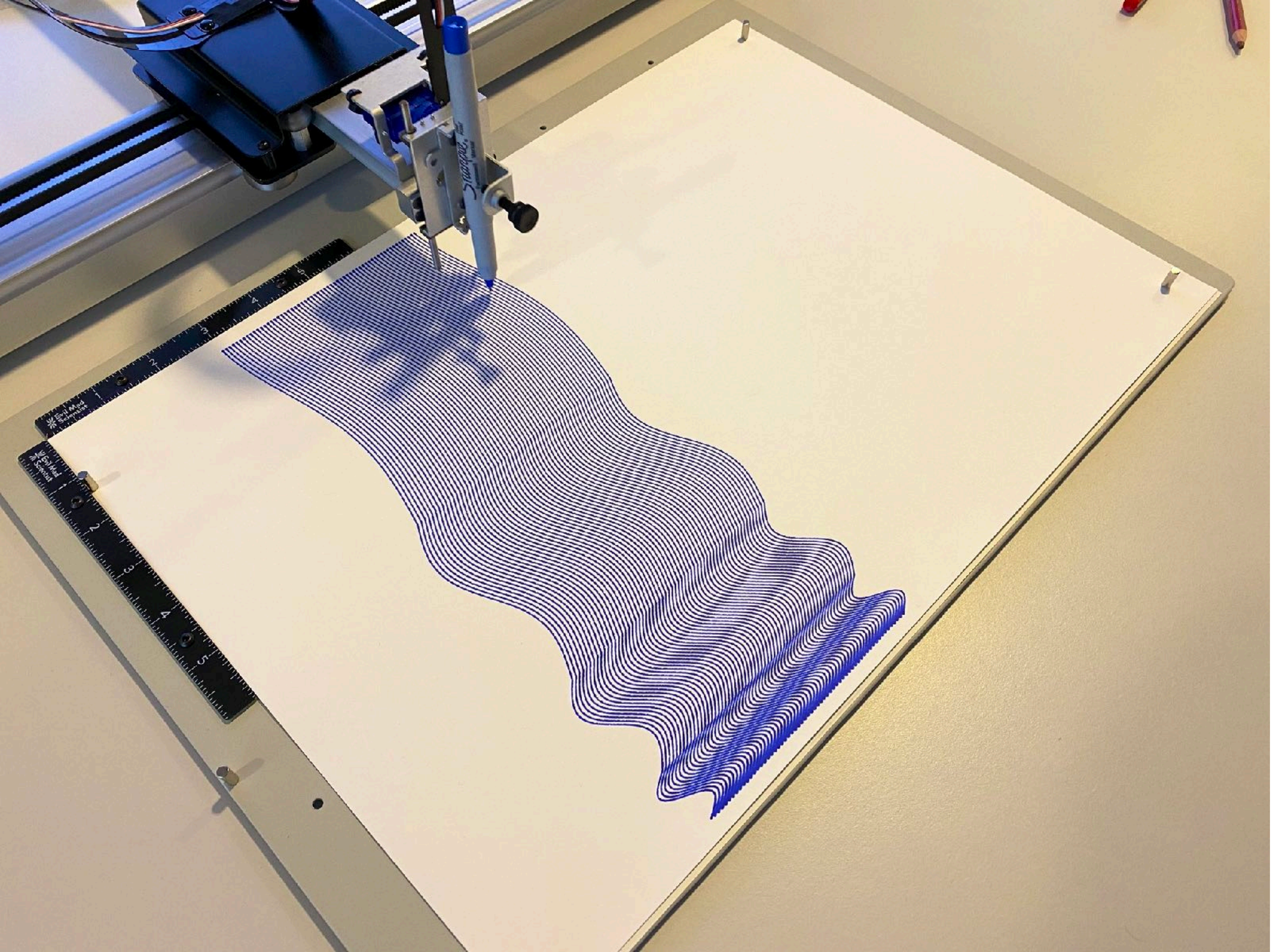
Turtle Graphics

Create generative art like it's 1967

A workshop by Process — Studio for Art and Design — 2023



Teaser

Start out with creative coding using an intuitive approach first developed for kids in the 1960s. Learn to create generative drawings using only three basic commands that move a virtual pen, called a turtle, around the canvas.

Revived and brought to modern creative coding platform p5.js, this technique not only allows you to create digital images, but the same code will drive an Axidraw flatbed pen plotter, a drawing machine that uses pens or markers to draw your artwork on paper.

Tags: generative design, creative coding, turtle graphics, pen plotter, axidraw, p5.js

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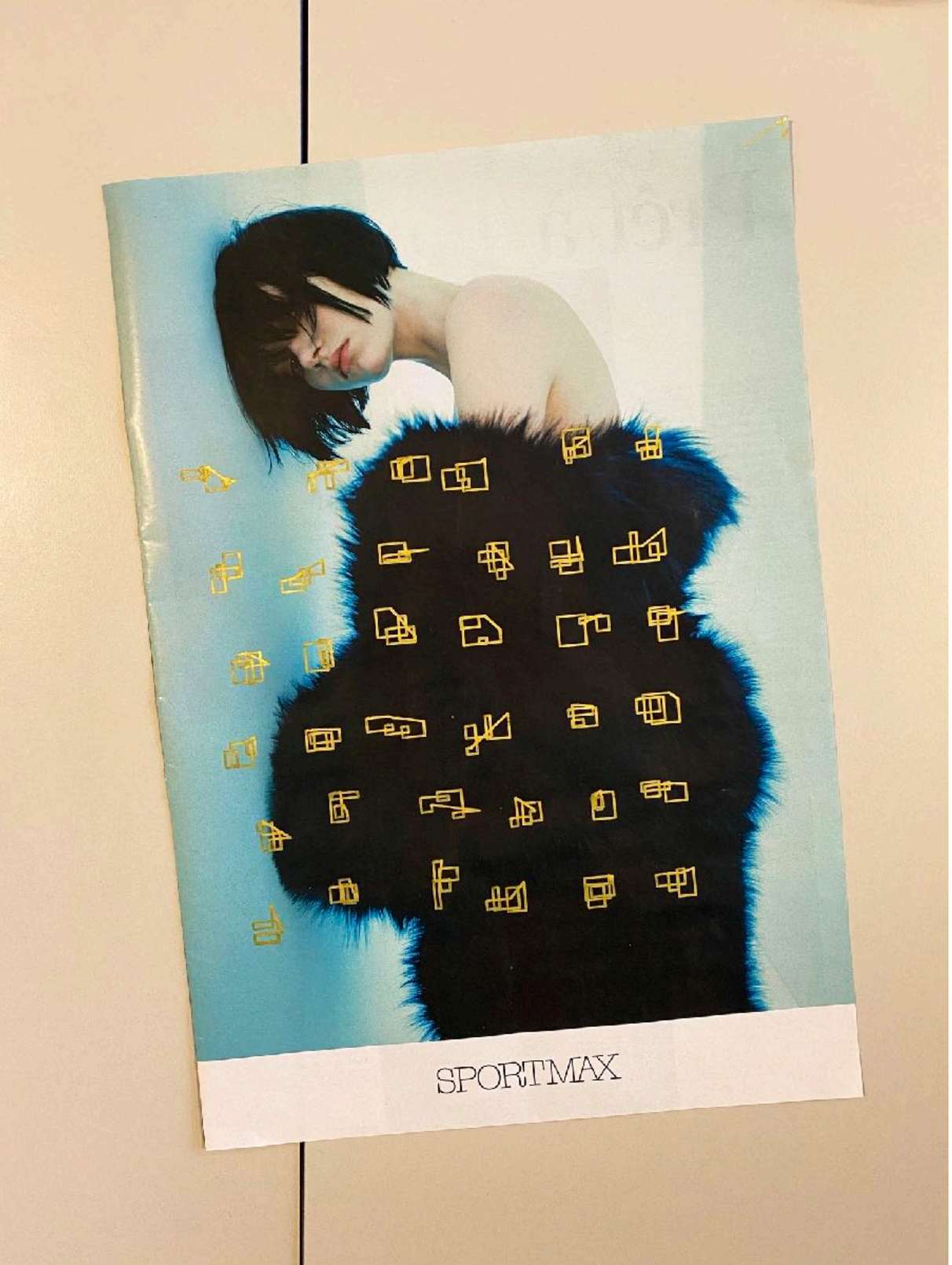
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Target Audience

Anyone who wants to get started with creative coding concepts and practice, especially:

- Art/Design Students
- Visual Artists
- Creatives
- (Graphic) Designers
- (Web) Developers

Workshop Exhibition, SUPSI Mendriso (Switzerland)

The workshop

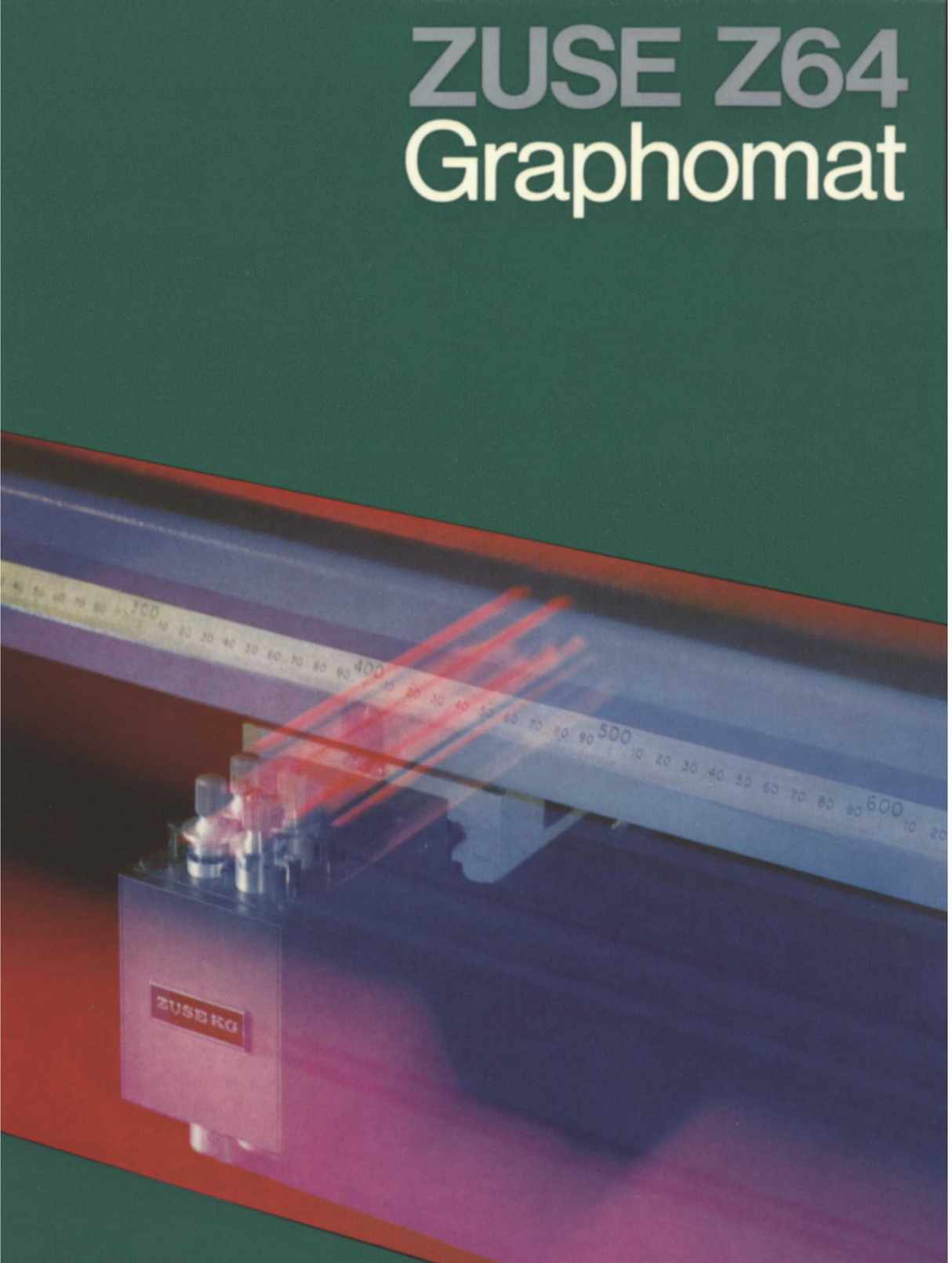
In this workshop students will learn to create generative graphics combining two approaches dating back to the beginnings of computer art in the 1960s: Turtle Graphics and Drawing Machines.

Turtle Graphics is an intuitive approach to programming, first developed as part of the LOGO programming language in 1967 around the Massachusetts Institute of Technology. Originally intended for teaching programming to kids, it uses the idea of a virtual turtle moving around on a plane leaving behind markings as it goes.

Drawing Machines, especially Pen Plotters such as the Zuse Graphomat Z64 presented in 1961, were the original output device for some of the first computer-generated art pieces. Actually intended for drawing plans, diagrams and scientific visualizations, these devices were 'mis-used' by early computer artists to produce drawings solely for aesthetic purposes.

A plugin specifically developed for this workshop will allow participants to use the turtle graphics approach in p5.js and send the resulting graphics to a modern Axidraw Pen Plotter, producing physical pen-on-paper drawings.

Students will first learn the basics of programming within the online environment of p5.js while producing simple drawings and animations. Then they will learn about the history of computer generated art and recreate/adapt some of the first generative artworks from the 1960s onwards. Finally students will engage in a free project to create a more elaborate generative drawing project and print it with pens on paper using the provided networked flatbed plotter.



Advertising Brochure, ZUSE KG, 1961

Background
Pen Plotters

Until the the 1980s, when printers with graphics capabilities were introduced, plotters were the predominant means to produce drawings using a computer.

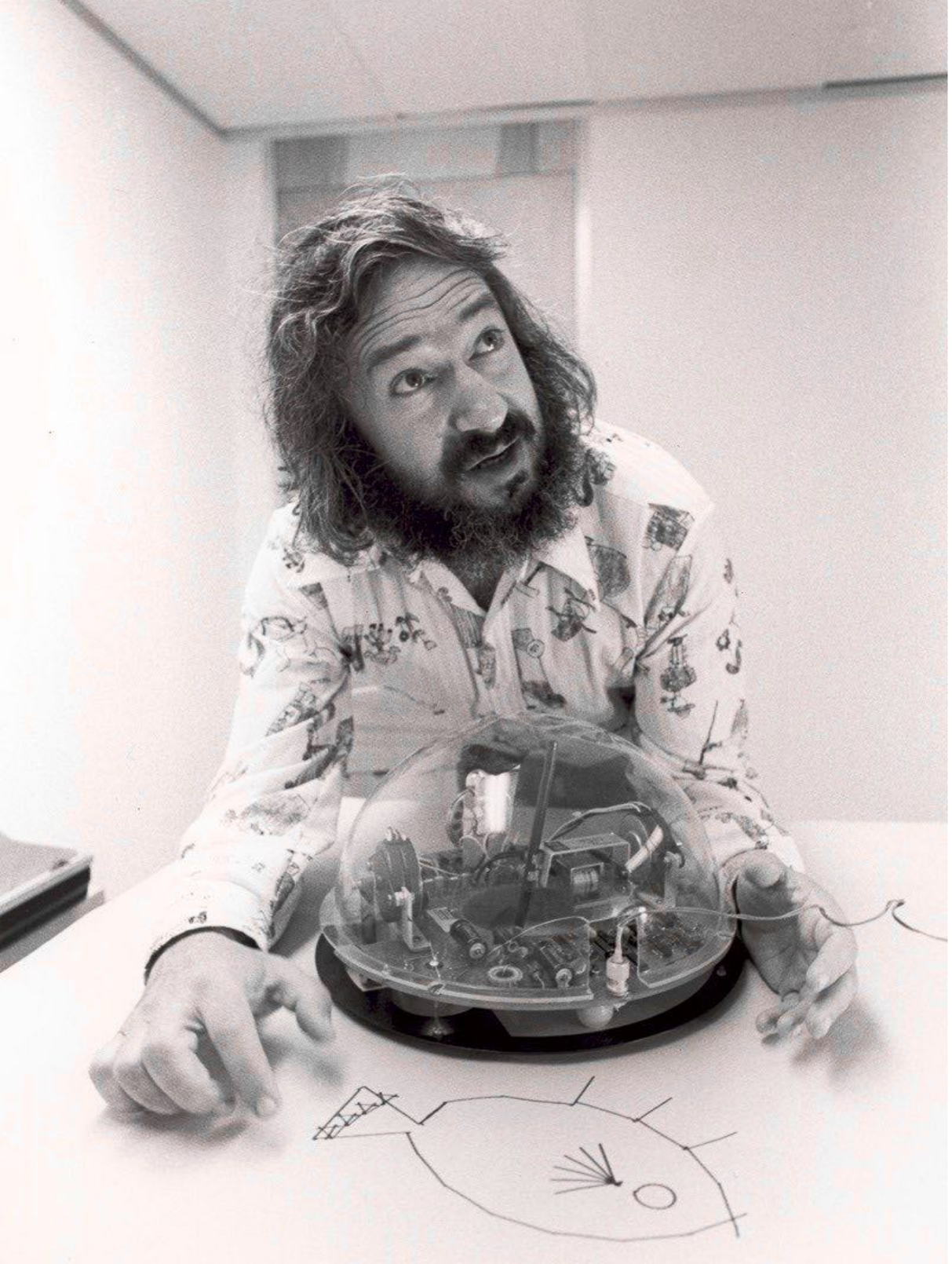
Inherently a vector graphics device, plotters are well suited for applications such as computer-aided design and engineering, where high-quality line drawings are useful.

Many successful Pen Plotters were manufactured in the US by companies such as Hewlett Packard, but the device used to produce some of the very first computer generated artworks was the Zuse Graphomat Z64 presented in 1961 in West Germany.

Today, vector graphics plotters are still in use for vinyl cutting, using a precision knife instead of a pen. As a drawing instrument it remains to serve a small niche of tinkerers and artists.

In the workshop we will be working with an AxiDraw V3/A3, one of only few high quality, portable pen plotters available today.

ZUSE Z25 Computer and Z64 Graphomat, Advertising Brochure, 1961



Seymour Papert with LOGO Turtle

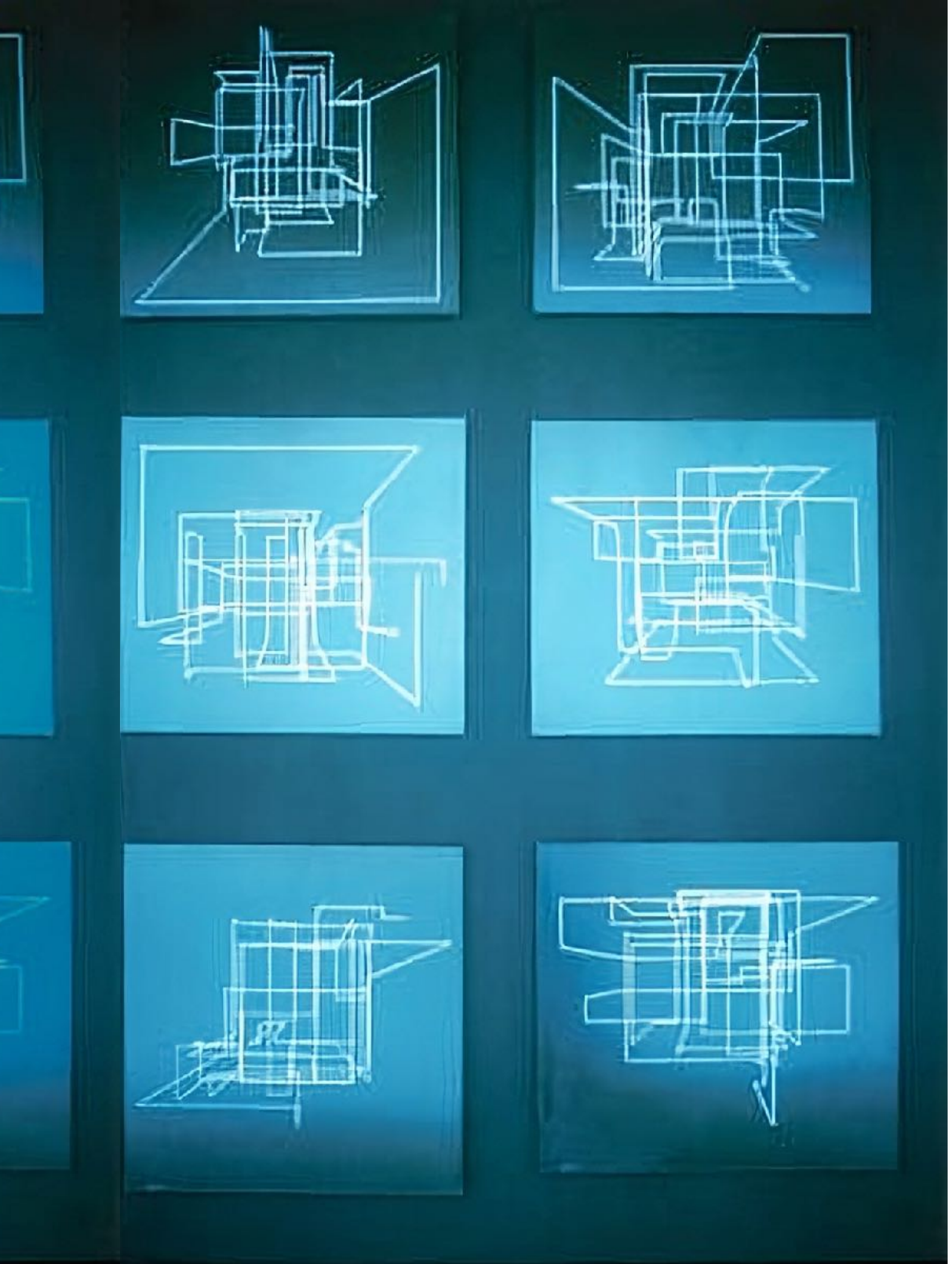
Background
Turtle Graphics

A unique and intuitive approach to teaching programming, Turtle Graphics was an essential feature of the LOGO programming language, designed in 1967 by Wally Feurzeig, Seymour Papert, and Cynthia Solomon.

The key idea is the concept of a virtual "turtle", which can be controlled with a simple set of commands: **forward/backward**, **left/right** and **penup/pendown**. The turtle is imagined to carry a pen leaving behind a line as it moves around the canvas. This technique has the unique property of being "embodied": One can imagine oneself in place of the turtle and think about its next moves, a notion which has be called "body syntonic reasoning”.

When paired with only a few universal programming concepts such as abstraction and repetition, this approach allows to quickly create complex drawings through an intuitive and vivid learning experience.

The Turtles Graphics Concept has been realized in a number of ways, even as a robot carrying an actual pen. We employ the modern creative coding platform p5.js, with a virtual on-screen turtle as well as a physical one in the form of an AxiDraw pen plotter.



Computer-Generated Pictures, Howard Wise Gallery, New York, 1965

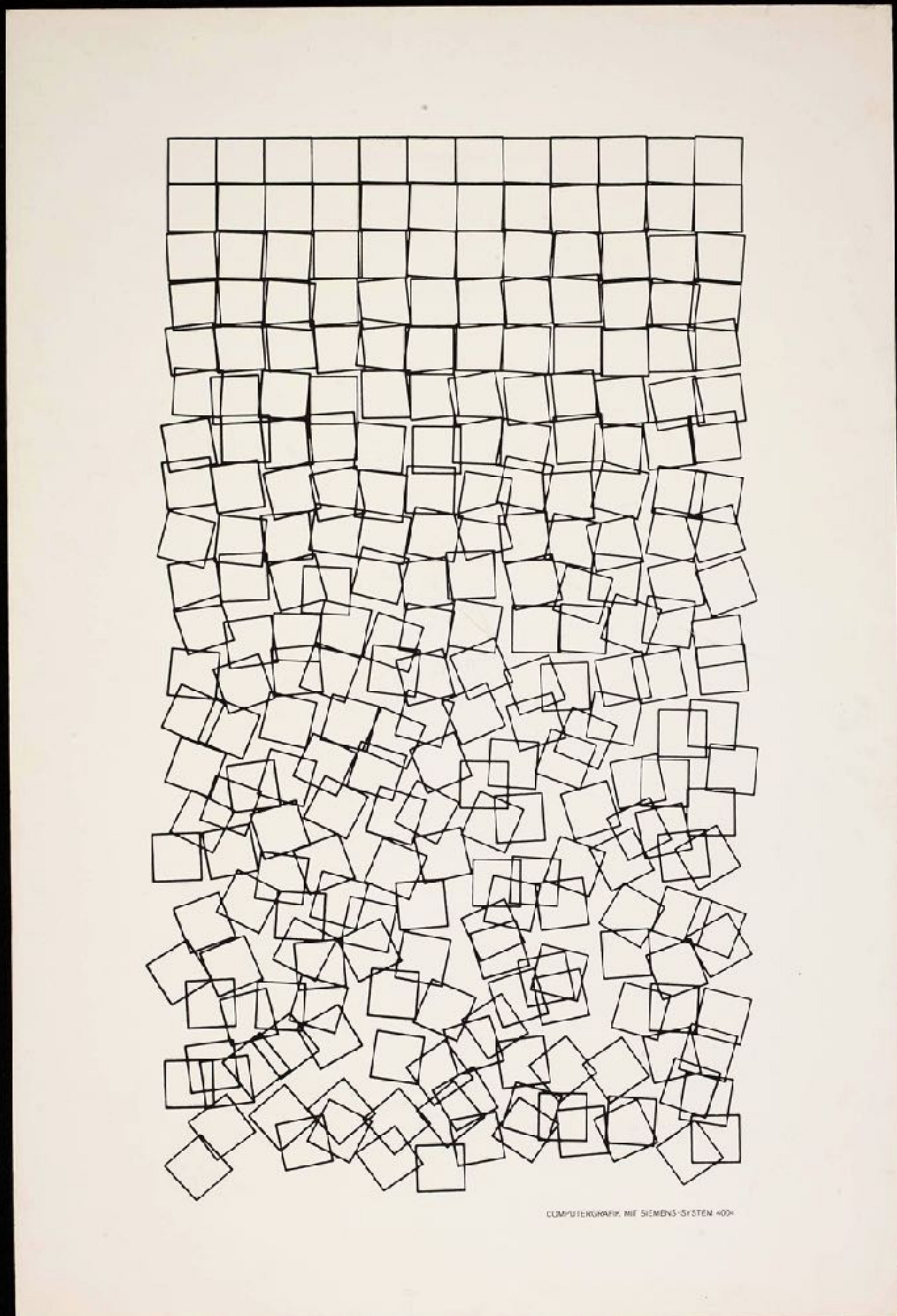
Background
Early Computer Art

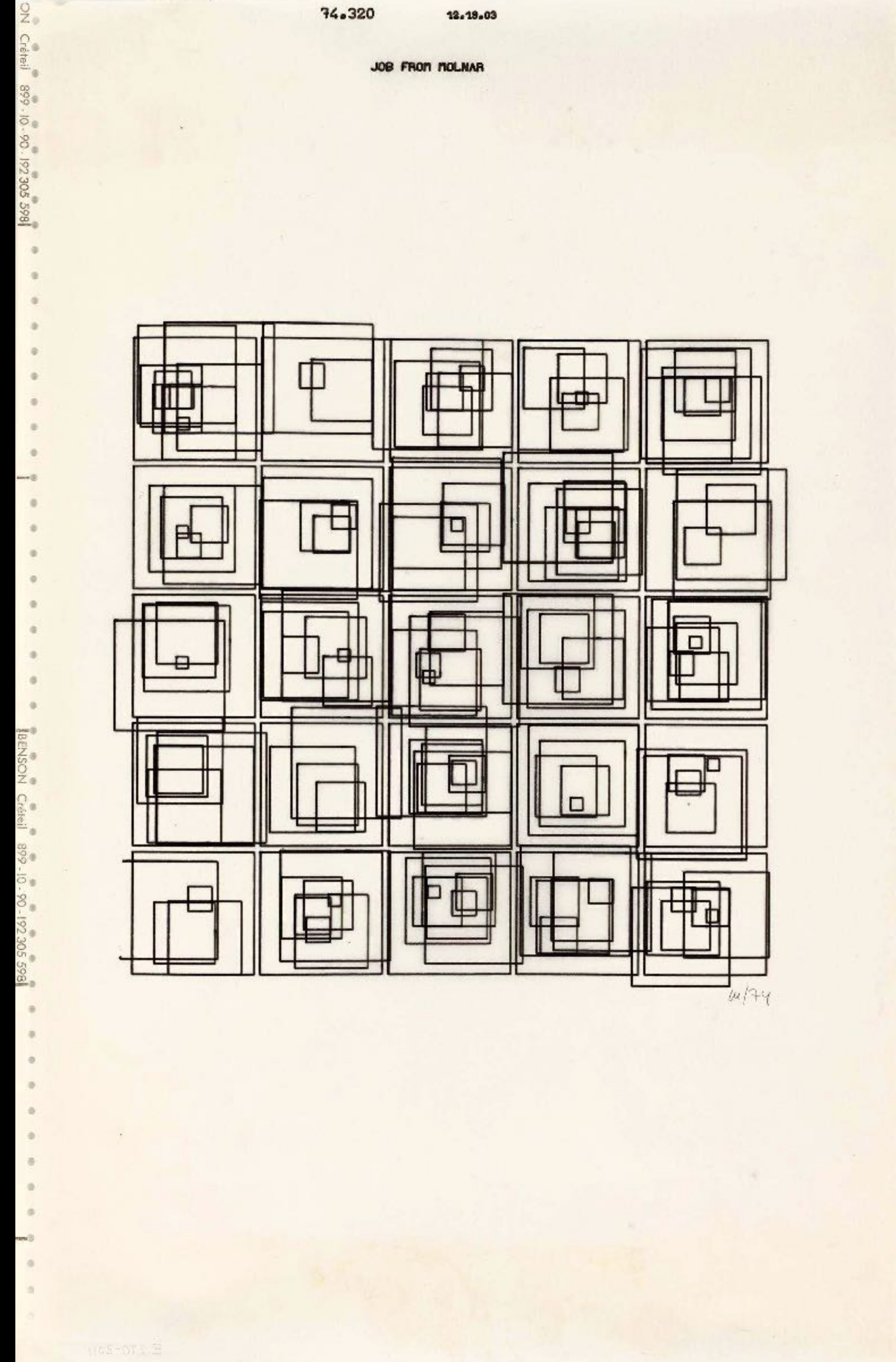
The earliest works of art produced on computers, were abstract graphical drawings, generated on room-sized computers and output on pen plotters, originally intended for drawing plans and scientific visualizations.

The artists were, with few exceptions, people with a background in the sciences and employed by Universities, Research Institutes and Technology Companies, who "misused" their employers equipment after working hours to create art.

The first exhibitions of computer generated artworks took place in 1965 in Stuttgart and New York City, with contributions from **Georg Nees** (DE), **Frieder Nake** (DE) and **A. Michael Noll** (US) who went on to become full-time artists with participations in international exhibitions such as the Venice Biennale and their works being a part of museum collections such as the Victoria and Albert Museum London.

In the final, main part of the workshop we will analyze, learn from, recreate, adapt and transform some of these very first computer generated artworks.

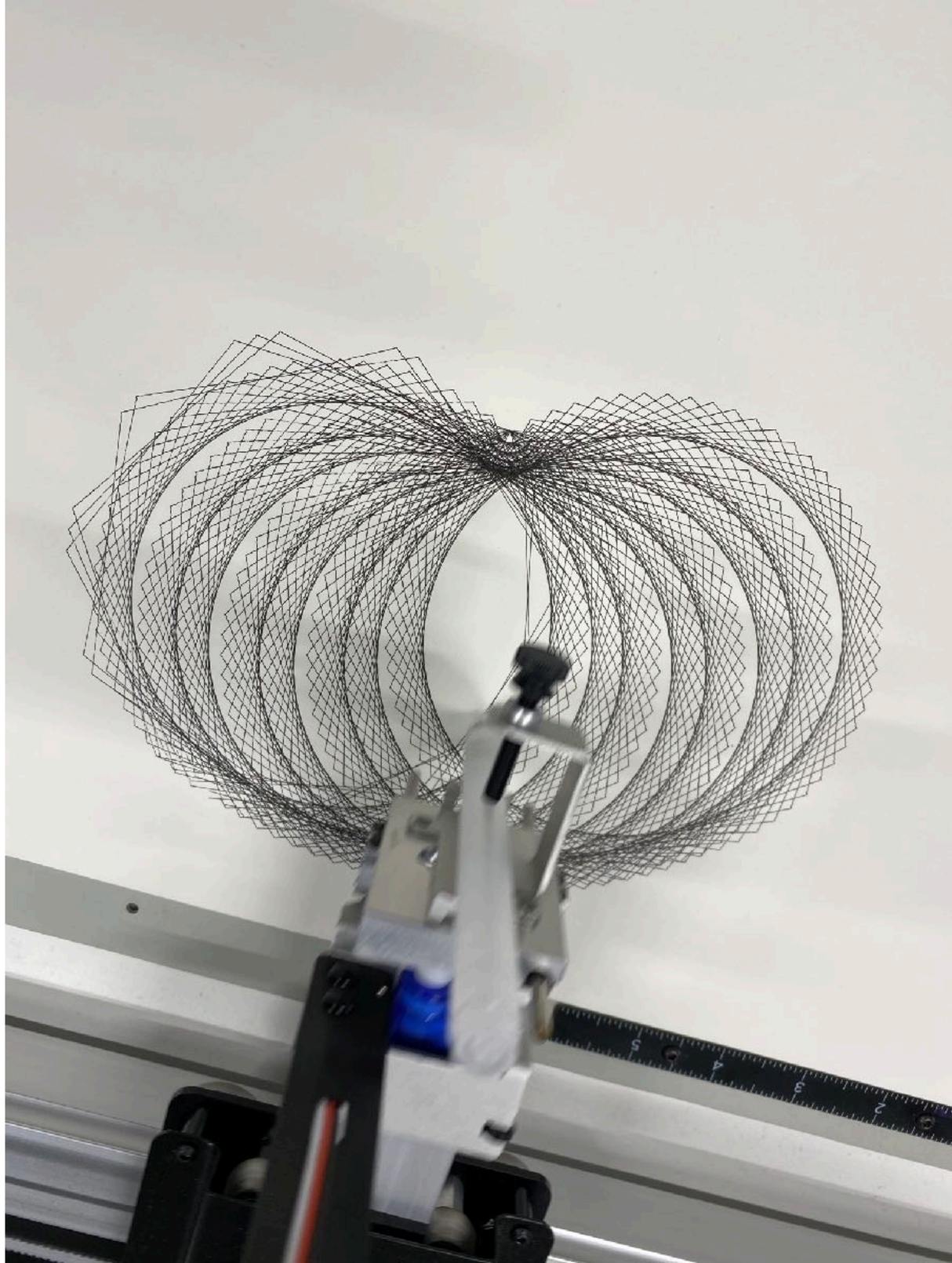




Schotter, Georg Nees; Structures of Squares, Vera Molnár

What students will learn

- Learn an intuitive approach to programming
- Start out with creative coding in p5.js and JavaScript
- Create your own generative artworks and print them with pen on paper
- Get to know the history of early computer art



Requirements

Prerequisites

- Basic Graphic Design skills
- No prior programming experience required

Materials needed

- Personal Laptop
- Drawing materials (Paper and Pens) are provided, participants can use own materials according to preference:
  - (Optional) Paper or magazines (DIN A3 or similar size)
  - (Optional) Various thickness drawing pens (Ink or felt-tip work best)

Room requirements

- Projector or Large Format Screen (USB-C or HDMI)
- Stable WiFi

Format

- Duration: 3 days
- 6 hours per day:
  2 x 3 hours, with a lunch break in between
- Max. 15 participants
- Language: German or English
- Fee: EUR 3.000,-
- Incl. 20% VAT, excl. travel/accommodation if outside Vienna
- Drawing materials (Paper, Pens) included
- If you have different requirements, let’s work something out **→ Contact us**

Workshop Group, Multimedia Art, FH Salzburg (Austria)

About
Process — Studio for Art and Design

Process is a design studio based in Vienna, specializing in generative and interactive design and working in the fields of branding, web, installation and print. As well as traditional graphic design solutions, Process designs and develops highly specialized software that is used as tools for and by clients.

Founded by Martin Grödl and Moritz Resl in 2015, the studio has since worked for a wide range of national and international clients including Massachusetts Institute of Technology, Sagmeister & Walsh, The Prodigy and Wienerberger. Their work is included in MAK – Museum of Applied Arts' Design Collection and has been part of exhibitions at Design Museum Holon, Ars Electronica Festival, Vienna Biennale, Triennale di Milano and Expo Dubai. Process designed the official Austrian contribution to the 2021 London Design Biennale.

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