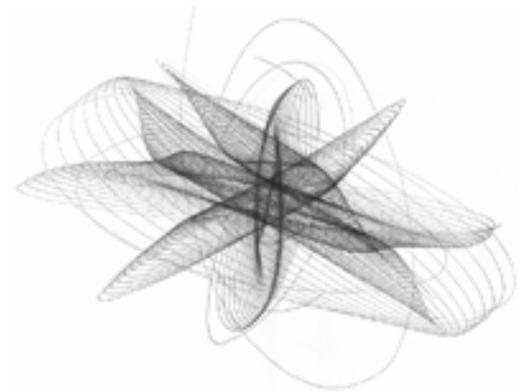# Robots and *Art*

CC 30.03

Robot Generated Art:
Harmonograph

- A harmonograph is a mechanical apparatus that employs pendulums to create a geometric image.
- Began to appear in the mid-19th century and peaked in popularity in the 1890's.
- Not robotic but could be considered the precursor to machine generated art.

Robot Generated Art:
Rakugaki by Keiko Takahashi, Shinji Sasada & Seiji Hori

- This idea came from a poetic image of a sound transforming into a line.

- Interactive drawing installation with sound.

- There is a correlation between the instruments played and the volume of the sound with the shapes and colors drawn.

Cybernetic Sculpture: Emergent Systems

- Exploring the confluence and coevolution of organic and technological cultures.

- Transparency is when the organism does not sense the mechanisms.

- Machine interface senses the organisms presence, desires or needs.

Cybernetic Sculpture: Emergent Systems
Mediated Encounters by Ken Rinaldo

- Four fish tanks designed to allow Siamese Fighting fish to determine the movement of two grapevine sculptures.

- Six light break-beams connected to the computer activate motors that move the tanks in the direction the fish look to the outside world.

Cybernetic Sculpture: Emergent Systems
## *Octofungi* by Yves Amu Klein

- An evolving autonomous art.

- Transformer powers eight legs and a regulated power supply feeds the brain and sensors.

- To interact with the sculpture, a person moves his hands above the eight light sensors placed around the brain frame. Depending on the "aggressiveness" or "gentleness" of the participant, *Octofungi* will manifest different behaviors.

Performance Art: Cyborg
Stelarc (formerly Stelios Arcadiou)

- Australian-based performance artist whose work explores and extends the concept of the body and its relationship with technology through human-machine interfaces incorporating medical imaging, prosthetics, robotics, virtual reality systems and the Internet.
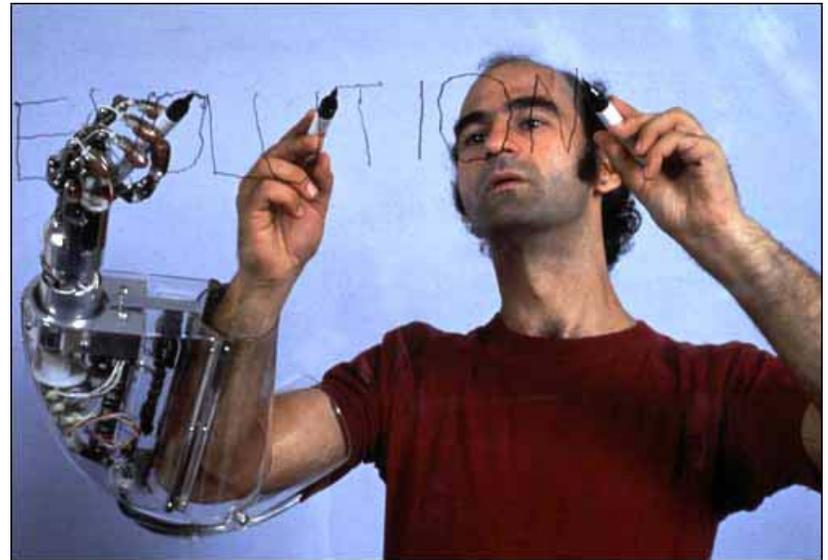
Robotic Musicians
Haile at Georgia Tech

- Robotic percussionist that can listen to live players, analyze their music in real-time, and use the product of this analysis to play back in an improvisational manner.

ArtBots: The Robot Talent Show

- artbots.org
- International art exhibition for robotic art and art-making robots.

LEMUR
## League of Electronic Musical Urban Robots

- www.lemurbots.org/
- Brooklyn-based group of artists and technologists developing robotic musical instruments.
- LEMURplex: converts into an oversized living-room to present performance and interactive gallery events on the last Friday of every month. www.lemurplex.org

Max/MSP/Jitter

www.cycling74.com

- Graphical environment for music, audio, video and multimedia.

- Create your own software using a visual toolkit of objects, and connect them together with patch cords.
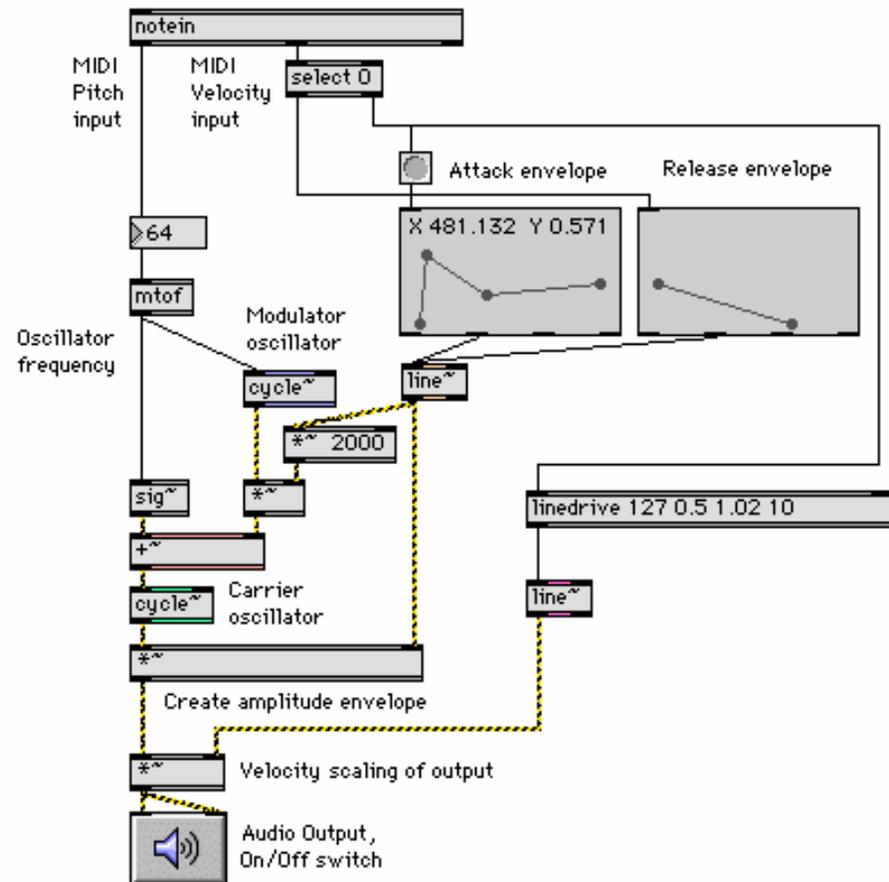
Dancing Automaton

- One or more robots come together with music, dressed in costume and moving in creative harmony.

- Need to develop an algorithm.

- Robot will be multitasking.

Algorithm

- A step-by-step sequence of instructions for carrying out some task.

- Examples of algorithms outside of computing:
  - Cooking recipes
  - Dance steps
  - Proofs (mathematical or logical)
  - Solutions to mathematical problems

- Often, there is more than one way to solve a problem.

Algorithm
solving problems

- In computing, algorithms are synonymous with problem solving.
- *How To Solve It*, by George Polya
  - 1. understand the problem
  - 2. devise a plan
  - 3. carry out your plan
  - 4. examine the solution

Algorithm
features

- Speed (number of steps)
- Memory (size of work space)
- Complexity (can others understand it?)
- Parallelism (can you do more than one step at once?)

Algorithm
Boids by Craig Reynolds

- Algorithmic steering behaviors for animated characters.

- These behaviors allowed individual elements to navigate their digital environments in a "life-like" manner with strategies for seeking, fleeing, wandering, arriving, pursuing, evading, path following, obstacle avoiding, etc.

- By building a system of multiple characters, each steering according to simple locally-based rules, surprising levels of complexity emerge, the most famous example being Reynolds' "boids" model for "flocking" / "swarming" behavior.

Multitasking

- In computing, multitasking is a method by which multiple tasks, also known as processes, share common processing resources such as a CPU.

- In the case of a computer with a single CPU, only one task is said to be running at any point in time, meaning that the CPU is actively executing instructions for that task.

- Multitasking involves scheduling which task may be the one running at any given time, and when another waiting task gets a turn.

Multitasking
the RCX using Robolab

- Each program can have up to 10 tasks, from which one is the main task.

- The execution of the program jumps from one active task to another.

- The act of reassigning a CPU from one task to another one is called a context switch. When context switches occur frequently enough the illusion of parallelism is achieved.