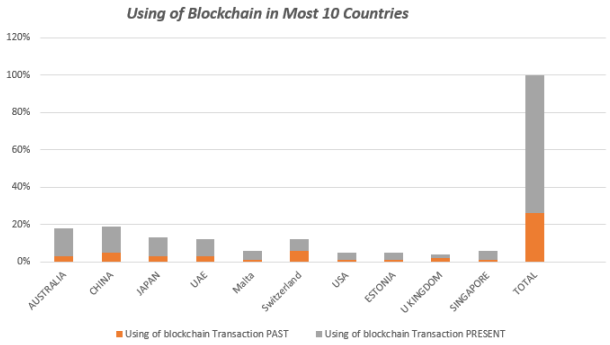

Fig. 3. Statistics of using blockchain system in most 10 countries around the world

B. Bitcoin

Bitcoin may be a decentralized computerized money, without a central bank or single director, that can be sent from client to client on the peer-to-peer bitcoin arrange without the require for mediators. Bitcoins are made as a remunerate for a handle known as mining. They can be traded for other monetary standards, items, and administrations. world wide installments are simple and cheap since bitcoins are not tied to any nation or subject to control. Little businesses may like them since there are no credit card expenses. A few individuals fair purchase bitcoins, trusting that they'll go up in esteem.

C. Cryptocurrency

The word "cryptocurrency" is inferred from the encryption procedures which are utilized to secure the arrange. Cryptocurrency may be a frame of installment that can be traded online for products and administrations. Numerous companies have issued their possess monetary forms, frequently called tokens, and these can be exchanged particularly for the great or service that the company gives. Cryptocurrencies work employing a innovation called blockchain. Blockchain may be a decentralized innovation spread over numerous computers that oversees and records exchanges. Portion of the request of this innovation is its security.

IV. Secure Transaction Process

Algorithm for Valid Users:

1. Function validUser (address1, address2, amount)
2. Require valid address1 = 1, address2 = 1
3. Require valid amount > 0
4. validUser ← true

Algorithm for Creating Keys & Digital Sign:

1. Function create makekeys (public key, private key);
2. Function makeDigitalSign ()
3. Require sender address> 0
4. Require Receiver address> 0
5. Require valid amount > 0
6. Makekeys←make new public key & make new private key
7. makeDigitalSign ← true

Algorithm for Transaction Process:

1. Function successful ()
2. Function unsuccessful ()
3. Require validUser ← true
4. Require makeDigitalSign ← true
5. Function successful ← true
6. Require validUser ← false
7. Require makeDigitalSign ← false
8. Function unsuccessful← true

Definition of Algorithms: Here we present the transactions of payment system. S and R are the sender and receiver of the transaction. Additionally there are miner who actually validates the transaction.

Keygen :$1^{exp}\phi$ Taking input that is a security parameter and

the algorithm returns a pair of public key (Pk) and private key (Pr).

Sign(Pr, m) : It takes an input private key Pr and m. This algorithm returns a signature γ on m.

Verify (γ , Pk) : It takes a input signature & public key pk. The algorithm returns true or false .This algorithm is called to verify the transaction.

BlockchainGen(b, Pk, Pr, n) : Taking input bitcoin b , public key Pk , private key Pr, n chain. Algorithm returns a chain of n chains. Then the blockchain is created. And then bitcoin is converted into a chain of n chains.

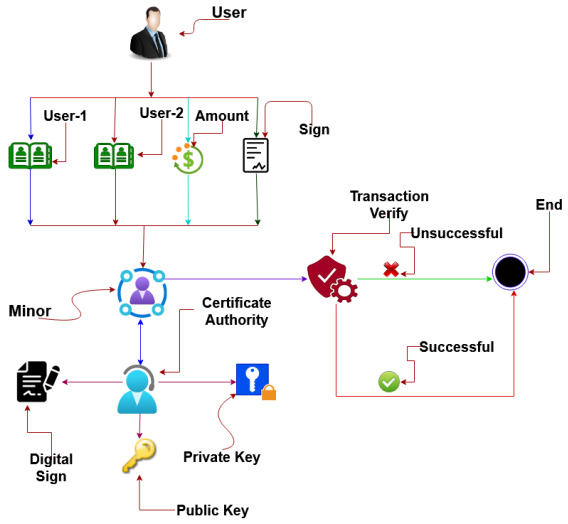

Fig. 4. Secure Transaction Process Using Blockchain Technology

The whole transaction Process is completed in 5 phases. The phases are given bellow:

Phase 1: CA (Certificate Authority) is trusted third party who is responsible for managing the certificate of users. In this model, their task is to generate the pair of public and private key for the user. The Public key is used to encrypt and is known to everyone. The private key is used to decrypt and is known only to the receiver of the transaction. Private key is a secret key that actually prevents from other people to send bitcoins from the address.

Phase 2: ANTx (Account number as transaction): It is used for transaction. The main account number is what the manager is giving to the public key.

phase 3: UDS (User digital signature): Digital signature is a term which is used to validate the authenticity and integrity of the transaction. It is created for user. Private key is used to generate a digital signature and must remain secret. There are miner who check the digital signature.

Phase 4: CUDS (Checking User Digital signature): Digital signature need to be checked that the information contained in the digital signature is correct and authentic. The minors will validate the authenticity of the signature. If validity is confirmed , the transaction will be ready.

phase 5: CT (Checking Transaction): All blockchain transaction must be checked by miners. It will be checked if there is any transaction without public key. Miner can store the transaction securely.

V. Implementation

We have implemented the transaction process that is secure and reliable.Here is a JSON file that is used to represent the structured data.

```
1.resizebox{,45\textwidth}{1}{
2.{"nonce":14784.
3."hash":
'0000e0be826768bb762ec801fda64edfc34d982a42ce9c2912f235cfd6d008af',
4."previousHash":
'735005d5f3f2d914ef6eb273e41e8e154e518493234a99fc72fd87e0bfa21847',
5.-version": "JSEcoin Server v1.1",
6."startTime": 1613740911154
7."size": |,
8."server": "192.158.2.|".
9."transaction_1": |,
10."data": "|{
11.\"first_name\":\"Robert\",
12.\"last_name\":\"Hogan\",
13.\"fromAddress\":\"043853a5786869ada3c265f48b0b6b3a8bcff069d00868362
ffebb1ddf29d54f9300584b475a76d7bcefb05458b7c1c8a18a8d41fbd53f2be54b776
acea8a344e8\",
14.\"toAddress\":\"043cf7881a0afdc9407a207d2434f5d85781ac5de35da26a2e4
579adf19dd52e5eb950ffc23f0eec2cf0d1fecdcf2dff1c9a1c8572eab7143d21fb9ef
a2f3bb38d\",
15.\"amount\":\"340\",
16.}|,
17."transaction_2": |,
18."data": "|{
19.\"first_name\":\"Raymond\",
20.\"last_name\":\"Paez\",
21.\"fromAddress\":\"044b0496f53de23113620916dce1c4293a74ec623ea3577ec
048d3271bea6eb595484cd43f088495202a17e51eba0a3f416ac449c6dfd093c452f60
2e2633106cb\",
22.\"toAddress\":\"04b5197e64d45f43fd4f09e4626dc6b372cb587d78b6c167953
c67c8fa9c46d6b05a39d2ac7dbe9d913a5d83cb3eea1ae39f191ec9162b68271b1e0bc
b9d566722\",
23.\"amount\":\"500\",
24.}|"}}
```

Fig. 5. Implementation of the system model

VI. Result & Analysis

An application is developed on the basis of secure transaction system using blockchain. The simulation results showed that the blockchain based proposed transaction system would bring the following benefits:

1. In our proposed architecture, the sender gives all the information to the minor. Then the miner verifies all the information. But in the older system, receiver sends a request to the sender and sender then sends all the information to the Certificate Authority (CA) for the verification and it's a time consuming process. So our system is comparatively much faster.

2. In our proposed system the work of the Certificate Authority (CA) has been divided with the miner so that it can perform more requests comparatively the older system. In the older system, the Certificate Authority (CA) executes all the work so it takes much time to complete the requests than our proposed system.

3. If our system finds that someone is trying to make

an uninformed transaction, it immediately cancels the transaction, puts it on hold instead of blocking the account. But in this type of case, the older system immediately blocks the user and cancels the transaction. Here we present the comparison between the existing system and proposed system in TABLE:01

TABLE:01: COMPARISON BETWEEN THE EXISTING SYSTEM AND PROPOSED SYSTEM

Category	Existing System	Proposed System
Verification	Weak	Strong
Transparency	No visible transparency	Transparent in design
Task Manager	CA (Certificate Authority)	CA and miner
Unauthorized Access	Blocks the access	Records the access
Time Consuming	More	Less

CONCLUSION

From the experiments , we have tried to secure the payment transaction that is easy and more flexible. Blockchain has the potential to help someone or some organization that use it to ensure transactions as well as safety. We have already developed a secure return system. The main objective of our work was to secure the payment system .We also introduce some advance services. In doing so, we have faced many difficulties and overcame them. We discuss about the reliability of a secure transaction system. In our model, anyone can make their personal or business transactions through a beautiful payment system that is actually secure, easy and a very low amount of time .We have developed a simple and secure system by reviewing many statistics. Since all the information in the system will be through on block so no one has the opportunity to hide or change the information.

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