BLOCK CHAIN TECHNOLOGY

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ABSTRACT

In this paper we present the compressive classification of blockchain application in numerous areas like healthcare, education, IOT, copyright protection, energy and data management. Our works provides the short summary on blockchain application. The aim is to research the present state of blockchain technology and its applications.we present a comprehensive classification of blockchain-enabled applications across diverse sectors like supply chain, business, healthcare, IoT, privacy, and data management, and that we establish key themes, trends and emerging areas for research. Technology is that the major categories which we are exceling in as we develop our brain from primes to alpha being. During this advancement phase we found a more robust platform for exchanging and storing information that's blockchain. Blockchain might be a decentralized approach to the creation and management. Many sector like banks, internet companies, manufacturing, education and even government.

Keywords: Blockchain; Digital Currency; Bitcoin.

1. INTRODUCTION

Blockchain technology could be a structure that stores transactional records, also called the block, of the general public in several databases, referred to as the "chain," during a network connected through peer-to-peer nodes. Typically, this storage is mentioned as a 'digital ledger.' Blockchain could be a shared, immutable ledger that facilitates the method of recording transactions and tracking assets in a very business network. An asset is tangible (a house, car, cash, land) or intangible (intellectual property, patents, copyrights, branding). Virtually anything valuable is tracked and traded on a blockchain network, reducing risk and cutting costs for all involved. A blockchain may be a distributed database that's shared among the nodes of a network. As a database, a blockchain stores information electronically in digital format. Blockchains are best known for his or her crucial role in cryptocurrency systems, like Bitcoin, for maintaining a secure and decentralized record of transactions. The innovation with a blockchain is that it guarantees the fidelity and security of a record of knowledge and generates trust.

The goal of blockchain is to permit digital information to be recorded and distributed, but not edited. during this way, a blockchain is that the foundation for immutable ledgers, or records of transactions that can't be altered, deleted, or destroyed. this can be why blockchains are called a distributed ledger technology (DLT).

Structure:
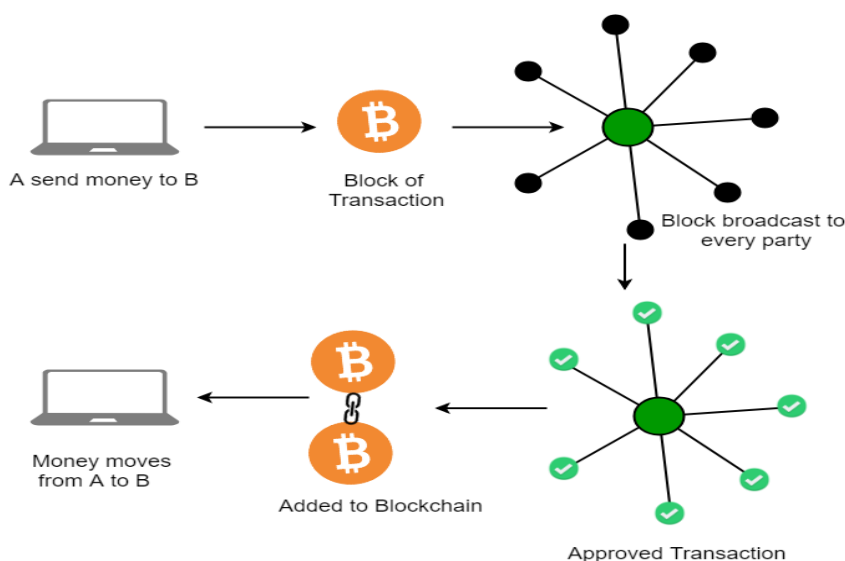
2.   CORE COMPONENTS OF BLOCKCHAIN ARCHITECTURE

These are the core blockchain architecture components:

- **Node** - user or computer within the blockchain architecture (each has an independent copy of the full blockchain ledger)
- **Transaction -** smallest building block of a blockchain system (records, information, etc.) that is the aim of blockchain
- **Block** - a knowledge structure used for keeping a group of transactions which is distributed to all or any nodes within the network
- **Chain -** a sequence of blocks during a specific order
- **Miners -** specific nodes which perform the block verification process before adding anything to the blockchain structure
- **Consensus (consensus protocol) -** a collection of rules and arrangements to hold out blockchain operations

How does it work?

In recent years, you will have noticed many businesses round the world integrating Blockchain technology. But how exactly does Blockchain technology work? is that this a big change or an easy addition? The advancements of Blockchain are still young and have the potential to be revolutionary within the future; so, let's begin demystifying this technology.

Blockchain could be a combination of three leading technologies:

1.   Cryptographic keys
2.   A peer-to-peer network containing a shared ledger
3.   a way of computing, to store the transactions and records of the network

Cryptography keys include two keys – Private key and Public key. These keys help in performing successful transactions between two parties. Each individual has these two keys, which they use to supply a secure digital identity reference. This secured identity is that the most vital aspect of Blockchain technology. within the world of cryptocurrency, this identity is remarked as 'digital signature' and is employed for authorizing and controlling transactions.
The digital signature is merged with the peer-to-peer network; an oversized number of people who act as authorities use the digital signature so as to succeed in a consensus on transactions, among other issues. after they authorize a deal, it's certified by a mathematical verification, which ends in a very successful secured transaction between the 2 network-connected parties. So to sum it up, Blockchain users employ cryptography keys to perform differing types of digital interactions over the peer-to-peer network.

3.   HISTORY OF BLOCKCHAIN

Although blockchain may be a new technology, it already boasts an expensive and interesting history. The subsequent may be a brief timeline of a number of the foremost important and notable events within the development of blockchain.

2008

- Satoshi Nakamoto, a pseudonym for an individual or group, publishes "Bitcoin: A Peer to see Electronic Cash System."

2009

- The first successful Bitcoin (BTC) transaction occurs between computer user Hal Finney and therefore the mysterious Satoshi Nakamoto.

2010
- Florida-based programmer Laszlo Hanycez completes the primary ever purchase using Bitcoin — two Papa John's pizzas. Hanycez transferred 10,000 BTC's, worth about $60 at the time. Today it's worth $80 million.
- The market cap of Bitcoin officially exceeds $1 million.

2011
- 1 BTC = $1USD, giving the cryptocurrency parity with the US dollar.
- Electronic Frontier Foundation, Wikileaks and other organizations start accepting Bitcoin as donations.

2012

- Blockchain and cryptocurrency are mentioned in popular television shows just like the Good Wife, injecting blockchain into popular culture.
- Bitcoin Magazine launched by early Bitcoin developer Vitalik Buterin.

2013

- BTC market cap surpassed $1 billion.
- Bitcoin reached $100/BTC for the primary time.
- Buterin publishes "Ethereum Project" paper suggesting that blockchain has other possibilities besides Bitcoin (e.g., smart contracts).

2014

- Gaming company Zynga, The D city Hotel and Overstock.com all start accepting Bitcoin as payment.
- Buterin's Ethereum Project is crowdfunded via an Initial Coin Offering (ICO) raising over $18 million in BTC and opening up new avenues for blockchain.
- R3, a bunch of over 200 blockchain firms, is created to get new ways blockchain may be implemented in technology.
- PayPal announces Bitcoin integration.

2015

- Number of merchants accepting BTC exceeds 100,000.
- NASDAQ and San-Francisco blockchain company Chain team to check the technology for trading shares privately companies.

2016

- Tech giant IBM announces a blockchain strategy for cloud-based business solutions.
- The government of Japan recognizes the legitimacy of blockchain and cryptocurrencies.

2017

- Bit coin reaches $1,000/BTC for the primary time.
- Crypto currency market cap reaches $150 billion.
- JP Morgan CEO Jamie Dimon says he believes in blockchain as a future technology, giving the ledger system a vote-of-confidence from Wall Street.
- Bitcoin reaches its all-time high at $19,783.21/BTC.
- Dubai announces its government are blockchain-powered by 2020.

2018

- Facebook commits to starting a blockchain group and also hints at the chance of making its own cryptocurrency.
- IBM develops a blockchain-based banking platform with large banks like Citi and Barclays signing on.

2019

- China's President Ji Xinping publicly embraces blockchain as China's financial organization announces it's performing on its own cryptocurrency
- Twitter & Square CEO Jack Dorsey announces that Square are hiring blockchain engineers to figure on the company's future crypto plans
- The ny securities market (NYSE) announces the creation of Bakkt - a digital wallet company that has crypto trading

2020

- Bitcoin almost reaches $30,000 by the top of 2020
- PayPal announces it'll allow users to shop for, sell and hold cryptocurrencies
- The Bahamas becomes the world's first country to launch its financial organisation digital currency, fittingly called the "Sand Dollar"
- Blockchain becomes a key player within the fight against COVID-19, mainly for securely storing medical research data and patient information

4. KEY ELEMENTS OF A BLOCKCHAIN

Distributed ledger technology:

All network participants have access to the distributed ledger and its immutable record of transactions. With this shared ledger, transactions are recorded just the once, eliminating the duplication of effort that's typical of traditional business networks.
Immutable records
No participant can change or tamper with a transaction after it's been recorded to the shared ledger. If a transaction record includes a blunder, a brand new transaction must be added to reverse the error, and both transactions are then visible.

Smart contracts:

To speed transactions, a group of rules — called a wise contract — is stored on the blockchain and executed automatically. a wise contract can define conditions for bond transfers, include terms for travel insurance to be paid and far more.

5. TYPES OF BLOCKCHAIN

There are four differing kinds of blockchains. They're as follows:

1) **Private Blockchain Networks:** Private blockchains care for closed networks, and have a tendency to figure well for personal businesses and organizations. Companies can use private blockchains to customize their accessibility and authorization preferences, parameters to the network, and other important security options. just one authority manages a personal blockchain network.

2) **Public Blockchain Networks:** Bitcoin and other cryptocurrencies originated from public blockchains, which also played a task in popularizing distributed ledger technology (DLT). Public blockchains also help to eliminate certain challenges and issues, like security flaws and centralization. With DLT, data is distributed across a peer-to-peer network, instead of being stored during a single location. A consensus algorithm is employed for verifying information authenticity; proof of stake (PoS) and proof of labor (PoW) are two frequently used consensus methods.

3) **Permissioned Blockchain Networks:** Also sometimes called hybrid blockchains, permissioned blockchain networks are private blockchains that allow special access for authorized individuals. Organizations typically founded these sorts of blockchains to urge the most effective of both worlds, and it enables better structure when assigning who can participate within the network and in what transactions.

4) **Consortium Blockchains:** Similar to permissioned blockchains, consortium blockchains have both public and personal components, except multiple organizations will manage one consortium blockchain network. Although these forms of blockchains can initially be more complex to line up, once they're running, they will offer better security. Additionally, consortium blockchains are optimal for collaboration with multiple organizations.

6. BENEFITS OF BLOCKCHAIN

The blockchain is nothing wanting a game-changing technology for anyone who chooses to use and master it. Let's discuss the advantages of blockchain-

- **Transparency –** Blockchain makes transaction histories more transparent than they ever were. Because it's a sort of a distributed ledger, all nodes within the network share a duplicate of the documentation. the information on a blockchain ledger is well accessible for everybody to look at. If a transaction history changes, everyone within the network can see the change and also the updated record. Therefore, all information about currency exchange is out there to everyone.

- **Security –** Blockchain is best than the other record-keeping system when it involves security, by all standards. The shared documentation of transactions can only be updated and/or modified with consensus on a blockchain network. as long as everyone or a majority of nodes conform to update a record, the knowledge is edited. Moreover, when a transaction is approved, it's encrypted and connected with the previous transaction. Therefore, nobody person or party has the potential to change a record. Blockchain is decentralized, and so, nobody reserves the proper to update records by their power. Any industry that includes a critical must protect sensitive data like governments, healthcare, financial services, etc., can use blockchain to enforce stringent security.

- **Efficiency –** With traditional, paperwork processes, completing a transaction is exhausting because it needs third-party mediation and is liable to human errors. Blockchain can streamline and discipline these legacy methods and take away the chance of mistakes, making trading more efficient and faster. Since there's just one ledger, parties don't need to maintain multiple documents, a undeniable fact that ends up in much less clutter. And, when everyone has access to the identical information, establishing trust is less complicated. with none need for intermediaries, settlements are often made smooth and effortless, too.

- **Traceability –** In complex supply chains, it's hard to trace products back to their origins. But, with blockchain, the exchanges of products are recorded, so you get an audit trail to be told where a specific asset came from. you furthermore may get to grasp every stop the merchandise made on its journey & this level of traceability of products can help verify the authenticity and forestall frauds.

- **Audit ability –** Another aspect of the purpose mentioned above is auditability. As each transaction is recorded for its complete lifetime in blockchain, there's an audit trail that already exists for you to work out and check the authenticity of your asset.

- **Cost reduction –** As blockchain eliminates the necessity for third-parties and middlemen, it saves enormous costs for businesses. only if you'll be able to trust the trading partner, you don't need anyone else to determine the principles and policies of exchange. the value and energy spent on documentation and its revisions also are saved as everyone gets to look at one immutable version of the ledger.

7. DRAWBACKS OF BLOCKCHAIN

Each coin contains a flip side. Blockchain could be a notch above its infancy today, and there are some drawbacks with the technology that must be handled before it may be widely used for everyday transactions.

- **Scalability –** Blockchain's application Bitcoin is massively popular. However, it can only handle seven transactions per second, where Hyprledger can handle 10,000 and Visa 24,000. the sensible use of blockchain gets a touch hard to imagine with the problem of scalability visible . Each participant node has to verify and approve a transaction, so one Bitcoin exchange can take up to many hours.

- **Storage –** Since blockchain databases are stored indefinitely on all network nodes, the problem of storage surfaces. With the increasing number of transactions, the dimensions of the database will only expand, and there's no way personal computers can store unlimited data which just gets appended. to place this in perspective, the Ethereum blockchain is increasing at the speed of 55 GB/year.

- **Privacy –** Data on a public blockchain is encrypted and anonymous, but lies within the hands of all nodes within the network. So, everyone within the network has rightful access to the current data. there's an opening someone could hunt the identity of an individual within the network through transactional data, even as web trackers and cookies are utilized by businesses normally. This proves that blockchain isn't one hundred pc secure, unfortunately.

- **Regulations –** Regulatory regimes within the financial arena are a challenge for blockchain's implementation. Blockchain applications will should lay down the method of pinpointing the culprit just in case a fraud takes place, which could be a little bit of a challenge. Other regulatory aspects of blockchain technology will have to be laid down first so as to facilitate its broad adoption.

- **Security** – Satoshi Nakamoto highlighted the '51% attack' when he launched Bitcoin. The attack will be simply put like this – if 51% of the nodes in an exceedingly network lie, the lie will need to be accepted as truth. Therefore, everyone within the network will must continually have a watch thereon to perceive any unwanted influence.

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