

Lab 1- Art Guardian Product Description

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1. Introduction

Currently, NFT artists have to manually track down their artwork by searching various NFT marketplaces and looking for their artwork. If a piece of stolen art is found the original artist would have to fill out a DMCA takedown request for each piece that may have been compromised. The rate at which NFT markets are expanding has been increasing and NFT markets such as OpenSea are doing very little to aid NFT artists when it comes to tracking and taking down stolen pieces of artwork even though there has been an increase in NFT theft. “The rise in such thefts comes as the market for non-fungible tokens, or NFTs, exploded last year, growing to an estimated \$22bn”. (Beckett, L. 2022, January 29).

Tracking stolen art and filling out DMCA takedown requests can be a tedious and tiring process and there is no current software out to automate these tasks. With NFT marketplaces placing a lot of the burden of policing their artwork on the artists, having an automated process to track stolen artwork is a workaround to frustrations that an artist may experience when trying to track stolen artwork manually. “OpenSea has grown at a dizzying pace, and is now valued at \$13bn. But amid its spectacular rise, the company is doing far too little to prevent the trade in fraudulent NFTs, some artists charge, and is placing much of the burden of policing art fraud on the artists themselves.” (Beckett, L. 2022, January 29). There is no easy or automated way to search the various NFT marketplaces for stolen art and send DMCA takedown requests if a stolen piece of art is found. This is where the Art Guardian can come in and help by providing a solution for these issues.

2. Product Description

The Art Guardian is a progressive Web Application that monitors an artist's artwork for theft on NFT marketplaces. The Art Guardian provides an automated system to detect stolen art that is being sold as an NFT and also eases the DMCA takedown process for artists. To ease the tedious DMCA takedown process, the Art Guardian will pre fill DMCA requests if it finds a stolen piece of art and ask the artist to verify that the art identified is really theirs and proceeds to get a signature from the artist to send the DMCA takedown Request.

2.1 Key Product Features and Capabilities

The Art Guardian is able to upload an artist's art to the Art Guardian's database. Any piece of art that is in the Art Guardian database can be used to search against existing images on NFT marketplaces to find stolen artwork. The Art Guardian can search a NFT marketplace multiple times to see if there are any matching NFTs that may be stolen. If a stolen NFT is found by the Art Guardian, then the Art Guardian has the ability to fill out a DMCA takedown request for that stolen NFT.

The Art Guardian contacts the original artist for verification and a signature to confirm the sendoff of the DMCA. The Art Guardian monitors sent and ongoing DMCA takedown requests. With these features the Art Guardian will be able to solve the existing issue of having to manually search NFT marketplaces for stolen art and the tedious nature of filling out and sending DMCA takedown requests.

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2.2 Major Components (Hardware/Software)

The Art Guardian is compatible with any PC or mobile device that has internet connection and artists will be able to access the art guardian through a web browser. The Art Guardian will be using an ID verification API to verify an artist's identity, will have profile settings or notification settings, and will also have access an art upload feature. There will be two databases, one is used to store an artist's information and another is used to store an artist's artwork. Amazon RDS is planned to be used to hold artist information while Amazon S3 is to be used to store artists artwork. Refer to Figure 1 below to see a diagram of our major functional components.

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3. Identification of Case Study

The Art Guardian is designed for commissioned artists and digital artists. As the Art guardian is being developed to help commissioned artists and digital artists, the case study will focus on ODU art students who can use the art guardian to make the process of looking through NFT marketplaces for stolen art much less tedious and provide feedback on improvements our team can make to the application. With the addition of generated DMCA takedown requests, the Art Guardian is the best application to be used to search for stolen NFT art and immediately generating and sending a DMCA takedown notice. The Art Guardian can help ODU art students feel secure in the vast market of NFTs while also helping our development team identify vital points of improvement within the application.

The goal of conducting a case study on ODU art students is to get an idea of the issues that may arise when a user uses our application consistently. With the data we collect from this case study our development team can have a better idea of the amount of traffic going through the web server and how much data we will be required to preserve. Artwork should never be sold without the original artists permission and the Art Guardian is envisioned to ensure that for all digital artist in the future.

4. Product Prototype Description

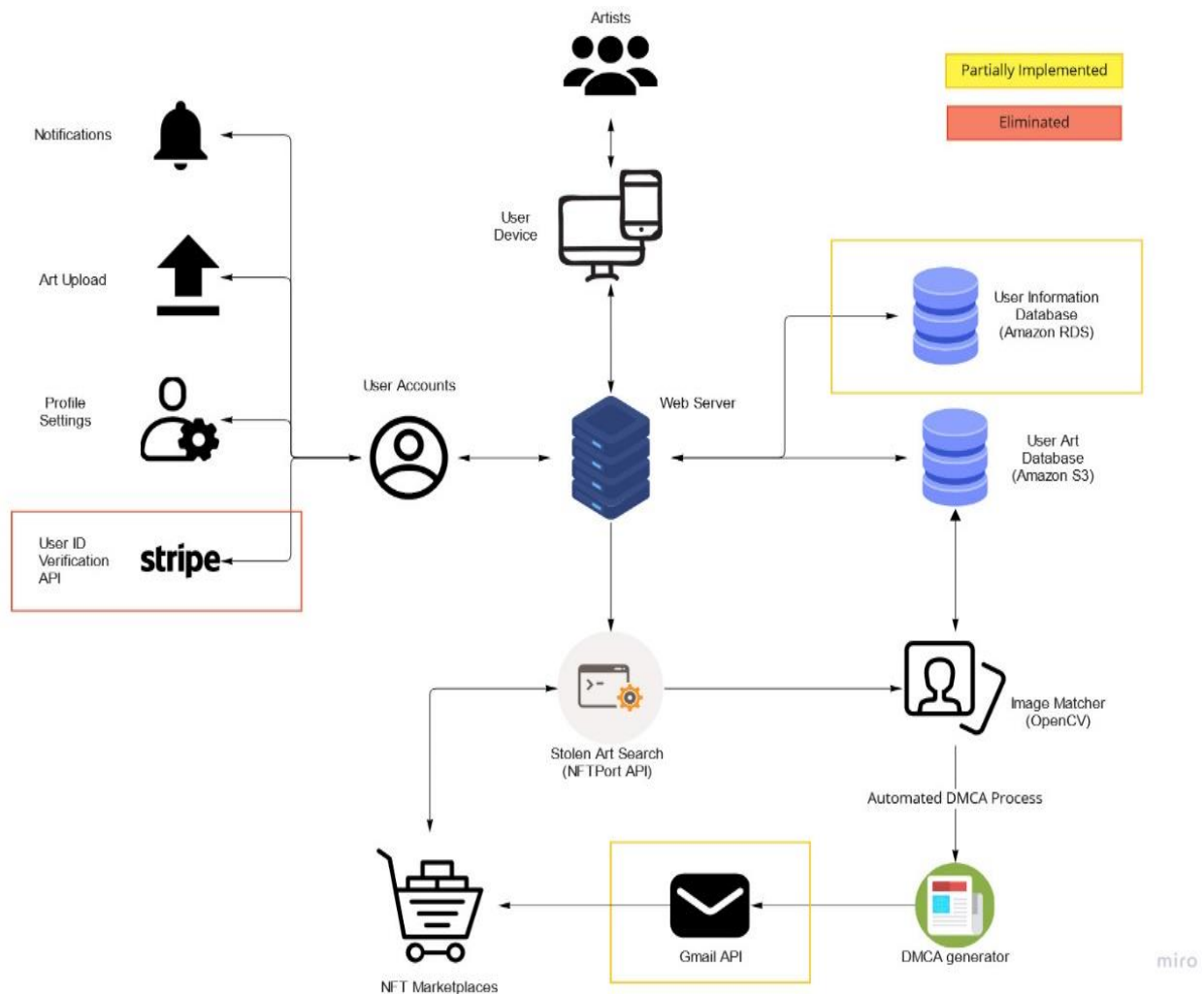
Art Guardian aims to protect digital artists, both those who do and do not mint NFTs from incidents of theft where art is minted and sold in the form of NFTs. The prototype for the Art Guardian will have a reduced set of features compared to the overall functionality of the real-world application. The Art Guardian prototype will serve as a proof of concept and is intended to show what a fully functional application can do for the end user. Even though these two features

will not be implemented, the Art Guardian will still be able to provide adequate demonstrations of the overall functionality that will make this application successful.

4.1 Prototype Architecture (Hardware/Software)

The Art Guardian prototype will operate on an Apache web server with PHP and a MySQL database. The web server runs on an Amazon EC2 instance using Amazon Linux, and the MySQL database is a MySQL DB instance. Both the Amazon EC2 instance and the DB instance run in a virtual private cloud (VPC) based on the Amazon VPC service. The web server will be connected to the database instance using the database instance endpoint. Art Guardians' prototype MFCD, shown in Figure 2, has been modified to show what features are going to be eliminated and partially implemented for the Art Guardian.

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Figure 2*Art Guardian Prototype Major Functional Component Diagram*

4.2 Prototype Features and Capabilities

As shown in Table 1 below, the Art Guardian prototype will only include features needed in order to have a successful proof of concept for end users. Art Guardian will be using mock data for two features that may change in functionality; User Verification and DMCA tracking. End users will still be required to enter their user information but we won't be verifying the user's

data and we won't be sending real DMCA's therefore we have no way of tracking a DMCA with our prototype design.

Table 1

MFCD Prototype Features Table

Art Guardian	RWP	Prototype
Account Creation	Fully Implemented	Fully Implemented
User Verification	Fully Implemented	Eliminated: Mock data
Art Upload	Fully Implemented	Fully Implemented
Image Library	Fully Implemented	Fully Implemented
Whitelisting	Fully Implemented	Fully Implemented
Marketplace Monitoring	Fully Implemented	Fully Implemented
Image Matching	Fully Implemented	Fully Implemented
Stolen Art Alert	Fully Implemented	Fully Implemented
DMCA Generation	Fully Implemented	Fully Implemented
DMCA Filing	Fully Implemented	Partially Implemented: Send to testing email
DMCA Cataloging	Fully Implemented	Fully Implemented
DMCA Tracking	Fully Implemented	Eliminated: Simulated Data

Using a smartphone, end users will be able to create an account and login to the Art Guardian prototype. Users will be able to upload their NFT art to our database and have the option to browse their account specific art library as well as having the option to whitelist any of their NFT art that is in their image library. The ability to monitor a NFT marketplace for matching NFT images will be implemented and users will get an alert if the Art Guardian has found their

stolen NFT art. Art Guardian will generate DMCA notices but will not file the generated DMCA. Instead, the Art Guardian prototype will take the generated DMCA and send it to a testing email. All generated DMCA's will be cataloged in the Art Guardian but we will not be tracking DMCA's because we are not filing the generated DMCA.

4.3 Prototype Development Challenges

One of the main development challenges for the Art Guardian will be the learning curves associated with learning new technologies such as AWS Amplify and DynamoDB. Another development challenge is time. The development team will have a small-time frame of 3 months to get the application working and connecting different components of our application together. Time is such a big concern because the Art Guardian will be mainly run on the Amazon Web Services cloud platform and not all of our team members are familiar with the AWS cloud platform. Research on the various AWS services will have to be done to find out the most efficient, effective way to build our applications cloud infrastructure.

Another development challenge is getting all of our team familiar with the AWS cloud services we decide on. It will be important that all of us know how to work with the AWS cloud command line interface and that will take time that we unfortunately don't have a lot of. Many members of the development team are not familiar with the AWS cloud platform so they will need time to familiarize themselves with the services we use such as EC2 and S3 in order to get a successful fully functional prototype. Lastly, getting the team together at the same time is a development challenge. Members of the development team all have other obligations they must attend to so it will be challenging coordinating development, integration, and testing activities across a geographically dispersed team with all activities conducted in an online environment.

5 Glossary

NFT: A sellable, tradeable, non-fungible token that exists on the blockchain and represents some form of data

Blockchain: A decentralized, immutable, public ledger that is split among multiple computers

Art Platform: A site that artists use to publish their art

DMCA (Digital Millennium Copyright Act) takedown: act of taking down a copyrighted work from a website on behalf of the owner of that work

Minting: Using a piece of data, such as an image, to create a unique NFT

NFT Marketplace: website where NFTs are sold

AWS (Amazon Web Services): Largest provider of various cloud computing services

AWS Amplify: an AWS service for building full-stack web applications

Amazon RDS (Relational Database Service): cloud-based database service which can work with other AWS services

Amazon DynamoDB: cloud-based database service which can work with other AWS services

NFTport API: interface for working with popular NFT blockchains and markets

React: open-source, front-end JavaScript library for creating websites with modern user interfaces

Stripe API: programming interface for verifying a user's identity

OpenCV: open-source computer vision library for Python

Gmail API: a programming interface for the creation and sending of emails

MySQL: a relational database management system

Git: version control system for tracking software changes

GitHub: online hosting of the git version control system

JavaScript: a general-purpose programming language often used for web development

HTML: markup language for displaying documents in the web browser

CSS: style sheet language that specifies the style and layout of how documents are displayed in a web browser

NFTs are a certificate of ownership stored on a blockchain that links to a file.

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6 References

Collins, B. (2021, December 23). Fungible vs Non-Fungible Tokens: What's The Difference? Bryan Collins. <https://www.bryancollins.com/fungible-vs-non-fungible-tokens/>

BBC. (2021, March 12). What are NFTs and why are some worth millions? BBC News. <https://www.bbc.com/news/technology-56371912>

Telmo Subira Rodriguez. (2018, December 2). Blockchain for Dummies. Medium; The Startup. <https://medium.com/swlh/blockchain-for-dummies-d3daf2170068>

Coincorner. (2022, February 11). What Is Nft Minting? Coin-Corner. <https://coin-corner.com/what-is-nft-minting/>

Beckett, L. (2022, January 29). 'Huge mess of theft and fraud:' artists sound alarm as NFT crime proliferates. The Guardian. Retrieved January 31, 2022, from <https://www.theguardian.com/global/2022/jan/29/huge-mess-of-theft-artists-sound-alarm-theft-nfts-proliferates>

Dailey, N. (2022, January 6). NFTs ballooned to a \$41 billion market in 2021 and are catching up to the total size of the global fine art market. Markets Insider. Retrieved February 23, 2022, from <https://markets.businessinsider.com/news/currencies/nft-market-41-billion-nearing-fine-art-market-size-2022-1>

Abrol, A. (2022, January 14). What is an NFT marketplace and How Do You Create Your Own? Blockchain Council. Retrieved February 23, 2022, from <https://www.blockchain-council.org/nft/nft-marketplace/>

Mr. DMCA Helper. (2022, February 23). What is a DMCA Takedown? Dmca.com. https://www.dmca.com/FAQ/What-is-a-DMCA-Takedown?ref=why_is_sol5a32

Palmer, R. (2022). @arvalis. Retrieved 1 March 2022, from
<https://twitter.com/arvalis/status/1369230566843813891?s=20>

Chang, J. (2021, April 12). How Did NFTs Become So Popular? Medium.
<https://medium.com/geekculture/how-did-nfts-become-so-popular-f894eea22f90>

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