

## Why On-chain 3D Art is the future

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Starknet Fellowship Summer 2022

### Introduction

The research focuses on building on-chain L2 3D NFTs and reviewing past projects.

#### Why 3D?

3D digital assets have more application potential than 2D NFTs in the near future. There are increasingly more metaverse concepts and platforms. 3D NFTs can be used as game avatars, outfits, even parts of the metaverse itself, etc.

#### Why on-chain?

Due to size limitations with Ethereum, most current 3D NFTs are stored off-chain. Off-chain storage includes centralized servers within the company or an InterPlanetary File System (IPFS). The issue with centralized storage is that if the centralized server or company goes down the art would be lost.

First, the on-chain digital assets “live and breathe” on the blockchain. It would enable digital permanence.

Second, artists would be entitled to recreate digital assets created by others, thus it enables an art-making environment emphasizing the product itself way more than in web 2.0.

#### Why L2?

Ethereum scalability limitation. Current gas is too expensive for small transactions and storage. Starknet is a permission-less decentralized ZK-rollup. It will enable more applications because of the largely reduced gas fees - 100x lower than transactions on the main chain.

The importance of creating 3D NFTs on-Chain on Layer 2 network may have not been highly recognized as much as projects dealing with core blockchain technologies. That's also why it has great potential. Many people new to blockchain technologies get to know web 3.0 because of some NFTs. NFTs to some extent act as a gateway to web 2.0 dependents. To push NFTs creation and storage method to the next level would attract more people, especially artists, to work on web 3.0.

### Problem Statement

3D arts are created by off-chain programs. 3D artists mostly work on off-chain programs and have limited interaction with 3D objects' raw data. There would be some compliance issues when storing 3D assets on-chain.

More specifically, the following research questions need to be addressed:

1. What are the possible ways to store 3D data on-chain? What are the trade-offs?
2. Is there any constraints when modelling using off-chain programs?
3. How do we render the on-chain data to showcase the 3D art ?

There is a need for a better understanding of constraints on current on-chain storage and a structured approach to ensure a long-term research plan.

## Objectives

The long-term goal of the research:

1. To create digital permanence.
2. To encourage 3D artists to focus on the more creative side.

The publicly share-able and privately own-able nature of blockchain stimulates artists creativity and provide another possible direction to resolve copy-right issue in reality.

In making an on-chain 3D NFTs' future, the purpose here is more for the creators' side. Imagine artists have the innate right to use all on-chain 3D art even if they do not own the art themselves. They have access to the raw data and thus can re-open the art and keep building on it. Some might argue that in web 2.0 people can do it too. However, most of the time we need to buy it, technically it's not as accessible, and the whole environment is based on a scarcity mindset instead of an abundance mindset. Only if we make the act of recreating and building upon others' work an innate right, can the artist community focus more on pushing the work forward more freely.

The research will be valuable to web 3.0 artists, game developers as well as related software providers in developing better practices and tools for creative activities with starknet.

## Past Projects Review

### The Origins of NFT

NFT, according to Ethereum, means tokens that we can use to represent ownership of unique items. The name NFT - non-fungible-token - was first proposed in 2017 by the Ethereum GitHub. It renamed past digital assets projects followed the launch of more projects including CryptoKitties, CryptoPunk that year.

The first NFT was Kevin McCoy's "Quantum" (2014-2021). It raked in \$1.4 million with fees at the close of Sotheby's auction in 2021. According to hyperallergic news - "*The auction house described the token as a "seismic genesis work" comparable to Picasso's Les Demoiselles d'Avignon (1907) or Kazimir Malevich's "Black Square" (1915).*"

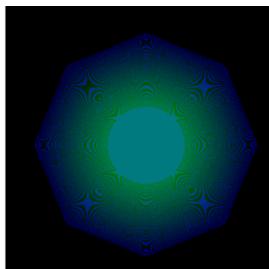


*Les Demoiselles d'Avignon - Pablo Picasso*



Black Square - Kazimir Malevich; The originally exhibition

\* The painting was hung in the Northeast corner - it was the sacred spot where a Russian Orthodox icon of a saint would sit in a traditional Russian house. Malevich called his movement suprematism, believed it would lead to the "supremacy of pure feeling or perception in the pictorial arts."



Kevin McCoy, "Quantum" (2014-21)

(<https://www.sothbys.com/en/buy/auction/2021/natively-digital-a-curated-nft-sale-2/quantum>)

In modern art history, new art movements follows two elements - the introduction of new technology and the recognition of individual human rights. The idea of modern art can be traced back to Renaissance when Humanism cultural movement was introduced.

#### *The medium is the message. (Marshall McLuhan)*

Before the metal paint tube was invented, artists were constrained by the medium - they could only paint one color at a time and had to grind new paints on a daily basis. Before impressionists stepped out of the studios and paint landscape scenes with quick brushes, only the subjects of history were seen as important and it took days to months to finish a painting. The subject of painting ranges from biblical scenes to authority's life, peasants' life, landscape, and more abstract representations. We see both shifts in subject and shifts in style.

Before Malevich, the subject of art was within the canvas. Malevich's "Black Square" and the way it was exhibited challenged people's view of the space we physically live in. On-chain native art challenges people's view on aspects of space, time, and human activities because of the nature of blockchain - data are stored permanently and with the hope of reaching out to extraterritorial cultures.

Blockchain technology enables and encourages individuals' creative work like no time before. The medium is accessible to people of all backgrounds regardless of culture, gender, race, and geographic location. As long as people have access to internet, they can be both users and contributors to the system. The core value of blockchain technology is decentralization. The distributed ledger system enables publicly shared and privately own-able codes, which leads to new ways of collaboration, and new artistic medium for creators. Making creative art work on-chain give content creative credits, in the meantime, stimulates other artists with similar interests and skills to be inspired and build on top of each others' work, pay credits to the original works and not deteriorate others' work.

## Off-chain projects examples:

### 3D Nouns

Noun NFTs come with a pre-rigged GLB model that is compatible with popular 3D animation software available today.

### Meebit

Image files were stored on IPFS.

## On-chain projects examples:

### Blitblox

In January 2022, Blitblox claimed to create the first 3D NFT on-chain.

### Roses

On 2022.09.13, dom (@dhof) published roses - a procedurally generated 3D + served fully on-chain NFTs. (<https://opensea.io/collection/roses-by-dom>).

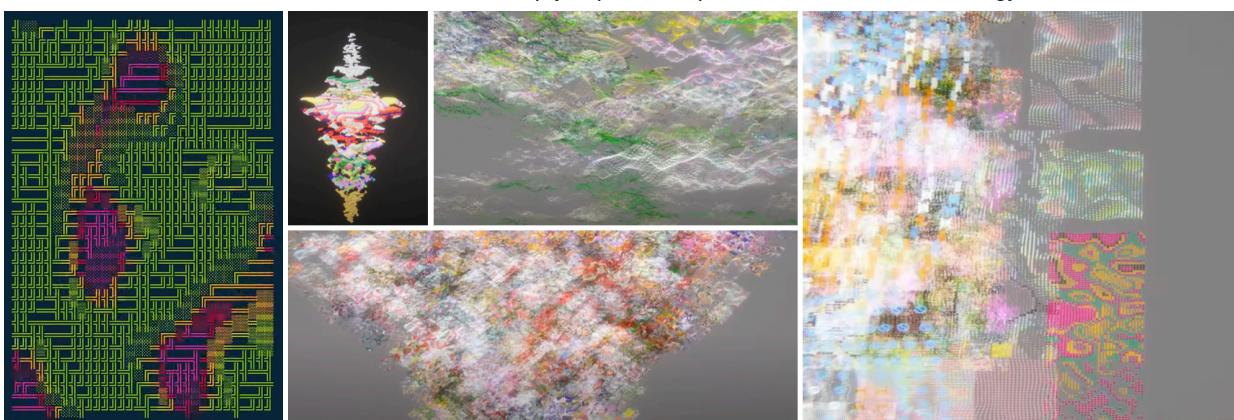
It's the latest 3D on-chain project to date. (Technical details <https://twitter.com/dhof/status/1569775925679558660?s=20&t=tSD9Flys8V7SmFBNjr6D8g>)

### Terraforms by Mathcastles

Onchain land art from a dynamically generated onchain 3D world.

Terraforms were created by @0x113d || Mathcastles and @xaltgeist who aim for lowkey & fair launches of extremely-onchain artworks. (<https://www.youtube.com/watch?v=U2xTl5pPHwk>)

*blockchain native work of art - which seeks to deeply explore the possibilities of this technology as an artistic medium*



Terraforms by Mathcastle has multiple hidden layers in this project. The 11,000 seemingly-2D items are top-view of 3D objects with elevations. Their smart contracts stored the coordinate information which marks their locations in an invisible 20-layer hyper-castle shape structure. Each item has 3 modes - Terrain, daydream and terraform modes.

where in terrain mode, it shows the animation; users can interact - draw in - daydream mode; and in terraform mode, it commits the drawing back to the blockchain for others to view.

The data-rich on-chain maximalism of the piece attracts software developers. Developers have built a variety of artistic and practical software applications based on it.

## Summary

In the blockchain, because of the nature of the medium, developers have a great advantage in navigating platforms and creating works, as in the past authorities with great resources hired artists to paint, or later artists who own the expensive painting materials could create art. Now it seems the tool favors the developers who also own artistic sensibilities or artists who genuinely see the potential of blockchain as a creative medium. Either way, we see both new possibilities emerging.

## References:

<https://mirror.xyz/angelsay.eth/Fpqj6Hawn-IWGgXm9oEYXysclgolotYscShuNaVTml4>

<https://art.haus/on-chain-nfts-and-why-theyre-better/>

[https://medium.com/@Gaze\\_AllOver/top-3d-nfts-worth-investing-into-5325f86de66f](https://medium.com/@Gaze_AllOver/top-3d-nfts-worth-investing-into-5325f86de66f)

<https://infinft.com/#about>

The idea of smart contracts - Nick Szabo 1997

<https://nakamotoinstitute.org/the-idea-of-smart-contracts/>

## NFT Projects:

Autoglyphs by larvalabs (maker of cryptopunks)

<https://larvalabs.com/autoglyphs>

Onchain NFT by Simon de la Rouviere

<https://blog.simondlr.com/posts/flavours-of-on-chain-svg-nfts-on-ethereum>

Neolastics

<https://blog.simondlr.com/posts/neolastics>

Blockheads (L1 onchain gltf)

<https://www.blockheads.network/>

Blitbox (L1 onchain gltf)

<https://mirror.xyz/angelsay.eth/Fpqj6Hawn-IWGgXm9oEYXysclgolotYscShuNaVTml4>