Marc Dunand

Portfolio

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Collaborative Drawing Machine

The Nature of Collaboration

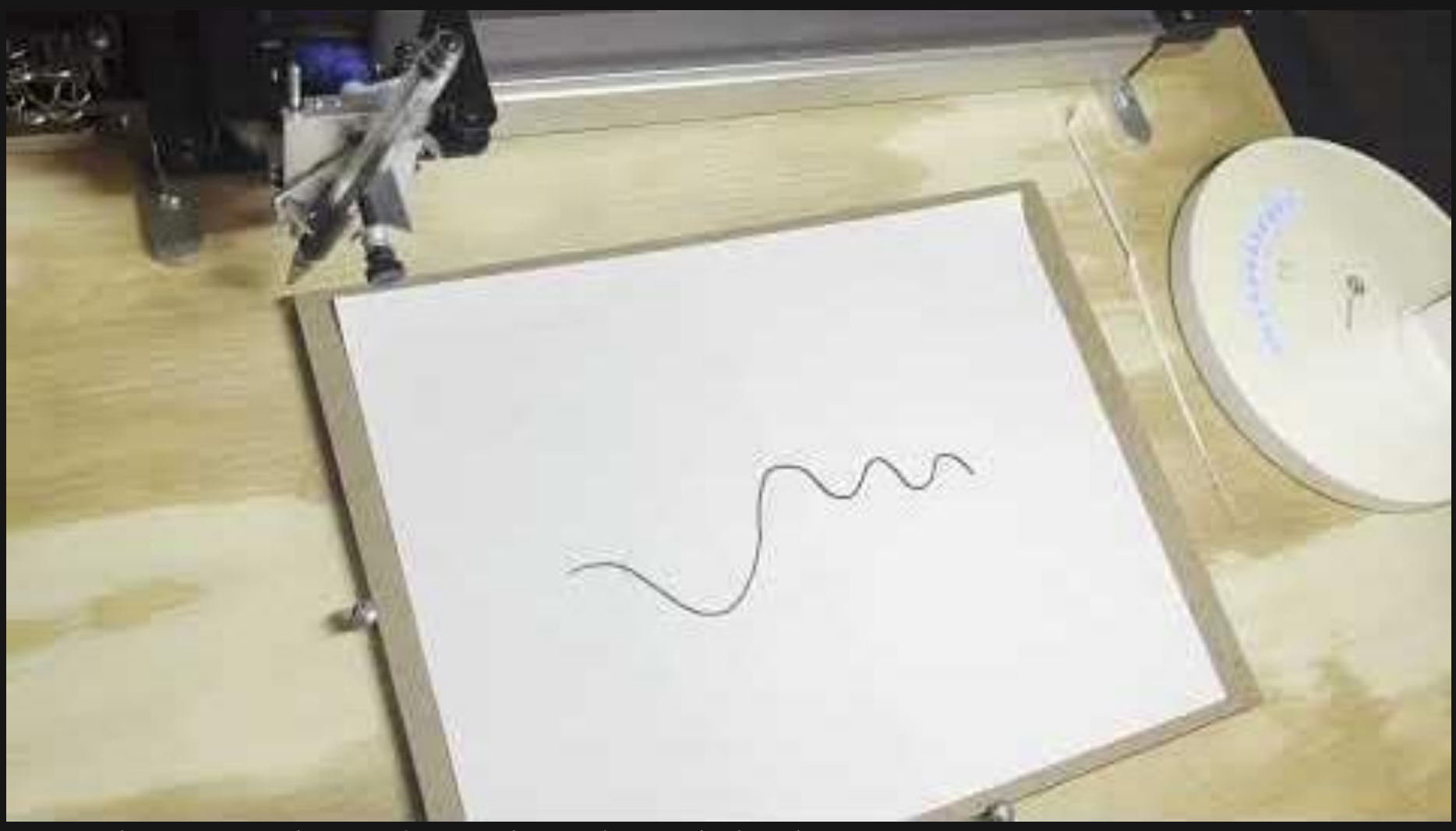
January 2024 – May 2024

Axidraw, Pen, Paper, Python, OpenCV

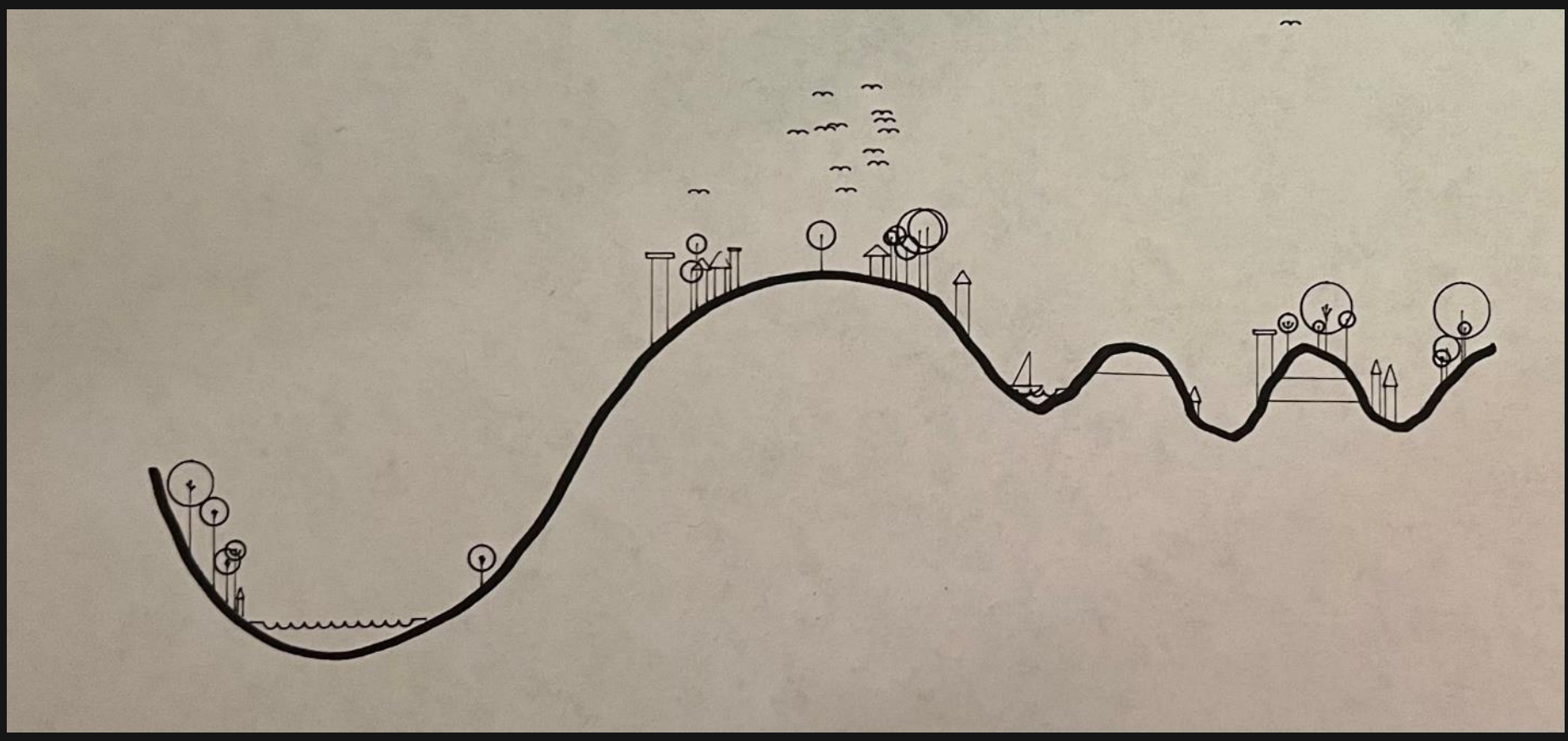
Academic, Personal

Creating this piece began by questioning my assumptions about how humans and technology collaborate to create art. Humans are often assumed to be the source of creativity, and technology works mindlessly to realize the human's vision. But technology is inherently just as creative as a person – for example, it is certainly much more creative at guessing random numbers. So, how could I reverse these roles? In my *Collaborative Drawing Machine*, a person takes the simple, nearly mindless job of drawing a line, and the machine creatively reimagines that line as a landscape.

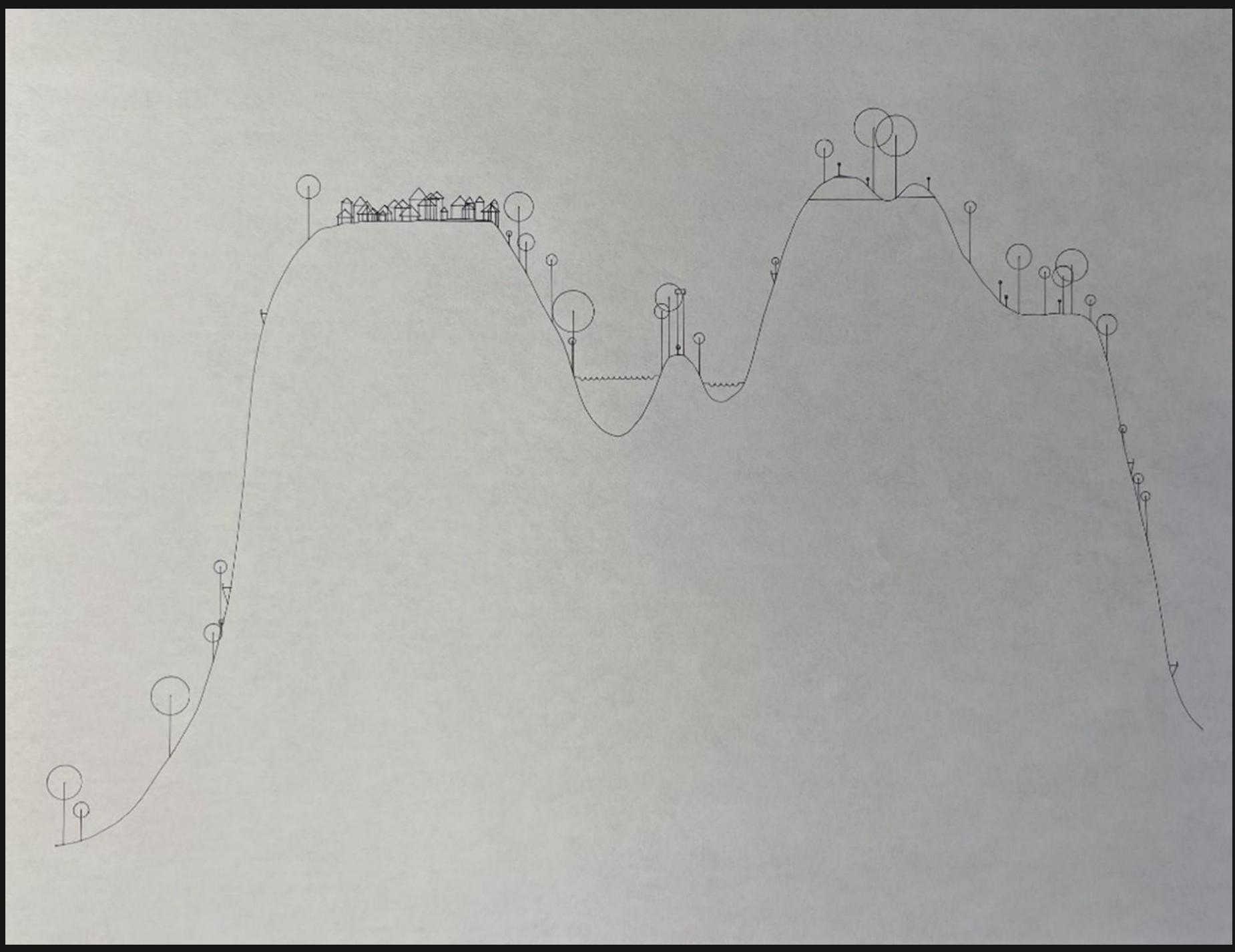
This process embodies collaboration by allowing users to consider non-human agents as creative equals. OpenCV image processing is used to determine the location of the Axidraw head and the line drawn on the paper. The contour is parsed internally, and my algorithm nondeterministically places features such as birds, houses, trees, towers, lakes, and boats upon the contour to turn the lifeless line into a tiny, floating world.



Narrated video demonstration of my Collaborative Drawing Machine in action
URL: https://youtu.be/KE64Mhv-7Kc?si=RZE5qXbgSSJKdjxo



Sample output from my Collaborative Drawing Machine



Sample output from my Collaborative Drawing Machine

Scribbler

The Nature of Writing

July 2024 – *Ongoing*

Axidraw, Pen, Paper, vSketch

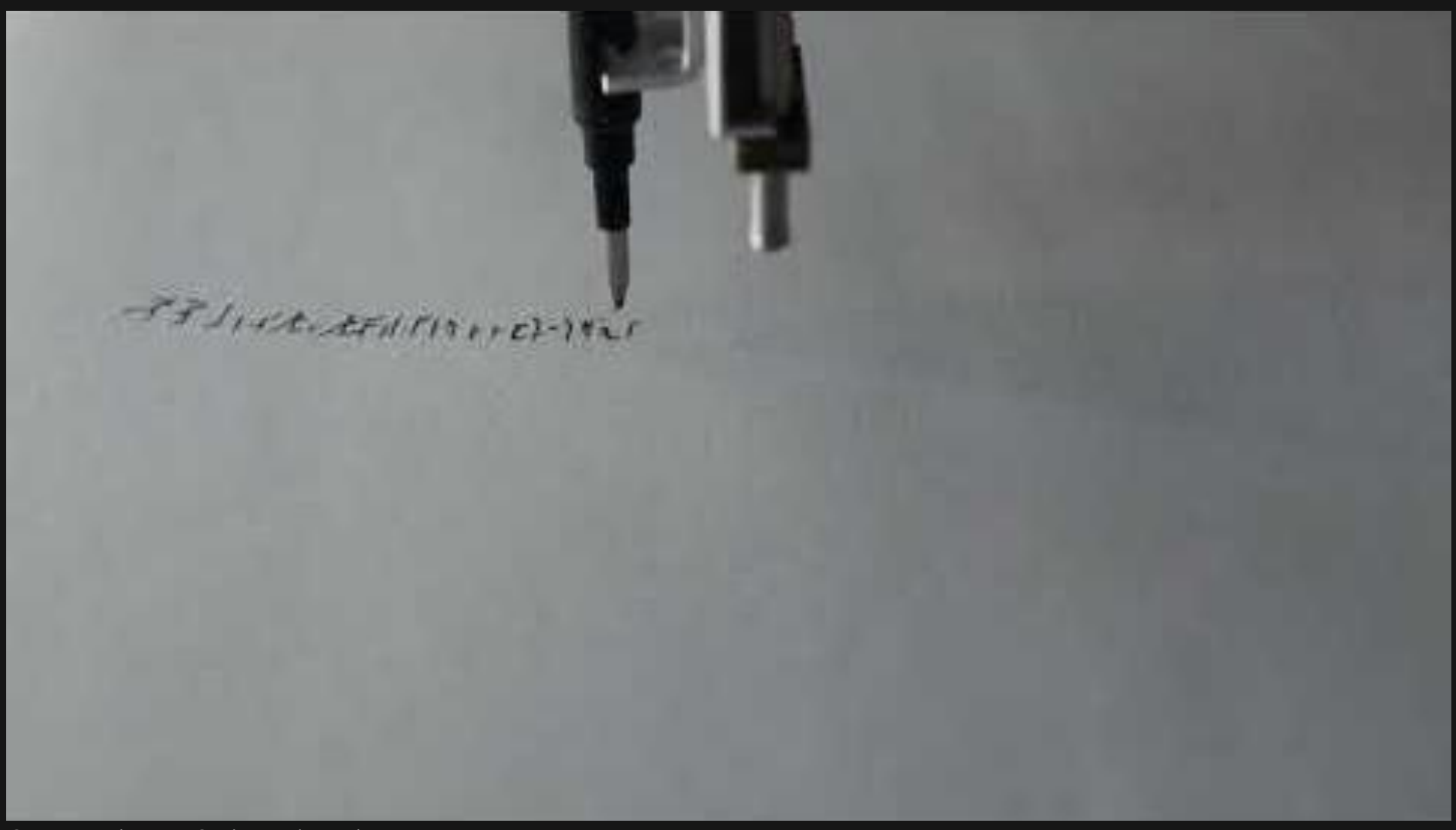
Research, Personal

Asemic script - meaningless scribbles that mimic handwriting - has always fascinated me. It implies that, regardless of cultural background, there are consistent graphical elements to written language. *Scribbler* is a speculative research project focused on isolating those elements. When a person attempts to create an asemic script, they will inevitably get caught up in their own cultural biases. The script they create will be subtly influenced by the specific written languages they have learned. I attempt to remove this influence by using the only cultureless agent: a machine.

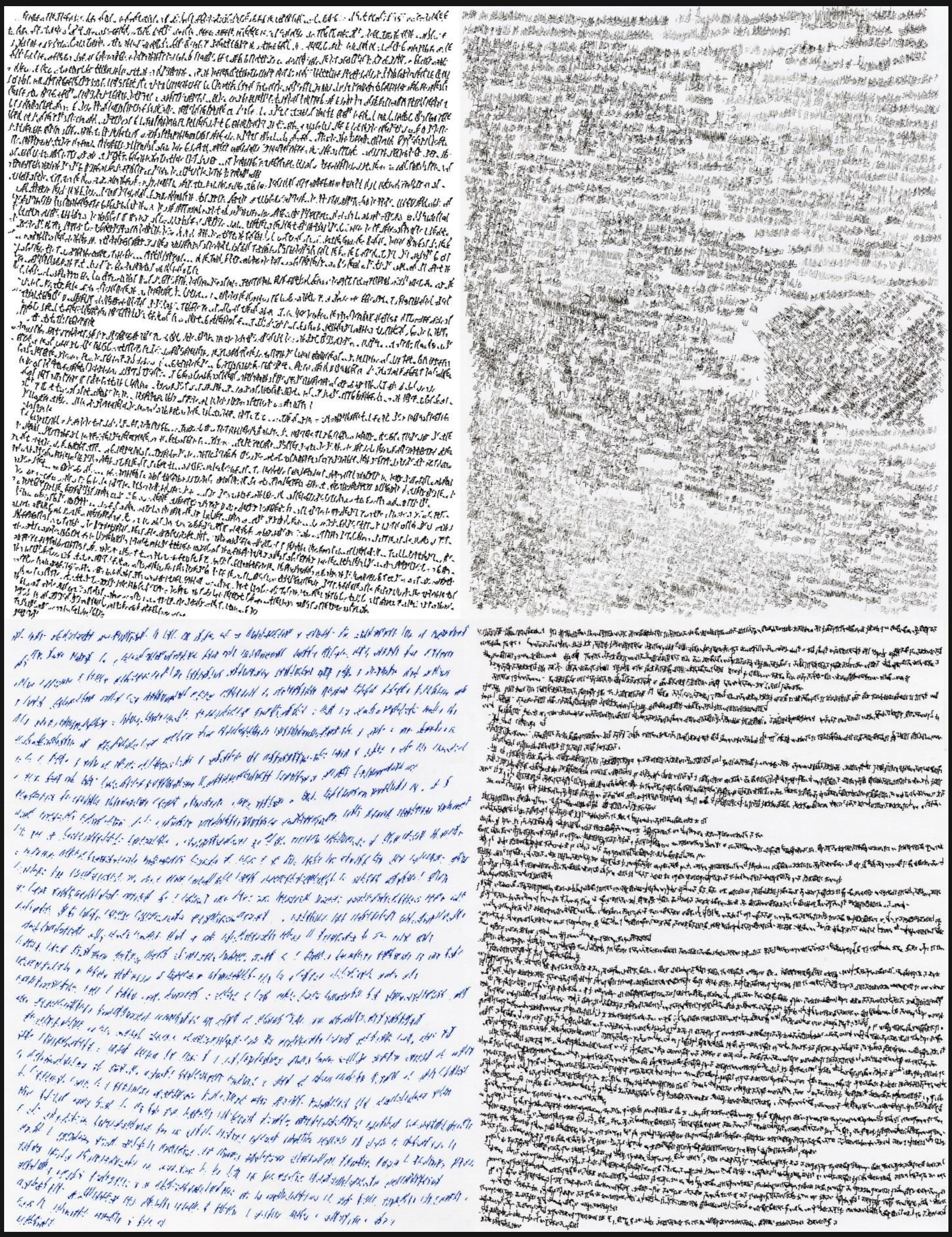
Scribbler is an ongoing process. Though its output is written by a machine, the piece is still ultimately designed by me. As such, it has elements of my own culture clearly present, such as horizontal writing and a phonographic alphabet. My next step with this piece is to research forms of writing external to my own culture to create a more universal asemic script.

This process embodies writing by allowing us to see the structures of text external to the rules of any language. To build my script, I created a procedural algorithm in Python that allows me to fine tune the behavior of my asemic script according to a set of thirty parameters, such as character tilt, alphabet size, and line waviness. My Axidraw pen plotter uses a custom-constructed “wiggly pen” to render this algorithm in realistically imperfect handwriting.

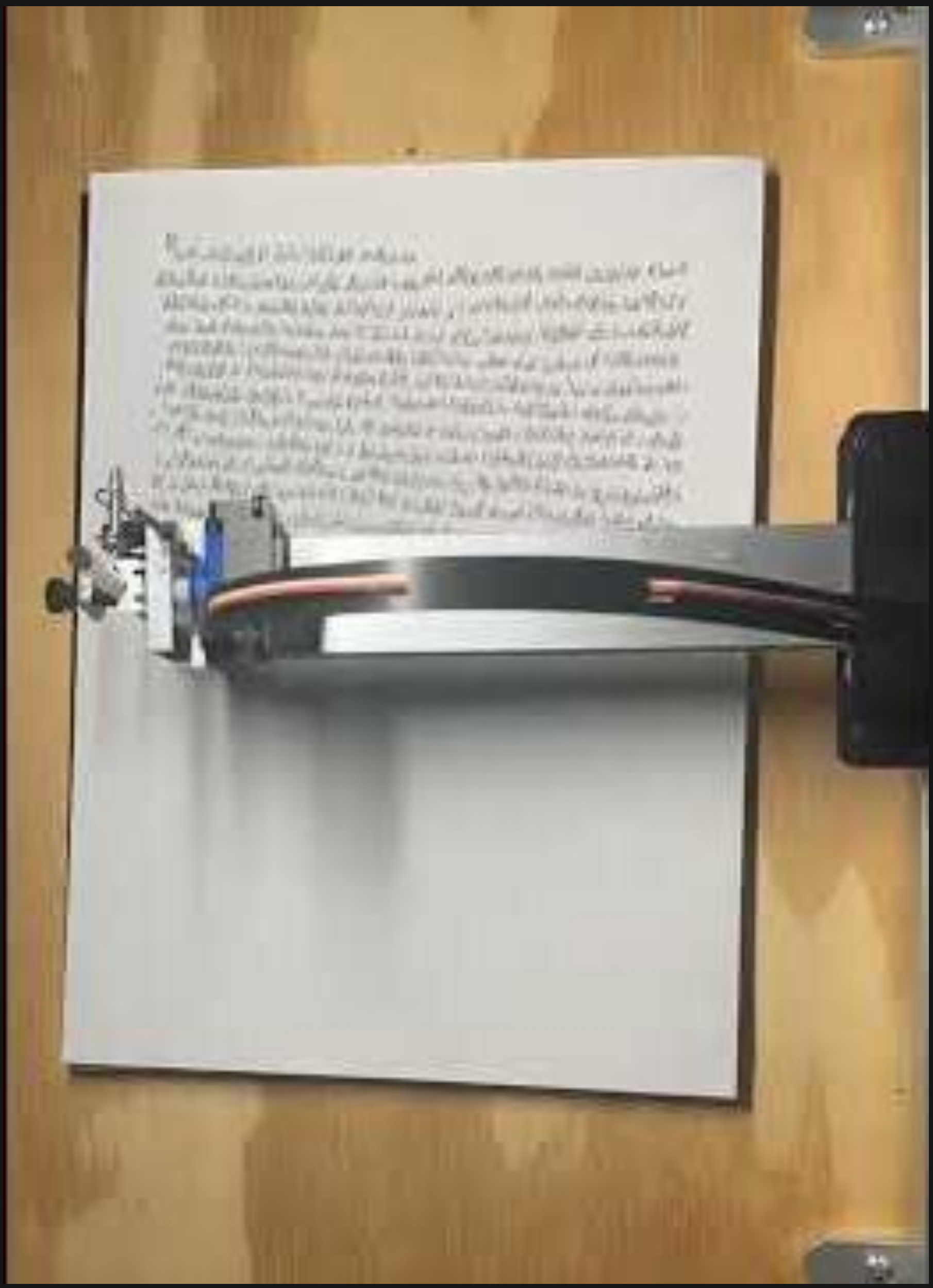
You can find a record of the evolution of my script here.
(URL: https://photos.app.goo.gl/fYZv4rSVFuVWXSfH6)



Close up video of Scribbler in action
(URL: https://youtu.be/sHxPJpjzSiw?si=FY53ptcInejTjez-)



Comparison of output from Scribbler



Timelapse of Scribbler generating a page of asemic script
(URL: https://youtu.be/k3VcJ_9kpg8?si=5NBIZiOgSyuL4_1i)

Scribbler: Educational Asemic Script Video

I collaborated with educational YouTube content creator PurpleMind to produce a video exploring the mechanics behind generating realistic asemic script and simulating handwriting with machines. The video, sponsored by Brilliant.org, was crafted to be accessible to viewers of all knowledge levels.

My contribution to this video was to co-write the script and visual elements, generate all physical and virtual asemic writing, and edit the video.

Deep dive into asemic script generation with Scribbler
Collaboration with educational content creator PurpleMind
(URL: https://youtu.be/oVxW6aG08HI?si=wtpYZd3xN2NMEmdC)

Lightsail

The Nature of Wind

September 2024 – November 2024

Shortwave Laser, Galvonometer, TouchDesigner, Phosphorescent Fabric, Table Fan

Professional

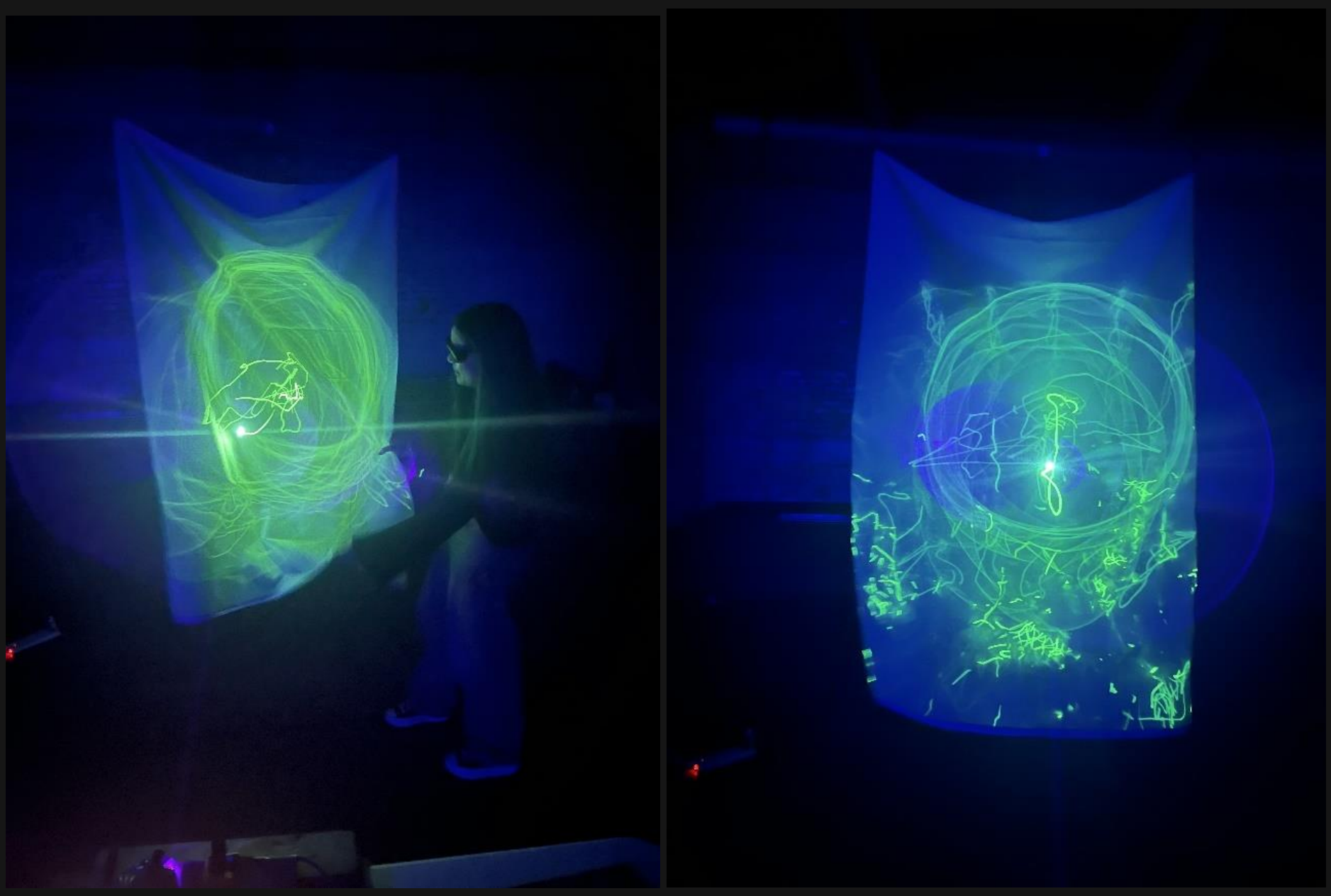
This piece began when I came across Hans Haacke's *Blue Sail* - a mid-century installation featuring a blue chiffon veil blown by an oscillating fan. Wind makes me feel alive, and seeing its essence so elegantly communicated called to me. *Blue Sail* conveys the momentary state of the wind, but I wanted to create a process that could represent the gusting irregularity of wind over time.

Lightsail is sensitive to its environment. Subtle differences in air currents vary how the sail flows, resulting in a unique signature of the wind for every space.

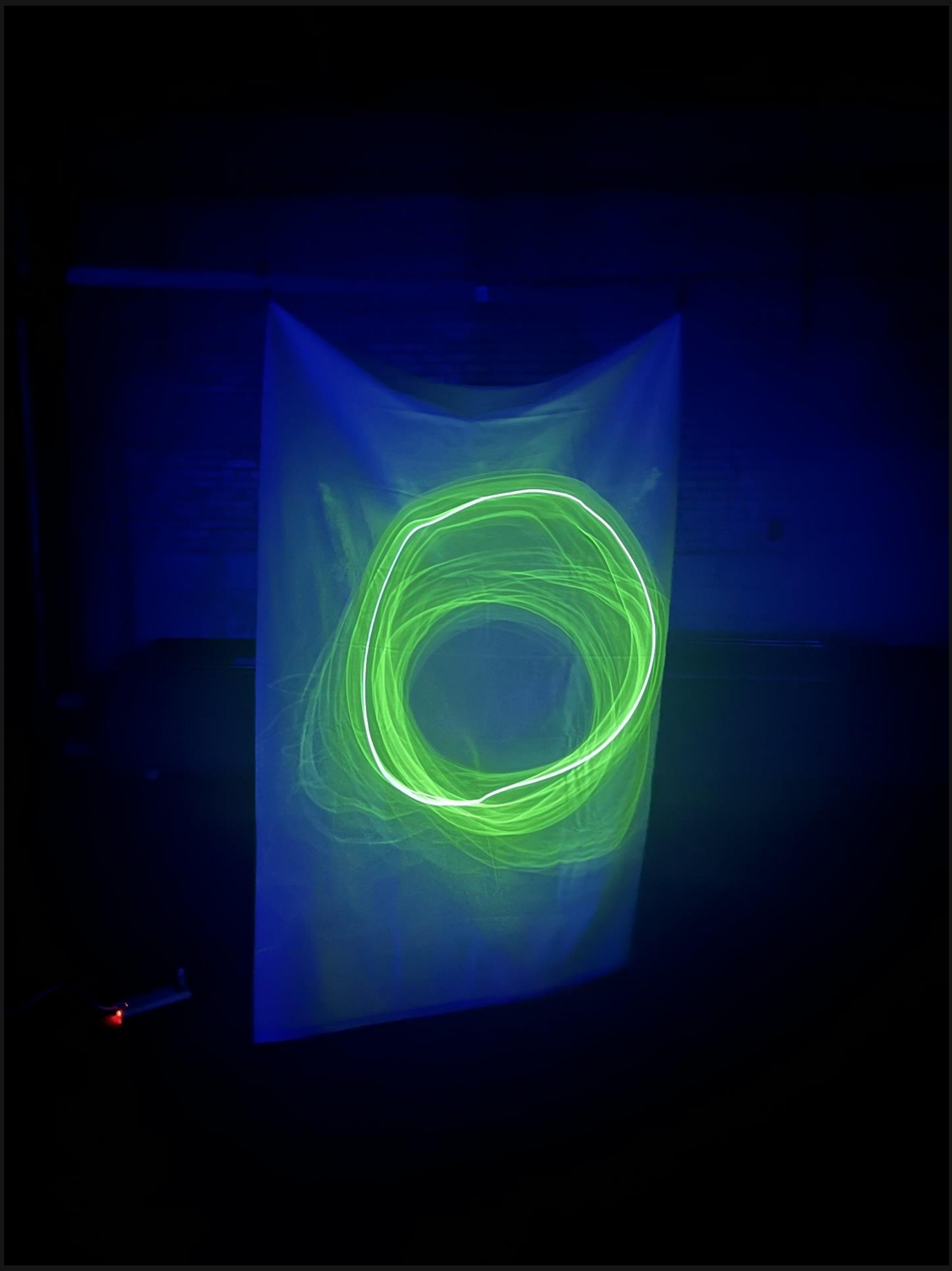
This process embodies the wind through a flowing sail that holds a record of the wind's currents upon its surface. *Lightsail* uses a galvanometer to project a shortwave near-ultraviolet laser onto a phosphorescent sail fluttering in the wind of a fan. The galvanometer rapidly moves the point of the laser according to programs that I wrote in TouchDesigner, resulting in the illusion of continuous shapes. The phosphorescent sail is excited by the high energy light of the laser, causing it to glow wherever it is struck. This results in the sail fleetingly capturing a record of its own shifting motion as the wind changes the relative positions of the laser's point and the sail.

Full installation View

Lightsail installed at Tech25



Audience interacting with Lightsail while wearing proper eye protection



Brief exposure of Lightsail's motion

Video of Rotating Bar setting
(URL: https://youtu.be/yeVCoVuP9-U)

Demonstration of Lightsail *at* Tech25 *(Pittsburgh, October 2024),* ***Subtitles for Accessibility***
Timestamps: 1:06-1:18, 1:50-2:15, 3:00-3:33
(URL: https://youtu.be/-sncnZK-srs?si=AT0rpCagbRJGU7CL)

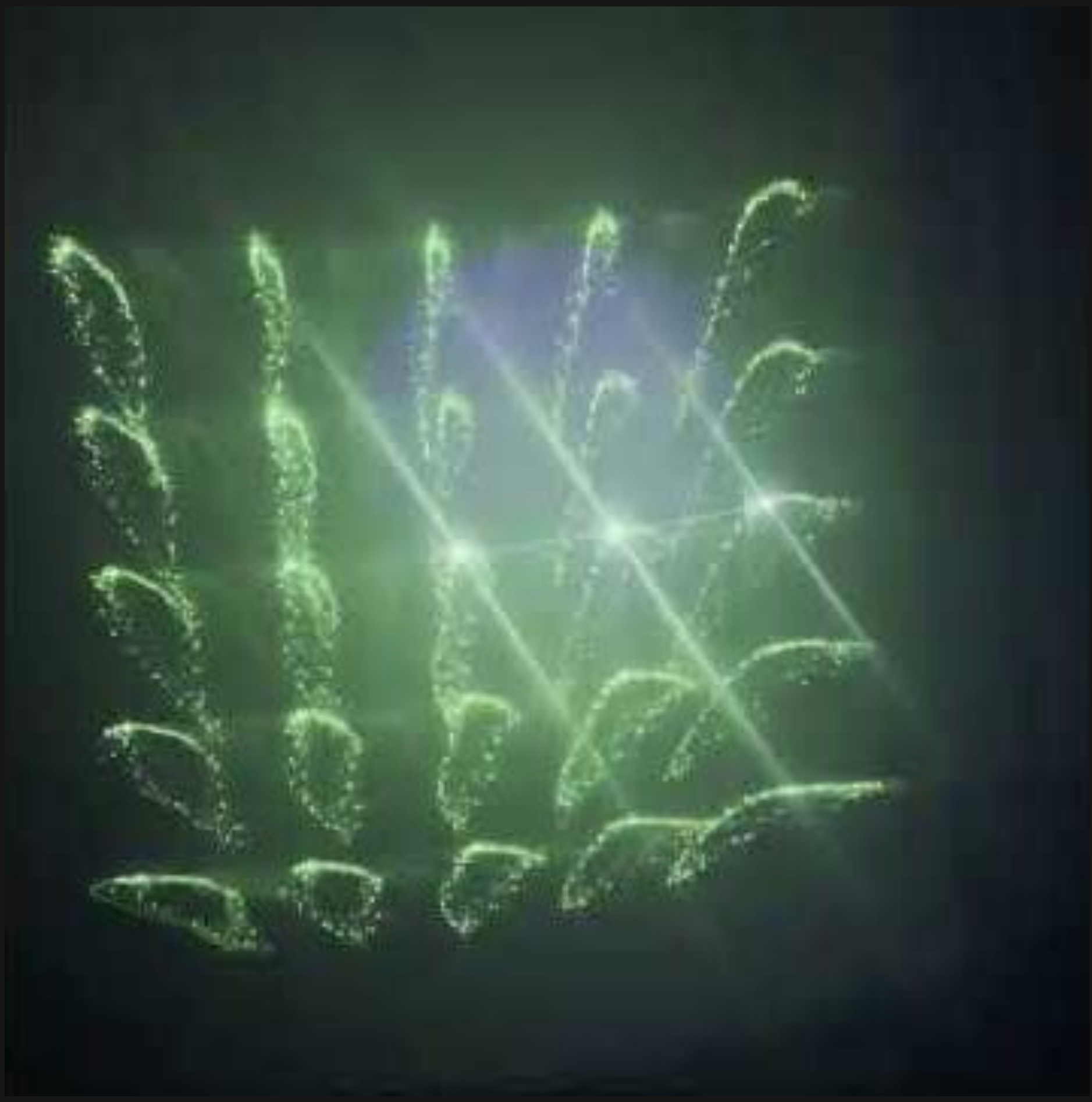
Lightsail's Signature of the Wind at Tech25 gallery
(URL: https://youtu.be/jT24YZGFV_k?si=ezCzNYNQgYa1IN8p)

Lightsail's Signature of the Wind in my apartment
(URL: https://youtu.be/-3go_n9MQKU?si=I26VecdDjRrf96L4)

Lightsail: Determinism in Wind

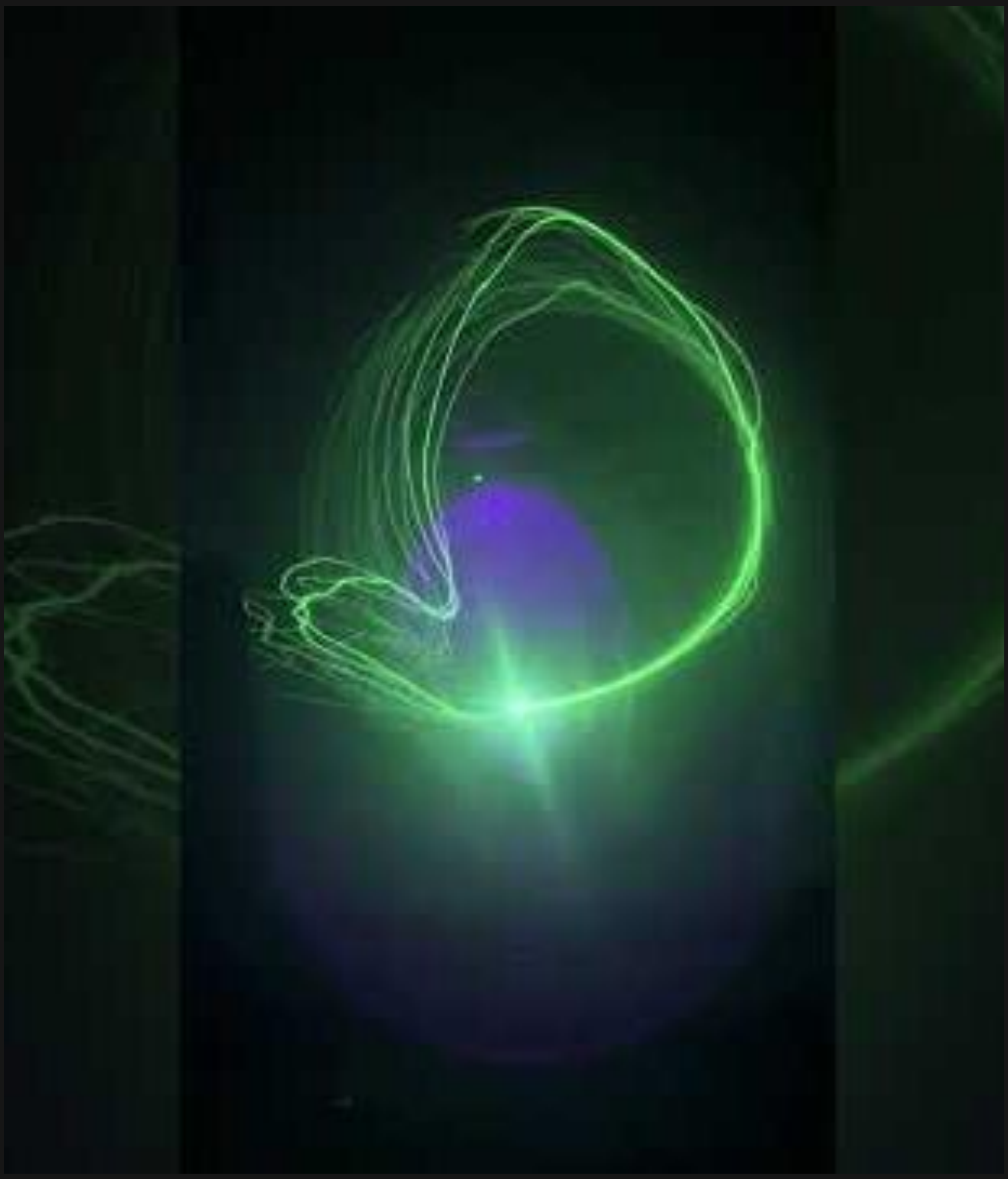
Lightsail had an unexpected second result. While watching the sail's motion, I noticed that it flowed in a repeating pattern, much like a flag flapping in the wind. I set the galvanometer to display a stationary 5x5 grid of points, and as the sail kept flowing in this pattern, it repeatedly traced a 5x5 field of blobs. Each blob represents the local motion of the fabric, integrated over time. Therefore, the closer any two points, the more related their blobs.

The fact that the exact same field of blobs was traced each time shows that the motion of the fabric is following a deterministic pattern. This made me rethink the nature of wind: fluid dynamics tells us that it is a chaotic, indeterministic force, yet here is evidence of wind following a precise pattern.



Video demonstration of deterministic sail behavior
(URL: https://youtu.be/DggmYOp2hIE?si=XTWBONQGmUeaT4Pu)

This is another method of representing the deterministic nature of wind. In this demonstration, I set my laser galvanometer to trace a circle with the period of that trace being synced with the period of the sail’s repeated flapping. The flapping disrupts what would otherwise be a perfect circle, transforming it into a dynamic blob. This evolving blob visually captures the wind's chaotic yet deterministic nature, as each consecutive cycle produces a shape that is similar but continually shifts toward something new.



Video demonstration of blob shape evolving with the wind over time
(URL: https://youtu.be/SY4-ie5yCOI?si=wzEJKWi6SE5FE5HW)

Flock Finder

The Nature of Flocking Birds

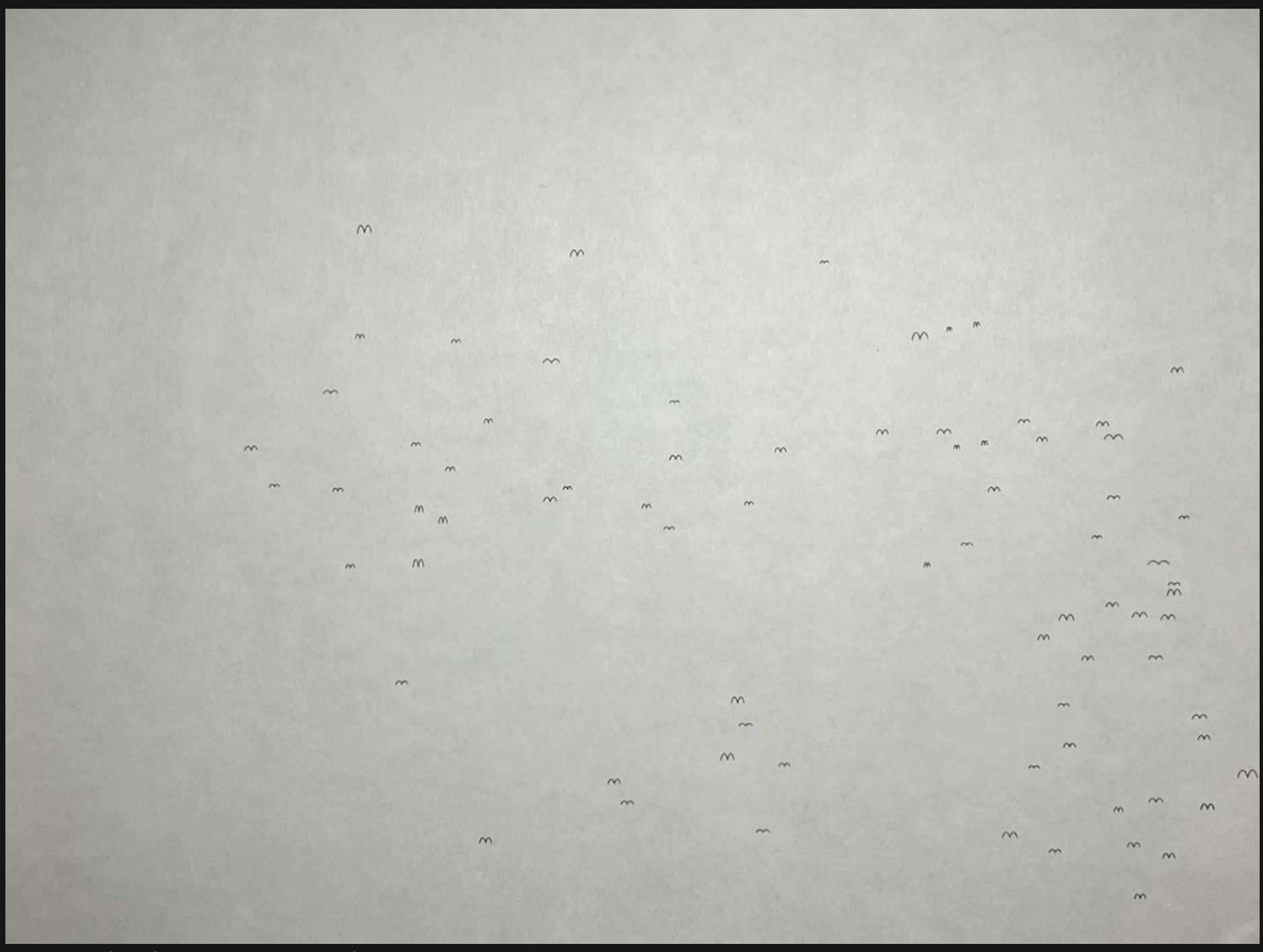
October 2024 – November 2024

Axidraw, Webcam, Pen, Paper, YOLOv8, OpenCV

Academic, Personal

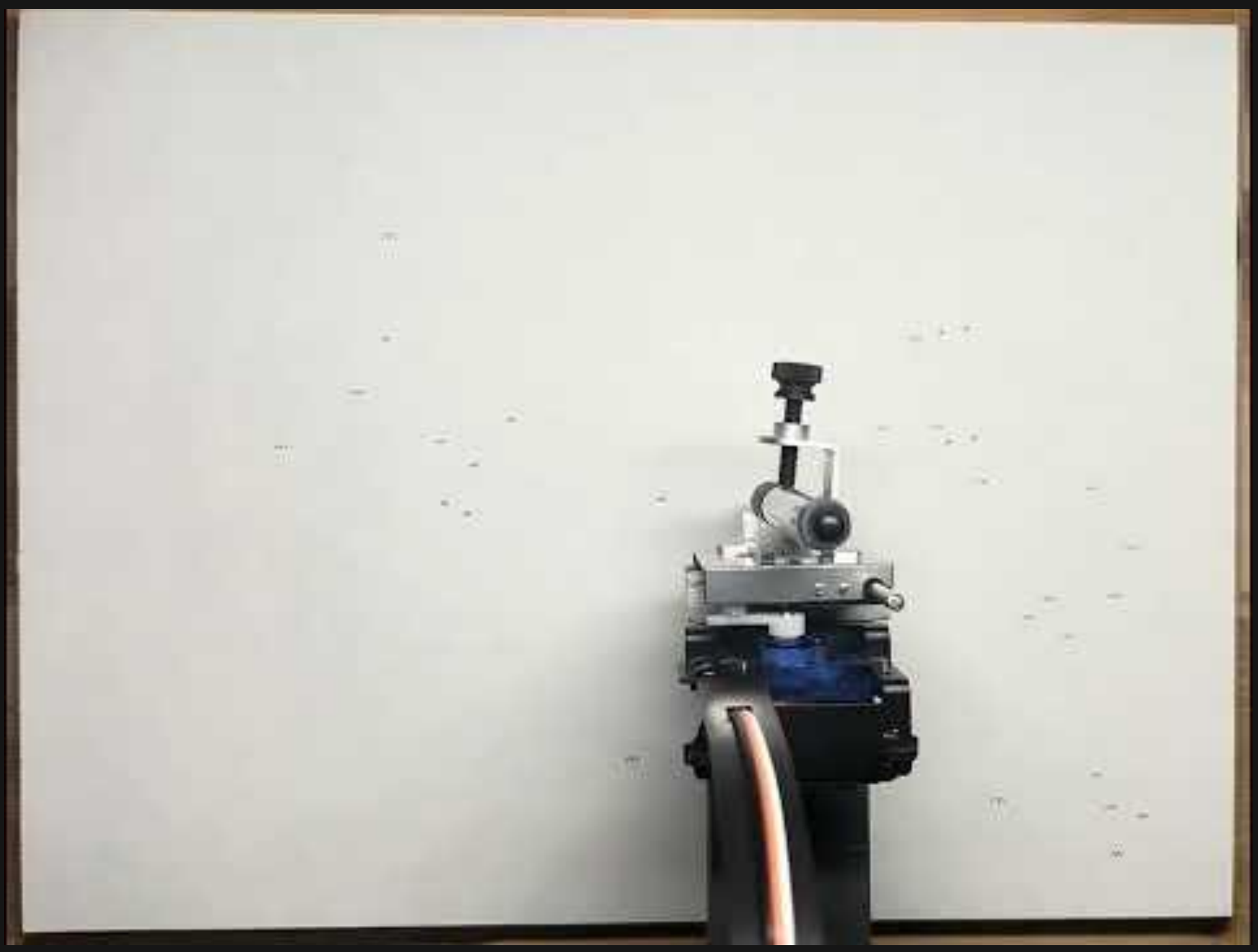
This piece began as a sense of awe. In Pittsburgh, it is not unusual to see flocks of thousands of crows darken the sky for hours at a time – it's a local type of weather! I was never happy with the pictures I took of this sight. By freezing the birds in place, I lost the critical coherency of the flocks, and video was too information-dense to be understood. In real time, *Flock Finder* isolates birds from their environment and captures the motion of a flock over time on a single sheet of paper. In doing so, the environment is reintroduced from the perspective of birds. That line of birds represents the peaked roof of a building. That blank spot is a noisy intersection. That spiral of birds is a thermal. *Flock Finder* uses birds as a sensor to remap space.

This process embodies flocks of birds by hinting at what the world looks like from the perspective of their distributed intelligence. I used YOLOv8 object categorization to do real-time bird detection from a high-resolution webcam pointed out of my window. When a bird is detected, the coordinates and proximity of the bird is sent to my Axidraw pen plotter which draws an abstracted bird at the appropriate position and scale on my paper.



A flock of birds, interpreted by Flock Finder

Video demonstration of real-time bird capture
(URL: https://youtu.be/gDhZHusg4Vk)

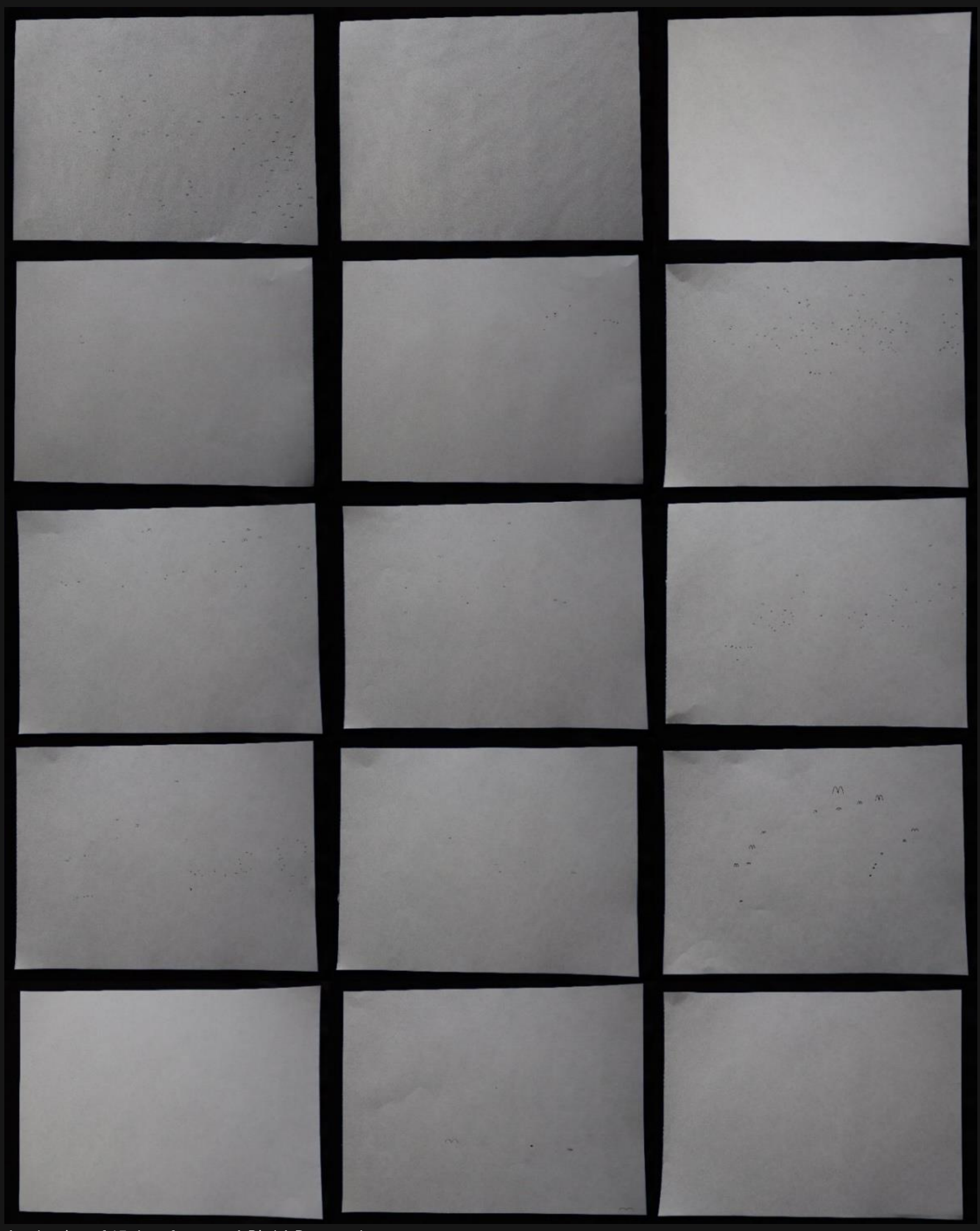


Video demonstration of an entire flock of birds being captured at once
(URL: https://youtu.be/eYEYhSvQHa8?si=fPNTAmo28yI1GnDk)

Flock Finder: A Bird A Day

This extremely high-resolution image is a sample of my *A Bird A Day* series. I left *Flock Finder* running continuously while replacing the paper each day to create a typology of birds-from-my-window and to capture the long-term trends in the flock's behavior.

Please click on the image for full resolution version
(URL: https://www.easyzoom.com/imageaccess/eab213a0a6b24fffa8c837ca4230258b?show-annotations=false)



A selection of 15 days from my A Bird A Day typology

What We Share

The Nature of Human Connection

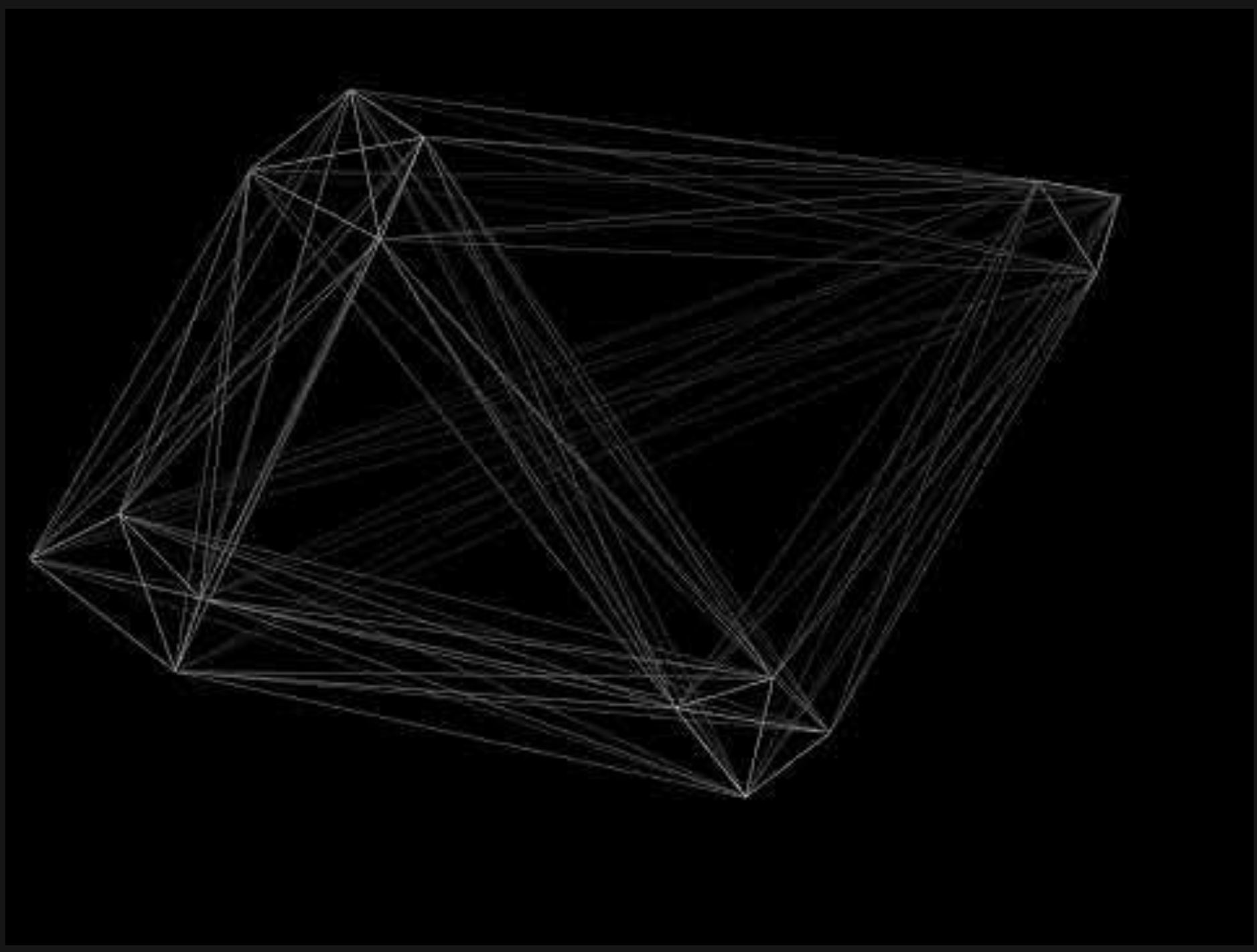
March 2022 – April 2022

Glitch.com, Tablets

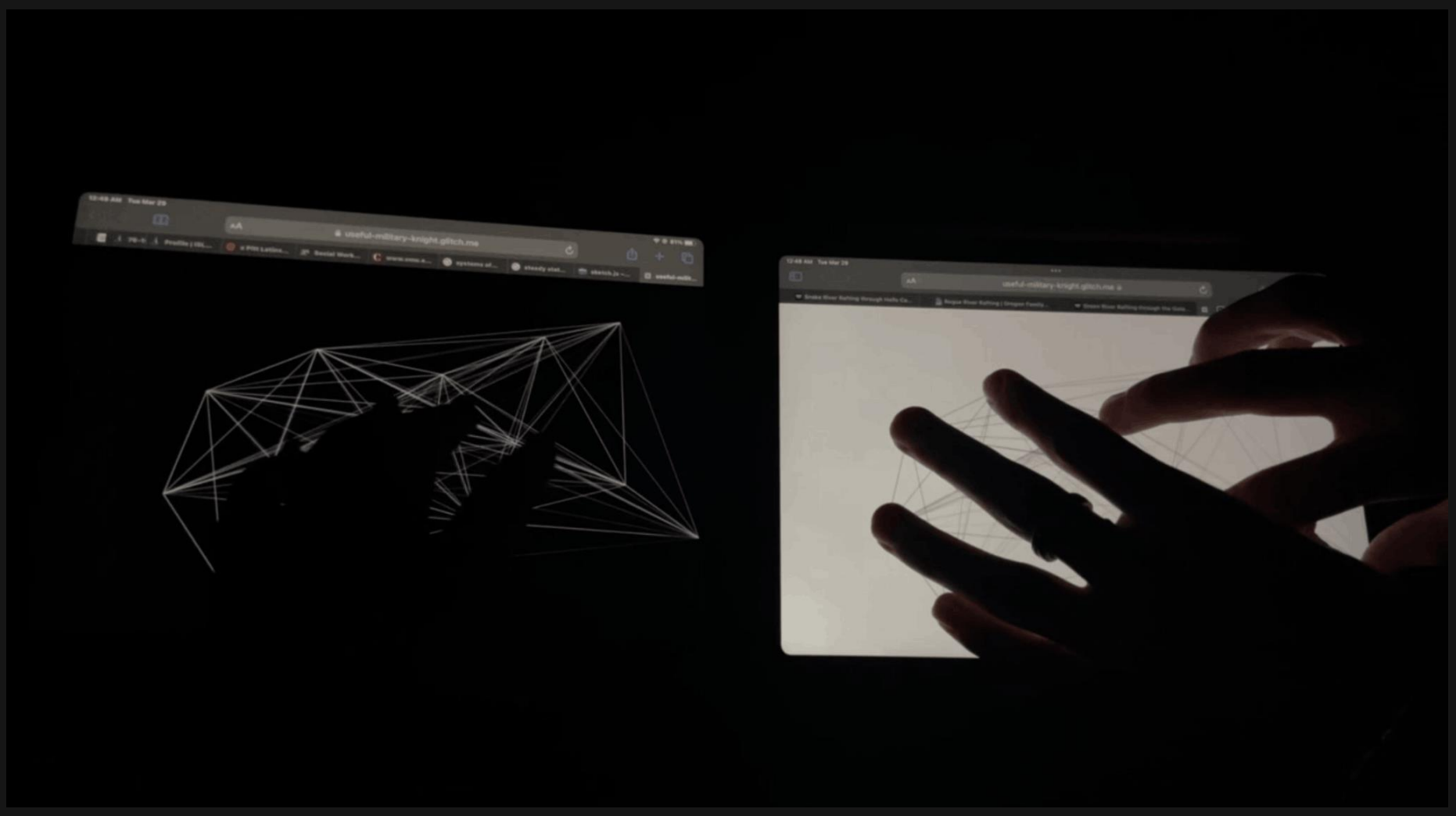
Academic, Personal

This piece began from the loss of connection with loved ones during quarantine. No matter how many hours I spent on FaceTime and on Zoom dinners, it could not fill this deep sense of loneliness. I tried to get specific: was it the lack of eye contact, of body language, physical touch, or the knowledge that you could always disconnect? The intimacy of connection was missing, and only the lack of connection made me fully aware of its importance. *What We Share* allows users to feel a sense of connection by physically touching the same virtual space. Linking fingers through the *Share* interface creates a sense of closeness with others, yet the impassible barrier of the screen remains.

This process embodies human connection by limiting what connection can permeate the *Share* interface. Awareness of what is missing brings users' attention to all that human connection can include. *What We Share* uses a web server hosted through Glitch.com that tracks the multitouch points from all current users. I capture this information and generate a web of attenuated connection between all touchpoints.



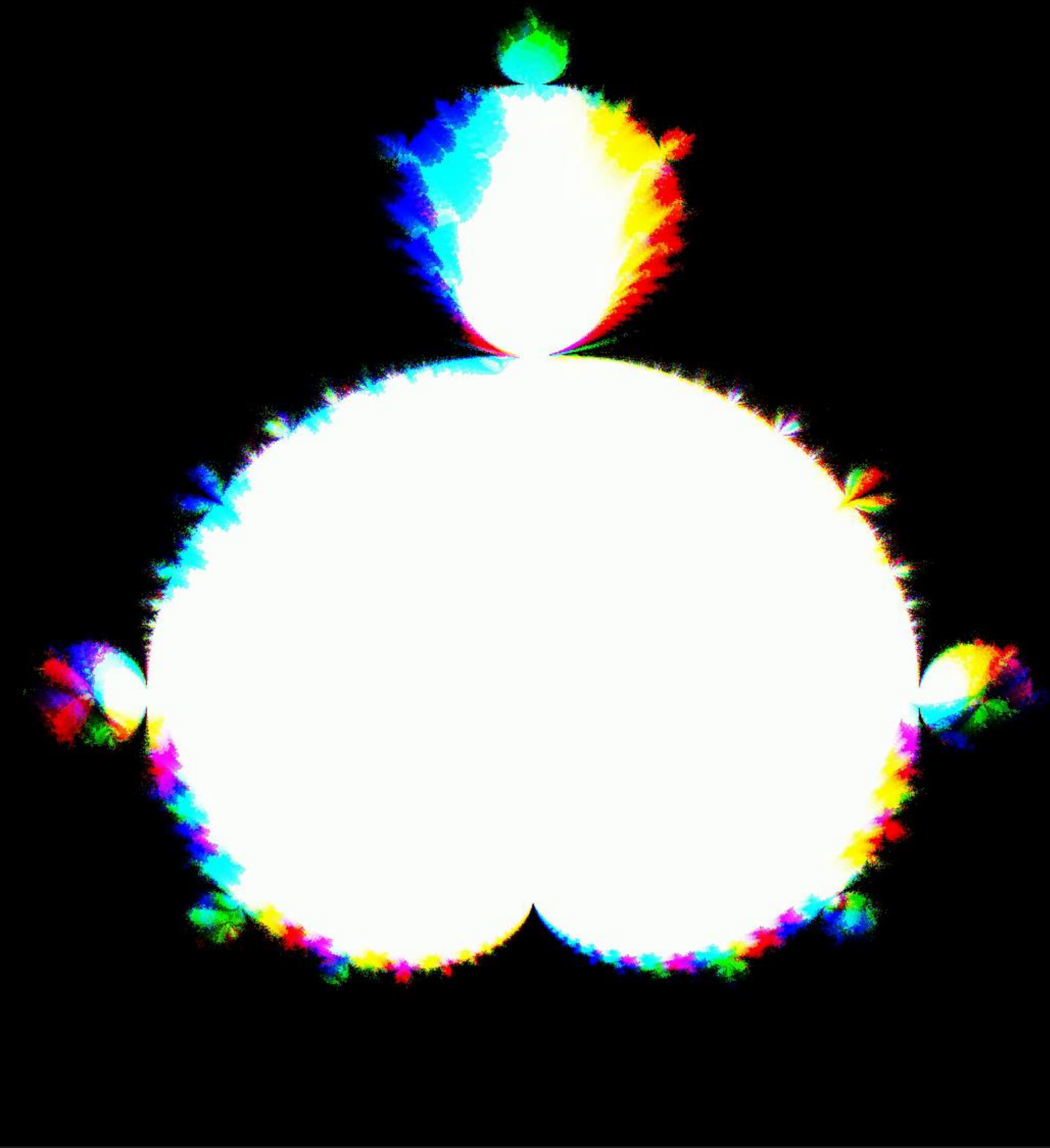
Video Demonstration and Artist Statement
(URL: https://youtu.be/KvVOvLyv_p0?si=kMbJM9N_uhktQz0a)



Sample of the Share *interface*

Ongoing Work Sample

The following pages of my portfolio showcase an ongoing project. As my work has a strong focus on inquiry and experimentation, I believe that by including an unfinished piece I can communicate a more insightful perspective of my thought process and creative practice.



Ball Chaser

December 2024 – Ongoing

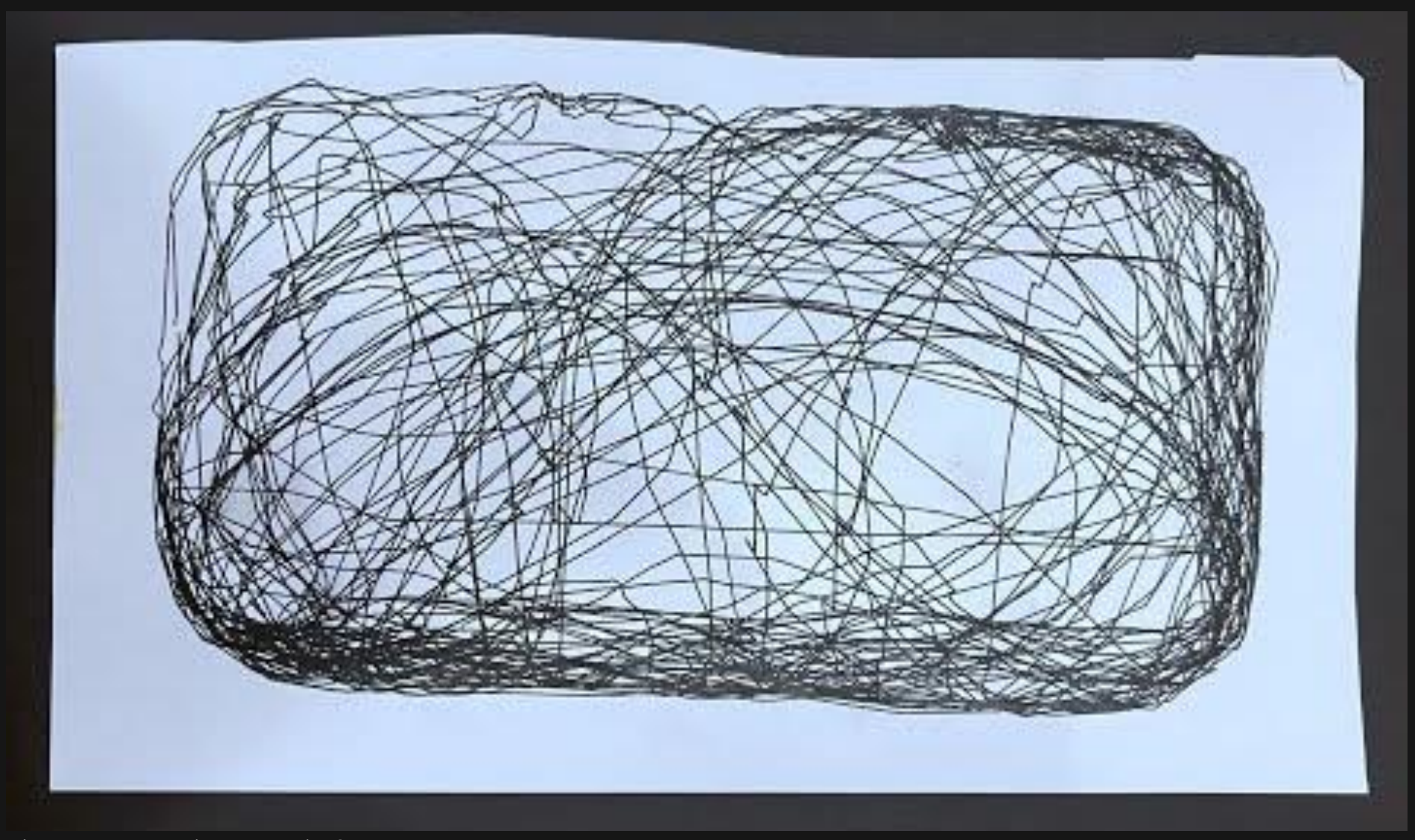
Personal

This piece is an ongoing inquiry into perpetual motion and pointless tasks. *Ball Chaser* is comprised of an Axidraw pen plotter, a Sensel Morph touchpad, paper, and a tungsten ball. The paper is placed on top of the Sensel touchpad with the ball on top of the paper. The Sensel detects the weight of the ball through the paper and directs the Axidraw to draw a line to the ball. As the Axidraw approaches it, the ball is inevitably knocked by the pen to a new position, beginning the chase all over again.

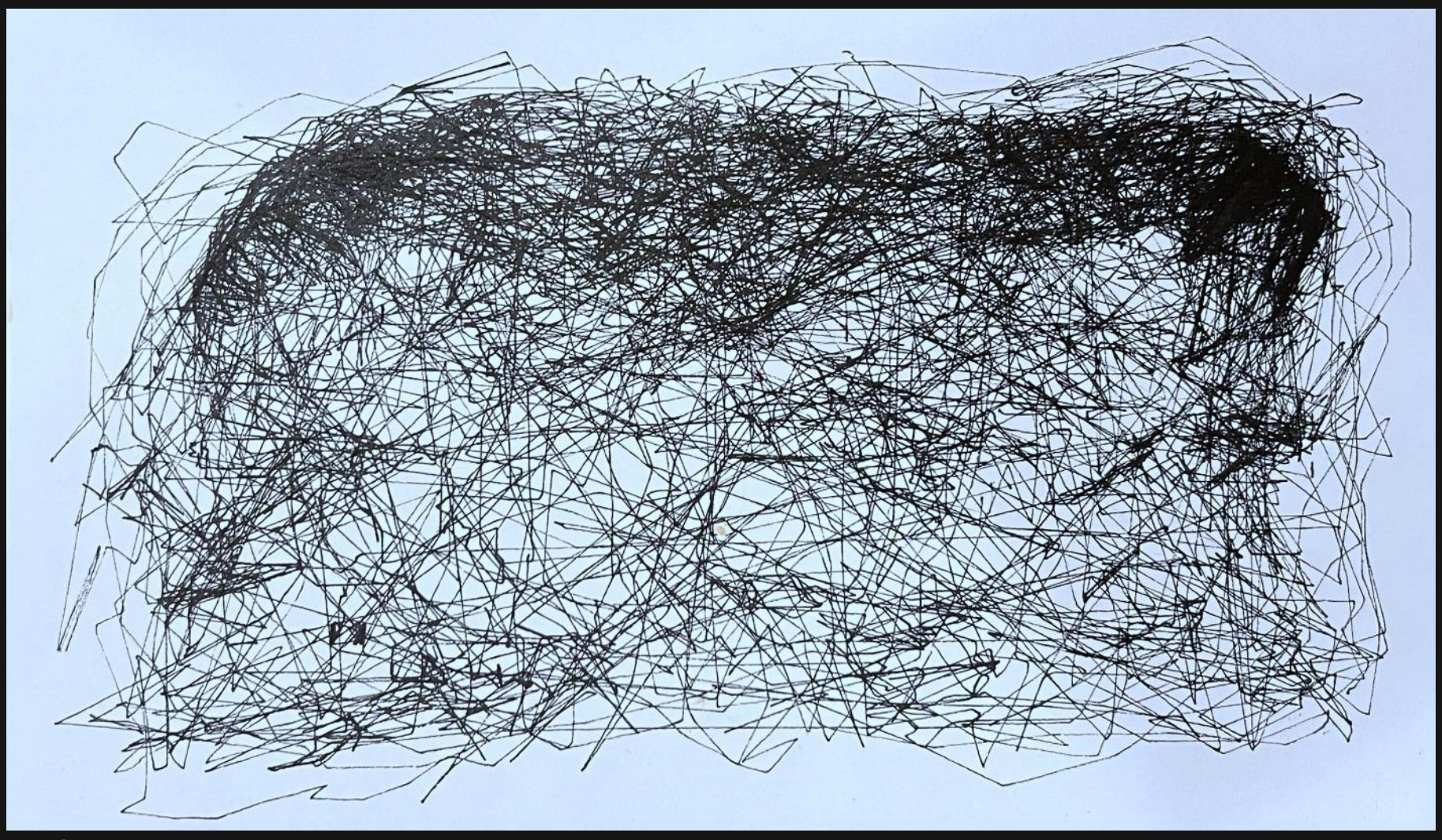
Inspired by the thermodynamically impossible perpetual motion machines of the past, *Ball Chaser* argues for a new type of perpetual motion: that of an impossible task met with an unbreakable will. By recording their eternal chase, the ball and pen author a greater work; one completed only when the viewer intervenes, finally allowing the system to come to rest.

Next Steps

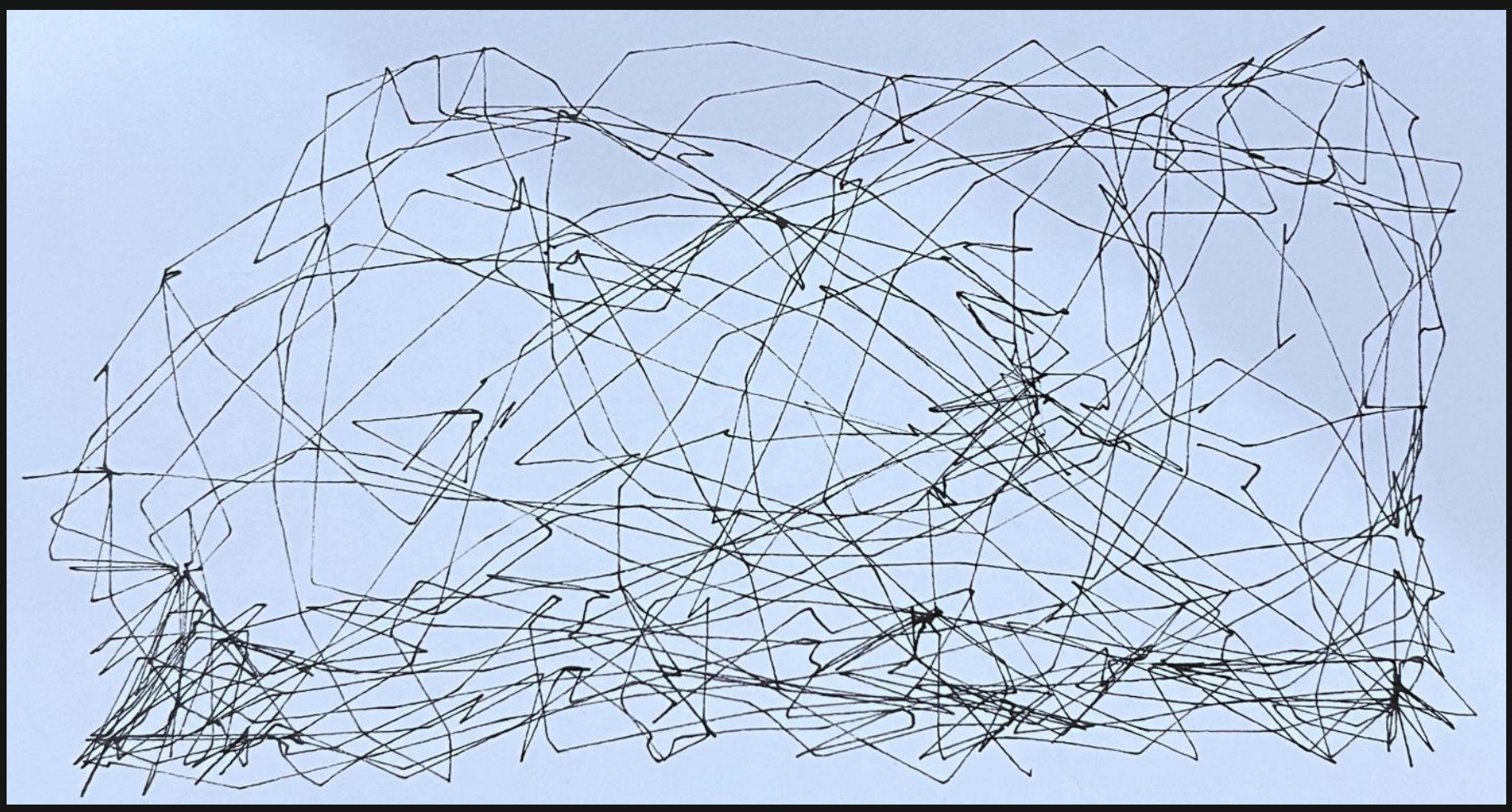
I am currently experimenting with a layer of carbon paper underneath the sheet of paper. I aim to use the carbon paper to create a simultaneous record of both the scribbled motion of the pen and the smooth motion of the ball. I wish to also experiment with different (non-spherical) ball shapes to see how this may affect the drawing generated by *Ball Chaser*.



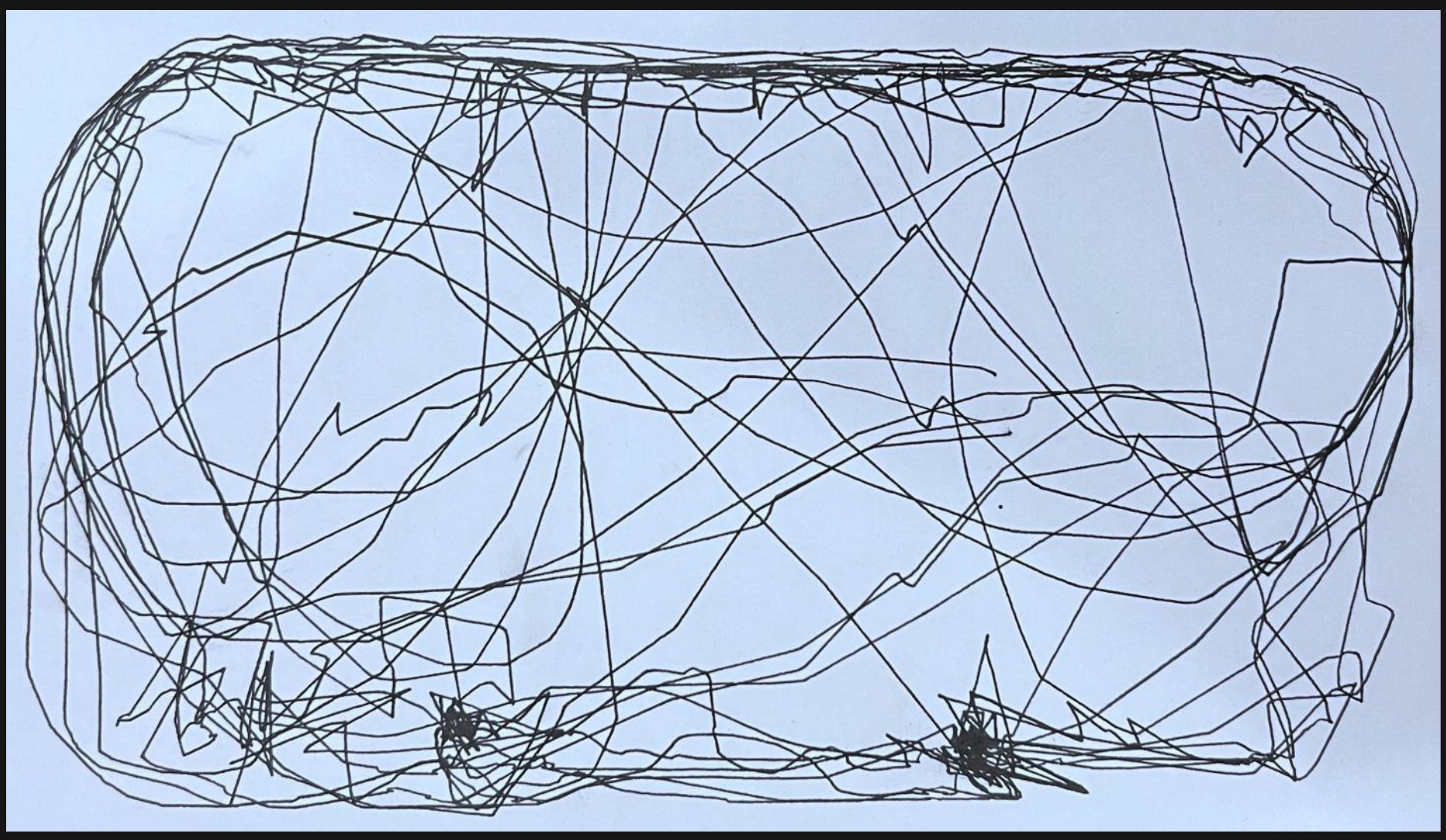
Video Demonstration and Artist Statement
(URL: https://youtu.be/iY5gsvAcMkk)



Ball Chaser: Two-hour sample



Ball Chaser: Twenty-minute sample with unweighted ball



Ball Chaser: Twenty-minute sample with magnets used as attractors