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# Survey on 3D Visualization of Museum, its Use Cases, Implementation of Blockchain and the Research Ahead

Prof. Aruna S[1], Pranav Pushkar Mishra[2], Abhay Bansal[3], Mahesh Chavan[4], Saniya Kouser[5]

***Abstract:*** ***We have many state-of-the-art museums around the world to display various forms of physical art. But with the rise of digital art like NFTs, we are still lagging behind in our ways to display them. Displaying them on a website is not enough as they do not guarantee their authenticity and can easily be forged.***
***Digital art needs a digital environment to be displayed without compromising security and reliability and should also provide a world-class environment for its viewers.***
***In the last few decades, a lot of efforts with regards to the 3D digitization of heritages of cultural importance and the improvements in research and development of virtual museums, 3D digital libraries, and virtual games have been put up. The results being realistic has always been a main factor of concern and the primary challenge regarding 3D modeling of artifacts, monuments and mainly sculptures.***
***However, there are flaws in the virtual museum's existing design, including low growth efficiency, large expansion difficulty, and expense, which have an impact on the growth and development of the online museum. This conundrum can be resolved thanks to Web3D's advanced technology. The growth and expansion trend of virtual museums and similar technologies are first described. A framework for an online virtual displays arrangement system for museum learning is also provided, with the goal of addressing the current weak points in the presentation and development of virtual museums. Finally, this online virtual displays arrangement technology was used to build the rural virtual museum in Mount Mogan.***
***Moreover, Smart contracts that are the foundation and building blocks of blockchain technologies are the main focus of attention in new business applications and in the scientific community, because Smart contracts allows integration of terms and conditions that further allows parties to integrate contractual terms in programming logic and thus eliminates the need for an intervention from a trusted third party in case of disagreements.***
***Index Terms: Virtual Museum, 3D models, 3D survey, Unity3D, Metaverse, Authenticity, Digital policies, Real/virtual***

## I. INTRODUCTION

Modern technology and 3D virtual environments are increasingly being employed by cultural organizations and museums, particularly in the creation of e-learning and edutainment applications. As the benefits that virtual reality offers continue to grow, the possibilities, limitations, and restrictions of technology in this field have not yet been completely studied and defined to the extent that we would like yet. A common example of a virtual museum is a 3D virtual setting that is a reproduction of an actual museum.

There is no widely agreed-upon definition, and numerous phrases are employed to describe it . However, we can define virtual museum as ". . . as a logically related collection of digital objects composed in a variety of media which, because of its capacity to provide connectedness and various points of access, lends itself to transcending traditional methods of communicating and interacting with visitors. . . ; it has no real place or space, its objects and the related information can be disseminated all over the world".

Development of a Virtual museum solves many problems such as:

*1)* Virtual museum does not require any space to build upon (not in the physical world).
*2)* Some of the ancient artifacts are very fragile but not in virtual museums.
*3)* It can allow visitors to see artifacts, buildings, etc which may have been damaged in the physical world.
*4)* It doesn't matter where the person is, they can visit the museum anytime, anywhere they want.

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Everyone is talking about the tremendous push toward NFTs and virtual art. Even the foremost authorities on art concur that the business will undergo a significant change thanks to this new virtual place for art. In 2021, the market for non-fungible tokens increased to $41 billion, which is easily equal to the $50 billion market for traditional art in 2020. Ethereum is the primary ecosystem that is based on top of blockchain which provides an environment to write code and programming logic in the form of smart contracts and then runs these smart contracts on Ethereum Virtual Machine(EVM). Coding smart contracts in Solidity language is yet a challenging endeavour. ”The brochure museum, the content museum, the learning museum, and the virtual museum” are the four categories of online museums that were founded and were being developed on top of real museums of today. Virtual museums are believed to have all the advantages of all the other categories of museums while also being a unique and different product. It integrates all the available digital collections from every institution in the world while also giving visitors all the information they require about the museum and its contents. So it is of supreme importance to understand what exactly a virtual museum should include and what are the benefits and the pros and cons of these technologies both for the museum and the people that visit the museum.

Since the turn of the millennium, the proliferation of electronic ecosystem and the growth of the Inter-networking ecosystem have led museums to take an ambivalent stance. On one hand, they predicted that a Website based application would make it easier for them to increase their visitors by opening their 3D virtual doors to the entire world, on the other hand, they ”feared the worst,” which was that they would be overtaken by the ”virtual” museum in visitors count, in other words, the physical visits to museums would be drastically reduced and be replaced by virtual visits.

The development of Blockchain technology has been revolutionizing for various stakeholders across various sectors including technological, financial, and business fields. The new tech has displayed humongous potential that allows for its use case in various businesses. Blockchain technology can also be used on various systems inside the museum industry in need of changes and upgrades, whether that’s in terms of ease of use, accuracy, or accessibility. Blockchain would be important in bringing both historic and modern systems into the modern age. Blockchain uses Smart contracts that allows integration of terms and conditions that further allows parties to integrate contractual terms in programming logic and therefore eliminates an intervention from a third party which is also trusted by all participants in case of disagreements. Smart contracts are programming logic that enforces the execution of legal contract. They are run as a part of blockchain transactions, they interact with cryptocurrency, and they have interface to control inputs from participants in the contract. They are implemented with the help of transactions in blockchain, they interact with the cryptocurrencies, and they have interfaces to handle input from contract participants. A smart contract is an independent, autonomous and logical factor that executes specific actions when certain conditions are met on its own. In todays date, the highest demand for smart contract platform in the market is Ethereum.

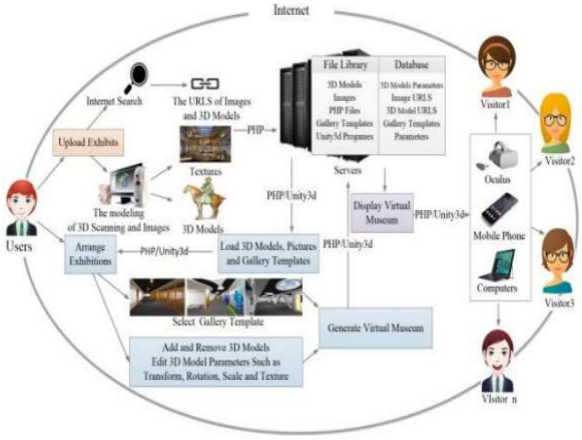



**Figure1. The system framework of online virtual exhibits arrangement.**

The Louvre was among the first cultural institutions to provide its patrons with a website in. Even if a website was just a showcase for the museum, showcasing artworks, diverse cultural and educational materials, and useful information aimed at making the museum’s visit and access easier, the Internet was nonetheless seen at the time as a revolutionary technical and social invention. The fact that there are still significant technical disparities amongst museums should be noted. These variations rely on factors including their scope, location, finance, and even administrative authority: High-end technology are still not widely used in many museums.

The real/virtual relationship is an important and challeng-ing problem for the future of museums in the digital era. Unexpectedly, little scholarly research has been conducted on this crucial problem. 1 Two distinct facets of the real/virtual theoretical paradigm are developed in Section 1 of this ar-ticle.

We start by contrasting the characteristics of ”real” website visitors. Second, we assess how we interacted with the museum and its online presence. Do the ”real” and ”vir-tual” experiences complement one other or are they mutually incompatible These questions also cover attendance growth and trends: In 2015, 8.53 million people visited the Louvre Museum, while 16.2 million people looked at its website.

1) *Blockchains and what are Smart Contracts:* Blockchains are a digital technology that is a convolution of cryptography, networking, and a highly sophisticated mecha-nisms that supports the verification, execution, and recording of transactions between different parties in a shared ledger. It is a distributed database or ledger that is shared among all the nodes of a computer network. In the simplest way possible, blockchain can be defined as decentralized shared ledger that offer very appealing properties some of which includes the immutability of transactions that have been made and the creation of trust between participants without the intervention of a third party. This makes blockchain feasible as open and distributed ledgers that can store transactions between any parties permanently and safely. One of the major applications of this is the exchange of digital assets, so-called cryptocurrencies. Widely known cryptocurrencies are Bitcoin, Ethereum, Dogecoin and many more. They have a lot to offer which goes beyond the transfer of currency as they allows us to integrate smart contracts in them as an integral part of the transaction. Smart contracts allows integration of terms and conditions that further allows parties to integrate contractual terms in programming logic and thus eliminates the need for an intervention from a trusted third party in case of disagreements. Smart contracts are programming logic that enforces the execution of legal contract. They are run as a part of blockchain transactions, they interact with cryptocurrency, and they have interface to control inputs from participants in the contract. When run on top of blockchain, Smart contracts become autonomous entity that executes on its own and allows specific actions when certain conditions are fulfilled. Just because smart contracts are run on the blockchain ecosystem, they run exactly as programmed, without any possibility of fraudulent transactions, censorship, downtime, or third-party intervention. As of this day, the most popular and highly used smart contract platform in the market is Ethereum.
2) *Ethereum Ecosystem:* Ethereum is the primary ecosystem that is based on top of blockchain which provides an environment to write code and programming logic in the form of smart contracts and then runs these smart contracts on Ethereum Virtual Machine(EVM). Ethereum uses Solidity as a language to write Smart Contracts on top of it. Coding Smart contracts in Solidity language is yet a challenging task. Ethereum Virtual Machine is a decentralized virtual machine that is a part of the ecosystem and it gives a platform for a runtime environment to run smart contracts on top of it within the ecosystem. All of this is aimed to be safe to use and reliable, and there is no need for intervention from third parties such as banks or agencies.

## II. ADVANTAGES OF VIRTUAL MUSEUMS

Creation of virtual museums offers advantages that are more significant to the curators and the museum itself, in addition to providing visitors with a richer, more realistic and more engaging experience. First of all, since most museums only display a tiny portion of their collection, a shortage of room is the main reason why Virtual museums can be taken into consideration (Lepouras et. al., 2004). Additionally, certain exhibitable items may be too delicate or too priceless for displaying, but that is not true in virtual settings, particularly if people can get all important information about them while also interacting with them in a fun and engaging manner.

The ability for people to observe a modelled recreation of significant items, buildings, or surroundings that might not exist anymore or are damaged is another factor that increases the value of virtual museums.

In virtual museum displays, the visitor has complete control over how to move around the space, explore freely, engage with the objects, and design his or her own flexible and interactive virtual experience. The visitor’s ability to compile, maintain, and share a unique collection of 3D digital ex-hibits—including those from several museums—in accordance with his or her interests and preferences is also crucial.

Additionally, in a virtual museum, the visitor engages in a productive discussion with the displays and broadens his or her knowledge rather than simply being a spectator. The visitor’s overall experience and navigation within the virtual museum characterization methods, arouse interest and sustain it by enhancing aesthetic sensibilities.

Finally, by experimenting, planning, and making modifications to the virtual exhibits, the museums and curators alike can gain insight into the optimal location for the exhibits in both the virtual and physical museum.

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## III. THE VIRTUAL MUSEUMS OF TODAY

The Virtual museum, virtual libraries and 3D models of real-world settings are currently undergoing rapid development. There are many individuals creators and huge orgs that are working on the creation of virtual museums in many parts all over the globe. The cultural industry may contribute to a nation's social and economical growth. Of utmost important is to note that the cultural section contributes a huge portion to the European economy, and it is crucial to emphasize both the economic and social benefits and products it produces.

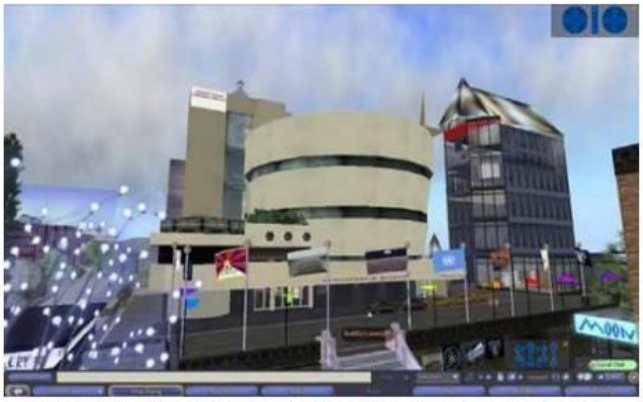


Figure 2: The Newggenheim Museum of Second Life.

## IV. INTRODUCTION TO UNITY3D

An integrated development tool called Unity3D Game Engine is used to create interactive content such as video games, architectural visualizations, and real-time 3D animations. Both Windows and Mac OS X support its editor. Though it only supports Windows and Windows Phone, Mac OS X, iOS, Wii, Linux, Android, and Web Player are some of the other platforms it can be used to develop programs for. All we require is the software development kit (SDK). Unity is an integrated environment, which combines a number of sophisticated components such as the PhysX physics engine, the Mechanism animation system, a self-contained terrain editor, and much more. It is also seamlessly integrated with the Monodevelop code editor, so that any changes made in Monodevelop is transparently compiled by Unity's C or Javascript compilers, and inserted into the game. Compilation errors are displayed in the Unity console window.

The most recent version is Unity 5, which went on sale on March 3, 2015. It supports the Geometrics Enlighten technology-based real-time global illumination. Physically based shaders, HDR sky-boxes, reflection probes, a new audio mixer with effects, and improved animator processes are among the other significant enhancements. With the release of Unity 5, a total of 21 platforms are supported, including Windows, Mac, Linux/Steam OS, Unity Web Player, Android, iOS, Blackberry 10, Windows Phone 8, Tizen, Windows Store apps, WebGL, PlayStation 3, PlayStation 4, PlayStation Vita, Wii U, Xbox One, Xbox 360, Android TV, Samsung Smart TV, Oculus Rift, and Gear VR. There are two separate versions of the Unity3D game engine available for download from their website: Unity and Unity Pro.




Figure 6: The main Interface and Views of Unity

## V. 3-D VISUALIZATION

The process of generating a virtual, 3D world that users can interact with and explore is referred to as 3D virtualization. Virtual reality (VR) experiences, architecture and building, product design and visualization, entertainment, and marketing and advertising are just a few examples of the many uses for this. Users of a 3D virtualization system can move around and explore a virtual environment using a variety of input methods, including keyboards, mice, VR headsets, and controllers. To create a realistic and compelling experience, the virtual world can be filled with 3D objects and furnished with textures and lighting. Different technologies and software tools, including game engines, VR platforms, and 3D modeling and animation software, can be used to create 3D virtualization. These tools offer a variety of features and functionalities, including networking for multiplayer experiences, support for real-time rendering, physics simulation, and support for. Overall, 3D virtualization offers a robust and adaptable method for building and exploring virtual worlds, and it is employed in a wide range of applications across numerous sectors.

### *A. 3-D Visualization use Cases*

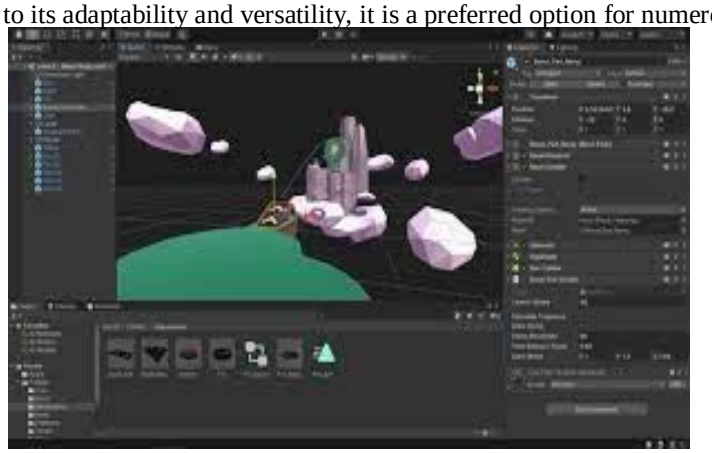
*1)* Making virtual reality (VR) experiences, in which users may interact with a virtual environment via VR headsets and other devices, is one common use case for 3D virtualization. This has a wide range of applications, including training, simulation, education, and gaming.

*2)* In order to visualize and assess design possibilities, archi-tects and engineers might make virtual models of build-ings and structures in the architecture and construction industries. This can assist in spotting possible problems and enhancing a project's general design.

*3)* The design and visualization of products, entertainment, marketing, and advertising are further possible appli-cations for 3D virtualization. In these industries, 3D virtualization can be utilized to develop captivating and lifelike experiences that let people interact with objects and settings virtually.

## VI. UNITY GAME ENGINE

A popular cross-platform game engine is Unity, which is used to create video games for PCs, consoles, and mobile devices. Being one of the most widely used game engines in the world with a sizable user base and a broad range of supported platforms, it was initially created by Unity Technologies. Unity's support for a broad range of platforms, which enables developers to create games that can be played on a number of gadgets and operating systems, is one of its primary characteristics. A visual editor, a scripting system, support for 3D graphics and physics, and support for multiplayer gameplay are just a few of the tools and features Unity provides for game production. Unity is utilized in a variety of industries in addition to game production, including architecture, engineering, and education. Due to its adaptability and versatility, it is a preferred option for numerous project kinds.



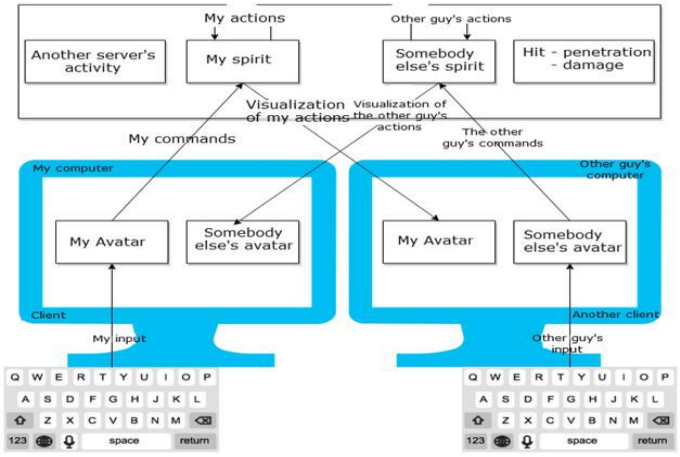
*1)* *Visual Editor:* An effective and flexible tool for de-veloping and managing Unity projects is the Unity editor. For creating, modifying, and maintaining a Unity project, it comes with a variety of features and tools, such as a visual editor for placing 3D objects, a scripting editor for writing and debugging scripts, and a plethora of other tools for audio, animation, and other things. Unity's visual editor enables programmers to build and tinker with 3D objects in a scene. This can be accomplished by dragging and dropping objects from the Asset Library or by creating, moving, rotating, and scaling objects using the editor's many tools and controls. Additionally, the visual editor has tools like a hierarchy view, scene view, and game view that let creators examine their scene from various angles and interact with it in various ways.

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2) *Rendering:* The process of creating a final visual rep-resentation of a 3D scene based on the details in the scene data is known as rendering. The process of producing 2D or 3D graphics that can be shown on a screen is referred to as rendering in the context of Unity. To process and render 3D scenes, Unity employs a rendering pipeline. The final rendered image is produced through a series of phases in this pipeline, including geometry processing, lighting, shading, and post-processing. To achieve the necessary visual quality and per-formance, Unity offers a variety of various rendering choices and settings. This contains choices for speed optimization on particular systems and hardware as well as support for various rendering approaches, like forward and delayed rendering.
3) *Scripting System:* Unity scripting is the process of writing scripts in a specific programming language to create functionality in a Unity game or application. Unity sup-ports a variety of programming languages, including C#, UnityScript (a variant of JavaScript), and Boo (a language based on Python). Scripts in Unity are typically attached to GameObjects, which are the basic building blocks of a Unity project. A script can define a GameObject's behavior, such as how it responds to user input or how it interacts with other objects in the scene. Unity provides a number of tools and features to support scripting, including a visual scripting system, a debugging environment, and integration with popular development tools and IDEs. Scripting is an essential part of game development in Unity as it allows developers to create custom gameplay mechanics and behaviors for their games.
4) *Unity Physics Engine:* A built-in physics engine in Unity makes it simple for developers to incorporate realistic physics behavior into their games. To simulate and control objects in a virtual environment, the Unity physics engine offers a variety of various parts and tools. Developers can add physics-based behaviors to objects in their environment using the Unity physics engine, including rigid body dynamics, collision detection, and constraints. This can be used to make in-game object interactions including things falling, bouncing, rolling, and colliding with each other realistic and entertaining. In addition to the core physics simulation, the Unity physics system also includes a number of other features and tools, such as support for ragdoll physics, character controllers, and cloth simulation. These can be used to create more complex and realistic physics-based behaviors and effects in a Unity game or application. The Unity physics engine offers a variety of additional features and capabilities in addition to the fundamental physics simulation, such as support for ragdoll physics, character controls, and fabric simulation. In a Unity game or application, these can be applied to provide more intricate and realistic physics-based behaviors and effects.

### A. *Unity Multiplayer System*

The Unity Multiplayer system includes a number of components and services that you can use to build your multiplayer game. These components include the Network Identity, which is used to identify networked items in a scene, as well as the Network Manager, which is the primary component for administering networked games. You can configure your multiplayer game using the Network Manager, which also offers choices for matchmaking, networked physics, and client-server or peer-to-peer networking. The Network Manager allows you to create and join games as well as manage the communication between your game's members. Identifying the items in your scene that need to be synced across the network is done using the Network Identity component. With the help of this component, you can define which object properties should be treated with synchronization and how. A robust and adaptable method for developing multiplayer games that many players may play online is offered by the Unity Multiplayer system. It is a great option for game developers that wish to create online multiplayer experiences due to its user-friendly interface and an extensive collection of features.



A number of the Unity Multiplayer system's components and services can be used to develop a multiplayer game. Some of these components include, for instance:

1) *Network Manager:* This is the key element in the management of networked games. With options for match-making, networked physics, client-server or peer-to-peer net-working, it enables the developer to set up your multiplayer game.
2) *Network Identity:* In a scene, networked objects are recognized using this component. It enables the developer to define which object properties ought to be handled with synchronization and how.
3) *Network Transform:* The position, rotation, and scale of an object can be synchronized over the network with this component.
4) *Network Animator:* The animations of an item can be coordinated across the network using this component.
5) *Network Lobby:* This component enables the devel-oper to design a multiplayer game lobby where participants may register and wait for the game to begin.
6) *Network Migrations:* This component enables the mi-gration of networked games across hosts in the event that the primary host is rendered inoperable.
7) *Network Matchmaking:* This service allows players to find and join games using a variety of matchmaking algorithms.

## VII. BLOCKCHAIN

Since its inception in 2008, blockchain technology has recently swept the globe. Businesses are starting to use blockchain technology for practical services. Shortly after the US financial crisis in 2008, the first blockchain technology was developed. Its concept was a peer-to-peer decentralized currency transfer network that people could count on in the event that the conventional financial system failed. Blockchain primarily flourished as a result and attracted considerable public interest. Blockchain is a database that is used in decentralized networks to store data. Blockchain is employed in areas outside of finance, though. Additionally, we can create a transaction that works with our application.

1) *Decentralized:* The key feature of blockchain has been that data may now be collected, held, and updated decentralised rather than relying on a single node.
2) *Transparent:* The data record of the blockchain sys-tem may be trusted since it is accessible to every node and accessible when updating the data.
3) *Free Software:* Most blockchain systems are open to the public, anybody may look up information, and anyone can use blockchain technologies to create whatever kind of application they want.
4) *Autonomy:* Since the node here on blockchain system may transfer or modify data securely owing to the consensus foundation, the idea is to trust everyone in the system from one person to the whole system without anybody being able to interfere.
5) *Immutable:* Unless more than 51 percent of the nodes are controlled concurrently, any entries will be irrevo-cably locked and won't be changed.
6) *Anonymity:* Blockchain systems have overcome the node-to-node trust problem, enabling transactions with the awareness of the participant's blockchain ip or even private data transmission.

### A. *Proof of Work Consensus*

Proof-of-work(POW) is used by Bitcoin2 to make sure that every participating node is on the blockchain's same branch.The protocol's main objective is to make it necessary for nodes to successfully perform a difficult computational work before they may suggest a new block.

To allow other nodes within the network to immediately verify its validity using the info in the block, the node that discovers the solution first generates the new element and transmits the knowledge to them. This is because in order for subsequent blocks to have legitimate hash values, all prior hash values inside the network must be known. An attacker might alter a single block inside this history, altering the core hash and invalidating the entire subsequent blockchain. "Mining" is the process of determining POW. The block header of every block contains a random value known as a "Nonce." By modifying this value, the POW must produce a value which reduces the hash value of block header.

A "Difficulty Target" has been established. The term "difficulty" refers to length of time required when the node calculates a hash function that is under the target level. The whole body of data in a block must be covered by a POW before it can be accepted by other users of the network. The complexity of this task is changed to force the network to generate new blocks no more frequently than once every ten minutes. Given the extremely low likelihood of successful production, it is uncertain which slave system in the network would be capable of producing the next block.

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### B. Smart Contracts

An ecosystem for creating and running smart contracts is provided by Ethereum, a significant blockchain-based platform. Solidity presently makes it challenging to create smart contracts. Due to the inherent characteristics of programme execution on blockchains, it entails the use of atypical programming paradigms. Furthermore, due to the direct connection between contract code and financial values, defects in deployed contracts may have substantial repercussions. As a result, having a solid foundation of tried-and-true design and code principles is beneficial because because simpler to write code that is both functional and error-free.

A smart contract is a digital agreement that establishes participant rights and obligations, controls the user digitally assets, and is automatically performed by the system. It is not simply a computer programme, it may be considered one of the contract's parties. It reacts to inputs it receives, stores data, and has the ability to communicate with outside parties. A smart contract is similar to a trustworthy person in that it can temporarily store assets and execute predetermined orders.

Most mobile and web developers are not familiar with both the engineering technique needed for Ethereum blockchain contract creation. Instead of allowing for the storing and manipulation of a large number of valuable data types like modern programming languages do, developers are in charge of organizing data internally and manipulating it a more profound level. This implies that the programmer will have to handle problems with which he may be unfamiliar. Developers typically do not have to consider chores like concatenating strings or lowering case strings in other languages, but in this scenario, a developer would have to implement them. Additionally, when new instructions are introduced, problems are found, and security threats are identified, Solidity and the Ethereum platform are consistently changing at a rapid rate, presenting developers with a constant system capabilities and the protection environment are changing. In a few months, it's possible that code created today won't compile, or at the very least, will need to be refactored, thus developers must take this into account.

```
1  pragma solidity 0.4.17;
2  contract StringStorageContract {
3    string private str = "Hello, world!";
4    function getString() public constant returns (string) {
5      return str;
6    }
7    function setString(string _str) public {
8      str = _str;
9    }
10 }
```

**Listing 1.1.** A simple contract in Solidity

### C. Ethereum and Gas fees

Ethereum may be compared to an automaton. The nodes of the Ethereum peer-to-peer open network knowledge of the status of the world. A user interacts with the network by delivering a transaction that symbolises an authorised state transition. The mempool, a collection of pending transactions, is chosen by nodes, who subsequently validate them, do the appropriate calculation (perhaps redistributing possession of ether, its native coin of Ethereum), and change the state. The two types of accounts accessible in Ethereum are externally owned profiles and contract accounts, that are controlled by a secret key or a smart contract (a chunk of code posted on the blockchain), respectively. Accounts and states are different in the Ethereum state model from those in Bitcoin. Unspent transaction output (UTXO) from Bitcoin transactions is stored on the blockchain; address balances are computed off-chain by the wallet software. The Ethereum protocol has a pricing system in place. Asset calculations in smart contracts become unprofitable from an economic standpoint. Every computing step in the EVM is priced in bits of gas. EVM opcodes are defined, together with their related gas costs, in the Yellow paper. A gas unit's price in ether is set by the market. For each transaction, the sender provides the maximum amount of gas that is anticipated to be needed (the gas limit) as well as the user's preferred gas price (the gas price). TTiming for gas caps The cost of the transaction is equal to the cost of gas. If the computation is successful, the additional ether is returned. Even if a mistake is made, the transfer has no effect on the state; yet, the whole supply line will be used. The miners can vote to progressively modify the maximum quantity of gas allowed to be utilised in a block. A verified data model with a set of instructions is a transaction that the EVM will atomically carry out.

## VIII. BLOCKCHAIN CHALLENGES AND SECURITY ISSUES

Iuon-Chang Lin et al discuss the specifics of Blockchain and its applications along with various possible security issues. These highlight the type of problems one need to avoid while developing or implementing new blocks or smart contacts. Then they go on to discuss the challenges Blockchain might face as they try to scale up, along with regulatory and efficiency issues.

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In order to address the issue of conventional distributed database synchronisation, blockchain technology integrates peer-to-peer systems with consensus mechanism methods. Math, algorithms, cryptography, and economic models are all included. The primary data, the hash of either the preceding and current blocks, the timestamp, and any other information are normally included in a block. POW, or proof of work, is a fact that is hard to ascertain but is easy for others to confirm and satisfies certain requirements. Bitcoin employs the Hashcash proof-of-work algorithm. For a block to be recognised by network users, miners must perform a POW that fits snuggly all of the content in the block.

Applications of blockchain include Digital Currency, Smart contracts, and Hyperledger, which was created by Linux as an open-source blockchain platform to enhance various areas of performance and dependability. It is concentrated on ledgers created to facilitate international commercial transactions, including significant technology, financial, and supply chain firms. The paper then discusses then security issues such as 51% attack and Fork problems. When a system accepts a new treaty or edition that seems to be inconsistent with the prior agreement, it experiences a hard fork. As a result, one chain split into two chains since the mining of the new nodes was not permitted by the old nodes. Even when the computational old nodes kept up the chain since they thought it was accurate even if their capacity was larger than that of new nodes. While being in soft forks, new nodes' processing power is lower than that of existing nodes.

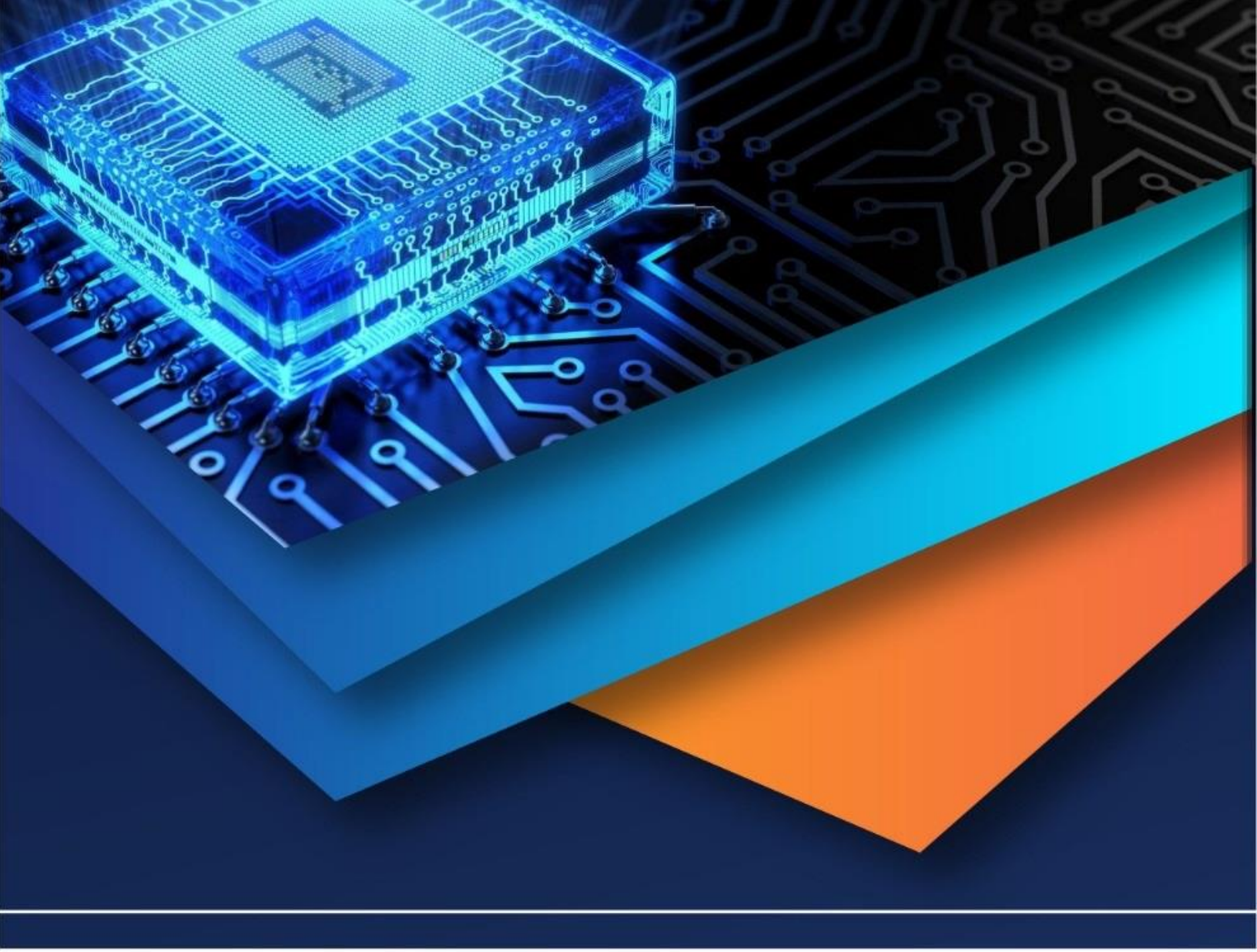
Next, the paper provides some solutions for issues scale of Blockchain and time confirmation. A payment verification system called Simplified Payment Verification (SPV) that just requires the use of block header messages rather than maintaining the entire blockchain. In order to securely route payments across various peer-to-peer payment channels, the Lightning Network is a suggested application of hashed information is securely contracts (HTLCs) with bidirectional payment channels. In order to prevent having a substantial detrimental influence on the current system, the paper finishes by noting the necessity for government rules that are suitable for this innovation and that enterprises must be ready to implement blockchain technology.

## IX. CONCLUSION

We have demonstrated that modern technology and 3D vir-tual environments are increasingly being employed by cultural organizations and museums, particularly in the creation of e-learning and edutainment applications. Ethereum provides a coding environment and smart contract execution environment for the virtual environment's validation and checking of electronic artwork like NFTs. A smart contract will become an independent entity that automatically carries out particular activities when certain criteria are satisfied when it is implemented on the blockchain. Because smart contracts operate on the blockchain, there is zero chance of restriction, delay, theft, or outside interference. They operate exactly as intended.

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