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## Real Estate Solution driven by Blockchain Technology

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### ABSTRACT

*The notion of Blockchain was first propositioned by Stuart Haber and Scott Stornetta in 1991 with an aim to develop a secure system where data and timestamps cannot be vandalizing. Within the established period of Blockchain, there have been a many momentous data breaches. As per the data breaches reports by MIT [1], cryptocurrency amount of almost \$2 billion has been stolen since 2017. Forthwith, attacks on different data systems become frequent around the clock at all possible levels. These potential breaches indicate the necessity of a fortified architecture backed with distributed database and comprehensive risk management and allayed security systems. Our paper reconnoitres the types, algorithm, cyber-attacks with their core ideas, the ways to evade the threats by stating various security solutions, with the ongoing and future technologies to make blockchain, the safest system to protect the data as real-estate blockchain architecture in which an entirely new verified mechanism is introduced in order to reduce the fraudulent activities in the sector.*

**Keywords:** Blockchain, Centralized, Consensus, Real-Estate Cyber-Security.

### 1. INTRODUCTION

The breaches in security of data have paved a path to the concept of Blockchain. Blockchain was presented to the universe as a blank paper in 2008 [2]. It is a distributed digital ledger which is open for changes, shared and highly secured, which defines that all the logs are immutable and verifiable. Blockchain has parcel of advantages, for example, decentralization, persistency, secrecy and auditability.

Ledger is widely used in Businesses and Banking operations to officially record all the data transactions done. Blockchain is an amalgamation of a various technology. These technologies include cryptography, linking with peer-to-peer networks taking the help of consensus algorithms to process the classic distributed data synchronization problem and protected from revision of data without logs. It has a ledger which stores all the data transactions in list of blocks and subsequently the block grows as new data transactions are affixed to it. On the current date, Blockchain applications have been widely adopted in many sectors due to the implementation of a decentralized

approach which provides an entire mechanism for fraud-resistant computing.

Like any other immature field, it is also suffering with numerous flaws especially with respect to security. Raised security concerns not only includes the issue in distributed processing or cryptographic calculations, but also the initial laid foundation framework as well.

### 2. THE THEORY OF BLOCKCHAIN

Data is stored in Blockchain inside a block which acts as a backbone of whole blockchain system that are connected via cryptographic calculations [2], [9]. Each block consists of time and date information along with cryptographic hash of the subsequent block, and exchange information in form of Merkle tree.

With respect to framework, blockchain technology is impervious to any malicious change of the information. It is an open, disseminated record which can record exchanges between many individuals productively and in an evident and perpetual way [7]. For its implementation and use as an appropriated record, a blockchain is ordinarily overseen by a shared system by and large sticking to a convention for between hub correspondence and approving new blocks. When recorded, the information in some random block can't be modified retroactively without modification of every single resulting blocks.

Five key elements of blockchain are:

#### 2.1. Decentralized

By putting away information over its shared system, the blockchain eradicates various dangers that accompany information being held one system. The decentralized feature of blockchain may utilize specially appointed data sharing and disseminated organizing. Shared blockchain systems need concentrated purposes of vulnerability of that PC attackers can misuse in most of the case, it has no main issue responsible to failure. Its security strategies incorporate the utilization of cryptographic mechanism of public key. A private key resembles a secret phrase that gives its proprietor access to their advanced resources or the way to in any case collaborate with the different capacities that new versions of system support.

Information stored in the blockchain is generally considered incorruptible [5].

### 2.2. Anonymity

Blockchain advancements take care of the trust issue between hub to hub, so information move can be mysterious, just individual's blockchain address need to know

### 2.3. Transparency

Transparency is another important feature in blockchain technology which attracts users from various domains. It ensures transparency to each and every node along with any update done in any point of data stored.

### 2.4. Autonomy

The blockchain exclusively works as indicated by the standards which are characterized by its individuals. There is no focal expert for the characterized rules.

### 2.5. Security

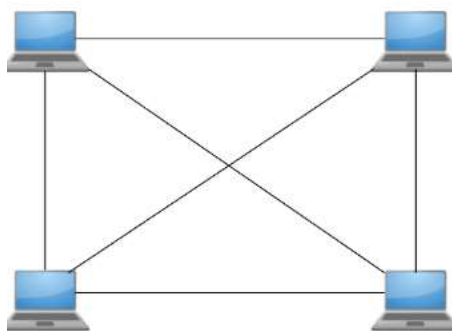
Despite the fact that it might be hard to accomplish synchronous security and protection in a framework, but blockchain uses concept of hash code, private and public for the purpose of security of transaction records.

## 3. TYPES OF BLOCK CHAIN

The block chain is primarily classified into two types i.e., Private block chain and Public Block Chain [6], [7]. However there exist several variations like Consortium and Hybrid block chain. In this section we will study about each type of block chain in details

### 3.1. Public Block chain

In this kind of block chain, everybody in the system can approve the exchange and can take part in the process of attaining consensus. It guarantees decentralization by setting up a square of distributed exchanges. Every exchange is related with the block chain before it is kept in touch with the framework. Subsequently, it can be affirmed and adjusted with each hub in arranged. Anyone with a PC and web association can be selected as a hub and can be given the total block chain history. It states that everyone can check the exchange and confirm it, and can likewise take an interest in the process of attaining consensus. The advantage of the open system is the obscurity of the client and full straightforwardness of the record. Its main applications evolves over Bit coin, crypto currency, etc.

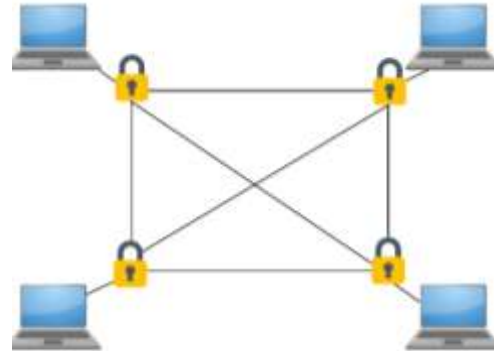


**Public Block Chain Framework**

### 3.2. Private Block Chain

Private Block Chains utilize an entrance control layer to oversee who approaches the network. In difference to public Block Chain systems, validators on private Block Chain systems are verified by the system proprietor. They don't depend on mysterious hubs to approve exchanges nor do they

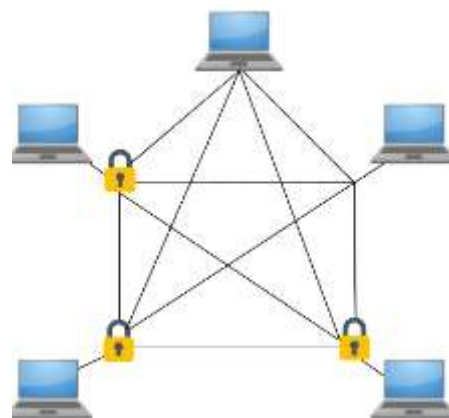
profit by the system impact. Private Block Chains are increasingly inclined to worthiness by the private division or government-based organizations as they permit a focal position to be available with a more secure, increasingly effective and quicker innovation. The only disadvantage of Private Block chain system is Low Transaction Rate per Second as it has huge network with high no. of nodes and for each node to verify a transaction with efficiency is time and energy consuming. Its main applications evolve over Voting, Supply Chain Management, Asset Ownership, etc.



**Private Block Chain Framework**

### 3.3. Consortium Block Chain

The consortium Block Chain is a framework that is 'semi-private' and has a controlled group of users, yet works across various associations. There are numerous advantages to consortium frameworks, and numerous Block Chain stages are setting themselves up as a spine for these cross-organization and cross-discipline arrangements. A Block Chain consortium of similarly invested organizations can use data to improve work processes, responsibility, and straightforwardness. Consortium Block Chain versus private Block Chain is a sweet-spot between completely open, decentralized frameworks and completely halfway controlled. There's bound to be a confided in accord, as numerous associations have a stake in the result. Its main applications evolve over Banks, Government Organizations, etc.

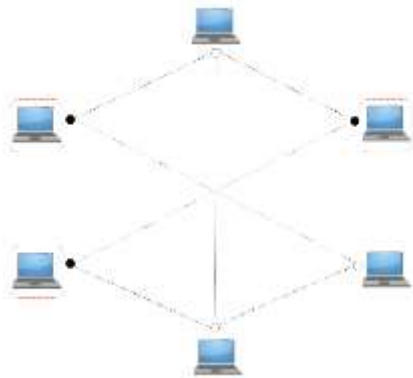


**Consortium Block Chain Framework**

### 3.4. Hybrid Block Chain

A Hybrid Block Chain is a blend of the private and public Block Chain. It utilizes the highlights of the two kinds of Block Chains that is one can have a private authorization-based framework just as a public consent less framework. With such a crossover arrange, clients can control who gains admittance to which information put away in the Block Chain. Just a chose area of information or records from the Block Chain can be permitted to open up to the world keeping the rest as secret in the private system. The half and half arrangement of Block

Chain is adaptable so clients can undoubtedly join a private Block Chain with different public Block Chains. Be that as it may, clients can likewise discharge it in the public Block Chain to get checked. The public Block Chains increment the hashing and include more hubs for check. This upgrades the security and straightforwardness of the Block Chain organize. Its main applications evolve over News Management System by Journalists etc.



### Hybrid Block Chain Framework

Along these lines, more or less, every case or instance of an effective block chain utilize that we have seen till date is of a public block chain. Public block chain ensures security as hacking the whole system is practically outlandish. What's more, it offers information straightforwardness as each hub has equivalent access to the record put away in the block chain.

### 4. CONSENSUS ALGORITHM

Consensus Algorithm makes the block chain system profoundly secure and decentralized. Consensus Algorithm is a process which settles on all block chain nodes understanding the same message, can ensure the most recent block of information has been added to the chain accurately, and ensure that the message that is stored by the node was the exact same and safe from various cyber-attacks. The Block chain Consensus algorithm is prejudiced for understanding, coordinated effort, co-activity, equivalent rights to each node, and compulsory assistance of every node in the agreement procedure [8].

Working of some of the consensus algorithms are explained below:

#### 4.1. Proof of Work

Delivering a proof of work can be an arbitrary procedure. Legit proof of work is produced after a great deal of experimentation. Computing of PoW is known as mining. Each data block has a design less value which is called Nonce in block header, by changing this nonce value, PoW needs to produce a value that makes this block header hash less than the difficulty target which has just been set up. Difficulty implies how much longer it will require when node is computing hash value less than target one. All together for a block to be acknowledged by network hosts, miners must accomplish a proof of work (PoW) which covers the entirety of the information in the block. .

#### 4.2. Proof of Stake

Proof of stake (PoS) is a sort of Consensus Algorithm by which a block chain network plans to accomplish distributed consensus. In PoS-based block chains, the author of the next block of data is picked through different mixes of arbitrary choice (i.e., the stake). The Proof of stake was made as an option in contrast to the proof of work (PoW), to handle inherent issues in the last mentioned. The Proof of stake (PoS) tries to address this issue by applying mining power to the

extent of coins held by a miner. In this way, rather than using vitality to answer PoW questions, a PoS miner is restricted to mining a level of exchanges that is intelligent of their proprietorship stake [9].

#### 4.3. Byzantine Fault Tolerance

This algorithm works efficiently in an asynchronous system. It can be achieved in a case when all the correctly working nodes come into a common agreement on their value. Any late message is considered as faulty and there is a default assignment in case the majority responds to the correct value.

#### 4.4. Proof of Elapsed Time

PoET is a decent consensus algorithm which picks the next block of data utilizing reasonable methods. It is broadly utilized in permissioned Blockchain systems. In this algorithm, each validator on the network gets a reasonable opportunity to make their own block. All the nodes do so by waiting for an arbitrary measure of time, including a proof of their hold up in the block. The blocks are then broadcasted to the network for others deliberation. The winner is the validator which has taken least time in the verification part. There are extra checks in the algorithm to prevent nodes from continually winning the race, and prevent nodes from creating a minimum clock esteem.

### 5. SECURITY STATUS OF BLOCK CHAIN

Each block in the block chain is associated with all the blocks. This makes it hard to alter a solitary record in light of the fact that a cyber-attacker would not only have to alter the block that contains information but all others connected to it to maintain a strategic detection. This by itself probably won't appear a very remarkable prevention, although block chain has some other innate attributes that give extra methods for security [10].

On the off chance that a record is altered, the mark will be considered invalid and the other system in the network will know immediately that some manipulation has occurred.

Tragically for those goal-oriented attackers, block chains are decentralized and circulated across shared systems that are consistently refreshed and kept in a state of harmony. Since they aren't contained in a focal area, block chains don't have a solitary purpose of disappointment and can't be transformed from a solitary PC. It would require enormous measures of registering capacity to get to each example (or possibly a 51 percent larger part) of a certain block chain and adjust them all simultaneously.

Although Block chains are barely permeable, yet in the world of emerging digital technology anything available for public use is also for cyber attackers and they are always there to get a way to get into it. Some of the commonly used cyber-attacks are listed below.

#### 5.1. Denial-of-Service

One of the most common cyber-attack where the attacks floods the objective framework in such a way, that the framework can no longer serve its clients. A Denial-of-Service (DoS) attack in block chain includes submitting a bigger number of exchanges than it can deal with and to send fake traffic to other peer nodes by taking charge for at least one node in the system. This will gradually block the whole system and the authentic exchanges may not get executed as all the hubs are caught up with approving fake traffic.

#### 5.2. The 51% Attack

A 51% attack may occur when a miner node, which happens to have particularly more computational assets than the remaining of the system nodes, endorse the exchanges and controls the substance of a block chain. As it has the greater proportion (51%) of the system's computational power, the prevailing node can outpace every other node to control the block chain, or even take resources from others. No 51% attacks have happened in the bitcoin organization since January 2009, when the genesis block was made and added to the block chain, the risk does exist, particularly in block chains with little systems.

### 5.3. Identity Theft

Despite the fact that block chains protect anonymity and security, the security of advantages relies upon shielding the private key. On the off chance that one's private key is obtained or taken, no can recuperate it. Thus, all the advantages this individual possesses in the block chain will disappear, and it will be almost difficult to recognize the criminal. The results might be more obliterating than wholesale fraud in the offline world, where outsider organizations protect exchanges, control dangers, identify dubious exercises, or on the other hand help discovering the culprit. With the appearance of quantum computing, it isn't futile for cryptographic keys to be split rapidly, flatten the establishment of block chain innovation [11].

### 5.4. System Hacking

It is hard to hack and adjust records stored in a form of block chain, yet not the programming codes and frameworks that actualize its implementation. For an instance, MtGox, the biggest Tokyo-based bitcoin trade company, was hacked in March 2014, and bitcoins worth \$700 million were taken.

### 5.5. End-Point Attack

Endpoints are defined as the point where the user interacts with the framework. In conventional conditions, endpoints are under the direct control of service providers while in blockchain end users utilize their own frameworks to get into blockchain. Attackers can take clients' key by getting in their framework without cracking the actual blockchain system.

## 6. CHALLENGES TO BLOCKCHAIN

A challenge can be characterized as an understood interest for verification. A portion of the significant challenges at present looked by blockchain innovation are recorded as underneath [12].

### 6.1. Adaptability

Advancement in Blockchain technology had led to an exponential increase in the number of clients. Therefore, the biggest challenge is to make blockchain mechanism more competent and efficient in dealing with large userbase within short span of time. As of 2017, the complete number of Coinbase clients is recorded to be 11.7 million. As an ever-growing technology, wide variety of people are getting acquainted with it. The regular exchanges have moreover extended drastically which significantly hit the rate of preparation of the exchanges as a better wide variety of people indicates greater PCs composing and attending to the employer creating a trendy lumbering framework.

### 6.2. Complex to comprehend and receive

The convoluted mechanism and tedious mining operations have resulted in complex architecture which is difficult to comprehend. Due to this complexity in the architecture design, the users are unable to use the technology to the fullest. Prior to

plunging into this developing technology, one should compulsorily learn and twig the canons of encryption and disseminated record. Another point that makes blockchain difficult to receive is that monetary foundations are satisfactory to provide secure instalment passages and different super users at a nominal price contrasted with the expenses developed with blockchain.

### 6.3. Security

Blockchain, an open source distributed ledger, available to everyone. It is a vital angle by and large, yet it turns into an obligation used in a delicate environment. Blockchain technology actually required to develop more to be embraced on a large scale. The data should be rebuilt in a form that permits confined permission and is open only for the authorized personals who has appropriate rights.

### 6.4. Blockchain is as yet a far-off dream

However, in all actuality the difficulties referenced above are still difficult to vanquish, and it will take some great time before blockchain turns into a fundamental piece of the apparent multitude of ventures.

Blockchain has a picture issue. Blockchain is an excess of connected with digital forms of money in the psyche of many. Particularly crypto has a negative picture that is encircled by fraudsters, programmers that are utilizing he innovation for crimes. This terrible name is pondering the blockchain innovation framework as entire and is making individuals truly reconsider prior to receiving it.

Before the overall selection is potential, individuals from the public must comprehend the distinction between bitcoins, other digital currencies, and blockchain. One ought to comprehend those digital forms of money are just a single utilization of blockchain innovation among numerous others. This will assist with wiping out the occasionally negative ramifications and may bring about an expanded eagerness to utilize the innovation.

### 6.5. Scalability

Bitcoin which is known for its security and safety often dangle in terms of performance. The sluggish transaction in Bitcoin projects as a convoluted issue for increase number of users. In current scenario the technologies used by enterprises and banking system have surpassed blockchain in terms of scalability.

### 6.6. Lack of standardization

Blockchain exists on a variety of networks but there is no existence of a universal standard. Lack of standardization paved path for many hurdles like interoperability, humongous variation in cost, difficult and different mechanism which all together makes Blockchain unavailable for mass adoption.

## 7. APPLICATIONS OF BLOCKCHAIN

Blockchain technology is been implemented in various sectors today which includes Finance, medical, travel, government, etc. Some of the applications of Blockchain technology have been described below.

### 7.1 Crypto Currency

A cryptocurrency can be defined as a virtual currency that is secured by various concepts of cryptography which makes counterfeiting or double spending nearly impossible. During the last decades we have witnessed the emergence of various cryptocurrency, Bitcoin being the most valuable and famous.

Anonymity, Decentralization, verifiability being the reason behind the increase use of these currencies among people.

These types of currencies reduce the needs of individual currencies which allows user to do transaction all around the world without any currency exchange.

Cryptocurrency also have certain issues associated with it. Due to anonymity, cryptocurrencies are used for illegal transactions which consider the main issue regarding its legality and adoption by various government. Mining of cryptocurrencies consumes a lot of fuel and having adverse effect on the environment [6].

### 7.2 Healthcare

Blockchain technology can also be implemented in health and care sector where it can be used for various purposes like managing electronic medical data, personal health record data management, protection of health care data.

With the help of blockchain a single system for data management can be designed which will store and update the data continuously which can be secured and easily available to authorized user. This will minimize the time in providing effective response to the patient in an emergency situation as well as avoid miscommunication which can lead to catastrophic results. It will help in a mechanism where the care can be personalized.

Blockchain can also be useful in providing an entire new mechanism for pharmaceutical which will make this system more secure and transparent and at the same time tracking and resolving issues will be more compatible.

It is also believed the combination of blockchain with artificial intelligence can do wonders in field of medical. Combining these mechanisms is a convoluted task due to accessing and storing mechanism in blockchain along with the privacy and safety concerns [15].

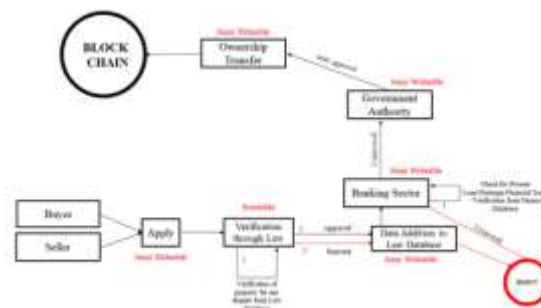
### 7.3 Real Estate System

Blockchain Technology can also be effectively implemented in the Real Estate Sector. Due to the properties like anonymity, transparency and security, Blockchain can be considered as one of the best possible options to store and record confidential information.

Considering the effective ability of Blockchain an entire new mechanism for Real Estates can be introduced. In this a Real Estate Data Blockchain is introduced with the aim of providing transparency, accessibility and user-friendly platform for all the users.

In this mechanism, we have various entities like the Law Department, Buyer/Seller, Government Authority, Banking Sector that will help in adding verified data in the blockchain via processes like Application, Verification, Approval, and Rejection.

As per the requirement, this blockchain will be a Consortium Blockchain. The consortium Blockchain is a framework that is 'semi-private' and has a controlled group of users, yet works across various associations.



In the above-mentioned diagram,

#### 1. Buyer/Seller

These entities are responsible for initiating the entire blockchain mechanism by applying for No Objection Certification (NOC) for selling or purchasing a property.

#### 2. Law Department

It is one of the entities which acts like a miner and will work collaboratively with other miners in order to add data in the Blockchain. This entity is responsible for providing the No Objection Certification with regards to any law related data and forward the request to the next entity.

#### 3. Bank

It is another miner which will provide No Objection Certification regarding any financial dispute on the property related to the banking sector and will forward the request to the next entity.

#### 4. Government

It is an entity that collects approval requests from the set of miners and processes the information in order to verify and produce the No Objection Certification to allow the Ownership Transfer process.

Once the transfer process is completed the Government Authority will add the verified Ownership Transfer data into a Block and once the sufficient amount of data is collected in block, the data block is further pushed in the real estate blockchain framework.

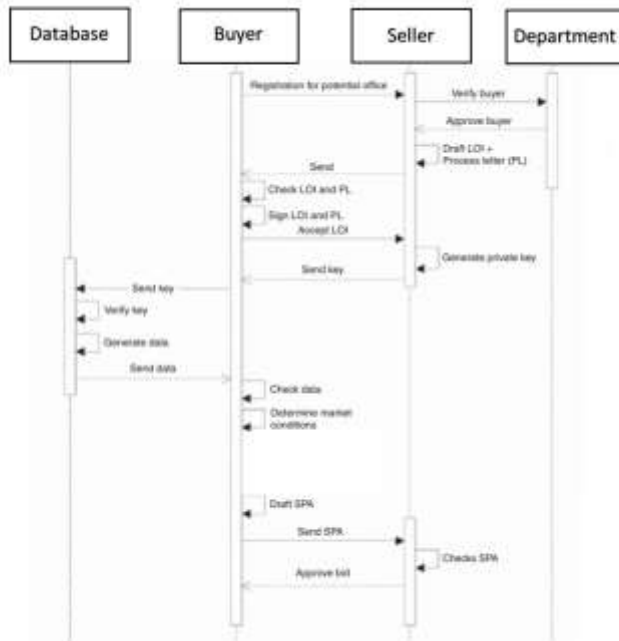
Advantages of Real Estate Data Blockchain -

1. Accessing and Retrieval of data by authorized users is quick and efficient.
2. Transparency and Anonymity.
3. Reduction of fraudulent activities in the Real Estate Sector.

## 8. METHODOLOGY

Writing states that blockchain innovation can be applied to land and could be a gamechanger in executing land. The attention on an answer for a field issue - the bulky exchange process - is in accordance with plan science research. Plan science research depends on practical exploration and expects to make an imaginative "antique" that will assist with taking care of true issues For this explanation, it is exceptionally pertinent to data framework research. Henceforth, this strategy is applied in fostering a plan recommendation for a field issue. The paper begins with a deliberate audit of past work on land exchanges and blockchain innovation. Be that as it may, no plan ideas are found - as existing work isn't set up or adequately grown - to give more prominent calculated lucidity about a particular point or field of proof. Subsequently, the amalgamation centres around checking the examination by the distinguishing proof of significant trouble spots inside the current exchange process. Trouble spots have been recognized through semi-organized meetings with five specialists associated with the cycle and

afterward investigated in view of the Grounded Theory philosophy. The discoveries of these meetings are utilized to foster a unified foundation (without the utilization of blockchain) which defeats the previously mentioned trouble spots. Therefore, blockchain innovation can be acquainted and contrasted and both the current technique for information the board (decentralized) and a concentrated approach to working. In the wake of planning the framework of the blockchain model and UI, the interviewees are asked again to practically approve the proposed model. Utilizing this technique, it tends to be exhibited that the created blockchain model is promising and fulfils the assumptions for future clients.



**9. FUTURE OF BLOCKCHAIN**

Blockchain have a wide range of future scope in various sectors and with various technology [16]. Some of them are listed below:

**9.1 Adoption of Blockchain Technology by various industries**

Various industries have already adopted or planning to adopt the blockchain technology due to its characteristics like security, anonymity and decentralization. Companies like Nordea, INBLOCK, Kroger, NuArca are already working on various projects related to blockchain technology in order to provide more feasible and secure solution to many companies’ problem of traceability, accessibility.

One of the leading organizations Plastic Bank had recently developed a security rich, reward system in field of plastic recycling.

Blockchain technology can find its implementation in various sectors which includes Healthcare sector, industry sector, food sectors etc.

**9.2 Government**

With the advancement in technology there is a big possibility of emergence of new governance model, pragmatic in nature which can align with the blockchain technology. These new models can provide a better means for efficient transaction, more security and will help in providing standardize information from different sources.

**9.3 Blockchain moves world economy**

Cryptocurrencies like Bitcoin had provided the real fame to blockchain technology. In a decade we have witnessed

emergence of various new Cryptocurrencies all around the world. With the increase number of users and popularity among people along with features like anonymity, traceability, security it is most likely that many governments will adopt or include cryptocurrencies in near future.

**9.4 Artificial Intelligence**

A combination of Artificial intelligence with Blockchain is capable in increasing the capability and effectiveness of various algorithms of machine learning as well as can produce new products with better efficiency.

In order to work with blockchain a huge amount of computational power and algorithms is required which is not a cost-efficient way of doing things. Artificial Intelligence can intelligently develop new algorithm mechanism that can be helpful in the mining process thus will make the entire process more efficient.

**10. RESULT AND DISCUSSION**

Blockchain is bewildering concerning rising innovation. The shortfall of genuine data, appropriate programming, and security devices prompt weaknesses in security structures. Additionally, different safety efforts should be joined to battle any harm against different sorts of digital assaults, and the security of the structure should be checked at a different place in time. In this paper we discussed the current security systems, applications, algorithms and project achievable in future to build further research platform, improving overall defensive stance from security perspective of blockchain technology.

**11. CONCLUSION**

A threat of digital attack to human life will continue till the day information and data is stored and used over internet. In the accompanying research, we should consider the upsides and downsides of safety solutions for different sorts of cyber-attacks and their defensive techniques. Broadly following from the initial algorithms and techniques to the present utilization of Artificial Intelligence and Machine Learning, Blockchain can be considered as safest place to store the confidential information.

We trust this paper will assist the people with understanding what is in stake when implementing any blockchain and furthermore what areas of technology are getting actuated by blockchain. In this paper, we additionally expect that this paper will give designers and developers some direction to implement secure framework for blockchain.

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