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Execution of IoT System using Blockchain with Authentication and Data Protection

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Abstract: Blockchain allows users and data providers to ensure authentication, authorization and data validity with proper multi-key exchange authentication for user identity and hash key for Blockchain so that the data is not just stored but also validated each time the user access. In this paper, we apply Zero Knowledge proof to a Strong rooms using RFID Card reader and Camera module IoT systems to prove that a prover without disclosing information such as public key enhances the anonymity of Blockchain.

Keywords: IoT, RFID Card Reader, Block Chain, Strong room, Zero Knowledge Proof

I. INTRODUCTION

Internet Of Things (IoT) is the extension of internet connectivity into physical devices and everyday objects. These devices can communicate and interact with others over the internet, and they can be remotely monitored and controlled. The paper introduces Blockchain which is a digital record of transactions. The name comes from the structure, in which indivisual transactions/records, called blocks are linked together to a single list called chain. Blockchain records transactions and each transaction added to the Blockchain is validated by multiple consumers. These systems are configured to monitor specific types of Blockchain transactions, form a peer-peer network. They work together to ensure each transaction is valid before it is added to the Blockchain. This decentralized network of computers ensures a single system cannot add invalid blocks to the chain. When a new block is added to the Blockchain, it is linked to the previous blocks using a cryptographic hash generated from contents of previous block. This ensures that the chain is never broken and that each block is permanently recorded.

II. PROBLEM STATEMENT

Blockchain technology consumes more energy than any centralized system. Not only does their redundancy cause them to consume more power than an average centralized cloud-based system, but their transaction validation method plays a great role too. First, they require more storage than any other system. The Approaches of authentication use centralized servers, which increses the chances of a single point of failure and the servers getting hacked. The hacking of servers can cause loss of valuable information.
To avoid thiss problem, we need a decentralized system that allows us to identify and authenticate users. The other issue related to centralized servers is that they are managed by a third party, which can modify the data with no user permission. A new system is needed to keep the activity records of a particular user in an immutable way.

III. PROPOSED SYSTEM

IoT, Blockchain Server and Client Application. We have taken the environment of strong room in police station. Smart cards will be given to few authorized staffs working in police station, and when the person swipes card to enter into the strong room, the RFID Card reader scans the value of that particular card swiped by the person, and the camera fixed at a place captures the image of the person swiping the card. The “RFID tag+image” is a transaction which gets stored in the Blockchain ledger. Client on the other hand, to view the transaction, should get registered to the Blockchain server initially. During the registration, Blockchain server shares a secret key to the client on request by encrypting it with the public key by providing the private key. Once the client gets registered and obtains the private key from the Blockchain, that client is said to have been authenticated and authorized. Again, when the client wants to view transactions, he has to regenerate the shared secret by encrypting it with the private key. Blockchain, upon receiving, decrypts it with the public key and checks if the shared secret key is the same given to the client while registering. Once the combination of the secret key is found to have been the same, Blockchain concludes that the client is an authorized person and allows the recent transaction to move to the respective user blocks. Once the transaction moves to user blocks, that particular transaction will be removed from the Blockchain ledger, hence no security breach and data tampering. In order to check the security breach, a hacker application has been developed where in, when a hacker modifies the transactions, then that particular transaction is viewed as a “bug” icon in the user block.

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IV. DESIGN & ARCHITECTURE

Smart grids are intelligent grids that combine IT technology with traditional grids to enhance the efficiency of the energy utilization. In a smart grid environment, each Advanced Mitigation Infrastructure (AMI) is deployed in users and facilities, and can be used to measure energy production and utilization and provide services such as resale. In a smart grid environment, smart meters are needed to measure power consumption. The smart meter is installed at the end of each device to record the power consumption and production of the device, and the accumulated data can analyze the power usage pattern. Security vulnerabilities for smart meters have privacy concerns that analyze patterns using power usage eavesdropping and traffic analysis. There is also the risk of moderating the power data transmitted from the smart meter to charge lower or higher costs. So we need to introduce smart meter authentication technology.

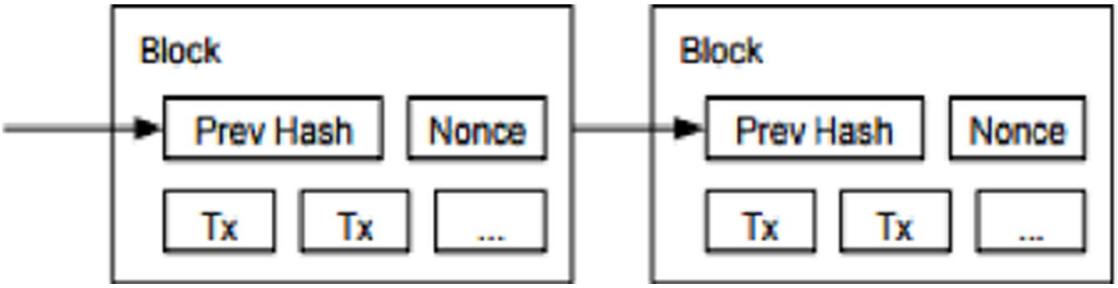

Fig. 1. Block Chain Concept Map

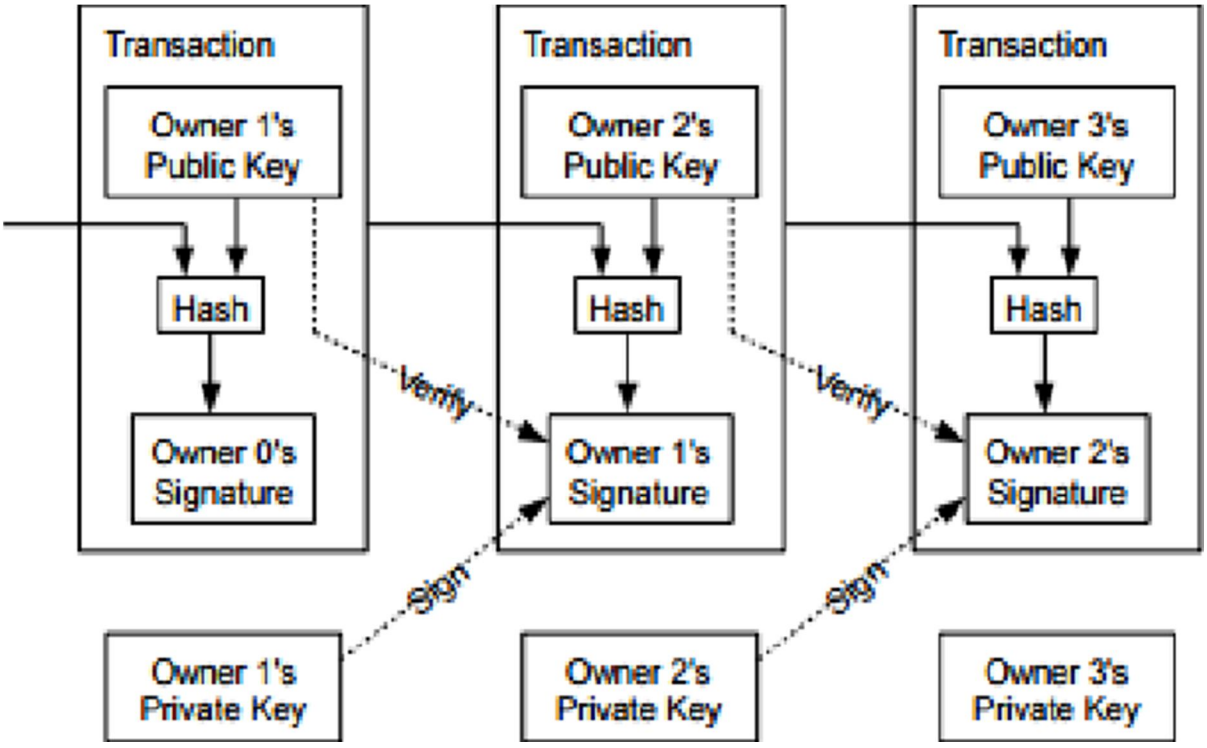

Fig. 2. Transactions in a block chain

Block chain has been applied to bitcoin and Ethereum using security technologies such as electronic signatures, public keys, and hash functions. The bitcoin developed by Satoshi Nakamoto is getting attention, and it is also studying the utilization method in financial and non-financial areas including virtual currency. In the bitcoin, the block chain is a kind of distributed digital book that stores the history of the bitcoin, which is a currency issued periodically. This ledger is made of cryptographic techniques that can not be counterfeited or modulated and is made as a verification step to prevent forgery and tampering of transactions through transaction processes and hash values for the transfer of ownership.

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V. BLOCK DIAGRAM

IoT Model stores the transactions i.e, RFID Card Reader as well as image captured by the camera in a queue and sends those transactions to the Blockchain ledger. Client need to be registered to the Blockchain server first, in order to seek transactions. Blockchain contains multi-key i.e, Private key, Public key and Secret key. During client registration, private key along with the secret key is given to the client. Public key is retained in the Blockchain only. Once the registration is done, the client can request for the recent transaction. Request for the data view involves regeneration of the shared secret key using the private key and sent to the server. And the Blockchain should check if the secret key is the same that had been sent to the client while registering. If the secret key is the same, then that particular client is said to have registered to the server and found to be authorized. And the recent transactions are sent to user blocks where only the authenticated user can view. And as soon as the transaction is moved to blocks, that particular block will be removed from the ledger in order to prevent the security breach and data tampering.

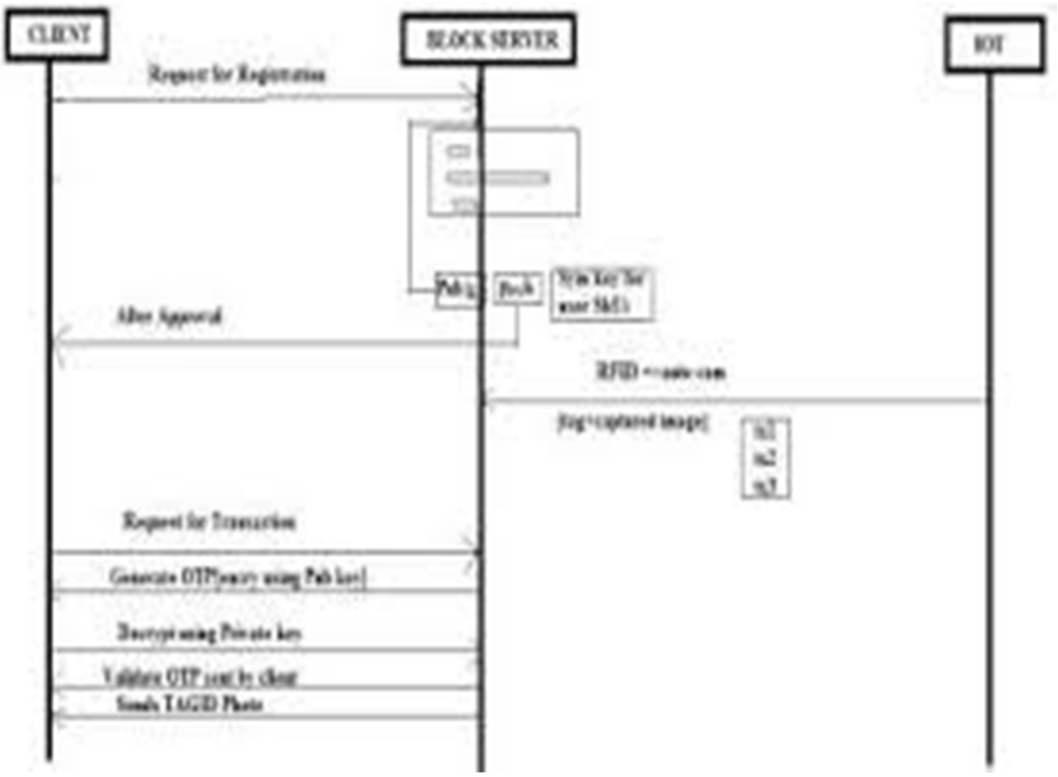


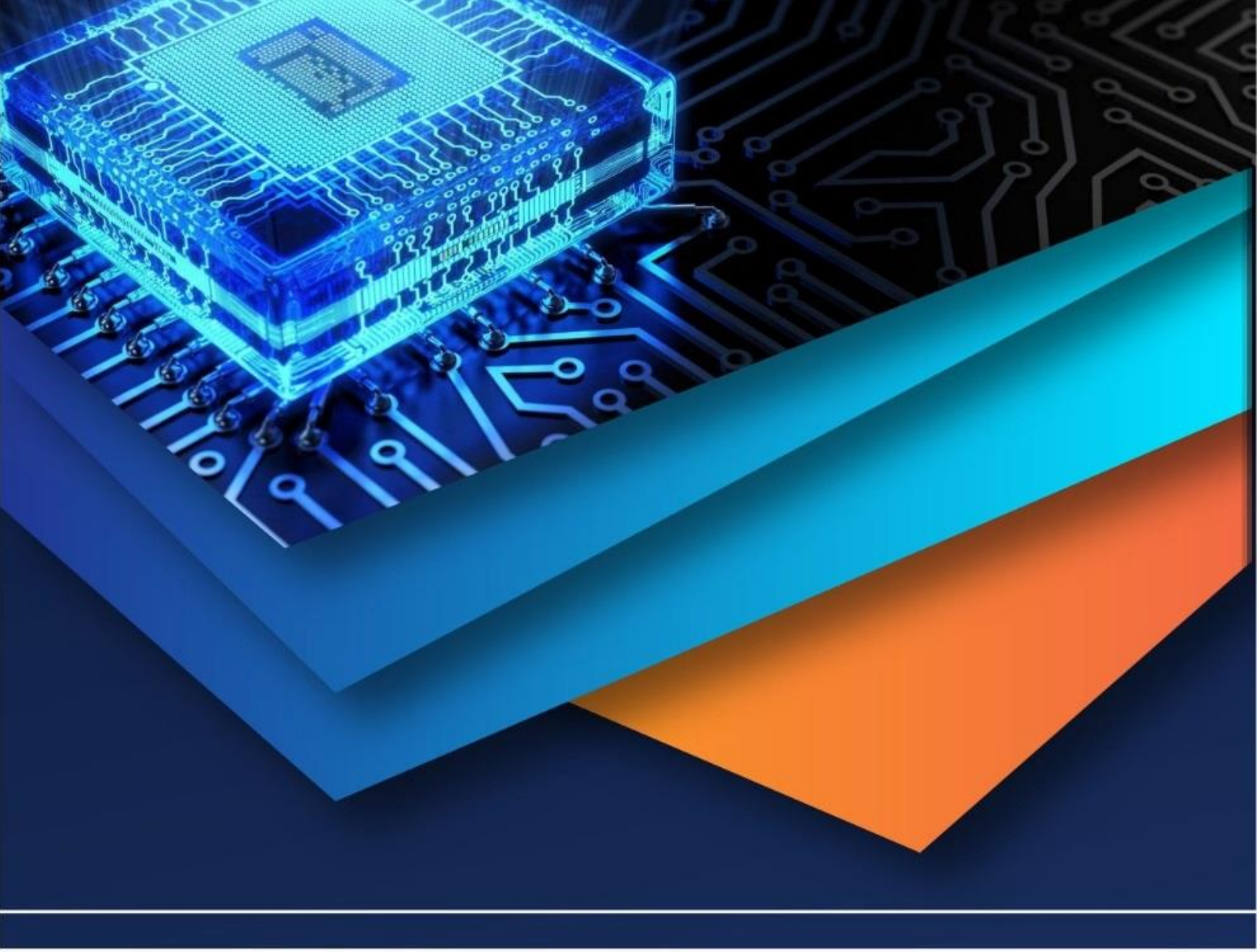
Fig. 3. Device Authentication and Data Transmission

VI. CONCLUSION

The project propose strong room using Zero-knowledge proof to protect data. IoT data is stored in the blockchain, which can prevent IoT device authentication and data tampering. RFID card monitors the modification of the data and the theft through block chain because of the problems such as forgery and alteration of data.

REFERENCES

[1] Gungor, V. Cagri, et al. "A survey on smart card potential applications and communication requirements." Industrial Informatics, Vol.9, No.1, 2013, pp. 28-42.
[2] Gangale, Flavia, Anna Mengolini, and Ijeoma Onyeji., "Consumer engagement: An insight from smart card projects in Europe.", Energy Policy, Vol.60, 2013, pp.621-628.
[3] Luan, Shang-Wen, et al. "Development of a smart power card for AMI based on ZigBee communication", Power Electronics and Drive Systems, 2009. PEDS 2009. International Conference on. IEEE, 2009.
[4] Common Criteria for Information Technology Security Evaluation, Version3.1, CCMB, Setp.2006.
[5] Youngu Lee, A Study for PKI Based Home Network System Authentication and Access Control Protocol, KICS '10-04Vol.35No.4



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