deepict

Final Report

by Tyler Manion

ITIN 4980 Fall 2019

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INTRODUCTION

Deepict uses A.I. and other generative algorithms to both save tablets from landfills, and to create something beautiful. It turns photos into works of art that are different each day.

The Problems

E-Waste is a major environmental issue. As technology becomes obsolete, it usually ends up in a landfill, which puts hazardous materials into the earth. Oftentimes these devices aren't actually broken, they're just a little slow. Tablets especially often have high-resolution screens that still perform great.

We print and frame pictures because they mean something to us. Whether they show a favorite memory, or a proud accomplishment, or a cherished loved one, we've decided that these pictures mean enough to us to place them in our homes, where we can see them and remember often. The issue is that the more familiar they become, the less impactful they become as well.

The Solution

Deepict is a way to give old tablets new purpose. It leverages physical tablets that are old, slow, and because of that – unused. Deepict will recycle old hardware, saving it from a landfill or a dusty drawer, and instead turn it into something beautiful.By introducing variety, deepict can give the viewer a fresh perspective on a favorite photo every day. Deepict can take a photo and repaint it in the style of cubism, impressionism, or something totally new. One day, you notice how the geometric lines lend a sense of vertical motion, and it gives you the stomach flipping sensation of weightlessness. The next, you notice how the swirling colors of the air feels like technicolor wind. The day after, the thick paint daubs resemble waves in the ocean, and you wonder if the girl is flying or swimming in the sky. Every single day there's new meaning to be found and appreciated.

MARKET

Every single day there's new meaning to be found and appreciated

User Stories

A business executive wants to display a picture of her dog on her desk without it feeling stale or unprofessional (Not that I think it's stale or unprofessional).

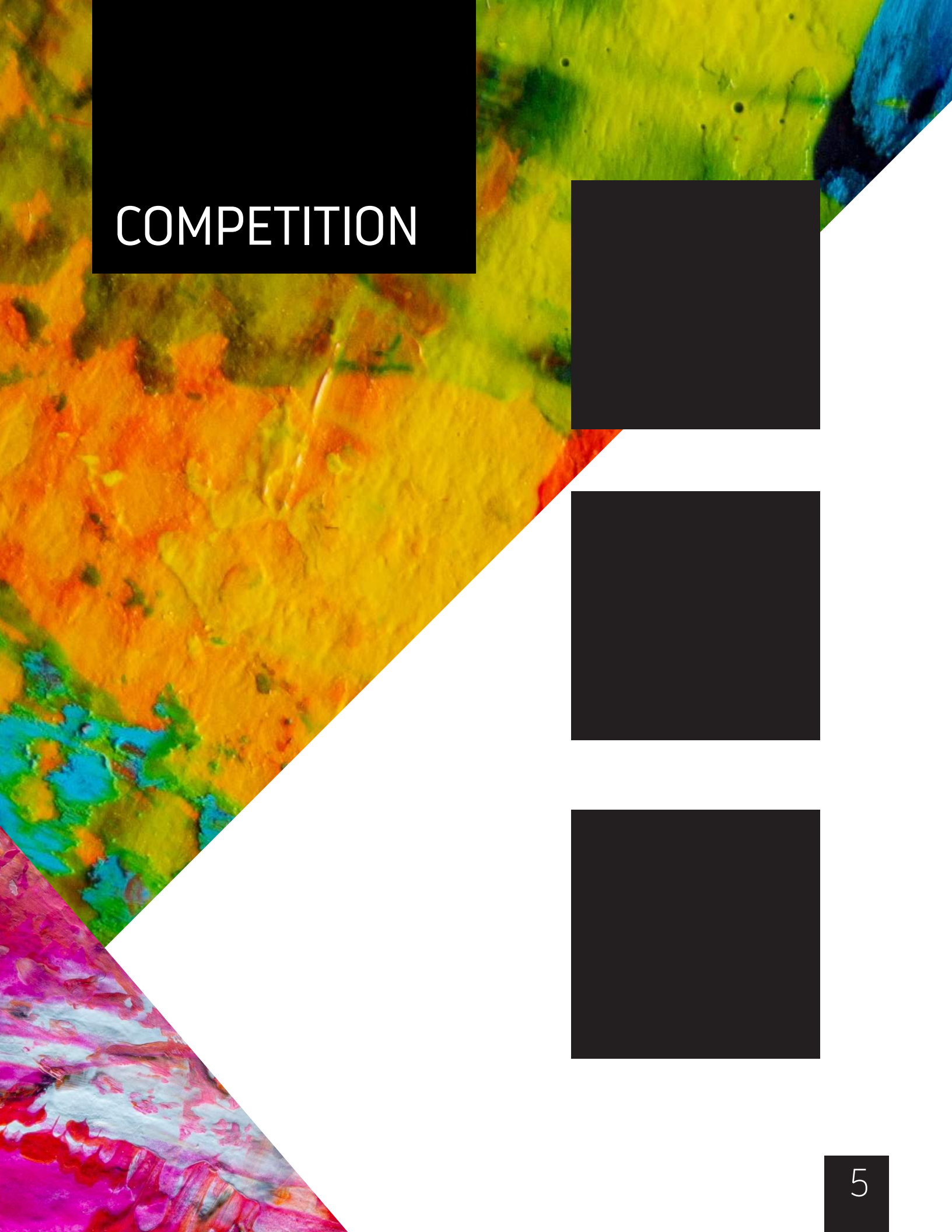
A young professional wants to hang a picture on their wall, but they like the idea of it creating content for them.

A grandparent wants to show pictures of their grandkids, and they like how the digital frame makes them look like paintings.

Landscape

Consumers are increasingly demanding smart technology in their homes and lives. In the last ten years, devices like alexa-equipped smart speakers have become one of the biggest tech purchases. Recently, Amazon debuted the Echo Dot, a smart speaker with a screen. Going forward, these devices will only become more prevelant.

COMPETITION



Digital Photo Frames

Market Size: $475,000,000 (According to BusinessWire)

Major Players: Nixplay, Pix-Star, Echo Show

Over the last 5 years the digital photo frame market has seen a dramatic drop in price per unit on average. This is due to the increasing prevelance of cheaper, mass-produced and relabeled devices available for consumers. Like a lot of electronics, many of the models sold are actually the same device, under a different brand name. These devices range from $35 to $65, and are sized at around 8 inches at 720p resolution. To differentiate from cheaper products, existing digital photo frame makers are developing more luxury products with better specifications and more technology. Nixplay and Pix-Star offer photo frames with wifi, speakers, and app integration, that can be had at $150-$300. Recently, devices like the Echo Show have been introduced, combining smart speaker technology with a display. Priced at $80-$150, smart displays are poised to undercut luxury digital photo frames.

A.I. Photo Filters

Market Size: $15,717,410 (According to Website Traffic Metrics)

Major Players: Deepart.io, Prisma-ai, Deep Art Effects, instapainting.com

As a.i. continues to grow as a viable technology, it continues to see use in new industries and applications. One of those applications is style-transfer, which intelligently applies photo filters to pictures to produce exceptional results. There aren't many players using the technology as of yet, and the current market is marginal, but it's poised to explode in coming years. Prisma-ai focuses on a phone app model, allowing users to customize their photos with filters, to later save and share. They monetize through the use of in-app purchases and ads. They suffered from the high churn rate of photo filter apps, and dropped from 18,000,000 users to <1,000,000. Companies like deepart.io allow users to emulate their photos in user-selected styles, and monetize through canvas purchases, paid HD downloads, and paid expedited processing. They have yet to break into widespread market awareness, and their site is plagued by bugs.

On-Demand Art Printing

Market Size: $600,000,000 (According to Redbubble Market Analytics)

Major Players: Redbubble, Zazzle, Society 6

Print on demand companies like Redbubble and Society6 have seen widespread success, and are continuosly growing at a cagr of >40%. Their model is based on providing a market place for digital artists to sell their work. The artists only have to upload their art, and the company will handle the selling, printing, shipping, and marketing, all for a commission off of each purchase. They allow printing on multiple options, from phone cases, to pillows, to shirts, to canvases. They prove that a direct printing market not only exists but is willing to spend even more. One thing they fail to fully capitalize on is personalization, where other sites allow for options like personalized engravings or commissions.

DIFFERENTIATOR

Deepict doesn't fit in any existing market, because there's nothing quite like it. Deepict will fill the gap of a photo frame that uses a.i. tech, and allows users to print their uniquely created art.

BUSINESS MODEL

Plan

Deepict will be built on an MVP model, with a focus on developing core features in a method that will allow for efficent deployment to multiple platforms for the greatest market penatration. Once the core features are established, work will begin on developing the ability to print and ship art. After that, development will be focused on creating a system that allows payment outside of the app stores, to circumvent high commission fees. The marketing strategy will rely heavily on organic social media buzz, which will be encouraged by incentivizing the posting of pictures from the app.

Pricing

Freemium Subscription Model with In-App Purchases

Subscription - $5 per month
Art Packs - $1.99 each
Art Prints -$35-$300 each

The pricing is set at common numbers that will be used as a baseline to evaluate customer acceptance. These numbers will be adjusted based off of A/B and focus group testing.

PREDICTIONS

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
USERS						
# Users	$ 10.00	$ 521.58	$ 11,179.76	$ 55,029.33	$ 158,889.16	$ 458,769.27
% Premium	10%	5%	5%	5%	5%	5%
# Premium Users	$ 1.00	$ 26.08	$ 558.99	$ 2,751.47	$ 7,944.46	$ 22,938.46
Churn Rate	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
Avg Monthly User Growth	-	40.00%	30.00%	15.00%	10.00%	10.00%
REVENUE						
Premium Subscription Revenue	$ 60.00	$ 130.40	$ 2,794.94	$ 13,757.33	$ 39,722.29	$ 114,692.32
In App Purchase Revenue	$ 2.80	$ 102.23	$ 2,191.23	$ 10,785.75	$ 31,142.28	$ 89,918.78
Print Revenue	$ -	$ 469.43	$ 10,061.78	$ 49,526.40	$ 143,000.24	$ 412,892.34
COSTS						
App Store Costs	$ 137.00	$ 46.53	$ 997.23	$ 4,908.62	$ 14,172.91	$ 40,922.22
Server Costs	$ -	$ 300.00	$ 400.00	$ 500.00	$ 1,000.00	$ 2,000.00
Labor Costs	$ 10,000.00	$ 50,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00
Consultation Costs	$ 5,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00
Print Costs		$ 78.24	$ 2,012.36	$ 12,381.60	$ 47,666.75	$ 137,630.78
Taxes	$ -	$ -	$ -	$ -	$ 10,710.00	$ 23,714.00
SUMMARY						
CAGR	-	22.25%	19.17%	14.20%	9.24%	9.24%
Total Revenue	$ 62.80	$ 702.05	$ 15,047.95	$ 74,069.48	$ 213,864.81	$ 617,503.44
Total Costs	$ 15,137.00	$ 52,424.76	$ 25,409.59	$ 39,790.22	$ 84,839.66	$ 202,553.00
Total Profit	$ (15,074.20)	$ (51,722.71)	$ (10,361.64)	$ 34,279.26	$ 129,025.15	$ 414,950.44
Total Profit After Tax	**$ -**	**$ -**	**$ -**	**$ 34,279.00**	**$ 118,315.15**	**$ 391,236.44**

PRODUCT

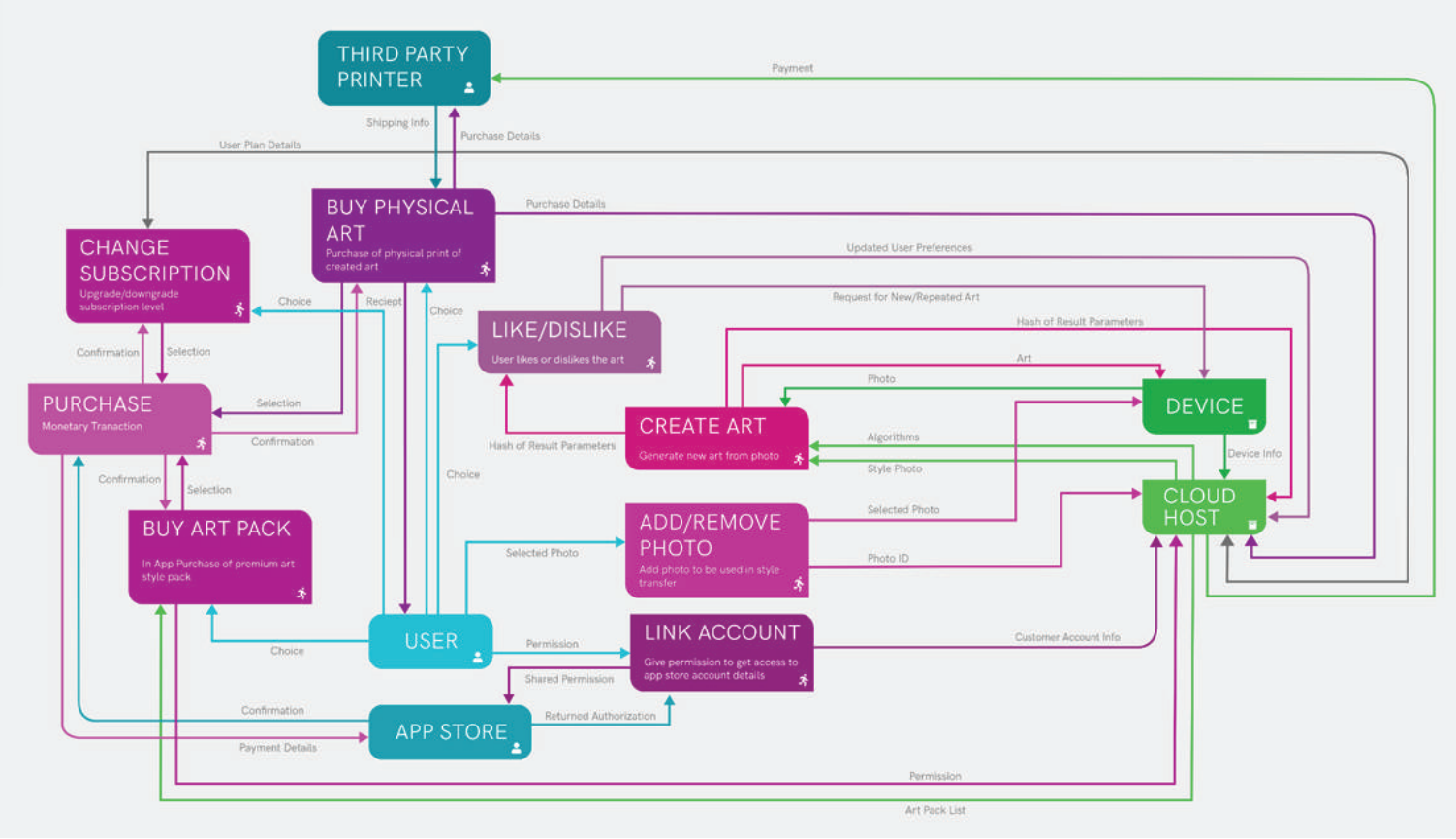
Tech Explanation

Deepict will rely on a blend of algorithms designed to drastically alter how a photo looks. The main technology it will rely on a flavor of neural networks called style-transfer. It'll take a given photo, combine it with an artwork, and return the original photo in the artwork's style. In addition to style transfer, deepict will also use generative algorithms to enhance the results, by running it through multipe filters designed to produce the best results for the specific artwork emulated.

Tech Stack

The purpose of this project is primarily as a means to educate myself, not as a way to make money. As such I intend to focus my tech stack on what I want to learn. I'm interested in web development, and as such I want to focus on javascript and the html5 canvas. The html5 canvas is really powerful when it comes to manipulating and displaying graphics. I was recommended by my mentor to use it in my project, and I intend to. On the front end, I want to program everything according to the modern best practices, which emphasize responsiveness and modularity. A javascript framework is great at handling that. I would like to use React, as it also handles graphics well, and it has a ton of support and plugins. One such plugin is React Router, which would handle all of the web-routing. With Ionic, I can use one codebase and apply it to android, apple, and the web, without much extra work. Ionic just came out with official support for react in October 2019. On the back end I'd like to use node.js, which I have a bit of prior experience with. It pairs well with javascript frameworks, and is good at asynchronous work, which will be important for handling image manipulation. I've yet to decide on the database I'll use. I'm leaning towards MongoDB but I'm looking at other options as well. My main criteria are that it's easy to learn and in-demand.

DESIGN DOCS


THIRD PARTY PRINTER
Payment
Shipping Info
Purchase Details
User Plan Details
BUY PHYSICAL ART
Purchase of physical print of created art
Purchase Details
CHANGE SUBSCRIPTION
Upgrade/downgrade subscription level
Choice
Reciept
Choice
Updated User Preferences
Request for New/Repeated Art
LIKE/DISLIKE
User likes or dislikes the art
Hash of Result Parameters
Art
Photo
DEVICE
Confirmation
Selection
PURCHASE
Monetary Tranaction
Selection
Confirmation
CREATE ART
Generate new art from photo
Hash of Result Parameters
Algorithms
Style Photo
Device Info
Confirmation
Selection
Choice
CLOUD HOST
BUY ART PACK
In App Purchase of premium art style pack
ADD/REMOVE PHOTO
Add photo to be used in style transfer
Selected Photo
Photo ID
Selected Photo
Choice
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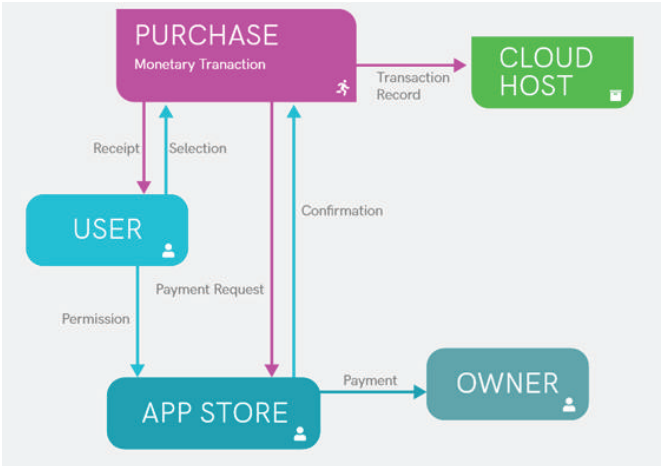
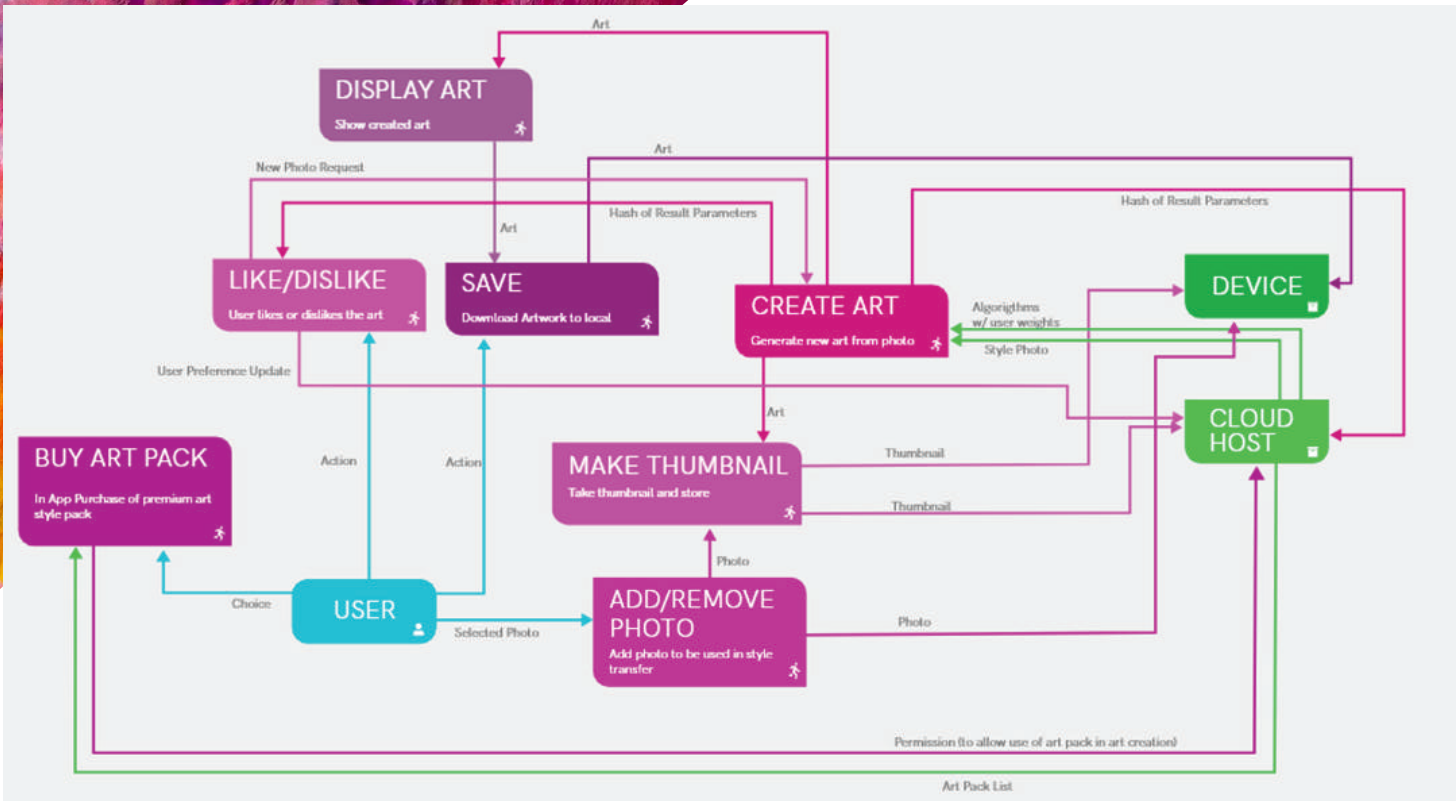
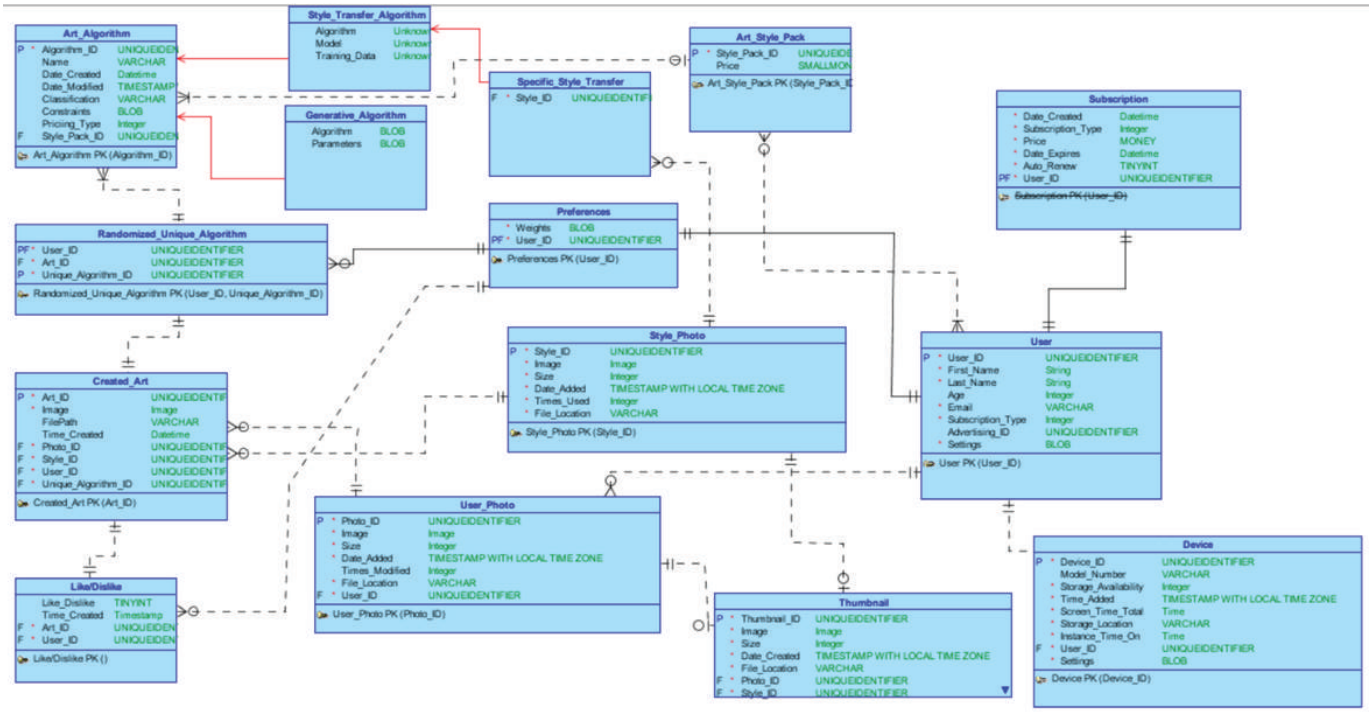
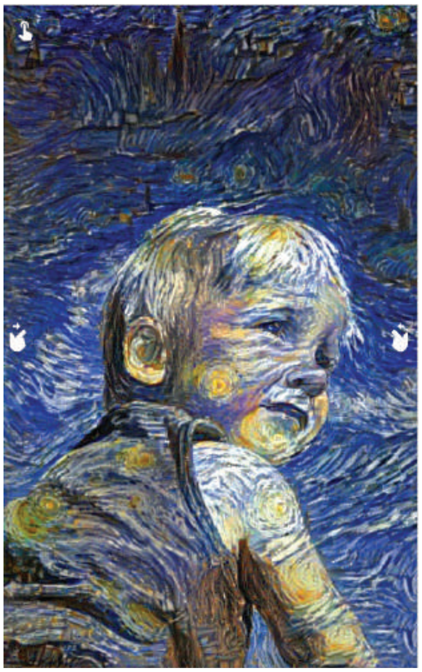
Art Pack List

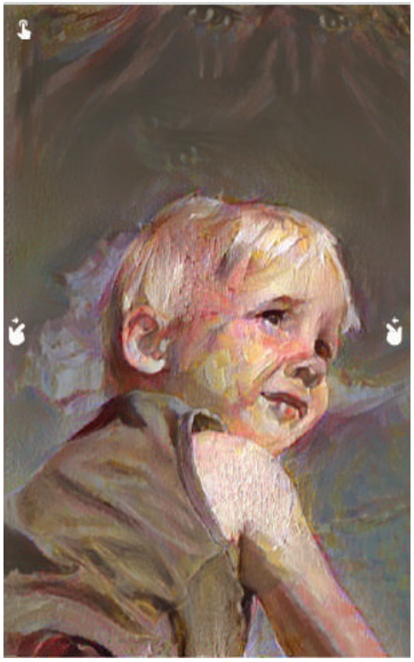

PURCHASE
Monetary Tranaction
Transaction Record
CLOUD HOST
Receipt
Selection
Confirmation
USER
Payment Request
Permission
Payment
OWNER
APP STORE

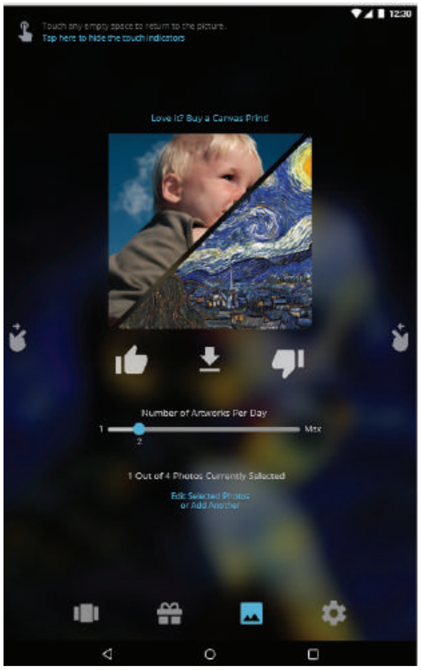

DISPLAY ART
Show created art
LIKE/DISLIKE
User likes or dislikes the art
SAVE
Download Artwork to local
CREATE ART
Generate new art from photo
DEVICE
CLOUD HOST
BUY ART PACK
In App Purchase of premium art style pack
MAKE THUMBNAIL
Take thumbnail and store
USER
ADD/REMOVE PHOTO
Add photo to be used in style transfer
Art
New Photo Request
Hash of Result Parameters
Algorithms w/ user weights
Style Photo
User Preference Update
Thumbnail
Action
Choice
Selected Photo
Photo
Permission (to allow use of art pack in art creation)
Art Pack List

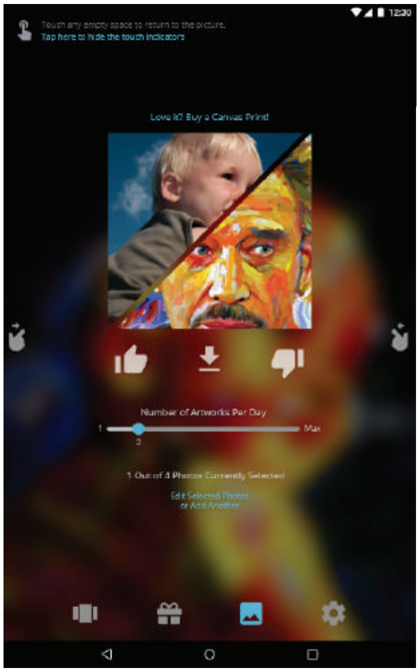

Art_Algorithm
Style_Transfer_Algorithm
Art_Style_Pack
Specific_Style_Transfer
Generative_Algorithm
Subscription
Preferences
Randomized_Unique_Algorithm
Style_Photo
User
Created_Art
User_Photo
Device
Like/Dislike
Thumbnail

MOCKUP






12:30
Touch any empty space to return to the picture.
Tap here to hide the touch indicators
Love it? Buy a Canvas Print
Number of Artworks Per Day
1
2
Max
1 Out of 4 Photos Currently Selected
Edit Selected Photos
or Add Another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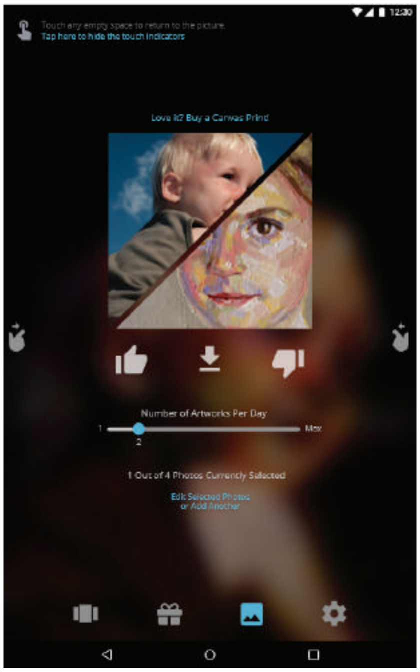
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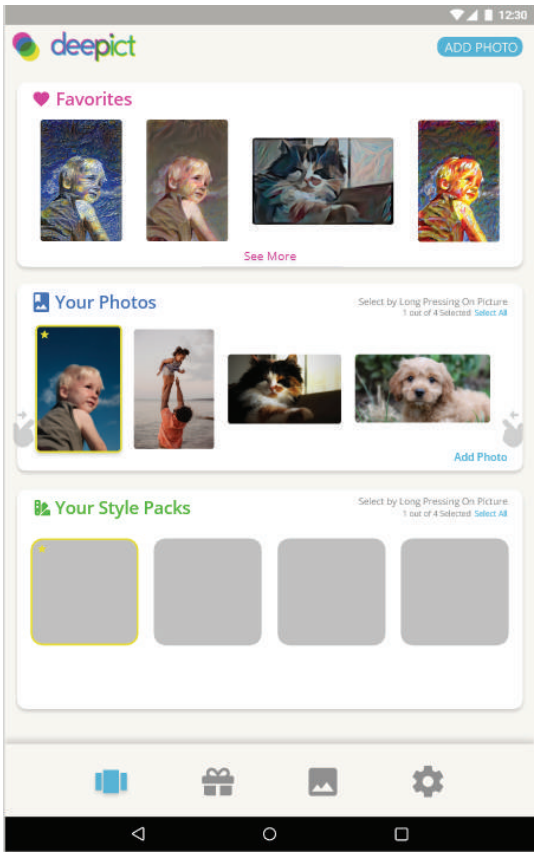
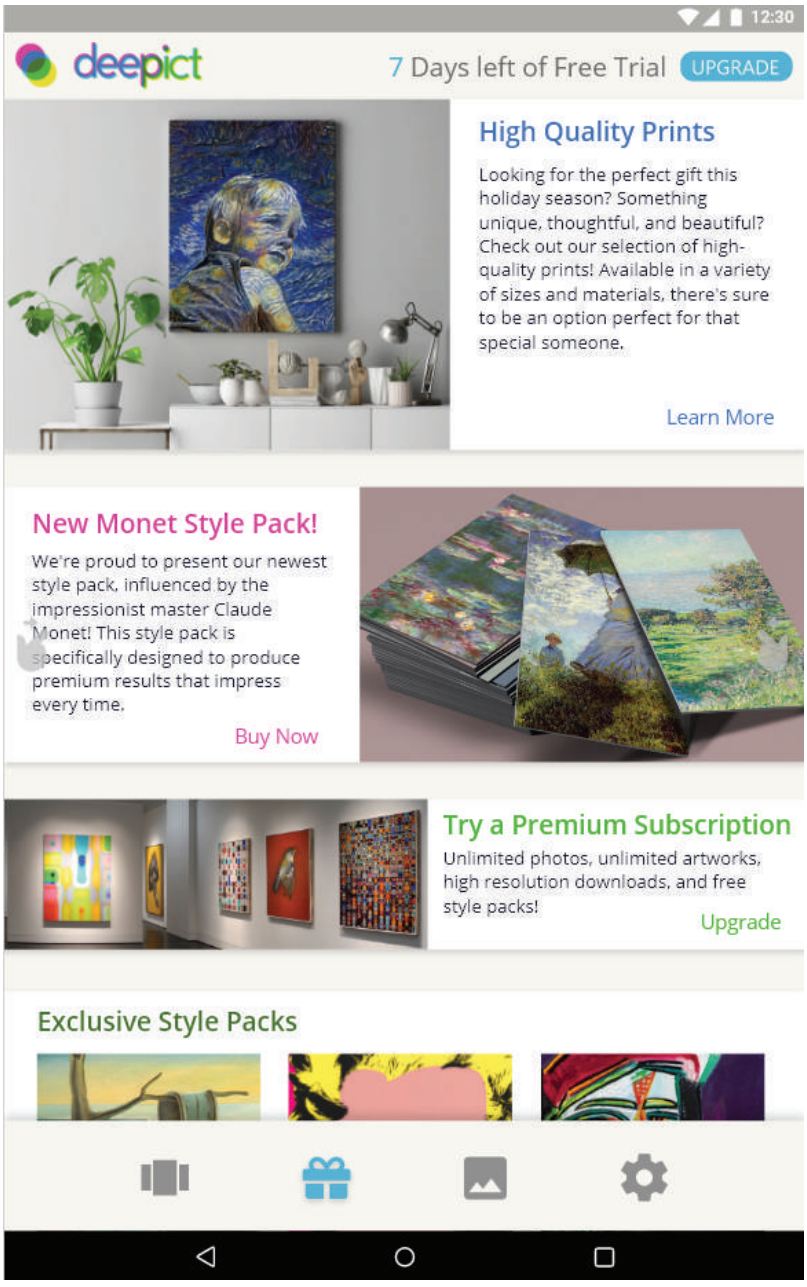

12:30
deepict
ADD PHOTO
Favorites
See More
Your Photos
Add Photo
Your Style Packs


12:30
deepict
7 Days left of Free Trial
UPGRADE
High Quality Prints
Looking for the perfect gift this holiday season? Something unique, thoughtful, and beautiful? Check out our selection of high-quality prints! Available in a variety of sizes and materials, there's sure to be an option perfect for that special someone.
Learn More
New Monet Style Pack!
We're proud to present our newest style pack, influenced by the impressionist master Claude Monet! This style pack is specifically designed to produce premium results that impress every time.
Buy Now
Try a Premium Subscription
Unlimited photos, unlimited artworks, high resolution downloads, and free style packs!
Upgrade
Exclusive Style Packs

FUTURE

Resources Needed

The next step is to begin developing with Google's Firebase platform, leveraging its' free plan as a way to get up and running on the cloud with minimal effort. Hardware will be needed to train a neural network, but whether that hardware will be physical or provided through cloud hosting is yet to be decided.

LOOKING FORWARD

Next Semester I'll be taking deepict from dream to reality. Keep an eye out for information on deepict.xyz!

Best,
Tyler Manion