Lab 2 – Art Guardian Specification Outline

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Version 1

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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 solen 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.

1.1 Purpose

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.

1.2 Scope

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. Art Guardian will do this by tracking art uploaded into the database and searching NFT marketplaces for cases of theft and automating any subsequent DMCA Takedowns. The benefit to the artist is the protection of them from theft online. The benefit to NFT artists is the security of their product from any counterfeits.

Art Guardian's prototype will fully implement art upload, whitelisting, art tracking, image matching, theft alert, DMCA generation, and DMCA cataloging. Due to constraints Art guardian will partially implement DMCA filing, as test DMCA's cannot be sent to real websites and instead will be sent to test emails. The prototype will eliminate user verification and DMCA tracking.

1.3 Definitions, Acronyms, and Abbreviations

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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1.4 References

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1.5 Overview

This product specification provides the hardware and software configuration, external interfaces, capabilities and features of the Art Guardian prototype. The information provided in the remaining sections of this document includes a detailed description of the hardware, software, and external interface architecture of the Art Guardian prototype; the key features of the prototype; the parameters that will be used to control, manage, or establish that feature; and the performance characteristics of that feature in terms of outputs, displays, and user interaction.

2 General Description

The information included in section 2 will include details about the Art Guardian prototype. Section 2 will go over the Art Guardians prototype architecture, interfaces, and communication protocols.

2.1 Prototype Architecture Description

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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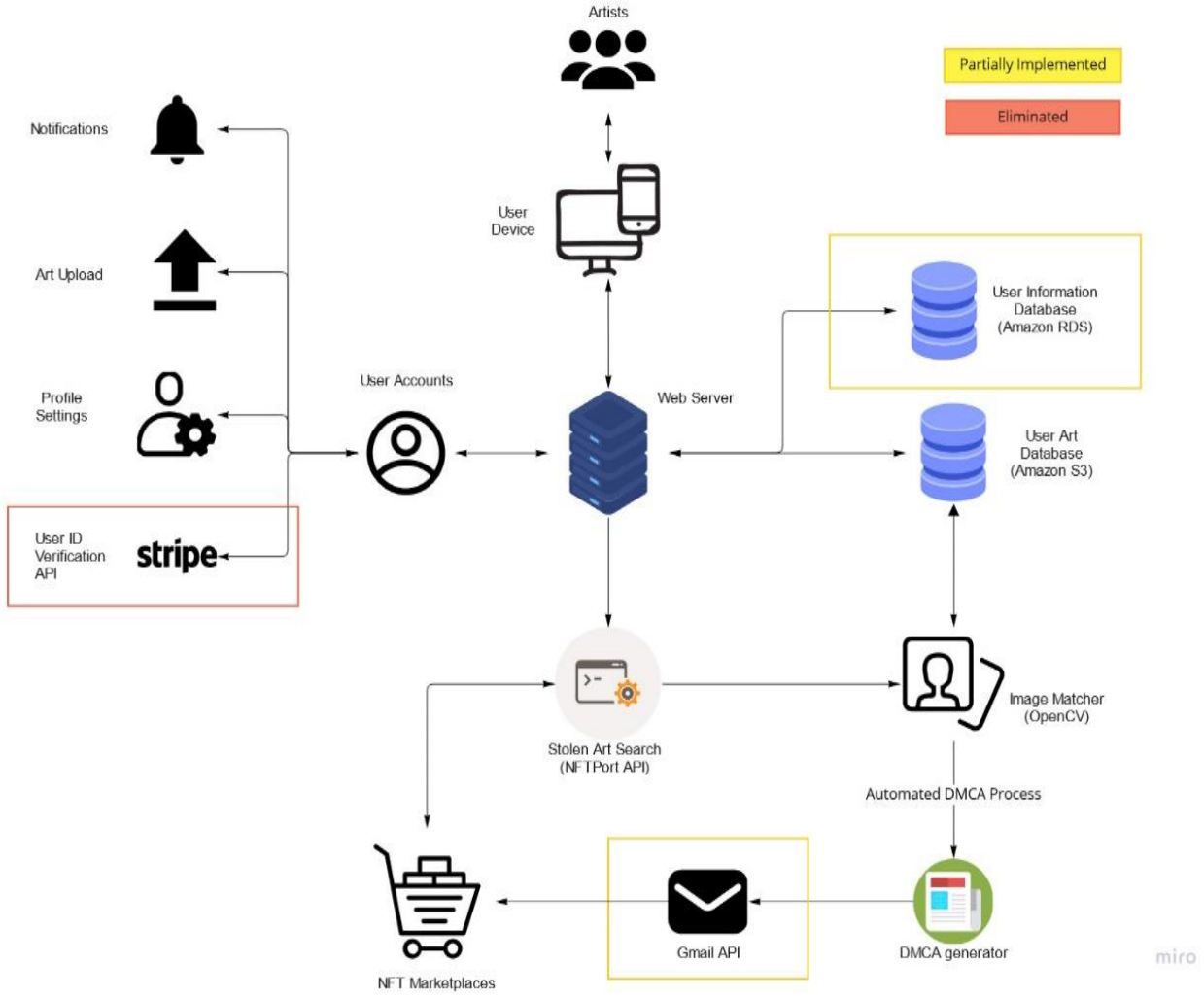
Figure 1

Art Guardian Prototype Major Functional Component Diagram



2.2 Prototype Functional Description

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 DMCAs therefore we have no way of tracking a DMCA with our prototype design.

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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 DMCAs will be cataloged in the Art Guardian but we will not be tracking DMCAs because we are not filing the generated DMCA.

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2.3 External Interfaces

The Art Guardian prototype will be cloud-based and using AWS cloud services such as Amplify to connect the frontend to the backend, CloudFormation to automate our web applications infrastructure, and s3 buckets to hold our infrastructure and Amplify configurations.

2.3.1 Hardware Interfaces

Desktop or Laptop running Windows, MacOS, or Linux.

2.3.2 Software Interfaces

- React Framework
- Gmail API
- OpenCV Library
- NFTPort API
- AWS Amplify
- AWS RDS
- AWS DynamoDB
- GitHub
- Git Version Control

2.3.3 User Interfaces

A flat-screen color display, keyboard for data entry, and a mouse for maneuvering.

2.3.4 Communications Protocols and Interfaces.

HTTP(S) for secure communication over the internet. TCP/IP for communication between the internet and the device.

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3 Product Requirements

Art Guardians' requirements will be included in a separate document titled "Lab 2 Section 3 – Product Requirements." The document will include the key functional requirements of the product as well as illustrations to expand on the concepts. In addition to the functional requirements, the performance requirements of Art Guardian will be included in the document. The performance requirements will be expressed in specific, measurable terms. Assumptions and constraints for Art Guardian will be described, and the non-functional requirements will be outlined.