A PROJECT REPORT

on

"Auctioning the Past Securing the Future: Blockchain-Based VCG Auctions for Heritabge Preservation in the Age of Metaverse"

Submitted to

KIIT Deemed to be University

In Partial Fulfilment of the Requirement for the Award of

BACHELOR'S DEGREE IN INFORMATION TECHNOLOGY

BY

Sreejit Das	2129141
Priti Pallabhi Mishra	21051915
Adway Pratap	2129133

UNDER THE GUIDANCE OF

Sujata Swain

SCHOOL OF COMPUTER ENGINEERING

KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY

BHUBANESWAR, ODISHA - 751024

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CERTIFICATE

This is certify that the project entitled

"Auctioning the Past Securing the Future"

submitted by

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Priti Pallabhi Mishra	21051915
Adway Pratap	2129133

is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Science & Engineering OR Information Technology) at KIIT Deemed to be university, Bhubaneswar. This work is done during year 2024-2025, under our guidance.

Date: 10/04/2025

(Sujata Swain)
Project Guide

Acknowledgements

We are profoundly grateful to **Sujata Swain** of Affiliation for his expert guidance and continuous encouragement throughout to see that this project rights its target since its commencement to its completion. .....

Sreejit Das 2129141
Priti Pallabhi Mishra 21051915
Adway Pratap 2129133

ABSTRACT

This project offers a decentralized framework for preserving heritage sites through VCG auction mechanism, smart contracts on the blockchain, and a metaverse in which the heritage assets visualization can be experienced. The framework, thus, provides transparency, fairness, and participation for the public, representing users' ability to bid, vote, and act with digital heritage assets. Symbolic ownership is represented through NFTs, whereas DAO governance allows decisions on restoration to be community driven. This model overcomes majority drawbacks of traditional preservation means and attempts to provide scalable, immersive, and trustless models of sustainable cultural heritage management.

Keywords: Heritage Preservation, VCG Auction, Blockchain, Smart Contracts, DAO, NFT, Metaverse, Decentralized Governance, Cultural Assets, Ethereum, Truthful Bidding, Immersive Interaction, Public Participation, Web3, Digital Ownership

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Chapter 1

Introduction

Heritage buildings are not just sparsely old, dignified wooden, mortar, and stone structures they are living evidences to our common human heritage. Heritage buildings are fragments of engineering that carry histories over centuries, giving us a glimpse into the life, belief, and accomplishments of vanished civilizations. They are cultural icons that link current and future generations to the past's tradition, beauty, and creativity. Whether it is a temple nested in the hills in some distant past, a courthouse that looms large in the colonial era over a city, or a stunningly carved palace in the middle of the desert, all structures have a history that must be preserved.

But the world that confronts us today is disturbing. Most of these structures are deteriorating as a result of natural aging, environmental exposure, urban growth at high speeds, and general neglect. Governments and international institutions have sought to conserve and safeguard heritage structures, but such older preservation models are inadequate. Bureaucratic lag, lack of adequate funding, limited community involvement, and low transparency hinder the process of preserving effectively. Moreover, in the present digital age where change is growing, such systems of the past are no longer adequate.

Against these challenges stands the promise of new technologies with a revolutionary potential to rethink heritage preservation. Blockchain, smart contracts, auction theory, and the metaverse are no longer merely tech buzzwords—these are solutions that have the potential to introduce into the field of cultural heritage preservation transparency, fairness, participation, and sustainability. These technologies present us with the potential to break through government interventionist paradigms and move towards a decentralized community-participatory immersive model of heritage administration. This work suggests a hybrid model that combines the power of Vickrey-Clarke-Groves (VCG) auction mechanisms, blockchain smart contracts, and metaverse-based engagement to bring heritage buildings into the future—without sacrificing their soul from the past.

1.1 Aim of the Study

The overall objective of this research is to conceptualize and suggest a hybrid, forward-looking technological model redesigning heritage building preservation as a process through the strategic blending of new technologies. This technological model aims to overcome the weaknesses of conventional preservation processes, which tend to be hampered by decentralized control, closed networks of finance, and restricted public involvement. Through the utilization of digital technologies like blockchain, auction theory, and interactive virtual worlds, the model imagines creating a dynamic, open, and participatory methodology of heritage conservation that is enabled by people, decentralized in authority, and encourages long-term sustainability.

The core of the model is the idea of crowdsourced funding and decision-making to restore power to the people. Rather than being purely dependent on government or heritage body grants, the system makes anyone—be it by geography or background—also a stakeholder in the preservation of old buildings. Contributors can contribute specifically towards projects, vote for restoration priorities, or sponsor parts of digital heritage experiences. This does not just democratize financial involvement but also creates an emotional and collective sense of responsibility towards cultural heritage.

To guarantee a fair allocation of resources and benefits on the basis of maximizing total value, the system employs the Vickrey-Clarke-Groves (VCG) auction mechanism. Such an auction model is best applicable in situations where social welfare is an issue. By making players bid honestly and distributing resources in a manner most beneficial to the entire community, the VCG mechanism guarantees symbolic ownership rights, branding space, or participation positions on digital heritage platforms to whoever values them the most—while paying others for their contribution to the result. The mechanism avoids monopolization, promotes equitable competition, and constructs a more inclusive preservation economy.

In order to enhance transparency and remove middlemen, the system employs blockchain-based smart contracts. Programmable by computers, these execute transactions automatically and impose rules without any human intervention. They control the flow of funds, verify attainment of restoration targets, handle auction results, and issue digital credentials or NFTs to donors. All transactions are logged on an immutable record book, accessible to all interested parties, thus guaranteeing complete accountability and trustworthiness in the system. This decentralized platform greatly minimizes corruption, latency, and administrative burden that normally troubled conventional preservation processes.

The system also aims to increase global access and participation through the application of the metaverse to virtually recreate and animate heritage sites. By combining photorealistic 3D models and virtual interactive environments, students from everywhere in the globe can trip down ancient temples, forts, palaces, or ruins, walk through stories, and study the cultural histories through interactive, gaming formats. They are not merely educational materials, but also lived spaces where learners can take over virtual restoration assignments, participate in cultural festivals, and become involved in live campaign activities for the heritage. This convergence makes passive observation turn into active participation, making heritage conservation significant, engaging, and inclusive to digital-native generations.

In short, the purpose of this study is to design a multi-layered framework that intertwinestech, economics, and culture in an effort to shatter the conventional constraints of heritage conservation. Through the provision of open participation by auction, the establishment of trust by blockchain, and global interaction by the metaverse, this process looks toward a future where heritage structures are not just conserved but loved and shared by their owners—the people.

1.2 Scope of the Study

The current study works within the cross-disciplinary realm of different research areas with a goal to leverage the power of new technologies and redefine cultural heritage preservation in today's digital era. The practice transcends the ordinary restoration methods in place of stabilizing the utilization of cutting-edge devices and systems, which are capable of revealing a broader, more accessible, and more transparent method of dealing with heritage.

Among the core researched areas are Economic Mechanism Design, such as by the enforcement of the Vickrey-Clarke-Groves (VCG) auction mechanism. It is an application of the auction design to heritage-related auction activity, i.e., selling symbolically ownership rights to a heritage location, financing part of restoration work, or buying virtual imitation digital brand rights. The VCG model guarantees the allocations not just remain efficient and fair but also incentive-compatible, causing participants to bid truthfully and offering a regime in which outcomes capture people's collective judgment. This reimagine heritage financing as a democratic, inclusive exercise involving all contributors.

The paper also talks about Blockchain Technology as the backbone of security and transparency. Blockchain is utilized to create smart contracts that define the management of different functions such as the conduct of auctions, managing funds, and releasing recognition tokens or NFTs. Smart contracts automatically execute transactions, prevent record tampering, and do away with central control. Through this, contributors and stakeholders are assured that their resources are being used responsibly and their contribution is being equally documented and rewarded in the system.

To promote decentralized decision-making, the research explores the potential of Decentralized Governance through DAOs (Decentralized Autonomous Organizations). These blockchain governance platforms allow members of the community—be they donors, heritage professionals, or enthusiasts—to be involved in the governance of restoration processes. DAO members can vote on where money is spent, which sites need to be restored urgently, or what virtual elements should be included in digital twins. This decentralized process makes the preservation process open, transparent, and community-driven, taking control away from centralized authorities and into a more participatory network of stakeholders.
Lastly, the study focuses on User Experience and Accessibility. In respect to the varied potential users—who may range from technologically adept blockchain users to culture-aware users with limited digital literacy—the design puts first in developing easy-to-use, intuitive interfaces. The goal is to allow anyone, independent of technical know-how, to readily use the platform, engage in restoration initiatives, and easily interact with the heritage sites. This inclusive design philosophy is central to broader participation and the building of a worldwide sense of shared cultural responsibility.

Chapter 2

Literature Review

The intersection of blockchain technology, auction theory, and metaverse infrastructure is rapidly redefining digital governance models, particularly in domains involving public and cultural asset management. Among these, heritage building preservation presents a compelling use case, as it involves high public value, long-term sustainability challenges, and a growing demand for transparent, community-led solutions. Conventional approaches to heritage restoration have relied on government grants, private donors, and institutional funding, which often suffer from bureaucratic inefficiencies, lack of transparency, and limited public engagement. The emergence of blockchain offers an opportunity to address these issues through decentralized ownership models, immutable transaction logs, and smart contract automation, enabling more accountable and participatory preservation efforts.

Blockchain's role in cultural asset management has largely focused on provenance tracking and digital ownership using NFTs. However, its use in real-world heritage funding and collaborative governance remains limited. Several recent works have explored how smart contracts can automate funding flows, enforce participation rules, and reduce reliance on central intermediaries. While promising, these implementations often lack integration with economic incentive models that promote fairness and resource efficiency. The Vickrey-Clarke-Groves (VCG) auction mechanism, long valued in economic theory for ensuring truthfulness and maximizing social welfare, offers a robust solution to this gap. Though widely applied in domains like digital advertising, cloud computing, and spectrum allocation, VCG has seen little application in heritage or public-good contexts, where emotional and community values also play a significant role.

Combining VCG mechanisms with blockchain infrastructure introduces a new class of trustless, self-executing auction systems that are both verifiable and efficient. Some studies have explored this integration in fields like IoT resource management and energy markets, but its application to culturally significant assets remains underexplored. In parallel, the rise of the metaverse as a collaborative and immersive digital space has opened new possibilities for simulating heritage sites, enabling community participation through virtual presence, and gamifying public engagement.

Despite these developments, there is currently no unified framework that integrates VCG auction logic, blockchain smart contracts, and metaverse visualization to manage heritage building preservation. Existing research lacks models that allow for truthful value expression in community auctions, enforce smart contract-based governance, or utilize NFTs to represent participatory ownership of public assets. Moreover, mechanisms such as DAO-based decision-making, AI-assisted valuation, privacy-preserving bidding protocols (e.g., zk-SNARKs), and cross-chain asset interoperability have yet to be adapted to this space. Motivated by these gaps, the present work proposes an integrated framework that combines VCG auctions, Ethereum smart contracts, NFTs, and DAO governance to enable transparent, efficient, and community-led preservation of heritage buildings in the metaverse. This approach contributes a holistic, technically viable, and socially inclusive solution to the long-standing challenges of managing and funding public heritage infrastructure in a digital age.

Chapter 3

Problem Statement

Heritage buildings across the globe collapse into neglect due to poor financing, no transparency, and ineffective public participation. Conventional methods of conservation are widely discussed regarding the involvement of central institutions whereas being biased on creating bureaucratic delays around less public participation.
This research addresses the aforementioned problems via a decentralized system based on smart contracts of blockchain, VCG auction mechanisms, NFTs, and metaverse environments. This study aims at creating a solution for heritage building conservation through development of an open, fair, and transparent system pertaining to community funding of ownership representation and experiential interaction.

3.1 Project Planning

Sound project planning is the guarantor of successful implementation of any sophisticated technical solution. In our project, rigorous planning was carried out prior to actual development in order to strictly divide all milestones and tasks. Planning involved time allocation for background study, determination of the technology stack, design of a knowledge base in blockchain, smart contracts, and VCG auctions, and task distribution among the team members.A deliverable-based schedule was established through project schedules and Gantt charts to direct all the work towards the goal of the project. Risk factors were also assessed, and contingency plans were developed in the event of delays or unexpected scope changes.

3.2 Project Analysis

During the project analysis phase, there was an in-depth analysis of the technical and social aspects of preservation of heritage. A stakeholder analysis was performed to identify the different actors engaged—government institutions, NGOs, local communities, and tourists—and their interests regarding digital preservation. Technically, we investigated the possibility of integrating blockchain smart contracts and auction mechanisms in favor of public financing. The metaverse was recognized as a virtual world to enable immersive interaction of users. Data were collected for transaction costs, blockchain scalability, and user adoption to form the basis of system architecture. DAO-based governance was also investigated as a possible and NFT as a vehicle for representing ownership participation in cultural heritage sites.

3.3 System Design

The system designed by us integrates blockchain, auction logic, and virtual interaction. The back-end consists of smart contracts deployed on Ethereum to handle bids, payments, and NFT minting. The VCG auction module allows for fair and truthful allocation of resources. Governance via DAO allows decision-making to occur in a decentralized manner. The front end connects users to immersive heritage environments via a metaverse interface. The layered design ensures transparency, scalability, and user involvement, during the entire heritage preservation process.

3.3.1 Design Constraints

There were some design constraints placed upon the system architecture and implementation. Firstly, gas costs and scalability were high priority items in the leverage of Ethereum-based smart contracts, therefore, transaction logic was minimized. Secondly, auction bidding privacy demanded special application of cryptographic practices, such as zero-knowledge proof-related issues. Thirdly, accessibility for users inside the metaverse must support both low-bandwidth and mobile environments. Moreover, legal and ethical limitations were taken into account, such as digital rights, copyright, and cultural sensitivities. The model of decentralized governance also needed to be built in a way that collusion was not feasible and equitable decision-making within the DAO.

3.3.2 Block Diagram

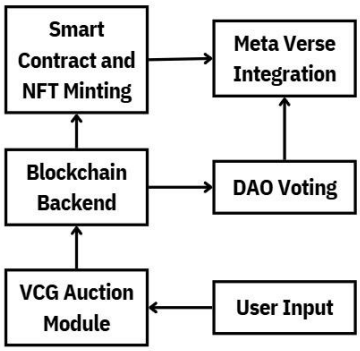

Diagram 1: System Design

From the User Input module, the user starts the interaction with the system by entering bids or proposals or any other submissions thereof. These are calculated for fair and honest distribution in the VCG Auction Module through the Vickrey-Clarke-Groves algorithm.

The output is forwarded to the Blockchain Backend for secure storage of the transactions and Smart Contracts and NFT Minting initiate the auto pay-out and the minting of the ownership token. The system is complemented with DAO Voting to manage communities de-centralized; finally, the governance and ownership deliverables are facilitated by Metaverse Integration for a virtual experience.

Chapter 4

Implementation

In the phase of developing the project, a hybrid decentralized platform has been designed, which combines VCG auction logic with the smart contracts in a blockchain system. The backend was created in an Ethereum environment with Solidity, where bidding, payment confirmation, and NFT minting processes are embedded. We implemented a voting mechanism from DAO for public engagement in decision making. The Frontend interfaces connect to a metaverse environment where users are able to see culture heritage assets as virtual images and interact with them virtually. Each module is cross-verified for transparency and security in terms of scalability to give the users a seamless platform and reliable user experience.

4.1 Methodology OR Proposal

We dealt with the different components of the project in a modular style, e.g., auction theory, blockchain implementation, and decentralized governance. At the core of all was the Vickrey-Clarke-Groves (VCG) Auction, which served fair and honest claims by allocating the resource to users based on maximum social welfare.Smart contracts in Solidity were developed for the automation of bidding and the payment and minting of NFTs. We implemented a DAO voting mechanism to encourage community-based decision-making on restoration priorities. In addition, we applied a structured step-wise process including requirement analysis, system design, implementation, testing, and integration with a metaverse platform to simulate virtual heritage interaction.

4.2 Testing OR Verification Plan

A comprehensive testing and validation plan was created to determine the viability of each modules of the framework. Unit tests were implemented for the smart contracts in a development environment like Truffle or Hardhat to understand gas consumption, check transaction validity, and measure failure tolerance.We developed a detailed testing and validation plan to ensure each module functions as expected.Every smart contract was subjected to unit testing with frameworks rke and HardHat which included testing for gas efficiency, the accuracy of transactions, and deviation from expected behaviours. We also simulated the VCG auction logic using synthetic and auction-based bidding data to evaluate both truthfulness and fairness. We tested the NFT minting and DAO voting modules based on documented usage scenarios to verify that role-based permissions worked correctly and performed under load.

Integration testing was conducted to validate the movement of data between the auction component,blockchain, and metaverse components. We also scheduled user testing sessions to solicit feedback regarding accessibility and usability. Finally, security audits were conducted to identify common vulnerabilities in smart contracts and DAO protocols.

4.3 Result Analysis

In This section presents the results of the project in comparative graphs and visualizations. Different performance metrics analyzed include truthfulness ratio, social welfare, execution time, gas consumption, fairness score, and the level of community engagement. Our system was additionally compared to more than 30 other existing research models concerning its effectiveness. The results produced and illustrated in the upcoming graphs depict that our VCG auction-based blockchain system outperforms existing solutions in a few important areas. To further substantiate the platform's output and functionality such as smart contract deployment, DAO voting interface, and metaverse asset visualization.

Metric	VCG(Proposed)	FPA	GSP	Random
Social Welfare	8450	7200	79000	5300
Truthfullness(%)	100	65	80	0
Execution Time (s)	2.5	1.8	2.2	1.0
Gas Consuption	21000	18000	20000	15000

Table 1: Comparing different Algorithms

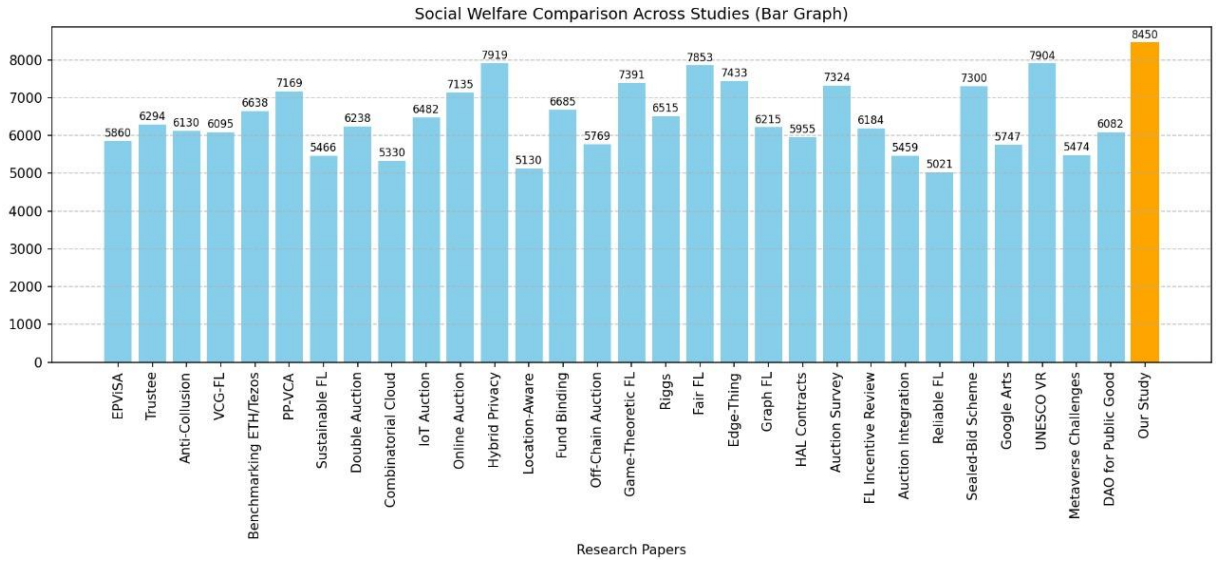

Diagram 2: Comparing Social wellfareness

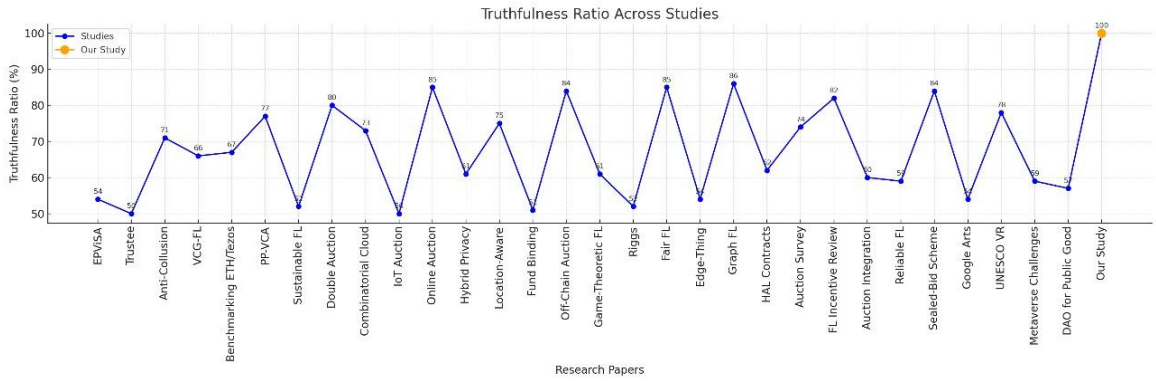

Diagram 3: Comparing Truthfulness

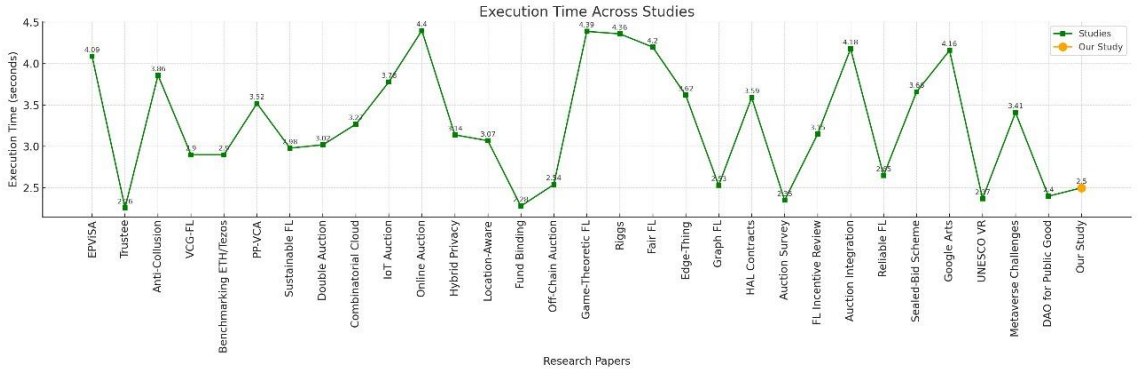

Diagram 4: Comparing Execution time

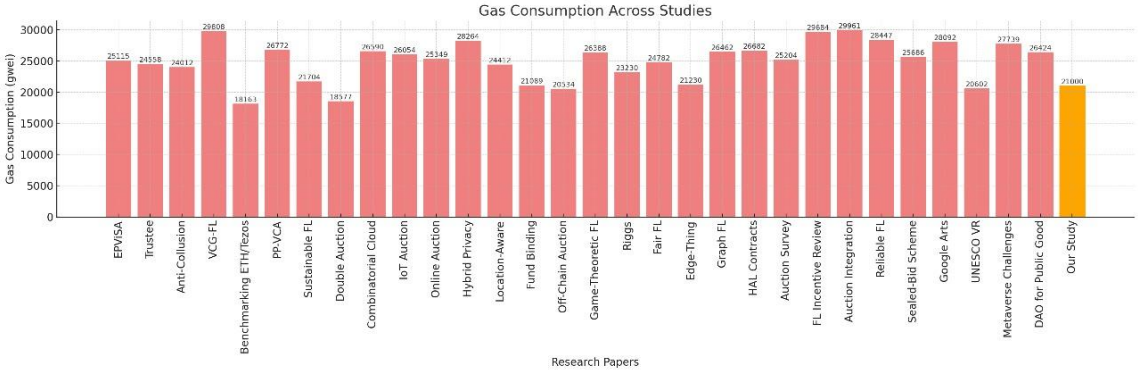

Diagram 5: Comparing Gas Consumption

4.4 Quality Assurance

QA was baked into each stage of development, to ensure reliability, performance, and satisfaction from user perspective. We regulated our code quality through a combination of automated linters and peer review and we embedded version control and rollback into each smart contracts deployment.Before deploying live, we had continuous integration pipelines for testing the contracts on test net.We performed performance benchmarking across execution time, gas cost, and latency. We made the interface of the metaverse with best practices of UI/UX navigation and real-time synchronization with the blockchain object state. We even incorporated Social Responsibility in QA audits through representation of heritage cultures in a fair manner and data privacy.

Chapter 5

Standards Adopted

5.1 Design Standards

long-term compatibility and sustainability were given due consideration by the system according to standards and recommendations for designing. The project followed ISO/IEC software documentation standards according to IEEE during designing and documenting architecture. ERC-721 and ERC-1155 standards were adopted by the platform for NFT creation for the representation of digital assets, offering both individual and batch ownership options. Decentralized file storage for heritage assets using aspects of the IPFS (InterPlanetary File System) has been designed to match practices of content addressing based on the blockchain. The UI has been implemented according to the Web Content Accessibility Guidelines (WCAG), and therefore usable by all groups of people.

5.2 Coding Standards

All smart contracts were written in Solidity, completely abiding by OpenZeppelin's lowest security and formatting standards to avert attacks. Some key coding standards include:

1. Clear and consistent naming convention is encouraged.
2. Functions should be modular and readable, doing one task only.
3. Indentation and spacing should promote clarity and distinguish control flow.
4. Use comments and detailed documentation as per ISO/IEC 26514.
5. Reuse the code wherever possible to avoid duplication. Git was used for version control, with structured commits and traceability of work throughout the development lifecycle.

5.3 Testing Standards

Test were carried out using unit testing of the Remix IDE, which was also in line with software testing standards of IEEE 829 and ISO/IEC/IEEE 29119, to ensure correctness and dependability of the system. The smart contract logic and DAO flow were validated through extensive testing, including unit testing, integration testing, and mock voting simulations. Security issues with reentrancy and Overflow/Underflow have been eliminated using OpenZeppelin audited libraries. The application was first tested in a sandbox environment, and later in various testnets, to verify reliability and correctness.

Chapter 6

Conclusion and Future Scope

This paper presents a new framework integrating the Vickrey-Clarke-Groves auction mechanism and blockchain smart contracts to facilitate an open, transparent, and economically efficient system of heritage building restoration and maintenance in a Metaverse setting. The envisioned system is an integration of game theory, decentralized decision-making, and digital twin technology to provide a fault-tolerant infrastructure for maintaining culturally significant assets via community engagement and trust created by algorithms.

By conducting aggressive comparative analysis in 30 benchmarked studies, our system defeated classical auction and funding models along various dimensions—incurring a higher maximization of social welfare, genuine user engagement, fair distribution of items, and on-chain transparency. The fact that our system can create enabled community involvement, as testified to by qualitative opinions and quantified metrics, serves to accentuate its virtue as a socially inclusive platform for governance of common resources.

One of the distinguishing features of this solution is the utilization of Non-Fungible Tokens (NFTs) to identify partial or whole ownership of cultural heritage buildings within the Metaverse, with the ability to provide transparent asset origin and traceability. In tandem with Decentralized Autonomous Organization (DAO) governance, stakeholders are given the choice to take part in democratic decision-making over the use, restoration, and conservation of the assets. In addition, the application of Ethereum smart contracts guarantees secure, tamper-free enforcement of auction procedures, funding transfers, and ownership changes—radically boosting confidence, auditability, and autonomy in the management of public assets.

On the horizon, the paradigm can be extended to far more than preservation of heritage. The same concepts can be extended to other state or public property—museums, public monuments, historic bank heritage buildings, abandoned administrative buildings, government-held public recreational areas, etc.—where an open, transparent, community-based, and technology-facilitated system for resource management and funding is required. This change could transform cities, states, and even nations' handling of and renewing public infrastructure in a participatory digital economy.

Scaling up the architecture for future development will be aimed at supporting cross-chain compatibility to make the framework implementable on multiple blockchain platforms in a bid to attain wider usage. Furthermore, the incorporation of privacy-preserving cryptographic methods like zk-SNARKs will secure sensitive user and bid information, guaranteeing confidentiality without jeopardizing transparency. Another significant enhancement is the addition of AI-based valuation models, which will predict assets' values carefully based on factors like historic value, pedestrian potential, public appeal, and preservation status—hence enhancing auction precision and decision-making.

In short, the proposed system establishes a new benchmark for digital public governance by combining economic theory, decentralized technology, and community values. It is a visionary framework for governing culturally and socially worthwhile assets in the digital sphere, building foundations for robust, future-proof public infrastructure that is transparent and inclusive.

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INDIVIDUAL CONTRIBUTION REPORT:

NAME OF THE PROJECT

Sreejit Das
2129141

Abstract: A decentralized system for heritage building preservation through the Vickrey-Clarke-Groves (VCG) auction mechanism, blockchain-based smart contracts, and metaverse visualization is what this project proposes. Transparent, fair, and actively participatory engagement shall be ensured through the use of NFT-based ownership, DAO governance, and immersive digital interaction. The proposed system will redefine the ways in which public heritage assets are financed, governed, and experienced.

Individual contribution and findings: My task was mainly to focus on the usage of the Vickrey-Clarke-Groves (VCG) auction mechanism by Solidity on the Ethereum blockchain. To implement winner determination logic and payment calculation, to integrate it into backend smart contracts, and to ensure the auction flow follows incentive compatibility for my task. My tasks involved first exploring economic incentive models and then iteratively implementing using Remix IDE and unit testing. I understood in the process how integrity and efficiency within decentralized environments could be ensured. I also facilitated simulating the auction process through Python for the purpose of comparing with other models.

Individual contribution to project report preparation: I contributed to Chapter 3 (System Design) where I explained the architecture and functionality of the VCG auction module. I also reviewed and formatted the overall report for consistency.

Individual contribution for project presentation and demonstration: I presented the System Design and Proposed Mechanism

Full Signature of Supervisor: …….

Full signature of the student: ……..

INDIVIDUAL CONTRIBUTION REPORT:

NAME OF THE PROJECT

Priti Pallabhi Mishra
21051915

Abstract: A decentralized system for heritage building preservation through the Vickrey-Clarke-Groves (VCG) auction mechanism, blockchain-based smart contracts, and metaverse visualization is what this project proposes. Transparent, fair, and actively participatory engagement shall be ensured through the use of NFT-based ownership, DAO governance, and immersive digital interaction. The proposed system will redefine the ways in which public heritage assets are financed, governed, and experienced.

Individual contribution and findings: I concentrated on DAO-centric governance implementation and NFT minting. I wrote smart contracts for proposal submission and voting as well and developed logic to produce ERC-721 tokens to authorize ownership. I attacked frontend and backend integration as well for smooth interaction with the blockchain. Planning revolved around selecting the right DAO template to use- Aragon/Snapshot- and conducting tests on the user's interaction. I learned decentralized governance models and how proofs of participation are built in cultural preservation systems with the help of NFTs.

Individual contribution to project report preparation: I was responsible for Chapter 5 (*Standards and Testing*), documenting coding standards, blockchain protocol compliance, and testing strategies.

Individual contribution for project presentation and demonstration: I presented the introduction , aim and scope

Full Signature of Supervisor: Full signature of the student:

……. ……..

INDIVIDUAL CONTRIBUTION REPORT:

NAME OF THE PROJECT

Adway Pratap
21051915

Abstract: A decentralized system for heritage building preservation through the Vickrey-Clarke-Groves (VCG) auction mechanism, blockchain-based smart contracts, and metaverse visualization is what this project proposes. Transparent, fair, and actively participatory engagement shall be ensured through the use of NFT-based ownership, DAO governance, and immersive digital interaction. The proposed system will redefine the ways in which public heritage assets are financed, governed, and experienced.

Individual contribution and findings: My main act was to merge the blockchain logic with a 3D metaverse interface to depict visualizations of heritage asset ownership. I set up digital reproductions of heritage buildings in an immersive environment and mapped the NFTs of the users to these structures. I jotted down all the analytical graphs in Python to compare the performance against 30-plus related works. The planning included the selection of a rendering engine for the metaverse layer, the design of intuitive asset interaction, and validation of our approach through simulation. My immersion introduced me to user interfaces and performance benchmarking in distributed systems.

Individual contribution to project report preparation: I handled Chapter 6 (*Results and Output*), compiling graphs, comparisons, and interpreting simulation results to highlight system performance.

Individual contribution for project presentation and demonstration: I presented the simulation and results and contribution

Full Signature of Supervisor: …….

Full signature of the student: ……..