CS122 Class 11: Brainstorming

"I'd waste less food if chocolate was a viable option."
reduce leftovers! reduce leftovers becoming waste
Food sharing! garden/produce etc with network
recipe sharing focusing on simple & what you have
GAPS "waste apps" generate recipes from playlists + community based off of what you have
- too many planning options apps
- no focus on waste or money
- not to singles
GAPS
Guilt
Single
Single
bags of spinach - ignored, went bad; packaging
"USDA calculated that American food waste costs about $160 billion in a single year."
"Along the food supply chain, private households represent the largest food-waste faction"
"The food wasted by US & Europe alone could feed the world 3 times over." (the world counts)
"According to USEPA, more than 35 million tons of food waste are thrown away into landfills each year - 40% of all food consumed in USA." (bioenergy consult)
Food waste = water waste
concerns: - food security - resource depletion - greenhouse gas emissions - soil erosion, - deforestation - H2O & air pollution
common ways to help: 1. compost 2. donate food 3. shop responsibly 4. buy ugly foods 5. check packaging 6. buy frozen
motivations: guilt, saving $, environmental, social
perceived behavioral control = more likely to reduce food waste directly
small shops, local markets, & gardens reduce food waste. (90% reduction)
leftovers: - boring - aversion (quality, fresh) - sense of guilt - unknown safety - forgotten - social: not serving to guests
buy 3 days a week helps me
give food to pets
buying new = better than risking getting sick
think about poor people when throwing out - feels bad
Lack of time
ignore food that is going bad
8.3 importance on reducing food waste
managing leftovers need to improve
pop up reminder that item x will be spoiled soon
FoodCloud - connects businesses with charities - upload description of food
Olio - allows people to share their unwanted food w/ neighbors - purchase surplus food from restaurants
Karma buy unsold food from restaurants at a discounted price
UGO Fresh
Winnow solutions - measures the waste (and $) wasted by restaurants
"Why did I eat out" should've ate my food
lack of control
duplicate items (forget what's in pantry)
don't know what to do with leftovers or produce purchased
uninspired in kitchen
food is about community
compost
traveling
calculate how much $ wasted
going to the gym motivates me
regret
packages
convince myself
wasn't in
eating healthy
"SHOW INNOVATIONS & money spent what you did w/ leftovers"
check local foods
inventory of pantry
freezing, compost, donate options
know what you have
"How much money am I throwing away right now?"
less ingredients = better
feel mad at myself for wasting
will choose friends over leftovers
authentic foods = simple
focus on Health
bragging points (food waste) or money saved
curated content on food waste
hate wasting money
forget about the food (goes bad)
ought to eat Healthy
Generate & educate
Keep things simple! simple foods waste less
create consciousness

“brainstorming” on Unsplash

Class 11 agenda

- Zipcrit
- PM4 crit
- Tool reflection/Introducing the final project
- Break
- Studio: Brainstorming

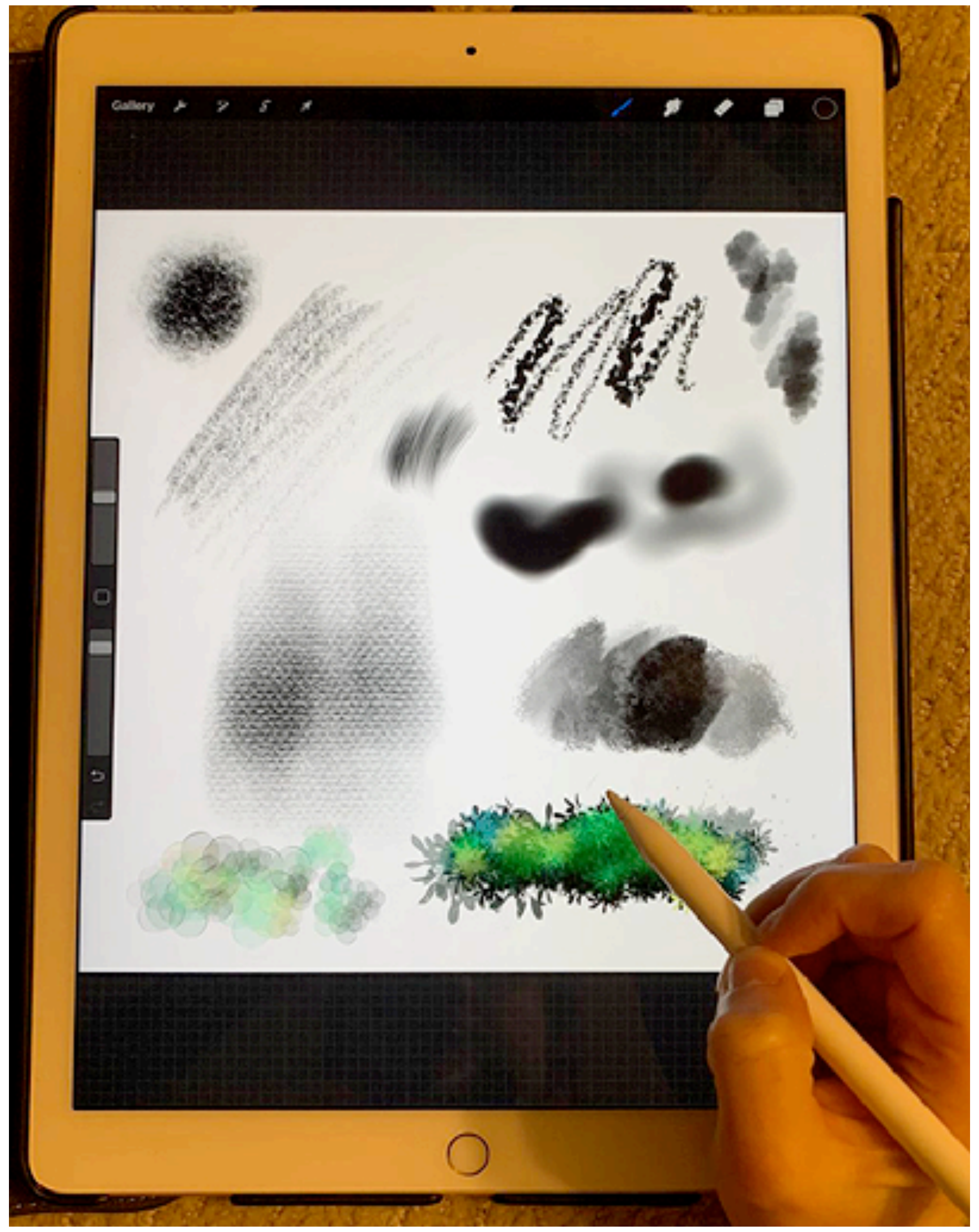
PM4 crit (10 min)

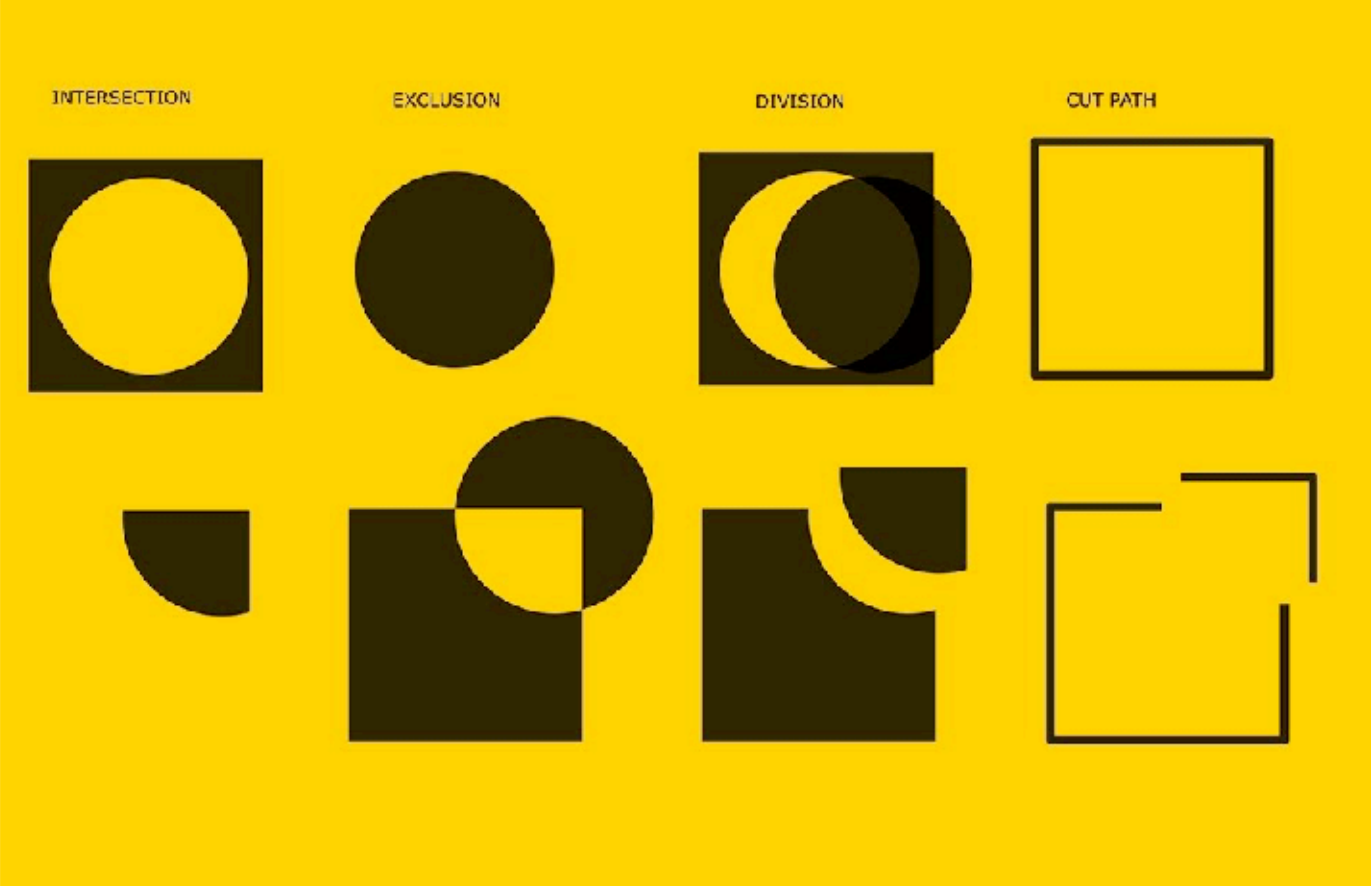
- Same art walk format as before, without artist notes—how are objects interpreted when the audience just encounters the object minus text? Try to give feedback on these points:
  - What do you think is the intended protest message?
  - How does the form of this object successfully support the protest? What ways could it be improved?
  - Anything that sticks out to you immediately? Anything you’re confused by?
- 4-6 post-its each, each object should at least have 3 pieces of feedback!

Tool reflections

Mental models

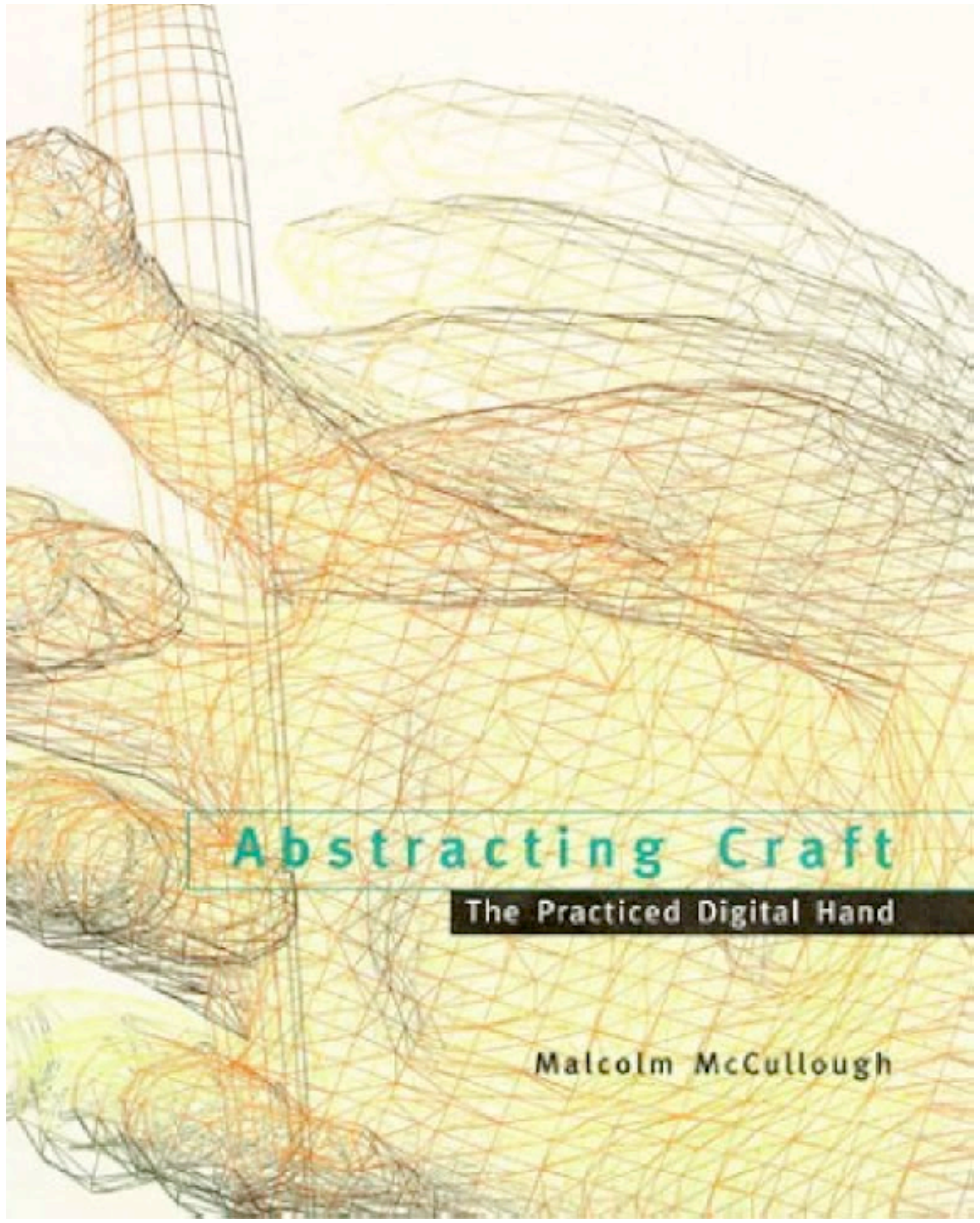
- An internal representation of external reality that influences our behavior (Kenneth Craik, 1943)
- Different ways of thinking based on the constraints of the tool
- As we use new tools, we develop new mental models
- Ex: Procreate (mental model closer to drawing) vs Figma (new vector and boolean mental model)





Recall Lecture 1: A definition of a tool

- a **moving entity** whose use is initiated and actively **guided by a human being**, for whom it acts as an **extension**, toward a specific **purpose** (Malcom McCullough, 1966)
- This to me implies..
  - 1. Interactivity (moving)
  - 2. Agency from humans (guided by)
  - 3. Complimenting human skills (extension)
  - 4. Existence of goals (purpose)



Tools we're now familiar with

- Analog
  - Xacto knives/scissors
  - Glue/tape/glue gun
  - Rulers, cutting mats
  - Pens, markers
- Digital
  - Figma
  - OpenSCAD, MeshLab
  - P5.js
- Machines
  - Laser cutter (+ software)
  - 3D Printer (+ slicer)

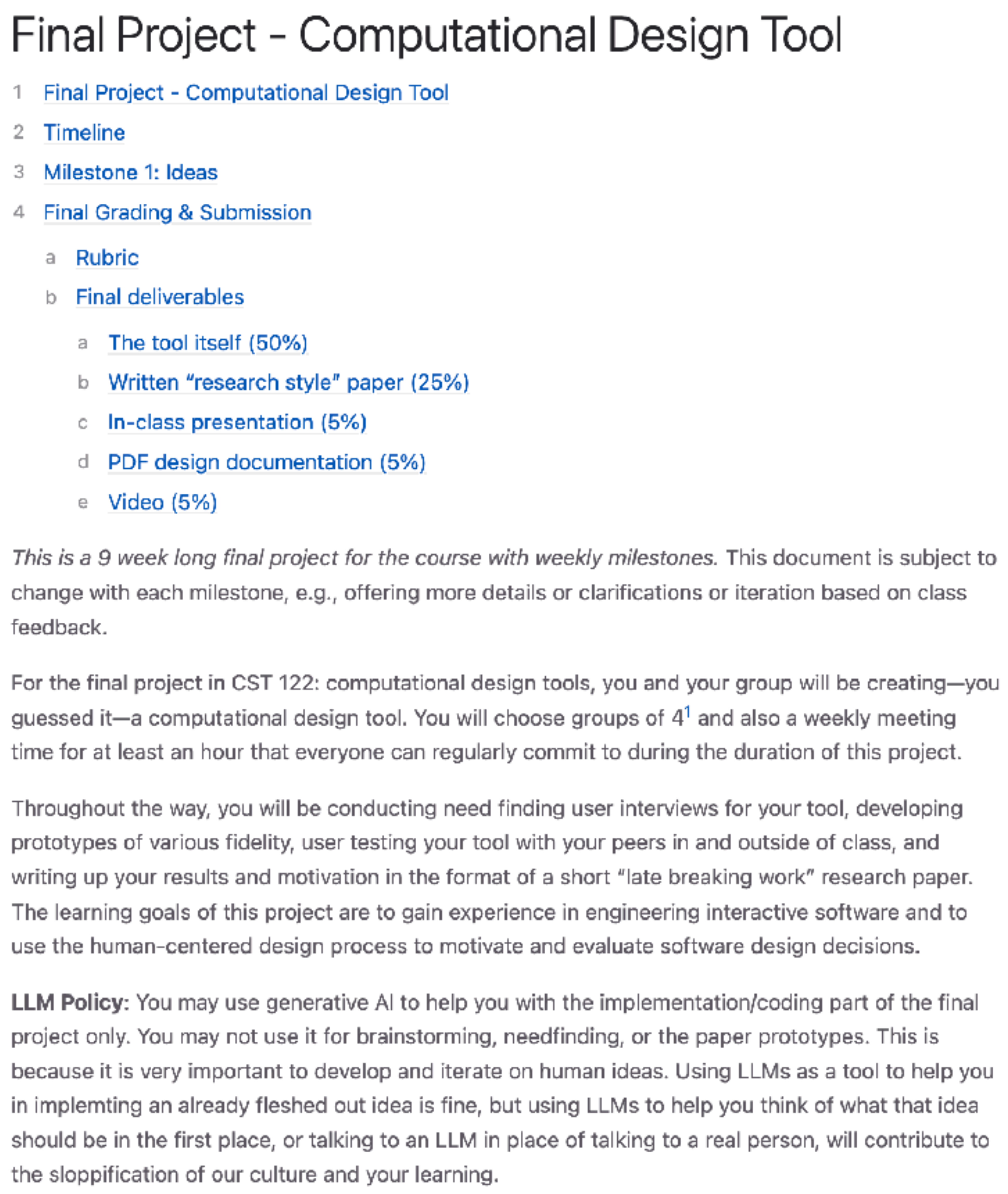
- Other ones you may have encountered in your life…
  - Notability
  - Excel
  - Adobe Creative Suite
  - Node.js / other programming libraries

Typed reflection:

Think about all the tools (analog + digital) you've used so far in this course. Which ones were (1) most interactive, (2) made you feel like you had agency, (3) best at complimenting your existing skills, and (4) best at helping you achieve your goals?
Why? When tools worked well, why? (Familiarity? Mental models?)
When tools were challenging to use, why?

Save this text; you'll need it later.

Final project: Computational design tool



Final Project - Computational Design Tool

This is a 9 week long final project for the course with weekly milestones. This document is subject to change with each milestone, e.g., offering more details or clarifications or iteration based on class feedback.

For the final project in CST 122: computational design tools, you and your group will be creating—you guessed it—a computational design tool. You will choose groups of 4[1] and also a weekly meeting time for at least an hour that everyone can regularly commit to during the duration of this project.

Throughout the way, you will be conducting need finding user interviews for your tool, developing prototypes of various fidelity, user testing your tool with your peers in and outside of class, and writing up your results and motivation in the format of a short "late breaking work" research paper. The learning goals of this project are to gain experience in engineering interactive software and to use the human-centered design process to motivate and evaluate software design decisions.

LLM Policy: You may use generative AI to help you with the implementation/coding part of the final project only. You may not use it for brainstorming, needfinding, or the paper prototypes. This is because it is very important to develop and iterate on human ideas. Using LLMs as a tool to help you in implemting an already fleshed out idea is fine, but using LLMs to help you think of what that idea should be in the first place, or talking to an LLM in place of talking to a real person, will contribute to the sloppification of our culture and your learning.

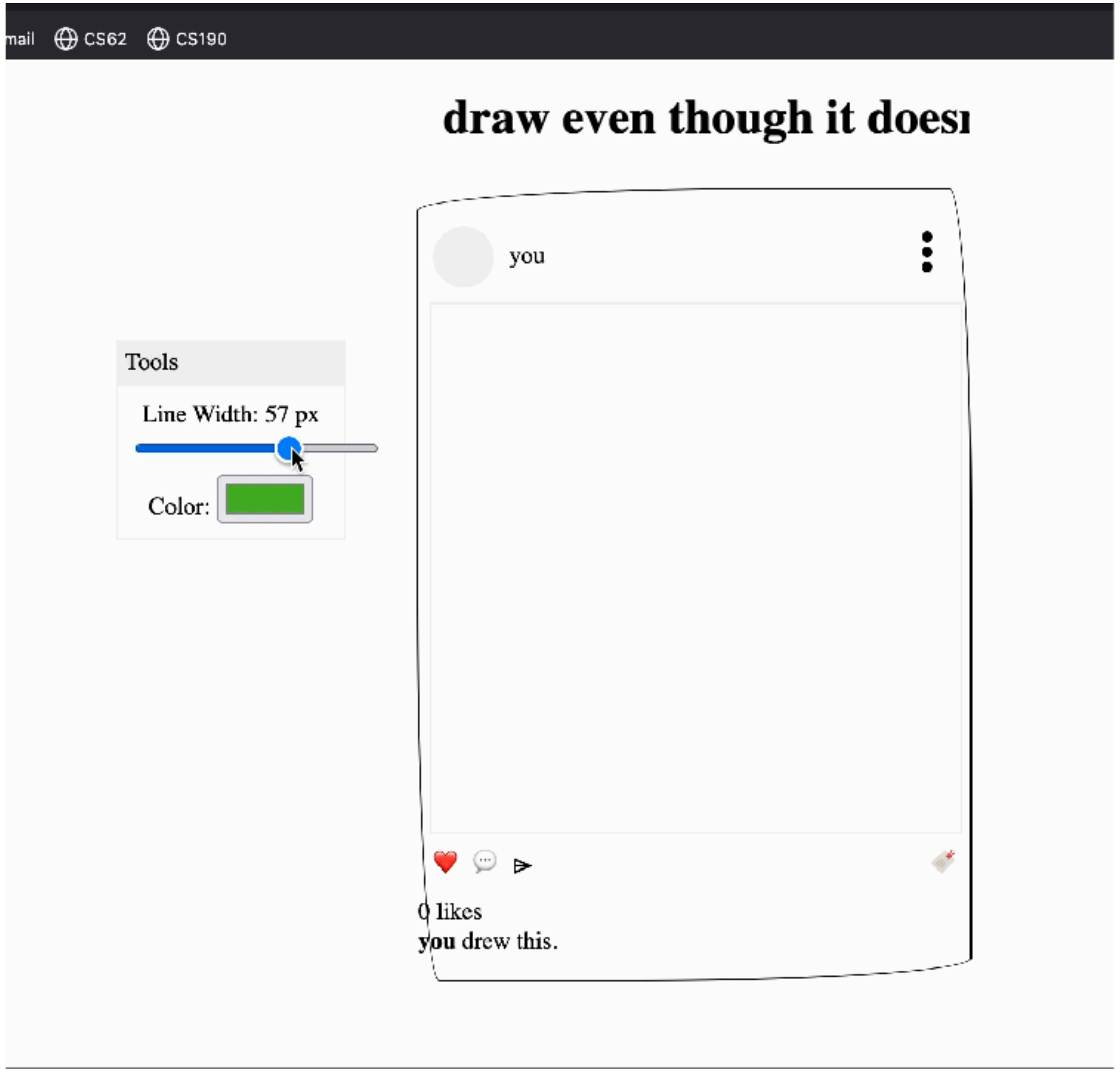
Feel free to follow along on the website:

https://cs.pomona.edu/classes/cs122/project/

Your computational design tool

- We've seen examples of *research* design tools (in digital fabrication and creativity support) the last 2 lectures. You are not expected to do *research* in this class. Your tool should be a new idea, but it does not have to result in generalizable knowledge.
- What constitutes a "computational design tool"?
  - A computational design tool is a tool that **uses computation to allow users to interactively create something**. The computational aspects may be simple or complex, the actual act of making may be simple or complex, but the results, or the impact on the process, should have the potential to be meaningful and diverse.
- Aim for wide walls

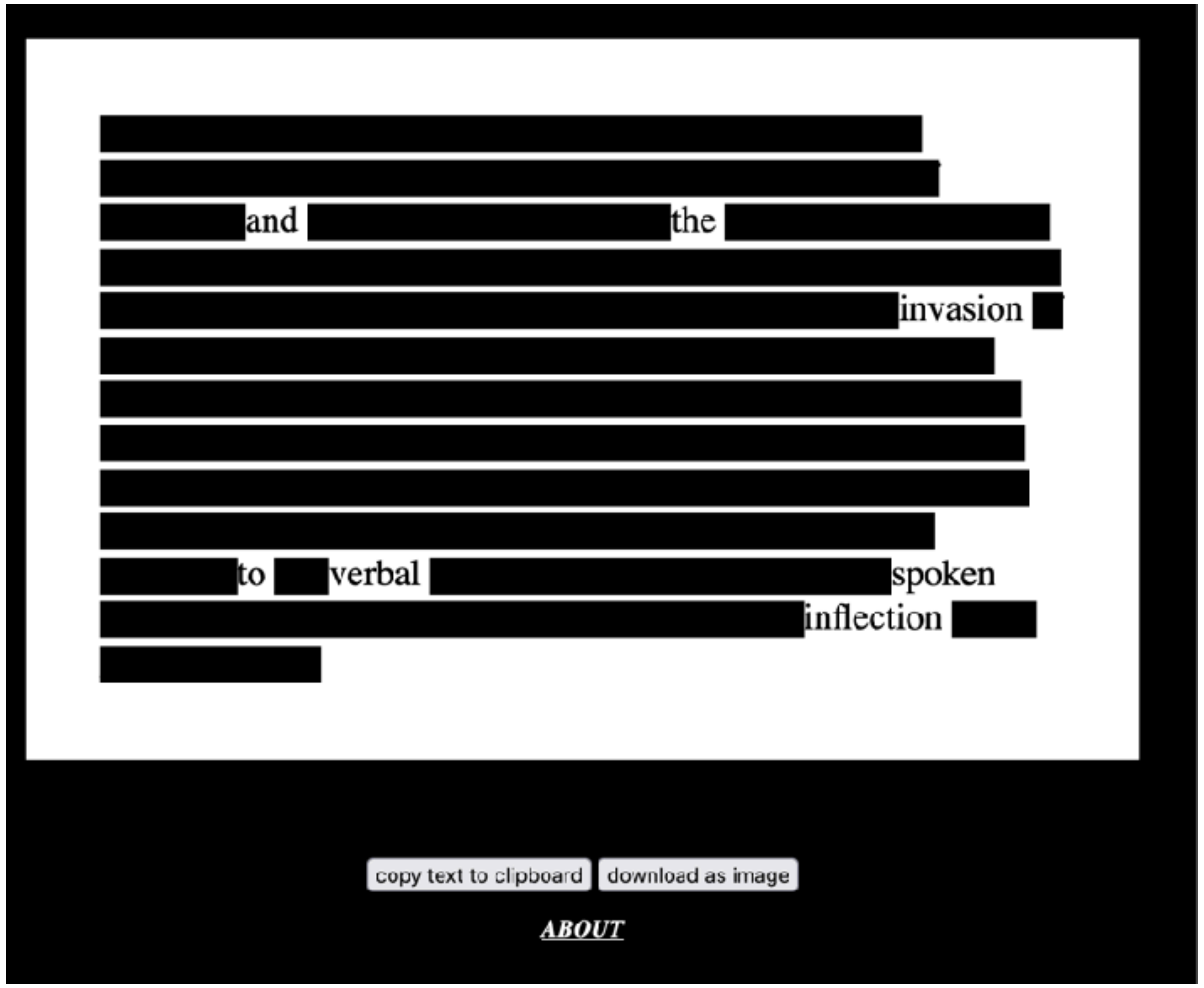
Example: A drawing tool that fades your brush strokes overtime



https://fadedraw-a6295fb1ad35.herokuapp.com/

- **Computation aspect:** simple-ish
- **Tool action**: simple
- **Results**: complex—changes how people approach traditional practices
- Users: individual, novice sketchers
- Domain: Visual art
- Problem: It is scary getting started with drawing
- Solution: Fade strokes so you feel less pressure and show nothing is permanent

Example: A tool for creating blackout poetry

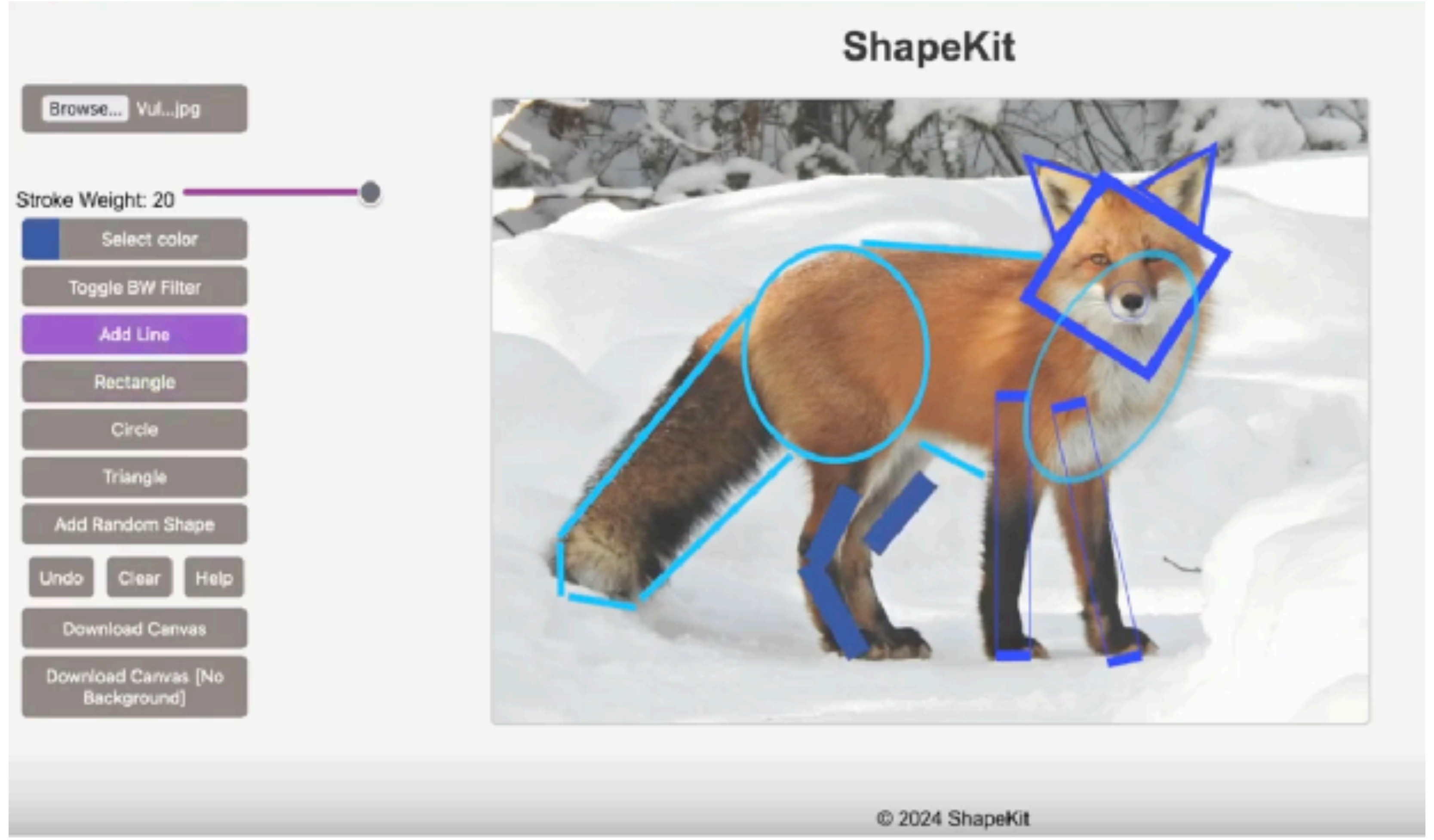


and the
invasion
to verbal spoken
inflection

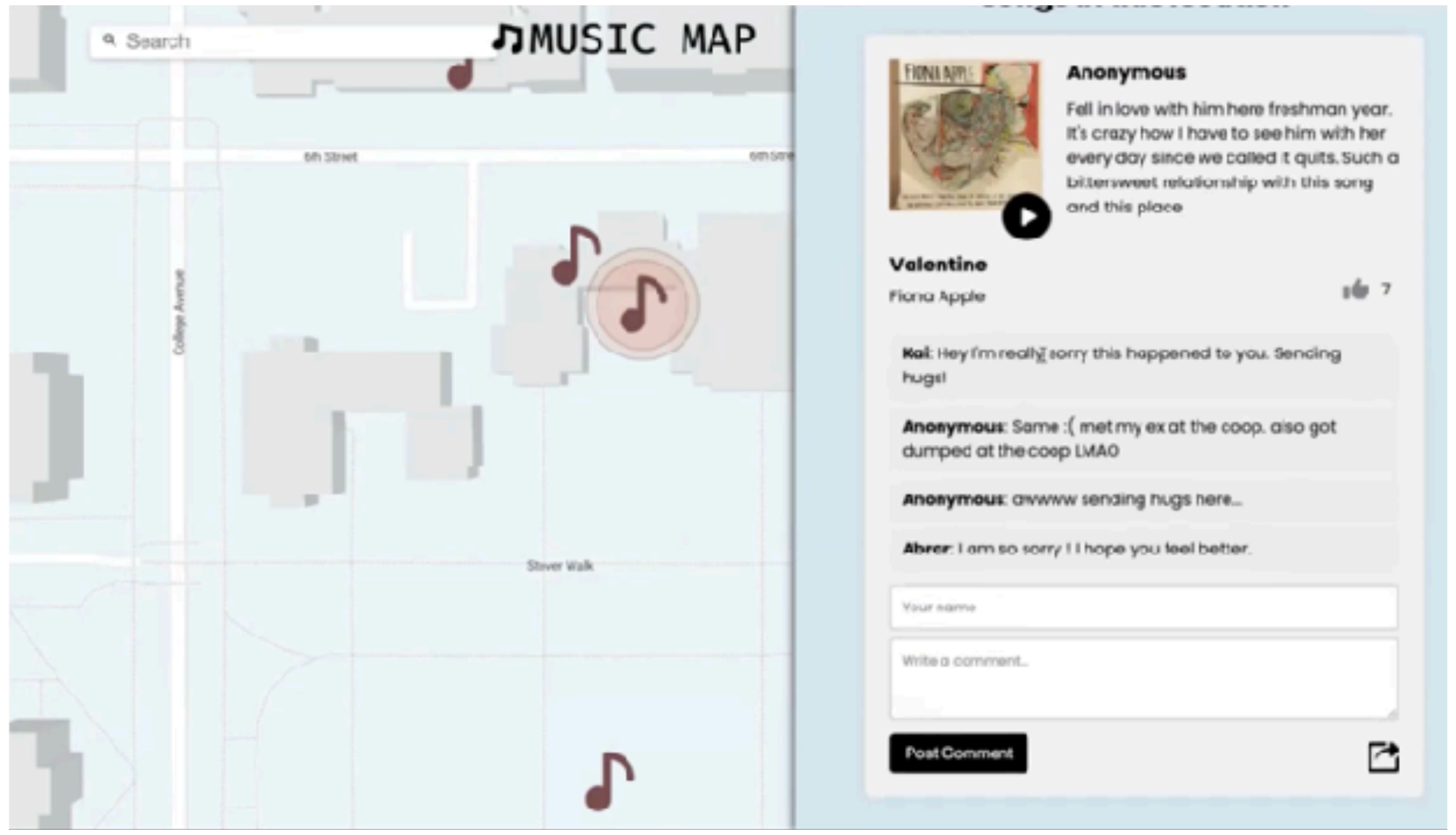
- **Computation aspect**: medium complexity; data mining Project Gutenburg and randomly loading a paragraph
- **Tool action**: medium complexity; clicking to un-black out words
- **Results**: complex—lots of user autonomy, creativity within constraints

https://blackout.tilde.town/

Selected final projects – Spring 2024



ShapeKit (decomposing photos into shapes for drawing)



Anonymous

Fell in love with him here freshman year. It's crazy how I have to see him with her every day since we called it quits. Such a bittersweet relationship with this song and this place

Valentine

Fiona Apple

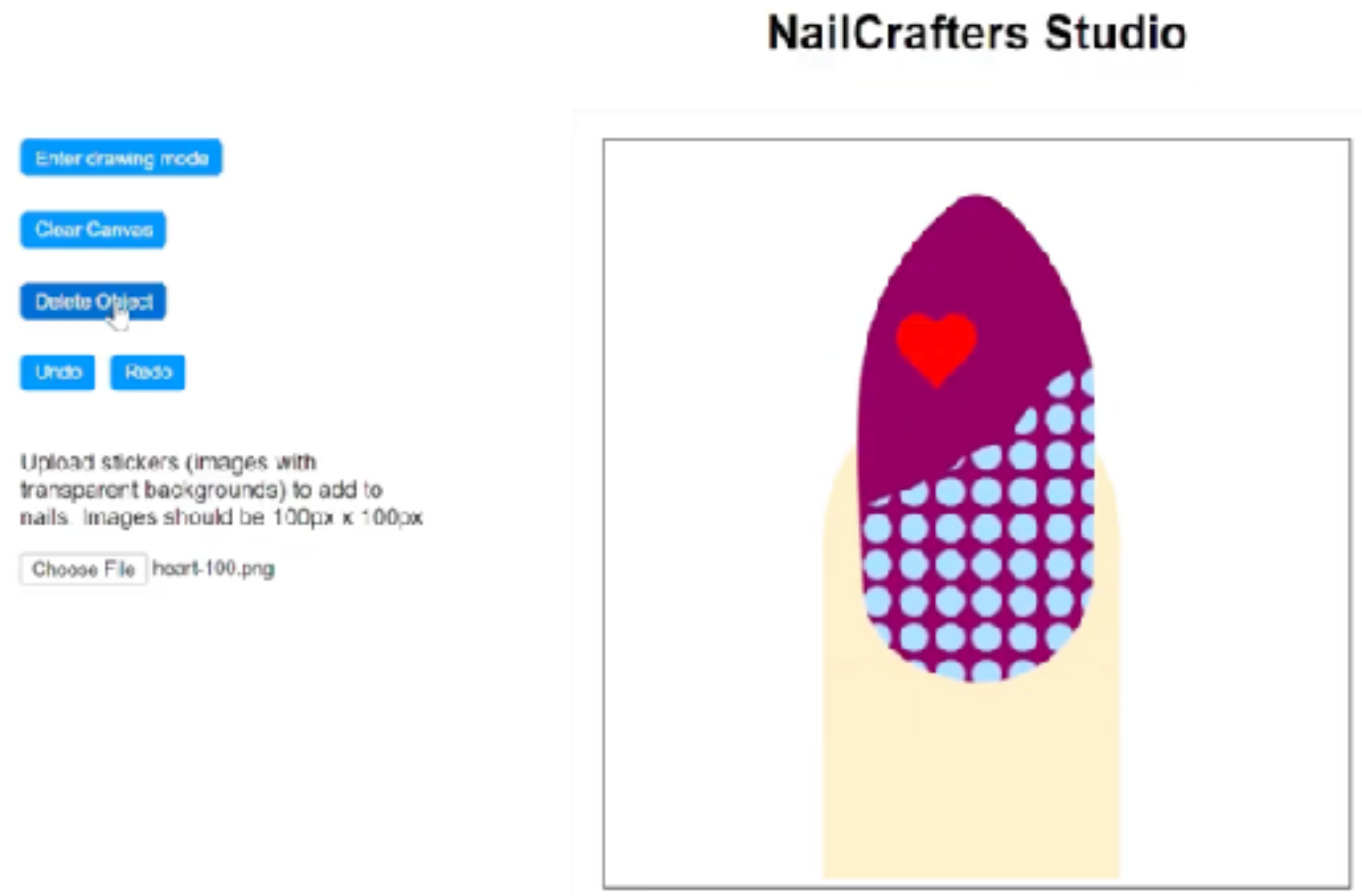
Kai: Hey I'm really sorry this happened to you. Sending hugs!

Anonymous: Same :(met my ex at the coop. also got dumped at the coop LMAO

Anonymous: awwww sending hugs here...

Abrer: I am so sorry ! I hope you feel better.

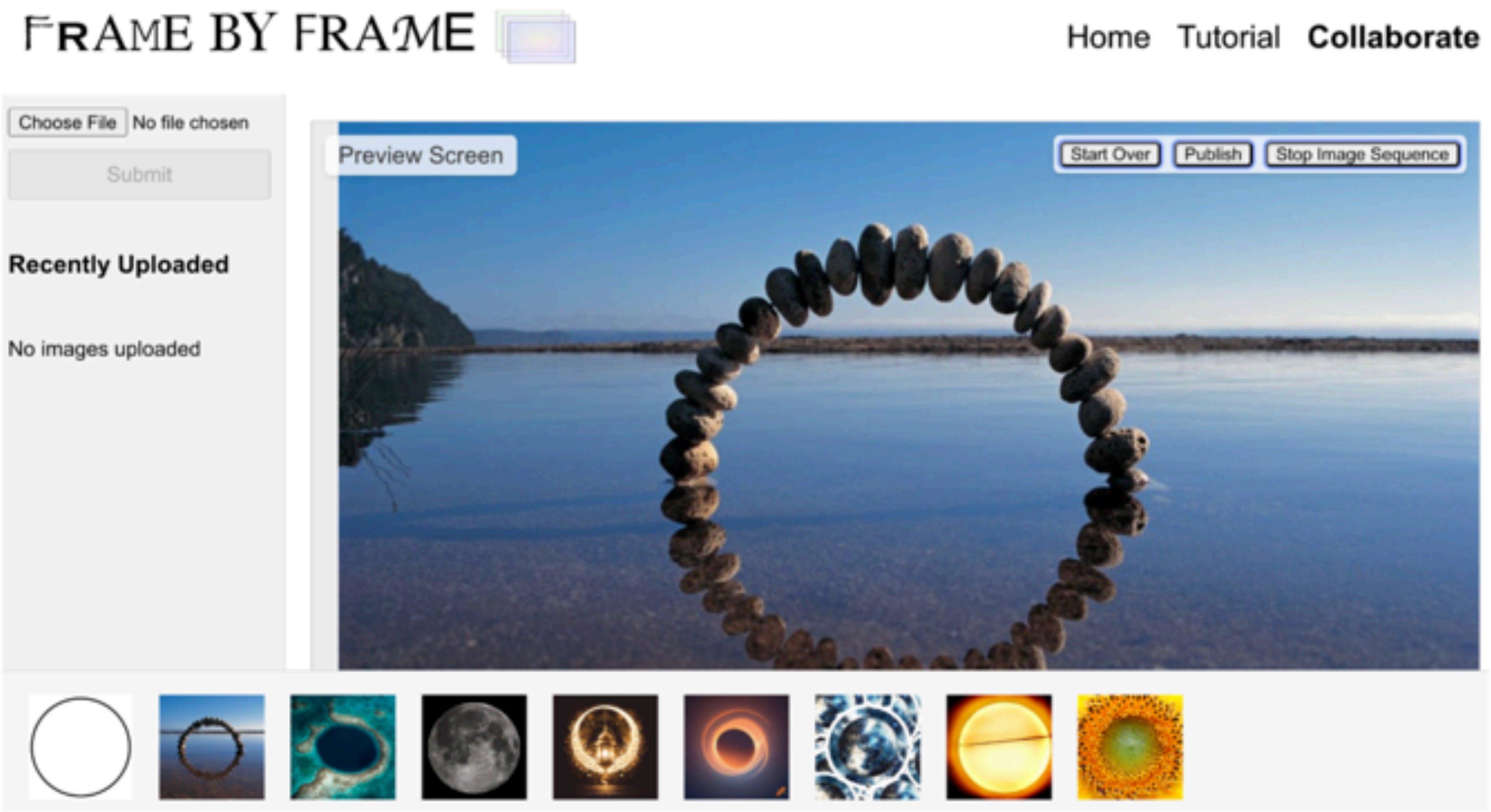
MusicMap (location based song memories)



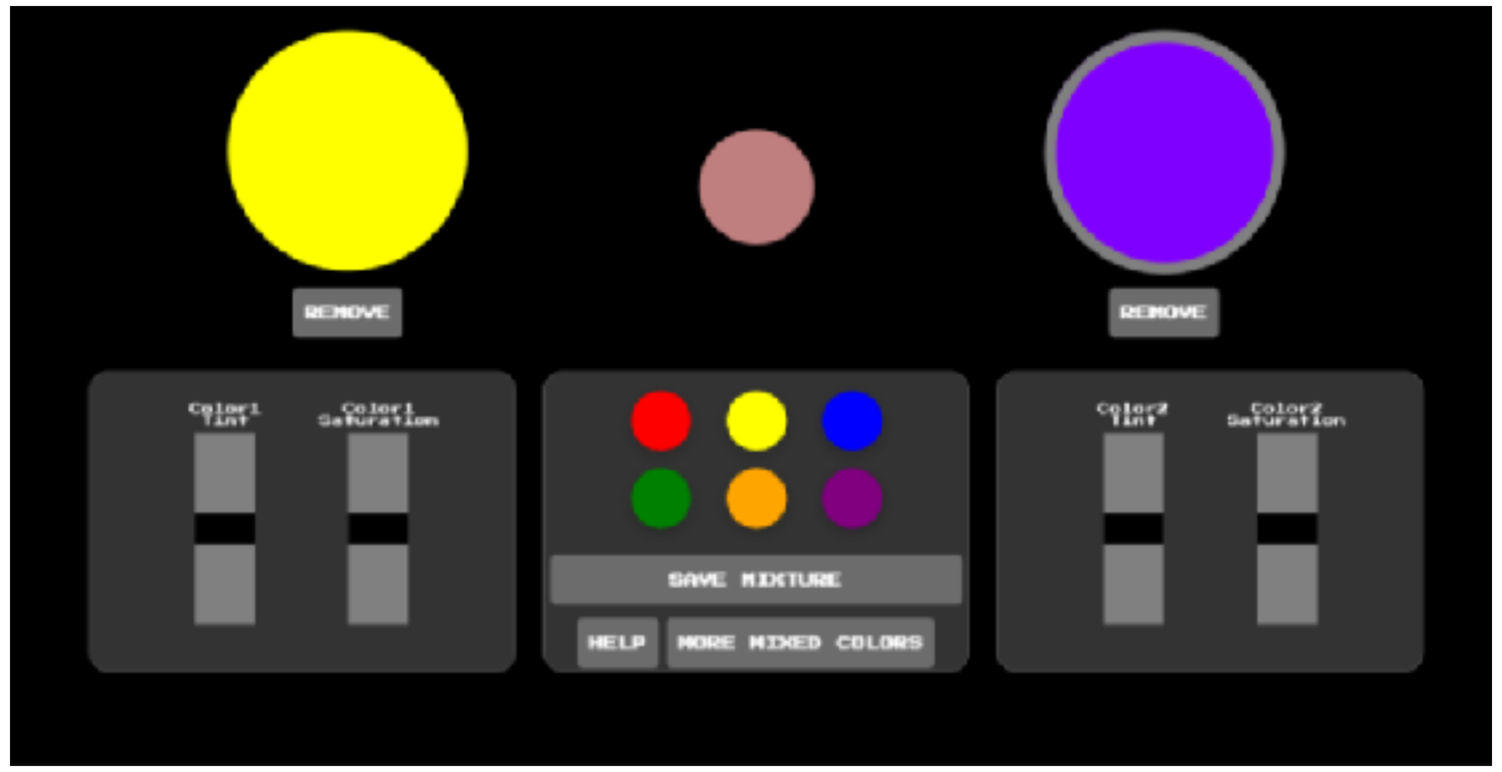
Upload stickers (images with transparent backgrounds) to add to nails. Images should be 100px x 100px

NailCrafter's Studio (digitally design & plan out your nails)

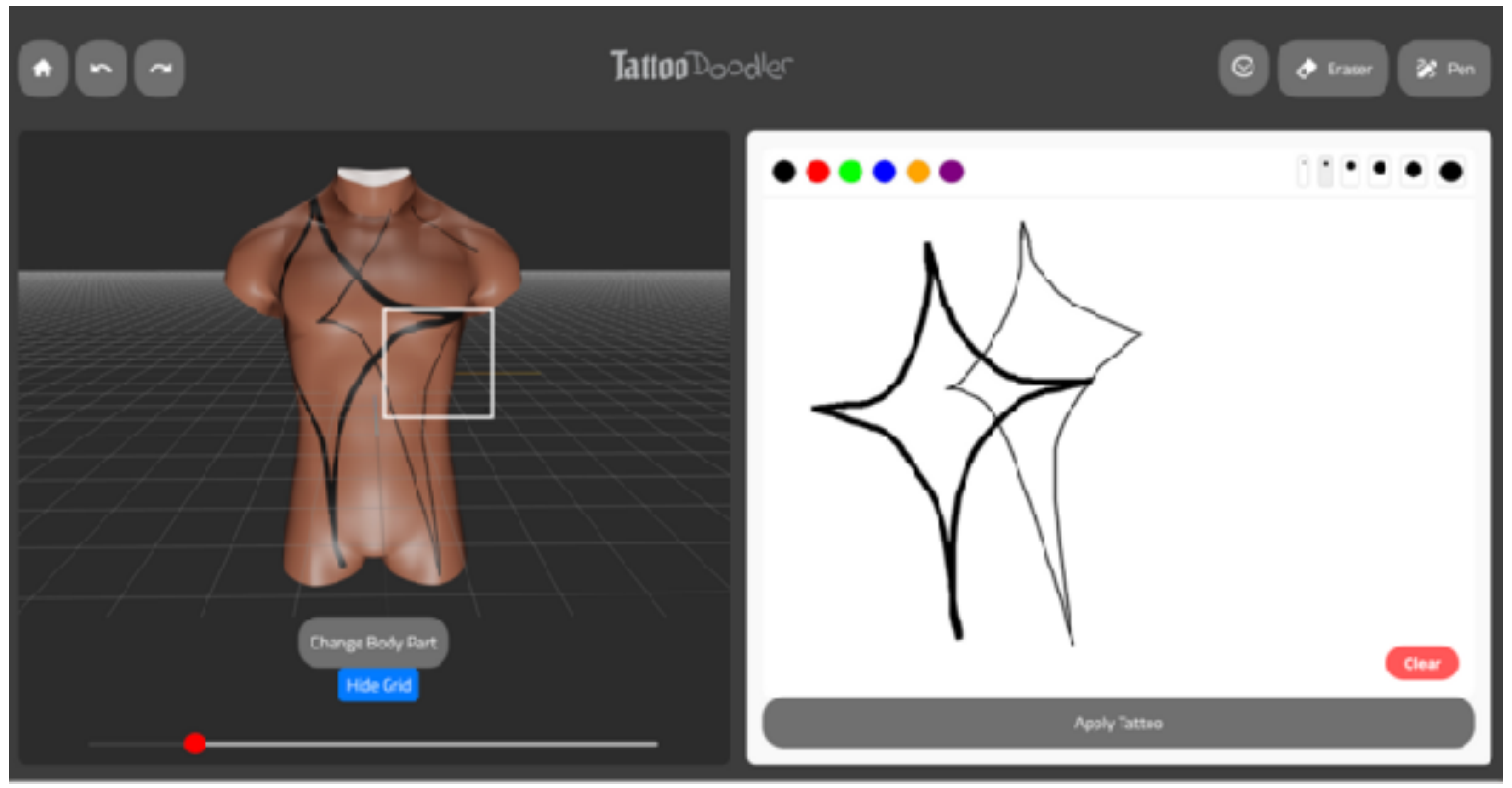
Selected final projects – Fall 2024



Frame by Frame (collaborative collaging)



Project MUSE (mix colors to create music)



Tattoo Doodler (preview tattoos on your body)

What doesn’t count? Narrow inputs/outputs

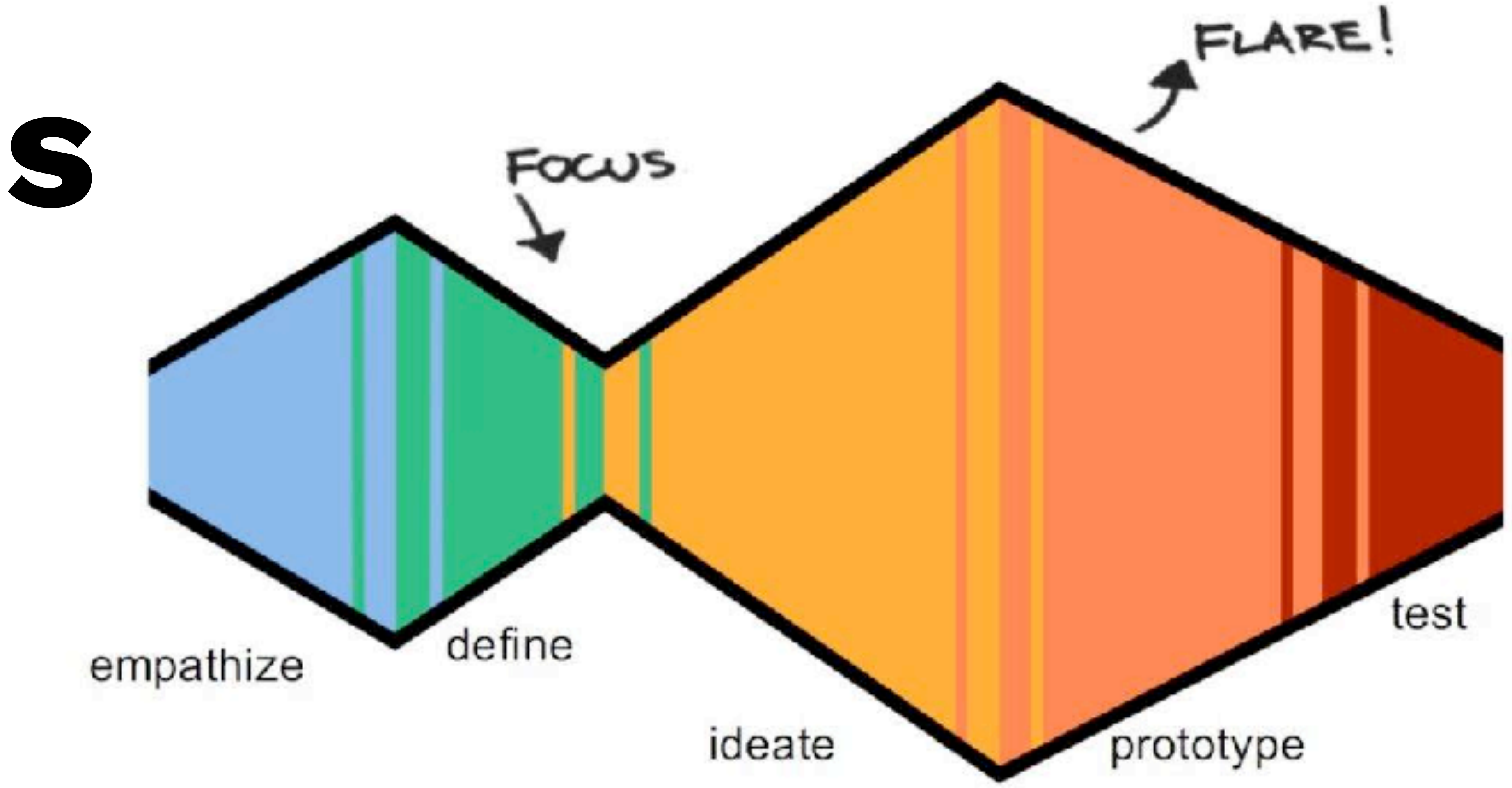
- Tools like Fishdraw that generate artifacts for the user without a lot of user input possibilities
    - Press a button, generate a fish — need more interactivity and user agency in the design process
- Tools with narrow walls that don’t have a diverse range of output possibilities
    - A direct manipulation UI that lets users make Gmail filters through selecting emails and folders, removing the need to code/know how to type the syntax for Gmail filters — need a more diverse range of results

Final deliverables

- The tool itself (in-class presentations last day of class)
- A video demonstration
- 4 page write up of final results in a research paper format: (1) an introduction, (2) a methods section, and (3) an evaluation
- A PDF documentation of your design process. Living document: add to it weekly, don’t save it for the end. The paper is about final results, this is for you to be messy, show your design rationale, pivots, etc.

Brainstorming

Brainstorming generalisms



- The best idea comes from many ideas:

  quantity over quality

- Now is not the time to judge or criticize

- Wild, exaggerated, “stupid” ideas encouraged

- Individual brainstorming generates a larger, more varied set of ideas. Group brainstorming is beneficial for “yes and…” building on ideas

- Constraints can actually help with the creative process

Productivity Loss In Brainstorming Groups: Toward the Solution of a Riddle. Diehl & Storebe, 1987

We’ll generate ~7 ideas today

- 1. Problem/solution driven (2-3 ideas)
- 2. Constraining prompts method (3 ideas)
- 3. Iterating from existing tools method (1-2 ideas)

Brainstorming warm up

- In 3 minutes, write down as many solutions for the problem as possible:
  - 1. Making waiting in line less boring
  - 2. Reducing stress during morning routines
  - 3. Staying focused while studying
  - 4. Cleaning the house more efficiently
  - 5. Finding lost items quickly
- Write down your ideas on post-its (one post-it per idea)
- *There’s no such thing as a bad idea right now*

Method 1: problem/solution driven

- Recalling your tool reflection, write down as many problems you've encountered with creation in this class or over the course of your life as you can
- Choose 2-3 problems of these and write a tool that would solve them
- **No ideas are bad ideas right now!**
- Swap papers with someone and "yes and…" feedback their idea(s)

Example "yes and": For FadeDraw, what if it was collaborative, and for some people the strokes faded in 10 min instead of 10 seconds? For blackout poetry, what if the user had to upload images/screenshots of text to make it more "found" rather than type directly?

Method 2: constraining prompts

- Come up with a tool that fits the “vibe” of each of the following prompts inspired from class:
  - Making things harder (friction, disorientation)
  - Making things more playful (creative coding)
  - Making using the computer feel less like using a computer (physical making)

- Stuck? Think about user groups you care about. (College students, parents, people who can sketch but can’t 3D model, people who can’t draw but can code…)

Method 3: iterate from existing tools

- Take a look at some of the new example tools I listed on the final project webpage: https://cs.pomona.edu/classes/cs122/project/#what-counts-as-a-computational-design-tool (under "New for spring 2026…") or the Tinytools directory
- Take inspiration from one of them, or one of the research projects we saw in class. How would you "yes and" the tool to make it your own?
  - Different users?
  - Different artistic domains?
  - Turn a tool that makes it easy into a tool that makes it hard?

Method 3: iterate from existing tools

- Digital fabrication
  - Polagons: tool for creating polarized light pieces
  - CeramWrap: helps hand apply computationally generated glaze patterns on ceramic surfaces
  - Printed optics: using light as a material in 3D prints
  - AirLogic: using air as a material in 3D prints
  - Computational design of linkage based characters: generating motion puppets like automata
  - Constructable: interactive laser cutting
  - p5.fab: controlling machine movement with code
  - Patching physical objects: fixing 3D prints when they fail instead of redoing it all
  - MetaMorphe: embed data into 3D prints for more personalization

- CSTs
  - Adaptive Photographic Composition Guidance: generate grid lines on the viewport while taking a photo
  - QuickCut: edit videos by editing the text transcript instead
  - Paper piecing quilt: tell users the steps to making a quilt by processing the design computationally
  - Selective Undo: undo any operation any time, not just last one
  - Object Oriented Drawing: let vector objects have classes and share attributes (like all the same stroke color)
  - Quickpose: visualize version history of code art
  - DrawMyPhoto: edit parts of a photo to guide users in drawing it more accurately
  - shapeCAD: render 3D model tangibly for blind 3D modelers
  - I/O Brush (sample IRL photos as textures), Draco (add motion graphics)

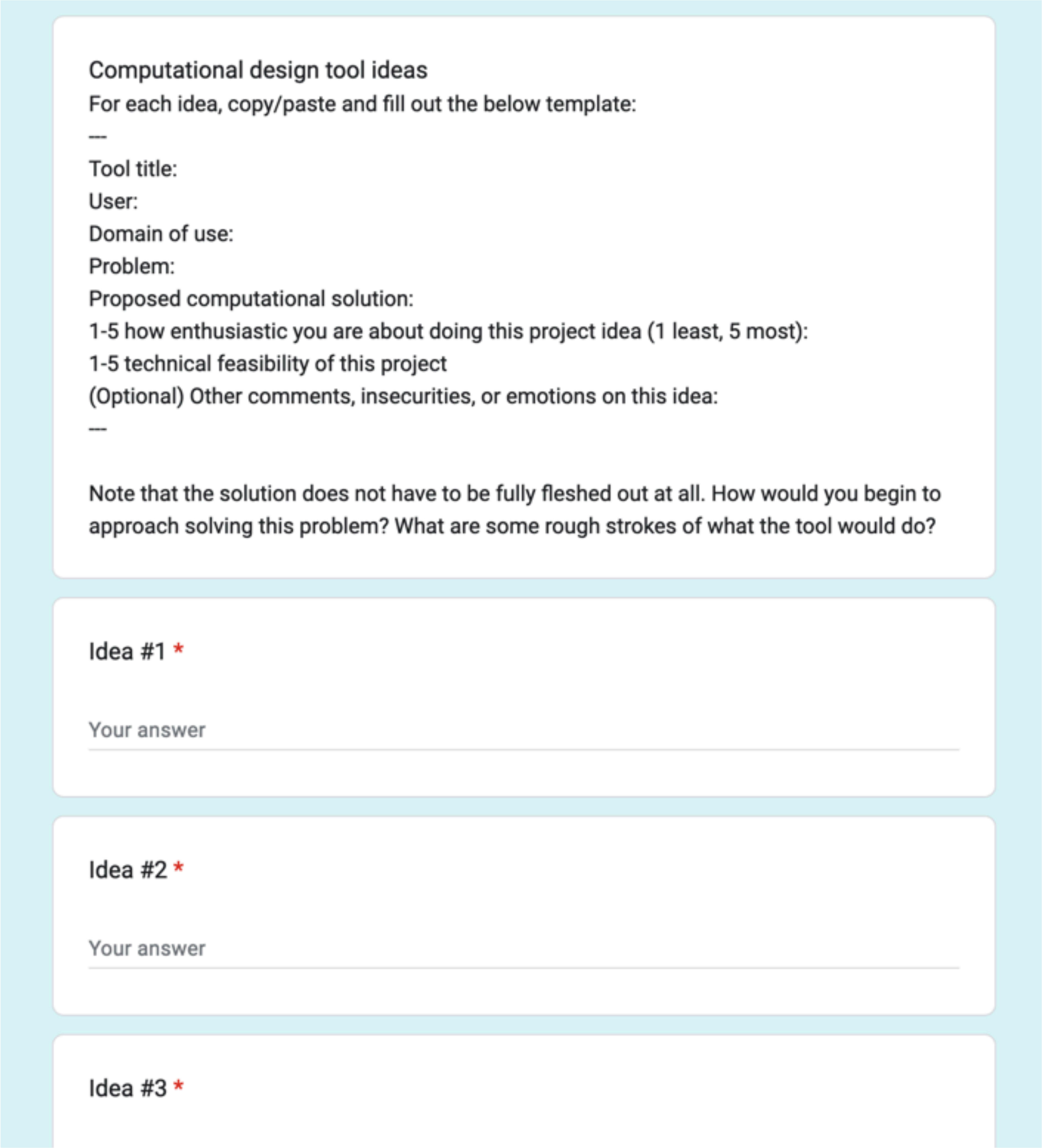
Design tools for digital fabrication strategies

- Make new materials workable (light, air)
- Work based off of your existing domain knowledge or expertise (what are problems you’re encountering?)
- Work to make the machines (tools) themselves better or more controllable
- Work to make making more sustainable
- Work to allow users to more easily be expressive in otherwise rigid computational forms

CST strategies

- Create new **computational constraints** to help with “traditional” workflows (DrawMyPhoto, Object Oriented Drawing, selective undo)
- Make things easier by **prioritizing a certain kind of task** (I/O brush, Draco)
- Create new interfaces that generate **new mental models** (Quickpose, shapeCAD)
- Automate and encode **domain knowledge** (DrawMyPhoto)
- Can help with other aspects of the creative process rather than implementation: **idea generation** (computers are great at generating things), **reflection, critique**, etc.

Milestone 1: ideas



Computational design tool ideas
For each idea, copy/paste and fill out the below template:

Tool title:
User:
Domain of use:
Problem:
Proposed computational solution:
1-5 how enthusiastic you are about doing this project idea (1 least, 5 most):
1-5 technical feasibility of this project
(Optional) Other comments, insecurities, or emotions on this idea:

Note that the solution does not have to be fully fleshed out at all. How would you begin to approach solving this problem? What are some rough strokes of what the tool would do?

Idea #1 *

Your answer

Idea #2 *

Your answer

Idea #3 *

- Google Form, put your tool reflection that you typed in here
- Also include 3 project ideas ranked by your enthusiasm: can be fleshed out versions of the ideas you had today, or brand new ideas
- Due before next Weds class

https://forms.gle/mdEkZ5aWAdRkiBsF8

Class 11 recap

- TODOs:
  - Weds:
    - Submit ideas form before class
    - Will be **making groups in class** by writing top ideas down on sheets of paper, sticking them around the room, and voting on ideas - if you can’t make it, have a friend represent you