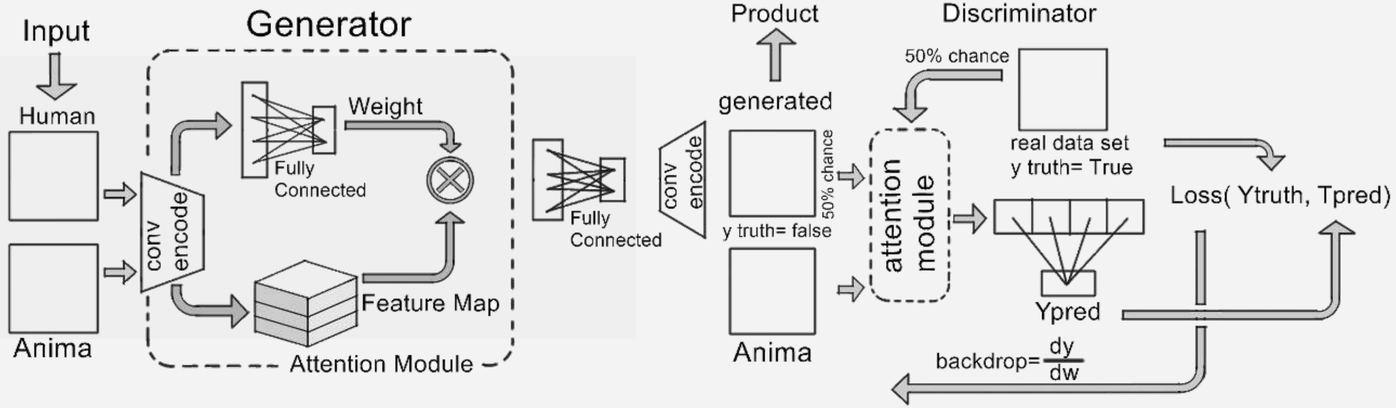
AI-Generated Self-Portraits

Time: 2019
Material: programmed digital imaging with Python
Size: 256px by 256px (each of 5)
Reference Research Paper: “UGATIT: Unsupervised Generative Attentional Networks with Adaptive Layer-Instance Normalization for Image-to-Image Translation” (2019)
Dataset Used:

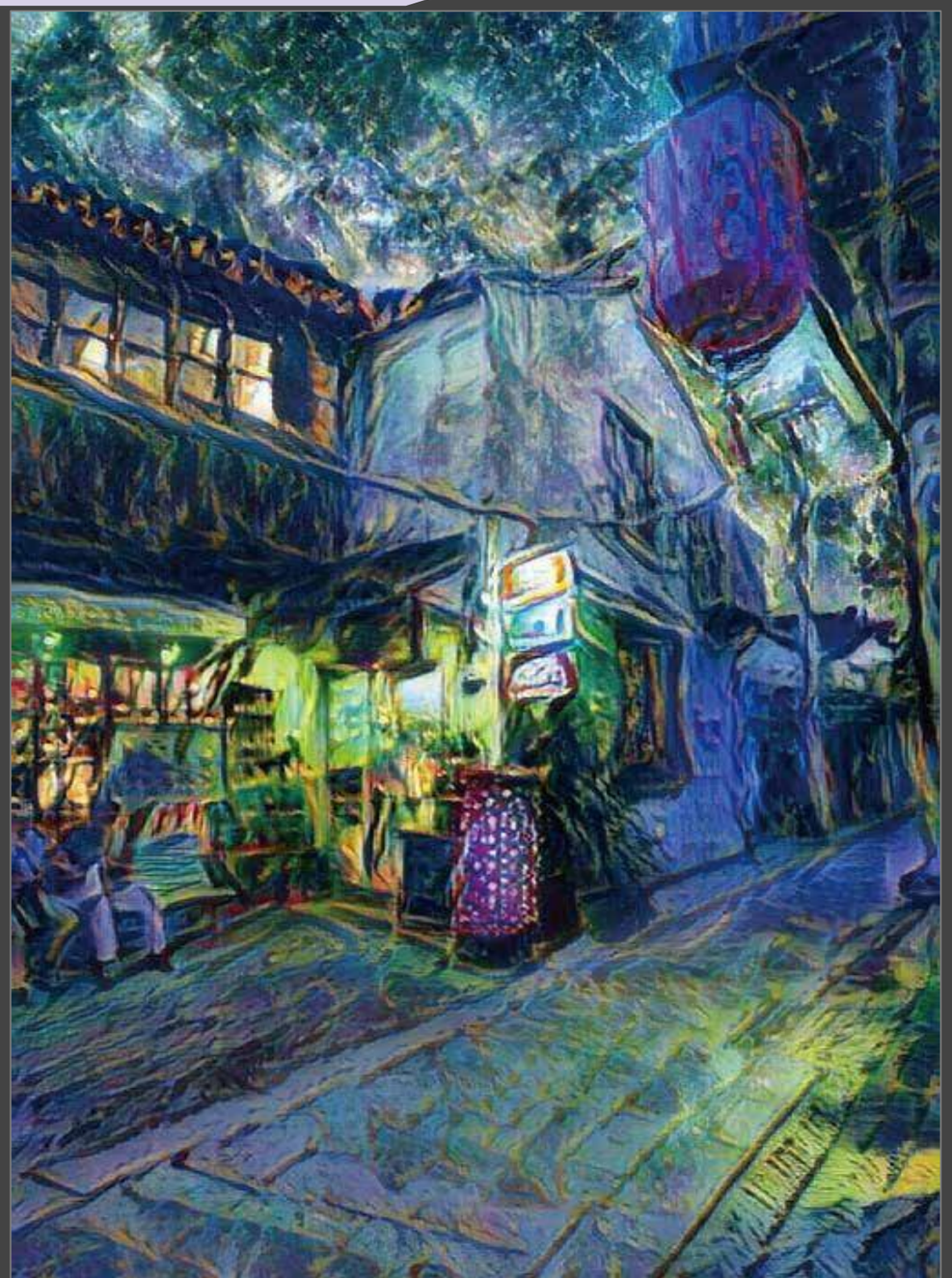
- animeface-character-dataset
- selfie-dataset

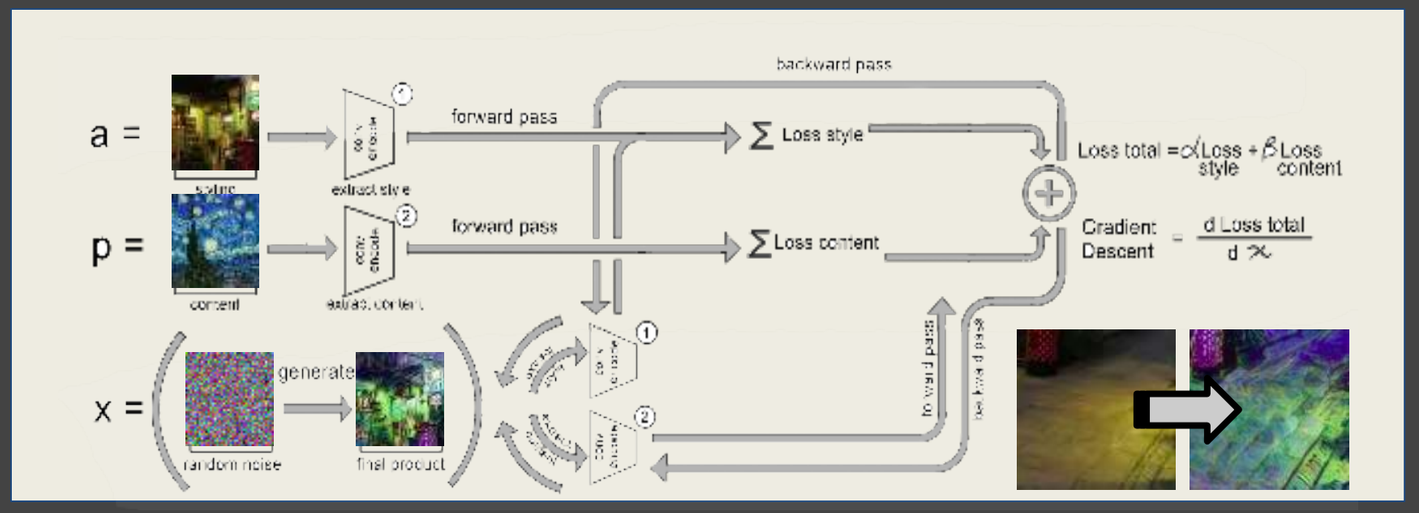
Modern psychology tells us that human vision is not mere copying of reality, rather, our mental images are heavily processed by our brain. Therefore, I was interested in how Artificial Intelligence perceives things. This artwork reflects literally how an AI sees me.

I trained and deployed my Neural Network according to sample code and methods in an unpublished paper in Computer Vision. The resulting images are generated by my code. (the training process is shown on the network architecture diagrams)



Network Architecture: Generative Adversarial Network (GAN) used to produce art





Network Architecture: Convolutional Neural Networks used to produce art

AI as My Brush

Material: programmed digital imaging with Python
Reference Research Paper: Image Style Transfer Using Convolutional Neural Networks (CVPR 2016)

I deployed the Deep Learning algorithm presented in the paper to generate images with my code.

1. Starry Town

Time: 2019
Size: 768px by 512px
Allusion To: Vincent van Gogh: "Cafe Terrace at Night"

Walking in an old town under the sunset,
cafe shops lit up into the bustle,
only with the starry sky still.

2. Chinese Garden

Chinese gardens have unique relationships with nature. The placements of rocks, ponds, and artificially planted trees immerse the viewers fully into nature. Here, I tried to show this aspect of Chinese gardens by blending the plants, rocks, and architecture together with an abstract painting using AI technology.

3. Water Township

This is an old town: People who live outside want to get in, while people who live inside want to get out.

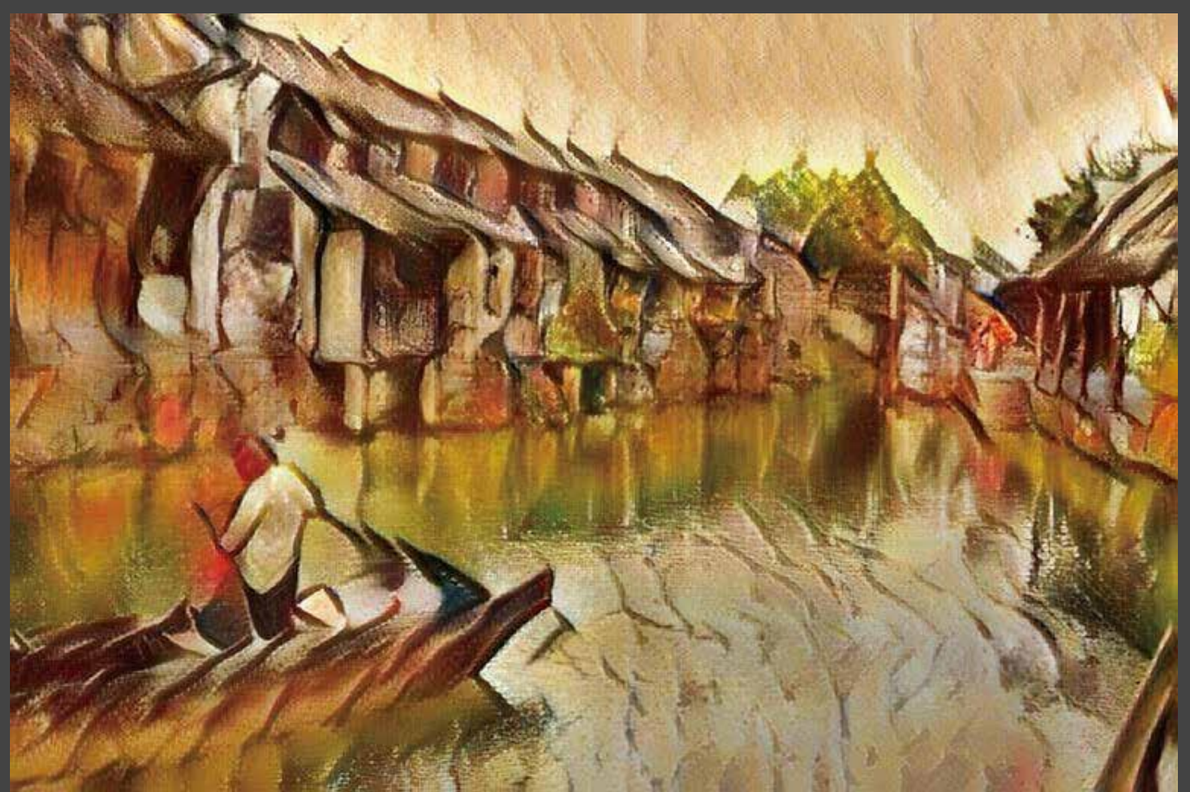
- A Nostalgic Feeling of My Hometown from Visiting Suzhou Watertown

2. Chinese Garden

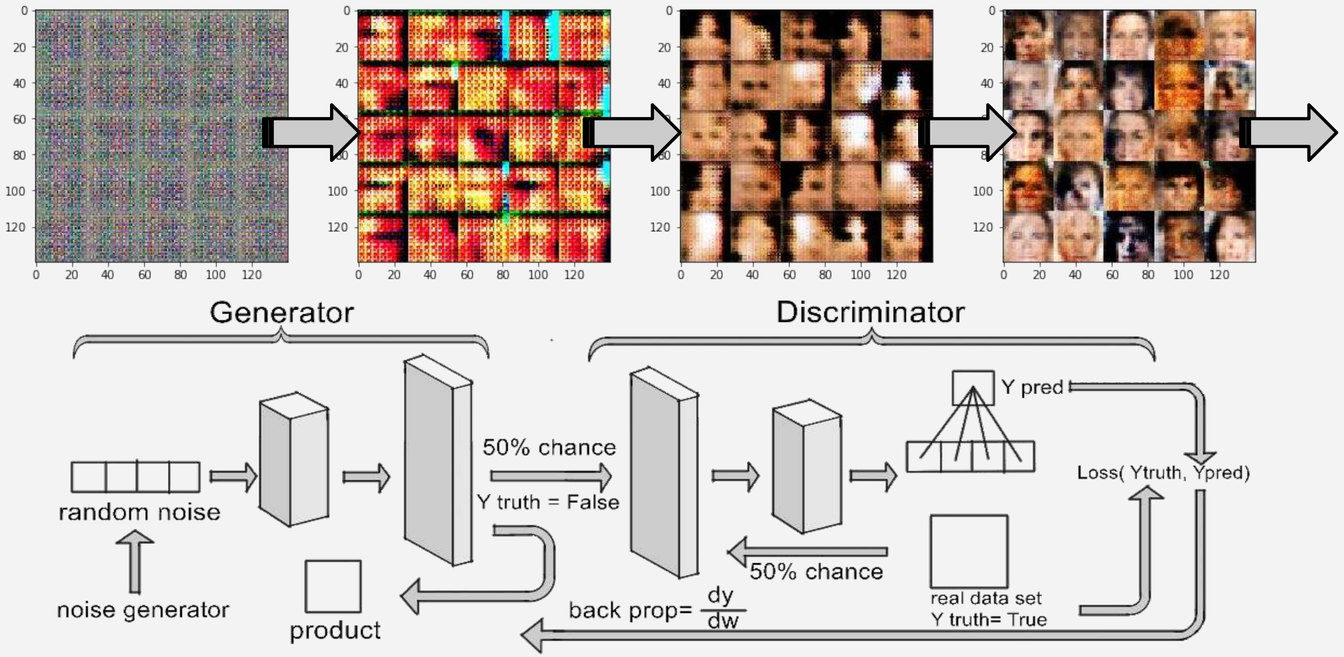
Time: 2018
Size: 512px by 768px

3. Water Township

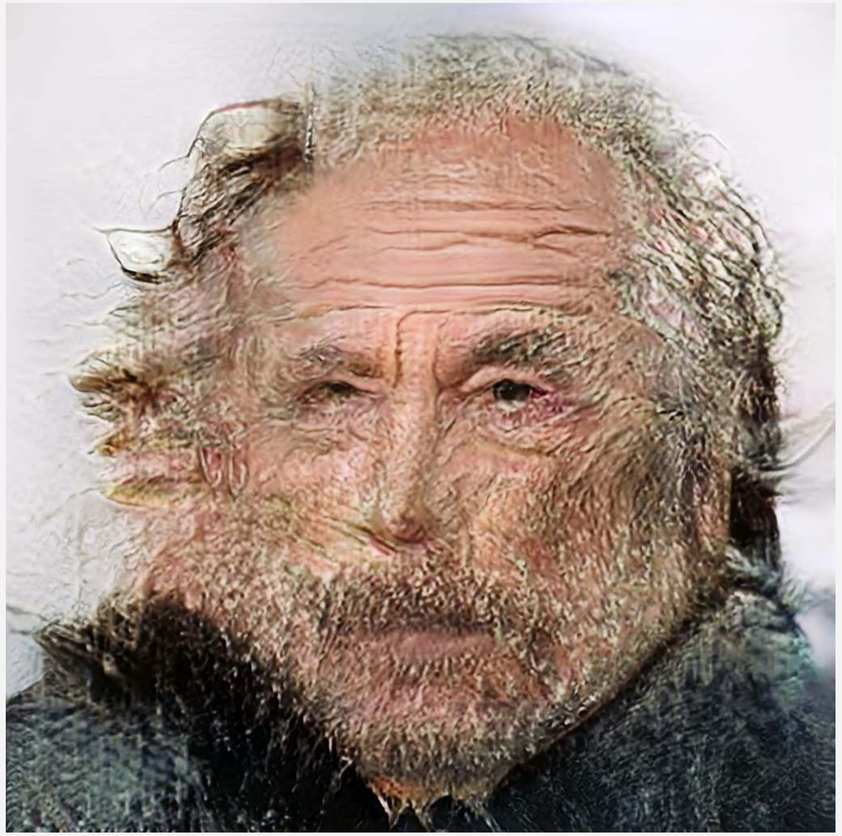
Time: 2018
Size: 512px by 768px



Training Process: Images trained from random noise gradually become recognizable.



Network Architecture: Generative Adversarial Network (GAN) used to produce art



Fake News

Time: 2019
Material: programmed digital imaging with Python
Size: 1024px by 1024px (each of many)
Reference Research Paper: “Generative Adversarial Networks” (2016)
Dataset Used: celebA

These paintings drawn with my AI algorithms was generated completely from random-noise inputs, which means that these people do not actually exist on earth.

I trained my algorithm and generated this piece to demonstrates the power of AI and how the growing technology can create problems like the "DeepFake crisis," generating distrust in our society.

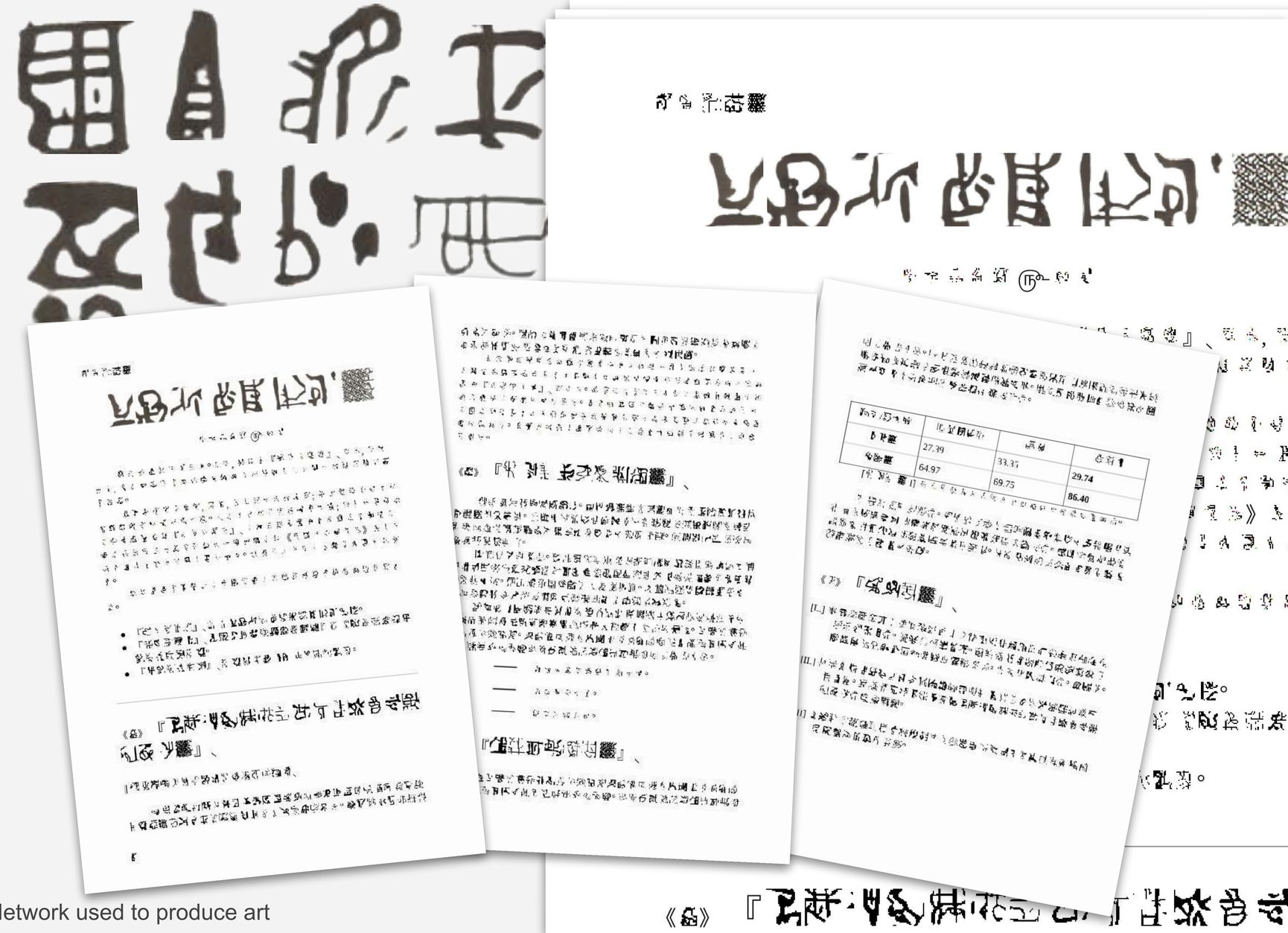
Oracles

Time: 2019
Size: 40,000 characters with 2 types of font and various sizes, creating 3 pages of academic paper
Material: programmed digital imaging with Python, printing paper
Dataset Used: Meiling Han Oracle dataset created from Meiling Han's "Words from Heaven" by myself
Allusion To: Book From the Sky by Bing Xu

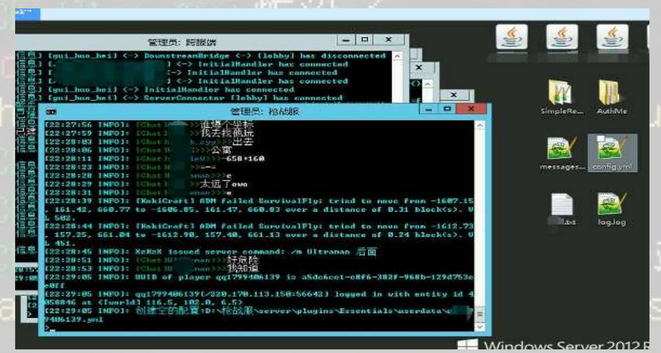
I trained an AI model to generate 40,000 fake characters that don't exist in real life, and used them to make an academic paper.

This work first makes the readers believe that they are reading a paper in an ancient language still in use in Asian countries. Then, after a closer look at the description, the readers start to find out that these words are computer-generated nonsense. They are tricked by the formality of the paper.

I used this work to criticize the restriction of our writing format put on by our society. The overemphasis on structure and formality of academic papers often leaves out the main message. After all, they convey nothing more than Oracles.



Algorithm: Generative Adversarial Network used to produce art



Server's backend: where I host the 10 sub servers & SQL database

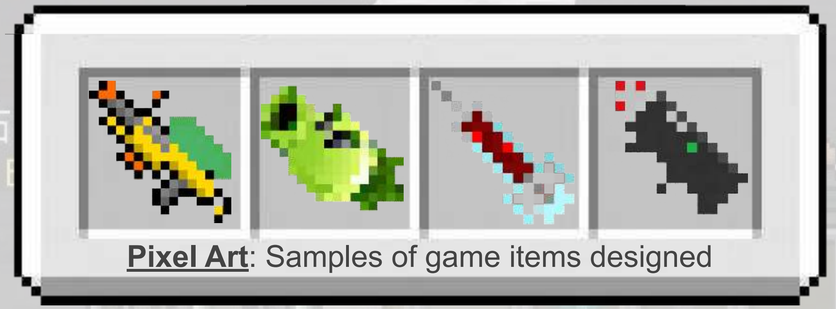
A MINECRAFT GTA SERVER
KOKICRAFT

Logo #1

KokiCraft Game Server

Time: 2014-2016
Material: programmed digital imaging with Java, Photoshop
Game Based On: Minecraft
***Team Project**: my players contributed to making suggestions
***My Position**: business owner, game designer, software programmer
Video: https://www.youtube.com/watch?v=PhJq5YnzfUo&t=1s

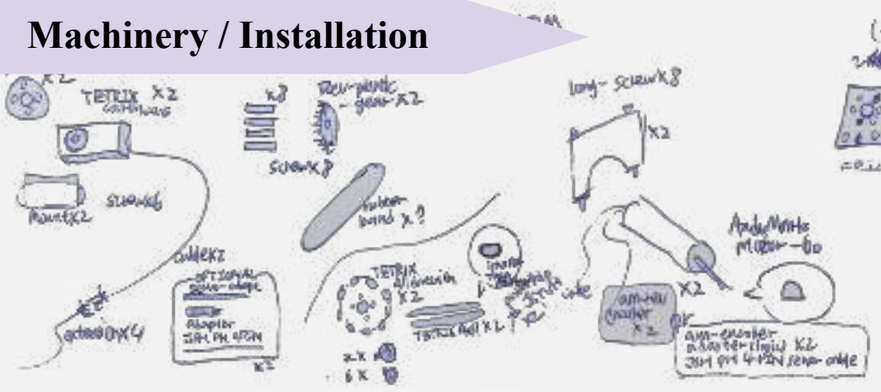
At 14, I created "KokiCraft", a game server that transformed Minecraft into a Grand Theft Auto-esque game with more player involvement and elaborate storyline through programming. It was 1st GTA Minecraft Server in China according to MCBBS, generating ~$500/month in revenue while serving close to 350,000 players with 10 sub-servers of different gameplay. I maintained monthly updates to introduce new elements in the game for better user experience. I even recruited a customer support team from authorized players.



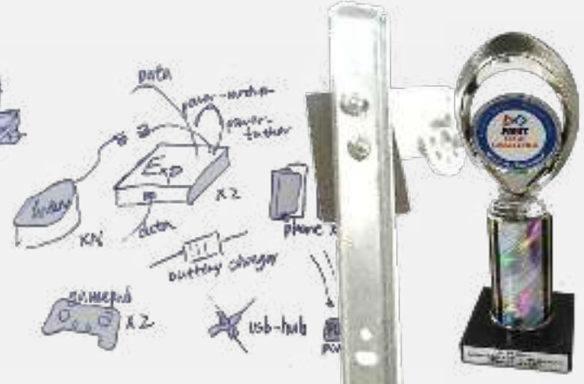
Pixel Art: Samples of game items designed

Logo #2

Interface Design: An animated lottery window



doogleing: prototypes of the robot designs



judges' award: From 2018 FTC Robotics Competition for team's "unique efforts, performance or dynamics merit recognition."

Team Item: 3D printed

BEESTBot

Time: 2017-2019
***Team Project**: working with 2~20 teammates in 3 years.
***My Position**: team leader, main hardware, software and electrical design, design director
Link: https://www.youtube.com/watch?v=BeDeAluq7HQ

In my 10th grade, I built our school's first STEAM community from ground-up. It is fascinating to see our team spirit from all grades unite together on one project. I worked for 3 years on the robot's design, including implementing machine learning for object detection and adjusting motors' gear-ratio for hooking and lifting itself from the ground.

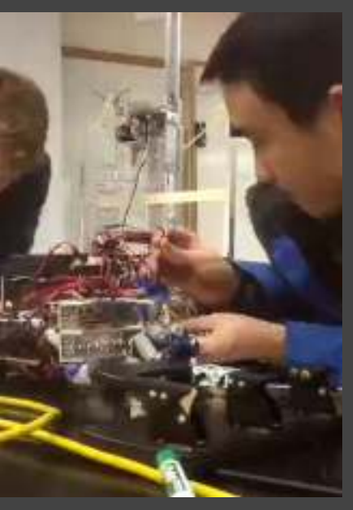
This autonomous robot is capable of picking and transporting "gold" and "silver" minerals; lifting itself onto a "rocket"; and landing to the "moon".

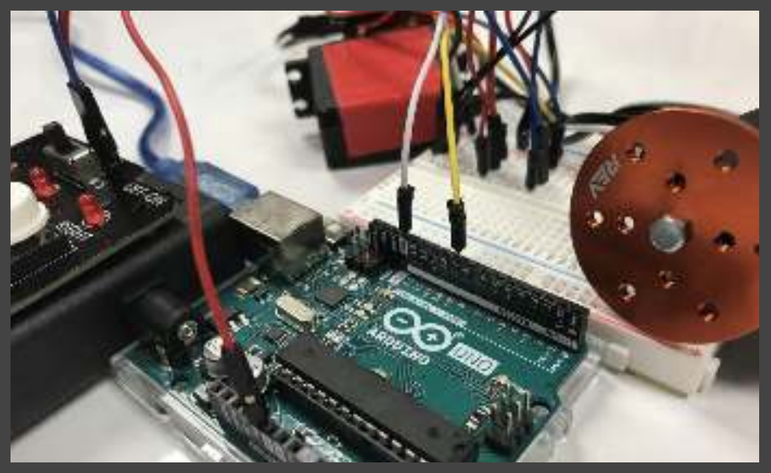
1. Robot Design

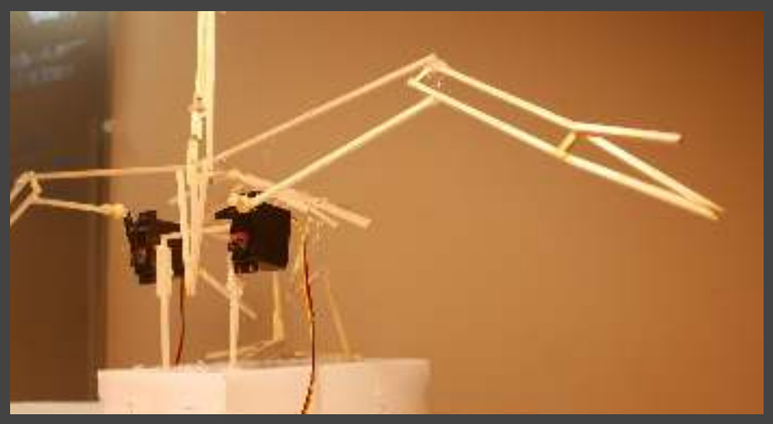
Material: Java programming language, steel, motors, servos, rubber bands, sensors, acrylonitrile butadiene styrene (for 3D printing), etc…
Size: 18 inches by 18 inches, height varies

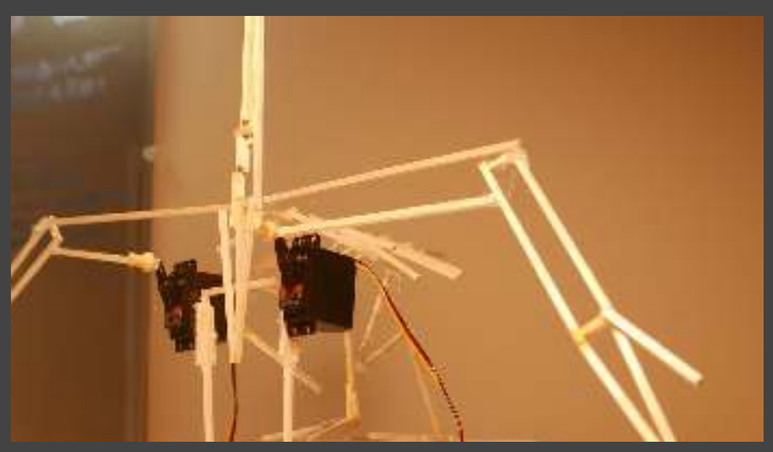
2. Logo and Team Uniform Design

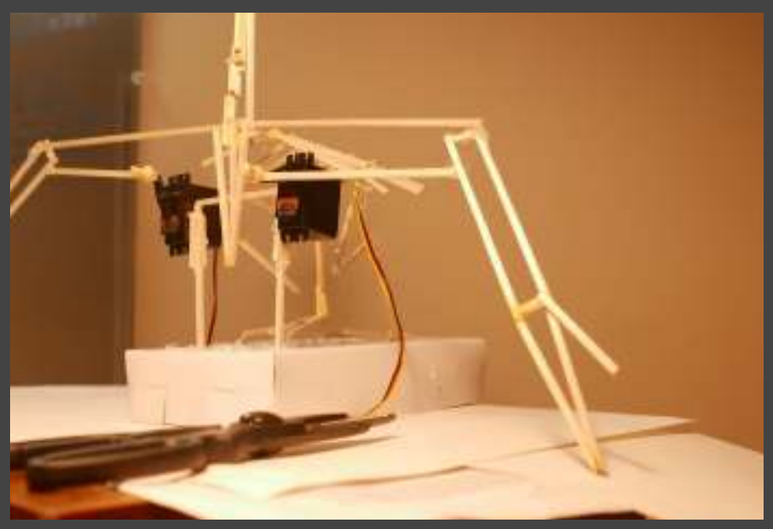
Material: digital imaging, pre-shrunk cotton, poly/cotton blend (for t-shirt & hoodie)

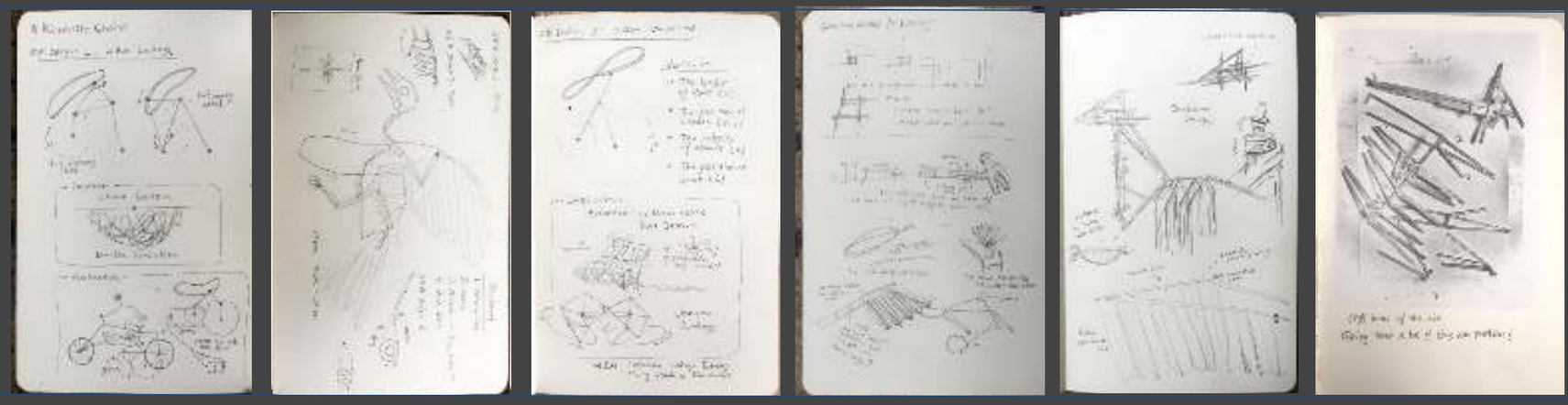








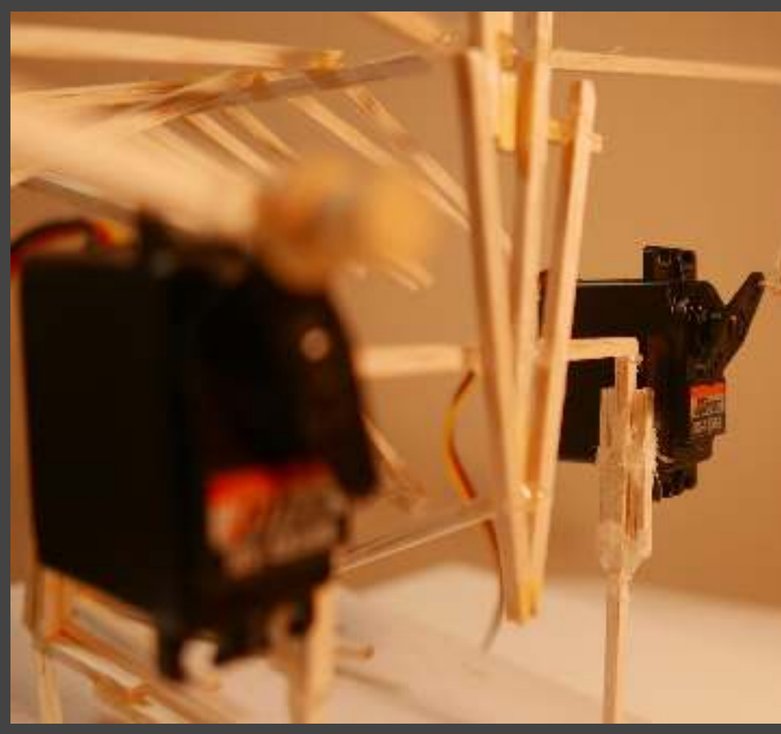




Mechanical Bird

Time: 2019
Material: RevRobotics servo, Arduino UNO, Balsa wood stick, wood glue, hot glue
Video: https://youtu.be/x0QL9g_TnyQ

I built a skeleton of a bird out of wood and used two motors to animate its wings, hoping to accurately represent birds' flying motion. After studying its anatomy, I made a few sketches and prototypes, and eventually simplified the motion-controlling device to a stick-and-circle system (an idea borrowed from mechanical chains).

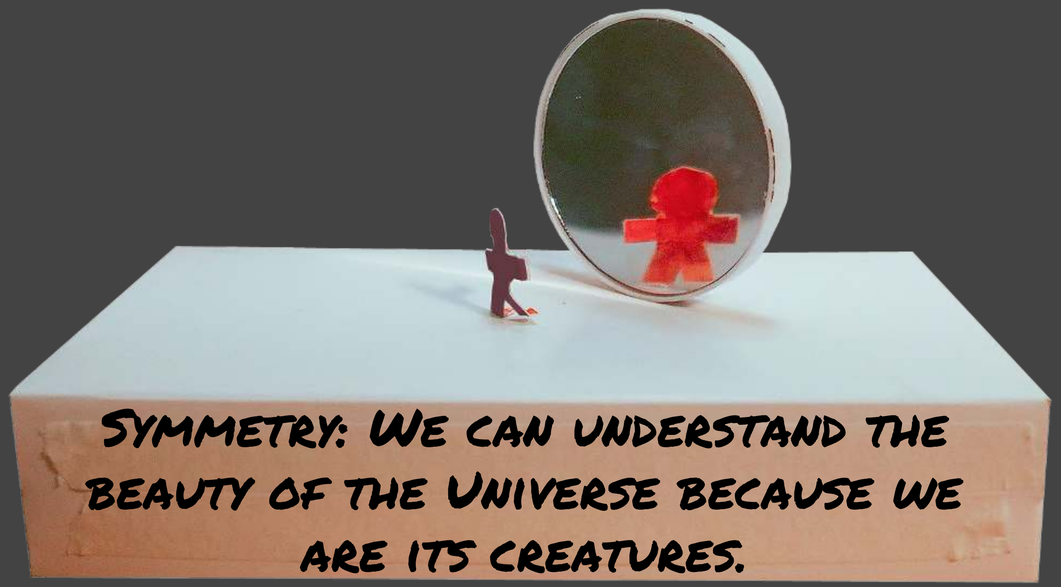


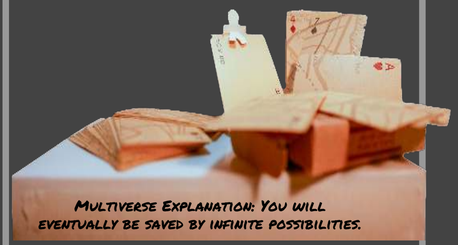
Physics Is Everywhere

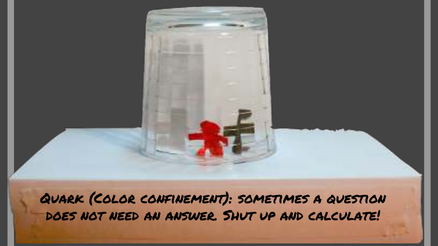
Time: 2019
Material: various materials from everyday objects
Size: 6 inches by 10 inches, height varies (each of 12)

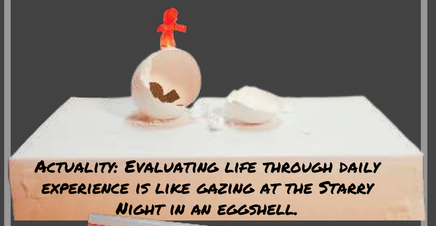
Inspired by Sou Fujimoto's work "Architecture is Everywhere" during a visit to The Museum of Modern Art (MoMA), I manipulated everyday objects in a way that often remind me of the counterintuitive aspect of physics. Here, I played with the relationship of objects to reflect on physics concepts.

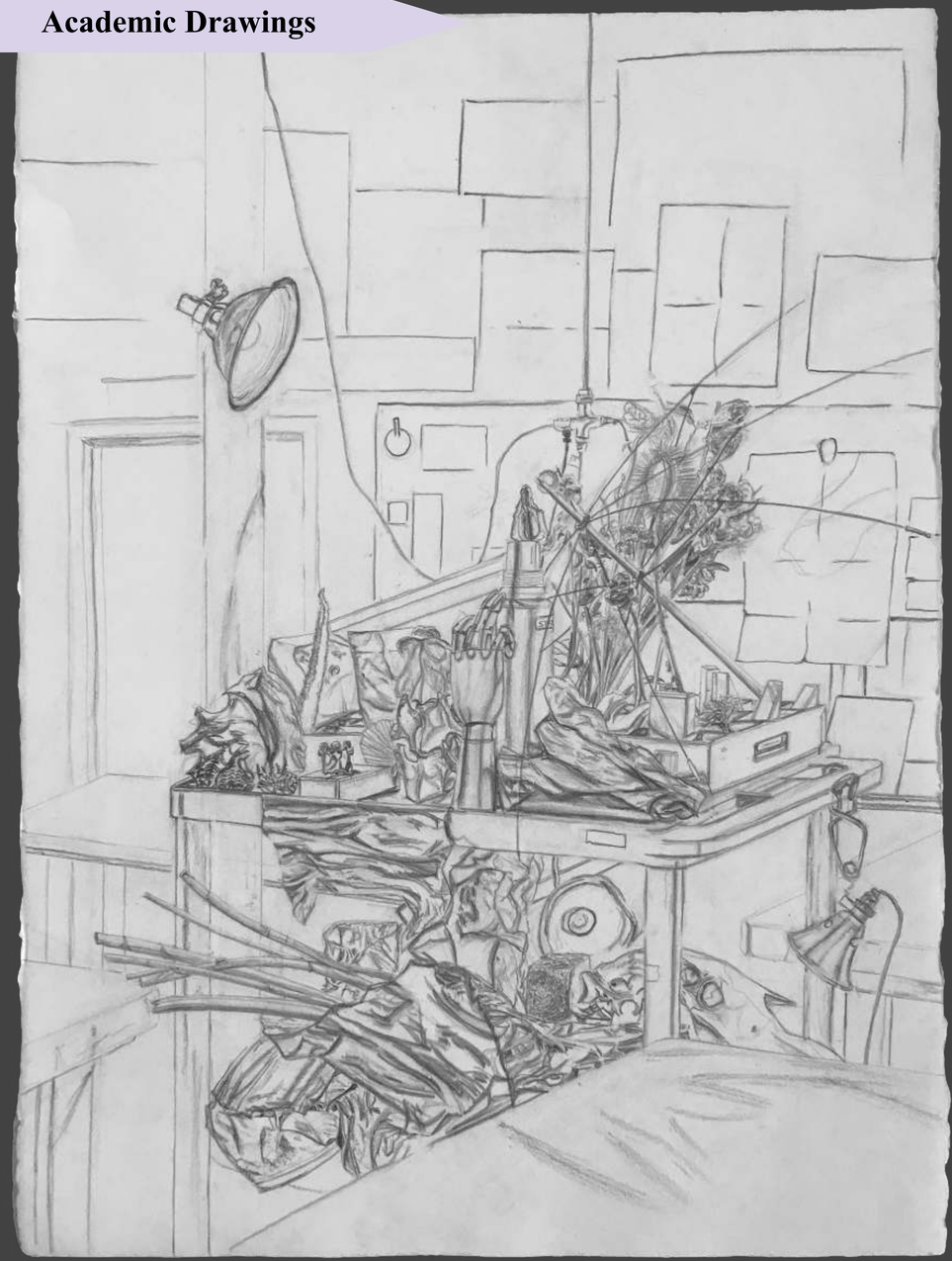
(see words on each item)









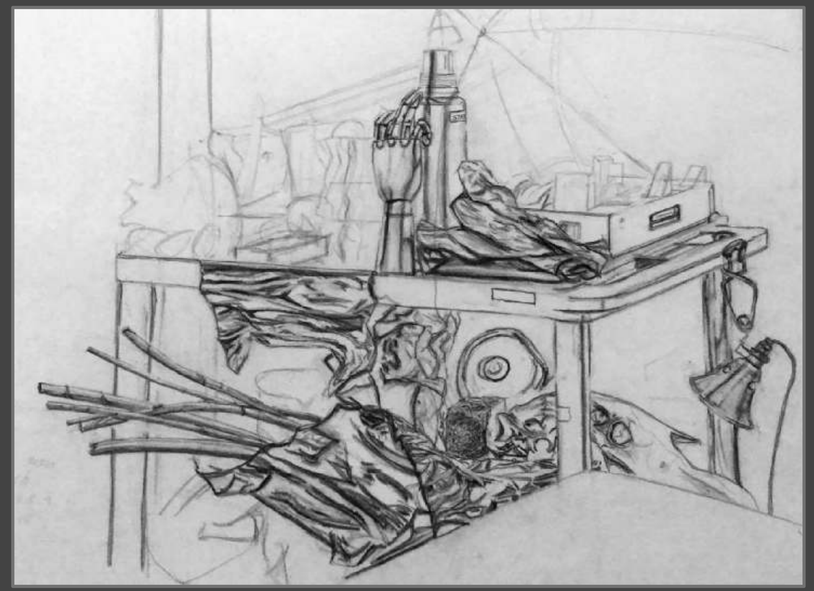


A Desk (line only)

Time: 2019
Material: pencil
Size: 29 inches by 23 inches

Still lives drawing using graphite; focusing on the quality of light, shadow, and shapes make forms.

Process: Half-completion



Cups

Time: 2019
Material: watercolor on Strathmore 500
Size: 29 inches by 23 inches

I appropriated the same cup on the table in 4 different positions and orientations, and drew them with watercolor on the same paper. I observed how light interacts with the surface of the cup and table to form reflections.

Shoe: A Poem

Time: 2019
Material: pencil
Size: 8.3 inches by 5.8 inches

Walking in my shoes, familiar, warm, and steady.
Walking in their shoes, exotic, strange, and uncertain.

But thanks to you-all,
I will keep this dirty, broken, and wrinkled shoe,
with my small, little, and meticulous care.

The Night

Time: 2017
Material: relief print with water-based block print ink
Size: 18 inches by 12 inches

After looking at of variety of relief prints (19-century German expressionist, mid-century modern Ukiyo-E and contemporary from around the world), I created my own relief print utilizing black on white shapes and white on black shapes within the same composition. (black on white and white on black)

The circular shapes of fish and bubbles blend together, creating an imaginative school of fish swimming in the sky.

Conceptions of AP Environmental Science

Time: 2017
Material: watercolor on Strathmore 500
Size: 10 inches by 17 inches

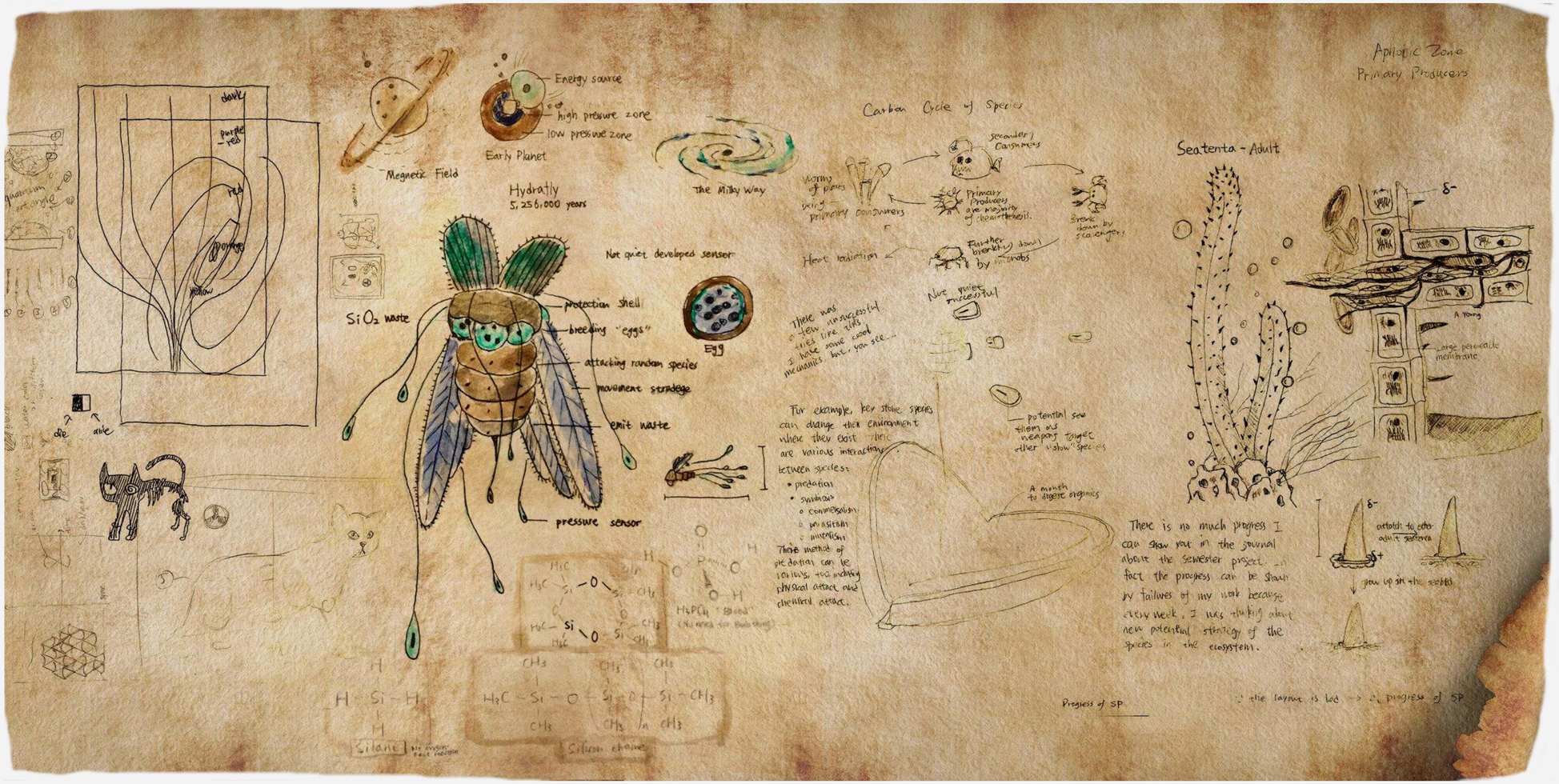
The doodles in this drawing are from all materials in a year-long course of AP Environmental Science. I used it as a review for my upcoming AP test while enjoying experimenting with watercolor.

Silicon [Si]

Time: 2018
Material: pen, watercolor on sketchbook
Size: 8 inches by 5 inches (each of 14)

Visualization of silicon-based imaginative organisms based on the chemical properties of silicon. (only 4/14 of drafts are shown, others are lost after completion)

Lives on Earth are mainly carbon-based, but scientists do believe that silicon-based life can exist due to silicon's similar chemical properties as carbon. However, silicon dioxide gas (and other silicon-based compounds an organism need for life) only exist under extreme temperature and pressure, restricting their niche to underground oceans on a planet. Due to silicon-based compounds' slow reaction rate, I suspect that silicon-based organisms have slow metabolism rates, which restrict their slow activities underwater.



The Book of Flowers

Time: 2017
Material: 100% natural, (not from concentrate), 80+ wildflowers in Maryland scanned in an album.
Size: 11.5 inches by 16.5 inches (each of 32)

Collecting flowers in the spring was my past hobby to enjoy and study nature. I identified and classified 80+ different species of flowers in Maryland. Now as I walk in the forest in the spring, my memories of the past flood out from my heart. Nature is just so beautiful.

Prototype Designs: Trying different arrangement of three colors

Class Logo Design

Time: 2016
Material: digital imaging with Adobe Illustrator
Size: vector image

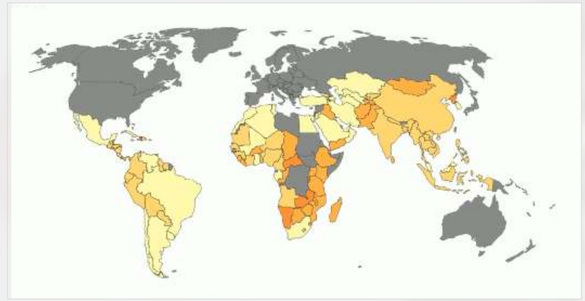
My design of the logo for my class includes the meaning of "growth," "love," and "peace." The class adopted my design onto our class t-shirt.

Photograph: My classmates wearing the logo

Hunger Is Not a Game

Time: 2018
Material: digital animation with Adobe After Effects (physics engine), Adobe Illustrator
Size: 720px by 1280px (1 minute)
Some Vector Images From: Shutterstock.com
***Team Project**: with 2 other students
***My Position**: animation design, research, script design
Link: https://www.youtube.com/watch?v=O1ydHoHfzJk

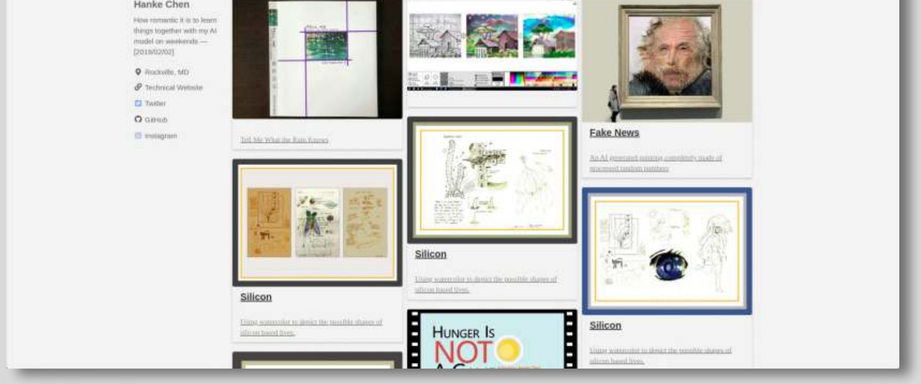
I animated this Public Service Announcement about how the growing world population and unbalanced food distribution could potentially cause hunger in certain countries. Our team proposed two solutions: creating food banks and promoting women's education.

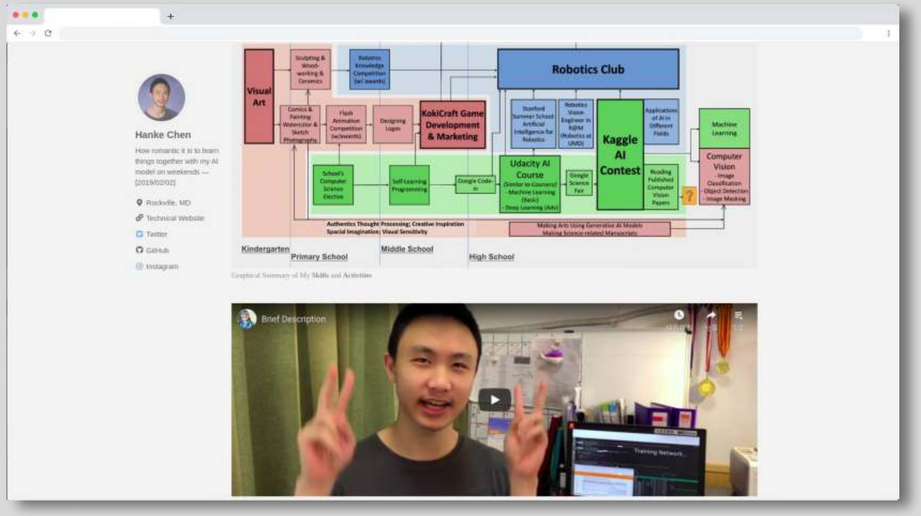


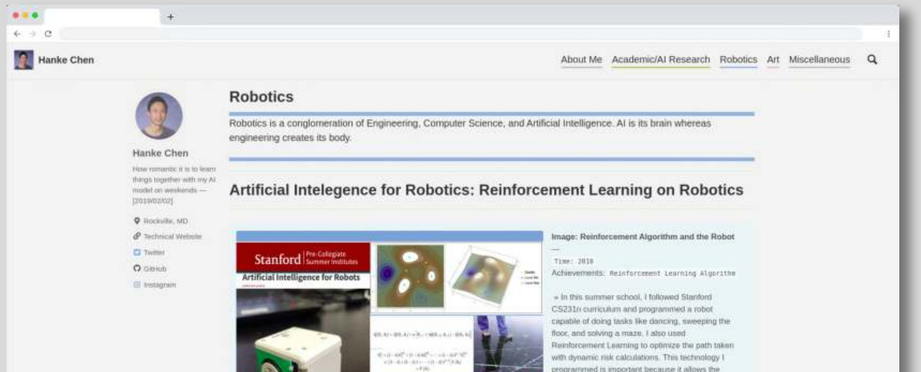
Hanke Chen

How romantic it is to learn things together with my AI model on weekends — [2019/02/02]

- Rockville, MD
- Technical Website
- Twitter
- GitHub
- Instagram



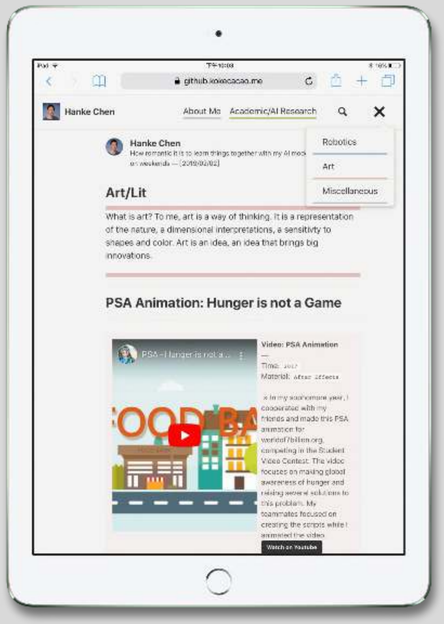




Website Design

Time: 2018
Material: programmed digital imaging with ruby, html, css, jekyll
Link: https://chenhanke.me

This general web page coded by me showcases every aspect of myself from AI Research, Robotics, to Art and Game Designs.

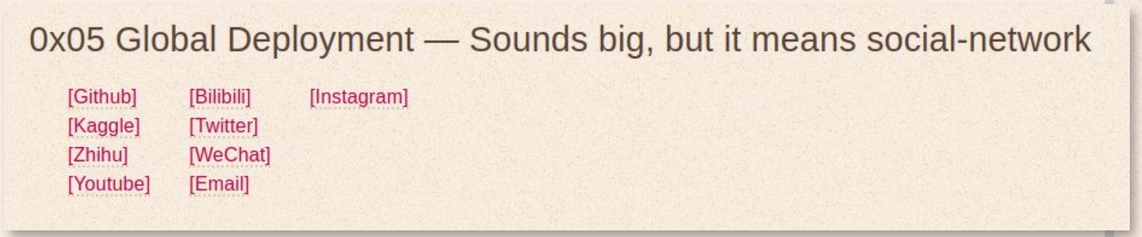


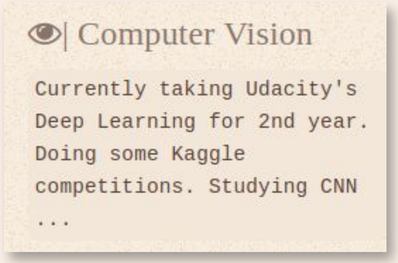
Responsive UI Design: automatic resize website on different devices

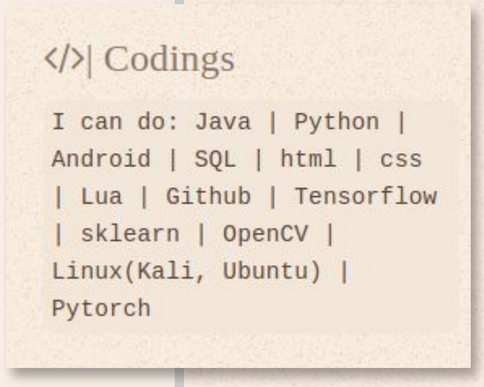
Brownie UI: A Personal Tech-Webpage

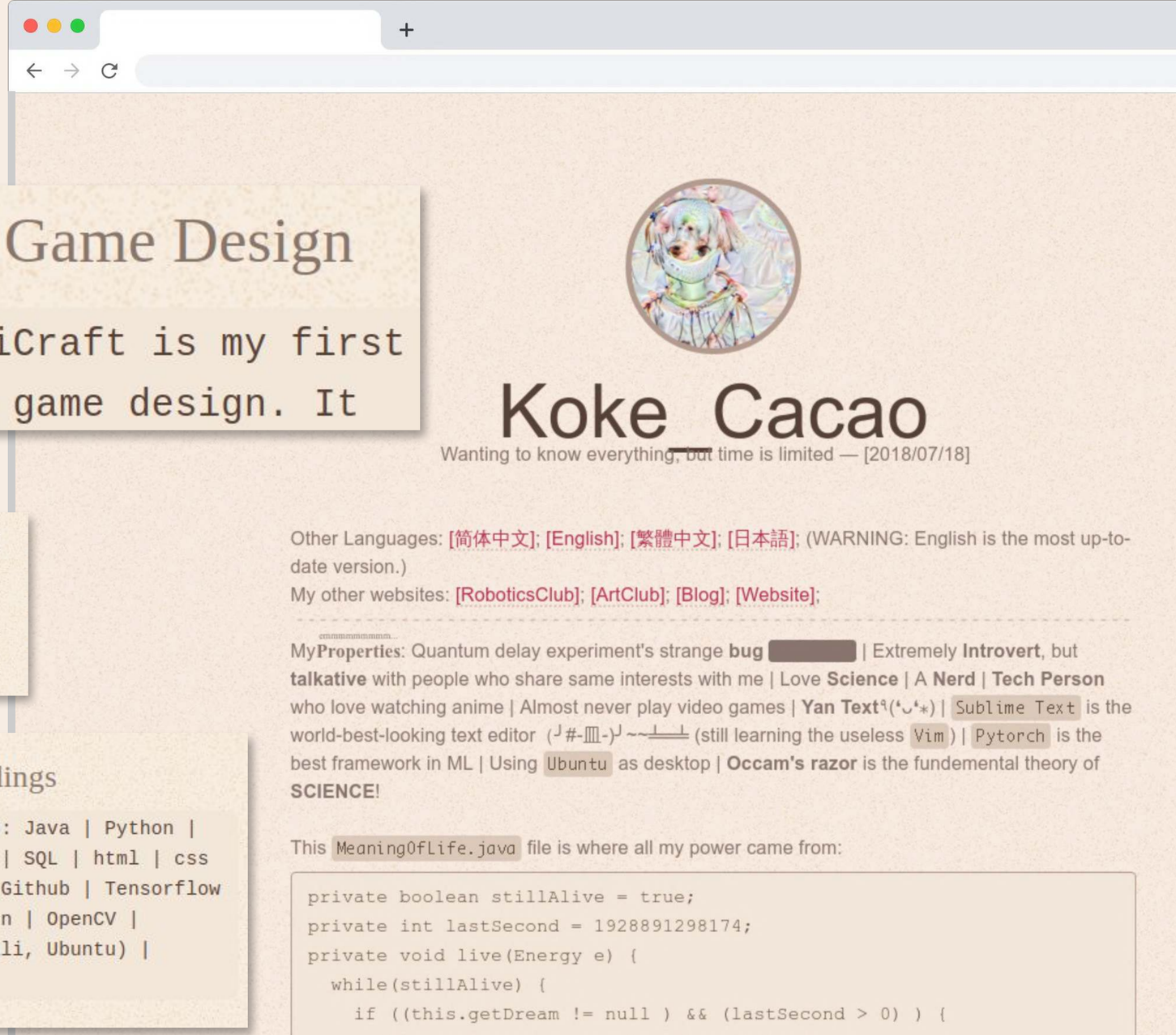
Time: 2017-now
Material: programmed digital imaging with html, css
Link: https://www.kokecacao.me

This geek-style minimalistic design is an expression of my personal values and how I show them to my friends. The use of line, shape, hue, and saturation gives the viewer a sense of intimacy.









Bitcoin Rating Visualization

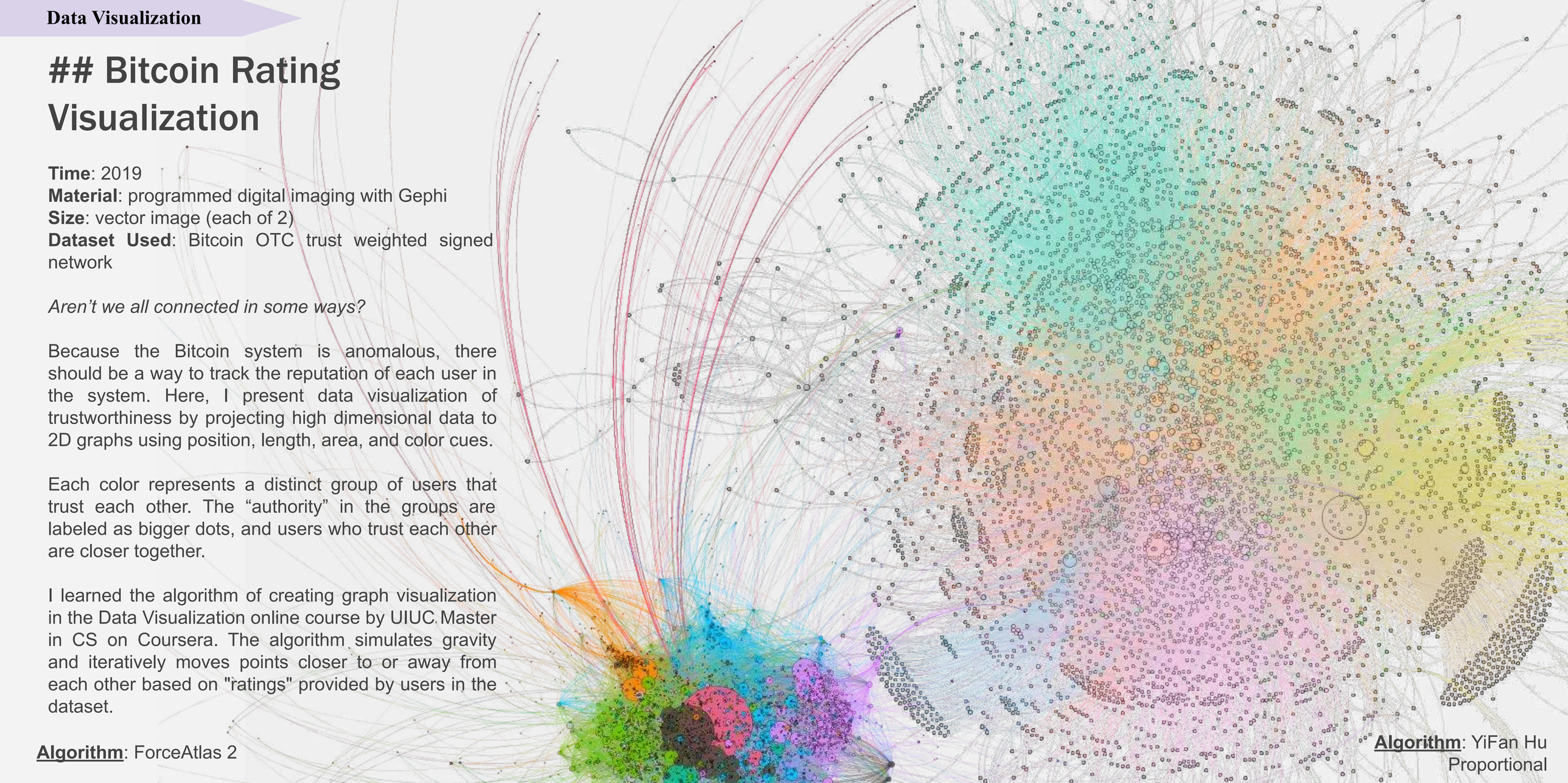
Time: 2019
Material: programmed digital imaging with Gephi
Size: vector image (each of 2)
Dataset Used: Bitcoin OTC trust weighted signed network

Aren't we all connected in some ways?

Because the Bitcoin system is anomalous, there should be a way to track the reputation of each user in the system. Here, I present data visualization of trustworthiness by projecting high dimensional data to 2D graphs using position, length, area, and color cues.

Each color represents a distinct group of users that trust each other. The "authority" in the groups are labeled as bigger dots, and users who trust each other are closer together.

I learned the algorithm of creating graph visualization in the Data Visualization online course by UIUC Master in CS on Coursera. The algorithm simulates gravity and iteratively moves points closer to or away from each other based on "ratings" provided by users in the dataset.



Algorithm: ForceAtlas 2

Algorithm: YiFan Hu Proportional

3

2

1

1-3: Hokkaido, Jepen
1.1/11,S=1/50,ISO=125,F=28mm
2.1/11,S=1/40,ISO=125,F=70mm
3.1/11,S=1/50,ISO=125,F=70mm
4-7:Namibia,South Africa
4.1/22,S=1/80,ISO=50,F=300mm
5.1/12,S=1/300,ISO=200,F=50mm
6.⅛.5,S=1/800,ISO=100,F=27mm
7.⅓.5,S=1/800,ISO=100,F=24mm
8:Kenya,Africa
8.1/6,S=1/800,ISO=200,F=66mm

N

S

The White v.s The Red

Time: 2013-2019
Material: photography
A**llusion To**: Ansel Adams photography of aspen trees

From middle school, my dad often takes me to photograph in Beijing, Japan, Kenya, and Namibia during my summer and winter breaks, where I learned to photograph.

During my travels, I noticed the landscape's texture contrast between the Northern- and the Southern- Hemisphere during the same month of the year. Without traveling, I would never have noticed that different climates give birth to a variety of people, geographic features, and therefore arts. How diverse our world is!

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