THE 2023 U.S. WOMEN’S OPEN® ARTBALL™

WHERE INNOVATION MEETS GOLF HISTORY
THE ARTBALL OWNERSHIP EXPERIENCE | 3,010 available

**STEP 1**

**PRE-MINT - ALLOWLIST**

We’re allocating multiple whitelists for web3 golf & sports fans.

Join the Discord to hear the latest announcements.

**STEP 2**

**MINT**

Head to [www.usga.artball.io](http://www.usga.artball.io) and connect your wallet to mint.

Price: 0.00 ETH [+gas/ transaction fee].

Yes, free. Bear market or not. Web3 sports fans, let’s play a round together.

We are proud of what we have built, let’s see if it delivers.

On the house, where innovation meets golf history.

**STEP 3**

**REVEAL**

Visit [scorecard.artball.io](http://scorecard.artball.io), see the location of your ArtBall on Hole 17 at Pebble Beach Golf Links.

**STEP 4**

**EXPERIENCE**

Watch the 2023 U.S. Women’s Open Championship and explore the evolution of your ArtBall design & see if any scorecard points have been earned based on your location on Hole 17.
SECTION TWO
2023 U.S. Women’s Open
ArtBall Concept
OWN THE BALL.

Beautifully unique artwork wrapped around a golf ball with a collection that includes generative, artist, collaborator and fan art.

OWN THE SHOT.

Using the championship’s official data to deliver new ways to engage with the most memorable shots of the U.S. Women’s Open.

OWN THE MOMENT.

Dynamic art and metadata updates based on key moments from the U.S. Women’s Open.
OVERVIEW OF THE DESIGNATED AREA OF THE 17TH HOLE AT PEBBLE BEACH

The designated area of play will be determined by the project.

One plot will be randomly assigned to each 2023 U.S. Women’s Open ArtBall at the time of minting.

Our smart contract applies a randomisation technique to ensure each 2023 U.S. Women’s Open ArtBall is allocated a verifiably random plot.

To view the designated area of play and plots assigned to ArtBalls visit: scorecard.artball.io

The plot assigned to each ArtBall cannot be changed.
OVERVIEW OF THE SCORECARD SITE
THE ARTBALL OWNERSHIP EXPERIENCE

Each 2023 U.S. Women’s Open ArtBall will be assigned a plot on a designated area of the 17th hole of Pebble Beach. Gamified elements will be introduced that use these plots, depict data that will update the art for each golf ball in this collection, and are unique to their position. Provenance is stored on the blockchain, and attributes will be added pending if the ball lands on your plot.

Landing Points
The position at which each tee shot lands within the designated area.

Closest to the Hole
Tee shot that lands closest to hole each day.

Longest Hole Out
Position within the designated area from which the longest hole out occurs.
THE RULES

1. Each 2023 U.S. Women’s Open ArtBall will be randomly assigned a plot from a designated area of the 17th hole at Pebble Beach Golf Links at the time of minting. The smart contract applies a randomization technique to ensure each ArtBall is allocated a verifiably random plot.

2. The dimensions and locations of each plot will be made available via scorecard.artball.io

3. One point will be awarded each time a ball comes to rest on a plot from the tee shot. This will be determined by the coordinates of the ball where it comes to rest using the championship’s official source of data.

4. Only the first shot (tee shot) is eligible. Any strokes thereafter, including provisional tee shots, will not be applicable.

5. If there is a hole-in-one, the plot that contains the centroid of the hole on a given day will be awarded the point(s)

6. The plot on which the most number of tee shots come to rest at the end of each of the four days of the championship will receive an updated metadata trait to reflect the Round and category [see slide 23].

7. The plot on which the most number of tee shots come to rest at the end of the championship will receive an updated metadata trait to reflect the Champion for the category. If there is a tie, the winners will receive a T1 metadata trait update [see slide 23].

LANDING POINTS
THE RULES

1. Each 2023 U.S. Women’s Open ArtBall will be randomly assigned a plot from a designated area of the 17th hole at Pebble Beach Golf Links at the time of minting. The smart contract applies a randomization technique to ensure each ArtBall is allocated a verifiably random plot.

2. The dimensions and locations of each plot will be made available via scorecard.artball.io.

3. For each tee shot landed on the green, the distance between the centroid of the ball when it comes to rest, and the hole, will be measured using the championship’s official source of data.

4. Only the first shot (tee shot) is eligible. Any strokes thereafter, including provisional tee shots, will not be applicable.

5. The hole location changes each day. The closest to the hole will reflect these changing hole locations each day.

6. At the end of each day, the plot containing the ball that landed closest to the hole will receive an updated metadata trait to reflect the Round and category [see slide 23].

7. At the end of the championship, the plot containing the ball that landed closest to the hole will receive an updated metadata trait to reflect the Champion for the category. If there is a tie, the winners will receive a T1 metadata trait update [see slide 23].
LONGEST HOLE OUT

THE RULES

1. Each 2023 U.S. Women’s Open ArtBall will be randomly assigned a plot from a designated area of the 17th hole at Pebble Beach Golf Links at the time of minting. The smart contract applies a randomization technique to ensure each ArtBall is allocated a verifiably random plot.

2. The dimensions and locations of each plot will be made available via scorecard.artball.io

3. The distance of each hole out will be captured using the championship’s official data.

4. The only strokes taken into consideration are those that originate from a plot in the designated area. Tee shots, and any other shots from outside of the designated area, are not applicable. A hole-in-one will not be included in determining the longest hole out.

5. At the end of each day, the plot from which the longest hole out occurred will receive an updated metadata trait to reflect the Round and category  

6. At the end of the championship, the plot from which the longest hole out occurred will receive an updated metadata trait to reflect the Champion for the category. If there is a tie, the winners will receive a T1 metadata trait update
INTRODUCING THE 2023 U.S. WOMEN’S OPEN
ARTBALL ARTWORK by Amy Goodchild (3,010)

Amy Goodchild is an artist based in London. She uses code and other technology to create art which explores generativity, group experience, and interaction.

Goodchild holds a BA in Photography from Sunderland University and a MArch in Design for Performance and Interaction from The Bartlett, UCL and has an background in user experience design and considers her audience in everything she crafts - creating art that people want to engage with.
The stroke data is analysed in relation to the tile on the green. A pattern might use data from all strokes that land within 15 feet of the centre of the tile, or the closest 30 strokes each day.

Elements of the stroke data such as the distance of the landing point from the tile, the length of the stroke, the path of the ball through the air, the height the ball reached or the angle of the landing point from the tile are interpreted within the patterns to control variables like the size of shapes, their position and the angle of lines. The link between the data and the output is sometimes clear to see but the intention is not to directly represent the strokes but rather to use them to influence the patterns in an abstract way.

In addition, the stroke data is more directly represented in arcs around each ball. The arc's start and end angle directly relates to the start and end angles of the stroke in relation to the tile, and the distance of the arc from the ball represents the stroke's length.

Given the complex nature of the stroke data, each pattern emerges unpredictably into a unique visual and no one, not even the artist, knows exactly how the art will look until the Championship is complete.
Everyone starts off with the same base ArtBall.

Each shot, pending your position on Hole 17, will cause each ArtBall to uniquely evolve throughout the championship.

In addition, the stroke data is represented in arcs around each ball, showcasing ultimate provenance of your tile’s location as it relates to each round and the daily hole location.
GENERATIVE NFT TRAITS

WAVES
Each wave represents a stroke which landed within 15 feet of the centre of the tile. The curvature of the wave is controlled by the angles of the start and end positions of the stroke, in relation to the tile. The length of the stroke determines the size of the wave, the number of stripes it has, and its distance from the logo. Short strokes across the green turn into short, rounded waves and longer drives become thinner, longer waves.

BLOCKS
This pattern is created with a grid of diagonal blocks, each representing one of the 15 strokes with the closest landing points to the tile in each round. The angle of the block is influenced by the angle of the landing point from the centre of the tile and the height of the block relates to the distance to the landing point.
**GENERATIVE NFT TRAITS**

**STRIPES**

Each line represents one of the 60 strokes with the closest landing points to the tile in each round. The distance from the landing point controls the thickness of the line, with more distant strokes appearing thinner. The lines are horizontal in the centre and then extend at an angle, controlled by the angles of the stroke in relation to the tile. The hit point of the stroke controls the angle on the left while the landing point controls the angle on the right.

**MORPHS**

Each curved shape represents the closest strokes to the tile in one round. The shape curves in and out, depicting strokes that landed near and far from the tile.
GENERATIVE NFT TRAITS

SHAPES

Each shape represents a stroke and starts out as an irregular polygon, with its number of sides and size determined by the stroke’s distance from the tile. The shapes are tilted in accordance with the angle of the stroke’s landing position from the tile. Then each edge of the shape is distorted using Perlin noise, with closer strokes appearing more jittery and more distant strokes appearing smoother.

RINGS

The average distance from the tile to all the strokes’ landing points determines how many strokes to use for this pattern. More distant tiles use more strokes and vice versa. Each stroke is drawn as an arc in one of 7 rings around the ball, with closer strokes on the inner rings and more distant strokes on the outer. The arc’s angle from the logo relates to the stroke’s angle from the tile and its length is determined by the stroke’s length.
GENERATIVE NFT TRAITS

SWOOPS

The irregular shapes in this pattern each represent a stroke, with all the strokes included bar the first stroke for each golfer. The position of the shape in terms of its angle and distance from the logo is determined by the angle and distance of start point of the stroke from the tile. Each shape's size relates to the length of the stroke, and its curved shape is generated randomly.

CONSTELLATION

The position of each node in the constellation represents a stroke's landing point. Each node connects to a number of its closest neighbours, with longer strokes connecting to more neighboring nodes and short strokes connecting to fewer. As the rounds progress, each node may connect to different neighbours, dynamically changing the form of the constellation throughout the tournament.
GENERATIVE NFT TRAITS - Palettes

- Champ
- Greens
- Blues
- Retro
- Sport
- Pop
- Swipe
- Fading Light
- Laundrette
- Tangerine
- Formal Arrangement
THE ROADMAP: ATTRIBUTES AND METADATA

One of the key features of the ArtBall is the ability to associate metadata and attributes to each token.

With this ArtBall, we recognise different graphic patterns and color palettes, but most importantly attributes associated with ‘Landing Points’, ‘Closest to the Hole’ and ‘Longest Hole Out’ moments during the 2023 U.S. Women’s Open Championship.

This is a first for golf, the USGA and Pebble Beach Company. The future is unknown, but this collection and its related traits are transparent and immutable on Ethereum’s blockchain, ready and waiting for whatever the future holds.
A NOTE ON PROCESS, PROVENANCE AND ACHIEVING FAIRNESS

PROCESS

To achieve true fairness in the allocation of artwork and court plot, a mapping procedure was executed by our smart contract that assigned a ball and a court plot to each of the 3,010 available NFTs. This 5-step process is outlined below:

1. Three lists of numbers are created, that represent 3,010 tokens, 3,010 art balls and 3,010 course plots.

2. Two random numbers between 1 and 3,010 were generated.

3. The first random number was generated and used to assign an Art Ball to the NFT. For example, if the number was 10, the 10th ball was assigned to the NFT. Once allocated, the 10th ball was removed from the list of available balls.

4. The second random number was generated and the corresponding plot was assigned to the token. Now allocated, this plot was be removed from the list.

5. Steps 2 to 4 was repeated 3,010 times.

FAIRNESS

Randomness, although simple in principle is complex technically to verifiably accomplish on the blockchain.

Powerful computers can out-compute others to affect blockchain outcomes. Although oftentimes this is cost prohibitive, we implemented preventative measures so that fairness was achieved.

Leveraging ChainLink's Verifiable Randomness Function (VRF) within our smart contract, random numbers were generated along with cryptographic proof of how that number was determined. The proof was published and verified on-chain before it was used. This ensures that results cannot be tampered with.

For further information please see: https://docs.chain.link/docs/chainlink-vrf/

PROVENANCE

Since the randomness of tokens to balls and plots were fairly established, how did we prove images uploaded to IPFS are not tampered with?

After images were uploaded to IPFS, the IPFS protocol provided a cryptographic hash of the files, this is called a content identifier or CID. We then recorded this CID on the blockchain ahead of the random token allocation.

This proved, at that point in time, that was the image dataset used and thereby establishing provenance of the ball images.

For further information please see: https://docs.ipfs.io/concepts/content-addressing/
VIRTUAL VS IRL, WHY NOT BOTH?

The 2023 U.S. Women’s Open ArtBall experience will be showcased at the championship via on-site displays at Pebble Beach - this will include the leaderboard from the Scorecard ArtBall experience and a rotation of 3D visualisations of each round's Landing Points, Longest Hole Out and Closest to the Hole moments.

This will replicate the at-home experience that fans can experience on mobile and web, and bring it directly to fans on-site at the championship.
SCORECARD POINTS, 3010 course plots

The scorecard is at the heart of the 2023 U.S. Women’s Open ArtBall.

For every ball that lands in the designated area of Hole 17 at Pebble Beach Golf Links, the data associated with each shot will be used to award the NFT owner of that course plot.

This will update your 2023 U.S. Women’s Open ArtBall with the appropriate scorecard sticker depending if it’s a ‘Landing Point’, ‘Closest to the Hole’ and/or ‘Longest Hole Out’, along with updated traits and metadata.
DATA DRIVEN INSIGHTS

The official championship data uses technology that captures and reports vital information on every shot, by every player, in real-time, during the championship. These separate views are then combined together to produce an accurate 3D representation of the path of the ball.

Each golf course is mapped prior to the event so a digital image of each hole is used as background information in order to calculate exact locations and distances between any two coordinates (e.g. teeing area and the player’s first shot or the shot location and the location of the hole).
SECTION THREE
Collaborators, Roadmap and FAQs
THE 2023 U.S. WOMEN'S ARTBALL IS BROUGHT TO YOU BY A PASSIONATE TEAM OF THINKERS, DREAMERS, BUILDERS AND GOLF FANATICS (OF COURSE)
1. **What is Ethereum and Ether?**
   Ethereum is a technology that's home to digital money, global payments, and applications. Ether is the native cryptocurrency of the platform. Among cryptocurrencies, ether is second only to bitcoin in market capitalization.

2. **Where can I purchase a 2023 U.S. Women’s Open Art Ball?**
   2023 U.S. Women’s Open Art Balls can be purchased from Opensea.

3. **I don’t have a digital wallet, what do I need to do?**
   It’s easy and free to get a digital wallet, head to usga.artball.io and follow the steps.

4. **Can I purchase an ArtBall with a credit card?**
   Yes you can. At the time of purchase you will be presented with the option to pay with credit card. This is a free mint [0.00ETH] + ethereum/transaction fees.

5. **Why are the USGA and Pebble Beach Company releasing a NFT?**
   Golf has a long history of championing technology to elevate and enrich the fan and player experience. Web3 offers an opportunity to give fans a new and exciting way to engage with the U.S. Women’s Open Championship like never before.

6. **There are heaps of NFT releases, what makes this project interesting?**
   This is the first officially licensed USGA and Pebble Beach NFT. The USGA was founded in 1894, and conducts many of golf’s premier professional and amateur championships, including the U.S. Open & U.S. Women’s Open. Pebble Beach Golf Links is one of the most celebrated and iconic golf courses in the world, founded in 1919. Collaborating to celebrate the U.S. Women’s Open Championship at this historic venue, by leveraging the incredible amount of data available, sets the stage for what’s possible when innovation takes center stage around the best players in the world.

7. **Who is behind this project?**
   The USGA & Pebble Beach Company, together with a team of collaborators.

8. **I own an AO ArtBall, do I get early access and/or other privileges?**
   The short answer is yes, ‘Matchpoint’ winners from AO22 & AO23 [1 Matchpoint Winner = 1 Whitelist] + those that hold a pair of AO22 & AO23 ArtBall [1 pair = 1 whitelist] - this snapshot was taken on 3rd July. No new holders will be in this count. There is also a PREMINT allocation for holders of either AO22 & AO23 ArtBalls [click here].
FAQS

11. I don’t like the art that I have received on my U.S. Women’s Open ArtBall? Can I change it?
Unfortunately not. The only way to change the artwork is to trade or sell your ArtBall or simply head to the marketplace and purchase one from the secondary market.

12. Why did this project choose to build on the Ethereum blockchain?
Ethereum’s technical maturity and compatibility with downstream platforms such as digital wallets and secondary markets (e.g. Opensea) are some of the reasons it has emerged as the dominant force in digital collectibles.

I heard that there are environmental issues with NFTs, what’s this all about? For further information, click here.
KEY DEFINITIONS

**Blockchain** - a data structure that holds transactional records and while ensuring security, transparency, and decentralization. You can also think of it as a chain or records stored in the forms of blocks which are controlled by no single authority.

**Ethereum** - Ethereum is open access to digital money and data-friendly services for everyone — no matter your background or location. It’s a community-built technology behind the cryptocurrency ether (ETH) and thousands of applications you can use today.

**ERC721 Smart Contract** - A standard for representing ownership of non-fungible tokens, that is, where each token is unique. ERC721 is a more complex standard than ERC20, with multiple optional extensions, and is split across a number of contracts.

**GWEI Fees** - Ethereum transaction fees, known as Gas Fees. When you mint your token you will incur a gas fee. These are payments made by users to compensate for the computing energy required to process and validate and vary depending the demand on the blockchain at that moment in time.

**IPFS** - The InterPlanetary File System is a protocol and peer-to-peer network for storing and sharing data in a distributed file system. IPFS uses content-addressing to uniquely identify each file in a global namespace connecting all computing devices.

**NFT** - A non-fungible token is a unit of data stored on a digital ledger, called a blockchain, that certifies a digital asset to be unique and therefore not interchangeable. NFTs can be used to represent items such as photos, videos, audio, and other types of digital files.

**Metamask** - A cryptocurrency wallet used to interact with the Ethereum blockchain. It allows users to access their Ethereum wallet through a browser extension or mobile app, which can then be used to interact with decentralized applications. This is where your NFTs and Ethereum can be stored.

**Minting** - is the process of creating tokens on the Ethereum blockchain.

**U.S. Women's Open Championship** - The 2023 U.S. Women's Open Championship, conducted by the United States Golf Association (USGA), will be held at Pebble Beach Golf Links in Pebble Beach, Calif., from Thursday, July 6 through Sunday, July 9, 2023.
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