

# **LightYear Buds: A 10,000-Year Clock Coded Into 10,000 Generative Art PFP's**

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**Abstract.** A PFP which holds the mechanisms of a clock revealing generative artwork once every ten thousand years, with intermediate art reveals every 1000 years could instil a sense of long term thinking and responsibility to its holders and help promote a sense of responsibility for the future of civilization in long timescales. LightYear Buds is at centre, an 8 x 8 pixel PFP inscribed into the transaction ledger of Bitcoin. It is a work of generative code art which progresses gradually over the course of thousands of years. On New Year's day every 1000 years marked by the years 3000, 4000, 5000 et cetera, every PFP in the collection will delineate the changing of the epochs with an 8x8 artwork to start the millennium over the course of three days. This would be preceded by an artwork reveal marking New Year's Eve before the new millennium. With a preluding generative piece revealed on December 31, 9999 setting off the event, for the first ten days of the year in January of 10,000 AD, every PFP will display an 8x8 flower. The PFP and code is compact enough to fit inside a single inscription on the Bitcoin chain with no external dependencies to aid in the storage, display, and ideally the longevity of the artwork. Holders and viewers can experience a PFP which evolves over the course of thousands of years, while the regular updating of the PFP as a code-based clock artwork at 1000 and 10000 year intervals can help serve as a reminder of the collective long journey of humans as a civilization.

## **1. Introduction**

Few artworks made to last the timescales of civilization have actually lasted the age of several thousands of years. Although there is the exception of the Great Pyramid of Giza, even architectural works named as the Seven Wonders of the Ancient World marking advancements in civilization survived for a time but eventually were lost to either natural disasters or man-made conflict and destruction, with most details about its existence lost and disputed in the case of the Hanging Gardens of Babylon. A project called The Clock of The Long Now by The Long Now Foundation is an attempt to construct a large clock that will tick once a year, moving its hand over the course of centuries.

Connecting the need for art that evokes thinking about very long periods of time, recent developments such as Bitcoin, and the Bitcoin Ordinals protocol offer an opportunity to create an artwork on a chain that has potential to last multiple millennia.

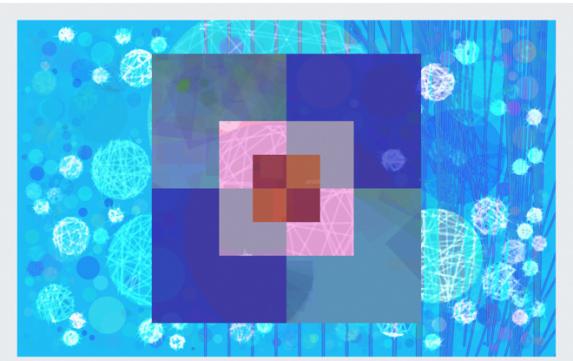


Figure 1a. Prelude Artwork on the Eve of the Millennium.

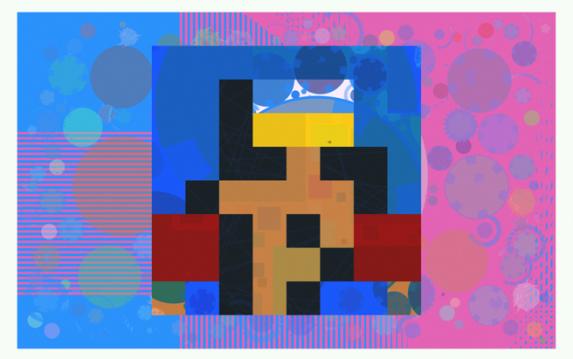


Figure 1b. LightYear Buds.

LightYear Buds is a generative code art PFP which progresses its animation once every 1000 years, revealing algorithmically unique hand-designed code-generated art for each NFT. Every 10000 years the NFT's will reveal a flower. The PFP and its carefully timed reveal mechanisms are designed to operate resilient to loss of the artwork thanks to the distribution, primary sales, secondary sales, and the microeconomic system of NFT's built on the Bitcoin blockchain. The full algorithm and hand-designed PFP component assets used to generate every LightYear Bud is built fully on-chain, meaning that there are no references to outside code or assets, only the equivalent of a modern-day browser is required to view the artwork in full.

## 2. Overview: LightYear Buds

LightYear Buds uses traditional PFP layers in the style of the 8x8 pixel art PFP's, a minimal form reminiscent of the videogame era, and the era of on-chain pixel art NFT's. Encoding the PFP as generative code art offers the LightYear Buds NFT the capability of having reveal features on-chain beyond what is possible with an image file. The timing of the art reveals represents the ticking of a symbolic clock every 1000 years, a reveal of 8x8 artwork which will display its animation only at the turn of the new millennium for three consecutive days. At the turn of 10000 years the flower artwork will be revealed for ten consecutive days, with the arrival of the clock tick artworks and flower artworks preceded by prelude art on 12/31.



Figure 2. LightYear Buds PFP.

The name LightYear was inspired by the concept of the distance light travels in one year, potentially a benchmark for human civilization if space travel were to be able to advance to cross this distance. The nearest star system is Alpha Centauri, which is around four lightyears away. The Milky Way Galaxy is 100,000 lightyears across, with Andromeda on the order of 2.5M lightyears away, and galaxy candidate HD1 by some estimates up to 33.4B light years away assuming an expanding universe the furthest observed object in the universe at the time.

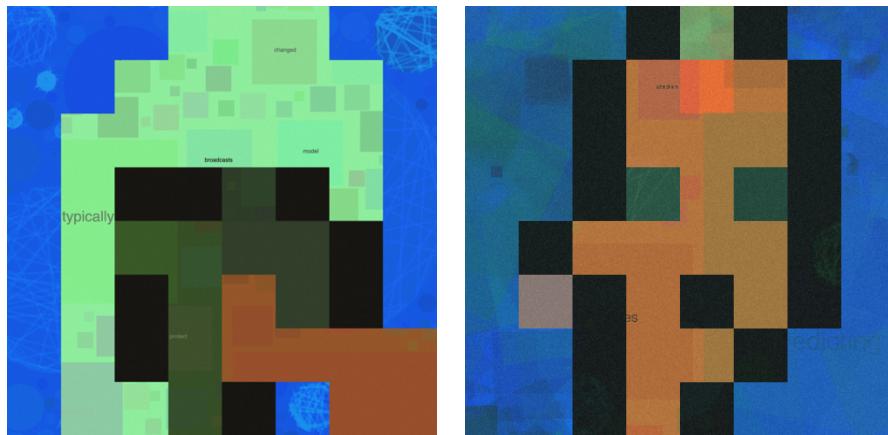
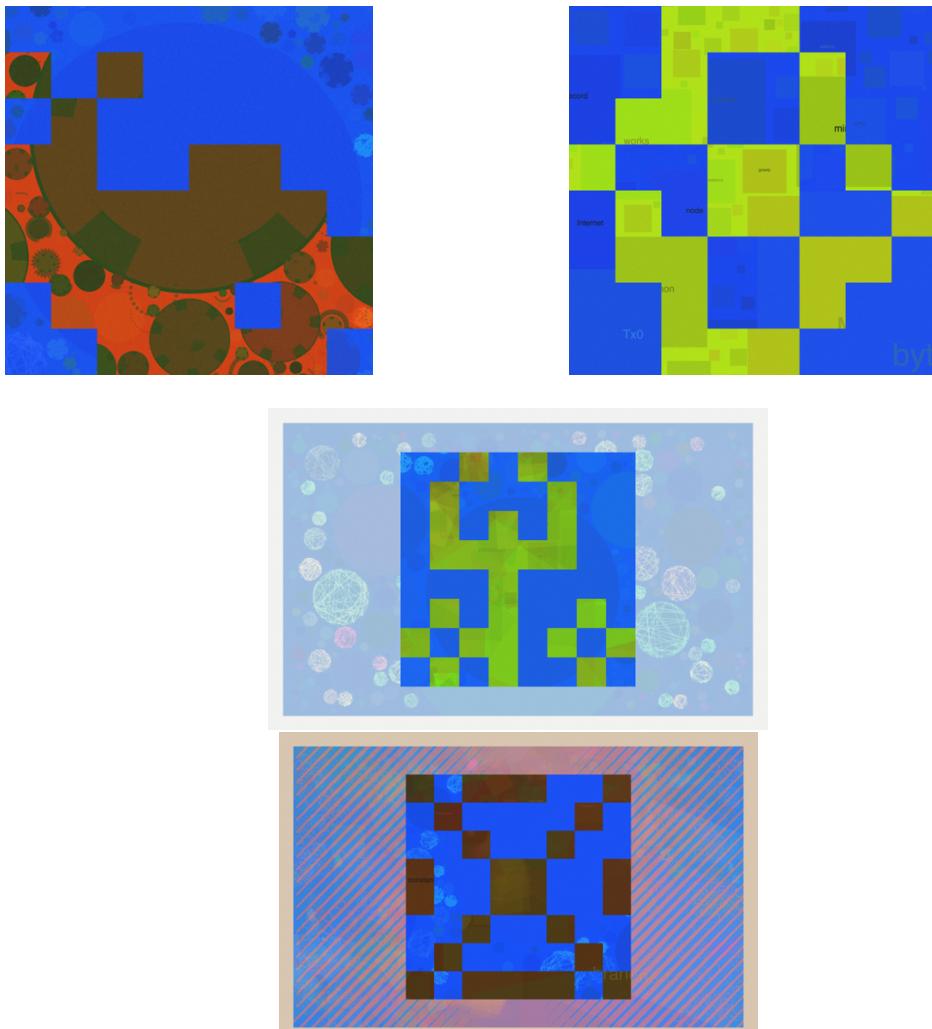


Figure 3. LightYear Buds.

Civilization is generally thought to have begun with the development of agriculture in the fertile crescent, Egypt, the Indus Valley, and Asia, and with later developments in areas such as metallurgy

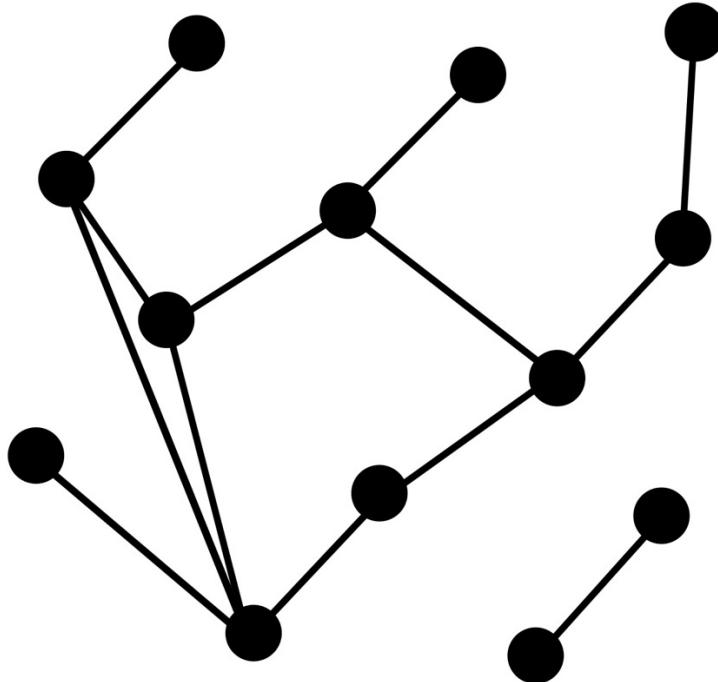
by the ancient Anatolians in modern-day Turkey, Egyptians, and peoples of Sub-Saharan Africa and other parts of the world such as South America. Many more achievements and monuments, as well catastrophes and cases of man-made suffering and war, mark what could be seen as major parts of human history. The point of the 1000 year and 10000 year reveal mechanisms of the LightYear Buds is to give viewers a chance to participate in long term thinking, and thinking that advances human civilization as opposed to short term thinking and short term gains. As holders either wait or allow the piece to change hands to other art collectors over ten turns of the millennia, the animation loop slowly progresses, and new artwork is revealed. With the deployment of the artwork on the Bitcoin blockchain the trail of ownership over the millennia would also become part of the artwork's history, the ledger acting as a time capsule notating a record of all that came before the most current state of the animation.

### 3. The Ticking of a Clock, Informal Human Consensus Network



*Figure 4. A Clock Ticking Once in 1000 Years. Art reveals once in 1000 years represent the ticking of a long running clock.*

By the time of the art reveals in the Gregorian calendar years 3000, 4000, 5000, et cetera, many things could change. Languages could change with the movement of people alongside changes in their means of communication. Even the standards for keeping time and date could change to something unrecognizable today. For example, if people in the future live off-Earth or elsewhere in the solar system or universe, there may be changes in how computers keep and attempt to synchronize time. The distribution of the NFT's to many collectors, and the collectability and economics behind NFT's could be helpful in allowing the reveal of LightYear Buds to take place with a consensus-like mechanism.



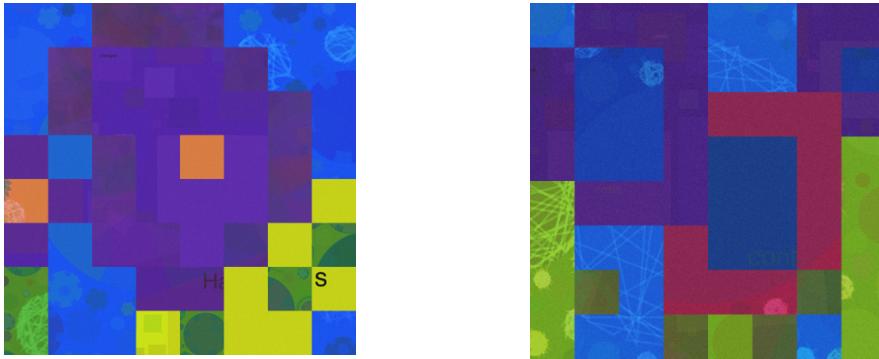
*Figure 5. Social Networks. “Synchronized” time and date stamps, or even LightYear Bud NFT viewers and owners living on certain planets cannot be assumed in thousands of years. Aided by what resources they may have such as long distance time synchronization and communication technology, social networks could help guide NFT owners and viewers to a “correct” date for viewing the artwork reveals as each node can help others come to a consensus on potentially a better time and date than the estimate of a single node.*

If there are social networks in the far future like those of today, the NFT holders and collector entities and organizations could be both viewers and potential disseminators of updates about the changes taking place in their own NFT's. As the first viewers shared their artwork, others would also see that their piece, if synchronized to the same date was also revealing artwork and transforming, thus assuring that even if some nodes in the social network in Figure 5. were not aware, or viewed the timing of the event differently, such as due to timekeeping differences across astronomical distances and potential calendar differences of people inhabiting different planets or stars, an informal consensus about the timing of the event could be part of the art reveal, with indeterminate parts of the social network either connected or distinct from one another perhaps taking a different view on

the date. The network is symbolic of the function of consensus on the Bitcoin network where LightYear Buds is stored. After the 3-day reveal each 1000 years and 10-day reveal every 10000 years LightYear Buds PFP's will return to the normal display with the PFP advanced a small number of frames, marking the beginning of another 10000 year era.

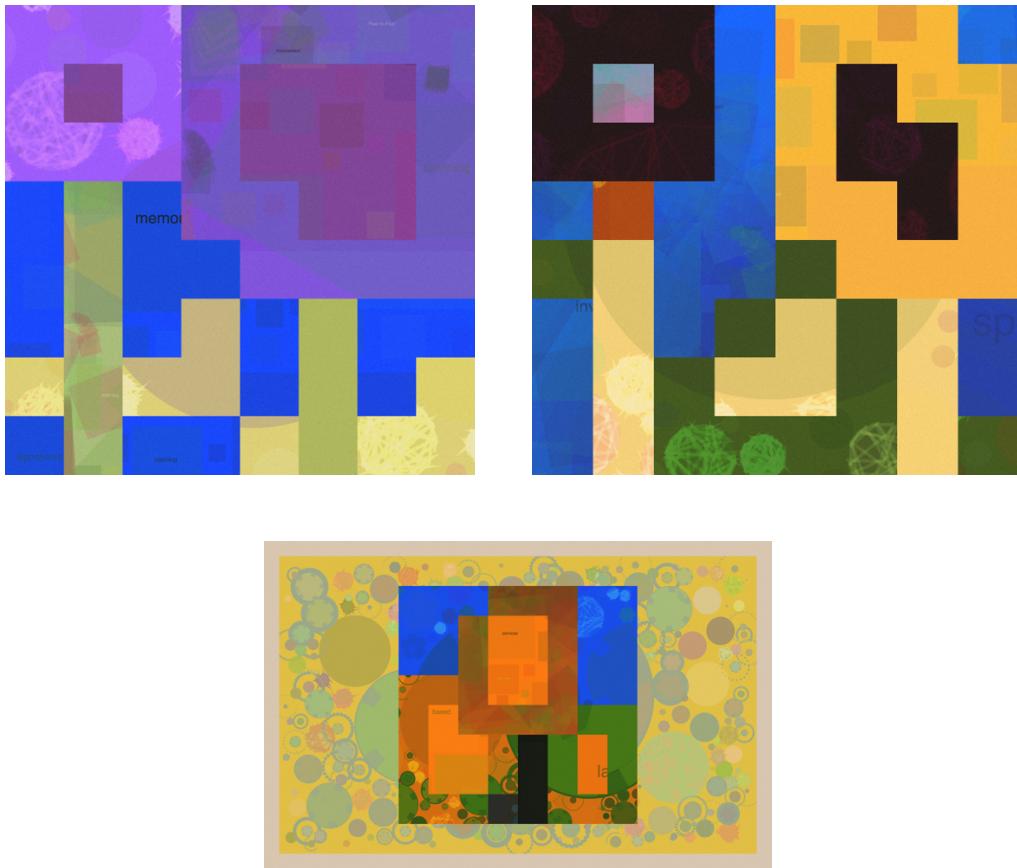
#### 4. Ten Thousand Years, Flower Artwork Time Capsule

LightYear Buds are in a sense, long-term clocks spread out across thousands of holders as nodes. From the perspective of the future viewers of the work, LightYear Buds is a time capsule preserving the elements of an ancient past, the world of the 21<sup>st</sup> Century and a cryptocurrency ledger of all who held each piece over time. Past artworks built for the timescale of civilization have acted as a sort of time capsule of civilization. The Great Pyramid of Giza holds ancient writing and inscriptions within its chambers and on numerous artifacts found within preserving information about Ancient Egyptian life and culture. Similarly works such as the Rosetta Stone, the Mayan Codecs, the Terracotta Army, and other significant archaeological artifacts and monuments contain illustrations and inscriptions which offer insight into past people and cultures.



*Figure 6. Flower Artwork Reveals in 10000 years*

At one level LightYear Buds contains artwork representative of the NFT PFP era, 8x8 pixels depicting a character that could represent the holder of the NFT as they want to be represented on the Internet, in their social network, or in the metaverse. At another level it is clockwork running over thousands of years, with 8x8 flower artwork revealing after 10000 year. At another level the trail of ownership over the centuries and millennia could serve as a record of human activity and culture which can be cross referenced with other records found for each owner, much like the paper trail of antiques and historic artwork. Given the different layers and the time-capsule-like record keeping of the Bitcoin blockchain, LightYear Bud collectors may be motivated to consider the long term in their own decisions and in their communities and activities.



*Figure 7. Each PFP contains the precise instructions to generate every flower and every character.*

Each iteration of LightYear Buds also contains the full algorithm to create all LightYear Buds, including the mechanism for the gradual release of individual generative artwork over the course of multiple thousands of years. The generative artwork and features of the NFT are an attempt to showcase the technology of the era of its creation both in its technical implementation and in its illustration of symbolic concepts, posing challenges, puzzles, and questions for audiences of the present and distant future. On the eve of the year 10000 of the astronomically numbered Gregorian calendar, LightYear Buds will signal that another reveal is on the way, at this interval flower artwork.

#### **On Flowers, Artist Note**

*The flower artwork is an attempt to capture the beauty of the flower while it can still be observed, as there is a possibility that people in the distant future will not have easy access to flowers, an eventuality that is possible with deforestation, rising temperatures, and loss of habitat for pollinators of flowering and fruit-bearing plants among the changes that have begun to be observed in 2023. Flowers could also symbolize nature, beauty, and joy even in the face of death and ultimate decay in an artwork that evolves over thousands of years before the PFP is restored on the NFT's display, and the time ticks again for another ten thousand years, the arrow of time always flowing to another reveal, another 10000 years, another reveal, another 10000 years...*

## 5. Manual Operation, Automation

To allow the user to confirm proper operation of the code generation, LightYear Buds NFT displays the current local system time and date on the console. A key feature of LightYear Buds is to ensure the NFT will have a failsafe to continue to function even if the machine running the NFT's code is unable to generate a compatible system date, such as scenarios related to the machine or Javascript version that would run the code. To input the time and date manually, a URL parameter "date" can be appended to the full URL of the NFT after the seed parameter. For example if the user's machine does not produce a proper date, then the NFT would revert to a base date and time, which is configured to a key time and date when LightYear Buds was being developed.

Appending the URL with a parameter can be done with the "&" or alternatively "%26" followed by the URL parameter. The below appended date manually loads 3099 AD, March 15 as the current date.

```
https://preview.generativeexplorer.com/generative  
explore?projectId=78928901&seed=e0347e19078901234749817fe3bcc34a67164c3ad334f68a9  
9ca6ee%26date=3099.3.15
```

*Figure 8a. Appending URL Parameter, the date.*

alternatively, depending on viewing environment:

```
https://preview.generativeexplorer.com/generative  
explore?projectId=78928901&seed=e0347e19078901234749817fe3bcc34a67164c3ad334f68a9  
9ca6ee&date=3099.3.15
```

*Figure 8b. Appending URL Parameter, the date, alternate format.*

The use of URL Parameter essentially establishes an API by which a secondary system could be easily configured to display the NFT with custom dates appended to the URL instead of generating the dates at the local system level. This could be beneficial if there are one of a number of system changes over the course of thousands of years which would make the generation of time and date formatted to 2023 standards difficult, such as, but not limited to, human habitation on other planets or on stations outside the solar system, a lack of computers tracking the date in the same manner as computer systems in 2023, or other time compatibility issues if browsers are simulated with some approximations of technology from this era. In the scenario that the user must simply manually input the date, that option is made available in the URL parameters.

Similarly grain effects can be turned off by using the "grain=off" parameter in the same manner, appended with an "&" or "%26" following an individual iteration's seed parameter.

Every 1000 years the animation will progress by continuing the animation gradually until it has completed drawing all elements, at which point the algorithm will add loops to lengthen the animation time, progressing through more and more loops as the millennia pass. Draw loops taken to finish the animation would gradually approach very large numbers of loops after tens and thousands of years. It would be likely that future viewers and NFT holders of LightYear Buds at that time thousands of years in the future would have access to comparatively more powerful computers that can run the code art of LightYear Buds over increasingly longer animations with gradually increasing numbers of loops without strain.

## 6. Animation Progression Over Thousands of Years

A specific NFT feature identifies which progression style an iteration will follow over the course of thousands of years. Some will grow more quickly than others, approaching numbers as large as the progression of time itself, while other will progress more quickly in the first few thousands of years, slowing down after some time, though still gradually progressing even after tens of thousands of years pass. New flower reveals for the year 20,000 AD will therefore animate longer than the reveals in 10,000 AD, imbuing a sense of growth over the long term to holders and viewers of LightYear Buds in that time.

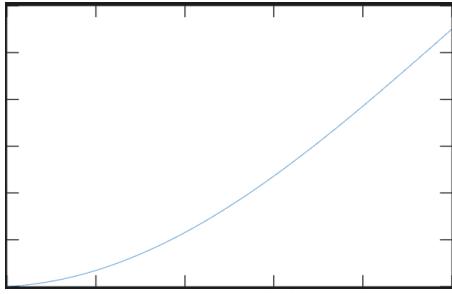


Figure 9a. Damped, Rescaled Partial Cosine Wave

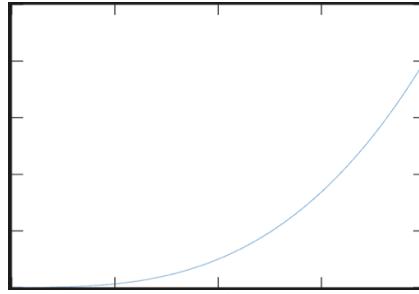


Figure 9b. Sigmoid-Like Exponential

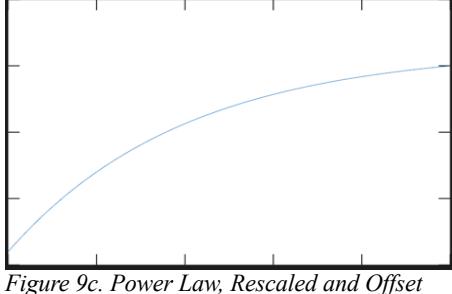


Figure 9c. Power Law, Rescaled and Offset

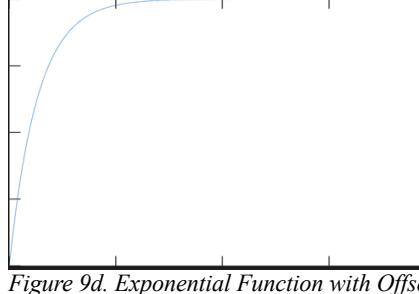


Figure 9d. Exponential Function with Offset

Termed as the “Clock Style” of the NFT, the x-axes of the four functions of Figure 9 are scaled to large time scales. Each NFT’s animation progresses each 1000 years driven by one of these four types of functions. The animations continue to lengthen to very long running loops after tens of thousands of years, but total computation time is distributed over the length of the animation with a definite stopping point at runtime that grows only every 1000 years at predictable levels that are unlikely to strain future computers displaying the NFT. A simple push of the image export button (`s>>download high resolution, e>>export at current screen resolution, numbers 1 through 9>> PFP export at 100x100, 200x200, 300x300... 0>>export the pfp at 1000x1000`) will stop the animation at any time before it is complete and export the animation at the current frame displayed.

## 7. Conclusion

An effective means to encourage thinking about the very long-term future at time scales on the order of the age of civilization would be beneficial in the face of the challenges of humankind, particularly if existential threats persist such as the perpetuation of war and environmental destruction. In an attempt to promote thinking about responsibility for the future, LightYear Buds is a PFP which animates a PFP in the style of 8x8 pixel artwork from code art deployed fully on-chain on Bitcoin. Representing a clock construction on the Bitcoin cryptographic blockchain, every 1000 years

starting from the year 3000 the artwork will progress its animation and reveal code art unique to each iteration embedded in an algorithm with a release mechanism that spans thousands and tens of thousands of years. After 10000 years 8x8 pixel generative flower art will be revealed on the display platform of each NFT. The artwork is compact, storable, transmittable, and designed to be resilient to the technological tests of time in its code design, while deploying with a wide availability and distribution on the Bitcoin blockchain to improve its reach and survivability.

## References, Credits

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