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Decentralized Tender Management System for Road Development Using Blockchain

Atharv Vaspathe, Aniket Datar, Shankar Avad, Niranjana Patankar, Prof. Manisha Marathe

Department of Computer, PVG's College of Engineering and Technology, G.K Pate (Wani) Institute of Management,
Pune, Maharashtra, India

Department of Computer, PVG's College of Engineering and Technology, G.K Pate (Wani) Institute of Management,
Pune, Maharashtra, India

Department of Computer, PVG's College of Engineering and Technology, G.K Pate (Wani) Institute of Management,
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ABSTRACT: The tender management process is a critical aspect of procurement and plays a vital role in ensuring fairness, transparency and efficiency in procurement. However, traditional tender management systems often face challenges such as lack of trust, transparency and vulnerability to corruption. This abstract presents a decentralized tender management system which uses block chain technology to address these challenges. Block chain as a decentralized and immutable ledger provides a secure and transparent environment for recording and verification of transactions. By utilizing block chain, the proposed tender management system enables all stakeholders, including bidders and government officials to participate in a credible and controllable process. In this system, tenders are published on the block chain network, allowing prospective bidders to access and review the requirements. Bidders may submit their bids electronically ensuring the integrity and confidentiality of submitted data. Block chain's distributed consensus mechanism guarantees that the proposed designs remain tamper-proof and durable to unauthorized modifications. Government officials can then review and select these bids specific offer manually.

I. INTRODUCTION

A decentralized tender management system is a cutting-edge platform that transforms the conventional tendering process by utilizing the power of block chain technology. It offers bidders and tender issuers a transparent, safe, and effective setting in which to participate in the tendering process. Smart contracts streamline and apply established guidelines to ensure fairness and compliance. The system's decentralized structure improves confidence, gets rid of middlemen, and lowers the chance of fraud. A decentralized tender administration system based on block chain has the potential to revolutionize the way that tenders are performed, providing a number of advantages to both issuers and bidders. It is not feasible to completely eliminate ambiguity; however it is possible to be lessened or mitigated. Third-party institutions have historically played a significant role in reducing uncertainty and creating trust in situations when parties need to come to agreements. For example, while purchasing something on eBay, Both the buyer and the seller need to feel confident about the deal. In this instance, they rely on eBay as a reliable middleman to guarantee a valid trade. However, it frequently calls for substantial investigation and understanding to be able to trust such "middleman" institutions. By offering decentralized, secure applications with a certain amount of assurance, block chain technology developed as a method to address these issues. This characteristic of block chain contributed significantly to its widespread adoption in a culture where trust is non-existent. The most important details in this text are that third-party institutions have historically played a significant role in reducing uncertainty and creating trust in situations when parties need to come to agreements. For example, eBay is a reliable middleman to guarantee a valid trade, but it often requires substantial investigation and understanding to be able to trust such "middleman" institutions. Block chain technology developed as a method to address these issues by offering decentralized, secure applications with a certain



amount of assurance. This characteristic of block chain contributed significantly to its widespread adoption in a culture where trust is non-existent

II. RELATED WORKS

Public procurement processes often lack transparency and can be highly complex. They encompass all purchases of goods and services by public institutions within a country, including contracts with the private sector in various sectors such as healthcare, military, and construction. Government bodies have floated tenders worth substantial amounts, such as INR 82,433 crores in 2012–13, INR 189,279 crores in 2013–14, INR 212,735.5 crores in 2014–15, INR 404,176.6 crores in 2015–16, and INR 543,820.5 crores in 2016–17. In total, an enormous sum of INR 14 lakh crores has been spent in the last five years, with suppliers being selected through the tender process. This constitutes approximately 30 percent of India’s annual GDP. The government has come to realize that suppliers in the country are often acquainted with each other and with officials, making it easier for them to exploit weaknesses in the system. Consequently, instances of misconduct, such as large-scale scams, suspicious modifications of tender requirements and deadlines, and the selection of undeserving bidders, have occurred. Unfortunately, those who raise their voices against such misconduct often face severe consequences. Given that procurement accounts for a significant portion of public resources, it is crucial that the tender process is conducted with accountability, transparency, and effective management.

III. PROPOSED SYSTEM

A system architecture is a conceptual model that defines the structure, behavior, and other views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports thinking about the structures and behavior of the system.

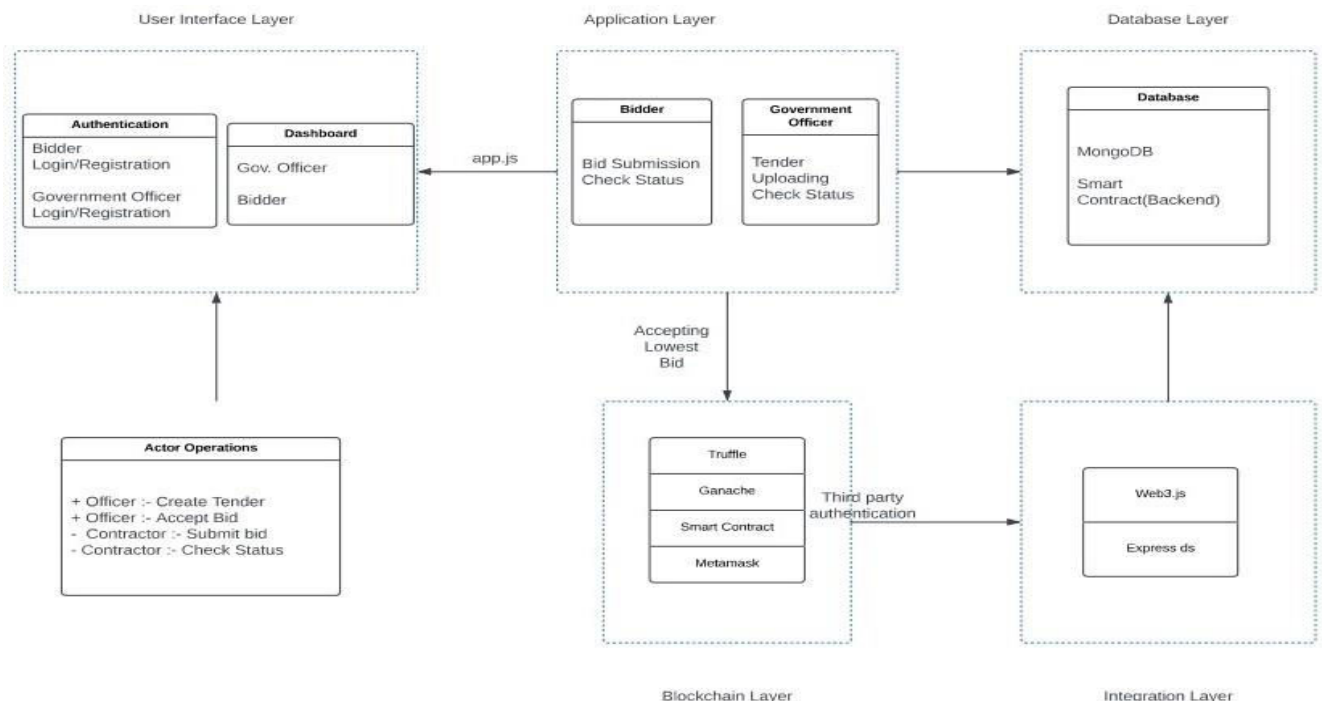


Figure 1: Architecture Diagram

Here's how we applied the Agile model to the SDLC of a decentralized block chain tender management system:

- Backlog:** The project team, including developers, stakeholders, and users, jointly defines the project's vision, goals, and scope. They identify key features and prioritize them based on their importance and value to stakeholders.
- Sprint Planning:** A project is divided into a series of time-bound iterations called sprints. In each sprint, a set of user stories or



requirements is selected from the product backlog. The development team estimates the effort required for each user story and commits to completing a set of them within a sprint. Development: The development team is working on the implementation of selected user stories, including block chain components and the application layer. It follows block chain development best practices such as writing smart contracts, implementing features, and integrating with the block chain network. Development tasks are broken down into smaller tasks and assigned to individual team members

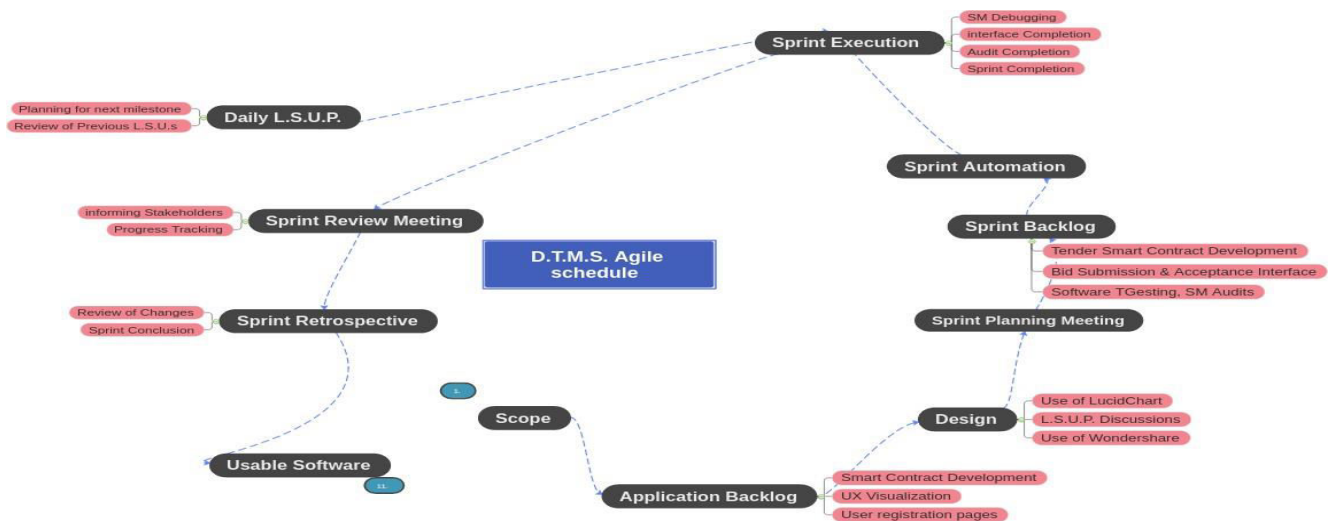


Figure 2: Agile Model

Daily Stand-up Meetings: Development team conducts daily stand-up meetings to discuss progress, challenges, and plans,

Continuous Integration and Testing: Continuous integration and testing of code ensures functionality, quality, and compliance in smart contracts, using automated testing and stakeholder feedback. Sprint

Review and Demo: Sprints end with a review and demo to stakeholders, ensuring functionality validation, course correction, and system goal achievement..

Sprint Retrospective: Analysing the sprint, the team evaluates the results, areas for development, and techniques understood for improving processes, problem-solving, and productivity growth.

Release and Deployment: Deployment with smart contracts, block chain network configuration, and production environment execution is ready for deployment after implementation, testing, and review..

On-going Maintenance and Improvements: Once deployed, the system is maintained and supported with regular updates, bug fixes, and improvements based on user feedback and evolving requirements.

Smart Contract Development: Tasks related to the creation of smart contracts that will drive the tendering process. This could include tendering, tendering, tender evaluation and procurement contracts.

UX Visualization: Decentralized application UX design should consider simplicity, usability, consistency, and block chain technology's unique properties.

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Smart Contract Development: Tasks related to the creation of smart contracts that will drive the tendering process. This could include tendering, tendering, tender evaluation and procurement contracts.

User Path: These would outline the path that different types of users (eg tender issuers, bidders) take when interacting with the system. For example, a bidder's journey includes finding a bid, evaluating it, preparing the bid, submitting the bid, and receiving the result.



Mock-ups and Prototypes: These are more detailed and interactive representations of the DApp. They could show the look and feel of the system, including colours, typography, and graphics. Prototypes could also demonstrate an interaction flow, allowing users to click through the various steps of submitting an offer, for example.

User feedback loops: Designing mechanisms for collecting user feedback can be part of user experience visualization. This may include surveys, feedback forms or user testing sessions. Collecting and incorporating user feedback is critical to improving the user experience.

Sprint Backlog: In a Decentralized Tender Management System project, the Sprint Backlog is a subset of the Product Backlog items that the team commits to deliver during a particular Sprint. The exact content of the Sprint Backlog will depend on the capacity of the team, the priorities set by the Product Owner, and the overall progress of the project.

Develop Tender Creation Smart Contract: The task is to develop a smart contract that will be used to create new tenders in the system.

Build the Bidding UI: The task is to create the part of the DApp that bidders will use to submit their bids.

Feature	Initial Estimat	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Hours Left
Categories	60	20	8	5	1	5	10	0	1	10
Synchronization	60	10	5	2	2	5	10	19	2	5
Accounts	60	5	8	2	10	5	10	5	10	5
Reminders	60	10	12	2	3	5	10	2	10	6

Setting	Start	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Planned Hours		30	30	30	30	30	30	30	30
Actual Hours		45	33	11	16	20	40	26	23
Remaining Effort	240	195	162	151	135	115	75	49	26
Ideal Burn down	240	210	180	150	120	90	60	30	0

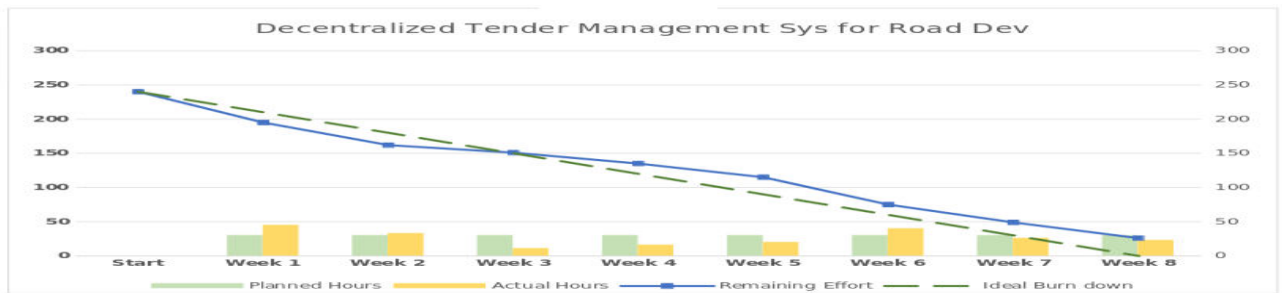


Figure 3: Sprint Analysis

IV. RESULTS AND DISCUSSION

Out Come

Thus, by introducing a decentralized tender management system for road development, we have come up with several advantages over the existing system.

The different results are:

- 1. Improved transparency:** A decentralized tender management system using block chain technology enhances transparency, allowing stakeholders like government entities, suppliers, and bidders to access auditable procurement records, reducing corruption and favouritism, promoting a fair and accountable environment.
- 2. Improved efficiency:** Block chain automation enhances efficiency by eliminating paperwork, intermediaries, and reducing delays, administrative overhead, and project delivery costs.
- 3. Enhanced Security:** Block chain technology enhances tender data security through cryptographic techniques, reducing risk of breaches and fraud, building trust and protecting positive information.
- 4. Greater participation:** Decentralized tender management systems increase participation from smaller contractors and suppliers, reducing barriers to entry and driving innovation in the road development sector.

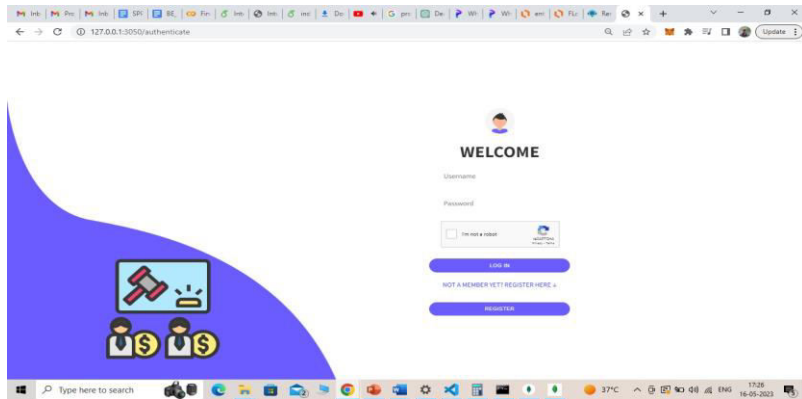


Figure 5: Landing Page

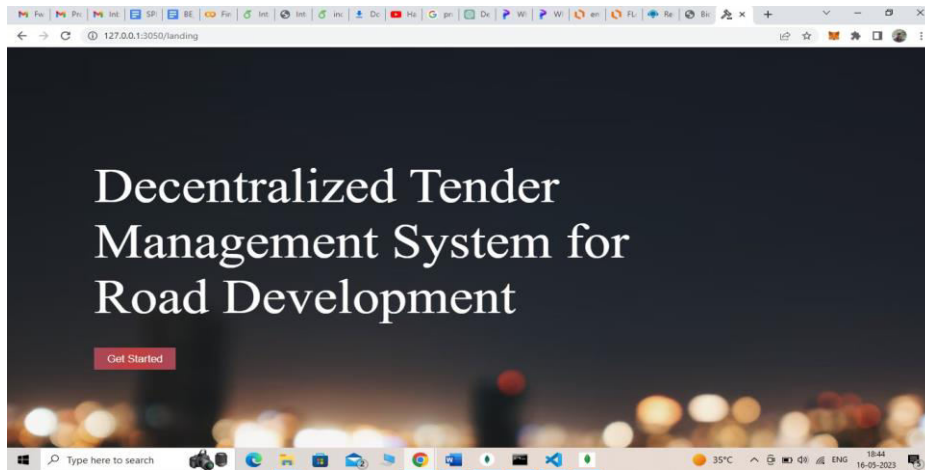


Figure 6: Login Page

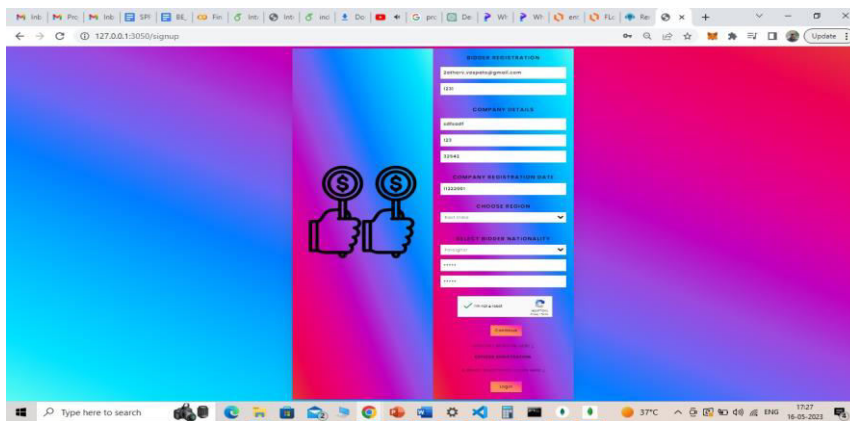


Figure 7: Bidder Registration Page



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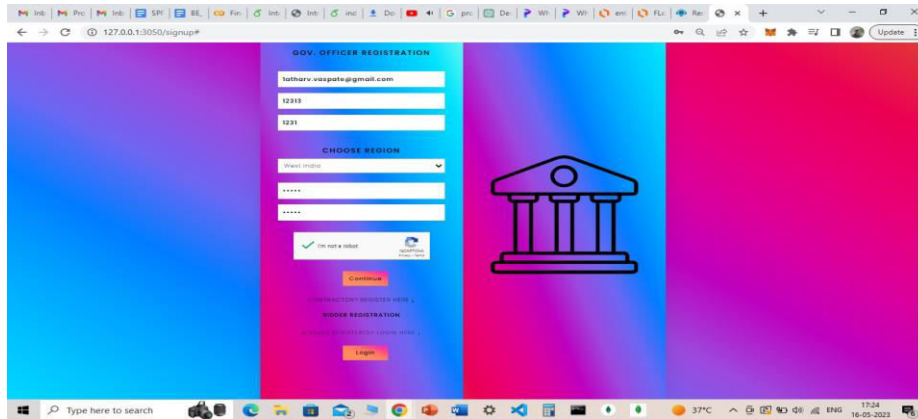


Figure 8: Government Officer Registration Page

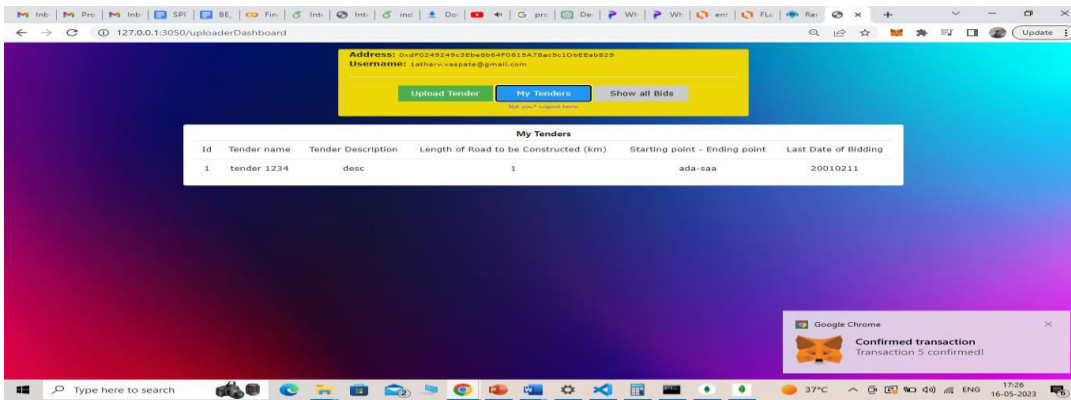


Figure 9: My Tenders

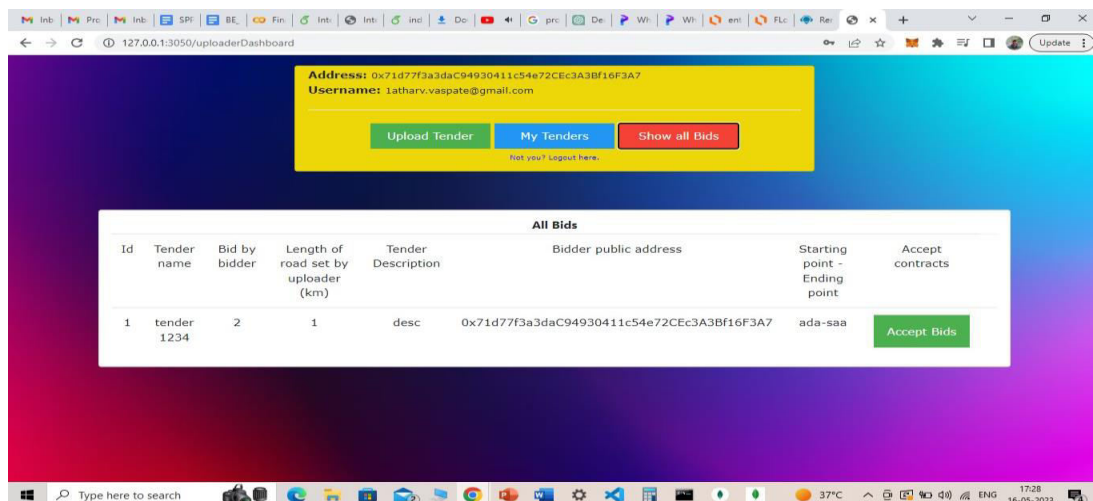


Figure 10: Show all Bids

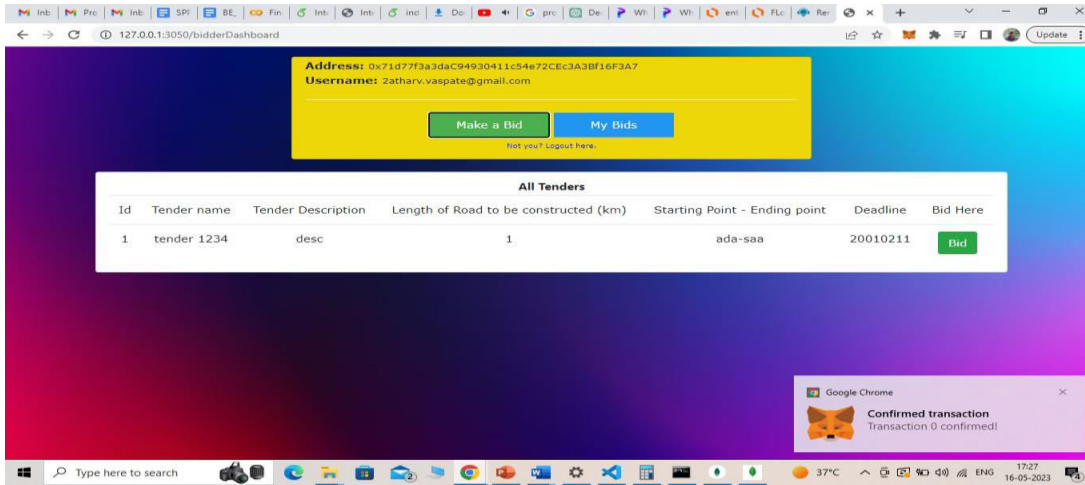


Figure 11: Make a bid

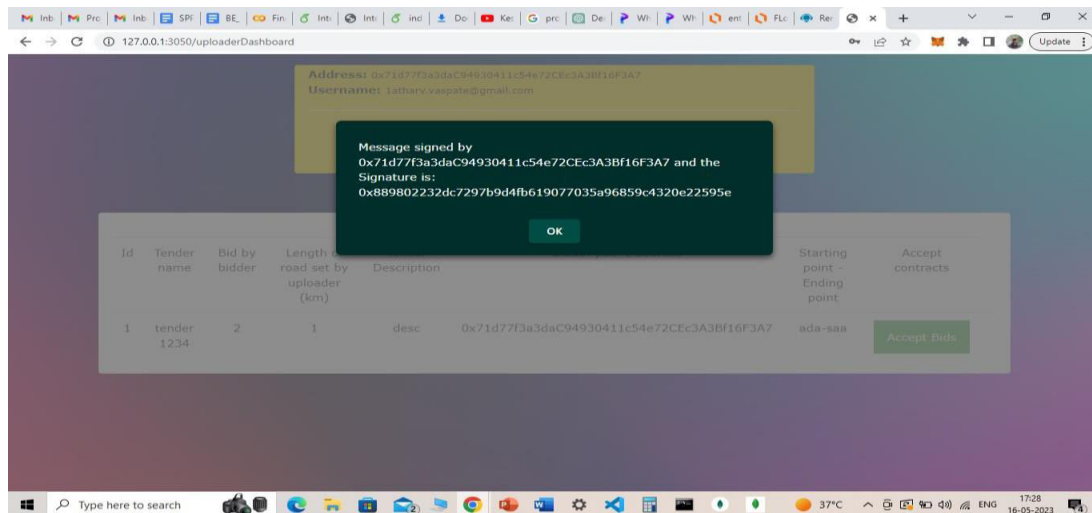


Figure 12: Transaction Signed Successfully

V. CONCLUSIONS

Implementing a decentralized tender management system for road development using block chain technology offers a number of benefits to the overall tender process. Brings increased transparency, improved efficiency, increased security and greater participation by leveraging the unique properties of blockchain, the road development sector can transform its procurement process, promote fairness and accountability and achieve more successful infrastructure projects.

Future Scope

A decentralized tender management system using block chain technology has several possibilities for future work and improvement.

Integration with IoT and sensors: The integration of Internet of Things (IoT) devices and sensors can provide real-time monitoring and data collection during the road development process. This integration enables the automated capture of data on road condition, traffic flow and maintenance needs that can be recorded on the block chain. Such data can improve decision-making, facilitate proactive maintenance and enable effective planning of road development projects.

Smart contract improvements: Smart contracts can be further enhanced to include more complex conditions and automated processes. For example, the system can automatically trigger payments based on pre-defined milestones or conditions, ensuring fast and accurate compensation for suppliers. In addition, incorporating penalties or incentives into smart contracts can encourage timely project completion and ensure high-quality results.

Extension to other infrastructure projects: While the focus is initially on road development, the decentralized tender management system can be extended to other infrastructure projects such as bridges, tunnels or public buildings.



Adapting the system to the specific requirements and regulations of different projects would broaden its applicability and impact and offer a comprehensive solution for managing different types of infrastructure development.

Scalability and Interoperability: As the system grows and handles an increasing volume of tenders and bids, ensuring scalability and interoperability becomes essential. Developing solutions that can handle higher transaction volumes, integrate with existing systems, and work with other block chain networks will be essential to the long-term success and widespread adoption of a decentralized procurement management system.

Application: A decentralized tender management system for road development using block chain technology has various applications in the road development industry.

Some key applications include:

Tendering and administration: The system facilitates the awarding and administration of tenders for road development projects. It provides a transparent and secure platform for government entities or project owners to publish tender details, specifications and requirements. Contractors and suppliers can easily access and participate in the bidding process, submit bids and track the progress of their submissions.

Evaluation and selection of offers: The system automates the bid evaluation and selection process and ensures fairness, transparency and accuracy. Smart contracts can be used to define evaluation criteria, automate scoring, and eliminate the need for manual intervention. This simplifies the evaluation process, reduces human bias and increases the efficiency of selecting the winning bid.

Audit and Accountability: The block chain-based system provides a reliable audit trail for tender-related activities. All transactions and interactions recorded on the block chain are immutable, enabling transparent auditing and ensuring accountability of all parties involved. This promotes trust and reduces the risk of corruption or malpractice.

REFERENCES

1. Tendering process in India and how it is its own Achilles heel. <https://www.esds.co.in/blog/tendering-process-india-achilles-heel>
2. Luo, Y., Riley, D. and Horman, M.J. 2005. Lean principles for prefabrication in green design-build (GDB) projects. In: Proc. 13th Ann. Conf. of the Int'l. Group for Lean Construction. Sydney, Australia, Jul. 19-21.
3. Madros, H. 1998. Comfort level in low cost housing in Johor Bahru. In: Proc. Of Conference on Low and Low-Medium Cost Housing Development. Sarawak, Malaysia, Jul.9-10.
4. Nunamaker, J.F. Jr., Chen, M. and Purdin, T.D.M. 1991. Systems development in information systems Research. Journal of Management Information Systems, 7(3), pp. 89-106.
5. Porter, M.E. 1985. Competitive advantage: Creating and sustaining superior performance. New York, NY: The Free Press.
6. Riley, D., Sanvido, V., Horman, M., McLaughlin, M. and Kerr, D. 2005. Lean and green: The role of design-build mechanical competencies in the design and construction of green buildings. In: Proc. of Construction Research Congress. San Diego, California, USA, Apr. 5-7.
7. Rooke, J., Koskela, L., Bertelsen, S. and Henrich, G., 2007. Centred flows: A lean approach to decision making and organisation. In: Proc. 15th Ann. Conf. of the Int'l. Group for Lean Construction. East Lansing, Michigan, Jul. 18-20.
8. Saidur, R., Hasanuzzaman, M., Hasan, M. M. and Masjuki, H. H. 2009. Overall thermal transfer value of residential buildings in Malaysia. Applied Science, 9(11), pp. 2130-2136.
9. Shingo, S., 1988. Non-stock production: the Shingo system for continuous improvement, Portland, OR: Productivity Press Sharpe, M. (2004). Safe as houses? Indoor air pollution and health. Journal of environmental monitoring, 6(5), pp. 46-49.
10. Tinker, J. A., Eng, C., Ibrahim, S. H. and Ghisi, E. 2004. An evaluation of thermal comfort in typical modern low-income housing in Malaysia. In: Proc. Ann. Conf. of Ameri



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