

`./kiwi_pycon_xi`

generative art with python (using py5 and bpy)

`# kiwi pycon xi`

./intro

intro

* tristan bunn -- creative technologies @ massey c.o.c.a

- * tristan bunn -- creative technologies @ *massey c.o.c.a*
- * taylor carrasco -- vfx @ *massey c.o.c.a*

./generative_art

generative art

"generative art refers to any art practice where the artist creates a process, such as a set of natural language rules, a computer program, a machine, or other procedural invention, which is then set into motion with some degree of autonomy contributing to or resulting in a completed work of art."

-- philip galanter

procedural art

code art

procedural generation

computer art

parametric design

evolutionary art

live coding

algorithmic art

./pre-2000

pre-2000





Please enter the word in the manual
located on Page 14, Line 6 ,Word 1
(Not counting headlines or spaces)

piece is the area upon
which it...



alone in the dark (1992); secret of monkey island (1990)

SIMCITY ALL TIME HIGH SCORES

■ MEXICO CITY	12,917,298
■ SAO PAULO	12,623,955
■ CAIRO	12,562,936
■ SHANGHAI	11,947,322
■ SEOUL	9,623,976
■ BEIJING	9,331,229
■ CALCUTTA	9,194,018
■ MOSCOW	8,642,729
■ TOKYO	8,386,119
■ BOMBAY	8,248,405
■ TIANJIN	7,850,967
■ JAKARTA	7,636,271
■ NEW YORK	7,164,742
■ CANTON	6,843,890
■ LONDON	6,765,557
■ TEHERAN	6,037,656
■ WUHAN	5,941,312
■ DELHI	5,729,283
■ RIO DE JANEIRO	5,615,149
■ ISTANBUL	5,494,916
■ SHENYANG	5,211,899
■ KARACHI	5,180,562
■ BANGKOK	5,174,682
■ LIMA	5,008,423
■ LENINGRAD	4,867,652
■ NANJING	4,562,377
■ MADRAS	4,289,347
■ SANTIAGO	4,231,523
■ BOGOTA	3,982,941
■ DHAKA	3,954,753
■ CHONGQUIG	3,895,871
■ HARBIN	3,730,926
■ BAGHDAD	3,512,281
■ PUSAN	3,500,185
■ ANKARA	3,462,765
■ SAIGON	3,450,197
■ SYDNEY	3,391,416
■ MADRID	3,217,461
■ BUENOS AIRES	3,142,276
■ LOS ANGELES	3,096,721
■ YOKOHAMA	3,037,188
■ BERLIN	3,033,722
■ ATHENS	3,027,321
■ CARACAS	3,012,489
■ KINSHASA	3,007,232
■ GUADALAJARA	3,003,143
■ TORONTO	2,998,947
■ CHICAGO	2,992,472
■ LAHORE	2,952,862
■ BANGALORE	2,921,751
■ MELBOURNE	2,916,287
■ MONTREAL	2,878,198
■ ROME	2,826,733
■ ALEXANDRIA	2,705,114
■ MONTERREY	2,700,382
■ HANOI	2,674,234
■ OSAKA	2,642,138
■ SINGAPORE	2,558,996
■ AHMEDABAD	2,548,057
■ HYDERABAD	2,545,836
■ BELO HORIZONTE	2,513,400
■ ALGIERS	2,502,397
■ TAIPEI	2,449,702
■ KIEV	2,448,243
■ ISMIR	2,316,843
■ RECIFE	2,312,542
■ SURABAJA	2,289,411
■ ANKARA	2,251,533
■ RANGOON	2,250,578
■ PORTO ALEGRE	2,211,432
■ CASABLANCA	2,158,369
■ PARIS	2,151,853
■ NAGOYA	2,128,696
■ BUDAPEST	2,108,277
■ TAEGU	2,078,235
■ MASHED	2,038,328
■ TASHKENT	2,030,323
■ HAVANA	1,992,879
■ MEDAN	1,966,325
■ BUCHAREST	1,961,189
■ SALVADOR	1,811,367
■ BARCELONA	1,765,905
■ ADANA	1,757,733
■ MANILA	1,728,441
■ JOHANNESBURG	1,711,895
■ BAKU	1,693,284
■ PHILADELPHIA	1,688,210
■ WARSAW	1,659,421



CRACKED BY

>DR. MICRO<

THANKS TO THE BIG M!

 Beast War
Broken by 

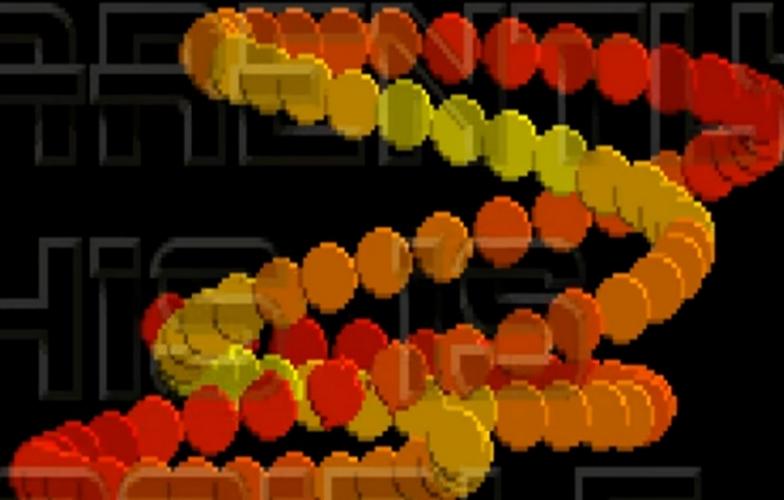
Gonif/Wombat

(Thanks to these UPG'ers...)

SIR EXCALIBER THE MINOTAUR
THE PHARAOH THE SPLAT
GANDALF THE WHITE



APPARENTLY
THIS IS
POSSIBLE



2000 and beyond



Timeline Output Compiler Errors Motion Editor Actions

ActionScript 1.0 & 2.0

Global Functions

Movie Clip Control

- duplicateMovieClip
- getProperty
- on
- onClipEvent
- removeMovieClip
- setProperty
- startDrag
- stopDrag
- targetPath
- updateAfterEvent

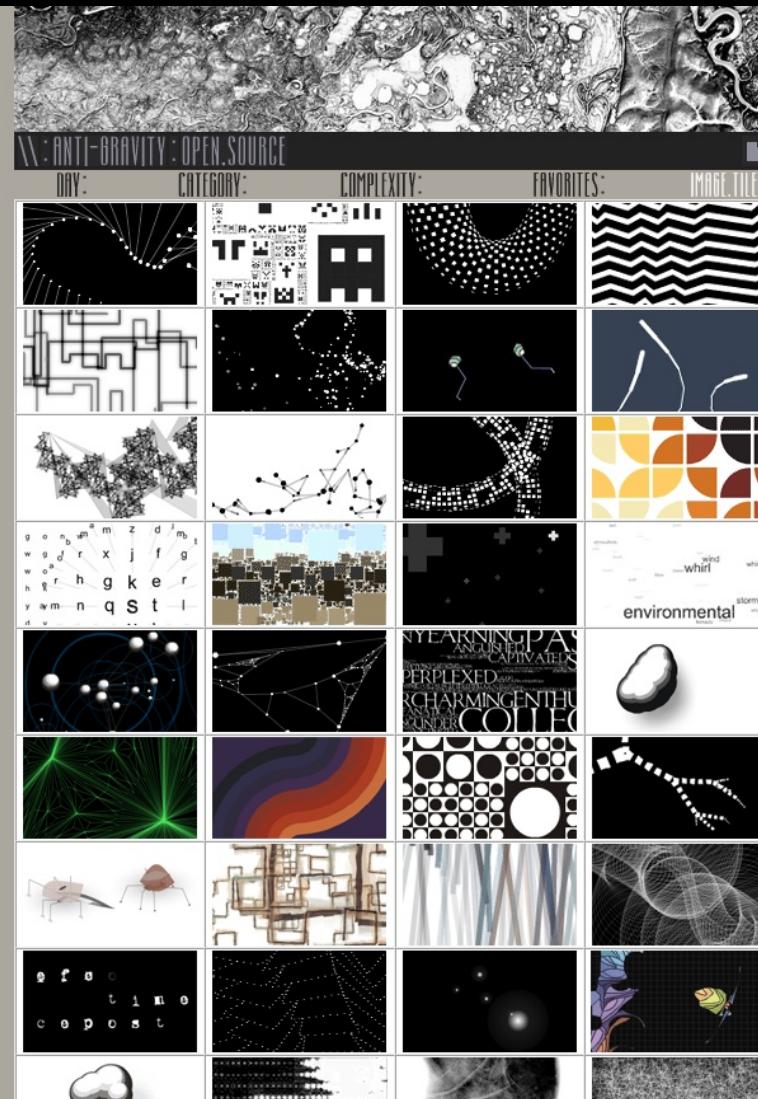
Timeline Control

adobe flash

Code Snippets

Actions : 1

```
1 master_mc.addEventListener(MouseEvent.MOUSE_DOWN, clickedF);
2 master_mc.buttonMode = true;
3
4 function clickedF(event:MouseEvent):void{
5     master_mc.setChildIndex(event.target as MovieClip, numChildren-1);
6 }
```



./2000_and_beyond/flash

Yugo
Nakamura
et al

New Masters
of Flash



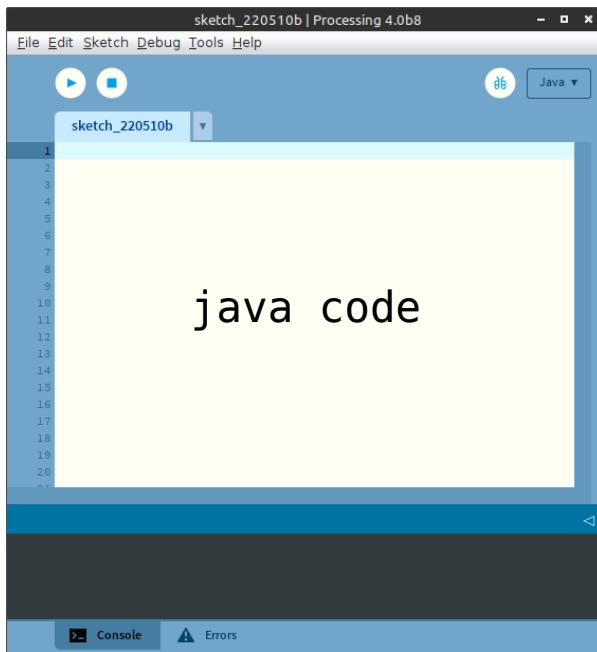
The screenshot shows the Processing IDE interface. The title bar reads "sketch_220510b | Processing 4.0b8". The menu bar includes "File", "Edit", "Sketch", "Debug", "Tools", and "Help". On the right side, there are buttons for "Run" (play), "Stop" (square), and "Java" (dropdown). The main workspace shows a code editor with the following content:

```
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~1
```

The code consists of the word "java" followed by "code" on separate lines.



Processing



A screenshot of the Processing IDE interface. The title bar reads "sketch_220510b | Processing 4.0b8". The menu bar includes File, Edit, Sketch, Debug, Tools, and Help. Below the menu is a toolbar with play/pause buttons and a "Java" dropdown. The main workspace shows a code editor with the following Java code:

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```

The word "java code" is overlaid on the code editor area. At the bottom of the IDE, there are tabs for "Console" and "Errors".





Processing

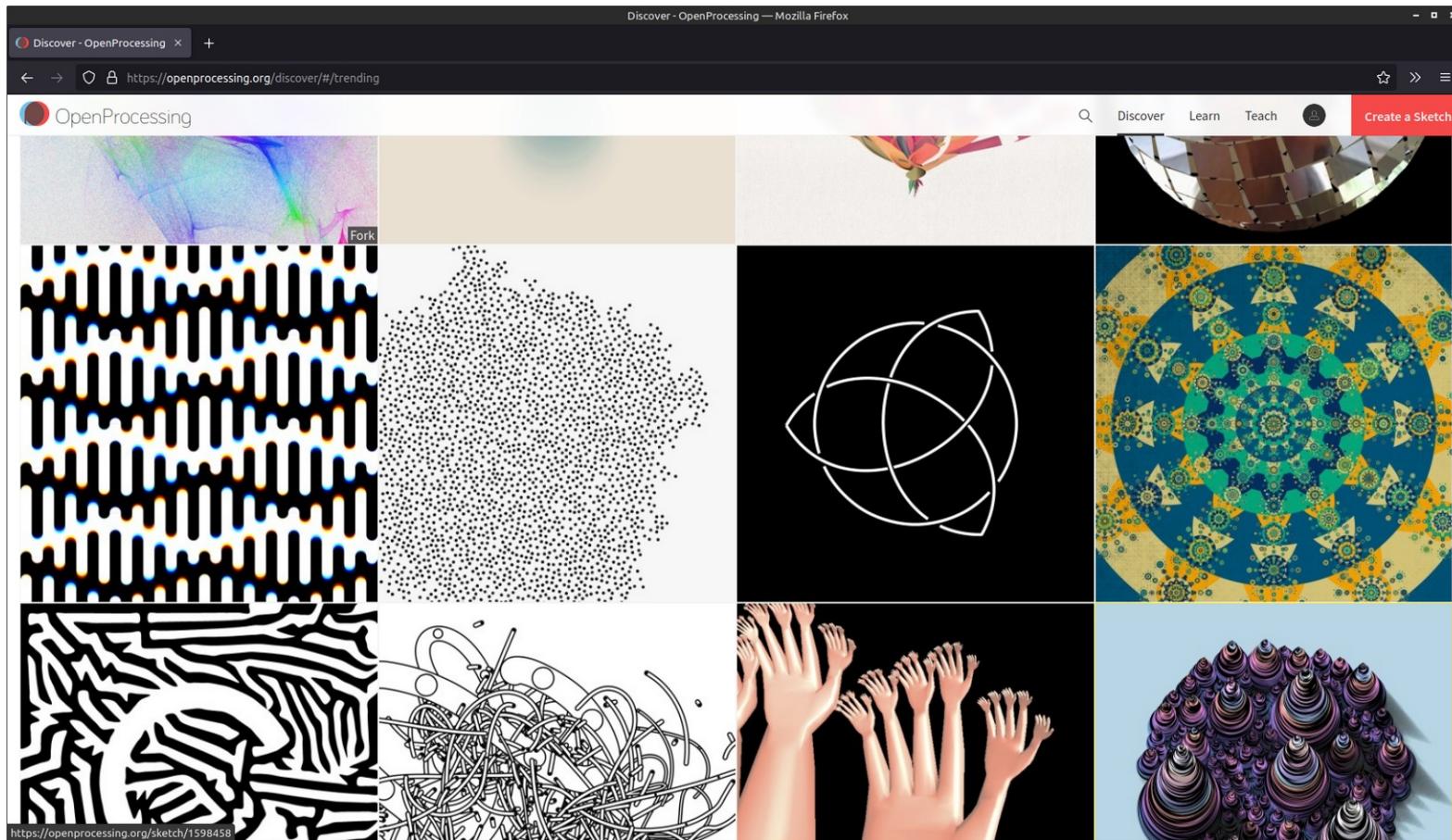
A screenshot of the Processing IDE interface. The title bar reads "sketch_220510b | Processing 4.0b8". The menu bar includes File, Edit, Sketch, Debug, Tools, and Help. Below the menu is a toolbar with play/pause buttons and a "Java" dropdown. The main workspace shows a code editor with the following Java code:

```
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```

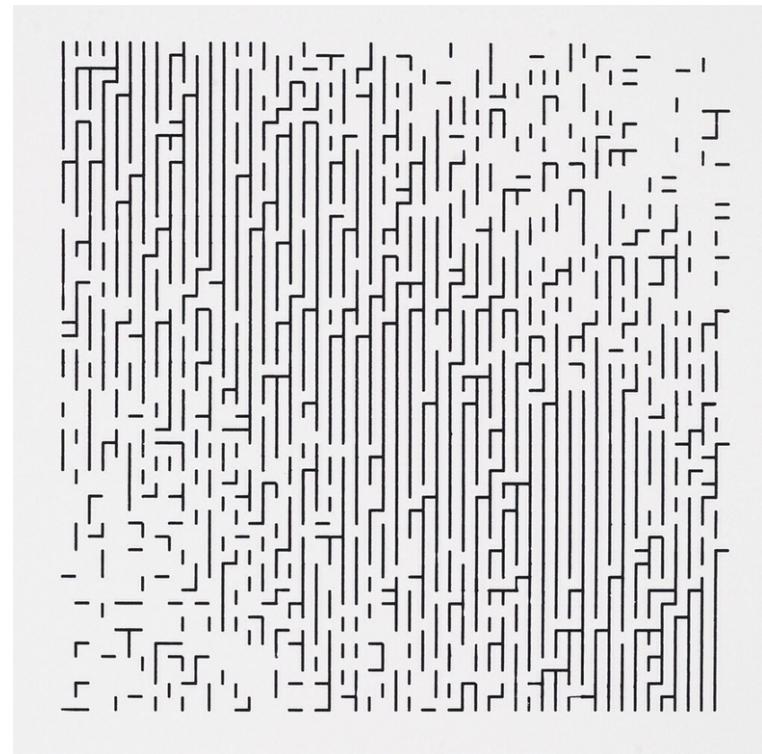
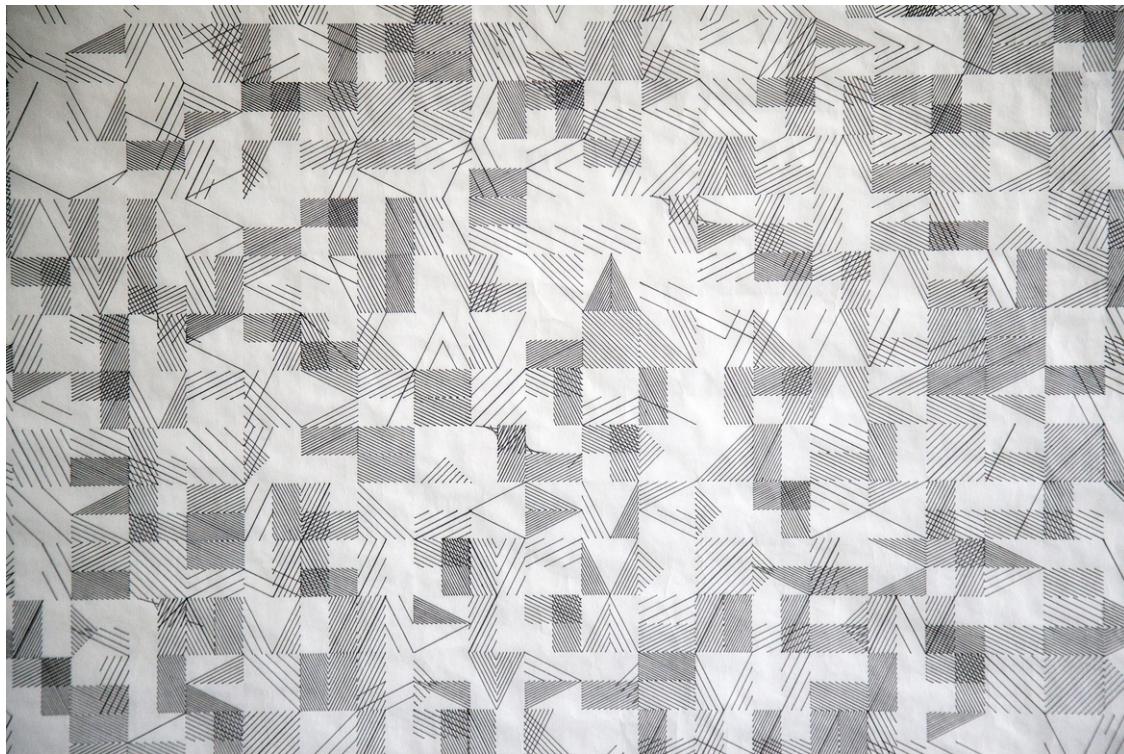
The code editor has a light blue background and a dark blue sidebar on the left. At the bottom of the screen, there are tabs for "Console" and "Errors".

java code





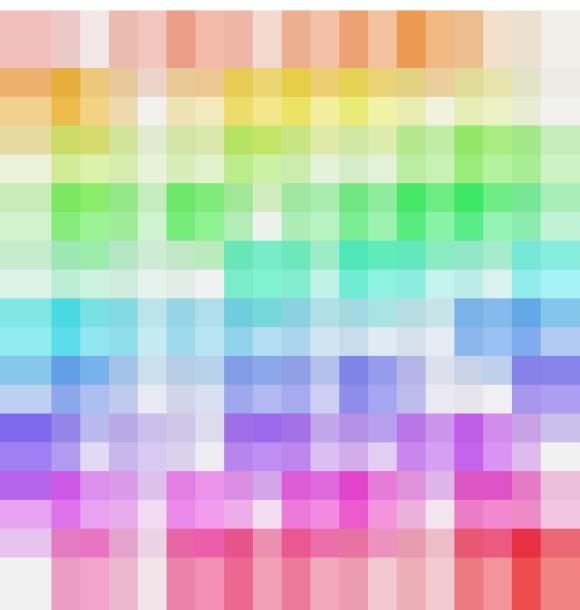
./2000_and_beyond/processing



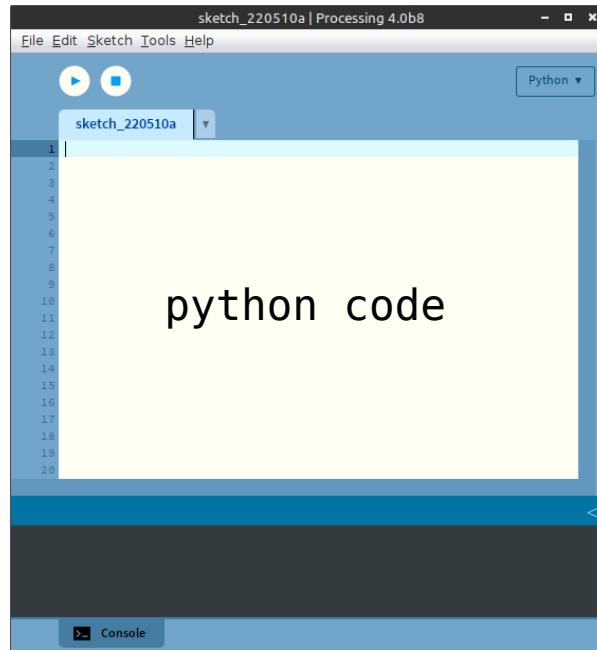
vera molnár (left), frieder nake (right)

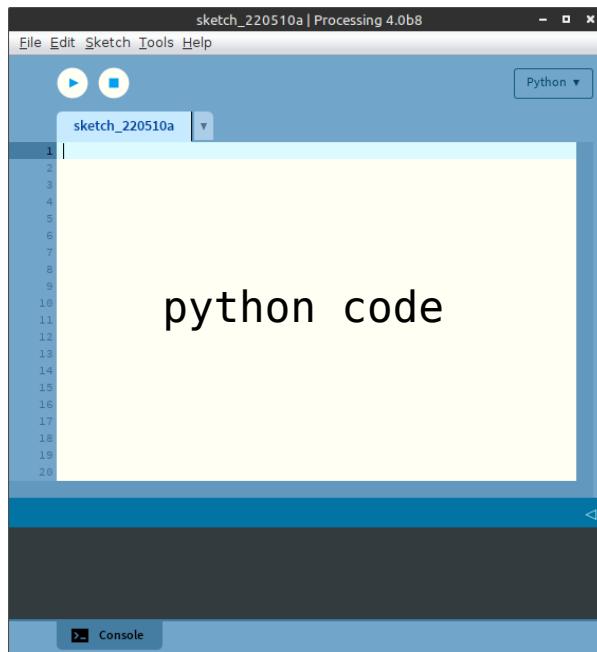
```
File Edit Run Settings Help
7 you to select colors more naturally, by
8 specifying a hue,
9 saturation and brightness.
9 """
10
11 size(625, 625)
12
13 colormode(HSB)
14
15 # Set some initial values. You can and
16 # should play around with these.
16 h = 0
17 s = 0.5
18 b = 0.9
19 a = 0.5
20
21 # Size is the size of one grid square.
22 square_size = 50
23
24 # Using the translate command, we can give
25 # the grid some margin.
25 translate(50, 50)
26
27 # Create a grid with 10 rows and 10
28 # columns. The width of the columns
28 # and the height of the rows is defined in
28 # the 'size' variable.
29 for x, y in grid(10, 10, square_size,
30     square_size):
30     # Increase the hue while choosing a
31     # random saturation.
31     # Try experimenting here, like
31     # decreasing the brightness while
32     # changing the alpha value etc.
32     h += 0.01
33     s = random()
34
35     # Set this to be the current fill
35     color.
36     fill(h, s, b, a)
37
38     # Draw a rectangle that is one and a
38     # half times larger than the
39     # grid size to get an overlap.
40     # rect(x, y, square_size * 1.5,
41     square_size * 1.5)
42
43 |
```

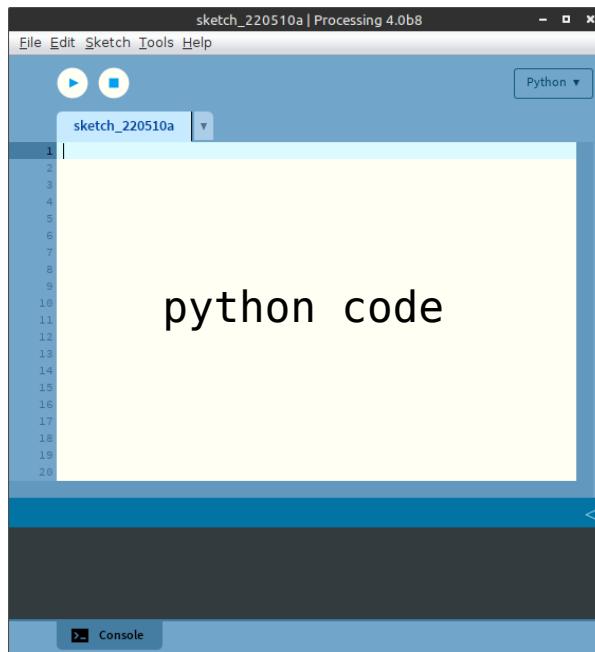
This is the console window.
Script output and error messages are shown here.
You can clear the window with the 'Edit - Clear console'
option or pressing Ctrl-Shift-C.



processing + python





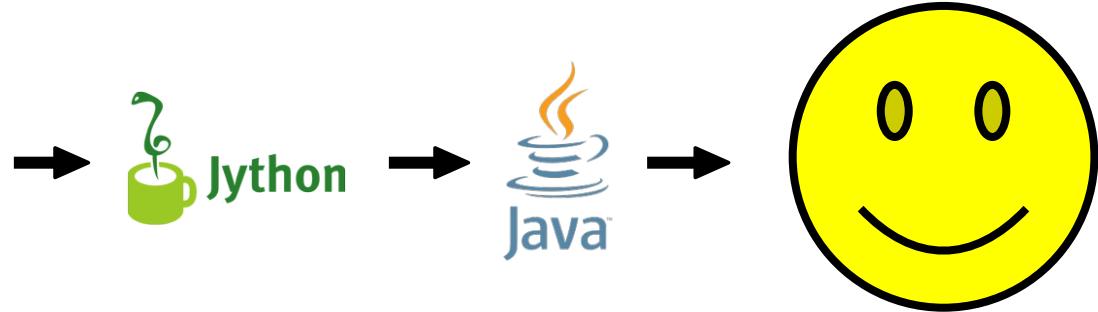


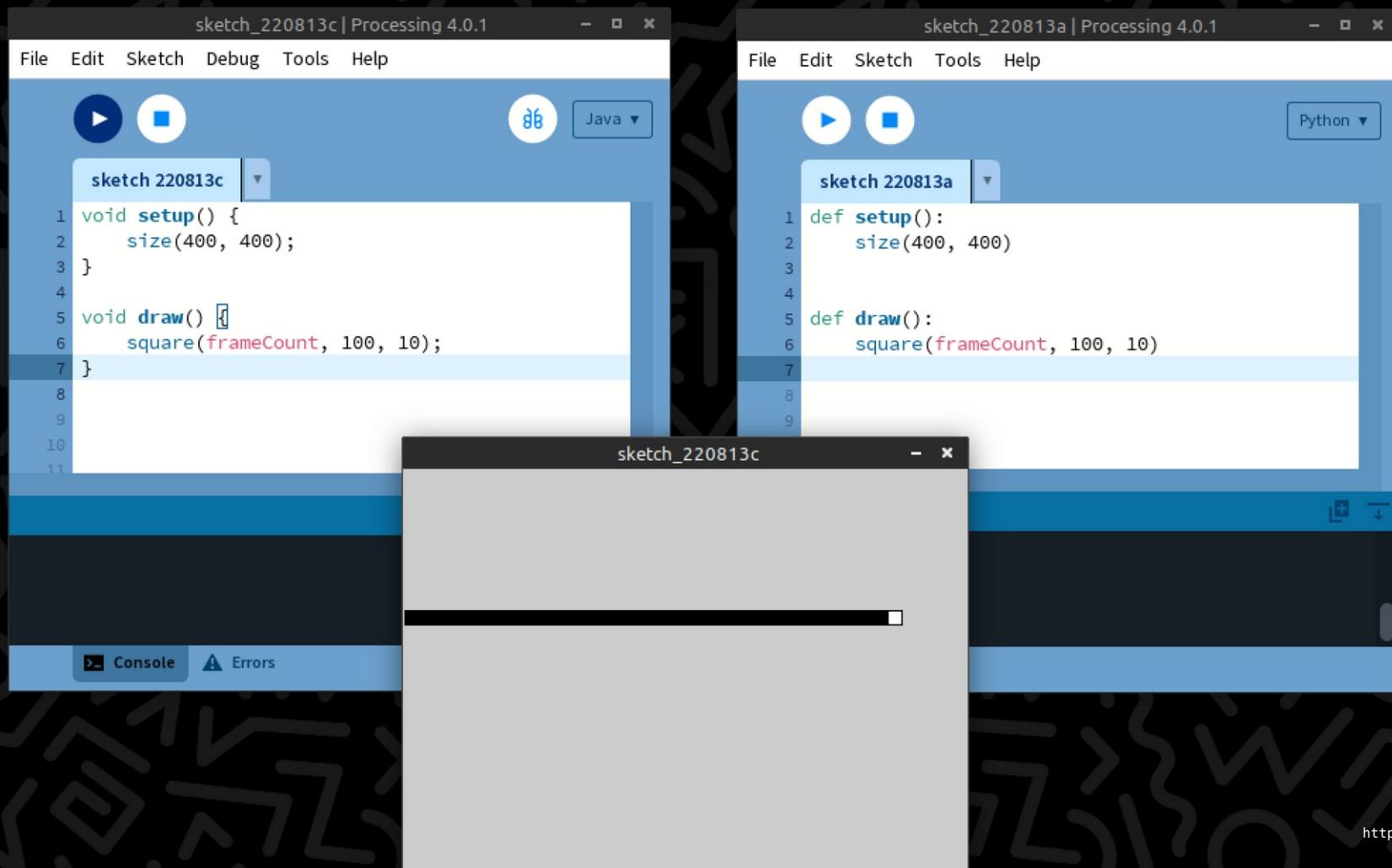


A screenshot of the Processing 4.0b8 IDE. The title bar says "sketch_220510a | Processing 4.0b8". The menu bar includes File, Edit, Sketch, Tools, and Help. A dropdown menu shows "Python". The main area is titled "sketch_220510a". The code editor contains the following Python code:

```
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```

The word "python code" is overlaid on the code editor area.





./2000_and_beyond/processing_+_python

jython

jython

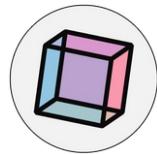
* jython is not cpython (reference implementation)

jython

- * jython is not cpython (reference implementation)
- * jython only supports up to python 2.7

jython

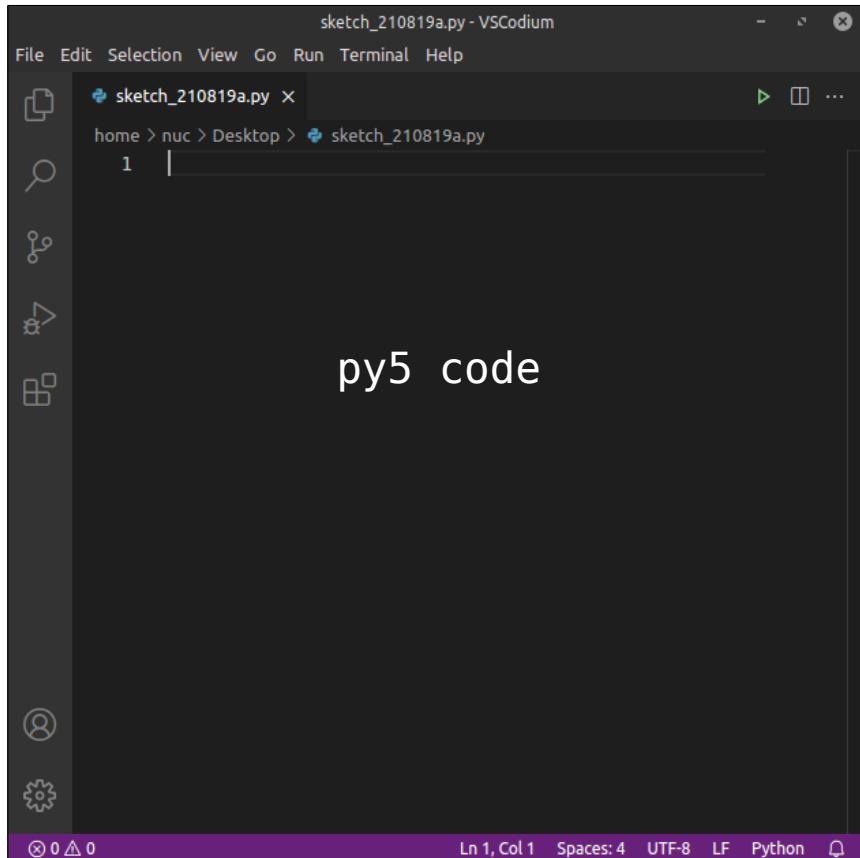
- * jython is not cpython (reference implementation)
- * jython only supports up to python 2.7
- * no support for 3rd-party python libraries with c extensions



py5

A screenshot of the VSCode editor interface. The title bar reads "sketch_210819a.py - VSCode". The menu bar includes File, Edit, Selection, View, Go, Run, Terminal, and Help. The left sidebar contains icons for file operations like Open, Save, Find, Replace, and Settings. The main editor area shows the path "home > nuc > Desktop > sketch_210819a.py" and the code "py5 code". The status bar at the bottom shows "Ln 1, Col 1" and "Spaces: 4" and "Python".

```
py5 code
```



A screenshot of the VSCode code editor. The title bar says "sketch_210819a.py - VSCode". The menu bar includes File, Edit, Selection, View, Go, Run, Terminal, and Help. The left sidebar has icons for file, search, folder, and settings. The main editor area shows the following code:

```
py5 code
```

The status bar at the bottom shows "Ln 1, Col 1" and "Spaces: 4" and "Python". There are also icons for file operations like save and close.



sketch_210819a.py - VSCode

File Edit Selection View Go Run Terminal Help

sketch_210819a.py X

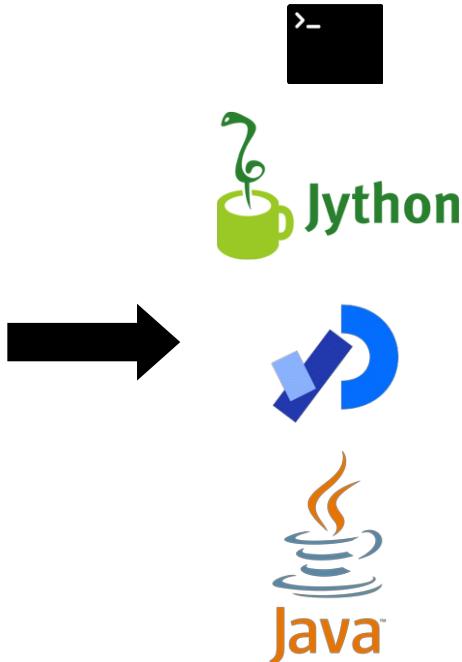
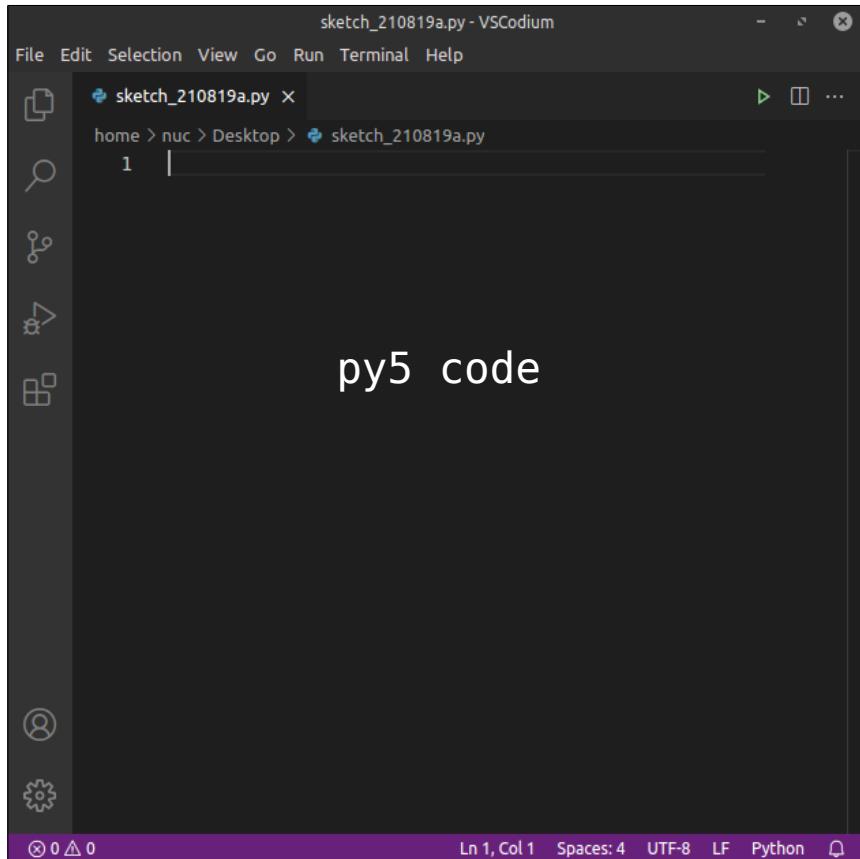
home > nuc > Desktop > sketch_210819a.py

1 |

py5 code

Ln 1, Col 1 Spaces: 4 UTF-8 LF Python ⚡

0 △ 0



sketch_210819a.py - VSCode

File Edit Selection View Go Run Terminal Help

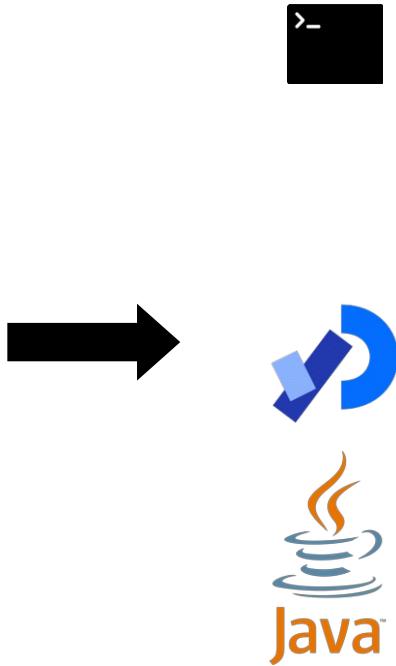
sketch_210819a.py X

home > nuc > Desktop > sketch_210819a.py

1 |

py5 code

VSCode interface showing a Python file named sketch_210819a.py. The code contains the text "py5 code". The status bar at the bottom shows "Ln 1, Col 1" and "Python".



sketch_210819a.py - VSCode

File Edit Selection View Go Run Terminal Help

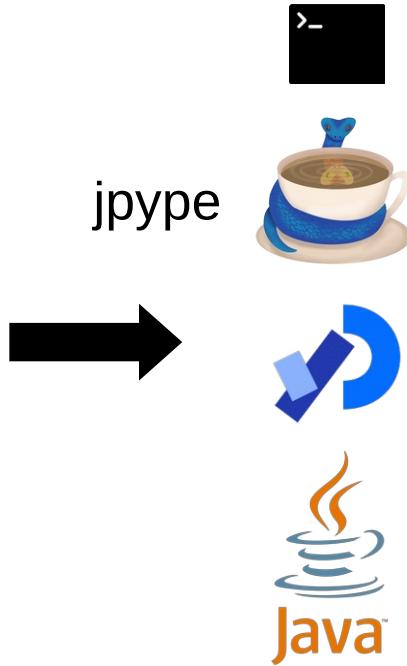
sketch_210819a.py X

home > nuc > Desktop > sketch_210819a.py

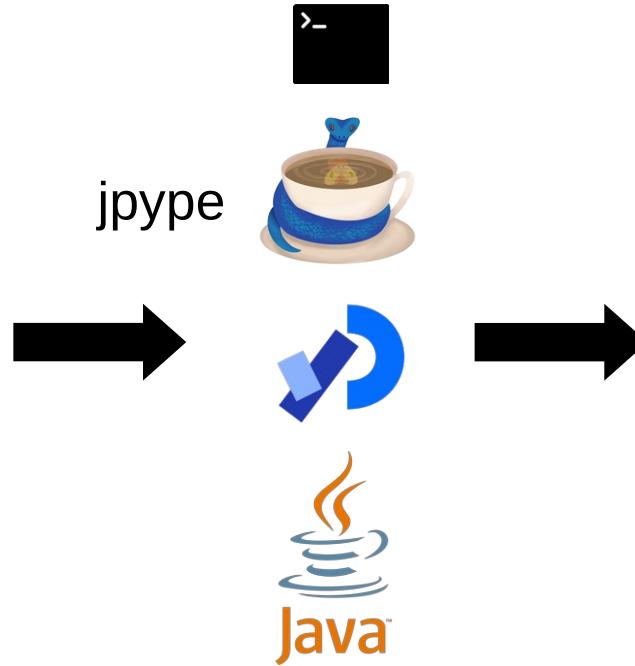
1 |

py5 code

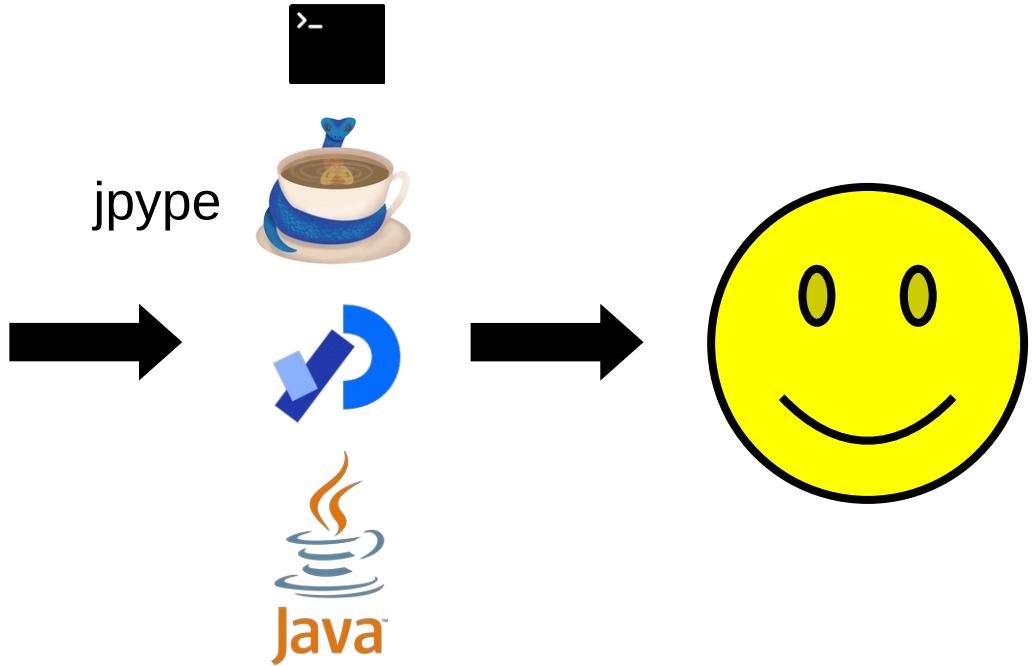
VSCode interface showing a Python file named sketch_210819a.py. The code contains the text "py5 code". The status bar at the bottom shows "Ln 1, Col 1" and "Python".

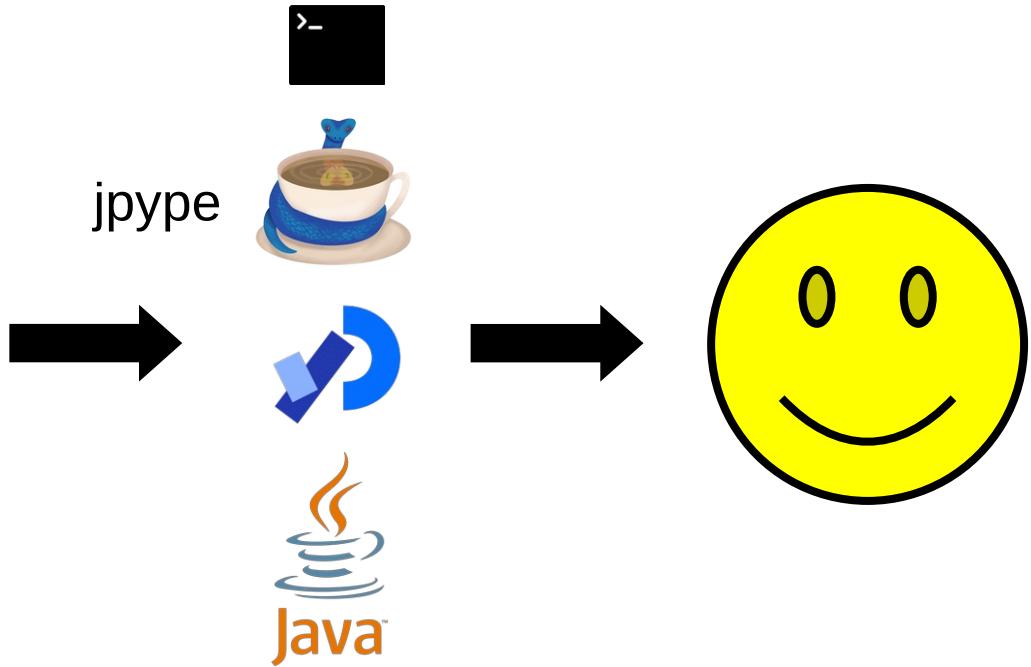
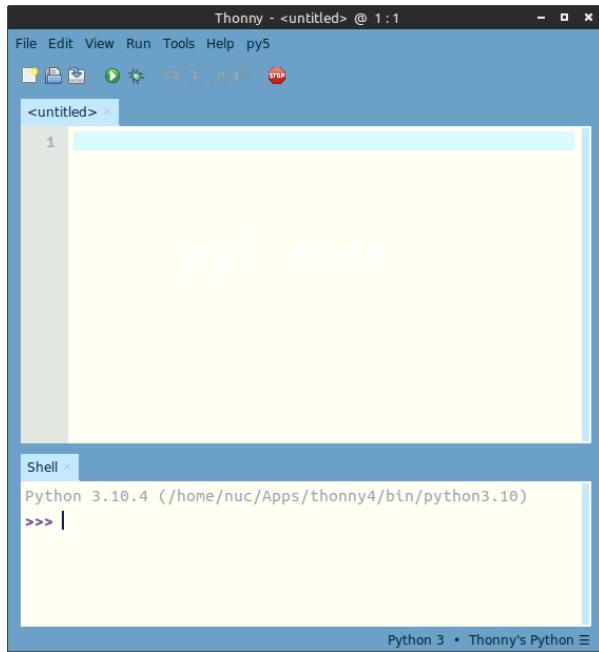


A screenshot of the VSCode interface. The title bar says "sketch_210819a.py - VSCode". The menu bar includes File, Edit, Selection, View, Go, Run, Terminal, and Help. The left sidebar has icons for file, search, folder, and settings. The main editor area shows the code "py5 code". The status bar at the bottom shows "Ln 1, Col 1" and "Spaces: 4".



A screenshot of the VSCode code editor. The title bar says "sketch_210819a.py - VSCode". The menu bar includes File, Edit, Selection, View, Go, Run, Terminal, and Help. A sidebar on the left shows icons for file operations like Open, Save, Find, and Settings. The main editor area contains the text "py5 code". The status bar at the bottom shows "Ln 1, Col 1" and "Spaces: 4" along with other settings.





./2000_and_beyond/processing_+_python/py5

jpype

jpype

* provides full access to java libraries from within cpython

jpy

- * provides full access to java libraries from within cpython
- * supports python 3

jpype

- * provides full access to java libraries from within cpython
- * supports python 3
- * supports 3rd-party python libraries with c extensions (numpy, ...)

./web3_+_art

web3 + art

Fidenza by Tyler Hobbs - Collection | OpenSea — Mozilla Firefox

https://opensea.io/collection/fidenza-by-tyler-hobbs?search[sortAscending]=false&search[sortBy]=UNIT_PRICE

OpenSea

Search items, collections, and accounts

Explore Stats Resources Create

Fidenza by Tyler Hobbs

By ArtBlocks_Admin

Fidenza is by far my most versatile algorithm to date. Although the program stays focused on structured curves...

See more ▾

999 items 528 owners + 50.1K total volume + 81 floor price + 42 best offer

Items Activity

Search by name or attribute

Price high to low

Make collection offer

Status: Buy Now, On Auction, Buy with Card

Price

Quantity

Currency

Collision Check: 3

Colors: 14

Density: 4

Have Margin: 2

Outlined: 2

Scale: 7

Fidenza #304 Price: + 3,333 Last sale: + 11

Fidenza #247 Price: + 2,500

Fidenza #971 Price: + 1,337.69

Fidenza #920 Price: + 980

Fidenza #673 Price: + 897 Last sale: + 14

999 items

fidenza, tyler hobbs

fxhash — marketplace / fxApe — Mozilla Firefox

fxhash — marketplace / fxApe — Mozilla Firefox

fxhash — marketplace / fxApe — Mozilla Firefox

Welcome to fxhash 1.0

fx(hash)

fxApe #7889

Littlesilver

1500/1500 minted

See Generative Token

1st sales ₿ 1.5K

2nd sales (tez) ₿ 81.7K

Items for sale 389

Lowest 2nd sale ₿ 9

Highest 2nd sale ₿ 1340

Floor ₿ 32.00

2nd sales 24h (nb) ₿ 0

Median ₿ 200.0

listed offers stats activity

price (high to low) ▾

fxApe #5 rudxane ₿ 240891

fxApe #943 Teus Will ₿ 70000.69

fxApe #1484 tz2NHJA ... C78PwPg ₿ 60069.69

fxApe #249 tz1LuDY ... 8RCXNWX ₿ 42000

fxApe #382 Batista_ddt ₿ 15000

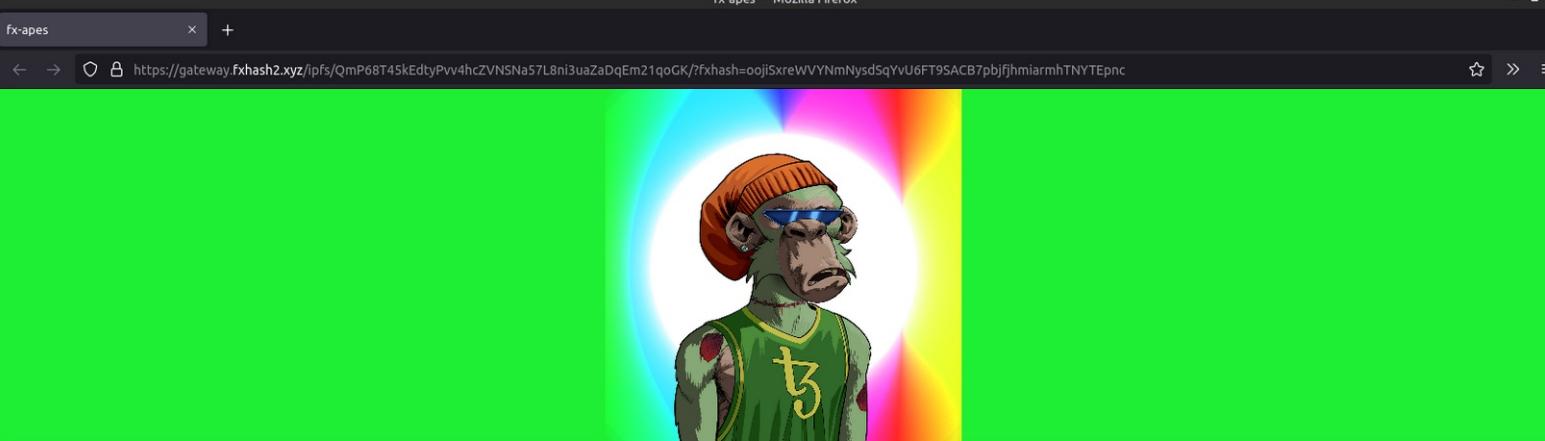
fxApe #65 yep_yep ₿ 11111

fxApe #405 agent004 ₿ 9000

fxape

fx-apes — Mozilla Firefox

fxhash2.xyz/pfs/QmP68T45kEdtyPw4hcZVN5Na57L8n3uaZaDqEm21qoGK/rxhash=oojISxreWVYNmNysdSqYU6FT95ACB7pbfjhmiarmhTNYTEpnc



Inspector Console Debugger Performance Network Style Editor Memory Storage Accessibility > 1 ⌂ ... ×

Filter URLs | + | All HTML CSS JS XHR Fonts Images Media WS Other | Disable Cache | No Throttling | ⚙

St	M	Domain	File	Initiator	Ty	T	Size
20	GET	gate...	p5.min.js	script	js	14	605
20	GET	gate...	script.js	script	js	4.	11.0

Headers Cookies Request Response Timings Security

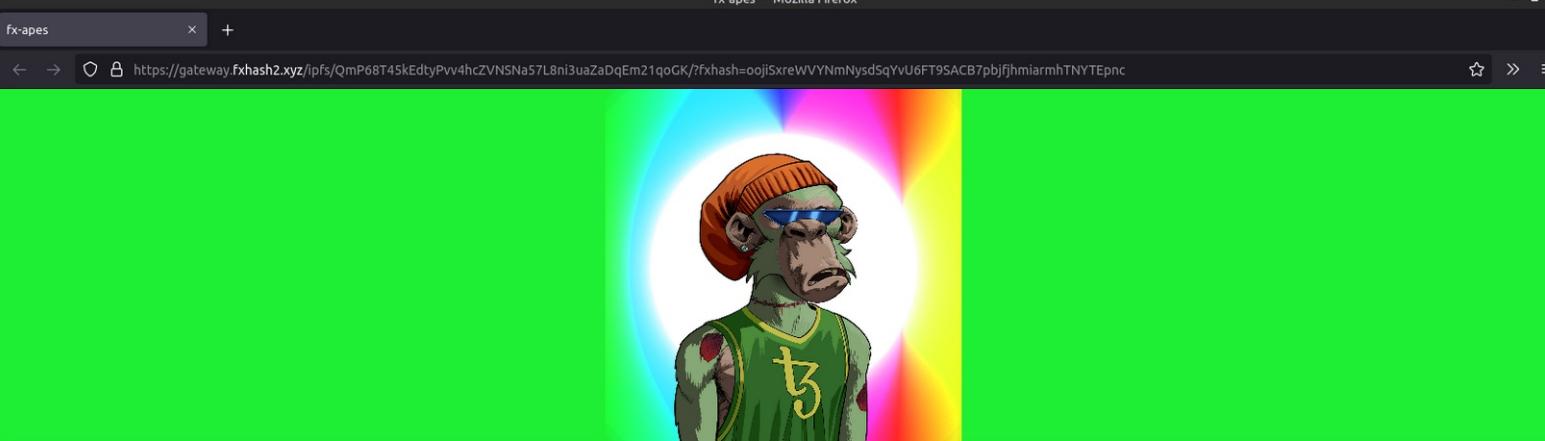
Response Payload

```
const NONE = -1;
random = fxrand();
function randomize() { ↴ }
// Feature strings for metadata
window.$fxhashFeatures = {};
// Preload pngs we need
function preload() { ↴ }
// Setup, matching canvas size
function setup() { ↴ }
//
function resetSeed() { ↴ }
// Draw image layer by layer
function draw() { ↴ }
```

2 requests | 616.32 KB / 147.37 KB transferred | Fin | fxape

fx-apes — Mozilla Firefox

fxhash2.xyz/pfs/QmP68T45kEdtyPw4hcZVN5Na57L8n3uaZaDqEm21qoGK/fxhash=oojISxreWVYNmNysdSqYU6FT95ACB7pbfjhmiarmhTNYTEpnc



Inspector Console Debugger Performance Network Style Editor Memory Storage Accessibility > 1 ⌂ ...

Filter URLs | All HTML CSS JS XHR Fonts Images Media WS Other | Disable Cache | No Throttling | ⚙

St	M	Domain	File	Initiator	Ty	T	Size
20	GET	gate...	p5.min.js		js	14	605
20	GET	gate...	script.js	script	js	4.	11.0

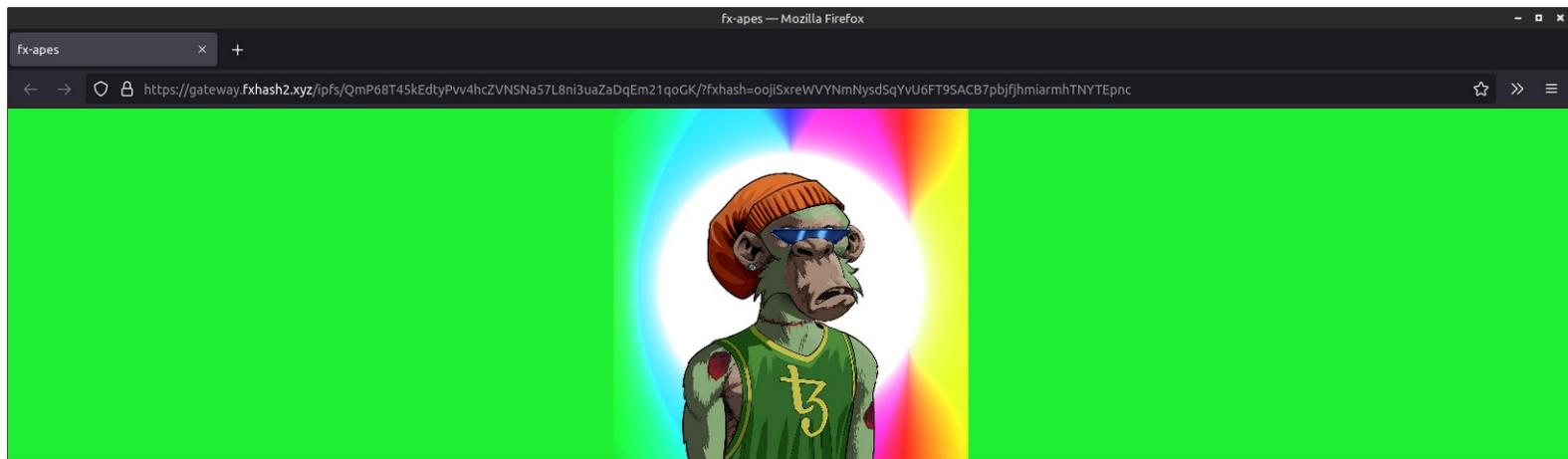
Headers Cookies Request Response Timings Security

Response Payload

```
1 const NONE = -1;
2 random = fxrand();
3 function randomize() { ↴ }
4
5 // Feature strings for metadata
6 window.$fxhashFeatures = {};
7
8 // Preload pngs we need
9 function preload() { ↴ }
10
11 // Setup, matching canvas size
12 function setup() { ↴ }
13
14 // Draw image layer by layer
15 function draw() { ↴ }
```

2 requests | 616.32 KB / 147.37 KB transferred | Fin

fxape



The screenshot shows a Firefox browser window with the title "fx-apes — Mozilla Firefox". The main content area displays a digital artwork of a green-skinned monkey wearing a red beanie and sunglasses, set against a vibrant rainbow gradient background. The URL in the address bar is <https://gateway.fxhash2.xyz/pfs/QmP68T45kEdtyPw4hcZVN5Na57L8n3uaZaDqEm21qoGK/fxhash=o0jISxreWVYNmNysdSqYU6FT95ACB7pbfjhmiarmhTNYTEpnc>. Below the image, the browser's developer tools Network tab is open, showing a list of requests. The first request, "p5.min.js", is highlighted with a yellow arrow. The response payload for this file is displayed in the bottom half of the Network tab, containing the following JavaScript code:

```
const NONE = -1;
random = fxrand();
function randomize() { }
// Feature strings for metadata
window.$fxhashFeatures = {};
// Preload pngs we need
function preload() { }
// Setup, matching canvas size
function setup() { }
//
function resetSeed() { }
// Draw image layer by layer
function draw() { }
```

fx-apes — Mozilla Firefox

fxhash2.xyz/pfs/QmP68T45kEdtyPw4hcZVN5Na57L8n3uaZaDqEm21qoGK/fxhash=oojiSxreWVYNmNysdSqYU6FT95ACB7pbfjhmiarmhTNYTEpnc

Network JS XHR Fonts Images Media WS Other Disable Cache No Throttling

St	M	Domain	File	Initiator	Ty	T	Size
20	GET	gate...	p5.min.js		js	14	605
20	GET	gate...	script.js	script	js	4.	11.0

Headers Cookies Request Response Timings Security

```
Response Payload
1 const NONE = -1;
2 random = fxrand();
3 function randomize() {←}
4
5 // Feature strings for metadata
6 window.$fxhashFeatures = {};
7
8
9 // Preload pngs we need
10 function preload() {←}
11
12 // Setup, matching canvas size
13 function setup() {←}
14 //
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16 function resetSeed() {←}
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18 // Draw image layer by layer
19 function draw() {←}
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2 requests | 616.32 KB / 147.37 KB transferred | Fin

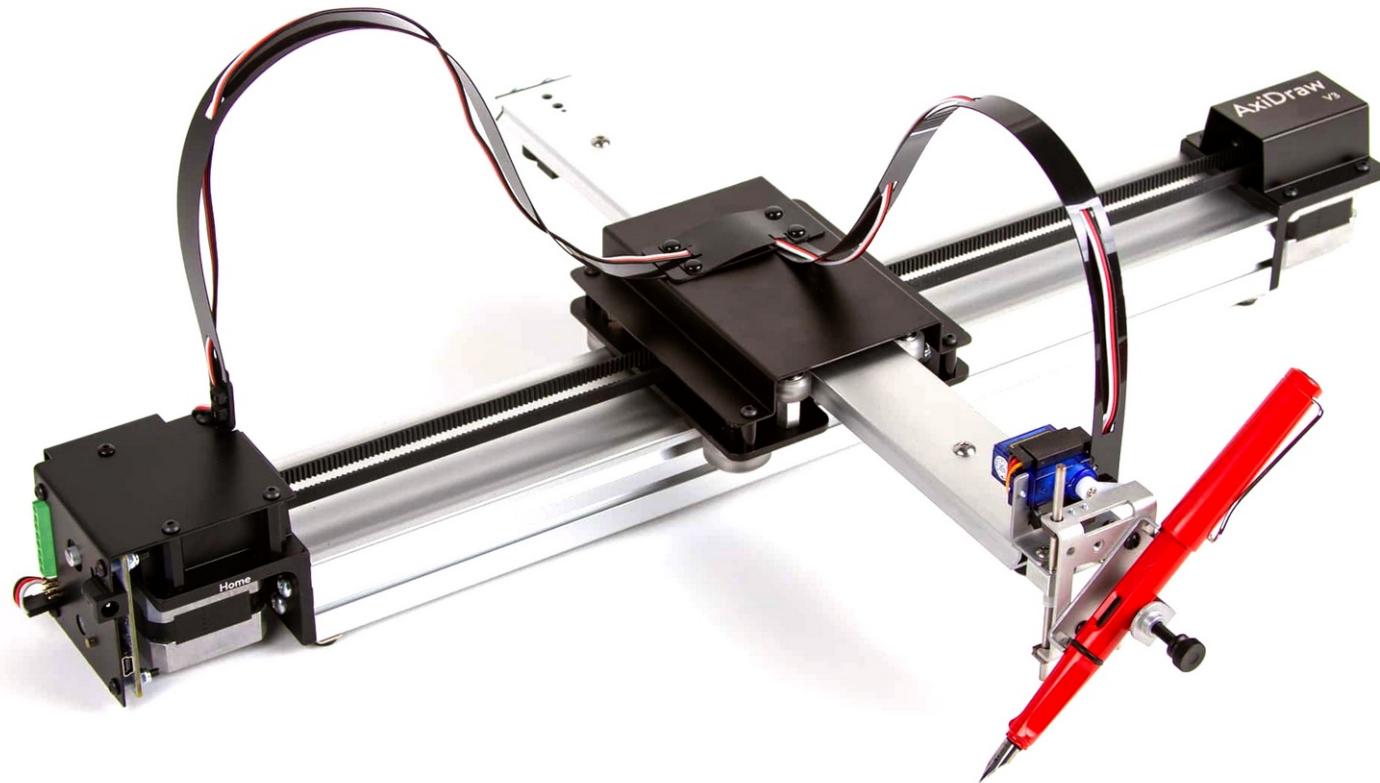
fxape



./plotter_art

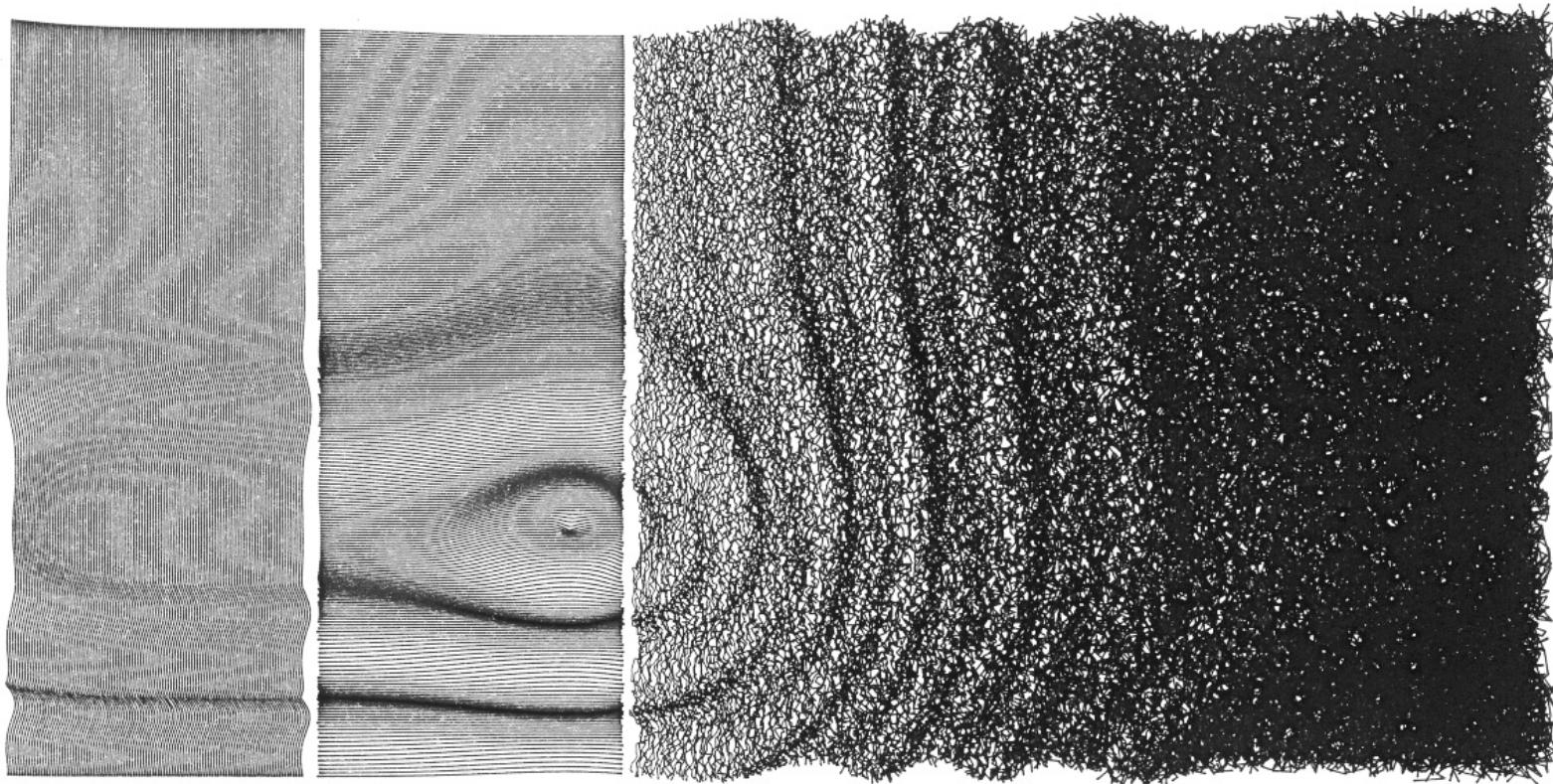
plotter art

./plotter_art/axidraw

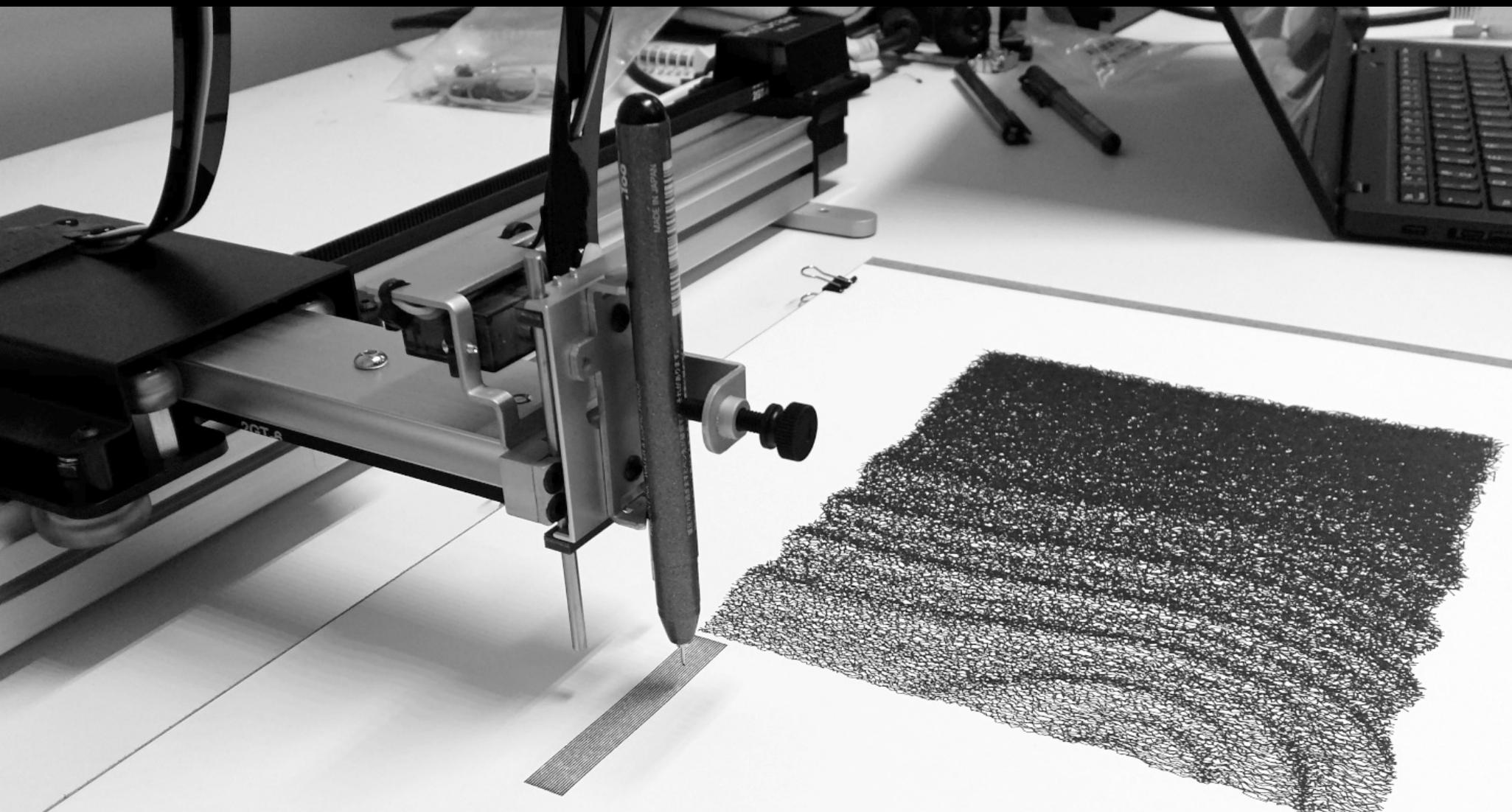


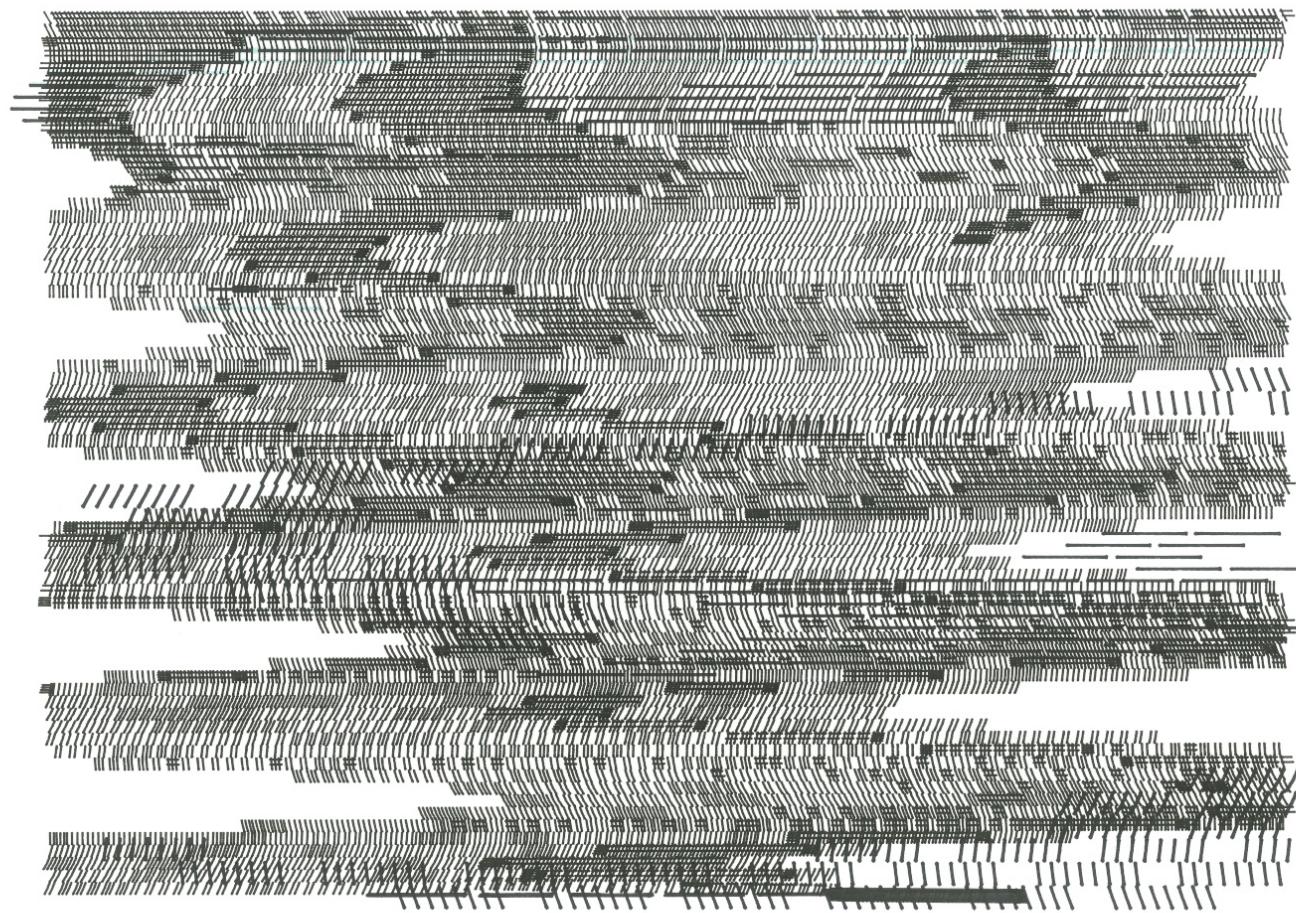
axidraw a3

./plotter_art/axidraw/artwork

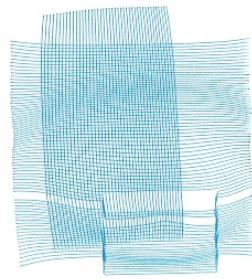
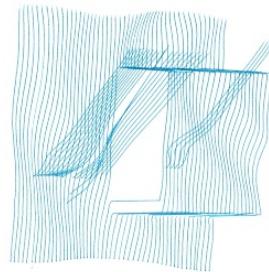
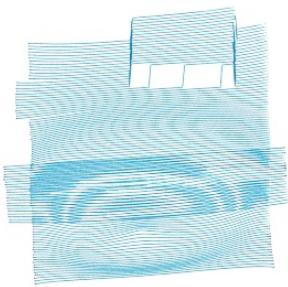


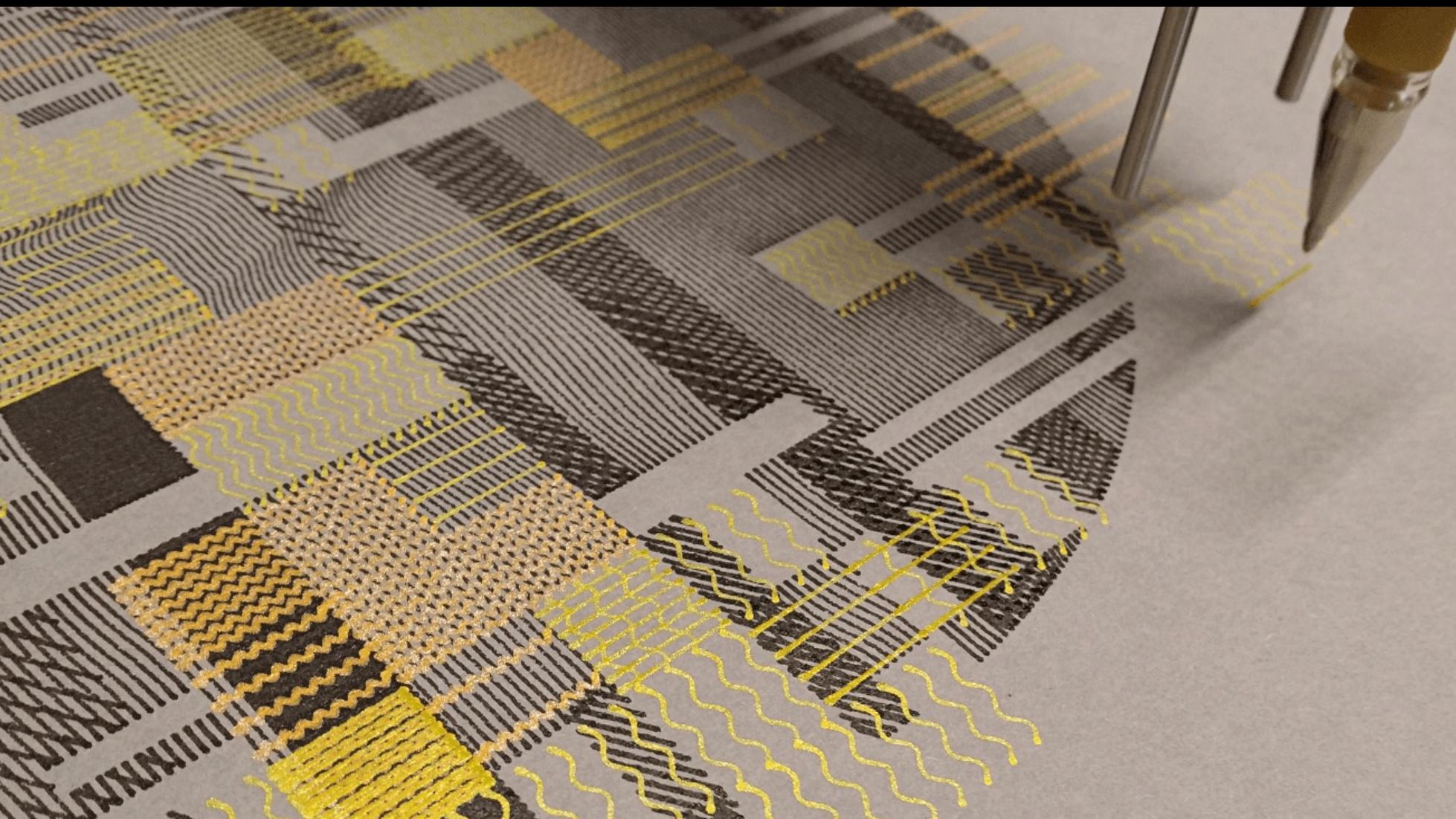
./plotter_art/axidraw/artwork

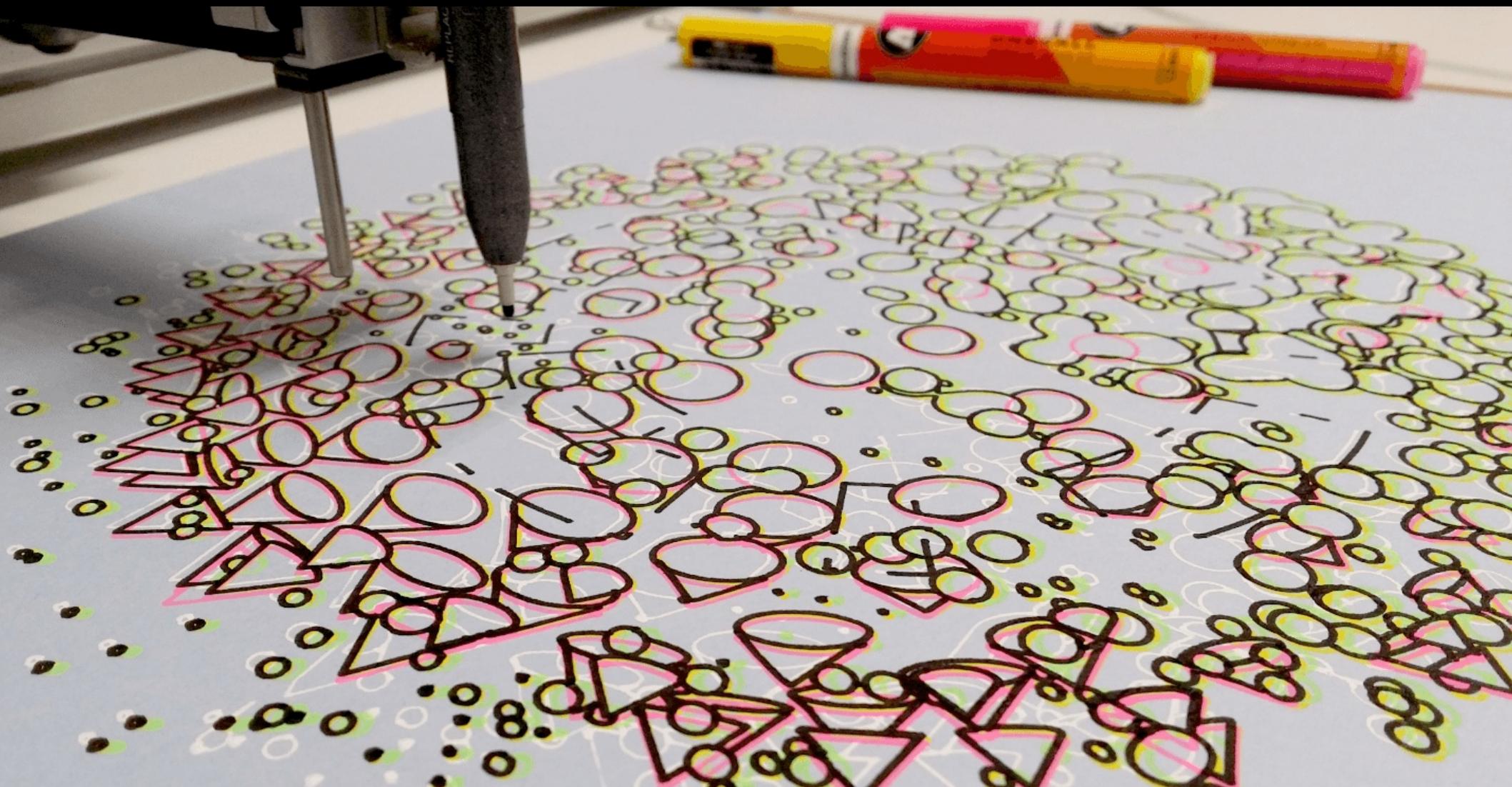




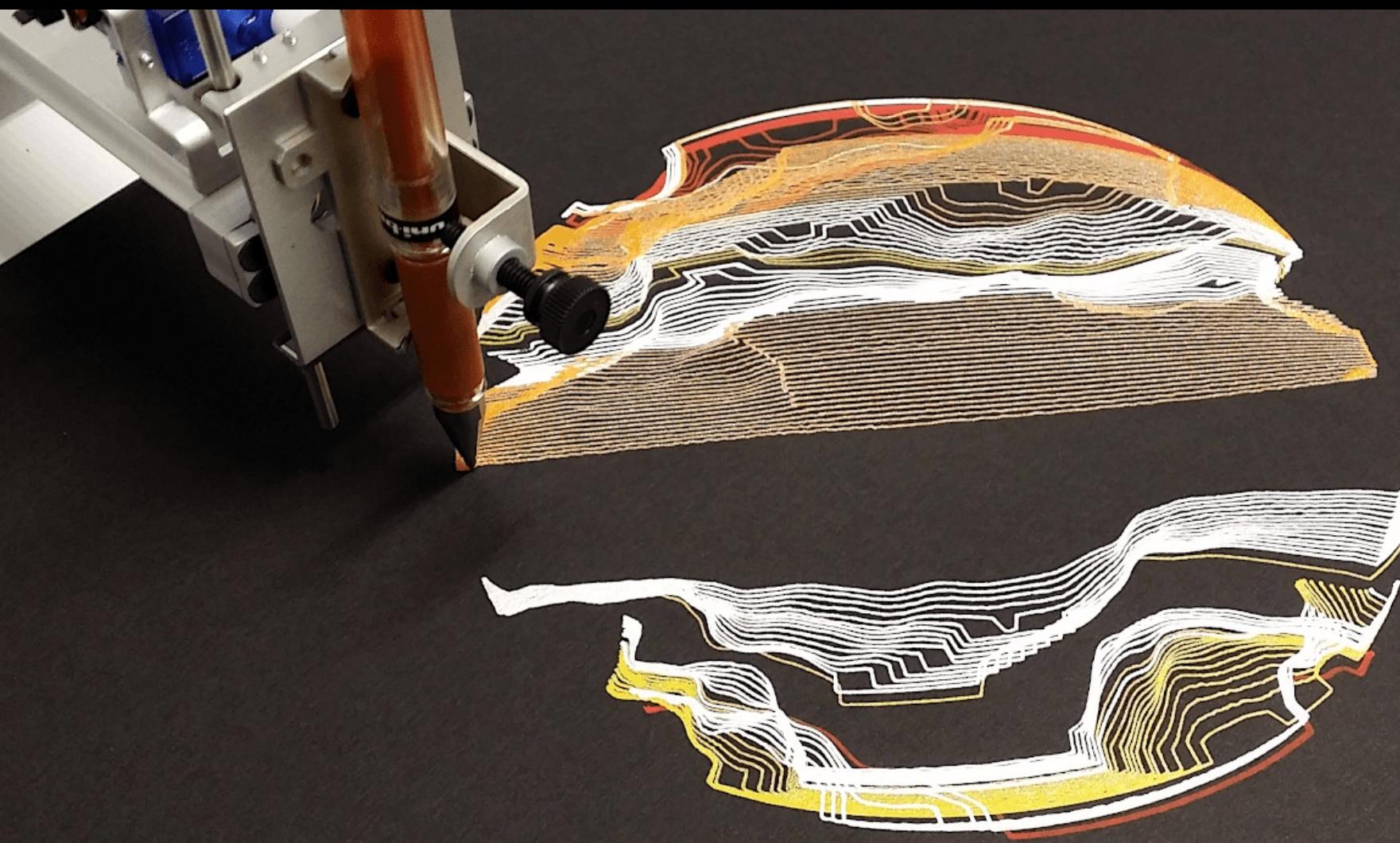
./plotter_art/axidraw/artwork



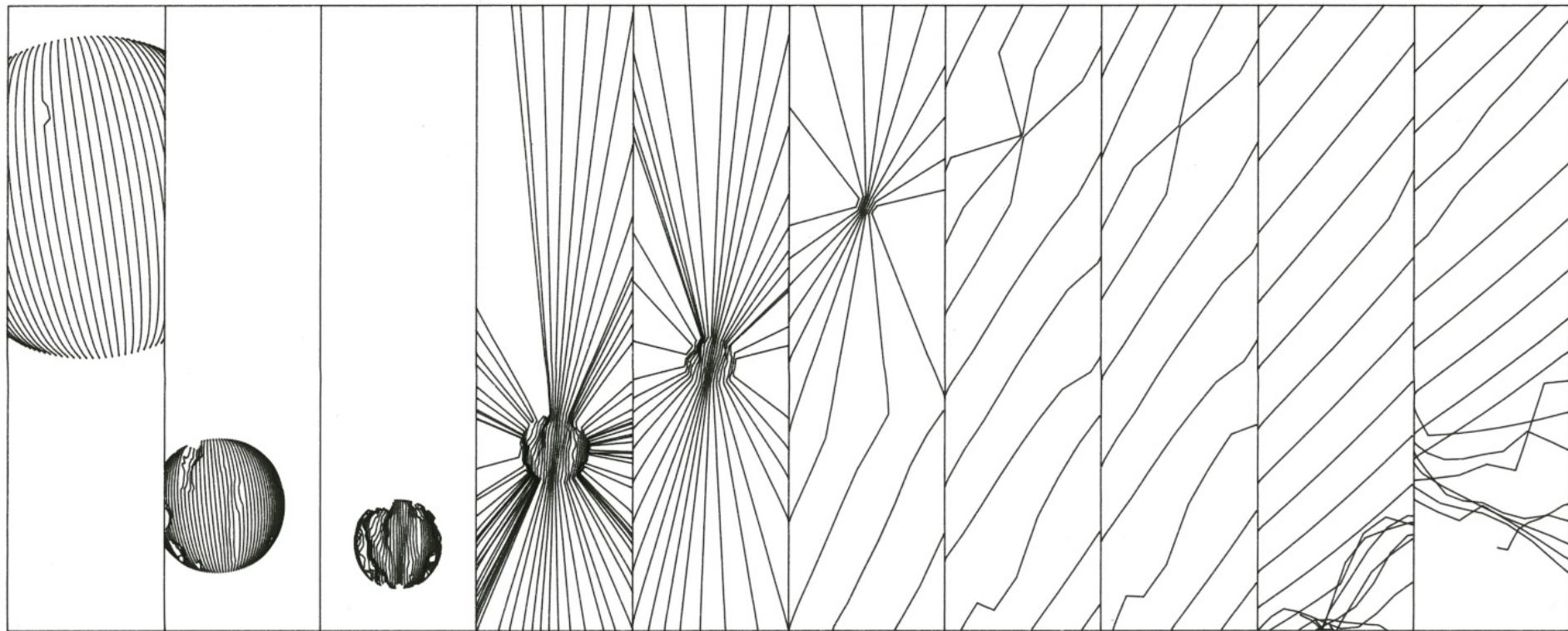




./plotter_art/axidraw/artwork







`./other_tools`

`other tools`

./other_tools/python

bpy (blender), drawbot, generativepy, p5py, panda3d, pyp5js, pyscript (+
svg/canvas?), vpython, ...

<https://github.com/villares/resources-for-teaching-programming>

./other_tools/non-python

cinder (c++), godot (gdscript), nannou (rust), openframeworks (c++), openrndr (kotlin), pure data (vpl), supercollider, ...

<https://github.com/terkelg/awesome-creative-coding#tools>

resources for this presentation

./resources

github.com/tabreturn/pycon-py5-bpy

./practical_examples

practical examples

`./practical_examples`

(present examples in resources)

./end

end