

BLOCKCHAIN BASED MODEL FOR ROYALTY PAYMENT OF ARTISTS

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Abstract - Music has always been a way for artists to express themselves. With the availability of digital music streaming platforms, the music industry has grown exponentially within the past few years. However, these streaming platforms that stream music are centralized due to which artists get a tiny fraction of revenue and also lack control over their content. The cases of plagiarism in the music industry have increased a lot due to which it is necessary to use such a technology that can act as a boon for artist. In the current scenario, a revolutionary technology is needed that can provide more control and transparency over their content to the artist. With the existing systems, the artist needs to be dependent on many middlemen like labels, streaming platforms, etc. To eliminate this problem, our paper mainly focuses on a decentralized approach using blockchain with direct interaction between artists and users for uploading, buying songs and paying royalty. The artists can upload their music on the DApp ensuring its ownership and avoiding any chances of plagiarism. The users can buy the song from the independent artist and listen to the music and also can support the artist by giving donations using Ethers.

Key Words: Web3.js, IPFS, Ganache, Truffle, React, Smart Contracts, Metamask, Royalty, Ethereum, DApp

1. INTRODUCTION

Blockchain is an evolving technology which holds records for transactions and guarantees security, transparency and decentralization. It is like stored records in immutable blocks where authorization is not central but decentralized. It has various applications in supply chain, banking sector, etc. Blockchain technology is prominently used in the banking and finance industry due to the security it provides in storing permanent records of millions of transactions and decentralization.

Music is a vastly extensive industry consisting of not alone artists but composers, recording labels, retailers, artist managers, and staff. In 2019, the total revenue of the recorded music industry amounted to 21.5 billion U.S. dollars. Streaming made up 56 percent of this figure, bringing in 11.9 billion dollars globally. In such cases holding accountability, all the inflow is quite difficult; another factor contributing to a sudden downfall is music piracy.[5]

With digitalization and the availability of various music streaming platforms, the music industry has grown immensely. However, the major music streaming platforms are centralized, and as a result, the artists lack control over their content and receive only a small fraction of the revenue generated by these platforms. The current system requires artists to depend on intermediaries like studio companies, record labels, and streaming service companies for managing and marketing their work. This can be solved by the direct interaction between consumers and artists as it would eliminate the need for intermediaries from the revenue stream.

To overcome these problems the proposed paper involves developing a DApp using React Framework, a private local blockchain- Ganache, truffle and libraries of Web3.js.

2. LITERATURE REVIEW

In [1] referred to blockchain adoption in the music industry supply chain is presented from the perspective of a semantic-driven framework for automated, flexible smart contract generation based on party agreement. Moreover, it has analyzed how the presented mechanism can be adopted in the music industry supply chain from the perspective of an independent, internet-based artist.

In [2] reviewed the uses of DApp technology to ensure that consumers do not blindly depend on the producers and check if products are genuine. Manufacturers can use the system to provide information about products without having to manage stores directly, which ultimately reduces costs.

In [3] Chavan, Sudarshan, et al. tries to remove third-parties and directly connect artists and listeners by making an Ethereum based music streaming service with IPFS as its backend. In this way, they overcome the lack of transparency in the current streaming industry, reduce the delay in artist royalty payments and simplify the licensing process of payments for the artist. In future, they propose to include a dynamic pricing structure and a consensus mechanism for approving tracks to be uploaded on the platform.

In [4] reviewed the impact that blockchain technology can have on the music industry by analysing the views of academic experts. They claim that the distribution of revenue to artists is an ongoing issue. According to them,

some industry experts believe that this problem can be resolved using blockchain technology while some are still sceptical about it. The author believes that blockchain technology (using smart contracts) has the ability to speed up payments and provide additional revenue.

3. PROBLEM STATEMENT

The purpose is to create a strong foundation for those who are hardworking and talented but do not get the opportunity to shine along with the fact that every hardworking artist can get their deserved recognition and royalty, irrespective of their fame or popularity .

“To create a blockchain-based model to deal with copyright of music, lack of transparency and to create a decentralized network to generate the monetization model for a royalty payment of artists.”

3.1 PROBLEM IN PRESENT SYSTEM

- 1. Lack of authentic copyright database:** The rights of musical composition includes right to reproduce music, right to perform and right to distribute. All this is managed by labels and recorders whereas actual artists lack the right over content.
- 2. Delayed and unfair payments :** A huge share of payments of rights, sharing, streaming and distribution is taken by labels and producers which leads to a small chunk of payment to the artists. Moreover, the major labels exploits the independent artists since they do not have the equality of bargaining power in negotiating licensing terms and conditions.
- 3. Lack of Data Transparency :** The statistics of songs, payments are all in the hands of labels who are too busy managing their data with negotiators and mediators with different payment systems and reporting systems.

4. TECHNOLOGIES

BLOCKCHAIN:

1. DApp: A decentralized application uses a decentralized system to perform different tasks. DApps help the user interact with the smart contract programs stored on a blockchain.

2. Solidity: It is the high-level language used to write smart contracts that can be stored on the blockchain. This will define the logic behind our blockchain, dictating the behaviour of all the accounts.

3. Ganache: It is used to create a personal local Ethereum blockchain, whose dummy accounts can be accessed by a cryptocurrency wallet and used in a DApp. This helps us

run our DApp like it is connected to the actual Ethereum network without long transaction times.

4. MetaMask: It is a crypto-wallet that can be accessed through a browser extension. We can use this to interact with our local blockchain created using Ganache.

5. Truffle: It is the development environment that will be used to develop smart contracts and DApps. It can be used for the compilation, testing as well as deployment of smart contracts.

FRONTEND:

React: It is an open-source Javascript library used for frontend development. We use it because it is easy, fast and has a lot of support in the form of tutorials and forums. Many DApps we explored use React to develop their frontend and thus we follow the same.

BACKEND:

1. Web3.js: It is an extensive collection of libraries that will help our web app to communicate with an Ethereum blockchain using JSON based Remote Procedure Calls.

2. IPFS (InterPlanetary File System): It is a distributed storage system that utilizes Peer-to-Peer (P2P) networking. Unlike traditional “location-based” storage systems, IPFS is “content-based” as it maintains unique global hashes of all the files. This gives it many advantages like independence from a single controlling entity and preventing duplicate files, thus being perfect for implementing our DApp.

5. SYSTEM REQUIREMENTS

Software	Function	Version
Web3.js	Connect with Ethereum	1.7.0
IPFS	Store Files	0.12.0
Ganache	Ethereum Blockchain Server	7.0.2
Metamask	Ethereum Wallet	10.9.3
Truffle	Development Server Of ETH	5.5.2
Node	JavaScript Runtime	16.14.0
React.js	User Interface	17.0.2
Visual Studio	Integrated Developer Environment	1.63.2
Windows 11	Operating System	21H2

Table -1: System Requirements

6. PROPOSED SYSTEM

Our proposed system includes registration of artists and audience to our DApp. The artists can upload songs, assign fees for the song or to keep it free for adding to audience playlist, track and analyse performance of their songs. The audience can pay the fee for the song they want to add in

their playlist and also donate to the artist they like. The songs uploaded by the artists will be stored on IPFS that is a distributed database. Here a unique hash for the song will be generated after checking for duplication. If the same song exists in the database then the song won't be uploaded. The audience can do payments in milliwei using Metamask Wallet with Ethers.

Two types of users:

Artists

1. Can post songs and track activity on their songs.
2. Can assign fees for listening to songs after the freeplays have been exhausted.
3. Can also choose to keep the song free for all.

Audience

- Can browse artists and songs.
- Can get access to a song by paying the fees as defined by the artist

Smart Contract: Smart contract is a transaction protocol which is intended to automatically execute, control or document legally relevant events and actions according to the terms of a contract or an agreement. The objectives of smart contracts are the reduction of need in trusted intermediators, arbitration and enforcement costs, fraud losses, as well as the reduction of malicious and accidental exceptions.

Transaction:

Buy Song: Audience can buy songs at the price set by the artists by paying in Ethereum.

Royalty/Donation: Audience can pay donation to artists.

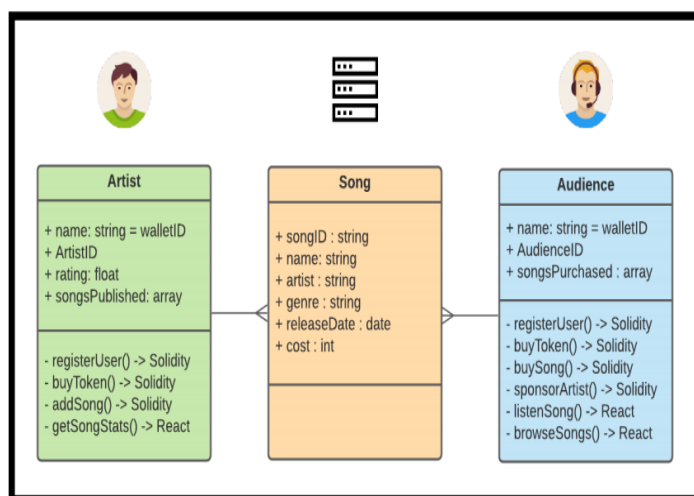


Fig -1: Entity Relational

6.1 SYSTEM ARCHITECTURE

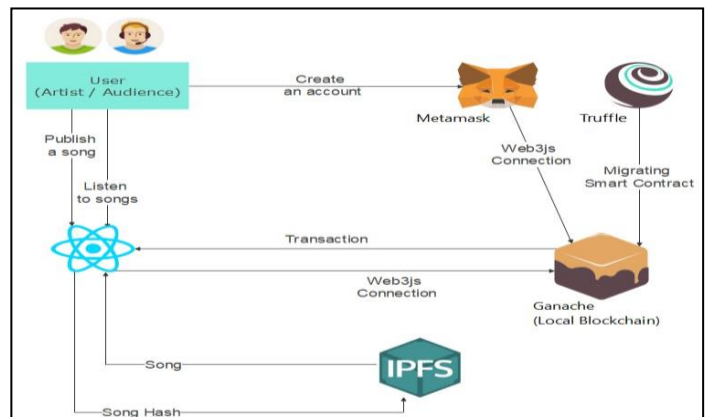


Fig -2: System Architecture

6.2 FEATURES

P2P Storage System: All data will be stored on a distributed database like IPFS and songs will be tested for duplication.

Cryptocurrency: All payments will be made in milliwei using Metamask Wallet. The wallet can be refilled using ETH funds.

Crowd Funding: Support favourite artists by funding their albums and tracks.

Survey System: Popularity scores would be generated for the various artists using the platform.

7. USE CASE DIAGRAM

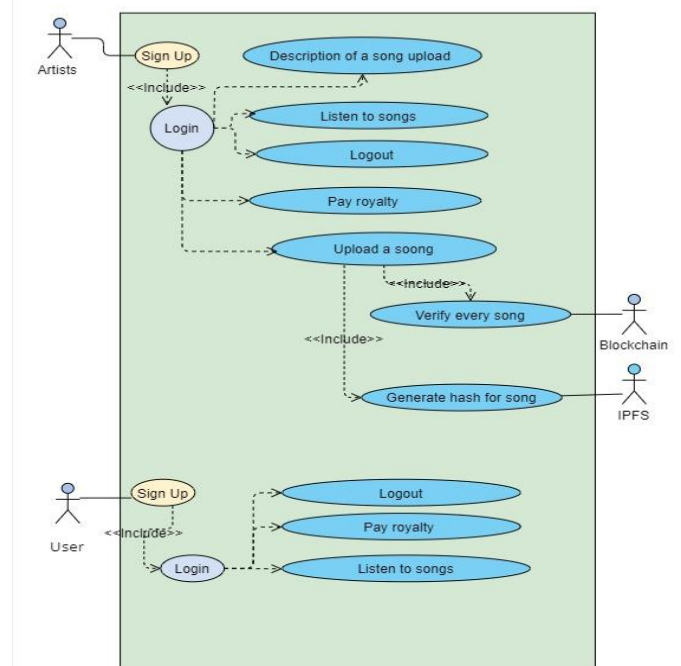


Fig -3: Use Case Diagram

8. IMPLEMENTATION

```
Windows PowerShell
Starting migrations...
-----
> Network name: 'ganache'
> Network id: 5777
> Block gas limit: 0x6601b7

1_initial_migration.js
-----
Replacing "Migrations"
  Blocks: 0 Seconds: 0 > transaction hash: 0x338c0ba864d83ceef8b8cf64fe446deb722274f583bd3dc5219a08950c60
  Blocks: 0
  > contract address: 0x1De91276A82EC882e643E7E8c5e9FA37F77Ce91
  > block number: 1
  > block timestamp: 1649315200
  > account: 0xFa8A2385685C64cfA94231E12161b333cfb883
  > balance: 99.99448228
  > gas used: 27586 (0x435aa)
  > gas price: 20 gwei
  > value sent: 0 ETH
  > total cost: 0.00551772 ETH

> Saving migration to chain.
> Saving artifacts
-----
2_deploy_contract.js
-----
Replacing "blockstudio"
  Blocks: 0 Seconds: 0 > transaction hash: 0xf71812c15211315255a4c336459866d4f954f3bcaa4b8d3da734e7ab7ec2c4
  Blocks: 0
  > contract address: 0xF9a8a008f9d044b8381e4141868bf423630
  > block number: 2
  > block timestamp: 1649315201
  > account: 0xFa8A2385685C64cfA94231E12161b333cfb883
  > balance: 99.95119192
  > gas used: 212189 (0x266098)
  > gas price: 20 gwei
  > value sent: 0 ETH
  > total cost: 0.0024376 ETH
```

Fig: Migration,Deployment of Smart Contract

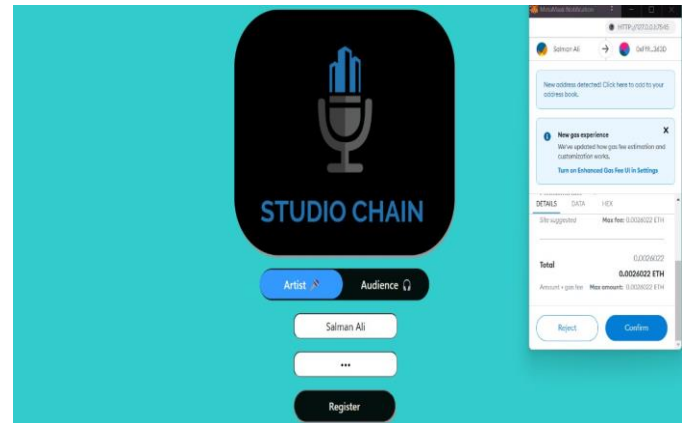


Fig: Artist Registration

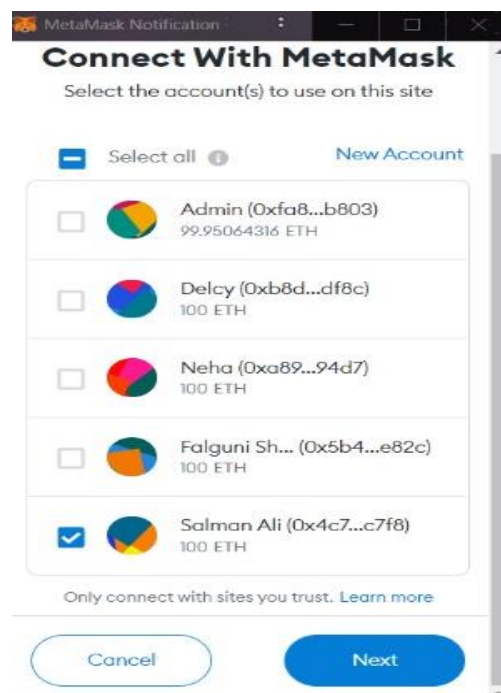


Fig: Accounts on Metamask

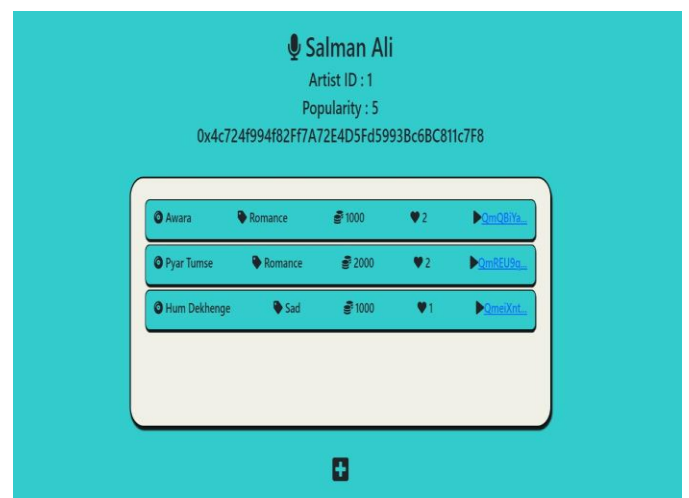


Fig: Artist Homepage

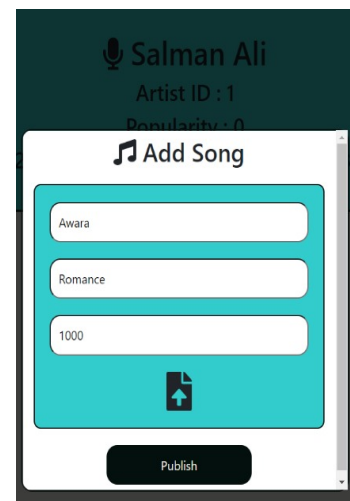


Fig: Upload Song

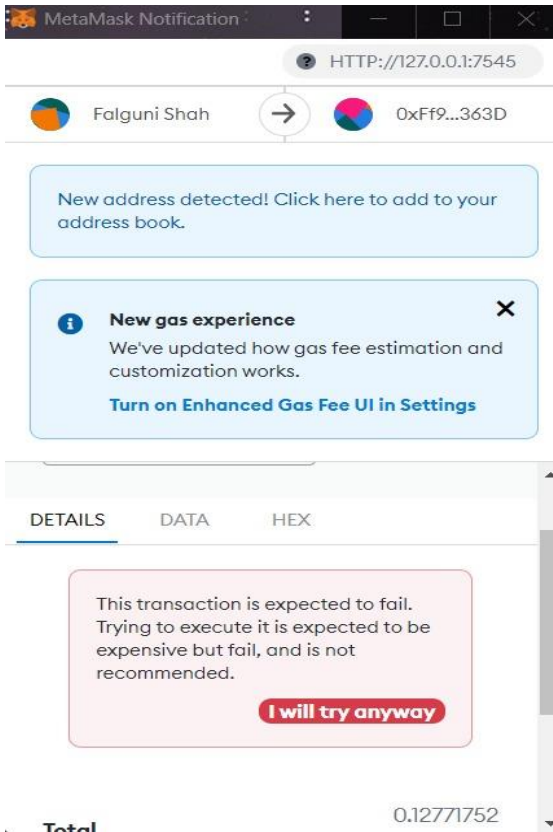


Fig: If Song already Exist, transaction Reject

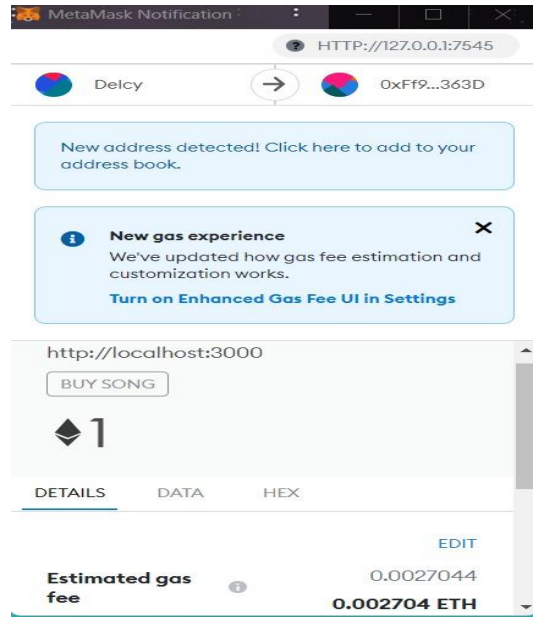


Fig: Buy song

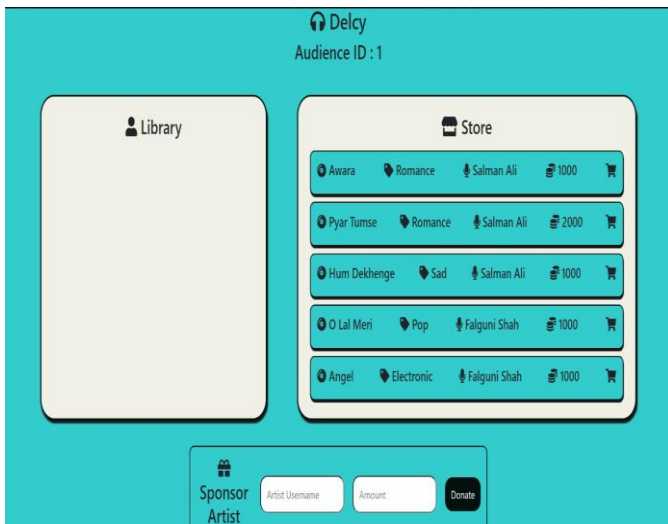


Fig: Audience/User Homepage

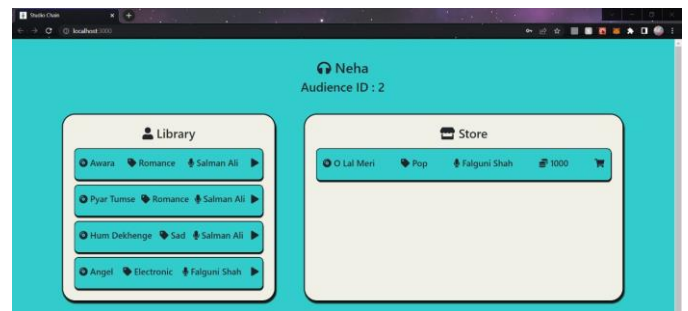


Fig: Library after Buying Song



Fig: Paying Donation/Royalty

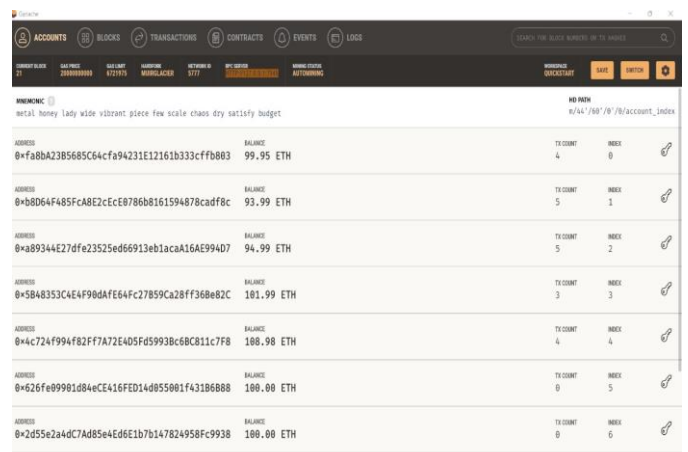
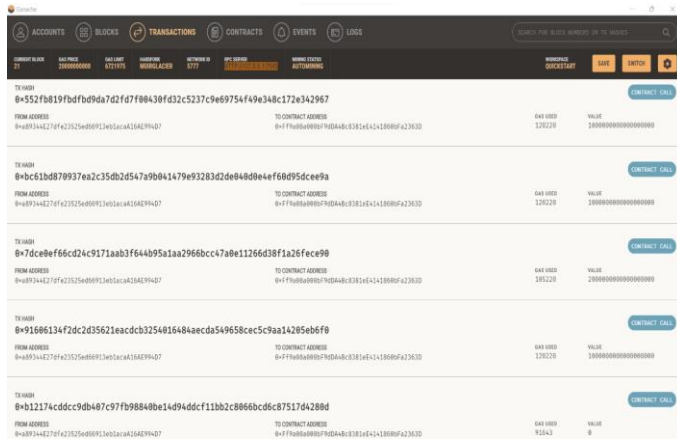


Fig: Ganache Interface



TX HASH	FROM ADDRESS	TO CONTRACT ADDRESS	GAS USED	VALUE
0x552f819f8fbd9da7d2fd7f08430fd32c5237c9e9754f49e348c172e342967	0x489734e27f423254809f3405a1a3484e99d7	0xf7f98b80b9f70d4ab03814e411309fa2363d	126229	2000000000000000000
0x0c61b878937ea2c35db2d547a908a1479e93283d2de04080e4ef60805dcee9a	0x489734e27f423254809f3405a1a3484e99d7	0xf7f98b80b9f70d4ab03814e411309fa2363d	126229	2000000000000000000
0x7dce0f66cd24c917aa3f64495a1aa2966bcc47a0e11266d38f1a26feca90	0x489734e27f423254809f3405a1a3484e99d7	0xf7f98b80b9f70d4ab03814e411309fa2363d	126229	2000000000000000000
0x91586134f2dc2d5621eacdc325481648aecdc549588cc5c9aa1a1056b6f9	0x489734e27f423254809f3405a1a3484e99d7	0xf7f98b80b9f70d4ab03814e411309fa2363d	126229	2000000000000000000
0xb12174cddc9db487c97fb98840be1d94d6cf11bb2c8866bcc8c87517d4288d	0x489734e27f423254809f3405a1a3484e99d7	0xf7f98b80b9f70d4ab03814e411309fa2363d	92543	0

Fig: Transaction Records

9. CONCLUSION

In conclusion, this paper focuses mainly focuses on creating a decentralized application that will be beneficial for an artist to publish their songs and get their desired royalty and recognition. Our project will also provide a base for further development. As blockchain is in its developing stages, it can be used to make immutable databases and records. In the future, audio-finger printing for remix makers, machine learning, and AI can be integrated. Features such as live streaming, playlist, and song recommendation can be added. Until then, the presented system is built to provide a comfortable multifaceted functioning.

REFERENCES

- [1] Nenad Petrovic, " Adopting Semantic-Driven Blockchain Technology to Support Newcomers in Music Industry", the 16th International Conference for Informatics and Information Technology (CIIT 2019)
- [2] Watermarking Technology and Blockchains in Music Industry. [Online]. Available: <https://www.digimarc.com/docs/default-source/digimarc-resources/whitepaper-blockchain-in-music-industry.pdf?sfvrsn=2>.
- [3] Chavan, Sudarshan, et al. 'Music Streaming Application Using Blockchain'. 2019 6th International Conference on Computing for Sustainable Global Development (INDIACom), 2019, pp. 1035–40.
- [4] Kim, Kenneth Chi Ho. "The Impact of Blockchain Technology on the Music Industry." International Journal of Advanced Smart Convergence, vol. 8, no. 1, 2019, pp. 196–203. [koreascience.or.kr,https://doi.org/10.7236/IJASC.2019.8.1.196](https://doi.org/10.7236/IJASC.2019.8.1.196).
- [5] Global revenue Music Industry. [Online]. Available: <https://www.statista.com/statistics/272305/global-revenue-of-the-music-industry/>

- [6] Is Transparency the Music Industry's Biggest Problem? [Online]. Available: <https://medium.com/@GetRevelator/transparency-is-the-music-industry-s-biggest-problem-2f5962f6c599>
- [7] How the Blockchain Will Play a Big Part in the Future of the Music Monetary System. [Online]. Available: <http://www.thembj.org/2020/10/how-the-blockchain-will-play-a-big-part-in-the-future-of-themusic-monetary-system/>
- [8] Kabi, Oliver R., and Virginia N. L. Franqueira. Blockchain-Based Distributed Marketplace. core.ac.uk, https://core.ac.uk/display/163078568?utm_source=pdf&utm_medium=banner&utm_campaign=pdf-decoration-v1. Accessed 14 Dec. 2021.
- [9] Sitonio, Camila, and Alberto Nucciarelli. The Impact of Blockchain on the Music Industry. Calgary: International Telecommunications Society (ITS), 2018. www.econstor.eu
- [10] What's really happening when you add a file to IPFS?. [Online]. Available: <https://medium.com/textileio/whats-really-happening-when-you-add-a-file-to-ipfs-ae3b8b5e4b0f>

BIOGRAPHIES



Delcy Dsouza is pursuing BE in Shree LR Tiwari College Of Engineering, Mira Road. She worked her final year project on blockchain. She has participated in many workshops regarding blockchain technology. Her area of interest are Blockchain, NLP and ML



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