Blockchain Technology

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Abstract: -

Blockchains are around for over 10 years, and since 2015, an excess of systems are launched to target more versatile use cases. Blockchain technology ensures benefits in trustability, collaboration, affiliation, identification, security, and clarity. More recently, many enterprises began to use blockchain systems, like Consensys quorum and Hyperledger fabric, that are launched to create blockchain easier to use in complicated structure configurations.

The fundamental theory is that the blockchain builds up an arrangement of making a disseminated agreement in the digital world. This allows partaking people to know for sure that an advanced event happened by creating a certain record in a public record. It opens the entryway for encouraging a vote-based open and adaptable digital economy from a brought-together whole. There are huge freedoms in this possible innovation and change in this space has quite recently started

This technology was developed by a team of computer scientists W. Scott Stornetta and Stuart Haber in 1991 – described as a cryptographically secured chain of blocks the first of its type. This research paper portrays blockchain innovation and some convincing explicit applications in both financial and non-financial areas. We then, at that point take a gander at the challenges ahead and business opportunities in this leading innovation that is good to go to alter our advanced world

I. INTRODUCTION

This technique was described in early 1991 by a group of researchers and was originally intended to timestamp digital documents so that it will no longer be feasible to backdate them or to tamper them, similarly like a notary. Blockchain is a series of blocks that consists of information, is one of the foremost promising new technologies for the longer term.

Fundamentally, a blockchain enables a decentralized mechanism for recording non-repudiable transactions so that no single entity has control of the data. This is achieved using a distributed consensus algorithm that leads to immutable (non-changeable) data, making it not possible for data to be tampered with once written. Each block has some data, like the hash of the block and the previous block's hash. A hash is a function that satisfies the encrypted demands required to solve a blockchain computation, you can compare a hash to a fingerprint. It identifies a block and all of its contents and it is often distinctive, just as a fingerprint once a block is made, its hash is being calculated, dynamic changing within the block can cause the hash to change, therefore in different words, hashes are very helpful when you need to find changes to blocks. The data that's stored inside a block depends on the sort of blockchain that is used.

Blockchain technology offers vast potential to promote multiple sectors, with its unique combination of properties, such as decentralization, efficiency, security, immutability, and transparency. We see encouraging possibilities in the use of this technology for science and academia

So far, the most noticeable recognition the technology got was through news from industry and media about the development of cryptocurrencies. Examples are Bitcoin, Ethereum, Litecoin, Dash, and Matic, which all are having exceptional market capitalizations.

Blockchain Technology, however, is not restricted to cryptocurrencies there are already existing blockchain-based applications in industry and the public sector like crowdfunding tracking of goods in supply chains, authentication, voting services, and issuing COVID-19 test certificates many more are under development

A blockchain is a distributed database of records or public ledger of all transactions or digital events that have been performed and administered among participating parties. All transactions in the public ledger are verified by the agreement of a majority of the participants in the system, and once entered information can never be erased. The blockchain holds a reliable and verifiable record of every single transaction ever executed.

Blockchain Technology can be most commonly seen in applications used in the financial sector. The ideal use case in that area for Blockchain Technology is the exchange of value units without the requirement of mediators. Examples for that are the previously discussed cryptocurrencies and other applications that, for instance, enable individuals to offer and sell their digital assets like art or data from approaching a marketplace or allowing property landlords to transfer their property without a notary.

The pioneering character of the financial sector looks bright because cryptocurrencies were the earliest usable blockchain applications. Although, the potential of this technology has drawn the recognition of other areas in recent times, leading to a broad number of new projects.

Blockchain Technology is still in an early growth phase without universally approved regularity and frameworks yet. There are already some scientific sources on how Blockchain Technology can be used to relieve existing obstacles in science like the reproducibility of results from published reports and experiments. Due to immutability, append-only function, and a viewable history of all transactions, Blockchain Technology can provide transparency for all users across every action done in a system.

As a result that, an ecosystem gets generated that does not need a trusted authority because the malicious operation is technically complex. As per the report by ReportLinker, the global blockchain market size is supposed to grow from $1.06 billion in 2020 to $10.45 billion by 2025.

II. HISTORY OF BLOCKCHAIN

This technology was developed by a team of computer scientists W. Scott Stornetta and Stuart Haber in 1991 – described as a cryptographically secured chain of blocks the first of its type. A year next, they added Merkle Trees to their conception, which advanced its security, performance, and ability. They were able to collect multiple documents on an individual block. Fast forward to 2009 when things exploded with the launch of Bitcoin, It mostly unused till it was adapted by Satoshi Nakamoto in 2009 to create the virtual currency Bitcoin.

Blockchain Technology Timeline
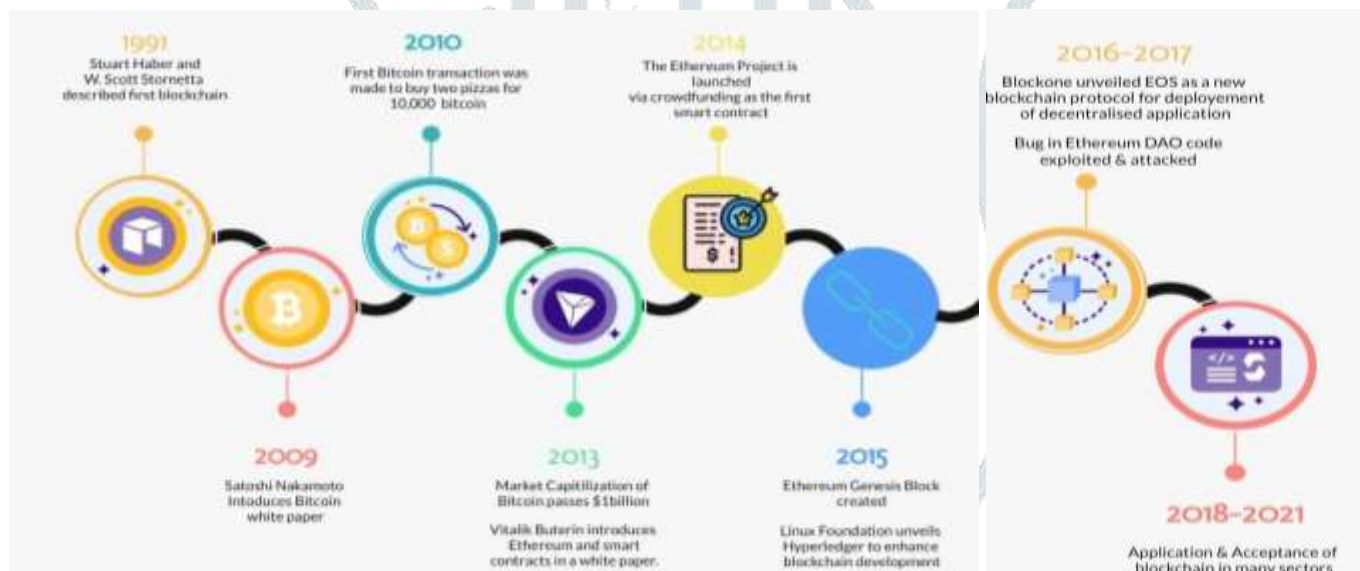
III. WORKING OF BLOCKCHAIN
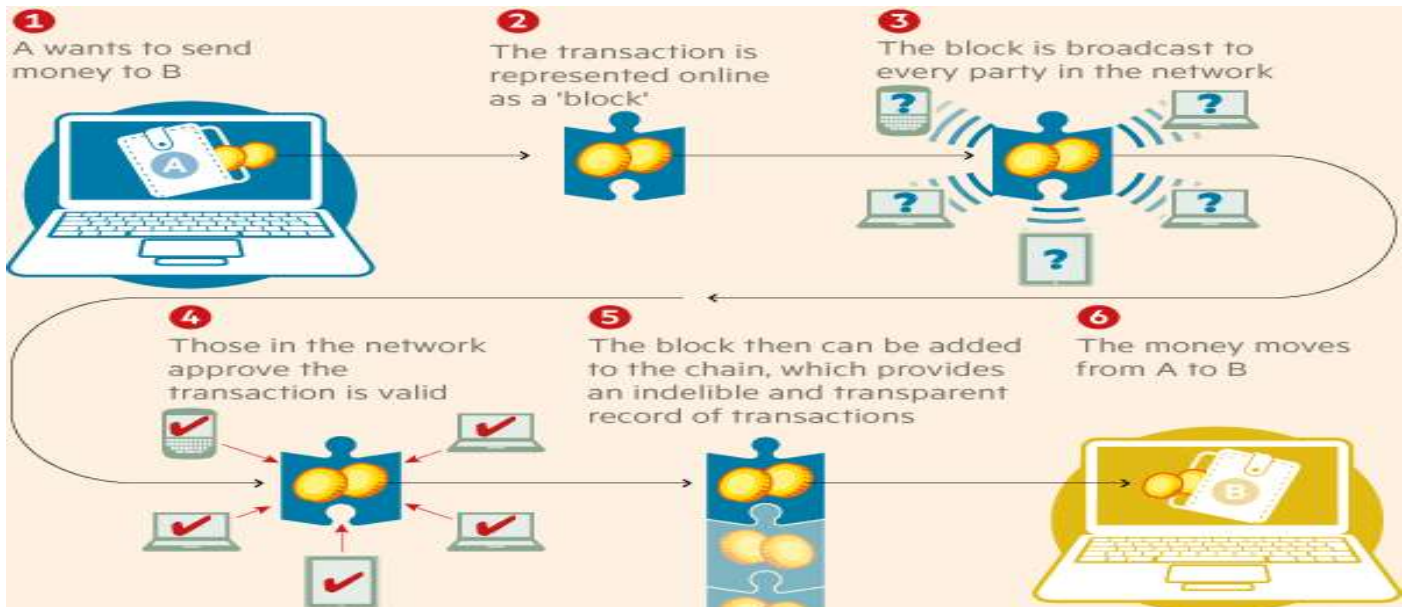
IV. REFORMATION OF INDUSTRY BY REVOLUTIONIZE BLOCKCHAIN TECHNOLOGY

Businesses have already explored how blockchain can revolutionize the way that cross-border payments are expedited, how identity and data privacy can be enhanced, and how smart contracts can enlarge functionality into the mainstream business world.

Below are some of the industries that blockchain may soon help to revolutionize.

1. Banking and Payments;-.
   Banking and payments firms have already shown major interest in blockchain technology.
With blockchain, users throughout the globe could gain access to banking opportunities they wouldn't otherwise have. Particularly, people in developing countries and without regular banks readily available can make use of blockchain to obtain these services. Partnering with digital currencies, blockchain could allow for on-the-spot transfers of money between nations and without higher fees and delay intervals.

2. Insurance Industry:-
   The global insurance market is based on trust management.
Blockchain is a new way of managing trust and verifying that many types of data insurance contracts can be used to like the insured person's identity.
The insurance industry is primed for the integration of blockchain technology.
Using the shared ledger's unique verification ability, the insurance industry could autonomously verify data within contracts to facilitate a more fluid process at every stage of the game.
So-called oracles integrate real-world data with blockchain contracts.
This technology is beneficial for any sort of insurance that relies on real-world data.

3. Voting System:-
   Ensuring that voting systems are fair and accountable is a primary concern around the world.
Some have said that blockchain could help to improve this process and increase reliability and security.
By using blockchain technology, voting systems could potentially improve everything from voter enrollment to voting counting. The blockchain's shared ledgers are publicly available and permanent, increasing transparency in the process.

4. Forecasting Industry:-
   Some corporations have already made use of blockchain technology to advance global decentralized prediction markets. Apart from these types of risk systems, there are other forecasting applications for blockchain technology besides these wager systems. Certainly, blockchain could improve the streamlined data industry in forecasting varying from traffic models to the weather.

5. Government:-
   The word "government" is like bureaucratic strikes and red tape. Beyond this, many characters of government are not efficient nor transparent, meaning that they are also receptive to corruption.
With blockchain, several characters of governmental procedure could be streamlined, by reducing bureaucratic holdups and promoting information security and transparency.

6. Network and innovating things:-

Samsung and IBM need to make a decentralized network of IoT devices using blockchain. Eliminate the need for a central region to address communications for IoT devices. The devices may communicate directly using an updated software system, manage bugs, and monitor energy usage
.

7. Private Transport and ride-sharing:-

The Blockchain may be used to create decentralized peer-to-peer ridesharing Apps permitting each vehicle owner and user, to set up terms and conditions in a secured manner without third-party providers.

8. Online Data Storage:-

Data on a centralized server are vulnerable to hacking data loss, and human error. Is in blockchain technology allows cloud storage to be more secure and robust against attacks. STORJ is one example of cloud storage networking using blockchain technology.

9. Charity:-

Common complaints in the charity space include inefficiency and corruption, preventing money from reaching those for mean having. Using blockchain technology to track the nation can be showing your money is going right hand.

10. Real Estate Industry:-

The Real estate industry is susceptive to both bureaucracy and scams because of a lack of transparency. It's constant for there to be errors in the public record, too. Blockchains could support to speed up the real estate industry also keep the record accurate. By decreasing the use of paper and helping track and validate ownership, blockchain systems could enhance real estate in many ways.

V. CRYPTOCURRENCY UTILIZING BLOCKCHAIN TECHNOLOGY

Bitcoin:-

Bitcoin, the decentralized peer-to-peer virtual currency, is the maximum famous instance that makes use of blockchain technology. Bitcoin blockchain stores the information about a transaction here, inclusive of the sender-receiver and the range of coins.

Bitcoin is a decentralized digital currency, without a central bank or single administrator it can be transferred from user to user on the peer-to-peer bitcoin network without any mediators. Bitcoin is a form of digital currency bound to an online payment system, in which any peer-to-peer transaction is cryptographically validated by the underlying blockchain technology.

Online money dealings using bitcoins are decentralized and stored in the blockchain ledger, which is distributed across the computers of practically all bitcoin users or account holders anywhere in the world, all these transactions are continually updated on the Internet.

The fame of bitcoins begins from its use of peer-to-peer file sharing and public-key encrypted addresses for carrying out all transactions on the network. The private keys are within the possession of the individual users of the system and aren't disclosed. To do a transaction using bitcoins, users simply affix their digital signatures to the transaction using the private keys that are in their possession. At the opposite end, the signatures are verified with the general public keys that are available on the network. In this way, bitcoin transactions proceed electronically with a nominal transaction fee with the help of a bitcoin wallet as an app running on a mobile device or as a web-based application executing on a personal computer.

The digital currency bitcoin itself is highly questionable but the underlying blockchain technology has worked flawlessly and found a broad range of applications in both the financial and nonfinancial world.

Ethereum:-

Ethereum is an example of such a blockchain network that has a network of nodes connected to form an Ethereum Virtual Machine (EVM). On an EVM, transactions are specified through the use of smart contracts, written in Solidity, which defines a data and logic interface to the underlying ledger. The public Ethereum network has proved to be scalable and resilient since its launch, having processed daily 1.1 million transactions at the time of writing. The main difference between Ethereum and the Bitcoin blockchain was that the former could also record contracts, loans, and more, while the latter was limited by its ability to record currency and nothing else. Ethereum is used to make one thing referred to as smart contracts, contracts that process automatically once the set contract criteria which are stored on the

blockchain are met while not the need for any human input or influence. this implies no lawyers, bankers, or middlemen. As you'll imagine the potential for this is often vast

Matic:-

MATIC is an Indian blockchain scalability platform known as 'the Ethereum's Internet of Blockchains'. It is the solution to some of the challenges encountered by Ethereum today, such as heavy charges, poor user experience, and low transactions per second (TPS). And its main aim to create a multi-chain ecosystem of Ethereum compatible blockchains.

Maharashtra government's Disaster Management Department has selected the technology, in cooperation with a startup Print2Block, to issue COVID-19 test certificates. These certificates are issued to the people who tested negative for COVID-19. As it meets the needs of scalability and data security. Lakhs of people tested daily in the state, from them almost 70-80 percent are tested negative.

Since healthcare data is very sensitive, So that's why the government has deployed a private blockchain, not a public one. The company had to twitch its product and build a private blockchain for this purpose. Now, it is the government that owns and manages the data, hardware, and everything. Private blockchains need a public blockchain to authenticate and validate their integrity. The Chennai-based startup has deployed a private blockchain and has partnered with Mumbai-based blockchain startup Polygon's Matic Network, a public blockchain, for review purposes.

VI. ADVANTAGES OF BLOCKCHAIN TECHNOLOGY

1. Speed & Efficiency:-
   When Traditional processes are used trading becomes a time-consuming process. Since the transaction record-keeping is performed using a single digital ledger and the same information is shared among all the participants it builds trust among them.

2. Reduced Cost:-
   In a traditional system transaction fees is high. Blockchain does not require third parties to manage the transactions so the transaction cost is reduced.

3. Security:
   Blockchain is a 'chain' of digital blocks. Each block is connected to every other block. This makes it hard to tamper with an individual record. The block is secured using cryptography. Its decentralized nature keeps the data secure, that is it does not have single-point failure.

4. Traceability:-
   Traceability the ability to find out where a product comes from and following its route throughout the entire transformation and distribution chain. When good exchanges are recorded using this technology, it shows where an asset comes from and every stop it made during its journey.

5. Transparency:-
   Transactions are transparent in blockchain because it makes use of distributed ledger, all participants share the same documentation. The versions of these documentations can be updated only if everyone agrees. Thus blockchain is more accurate and consistent, Append only information is recorded. it cannot be reversed or altered once recorded. Validate transactions before blocks are recorded, transaction must be validated. Reliable Security data stored on a blockchain can only be accessed with private keys.

VII. DISADVANTAGES OF BLOCKCHAIN TECHNOLOGY

1. High energy consumption in the blockchain.
2. Human error if used as database information must be of immense quality.
3. Uncertain regulator status many governments are still exploring the need for blockchain.
4. Lack of full-scale adoption Businesses worldwide is still unsure about the adoption of blockchain.

VIII. CONCLUSION

To finish up, Blockchain is the innovation spine of Bitcoin. The dispersed record usefulness combined with the security of Blockchain makes it an extremely appealing innovation to tackle the current Financial just as non-Financial business issues.

There is huge interest in BlockChain based business applications and henceforth various Startups chipping away at them. Of course, countless other industries could reach to benefit from blockchain integration. As more and more businesses open up their doors to blockchain and its opportunities, it's almost confirmed that the above list will grow even longer. One thing is for certain: blockchain technology is here to stay, and its influence on the world will proceed to grow as the technology further grows. The selection certainly faces solid headwinds as depicted previously.

The huge Financial establishments like Visa, Mastercard, Banks, NASDAQ, and so on, are putting resources into investigating the use of current business models on BlockChain. Indeed, some of them are looking for new business models in the realm of BlockChain. Some might want to remain on the ball in terms of changed administrative conditions of BlockChain.

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