Lab 1 – Art Guardian Product Description

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1 Introduction

While adapting to developing technologies, artists have found great value in the digital art sector; art can be minted into a non-fungible token (NFT) and sold on a blockchain. An NFT is a unique cryptographic token on a blockchain that cannot be replicated. In recent years, interest in NFTs have dramatically increased from an average of about 100 sales per week in late 2017 to about 80,000 per week in early 2020 (Barber 2022). In addition to popularity, the value of NFTs have also seen a quick uprising with statistics showing the NFT market was at $100 million in 2020 and hit $41 billion in 2021 (Dailey 2022). With the sudden rise of NFTs, artists have a new option for the distribution of their art. According to ArtDiction, an artist was able to sell an NFT of his collaged artwork for $69.3 million (ArtDiction 2021).

With these numbers in mind, it is clear to see that digital artists are directly impacted by any situation involving someone else stealing their original art and benefiting from it through NFTs. A popular digital art platform, Deviantart, reported a 300% increase of art theft in just a single month, reaching up to 90,000 possible cases of art theft (Beckett 2022). When an artist has their artwork stolen, minted into an NFT, and put for sale on the NFT marketplace, the original artist has to undergo a very tedious process. The artist will have to manually search for the NFT with their artwork on hundreds of NFT marketplaces with thousands of NFTs for auction, manually send a Digital Millennium Copyright Act (DMCA) takedown request, and repeat this process if their artwork is ever stolen and minted again.

Art Guardian seeks to provide assistance for these artists. Art Guardian is a progressive web application where digital artists can upload their artwork to the database, and through web crawlers, template matching, and efficient use of APIs, artists will have a tool that automatically

searches for stolen artwork on various NFT marketplaces and simplifies the process of requesting a DMCA takedown request.

2 Product Description

Art Guardian is a progressive web application, which provides availability on both desktops and mobile devices. It will have a user-friendly interface to prevent any issues or complications that could disrupt the user experience. Art Guardian aims to give digital artists an essential layer of security to their digital artwork. The overall goal of Art Guardian is to prevent digital art from being sold on the blockchain as an NFT without the original artist's permission.

2.1 Key Product Description and Capabilities

When users sign up for Art Guardian, they will have to provide their legal information such as first and last name, contact information, address, and date of birth to allow legitimacy and verification of their identity. They will also be able to link their art account to further verify that a user's artwork was actually created and owned by them. Art Guardian's database will store every user's original artwork. Users will have a profile so they can see their uploaded art and view the DMCA takedown statuses of them. As soon as a piece of art is uploaded to the database, Art Guardian protects that artwork with its automatic NFT marketplace detection.

The major feature of Art Guardian is its *automatic* detection of stolen art as NFTs. Through web crawlers and template matching, Art Guardian prevents users from having to manually search for their stolen art on these various marketplaces. This feature will eliminate the need for an artist to manually search for their stolen artwork on hundreds of marketplaces with thousands of NFT transactions, which is a very time consuming, tedious process. Even if they manage to find the NFT with their artwork, it is relatively simple for another theft to occur with

the same piece of art, thus repeating this tedious process over again. Art Guardian's system of automatically detecting stolen art as NFTs will run on a periodic basis to allow for continuous NFT marketplace monitoring.

Once a stolen piece of art's NFT transaction has been found, a notification is automatically sent to the original artist; both through the user's email and the application. The notification will provide in-depth information about the NFT transaction, such as the NFT image, token, seller, and link to the marketplace which it is being sold on. There will be a procedure that ensures the user is, in good faith, the original artist and that they want to send a DMCA takedown request for that specific NFT. Once they approve of everything in this procedure, Art Guardian will provide an automatically-filled DMCA takedown request for the user to review. This will have the correct information that follows the provided guidelines for a DMCA takedown request. Users will provide an e-signature to send the request, and Art Guardian will have a feature that allows artists to monitor the statuses of all of their DMCA takedown requests.

Art Guardian will also have a general section that provides guidance to protect digital artwork. This section is simply for artists to read and browse, as it will include updated articles, posts, and FAQs pertaining to actions taken for users to protect their digital art.

The interfaces of the desktop and mobile applications will be very similar to ease navigation and user functionality between both systems. Users will be able to use either form of the application, and all of Art Guardian's features are available to both forms.

2.2 Major Functional Components

Art Guardian will require a web server, database server, and a device that can run this application. It will use the AWS web server and MySQL database server to send and receive requests between users' devices, the database, and the various APIs that will be implemented.

Art Guardian's web application can be accessed through any device that has access to the internet (such as a desktop computer or a laptop), and its mobile application will be available on both iOS and Android devices.

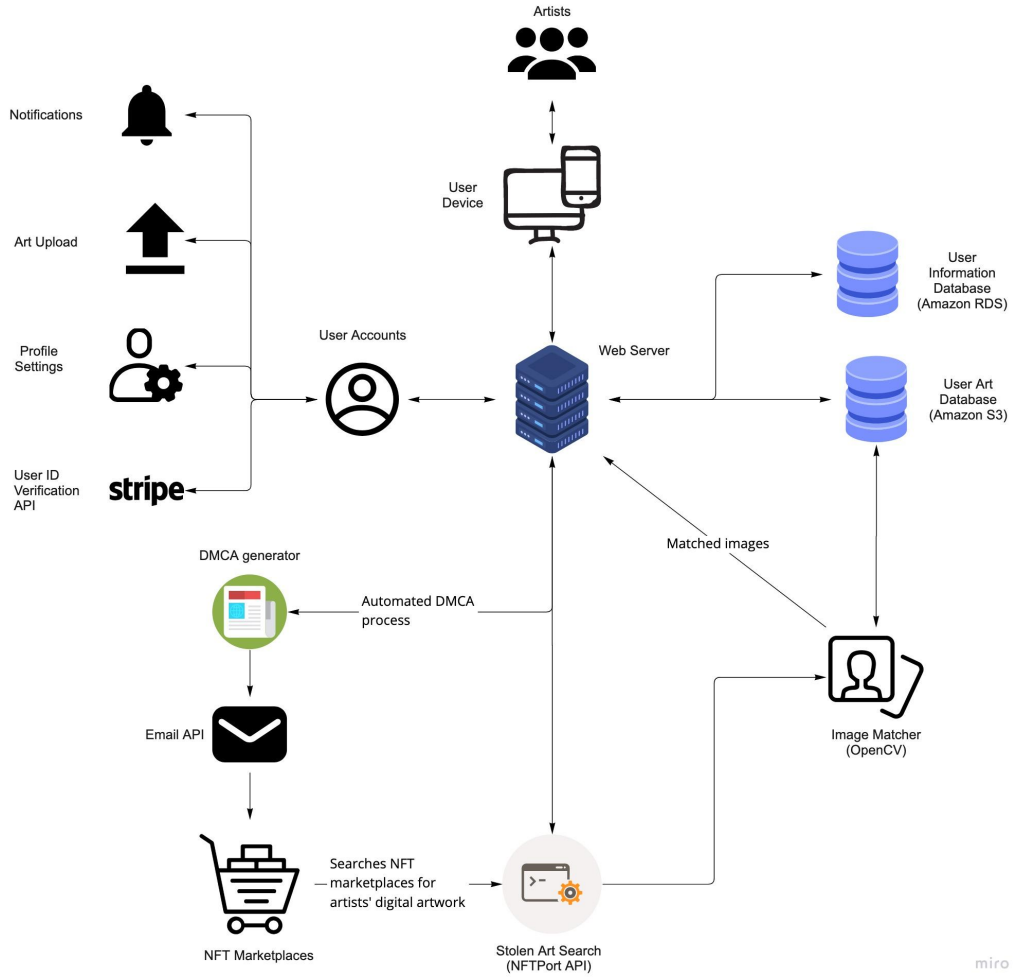

Figure 1 - Art Guardian Major Functional Component Diagram

The React front-end framework will be utilized for the website application along with HTML, CSS, and JavaScript. Art Guardian's mobile application will be implemented with the React Native framework along with JavaScript. Git and GitHub will be used for version control, continuous integration, and continuous development. The Stripe API will be used to assist in user identity verification. Amazon RDS and MySQL will be used as the database to provide

encryption for the stored artwork. The database will store user information, artwork, and DMCA history. AWS will be the standard web server for Art Guardian. OpenCV will be used for the template matcher, which will compare NFTs with artwork on Art Guardian's database. The application will utilize the NFT Port API to assist in searching NFT marketplaces for stolen artwork as NFTs. The Gmail API will be used to assist in sending the pre-filled DMCA takedown request to the NFT marketplace.

3 Identification of Case Study

Art Guardian is aimed directly towards digital artists to prevent unsolicited minting of their artwork. It will provide digital artists with an essential layer of security for their original artwork as the popularity and economic value of NFTs are drastically growing. Commissioned artists are faced with a direct threat if their creative works are being infringed upon for a profit. NFT artists are also a group of interest because they may want to keep the integrity of NFT sales. The case study group for the Art Guardian prototype will be NFT artists, commissioned artists, and students with a major in art from Old Dominion University. The case study will aim to create positive feedback towards the design, implementation, and overall effectiveness of the prototype. Art Guardian has the goal of safeguarding the proliferation of NFT that infringe on the originality of the artwork.

Major art platforms, such as DeviantArt, will have interest in Art Guardian because these platforms lack an effective system of preventing NFT sales with stolen artwork. They may seek interest in this system in order to provide their users with the same layer of protection for the artwork on their databases. Additionally, NFT marketplaces may be a party of interest because they will have access to a system that can assess the problem firsthand on the marketplace of choice.

4 Product Prototype Description

4.1 Architecture (Hardware/Software)

4.2 Features and Capabilities

4.3 Development Challenges

5 Glossary

Art Platform - A website in which users can post their digital art

Blockchain - An immutable ledger that anyone can validate

DMCA (Digital Millennium Copyright Act) Takedown - A request sent by the owner of the copyrighted content to remove the infringing content from the internet or platform

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

NFT (Non Fungible Token) - A certificate of ownership stored on a blockchain that links to a file

- **Non-fungible** - Unique, indivisible, and irreplaceable

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