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BLOCKCHAIN TECHNOLOGY AND ITS VARIOUS APPLICATIONS

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ABSTRACT

For any online transaction, electronic data must be authenticated and verified. Therefore, the authentication and secure electronic transaction will only exist virtually if these requirements are not met. Electronic data authentication and security are achieved through the use of emerging technologies like blockchain, deep learning, and machine learning. Blockchain is a system that allows for the addition of blocks that are connected by cryptography and comprise data, a timestamp, and a cryptographic hash of the preceding block. Based on prior data sets, machines are able to interpret and learn; the system finds patterns and makes a determination. Through the study of learned data, machine learning makes predictions about future details. In order to extract complicated features from the original input, deep learning employs numerous layers. Deep learning is a contemporary variant that focuses on an unlimited number of layers with bounded sizes, allowing for optimal implementation and practical use. As a result of its ability to provide decentralised methods for managing and producing value, blockchains have received a lot of interest recently. Numerous banks, Internet companies, automakers, and even governments throughout the world have adopted or started to study blockchain technology to improve the security, scalability, and effectiveness of their services. The uses of blockchain across many industries are examined in this study. Copyright defence, healthcare, insurance, advertising, insurance, energy, and societal applications are some of these sectors. Work provides a timely summary for those individuals and companies interested in blockchains. A study that would promote additional blockchain applications comes to mind.

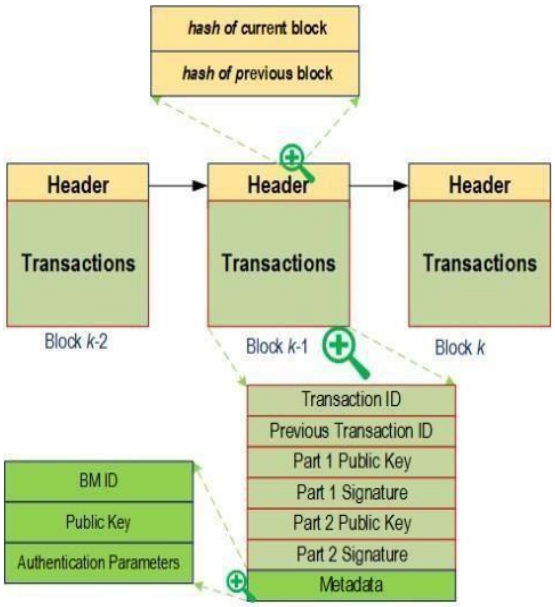
1. INTRODUCTION

The journey of block chain technology begin from finance applications like decentralized digital money (Bit coin). As innovations are advancing day by day, the implementation of block chain is likewise rising in various realms, and also block chain is transforming various business applications because of its exciting features like decentralization, trustworthy, zero exchange transaction fee (it means, removal of intermediaries in distributed applications), and secure data storage system. In simple terms, block chain is a distributed ledger network in which nodes communicate with one another for trading the data and transactions too.

In addition to using distributed consensus techniques to address common issues with distributed database synchronisation, block chain applications also combine peer-to-peer networks, cryptography, mathematics, algorithms, and economic models. Block chain can be used to sign a digital contract in the peer-to-peer industries of energy trading, ride-sharing, insurance, and more. Private industries, including as banking organisations, are aware of the potential of using the distributed ledger technology of a permissioned block chain to create secure transactions. The consortium's members or different companies operating inside the same company validate this permissioned block chain. Although block chain is most famous for its use with bitcoin, it also has a broad variety of other applications. Chine-Ming Chen was the associate editor in charge of organising the review of this article and giving it final approval for publishing since it allows payments to be made. Without the need for a bank or other middleman, block chain can be used in a variety of financial services, such as digital assets, remittance, and online payments. The block chain has found extensive adoption and applications in a number of different areas, including finance, healthcare, government, manufacturing, and distribution.Although block chain is best famous for its use with bitcoin, there are a variety of other applications as well.

2. BLOCKDIAGRAM AND DISCRIPTION

A Blockchain transaction is a discrete task that is recorded in public databases. Blocks also refers to these records. All miners connected to the blockchain network execute, implement, and store these blocks in the blockchain for validation. While past transactions can always be examined, they cannot be changed. The underlying technology of Bitcoin is called blockchain, and it enables decentralized peer-to-peer worldwide network transactions. In that it transfers ownership of digital goods from one peer to another without requiring any confidence, this is the sweet spot for public blockchain technology. all the activities within the network. Security is another aspect to consider while initiating transactions. The security concerns can be resolved by using consensus procedures and blockchain mining that largely rely on cryptographic hash functions. For instance, the SHA-256 safe hashing method is used by Bitcoin. Any sort of input, including text, numbers, strings, or even a computer-generated file of any length, can be used by Bitcoin to create an output with 256 bits, or the 64 characters known as a hash. The converted hash result will always be identical given the same input. It's sometimes referred to as a one-way function because it drastically changes the output with even the smallest change to the input.



2.1 BLOCK STRUCTURE

The input can be calculated. One can only speculate as to what the input was, and the chances of getting the guess correct are extremely remote, hence it is secure. Verifying the sender's identity is the initial stage in the transaction process, indicating that only the sender and not anybody else is requesting the transaction between the sender and the receiver. Using a straightforward transaction between Bob and Alice as an example, describe the verification process. Assume that Bob and Alice each have a balance in bitcoins, and that Alice wants to send Bob 10 bitcoins. Alice will now broadcast a message in the blockchain network with the details of the transaction in order to send the money. Blockchain uses digital signatures to do this. Bob's details, including his public address and transaction amount, as well as Alice's public key and digital signature, are provided for the broadcast. Alice created that digital signature using her private key. All miners individually do transaction validation based on various standards that were covered later in this section. Blockchain utilises the elliptic curve digital signature algorithm (ECDSA). This algorithm makes sure that the money can only be used by the people who actually own it. Each transaction's signature is made up of 256 bits, making it difficult to forge in order to create a fraudulent transaction. For a hostile peer or attacker to complete the transaction, he or she would need to estimate 2256 scenarios, which is impossible and a waste of time. The verifier must not only verify the sender's legitimacy but also the transaction's legitimacy, including whether the sender has enough funds to transmit to the recipient or not. It might be done by consulting the ledger, which contains details about each previous successful transaction.

3. APPLICATIONS AND ADVANTAGES

3.1 APPLICATIONS

- Internet of Battle-Field Things (IoBT)
- Cybersecurity
- Cloud Storage and Provenance
- Voting
- Cryptocurrency
- Smart Contracts
- Power grid

3.2 ADVANTAGES

- Enhanced security
- Greater transparency
- Instant traceability
- Automation
- Increased efficiency and speed

4. CONCLUSION

Through a comparative survey study, the blockchain's potential uses, advantages, and drawbacks are discussed. Additionally, the blockchain's consensus processes, application domains, system architecture, and transaction procedure are all outlined. For the purpose of developing more practical and efficient

industrial applications that may fully benefit from the usage of blockchain and accomplish the intended goals, there are still a number of unresolved challenges that require further research and analysis. These unresolved problems include those related to security, privacy, scalability, energy use, integration with other systems, and, more particularly, regulatory challenges. To solve these problems and bridge the gaps for more effective, scalable, and secure blockchain industrial applications, further research in this area is needed. This survey is anticipated to be a useful tool for advancing knowledge of the tradeoffs between various blockchain consensus techniques and application sectors for examining future research trajectories that would produce exciting results in related fields.

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