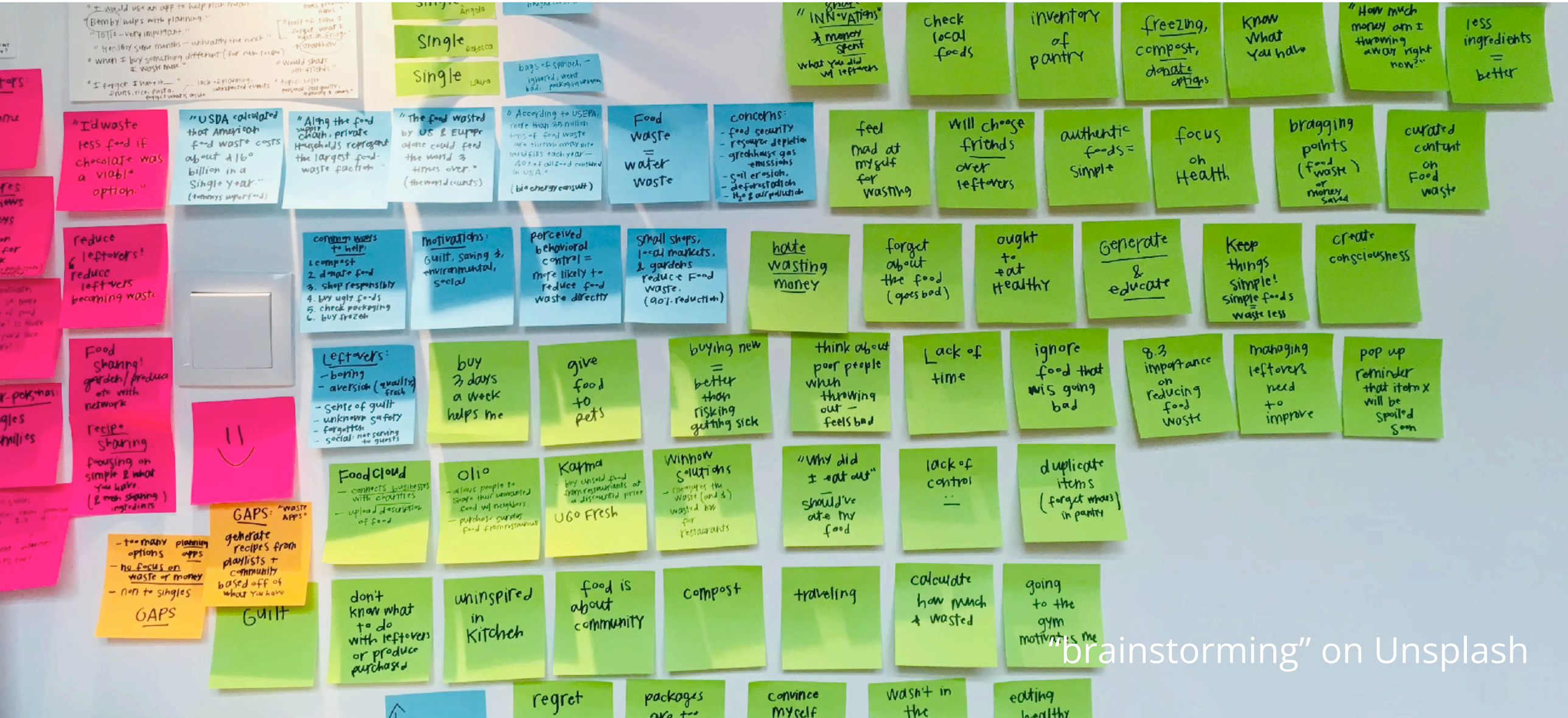
CS181DT Class 11: Brainstorming



"brainstorming" on Unsplash

Class 11 agenda

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

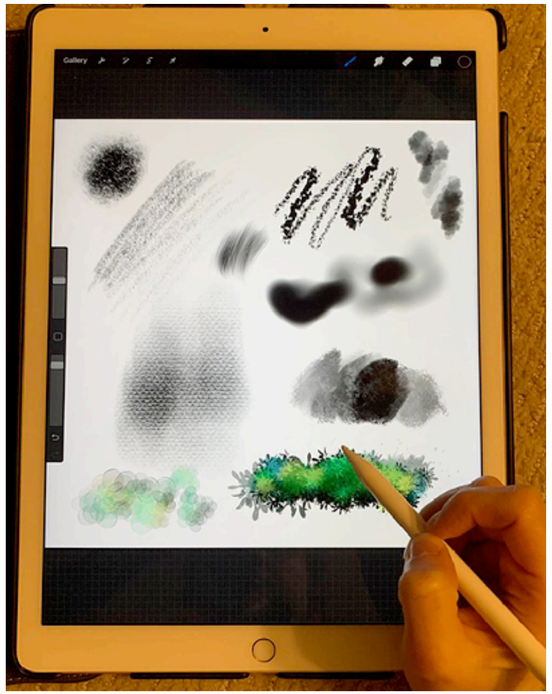
PM4 crit

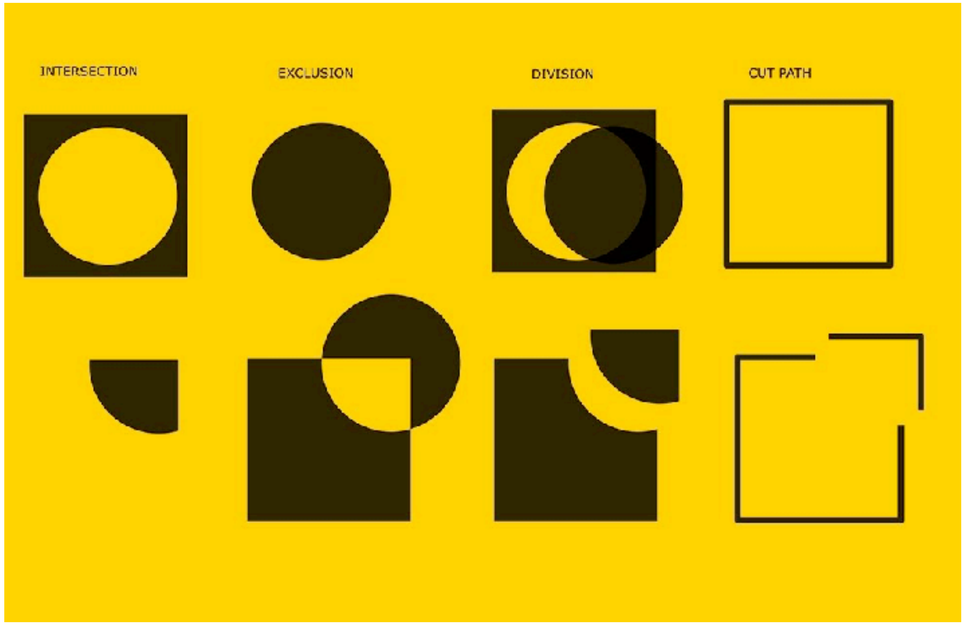
- Same art walk format as before, but no artist notes this time. Try to give feedback on these points:
  - What do you think is the intended protest message?
  - How does the form of this object successfully support the protest? What ways could it be improved?
  - Anything that sticks out to you immediately? Anything you're confused by?
- 4-6 post-its each, each object should at least have 3 pieces of feedback!

Tool reflections

Mental models

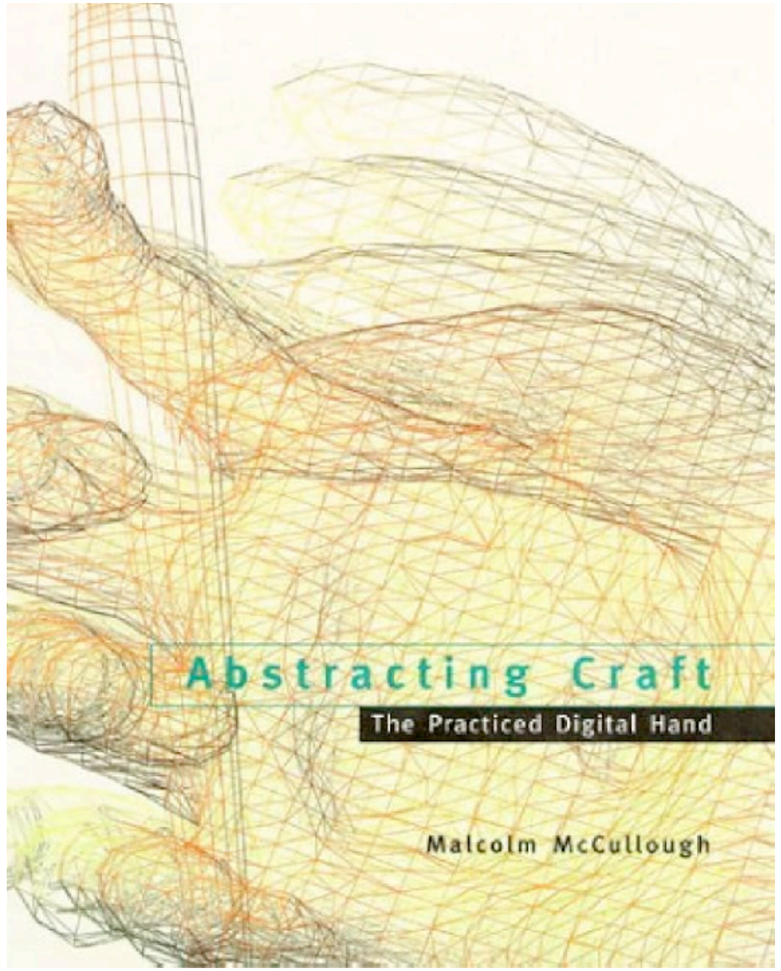
- An internal representation of external reality that influences our behavior (Kenneth Craik, 1943)
- Different ways of thinking based on the constraints of the tool
- As we use new tools, we develop new mental models
- Ex: Procreate (mental model closer to drawing) vs Inkscape (new vector and boolean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

- Other ones you may have encountered…
  - 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

1. Final Project - Computational Design Tool
2. Timeline
3. Milestone 1: Ideas
4. Final Grading & Submission
    a. Rubric

This is a 8 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 181DT: 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.

What counts as 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.

Feel free to follow along on the website:

https://cs.pomona.edu/classes/cs181dt/project

Your computational design tool

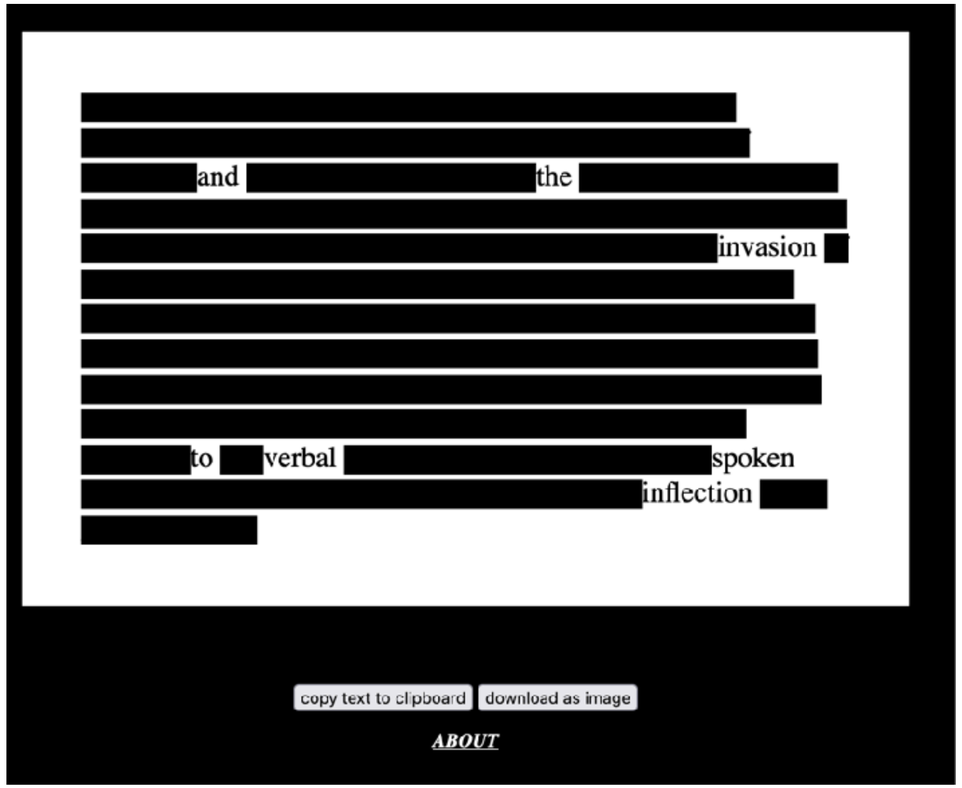
- We've seen examples of *research* design tools (in digital fabrication and creativity support) the last 2 lectures. You are not expected to do *research* in this class. Your tool should be a new idea, but it does not have to result in generalizable knowledge.
- What constitutes a "computational design 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

- **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

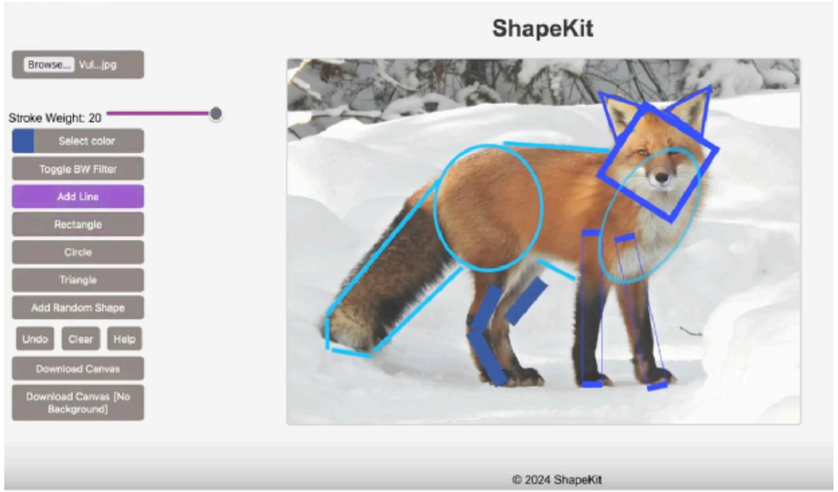
Example: A tool for creating blackout poetry



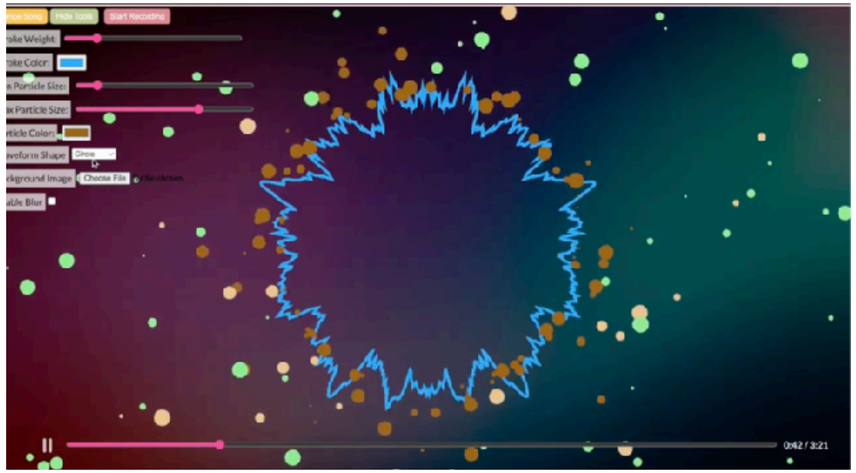
- **Computation aspect**: medium complexity; data mining Project Gutenburg and randomly loading a paragraph
- **Tool action**: medium complexity; clicking to un-black out words
- **Results**: complex—lots of user autonomy, creativity within constraints

https://blackout.tilde.town/

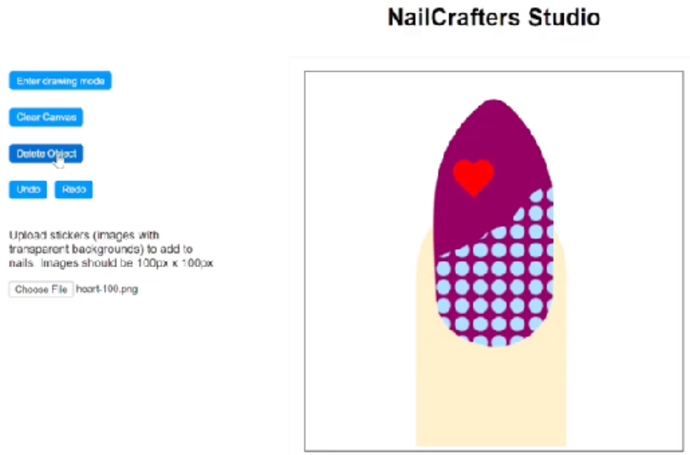
Last semester’s final projects



ShapeKit (decomposing photos into shapes for drawing)

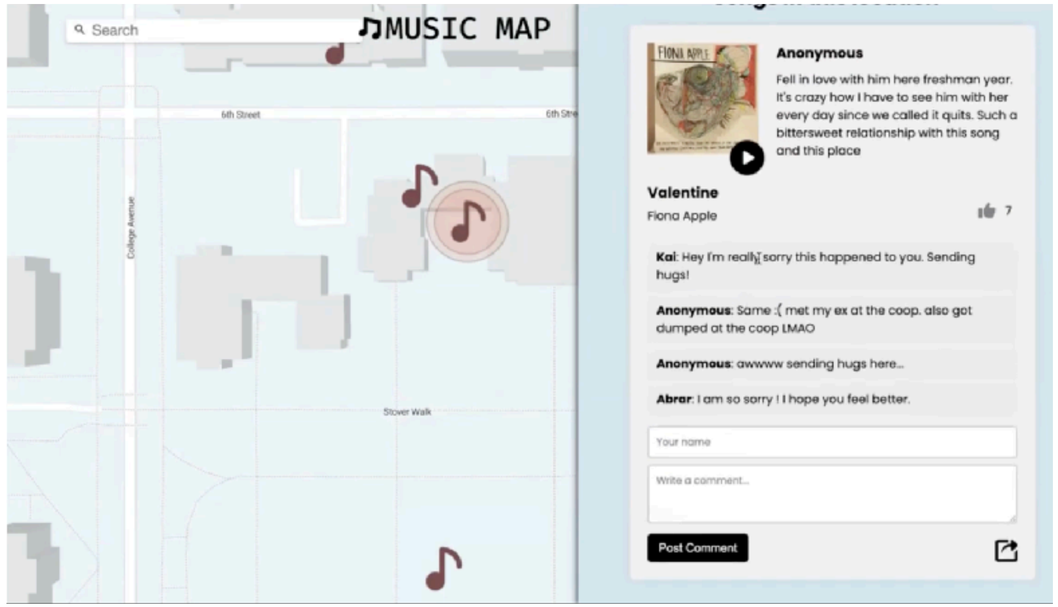


AudioViz (customizable music waveform visualizer)

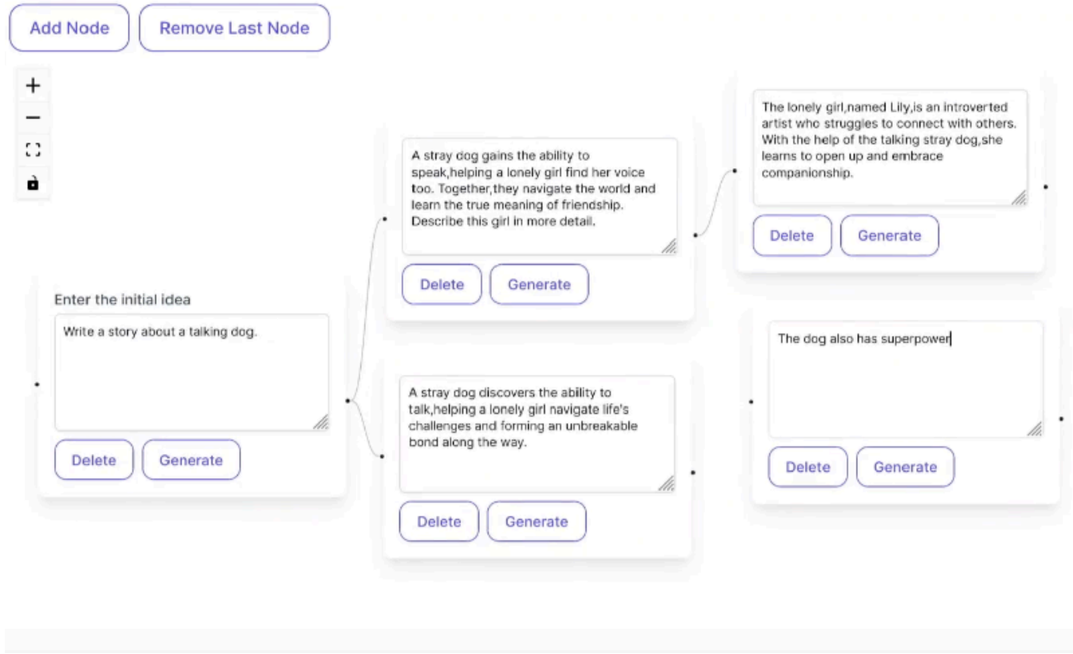


NailCrafter’s Studio (digitally design & plan out your nails)

Last semester’s final projects



MusicMap (location based song memories)



Nodea (generative AI for story plot planning)

What doesn’t count? Narrow inputs/outputs

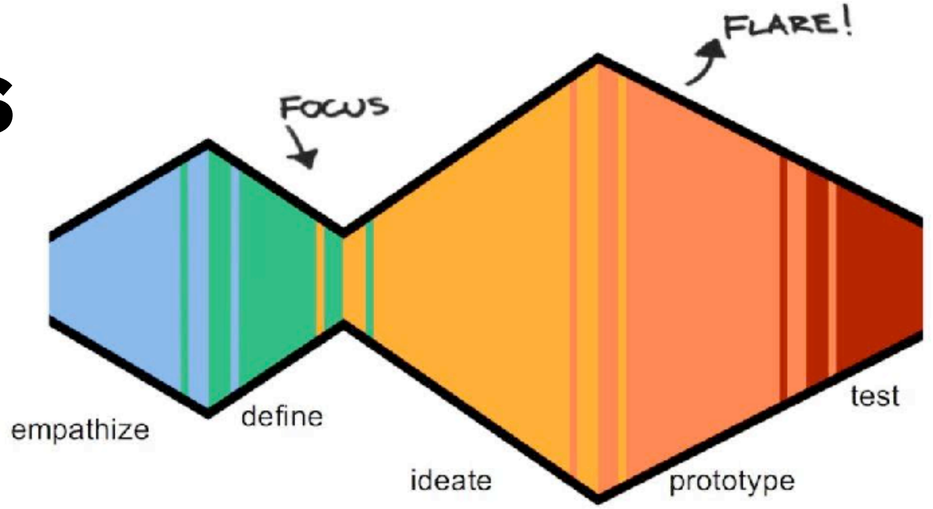
- Tools like Fishdraw that generate artifacts for the user without a lot of user input possibilities
  - Press a button, generate a fish — need more interactivity and user agency in the design process
- Tools with narrow walls that don’t have a diverse range of output possibilities
  - A direct manipulation 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. Constraining prompts method (4 ideas)
- 2. Iterating from existing tools method (≥ 1 idea)
- 3. Problem/solution driven (2-3 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: constraining prompts

- On the top of your sheet of paper, write
  - 3 user groups you care about
  - 3 domains of creation you care about
- Now draw a grid and define a tool that fits the “vibe” of each of the following prompts:
  - Playful & fun
  - Generative
  - Useful
  - Weird/adversarial
- Let what you wrote above guide you (e.g., if you care about children, and care about sewing, what is a playful tool for children who want to sew?). Don’t worry about defining problems or solutions right now - just write a sentence about the general idea. **NO IDEAS ARE BAD IDEAS**
- Swap sheets with the person next you. Offer at least two “yes and…” alternatives.

Method 2: iterate from existing tools

- Flip your paper and divide it in half
- Think of all the research tools you've seen so far in this class. Using one as inspiration, how would you create a new tool pivoting from it?
- Same method, but different users? Different domains? Ask yourself "yes and…", or "what if…". You also probably need to simplify the task to be appropriate to the scope of the class.

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, Lillicon, 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.

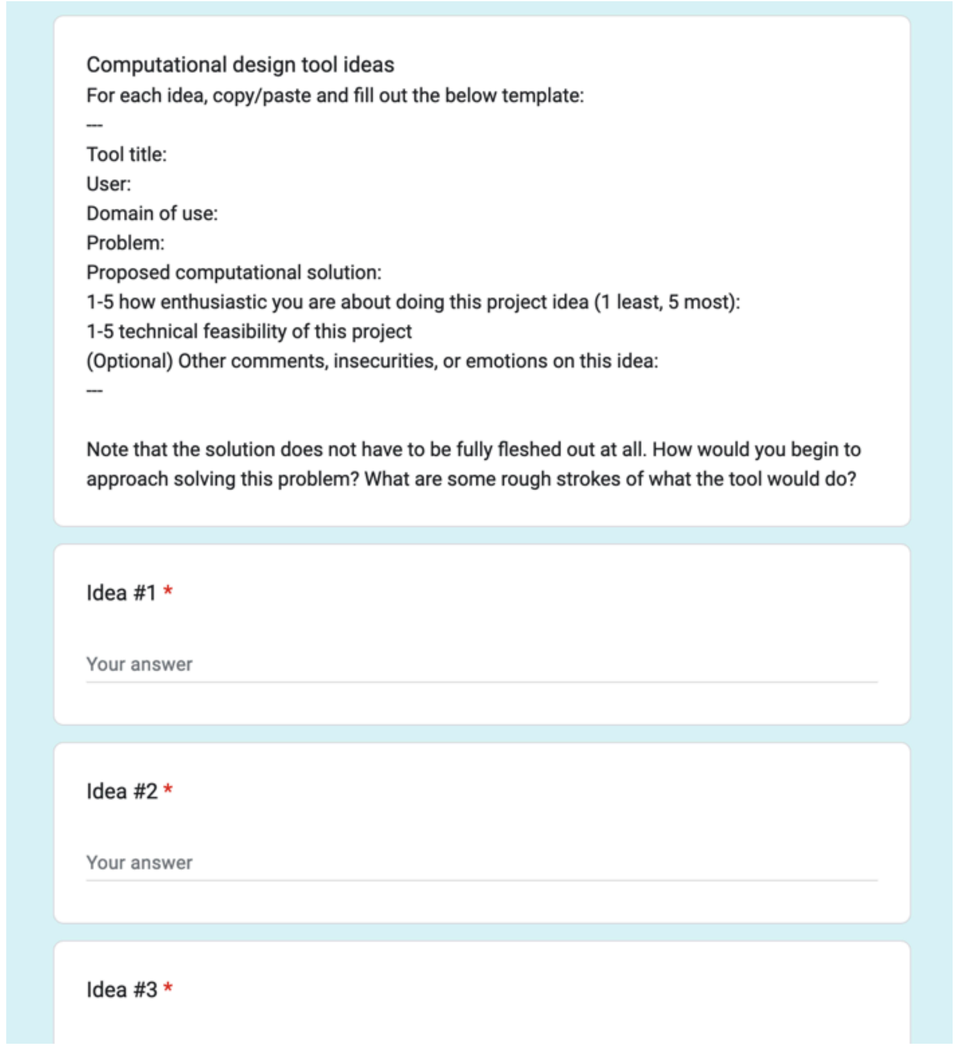
Method 2: iterate from existing tools

- 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)

Method 3: 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
- Switch seats with someone, and "yes and…" at least 2 of their ideas generated from methods 2 & 3

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/4c26LwvDbpoJQB6f6

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
    - Will also have a midsemester evaluation form for you to fill out :)