Student Engagement in College using Blockchain Based Approach

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ABSTRACT

The traditional education system has undergone a paradigm shift in the recent past, with the introduction of digital tools and platforms that facilitate learning beyond the physical classrooms. However, even as online learning becomes more popular, student engagement on campus remains a crucial aspect of the learning experience. In this context, the blockchain approach offers an innovative solution to enhance student engagement and foster a more inclusive campus environment. This is a development of a rewards program that incentivizes students for positive behavior and achievements on the blockchain network. This can be achieved by assigning tokens to students for participating in college events, volunteering work, and academic achievements. The purpose of this program is to encourage students to engage in positive behavior and achieve academic success. By using the blockchain network to record the rewards, it becomes transparent and tamper-proof, ensuring that students can trust the system.

Keyword : - *Blockchain , tokens, engagement,, Rewards, transparency.*

1. INTRODUCTION

Student engagement is a crucial aspect of the learning experience, as it enhances academic success, personal growth, and overall campus culture. However, traditional methods of tracking and incentivizing student engagement can be inefficient and ineffective. In recent years, there has been growing interest in using blockchain technology to create a more decentralized, transparent, and secure system for managing student engagement.

One such approach is a blockchain-based student engagement program, where students earn tokens for attending events, participating in fests, and other activities that promote learning and personal development. The tokens can be redeemed for rewards such as discounts, free tickets, or exclusive access to campus facilities. This approach not only incentivizes student engagement but also creates a culture of accountability, recognition, and community building. To implement this program, the college can develop a set of criteria for earning tokens. For instance, students can earn tokens for attending college events such as sports tournaments, music concerts, and guest lectures. Likewise, students can earn tokens for volunteering work for the college or participating in academic achievements such as writing papers, making presentations, or achieving good grades.

To ensure transparency, the blockchain can be used to record the number of tokens each student has earned. of, an incentive-based system can be employed, where students earn rewards for performing certain activities.

2. IMPLEMENTATION

Implementations of this system have the main objective of providing a solution for students to get motivated and inspire others into having a more enriching university experience. This paper aims to encourage more students to

participate in this campus-experience. Consequently, an improvement in facility qualities (due to the new perspective brought in by the youth) complements the experiences newly gained by the students The implementation of a blockchain-based method for student engagement involves several steps, such as the following

2.1 Defining the Objectives

The first step in implementing a blockchain-based method for student engagement is to define the objectives of the program. This involves identifying the activities and events that will be included in the program, as well as the rewards that will be offered to students. For example, the program may include attending seminars, workshops, volunteering, participating in fests, and other campus activities. The rewards may include tokens that can be redeemed for discounts, free tickets, or exclusive access to campus facilities, or would help in publishing papers along with teachers.

2.2 Framework

To develop a blockchain-based rewards program for positive behavior and achievements using MERN (MongoDB, Express.js, React.js, and Node.js) stack, we can follow these steps:

- Create a database schema using MongoDB to store student records, including their names, student ID numbers, and the number of tokens they have earned.
- Develop a RESTful API using Express.js that connects to the database and enables CRUD (Create, Read, Update, Delete) operations for student records.
- Use Node.js to implement a token generation system that generates a unique token for each student for their participation in college events, volunteering work, and academic achievements.
- Use React.js to create a user interface that allows students to view their token balance, track their progress, and redeem their tokens for rewards.
- Use smart contracts and blockchain technology to record token transactions on the blockchain network, ensuring transparency and security.
- Use a secure authentication system to ensure that only authorized students can access their token records.
- Implement a notification system that sends reminders to students to participate in events and volunteer work, and notifies them when they earn tokens.
- Continuously monitor and improve the system's performance by analyzing usage data, feedback from students, and updating the system's design and features accordingly.

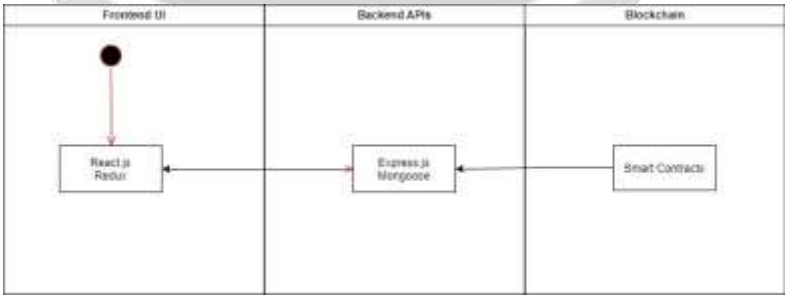

Fig -1: Architecture

2.3 Creating a Blockchain Network

The blockchain network works in the following way.We define a schema for a block in a blockchain using Mongoose, which is a popular Node.js package for working with MongoDB. The block schema includes the following properties:

- `index`: A unique index assigned to the block.
- `timestamp`: The timestamp of when the block was created.
- `transactions`: The ID of the transaction stored in a separate collection using a reference.
- `previousHash`: The hash of the previous block in the blockchain.
- `hash`: The hash of the current block, which is calculated using the `calculateHash()` method.

The `calculateHash()` method takes in the index, previous hash, timestamp, and transactions of the block and returns the SHA256 hash of these values as a string.

The working of a blockchain based on this code involves the following steps:

1. Genesis Block: The first block in the blockchain, also known as the genesis block, is created with an index of 0 and a previous hash of "0". This block does not have any transactions.

2. Adding Blocks: Each subsequent block in the blockchain is added by creating a new instance of the block schema and setting its properties to the appropriate values. The index of the new block is set to the index of the previous block plus one. The previous hash of the new block is set to the hash of the previous block. The timestamp of the new block is set to the current time. The transactions of the new block are stored in a separate collection and the ID of the transaction document is stored in the transactions property of the block schema. The hash of the new block is calculated using the `calculateHash()` method.

3. Validating Blocks: Before a new block can be added to the blockchain, it must be validated to ensure that it has not been tampered with. This is done by verifying that the hash of the previous block stored in the `previousHash` property of the new block matches the hash of the actual previous block in the blockchain.

4. Resolving Conflicts: If there are multiple branches in the blockchain, such as when two blocks are added to the blockchain at the same time, the longest chain is considered the valid one. In case of conflicts, the nodes in the network resolve the conflict by choosing the longest chain.

In summary, the given code defines a schema for a block in a blockchain and includes a method to calculate the hash of the block. The working of a blockchain based on this code involves creating blocks, validating them, and resolving conflicts to maintain the integrity of the blockchain.

2.4 Creating a User Interface

To make the program accessible to students, a user interface should be developed that allows students to view their token balance, track their progress, and redeem their tokens for rewards. The user interface can be developed using a web or mobile application. It should be user-friendly and intuitive so that students can easily navigate and use the program

Finally, the program should be marketed and promoted to students to encourage participation. This can be done through social media, email newsletters, and other channels. The program should be promoted as a fun and rewarding way for students to engage with the campus community and enhance their academic and personal growth.

3. CONCLUSIONS

In conclusion, the implementation of a blockchain-based method for student engagement involves defining the objectives of the program, choosing a blockchain platform, developing smart contracts, creating a user interface, testing and deployment, and marketing and promotion. By following these steps, a robust and effective student

engagement program can be developed that leverages the benefits of blockchain technology to promote a vibrant and inclusive campus culture

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