Kinetic Art and Embedded Systems

THE UNIVERSITY OF UTAH

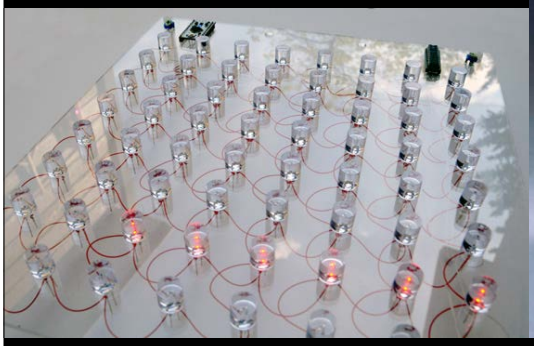
Erik Brunvand
School of Computing

Wendy Wischer
Dept. of Art & Art History

- Class meets from 3:40-5:00pm on Tue and Thu
- Main classrooms: Art 158 and Art 178 (sculpture area)
- Canvas page is the main course web site
  - https://utah.instructure.com/courses/542019
  - No textbook, but you will be required to buy a sketchbook
- Also, be prepared to spend some money on your projects…

Agenda

We argue that arts/technology collaboration is a powerful framework for enhancing ideas in both arenas



Context

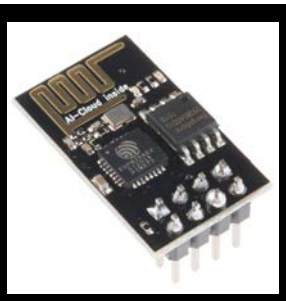
This class explores arts/tech collaboration
in the context of ***kinetic art***
and its connection to ***embedded systems***

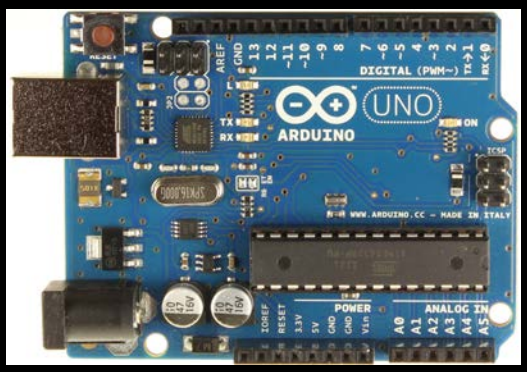




Embedded Systems

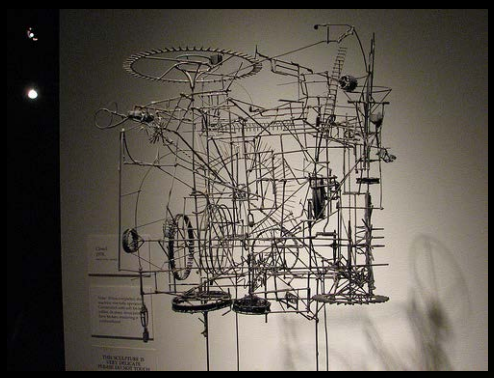
- Computer systems that are embedded into a complete device
  - Often small or special purpose computers or microprocessors
  - Designed to perform one or a few dedicated functions
  - Often reactive to environmental sensors
  - Often designed to directly control output devices

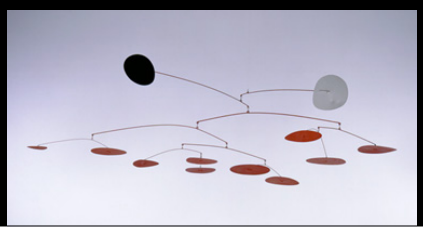




Kinetic Art

- Contains moving parts
  - Involving motion, sound, or light
- Often controlled by microcontrollers
  - Motors, actuators, transducers... (Physical Computing)
- Often reactive to environment



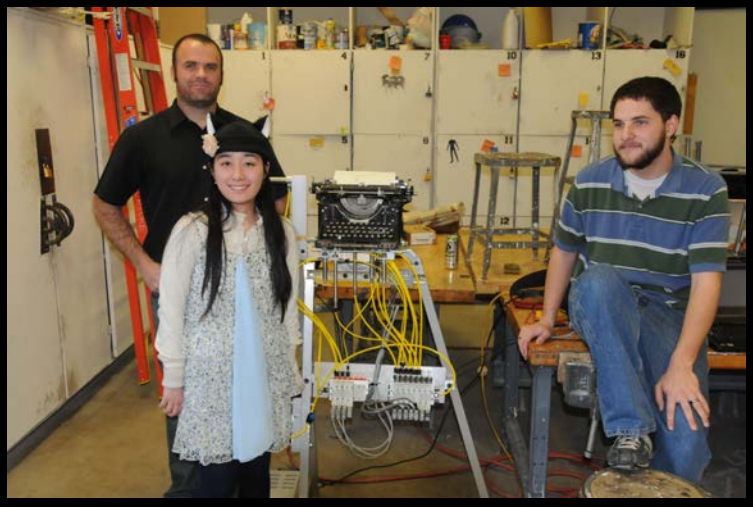


Cross-Disciplinary Class

- Bring Art students and Computer Science and Engineering (CSE) students together
  - Design and build embedded-system-controlled kinetic art
  - Goal is benefit for both groups of students
- Fundamental nature of ***Design***?
  - Design thinking vs. computational thinking?

Class Overview

- Basic reactive programming with embedded systems
  - Electronics fundamentals
  - Sensors and actuators as I/O
- Basic 3d art concepts
  - Formal elements: aesthetics, proportion, balance, tension
  - Material studies and mechanical linkages
- Studio-based instruction model



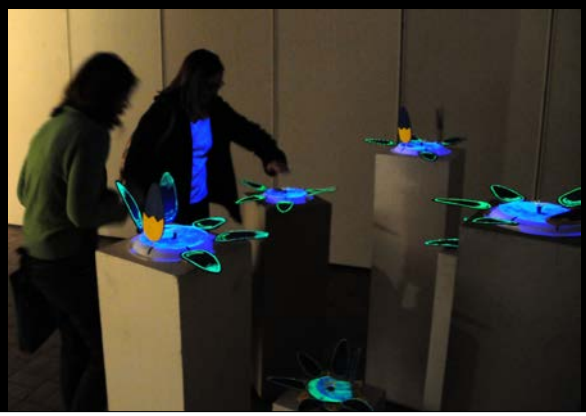
Class Overview

- Individual and group projects
- Finish with a gallery show
  - F 2009: Invisible Logic
  - F 2010: Intersectio
  - Sp 2012: Drawing Machines
  - Sp 2013: Input/Artput
  - Sp 2015: C:\Art\Run
  - Sp 2017: Kinetic Asthetic

Intersectio

Enhancing Creativity

- Creative design and design-thinking: powerful concepts
  - One definition: enhanced creativity is generating many potential solutions instead of gravitating quickly to one



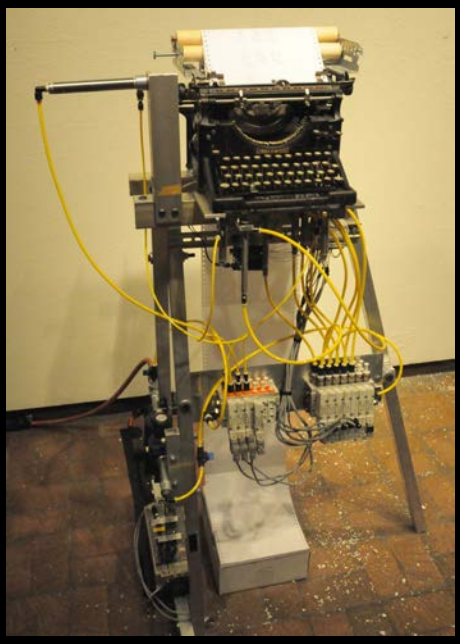
Kinetic art is serious stuff…

… but not regular CS projects

CS students have the freedom to explore without worrying about getting it "right"

HW Infrastructure

- Controllers – Arduino, PSoC, ESP8266
- Sensors
  - Potentiometers/knobs, light, motion (PIR), distance, vibration (piezo), sound, temperature, etc.
- Actuators and transducers
  - LEDs , servos, DC motors, stepper motors, sound, etc.
- Other parts
  - LED drivers, transistors, resistors, diodes
  - LCD displays, SPI/I2C peripherals
  - Power supplies, soldering stations, wire, etc.

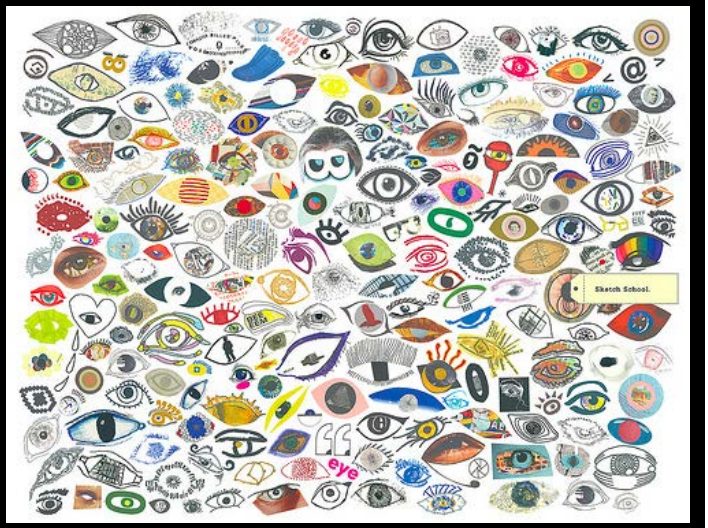


Drawing on Data

- Connection to Computer Engineering
- The idea is to explore kinetic works that are based upon data
  - Mark making?
  - Environmental sensors?
  - Reactive art?
  - Data mining?

Sketchbooks

- You should start keeping a sketchbook
  - A page a day is a good target
    - Not every page needs to be a masterpiece…
  - Design ideas, inspiration, thoughts, etc.
  - Look at Carol Sogard's "Sketch School" for inspiration (link on class web site)

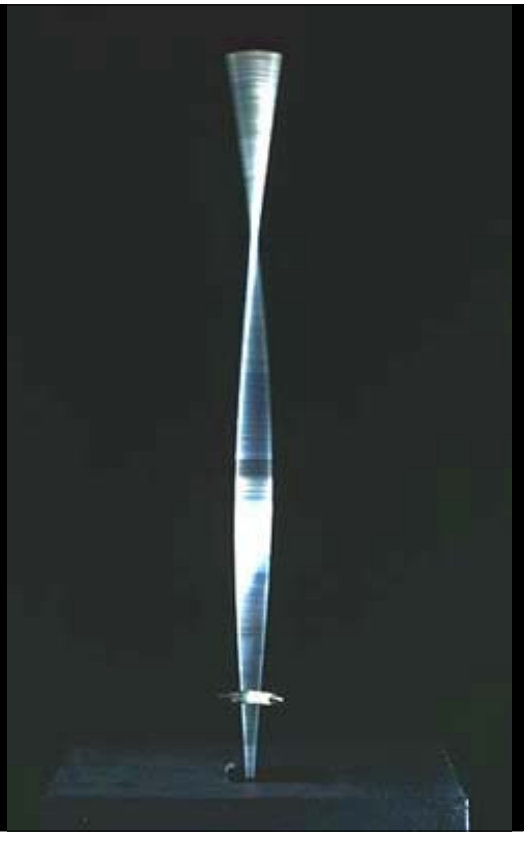


Background

- Short survey of kinetic art
  - The avant garde in the 1920's
  - Small steps in the 1950's
  - The computer age
- Class Examples

Naum Gabo (1890-1977)

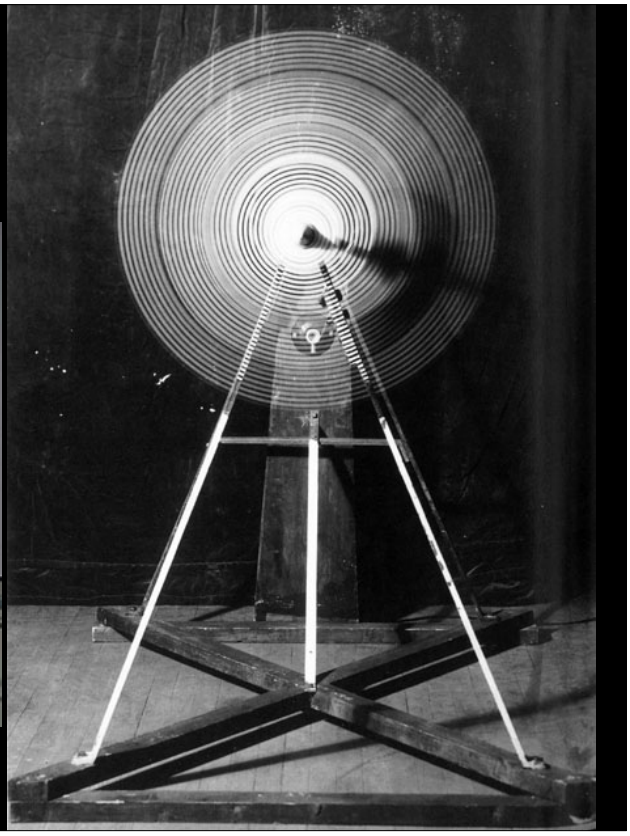
- Kinetic Construction (Standing Wave) 1919-1920



Marcel Duchamp

(1887 – 1968)

- Rotary Glass Plates, 1920
- Built with the help of Man Ray



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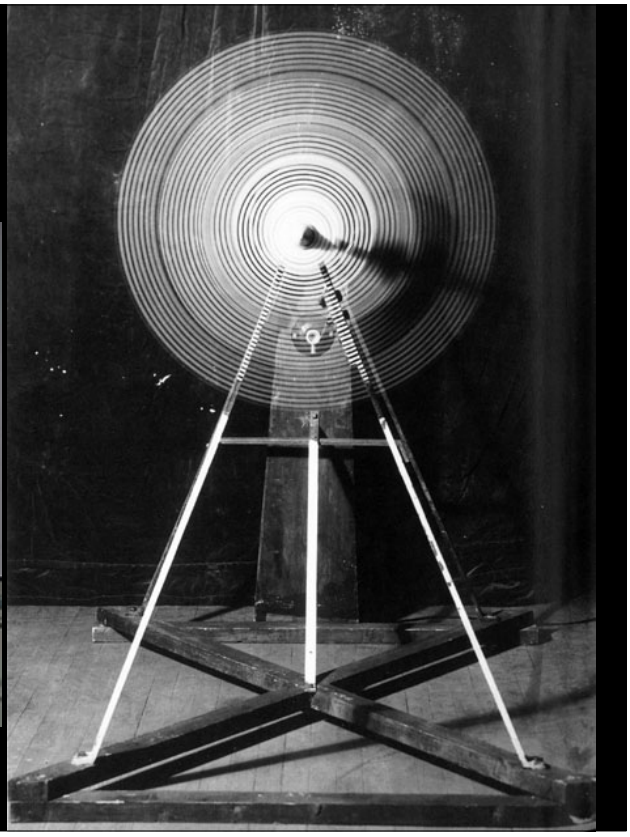


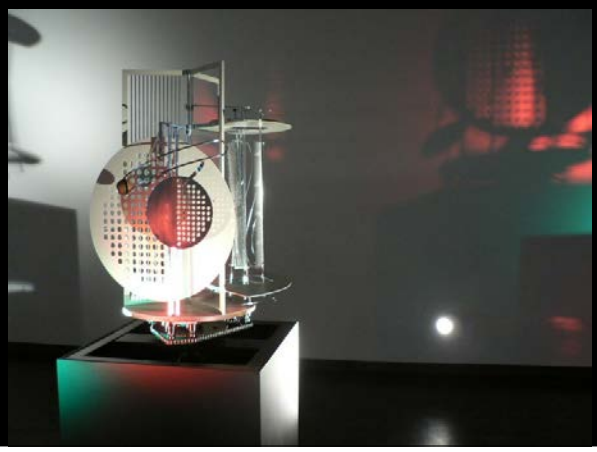
Marcel Duchamp

(1887 – 1968)

- Rotary Demisphere (Precision Optics) 1925

László Moholy-Nagy (1895-1946)

- Light-Space Modulator (1922-30)



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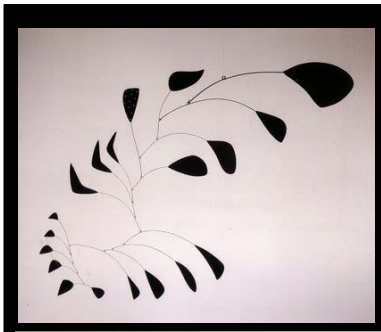
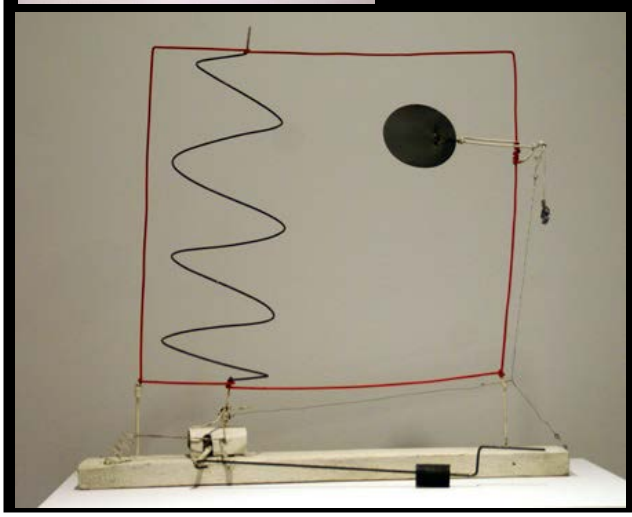
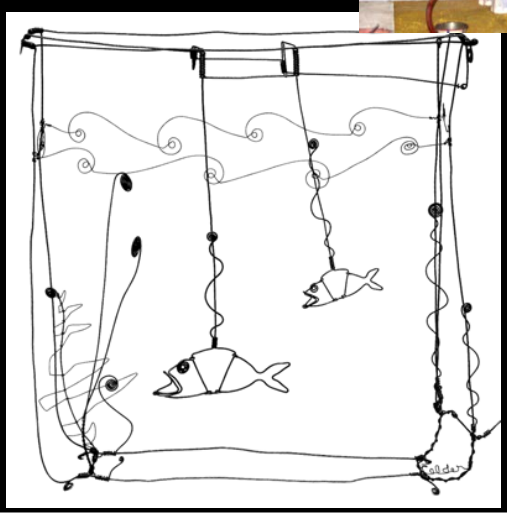


Alexander Calder

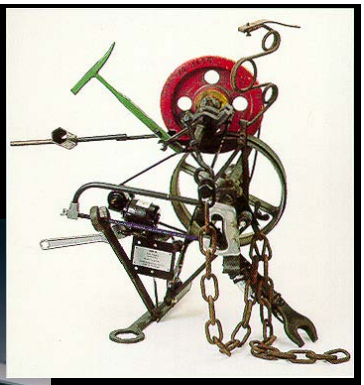
(1898 – 1976)

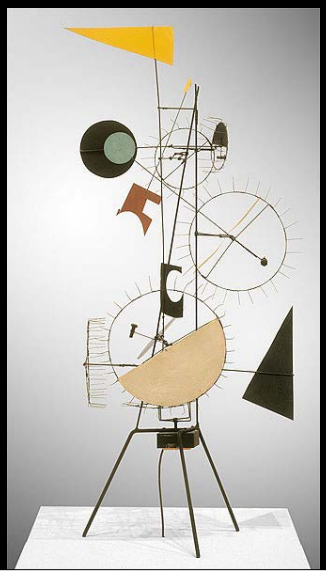
Mobiles and Stabiles
Wire and Circuses





Jean Tinguely
(1925 – 1991)





Jump ahead to the Computer Age

- Electronic control
  - microprocessors or discrete electronics
- Mechanical actuators
  - motors, servos, relays, solenoids, etc.
  - speakers, buzzers, other noise makers
- Lights
  - LEDs, light bulbs, EL wire, etc.
- Sensors to interact with the viewer
  - distance, movement, sound, temperature, vibration, etc.

Ivan Sutherland (b1938)

The 9 Evenings and E.A.T.

Billy Klüver
Robert Rauschenberg
1966

The 9 Evenings and E.A.T.

- “Rauschenberg's strong commitment to the idea of collaboration shaped my thinking. We evolved the idea of the equal collaboration between individuals in these two fields contributing to a joint project”
- - Billy Klüver

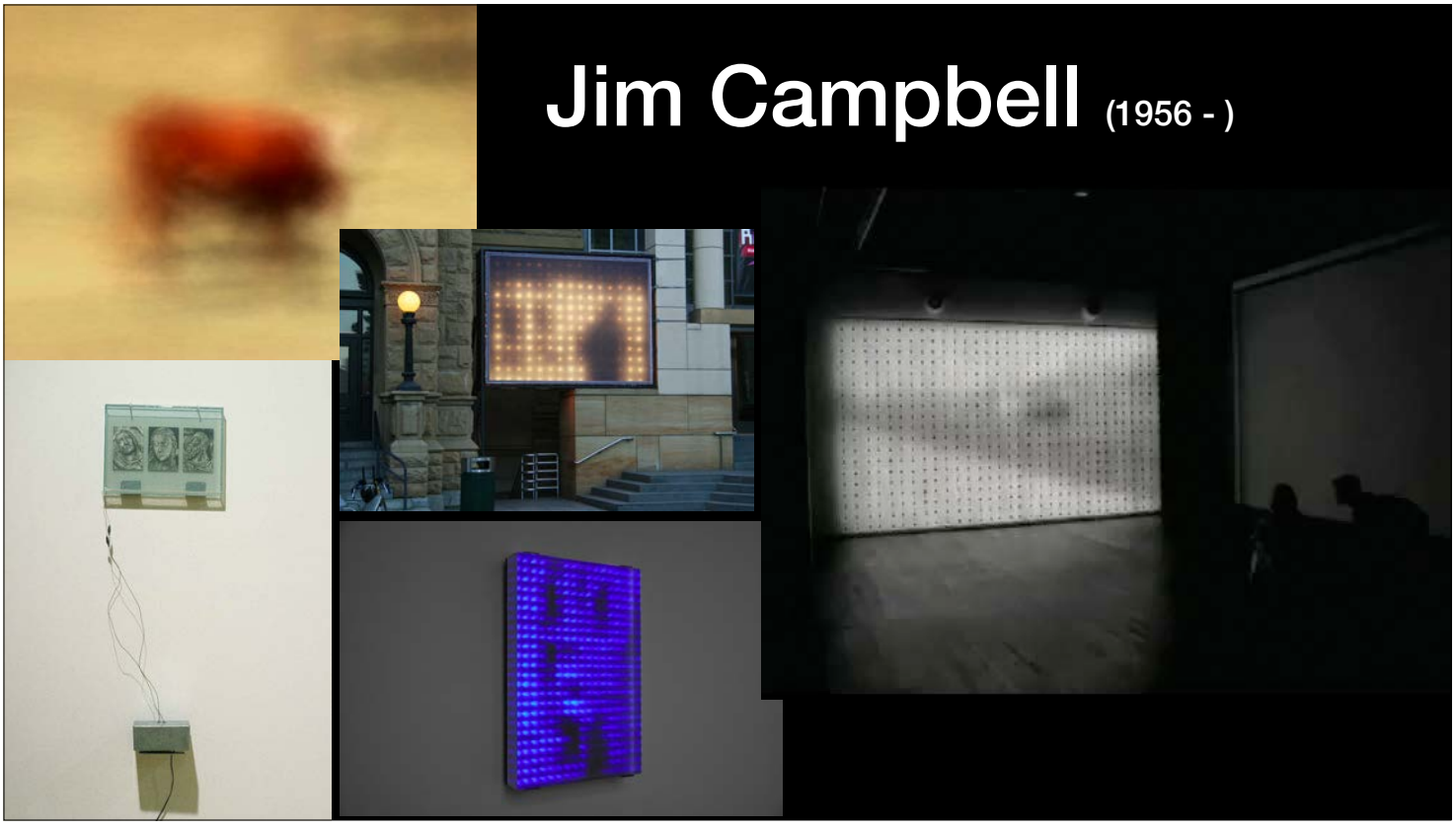
The 9 Evenings and E.A.T.

- “I came to believe that a hands on, working relationship between the artist and the engineer was the means for providing the artist with access to technology. Rauschenberg's strong commitment to the idea of collaboration shaped my thinking. We evolved the idea of the equal collaboration between individuals in these two fields contributing to a joint project”
- - Billy Klüver

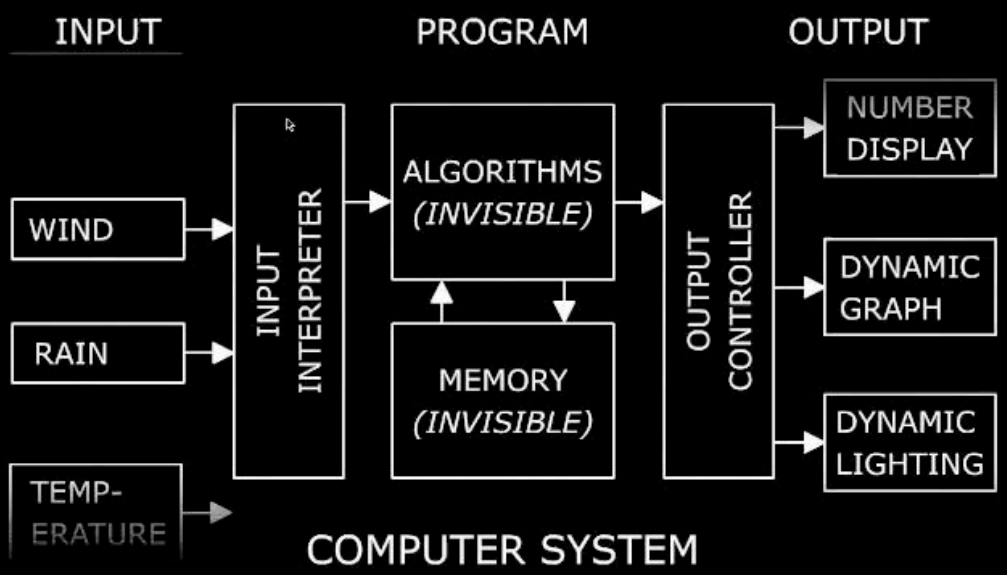
Ed Catmull, Fred Parke

1972

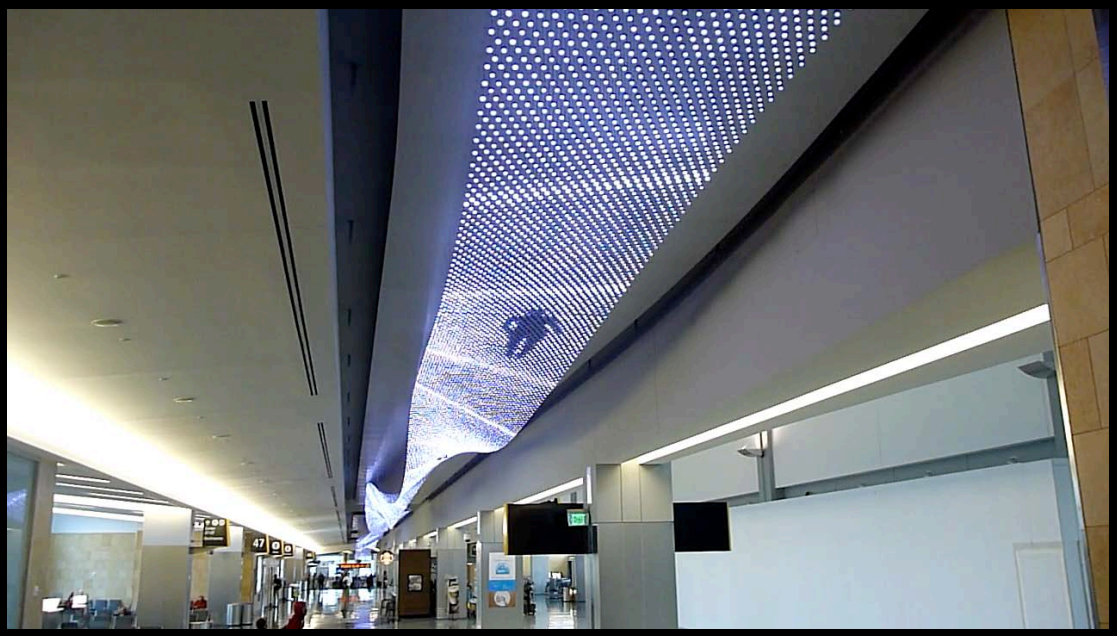
Jim Campbell (1956 -)



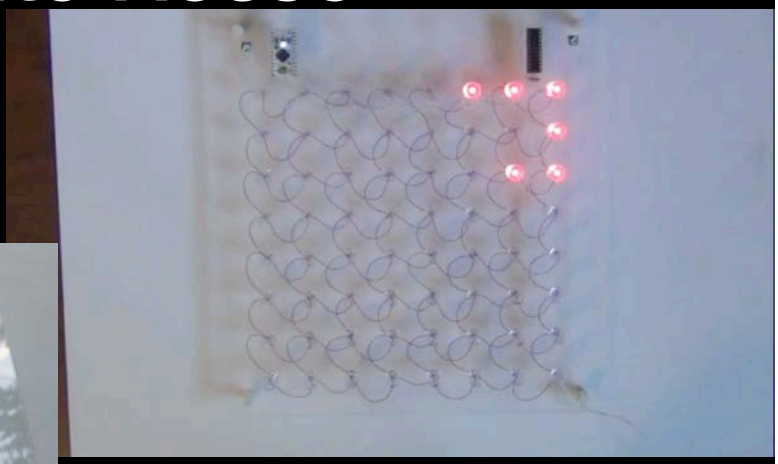
Jim Campbell's Algorithm

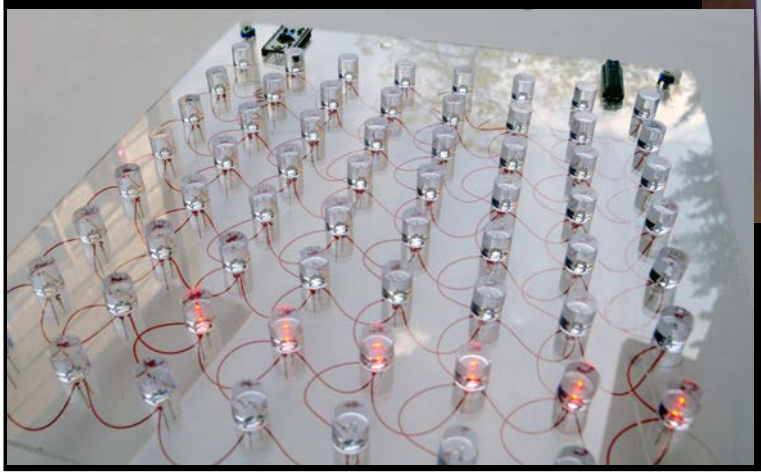


Jim Campbell

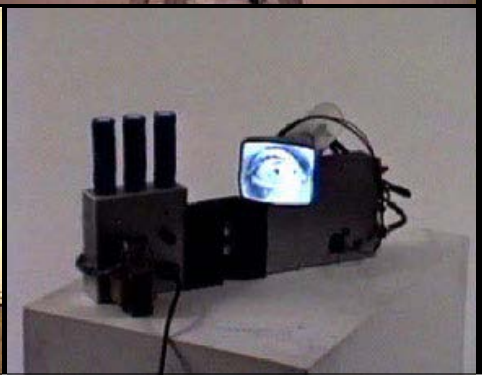


Serpente Rosso



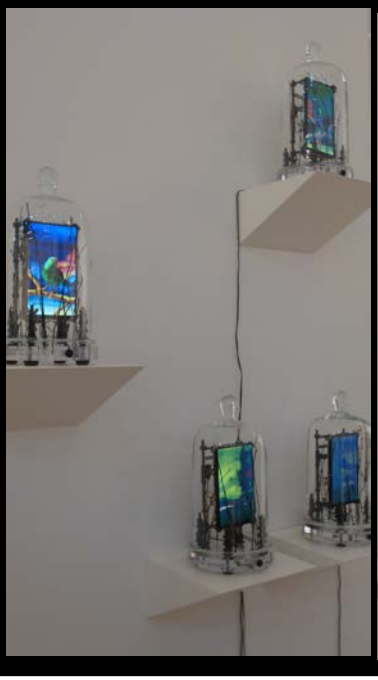
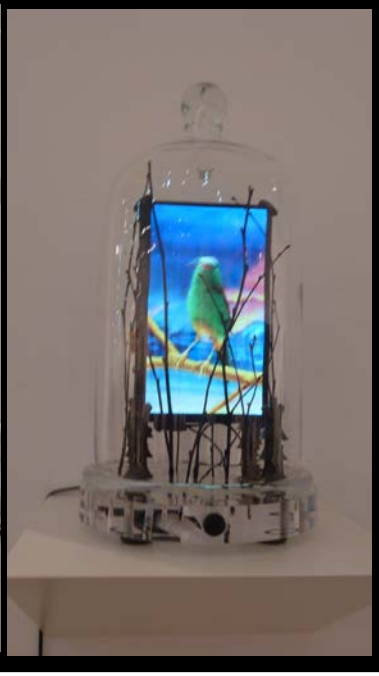


Alan Rath (1959 -)



Alan Rath (1959 -)

Art Basel, 2013

Alan Rath (1959 -)

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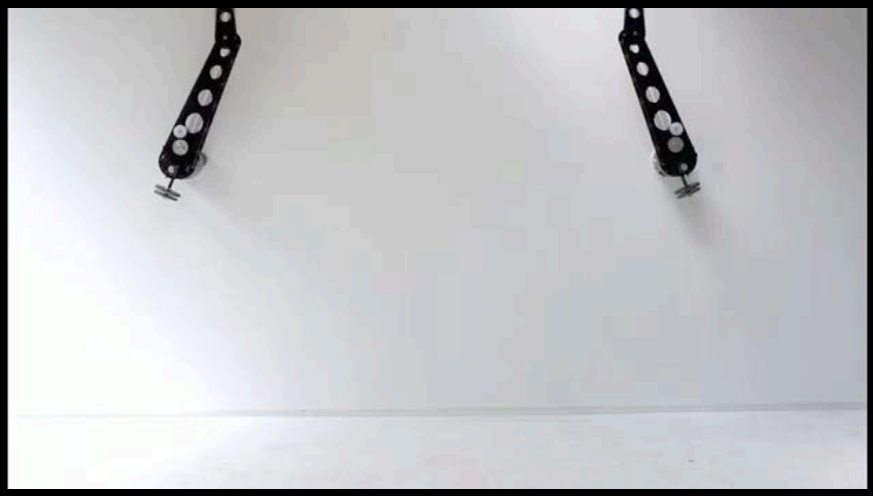
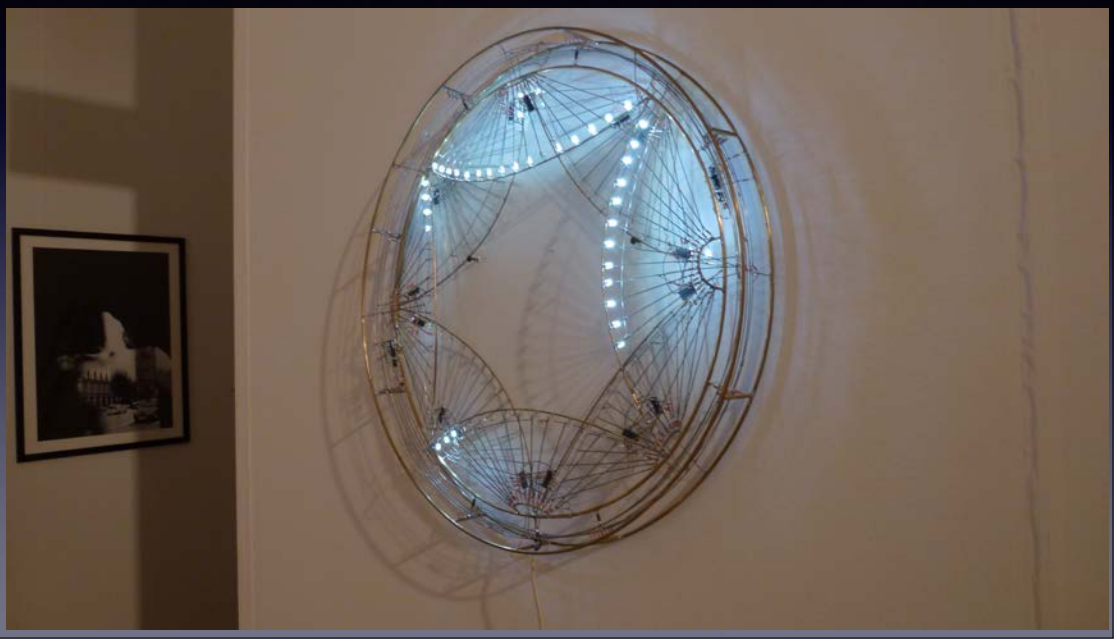


Alain Le Boucher (1950 -)

Art Basel, 2013

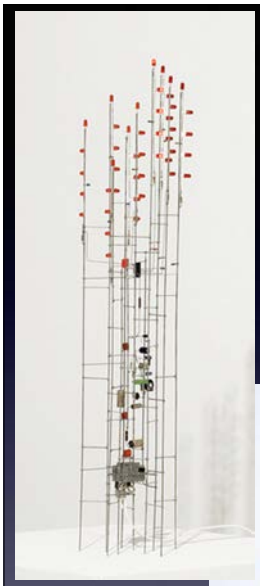


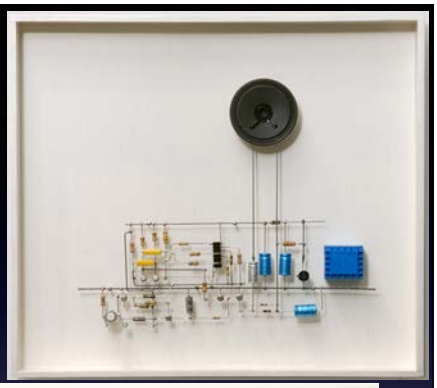
Alain Le Boucher (1950 -)

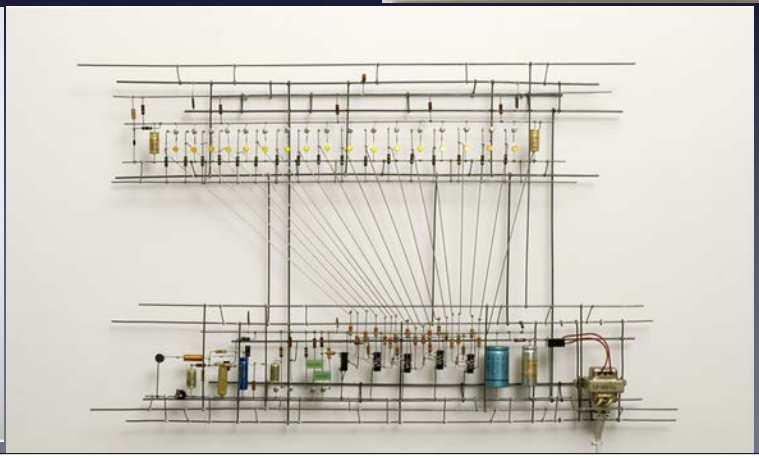
Alain Le Boucher (1950 -)

Alain Le Boucher
Unstable Harmonies
2012

Peter Vogel (b 1954)





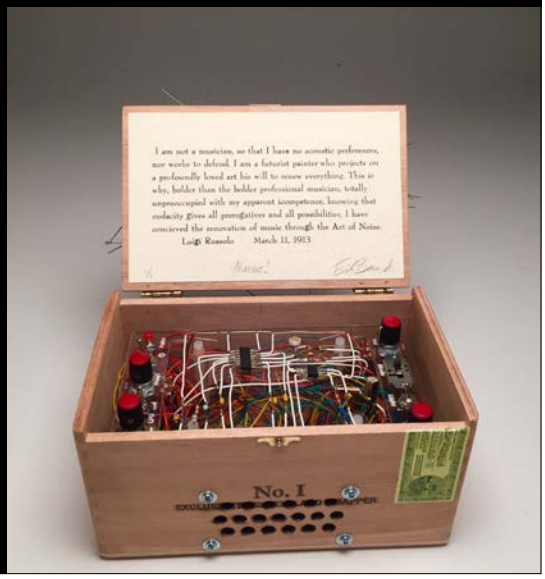


Peter Vogel (b 1954)

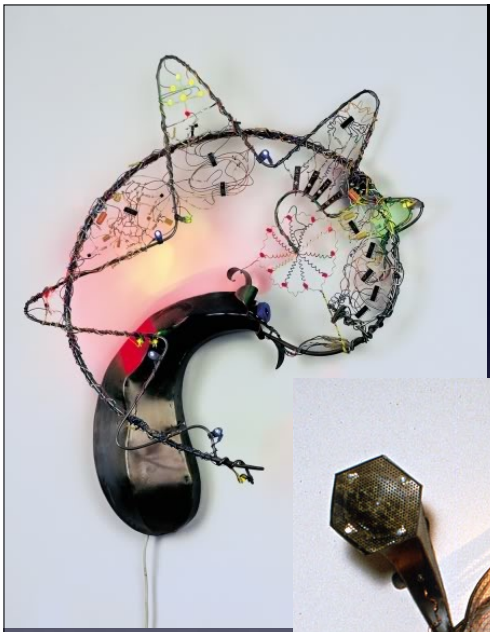
Soundwall Performance II

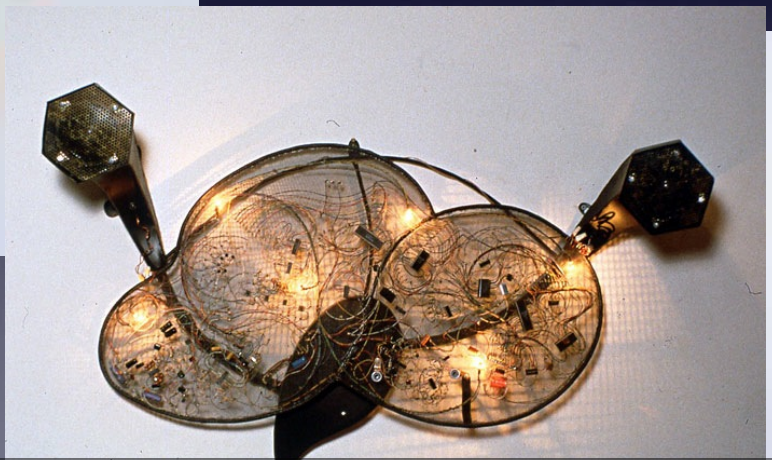
Totem (2018)

Noise! (2018)

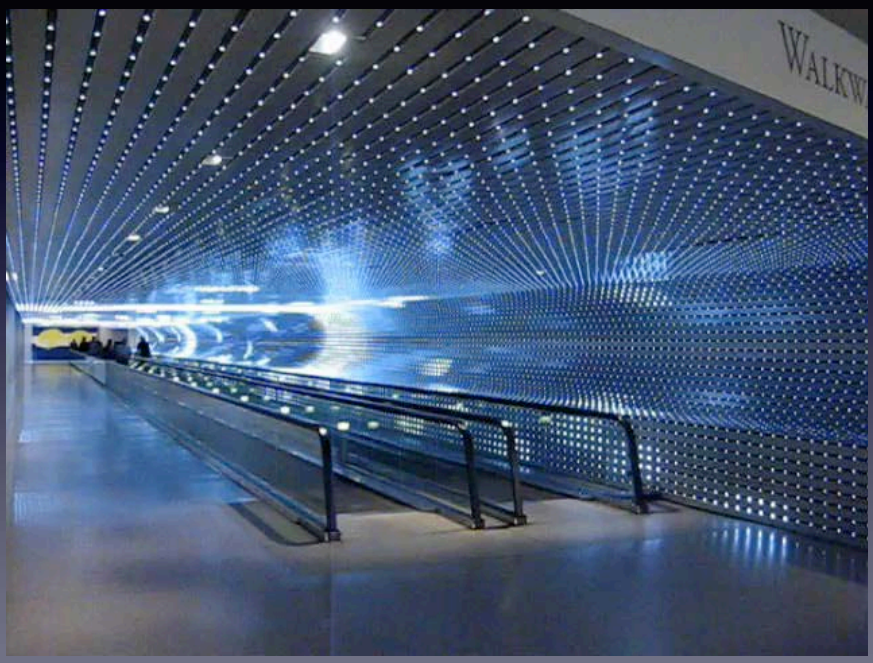


Jack Dollhausen





Leo Villareal (b1967)



Leo Villareal (b1967)

Jenny Holzer (b1950)

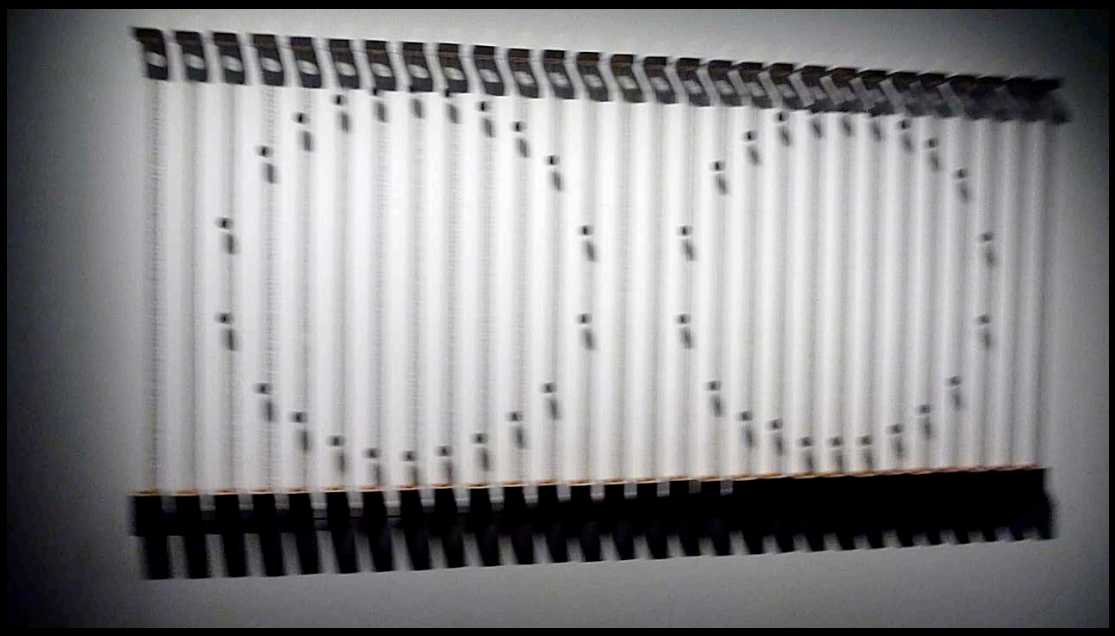
CHI Interactivity

Gravity of Light

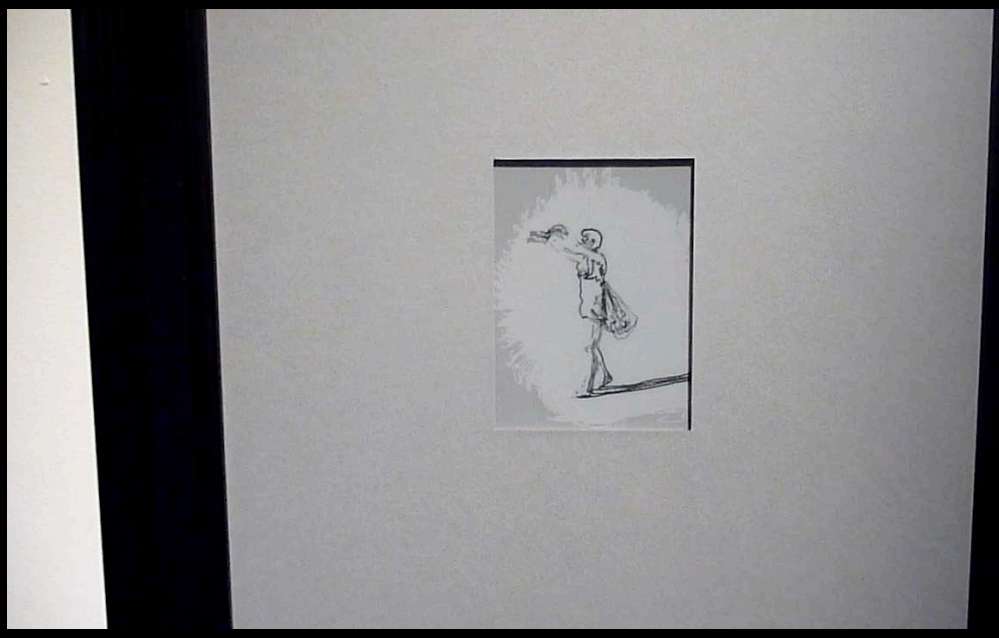
3D Printed Wearable Project

YOUNGHUI KIM / YEJIN CHO

SIGGRAPH Art Gallery



SIGGRAPH Art Gallery



SIGGRAPH Art Gallery

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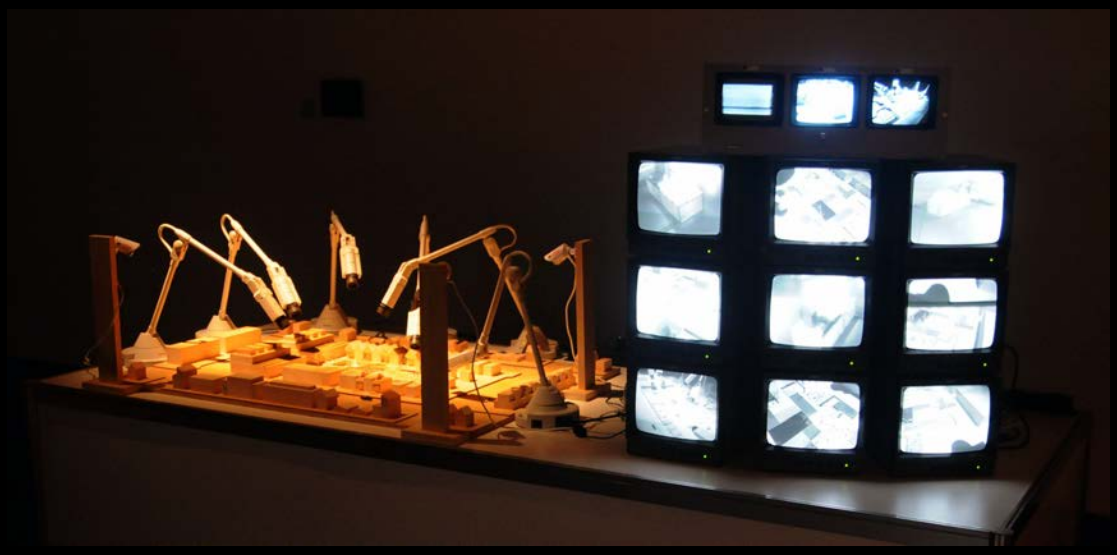

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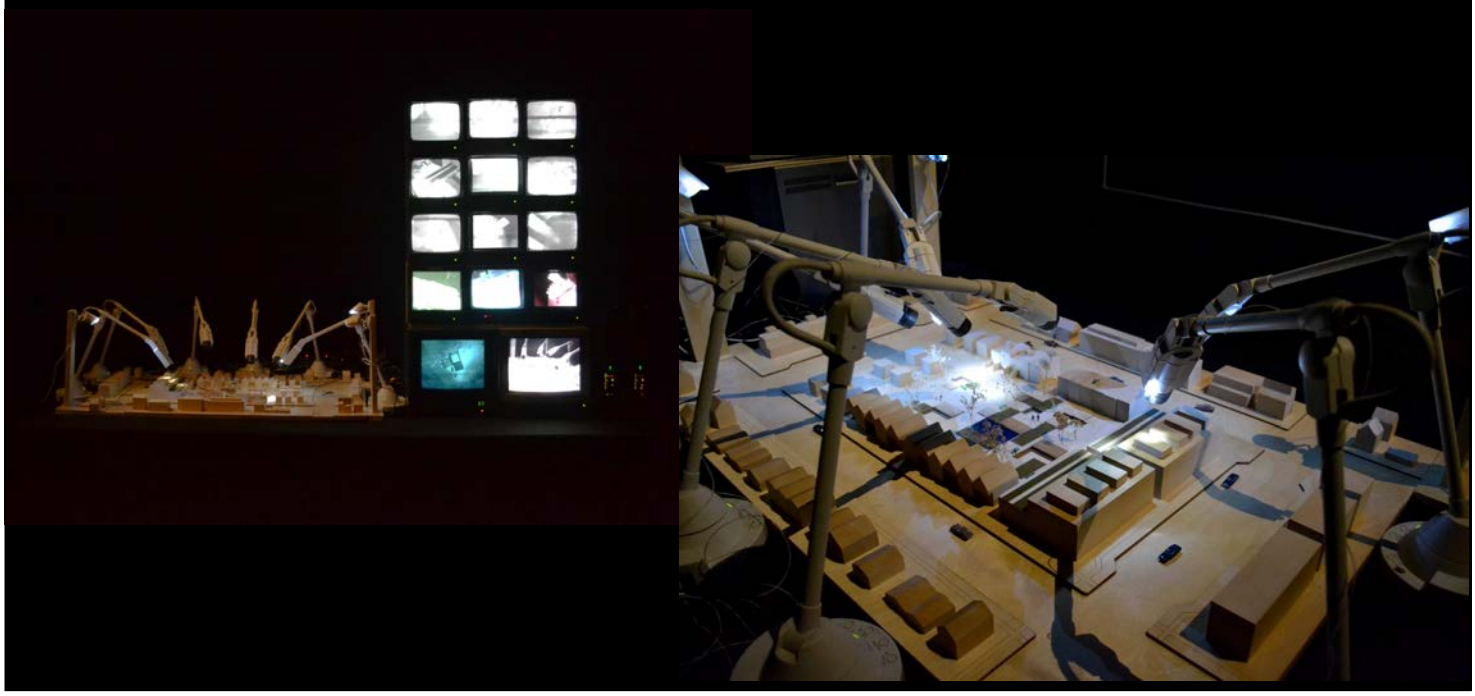
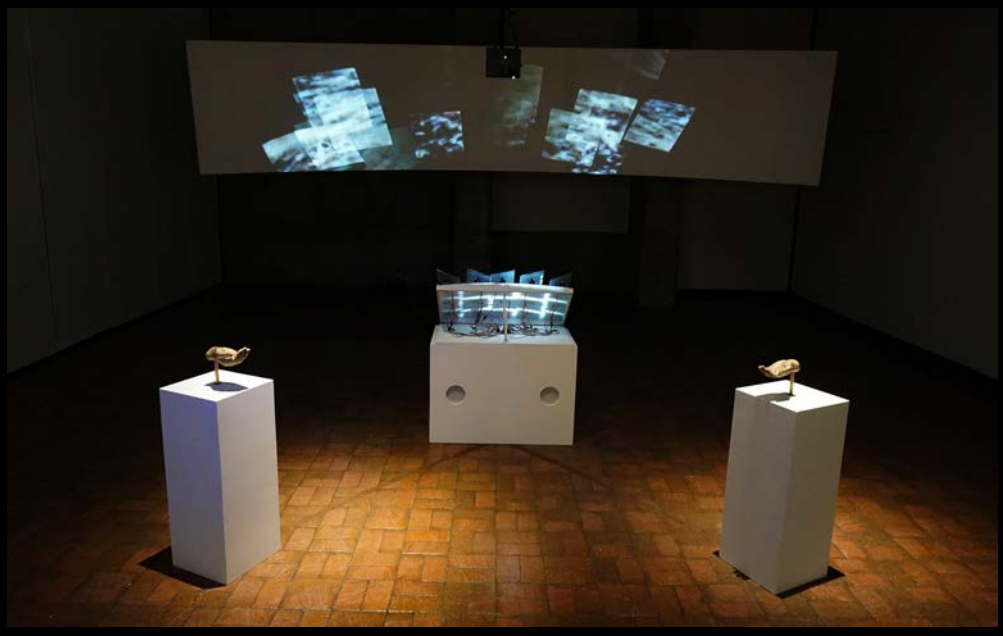


Erik Brunvand and Wendy Wischer



Erik Brunvand and Wendy Wischer

Wendy Wischer

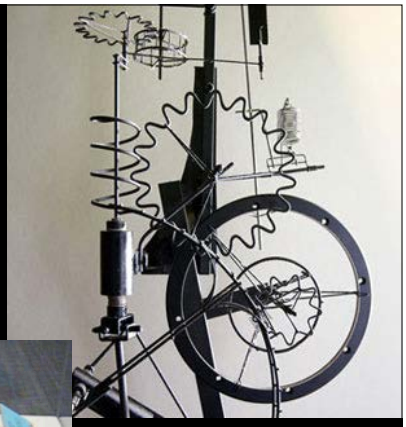
Parallel Journeys

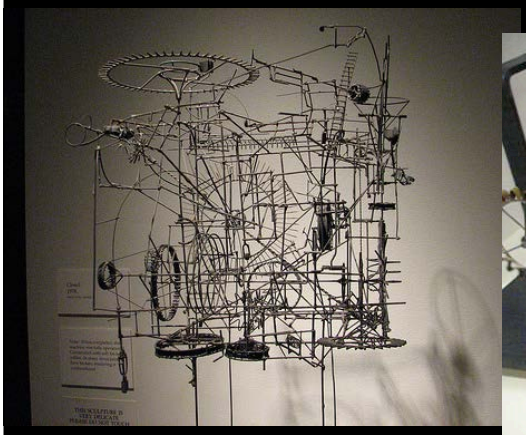
Wendy Wischer

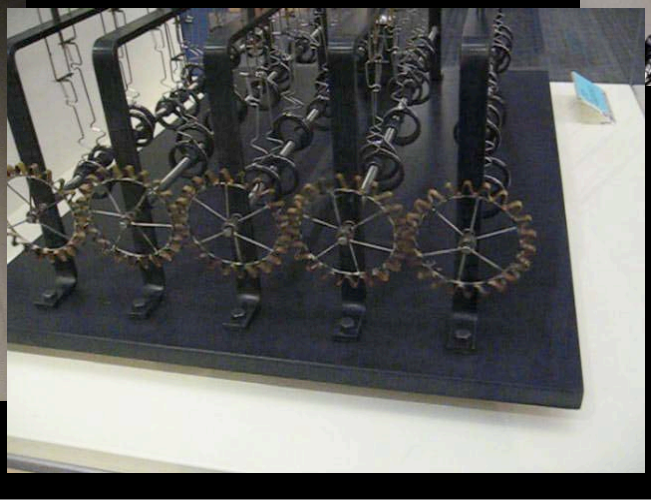
Daniel Rozin (1961 -)

Daniel Rozin

Arthur Ganson (1955 -)

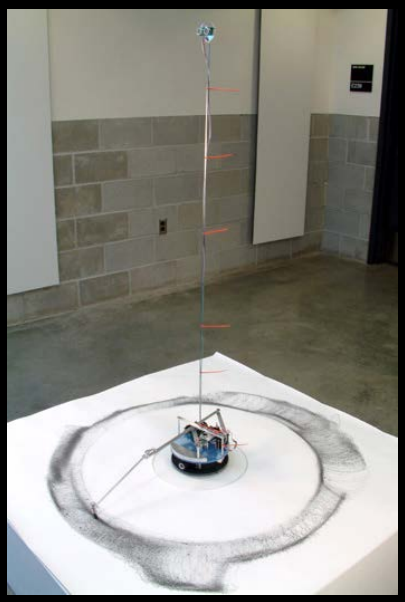






David Bowen

University of
Minnesota, Duluth

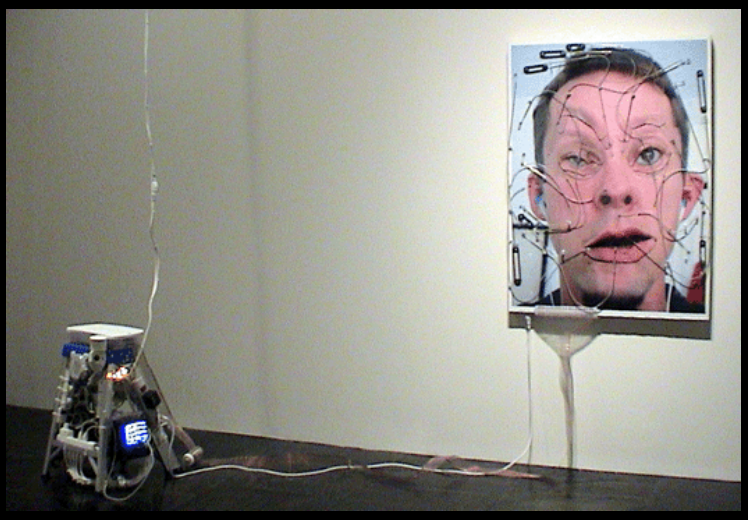


David Bowen

telepresent wind
2009

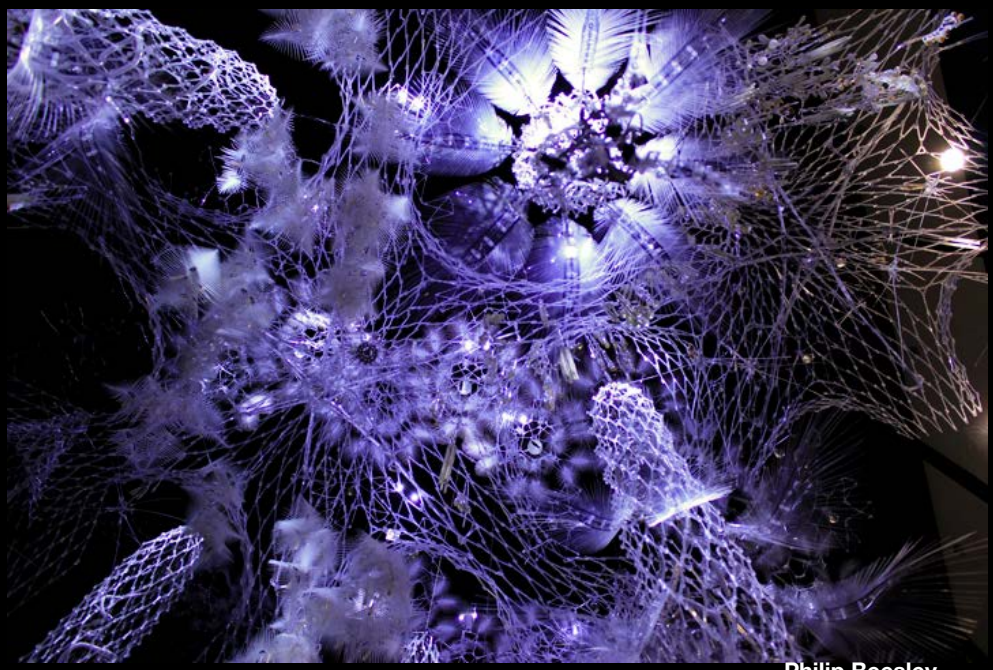
Tim Hawkinson

(1960 -)



Jim Pallas

Hylozoic Veil at The Leonardo



Philip Beesley

Hylozoic Veil at The Leonardo

07

Philip Beesley

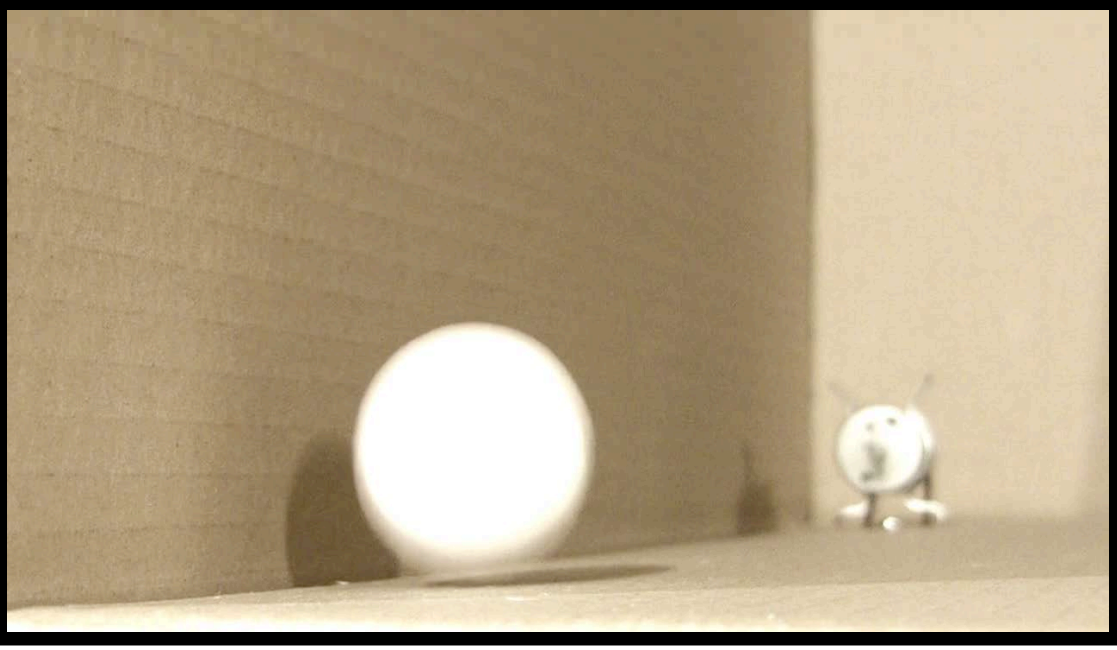
Zimoun (b 1977)

Swiss artist

Makes “sound sculptures”

for example: rotating balls on cardboard boxes

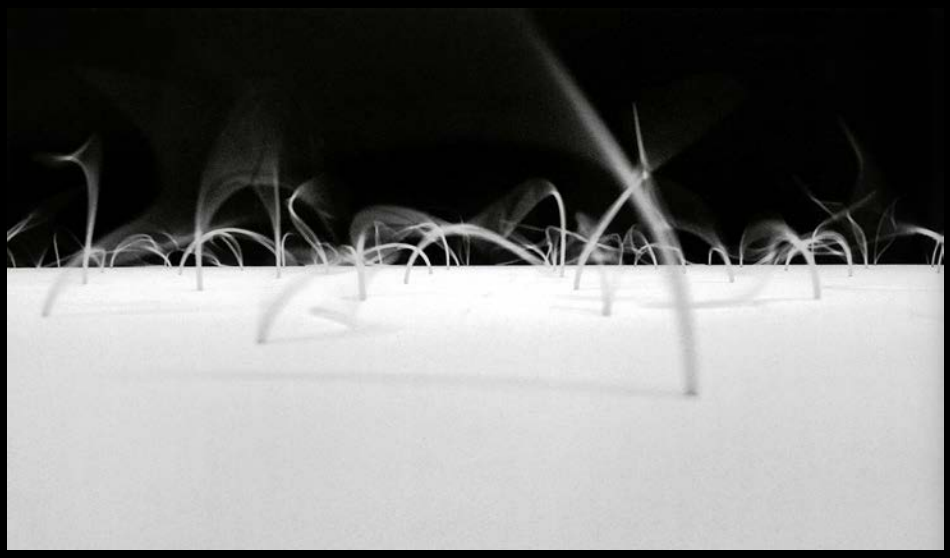
Zimoun



Zimoun

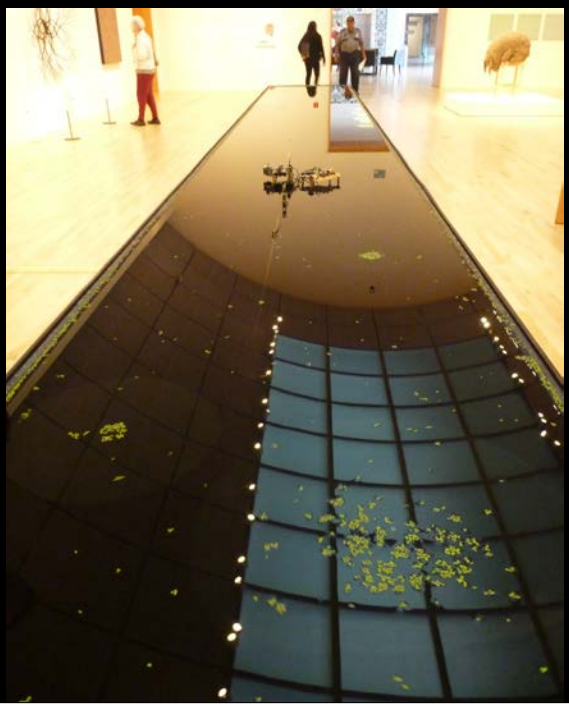
Zimoun

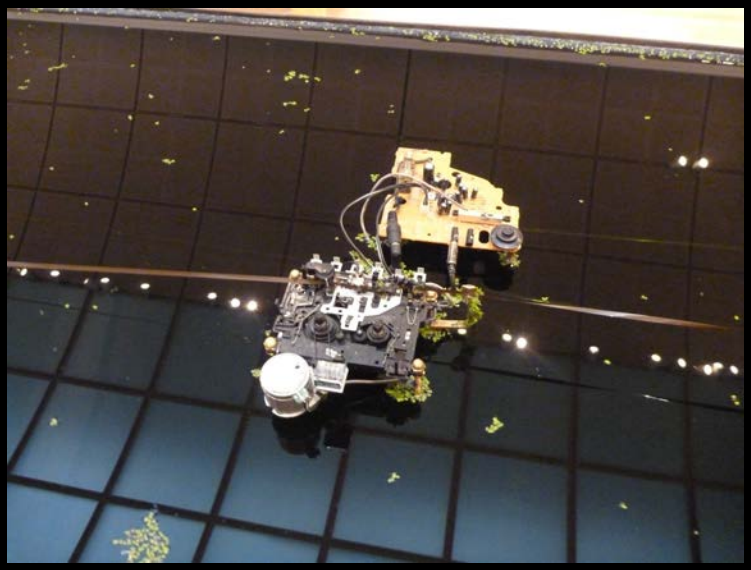
Zimoun



Zimoun

Evan Holm - Water Table





Evan Holm - Water Table

Paul Stout

THE UNIVERSITY OF UTAH

Pittsburgh, Oct 2018

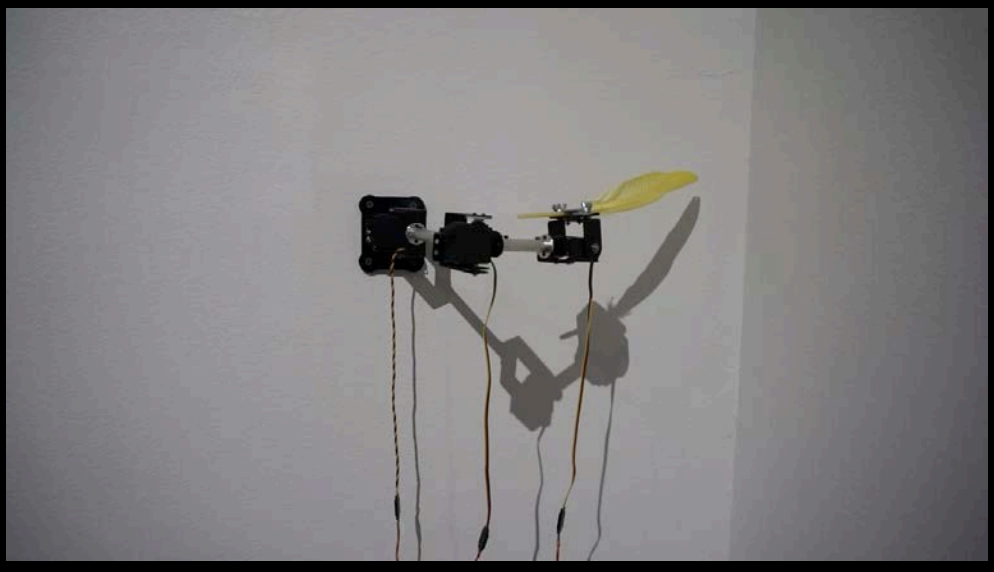
Pittsburgh, Oct 2018

Samuel St-Aubin

Tablespoons, 2012

Tablespoons is the second version of the work made in 2012. Eight rotating spoons exchange four eggs.

Pittsburgh, Oct 2018



Ali Miharbi

Machine that Tickles the Wall, 2013

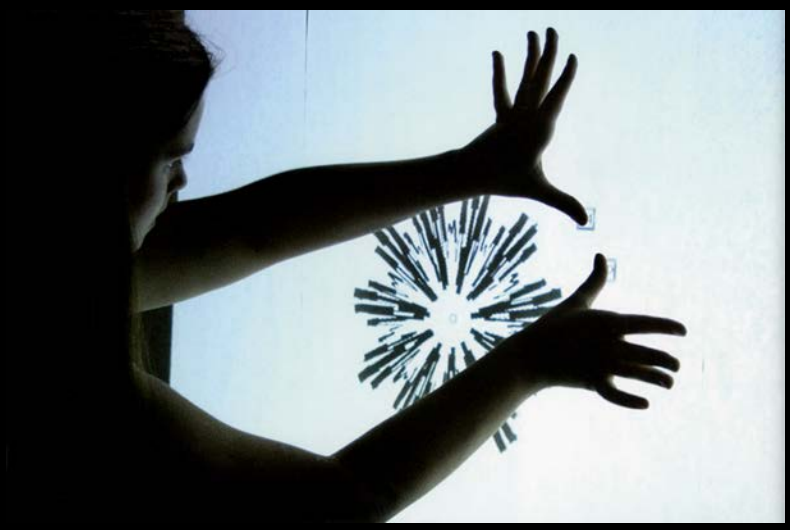
Machine that Tickles the Wall is a small mechanical arm with a feather attached to its tip which points to a wall edge in the gallery. The arm is programmed to imitate various types of tickling movements in a loop.

Pittsburgh, Oct 2018

Julius Popp

Julius Popp

Kitchen Budapest



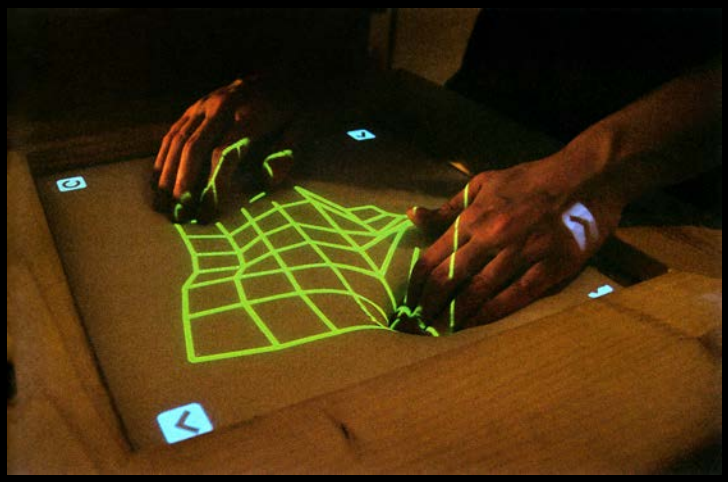
Kitchen Budapest

Niklas Roy

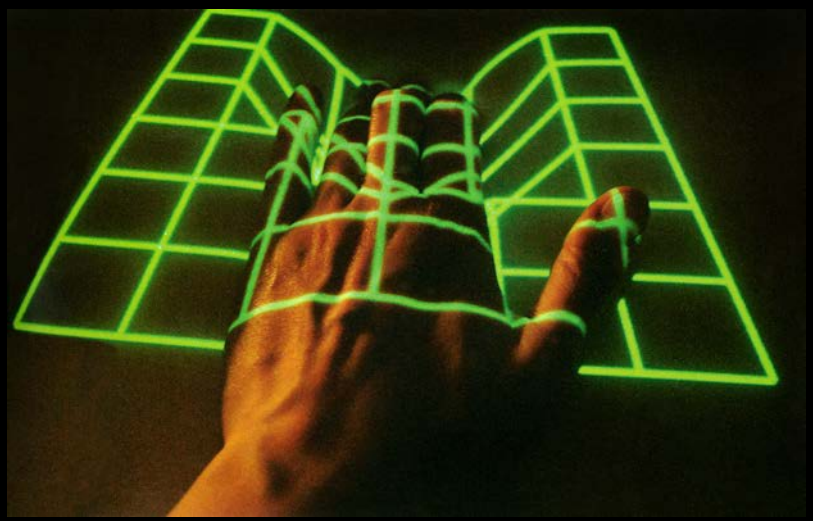
Niklas Roy

Niklas Roy

Silke Hilsing



Silke Hilsing



Silke Hilsing

Robert Mathy

Robert Mathy

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TheGreenEyl

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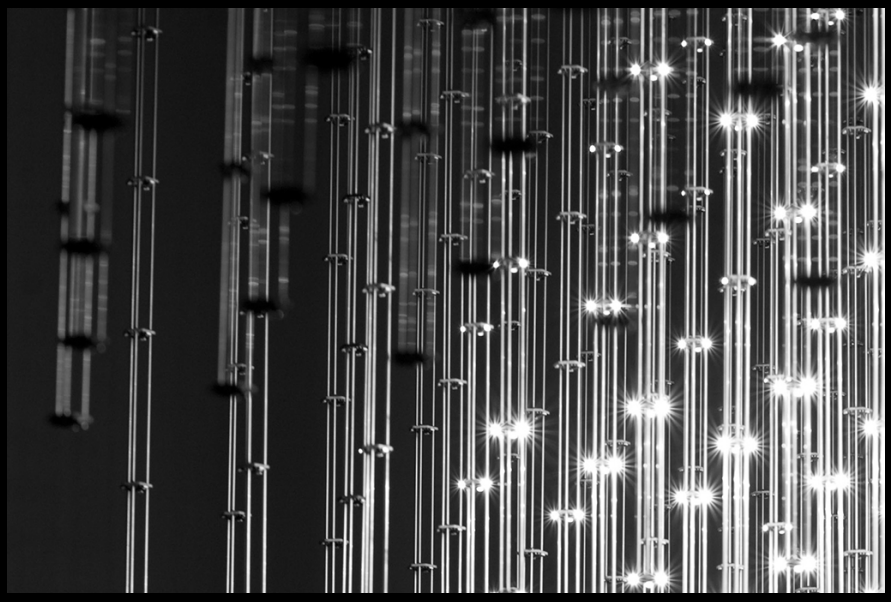
Jed Berk

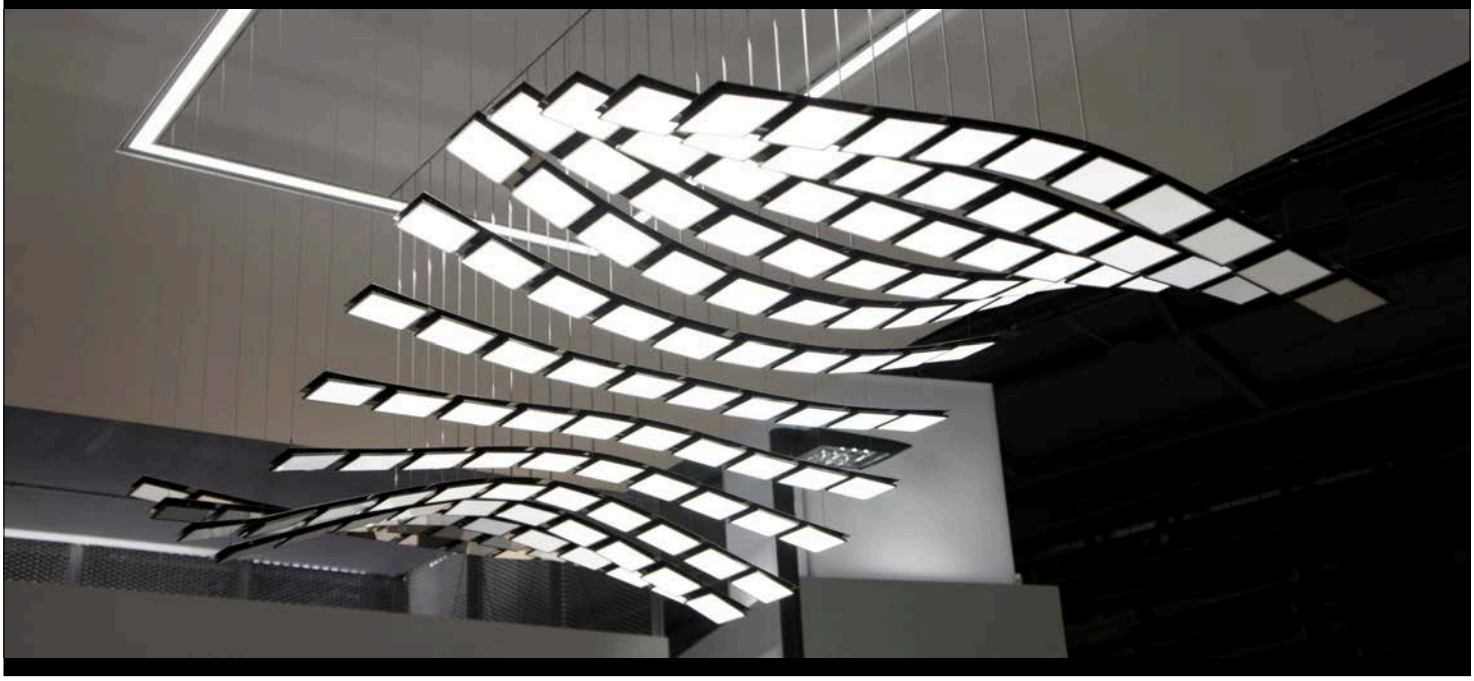
rAndom international



rAndom international

ART + COM

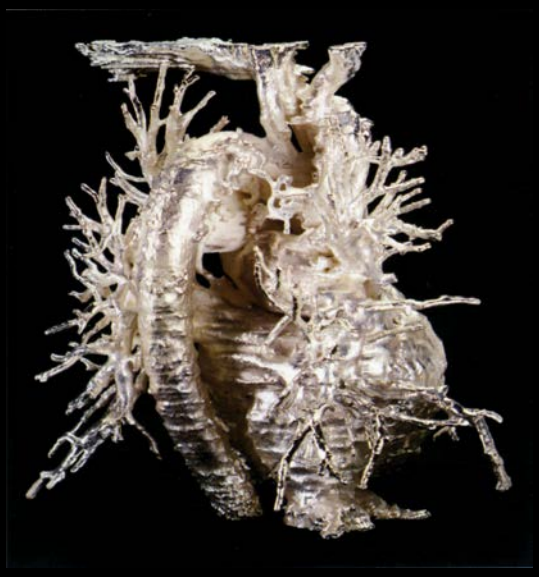
ART + COM



Studio Roosegaarde

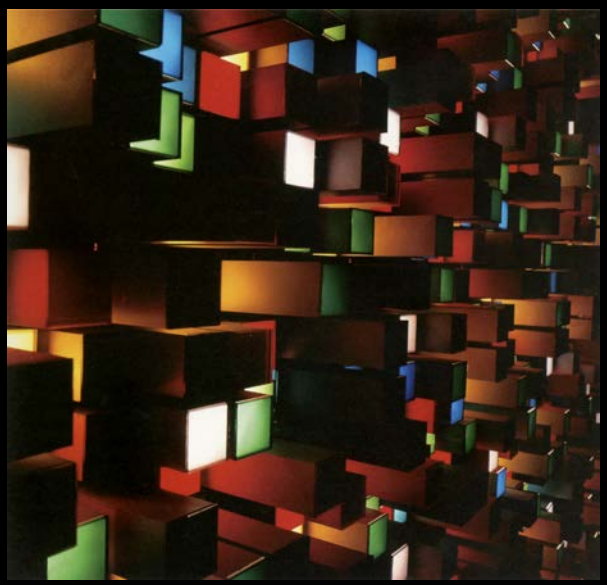
Studio Roosegaarde

Jane Prophet

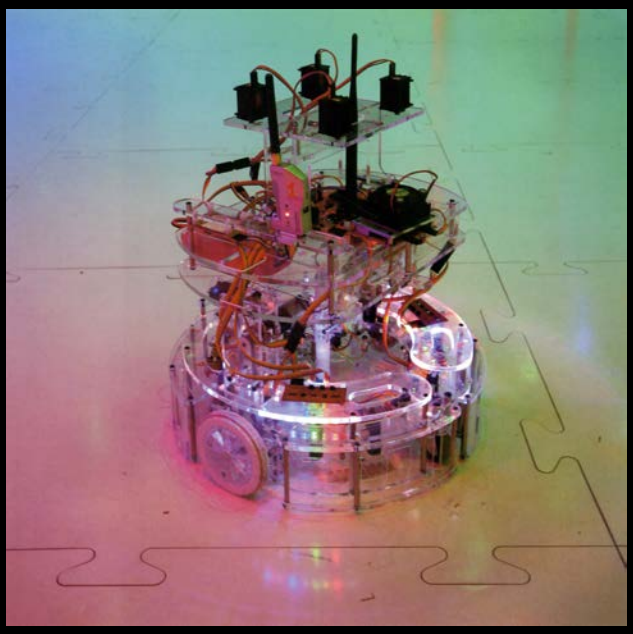


Vladimir Bonacic

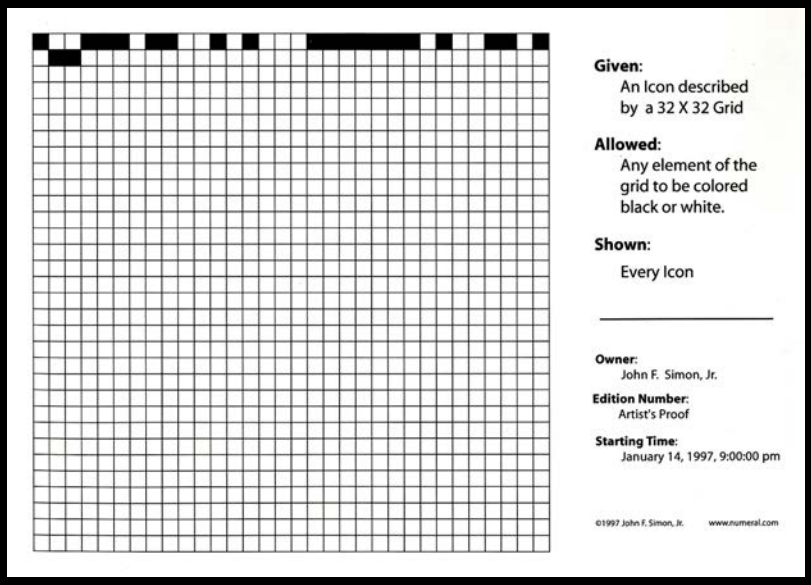
Vladimir Bonacic



Paul Brown, Bill Bigge, Dustin Stokes, Maggie Boden and Phil Husbands



John Simon Jr.



John Simon Jr.

John Simon Jr.

Ken Rinaldo

That's Just Scratching the Surface…

- You're up next - we'll draw artist names and you'll prepare a 10min presentation about their work
  - Show this in class next week

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