

Pixegram - The future to NFT and Blockchain Trading education

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1 Introduction

Non-fungible Tokens, more commonly known as NFTs, have taken the internet and the Blockchain community by storm. In the past decade, Blockchain technology, along with popular currency such as Bitcoin and Ethereum has become the backbone of the Blockchain market.

In recent years, NFTs have made headlines in international and economic news. In particular, the premium collections of “Cryptopunks” and “Bored ape yacht club” are sets of 10000 pieces of NFT art that are currently trading for a minimum of \$200,000 per art piece. Other than these collections, individual art pieces converted into the form of tokens have been doing very well as well. For instance, the piece “Beeple”[3] have made a record sale of \$69,000,000 USD.

It is important to understand the nature of NFTs. The surprising factor to most newcomers is that the ‘ownership’ of an NFT does not mean sole possession or distribution rights of the NFT. Rather, it is simply putting the owner’s digital signature onto the art piece. The owner is then given the option to trade the NFT as a stock; when such an event happens, the digital signature would transfer between its owners. In a way, it is akin to purchasing bragging rights. This theory is proven recently by the popular NFT set “Bored ape yacht club”; there had been an exclusive event that was exclusively open to owners of any of the tokens from the “Bored ape yacht club” collection[3]. It is astonishing because “Bored ape yacht club” were mere computer generated art pieces, but has transcended into a symbol of status with the introduction of NFTs.

Only time will tell whether the trading of NFTs is a fad, or is here to stay. Though, it is undeniable that there has been a lot of recent hype with NFT trading. Currently, there are many ways to trade and invest in NFTs, mostly in the form of online marketplaces. “OpenSea”, one of such marketplaces, boasts the largest volume of monthly transactions[2]; at its peak, it had a record \$4.21 USD billion monthly trading volume.

There are a plethora of competitors with regards to service providers of NFT marketplaces. Thus, it would be hard to break into the NFT marketplace without leverage. Instead, in this project, we would be proposing the creation of a NFT marketplace simulator. The details of the project, named “Pixegram”, will be discussed in this report.

2 Infrastructure

Pixegram aims to create an educational platform that simulates a typical NFT marketplace. However, rather than allowing the trading of real NFTs on the platform, all materials would be self-contained, including tradeable goods and currency.

The way the platform operates can be separated into two parts: trading and creation of NFTs.

Allowing the creation of NFTs on the platform is important for several reasons. Firstly, it limits the type of tradeable NFTs on the platform. While this might seem like a limitation, in our simulation it is a favorable feature as it allows beginner users to understand the essence of the value of NFTs. Even though the current market of NFT is flooded with a wide variety of art forms, the ones that have succeeded typically follow the fundamentals of any free market: scarcity and branding.

Hence, we want the type of tradeable NFT on our platform to be similar to the popular NFT Cryptopunks. Created in 2017, the various 10,000 pieces of computer generated art in the Cryptopunk collection is valued using a simple algorithm; the more rare components each art piece consists of, the higher its value becomes. For instance, in figure 1, we can see that the “Goat” and “Do-rag” component is only present in 3% of the rest of the Cryptopunks collection. These rare components are the main factors in determining its high price.

To simulate the effect of rarity on user generated NFTs, we would be implementing a daily lottery system, for a chance to receive rare components. Further details would be discussed in the following section.

Finally, the environment that we would like to create should not only be beginner friendly, but likely also children friendly, due to its educational component. By limiting the type of art to the creation on a pixel based canvas, most content should be appropriate for all audiences.

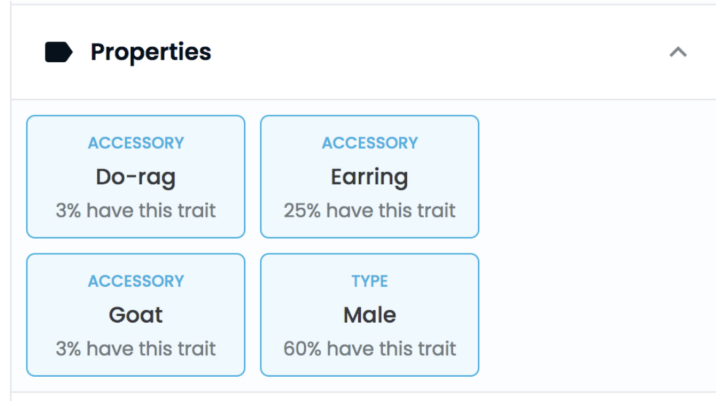


Fig. 1: Sample traits of a piece of NFT art

For the services of our platform, we intend to implement a small monthly charge (\$1 USD). A subscription model is beneficial in several aspects. The accumulative nature of in-game currency in each user account would mean that it is beneficial to continually renew the subscription. We do not want our service to be too gated with a high subscription charge, but a reasonable payment would discourage users from possible illegitimate trading with multiple accounts.

3 Creation - Canvas and Daily Lottery

The method of creation of NFTs on the platform is done through a pixel based canvas, as illustrated in Figure 2. Users will be given a palette of colors to fill in each grid of a default 15 by 15 sized square canvas. Upon customization through micro-transactions, both the palette and the canvas size can be modified.

Users are free to create as many pieces of art as they want through the canvas art tool. These art pieces would then be tradeable through the platform to other users. This simple system is crucially augmented with the inclusion of a daily lottery of items. Users have a chance to receive different item components daily; these components can

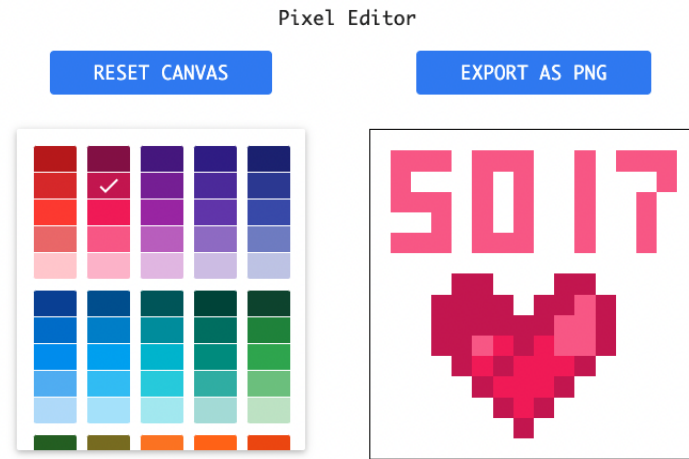


Fig. 2: Pixel based canvas on Pixegram

be thought of as 'features' from the "Cryptopunks" art collection. These rare items on Pixegram would be named "Pix-cessories".

With every daily login within a 24 hour period, users will receive one Pix-cessory. Pix-cessories can be included (without replacement) into any art piece, though its non-replacement nature might incentivize users to not use them rashly. Rare pix-cessories with a lower chance drop rate would naturally be valued higher than common pix-cessories. The collection and usage of pix-cessories in each users' art pieces would give them different inherent values, thus diversifying the NFT market.

Although the lottery system of Pix-cessories can make our simulation seem like a game of luck, inclusion of Pix-cessories would not be the only way to increase the value of your NFT arts. Since users will be given a profile to feature their art and collection, naturally, user branding would play a role. Users that create higher quality, distinctive art pieces may find their art become highly valued without the necessity to include rare items. Users will thus be encouraged to build their own brand through careful profile construction.

4 Trading Mechanisms

With one of the main goals being earning currency through the trading of NFTs in our simulation, we have decided to model our trading system as closely as possible to popular marketplaces. A relatively close reference would be the "OpenSea" NFT marketplace.

The main elements that we would implement on any tradeable NFTs is basic feature analysis, shown in Figure 1, as well as historical price tracking, as shown in Figure 3. These basic elements allow any user to do basic financial and technical analysis on stocks. Through analysis, users can make informed decisions when trading NFTs.

Auctions will also in the future be one of such mechanisms featured. Multiple users can bet on NFTs that are high in demand. While traditional NFT trading can be a meticulous process in acquiring NFTs, auctions can be a change of pace for users. Timed auctions in particular can provide users with a fast paced exciting competitive like trading environment.

Finally, for more casual users who might not be ready to directly invest or dabble in currency and economics, we also offer the choice to make custom trades with other



Fig. 3: Historical price tracking of NFT

users. For instance, two users can exchange their NFT freely, bypassing the necessity for using currency, as long as both parties agree to the trade.

5 Technology

In this section, we describe the details of our implementation. All the relevant source code has been uploaded to the following link: Github.

5.1 Architecture

The overall scheme of Pixegram consists of three major parts.

- (1) **Pixegram smart contracts:** Solidity smart contracts deployed on the Etherdata blockchain. The following are the main functions.
 - Minting new tokens.
 - Managing users' balances of ERC20 tokens.
 - Managing users' balances of ERC721 tokens.
 - Dealing with users' operations of their tokens.
 - Recording transaction history.
- (2) **Front-end application:** The website on which Pixegram operates on. Below are the main features:
 - Interacting with the smart contract.
 - Creating own pixel NFT arts on canvas.
 - Minting NFTs.
 - Managing and tracking current status of NFT in trades.
 - Trading NFTs with other users.
 - Browsing all available NFTs on the market.
- (3) **IPFS nodes**
 - Immutably storing the content of the file.

5.2 Tools used

We use the programming language Solidity (version 0.8.7) to implement our smart contract. For the smart contract development, we use the Etherdata-blockchain as our network. We also use Hardhat, an Ethereum development environment to carefully test our contracts. After that, we use the Remix IDE to deploy it.

It is expensive to store all the data on the blockchain. Therefore, we use the (Inter-Planetary Filing System) IPFS which uses a decentralized, peer-to-peer file sharing protocol for storing and accessing metadata of NFTs. We only record the IPFS hash of the tokens on the chain.

For demonstration purposes, we have developed a website that allows users to have basic interactions with our platform. The entire platform is written in the JavaScript programming language. We use the React library to develop the front-end application and Vite as the building tool.

5.3 Work flow

Here, we describe a typical work flow of an user who wants to create and trade their NFT art.

1. Start a new pixel painting on the canvas provided on the website platform. You can currently select between few color palettes. Then, once complete, export the painting as a '.png' file.
2. Upload the '.png' file onto the platform. It will be automatically recorded as a returned hash on the IPFS. Then, you can name the completed token and give a brief introduction to it. Finally, the system would upload all its metadata onto the IPFS.
3. Mint the NFT.
4. You are presented with the option to check the detailed information and compare your token's statistics with all the tokens on the market.
5. Price your NFT and put it onto the market.
6. Trade with others.

6 Micro-transactions

Pix-cessories are mainly earned through daily login, but we also allow the purchase of time-limited Pix-cessories in our in-game shop. This incentivizes users to earn currency through smart trading, quality art creations, or even direct purchase of in-game currency with real dollars.

Since creation of NFT art is a major component of the platform, we will also introduce various color palettes to those who feel limited by the default colors. Although not a currently implemented feature, we also plan to release time-limited color palettes as an attractive option to color palette collectors, and to diversify NFTs in the future.

The business potential with micro-transactions is endless, as proven by most successful gaming companies. The non-existent entry cost to 'free to play' games entices new customers to join, only to be introduced to attractive in-game premiums that drives the modern successful business model.

7 Market Capitalization

Pixegram is able to beat its stiff competition by introducing itself as the premier education simulator of NFT, rather than a traditional marketplace that provides trading for its users.

Instead, it is a platform geared towards children and learners who seek guidance into the world of NFT and blockchain technology. Education and educational technology is valued annually at \$2 trillion USD in the United states[1] alone. It is

a market that can be highly profitable and sustainable, due to the fact that NFT is a new area to most educators.

In an even grander scheme of things, Pixegram can be implemented into greater educational institutions. It can create a safe environment for children and young adults to learn of the intricacies of NFT without fear of fraud, or malicious users. As these beginners get more comfortable with the various features of NFT trading, more advanced techniques could be introduced to them.

8 Educational Values

An introduction to NFT trading can be seen as an introduction to wall street trading. As blockchain technology has been advancing, people are realizing the potential of such a tool. This comes with the security as well as the volatility of blockchain technology, similar to wall street bets. Thus, fundamentals in both financial and technical analysis are pivotal to success in stock trading.

Pixegram brings forth the opportunity to pursue virtual success in a safe space. Through creative art crafting, careful branding of user profiles, and financial trading, users strive to succeed on our virtual platform, without actual monetary risk.

9 Future Plans

When the bulk of the plans of Pixegram is carried out successfully, we plan to implement future updates to keep the platform fresh.

One such future plan would be to implement in-game currency. This distinction from normal NFT marketplaces is due to the fact that the platform tries to provide a safe and controlled environment to simulate an NFT market. Hence, it is more logical to use a virtual currency that is not subject to direct exterior market forces. This would essentially eliminate direct trading through crypt-currency. In-game currency can be earned through daily logins (similar to Pix-cessories), but would also be purchasable through micro-transactions.

An obvious implementation would be a communication system. Chat rooms can be useful for exchange of ideas or policies on NFT trading. In addition, a comment system can be helpful and supportive to well crafted tokens. Though, careful filtering would need to be put in place to ensure the children friendly nature of our platform.

10 Contribution

- * Isaac Chap: Architectural design, Business Vision, general Market Research and Capitalization and Smart Contracts Engineering.
- * Wang Wei Hong: Technology lead, Website design, Front-end and Smart Contracts Engineering

References

1. Bambury, S.: 3 ways nfts will disrupt the education sector. <https://www.gesseducation.com/gess-talks/articles/3-ways-nfts-will-disrupt-the-education-sector/> (2021), accessed: 2021-04-22
2. Dean, I.: 11 nft marketplaces you should know. <https://www.creativebloq.com/features/nft-marketplaces> (2022)
3. RESEARCH, E.: Non-fungible token market by type. <https://www.emergenresearch.com/industry-report/non-fungible-token-market> (2022), accessed: 2022-04-20