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.
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

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.
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.