

**Lab 1 – Art Guardian Product Description**

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## **1. Introduction**

NFTs exploded in popularity and market value around Q1 2021, resulting in a year over year growth in volume within NFT marketplaces from less than \$100 million in Q1 2020 to \$1.5 billion in Q1 2021. (Chang, 2021) This growth sustained throughout all of 2021, as volume within NFT marketplaces reached around \$41 billion towards the end of the year. (Collins, 2021) NFTs have no doubt changed the digital art landscape throughout this period of growth; they have become infamously known to counterfeit digital art and sell them for high value. DeviantArt, a well-known art platform, reported that there were 90,000 possible thefts of digital art in December 2021, which was an increase of 300% from November 2021. (Beckett, 2022) Adding on to this, roughly 50% of all NFT sales were over \$200 at the beginning of 2022. (Dailey, 2022)

Although more and more digital artwork is being stolen from artists and sold on these NFT marketplaces for profit, there are currently not many solutions that address the needs of these artists. To find out whether their artwork has been stolen, they must manually search on NFT Marketplaces. After they discover that their artwork has been stolen, they then must file DMCA takedown requests through the NFT marketplace; a tedious process which needs to be done for each piece of stolen art. Artists then have to manually track the statuses of their takedown requests, along with any information that they contain. This entire process is cumbersome for artists and takes up a lot of time, but Art Guardian provides a solution which aims to automate this process. As the world of NFTs continues to grow and subsequently cause increasing counterfeiting issues, Art Guardian gives artists a way to safeguard their art from being stolen and sold.

## **2. Art Guardian Product Description**

The overall goals of Art Guardian are to streamline and automate the process of removing stolen art from NFT marketplaces for artists. The first objective is to provide artists with a product that automatically searches for artwork that has been stolen and minted on NFT marketplaces. The second objective is to provide artists with an automated process that creates DMCA takedown requests and sends them to NFT marketplaces on their behalf. Finally, the last objective of Art Guardian is to give artists detailed up-to-date information on all their DMCA takedown requests, which includes a record of all DMCA takedown requests sent and their status. Additional features that Art Guardian aims to provide to artists are whitelisting capabilities which remove artwork from the automated stolen art search, and helpful advice to prevent artwork from being stolen and minted as NFTs.

### **2.1 Key Product Features and Capabilities**

The user interface for Art Guardian is a progressive web application. This type of application is compatible with both mobile and desktop devices, regardless of operating system. This gives artists the ability to upload artwork into a secure database through either option. Art Guardian will then use the uploaded artwork to automatically search for stolen art on NFT marketplaces. This search is done on an interval basis, and each piece of uploaded art is searched once every 30 days. If the user chooses to do so, they can whitelist pieces of their uploaded art from the automatic search. This can be done by selecting which specific uploaded artwork they want to whitelist within the user interface.

If stolen art was found on an NFT marketplace, then Art Guardian will utilize an image matcher to compare stolen art and the artist's artwork. When the image matcher detects a match, Art Guardian will then notify the artists for additional confirmation on whether the stolen art

found is their artwork. Additional confirmation is required to prevent any mismatches from the image matcher. Artwork that has been whitelisted will never invoke this process. Artists can then choose to warrant legal action, which prompts Art Guardian to automatically generate a DMCA takedown request for that piece of stolen art using legal information provided during sign up. This will then require an e-signature from the artist for liability reasons and prevents people from abusing the system. Once the e-signature has been received, Art Guardian will send the DMCA takedown request to the NFT marketplace on the artist's behalf, which will be monitored and cataloged as an item that the artist can investigate for additional details.

As an additional feature, helpful hints and advice are also provided to the artist. This includes information such as how the NFT minting process works, how certain NFT marketplaces handle stolen artwork, etc. Most of the helpful hints will focus on providing the artist information on how to protect their art from being stolen and minted as NFTs. For instance, Art Guardian will suggest how to create effective watermarks. Another example would be that Art Guardian will inform the artist on methods that stolen art minters may try to use to spoof image matching algorithms and other stolen art detection software, and how to prevent that from happening.

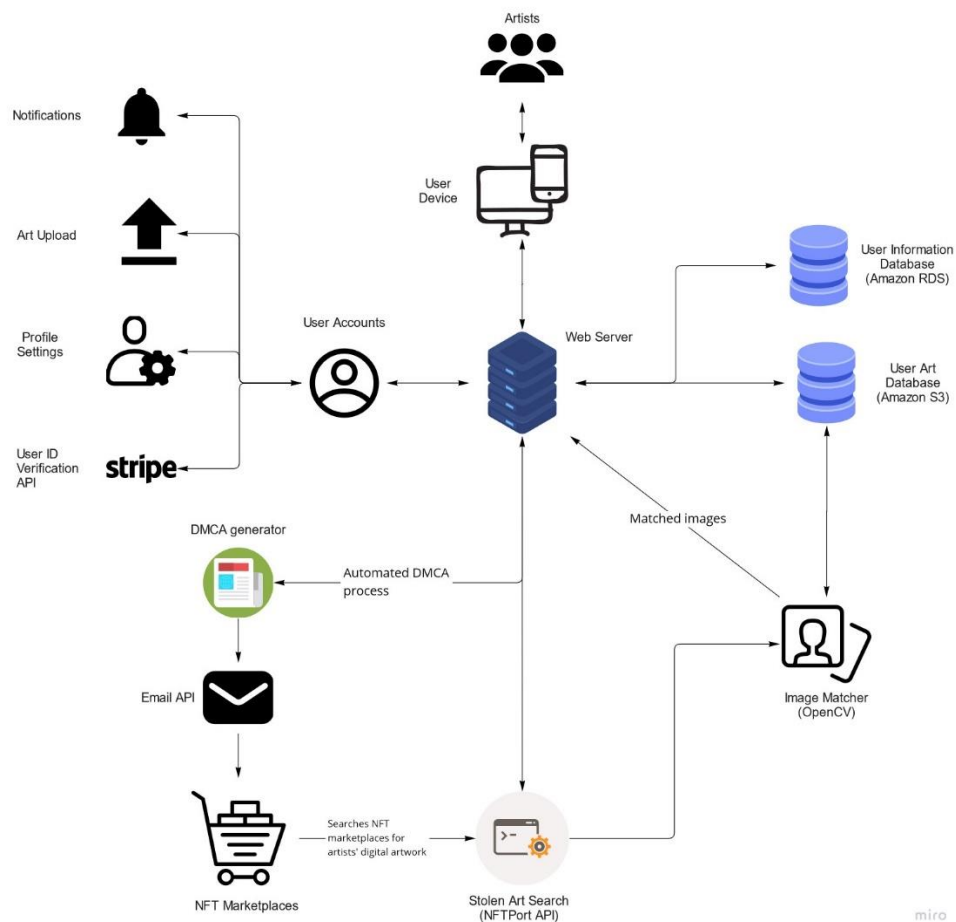
## **2.2 Major Components (Hardware/Software)**

Users can access features of Art Guardian using a device that has Internet connection and can run a web standards compliant browser. The mobile and desktop applications both communicate with the Art Guardian Web Server, which is shown at the center of Figure 1. Artists must make an account first, which requires them to upload legal identification in the form of a photo that will then be validated via the Stripe API. After registering an account, the User

will be able to upload their art, change profile settings, and check for any notifications. Account Information is stored on the Amazon RDS database. Image matching confirmations and electronic signature requirements on DMCA Takedowns are two important notifications that the Artist will receive.

**Figure 1**

*Art Guardian Major Functional Component Diagram*



The flow of the Artist's experience is as follows. First, as mentioned before, the Artist must register an account with Art Guardian and provide a photo of legal identification which will be verified using the external Stripe API. After the account is created, the Artist will upload

images of their digital art into the system, which will start the image matching process. This art is stored on the User Art Database, located on the right side of Figure 1. The database is powered by an Amazon S3 instance. Each piece of art uploaded by the Artist will be searched on NFT Marketplaces using an external API provided by NFTPort. Searches for each piece of art will be conducted once every 30 days due to rate limits of NFTPort.

NFTPort returns the most similar NFT that matches the art uploaded by the Artist. Art Guardian's Image Matcher will then compare the art uploaded by the Artist and the returned image. If the matcher determines that the two images are similar, then a notification is sent to the Artist, which they will manually confirm or deny whether the two images match. After they confirm, information about the stolen art or NFT will be stored into the S3 instance, and the automated DMCA process will start. Once the DMCA Generator has created a takedown notice, a notification requiring an E-signature from the Artist is sent. Signing the E-signature prompts the Takedown to be sent to the offending NFT Marketplace via the external Gmail API.

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### **3 Identification of Case Study**

Art Guardian is a solution developed specifically for commissioned artists, aiming to prevent their artwork from being stolen and minted as NFTs, and subsequently sold for profits. Art Guardian will allow commissioned artists to upload their artwork into a secure database, which will be used to automatically search for stolen artwork on NFT marketplaces. Image matching, along with confirmation from the commissioned artist, will be used to certify that the searched artwork is stolen. A DMCA generator will be used to automatically fill out DMCA takedown requests using the legal information provided by commissioned artists during sign up and will be sent via email on the Artist's behalf.

ODU undergraduate art students are the selected case study group for Art Guardian. Aside from providing general feedback on user interface and functionality, Students will also upload art from either their personal projects or from school assignments. These pieces of art will be used for two tests. The first test modifies artwork uploaded by the students, such as applying negative inversion, and records whether the image matching algorithm can detect a match between the modified artwork and the original artwork. The second test involves uploading student artwork as NFTs, or identifying known open NFTs, on to NFT marketplaces. Afterwards, image copies of these NFTs will be used to test the functionality of the NFTPort search API, DMCA Generator, and whitelisting.

The future goals of Art Guardian involve including any digital artist who would use it as a solution against their art being stolen and minted as NFTs for sale. This also includes major art platforms that are interested in using the product as a way of safeguarding artists and their artwork on their platforms. Another possible future customer would be NFT marketplaces themselves, as they also require a solution to prevent stolen art from being sold as NFTs.



## **4 Art Guardian Prototype Description**

### **4.1 Prototype Architecture (Hardware/Software)**

### **4.2 Prototype Features and Capabilities**

### **4.3 Prototype Development Challenges**

## 5 Glossary

- **NFT:** Non-Fungible Token.
  - Non-fungible means unique, indivisible, and irreplaceable.
  - NFTs are a certificate of ownership stored on a blockchain that links to a file.
- **Blockchain:** An immutable ledger that anyone can validate.
- **Minting:** The process in which the files become part of the blockchain.
- **NFT Marketplace:** An online platform in which NFTs are minted, sold, and collected.
- **DMCA (Digital Millennium Copyright Act) Takedown:** A process in which the owner of copyrighted content requests the removal of the infringing content from the internet or platform.
- **Art Platform:** A website in which users can post their digital art.

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