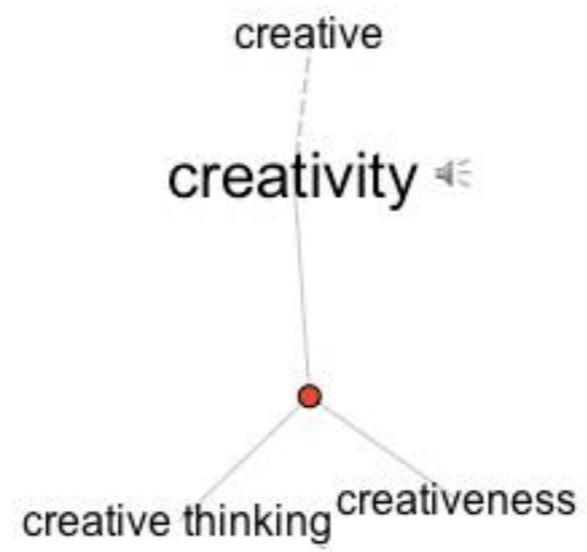


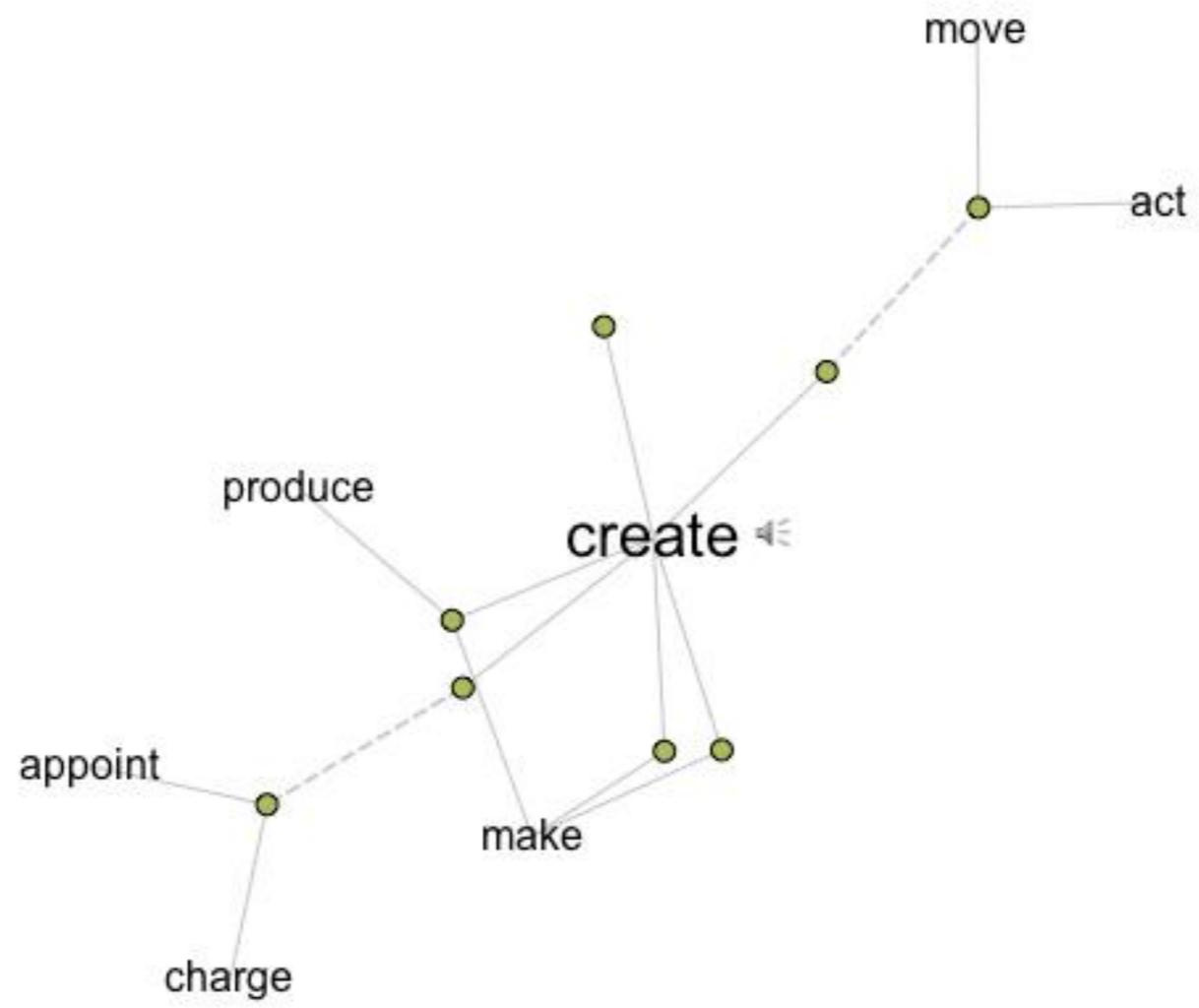
# Design, Making and Creativity

(or please pass the polymaths)

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ATLAS Institute  
University of Colorado Boulder



cleverness, genius, imagination, imaginativeness, ingenuity, inspiration, inventiveness, originality, resourcefulness, talent, vision





**make**

verb (māk)



SAVE

**made** | **mak·ing**

Definition of MAKE

+1



*transitive verb*

- 1 a** *obsolete* : BEHAVE, ACT  
**b** : to begin or seem to begin (an action) <made to go>
- 2 a** : to cause to happen to or be experienced by someone <made trouble for us>

**b** : to cause to exist, occur, or appear : CREATE <make a disturbance>

**c** : to favor the growth or occurrence of <haste makes waste>

**d** : to fit, intend, or destine by or as if by creating <was made to be an actor>

**3 a** : to bring into being by forming, shaping, or altering material : FASHION <make a dress>

**b** : COMPOSE, WRITE <make verses>

**c** : to lay out and construct <make a road>

**4** : to frame or formulate in the mind <make plans>

**5** : to put together from components : CONSTITUTE <houses made of stone>

**6 a** : to compute or estimate to be

**b** : to form and hold in the mind <make no doubt of it>

**7 a** : to assemble and set alight the materials for (a fire)

**b** : to set in order <make beds>

**c** : PREPARE, FIX <make dinner>

**cre·ate**



verb

\krē-'āt, 'krē-,\



SAVE

**cre·at·ed** | **cre·at·ing**

Definition of CREATE

+1



*transitive verb*

**1** : to bring into existence <God *created* the heaven and the earth — Genesis 1:1(Authorized Version)>

**2 a** : to invest with a new form, office, or rank <was *created* a lieutenant>

**b** : to produce or bring about by a course of action or behavior <her arrival *created* a terrible fuss> <*create* new jobs>

**3** : CAUSE, OCCASION <famine *creates* high food prices>

**4 a** : to produce through imaginative skill <*create* a painting>

**b** : DESIGN <*creates* dresses>

*intransitive verb*

**1** : to make or bring into existence something new

**2** : to set up a scoring opportunity in basketball <*create* off the dribble>

See [create](#) defined for English-language learners »

See [create](#) defined for kids »

to make is to create

(learning) to make is (learning) to create

so: can we learn creativity by learning to make?



We have noticed the growing communication among intellectual disciplines that takes place around the computer.

We have welcomed it, because it has brought us into contact with new worlds of knowledge—has helped us combat our own multiple-cultures isolation.

This breakdown of old disciplinary boundaries has been much commented upon, and its connection with computers and the information sciences often noted.

Herb Simon  
(Science of Design)  
Sciences of the Artificial 1969

The ability to communicate across fields—the common ground—comes from the fact that **all who use computers in complex ways are using computers to design or to participate in the process of design.**

**Consequently we as designers, or as designers of design processes, have had to be explicit as never before about what is involved in creating a design and what takes place while the creation is going on.**

out, forward

pro.gram

something  
written, a mark

==

out, off

de.sign

mark

3D-printing sensors  
materials fabric  
designing program creative  
paper fun  
arduino min-play  
DIY design  
mechanical laser-cutter  
robotics children  
create mechatronic  
designer electronics smart  
make



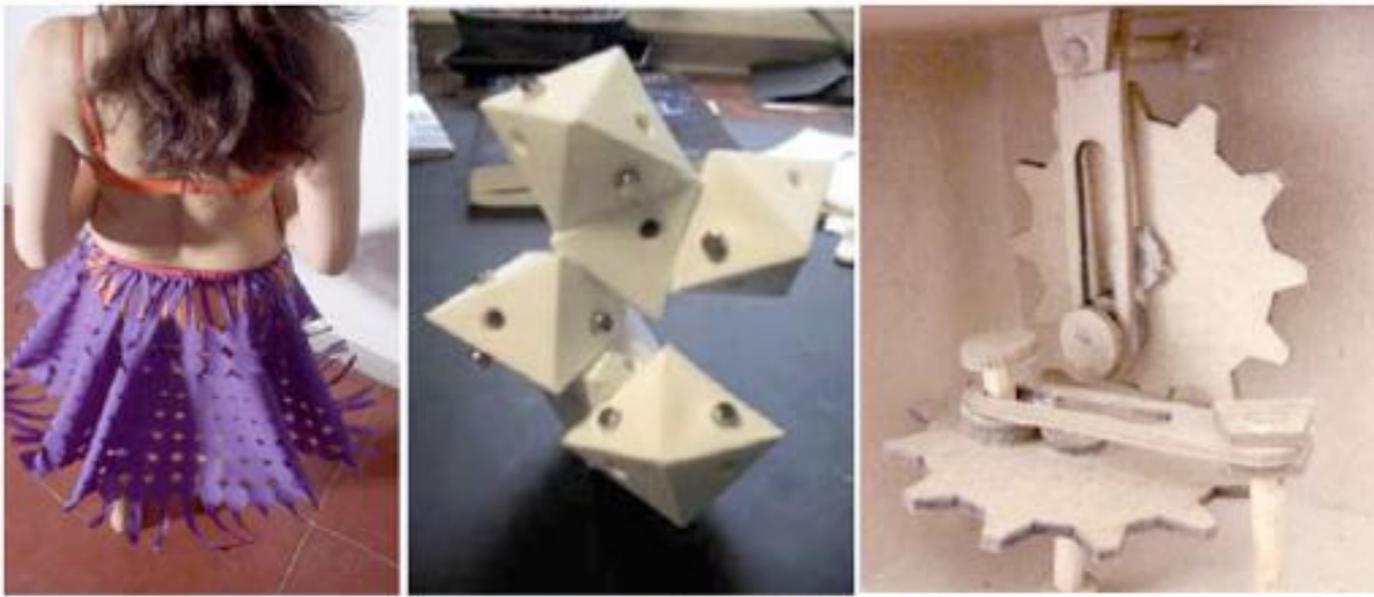
## DIGITAL FABRICATION

Blending new and old materials and methods of manufacture, students in this course used a laser cutter, plastic casting and molding, 3-D printing, and a machine shop in a series of eight exercises and a term project that explored the design space of new ways of making things.

*top row; Color-changing LED lamp—Grace Whang ; Perforated sculptures — Sam Espada*

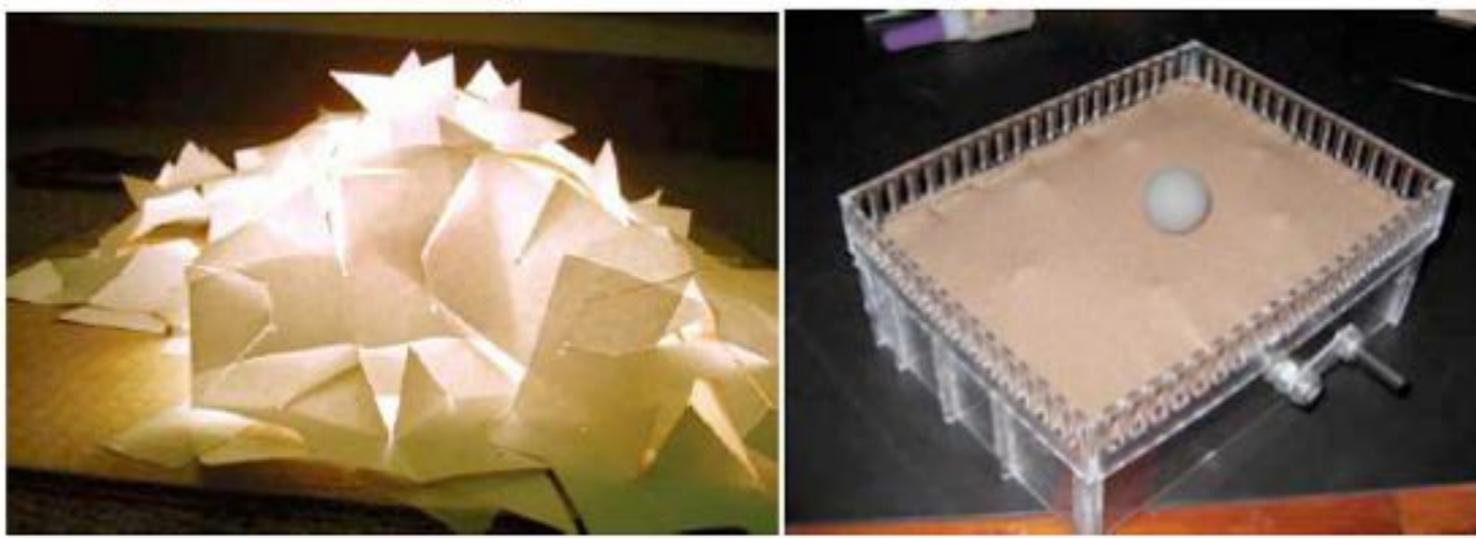


*second row: Handmade zoetrope — Michelle Lopez; Metal Construction Kit— Adam Lockett*



*third row: Laser-cut paper hoop skirt — Lea Albaugh; Plastic/magnet construction kit —John Thornton; Laser cut wood gear toy — Stephanie Fonticoba*

*bottom row: Paper lamp — Jeff Bourke; Undulating surface — John Thornton*

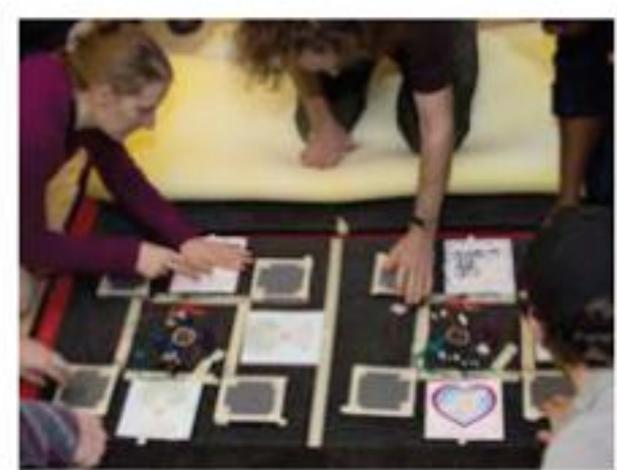




## MAKING THINGS INTERACT(ive)

An interdisciplinary project course at CMU attracts students from diverse disciplines from first-year undergraduates to PhD candidates. Students learn basic analog electronics, microcontroller programming, simple mechanical design. They exercise these skills through a series of assignments, followed by an open-ended term project that results in a working physical prototype.

*top row: Air Chair senses body temperature and cools when needed — Mark Manzke (Architecture); Rideable Hexabot robot — Rich Pantaleo (Mechanical Engineering)*



*second row: Talking Playroom Floor; — Ronit Slyper (Computer Science); Energy kitchen wall shows energy use with color—Andrea Irwin (Design); WireSpy handheld house energy monitor — Ethan Goldman (Civil Engg)*

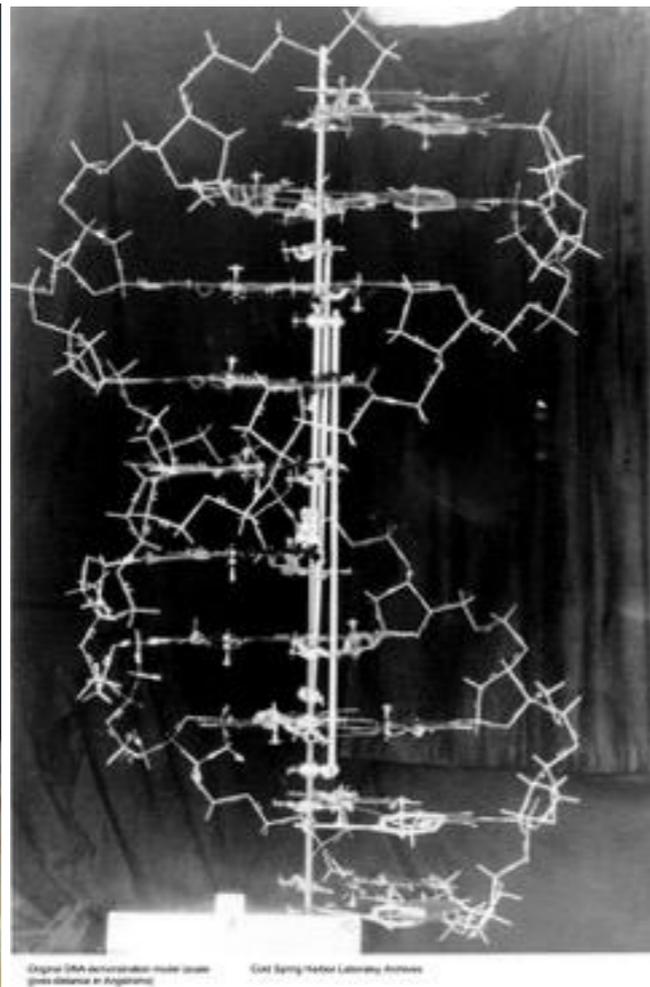


*third row: BoomBox color cube seating connects to iPod — Jesse Chong and Paul Castellana (Architecture); Sonic Bookshelf as musical instrument — Beste Nazilli & Imran Sobh (Design); E-book reader — Nadeem Haidary (Design)*

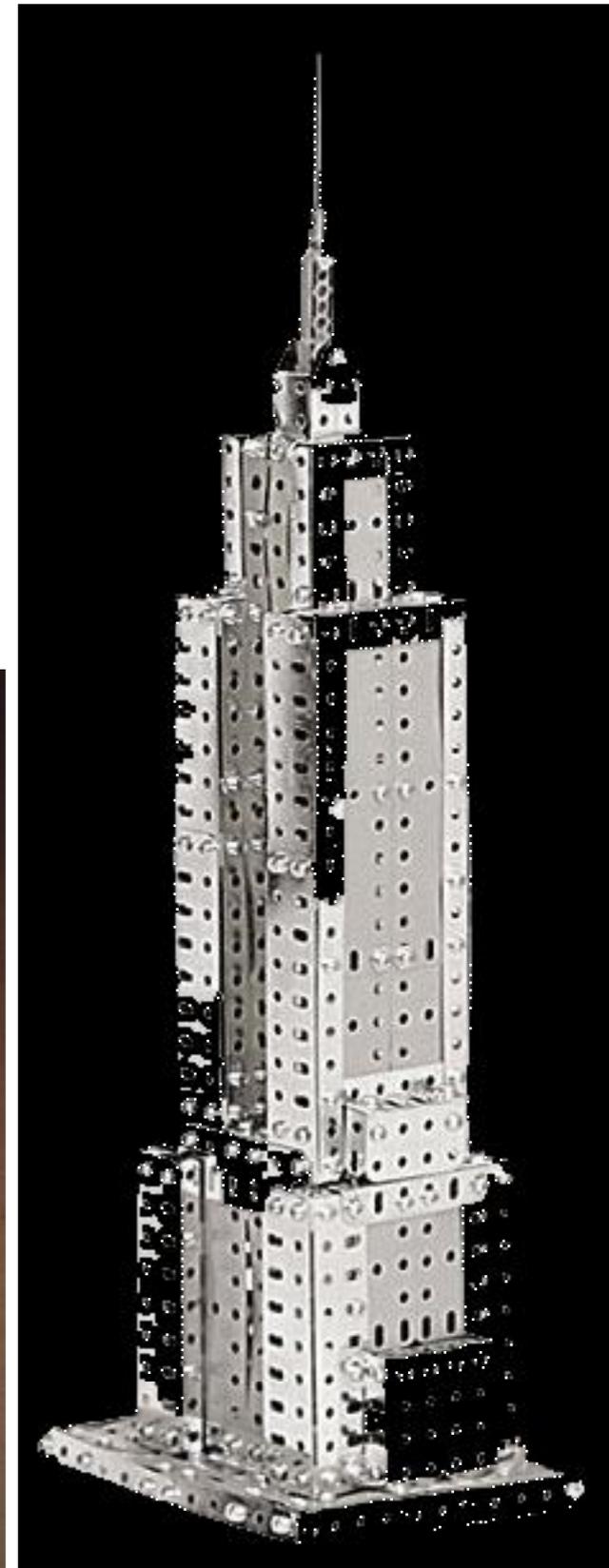
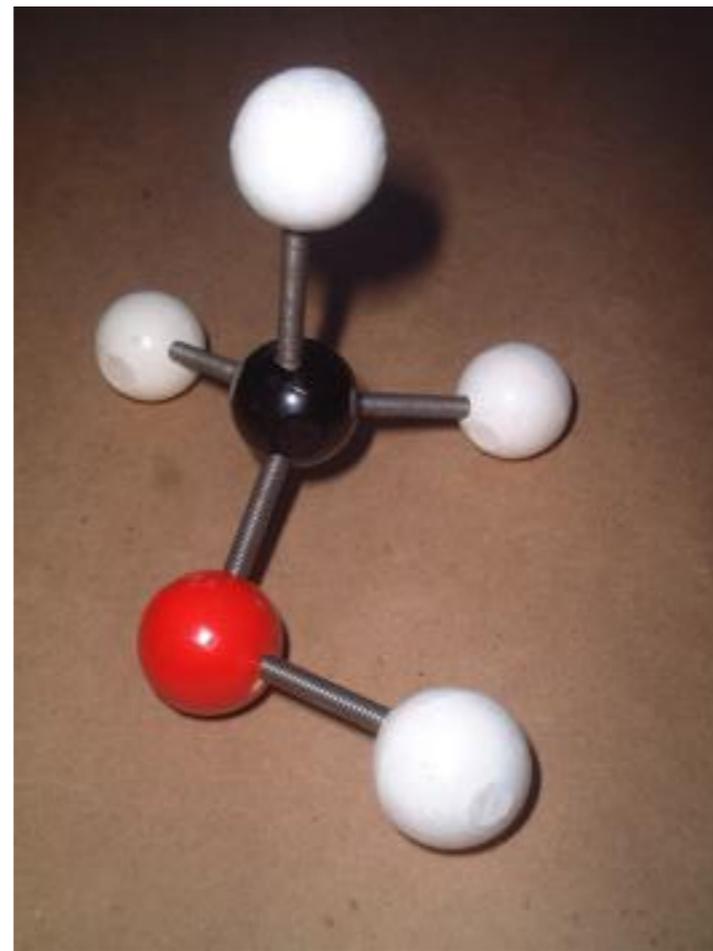


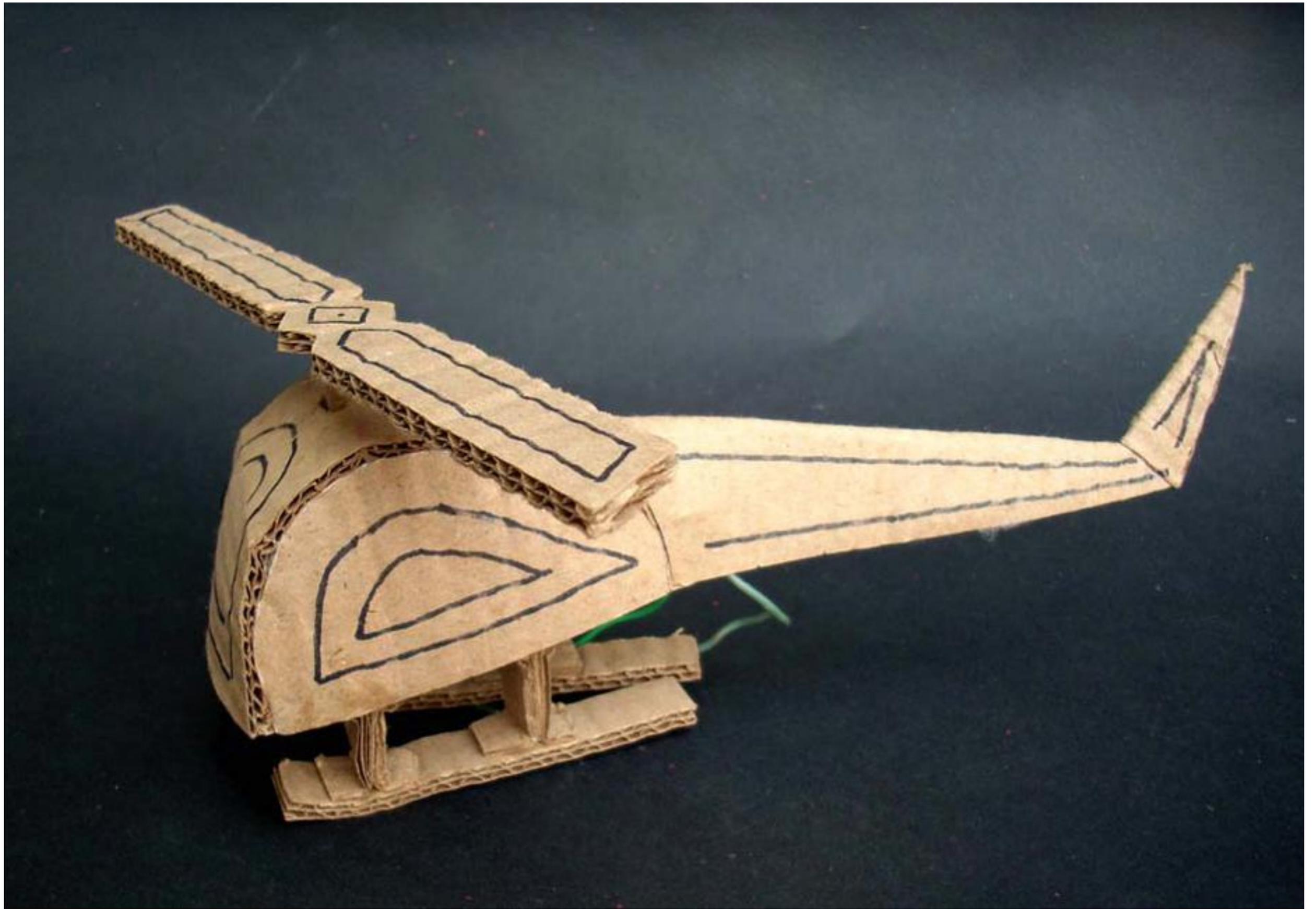
*bottom row: ColorFields GPS goggles color the scene based on location in the city—Tiago Rorke (Design)*

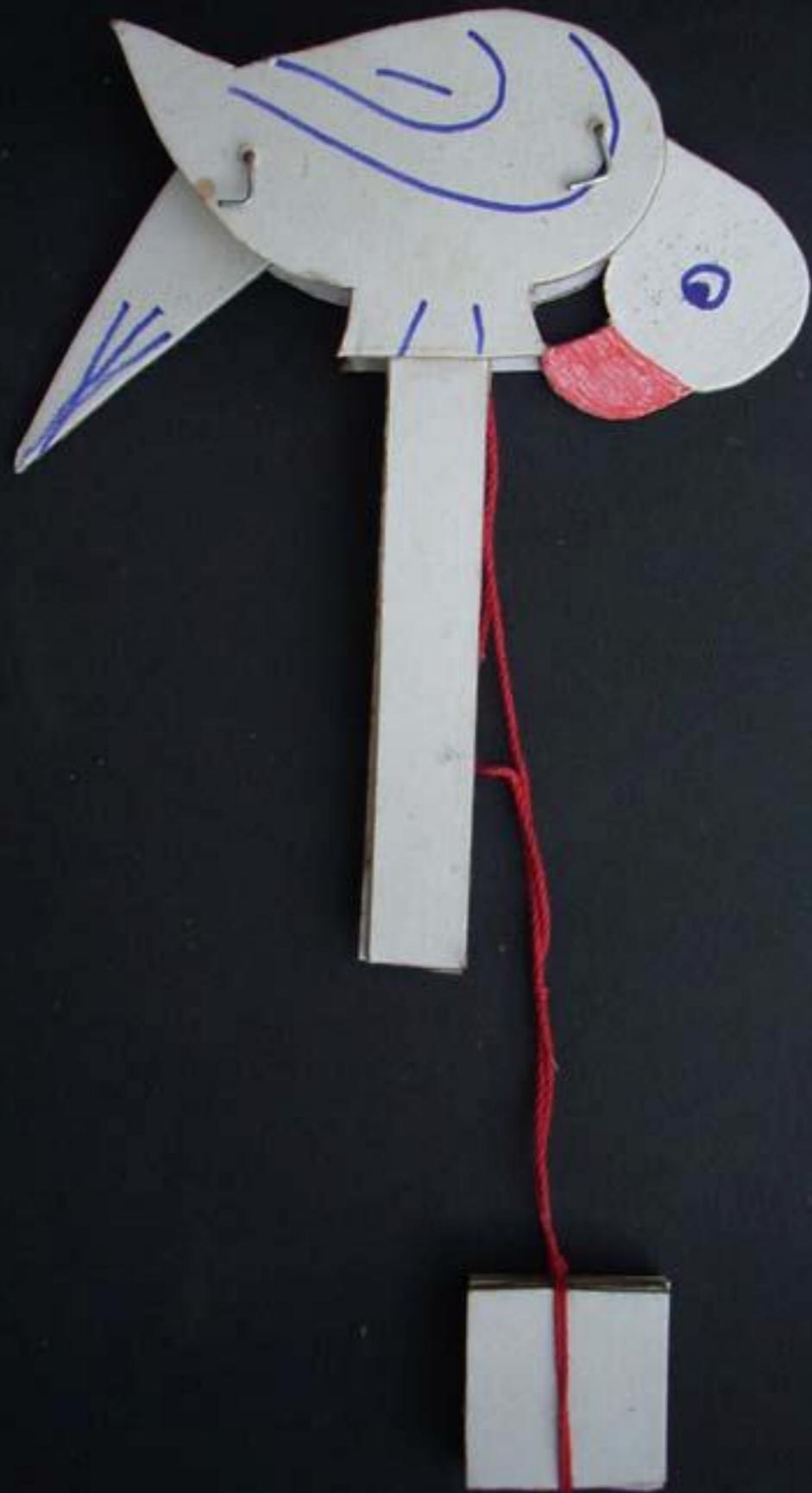
# things matter



Original DNA description model (left) and Spring/Necker Laboratory Archive (right)



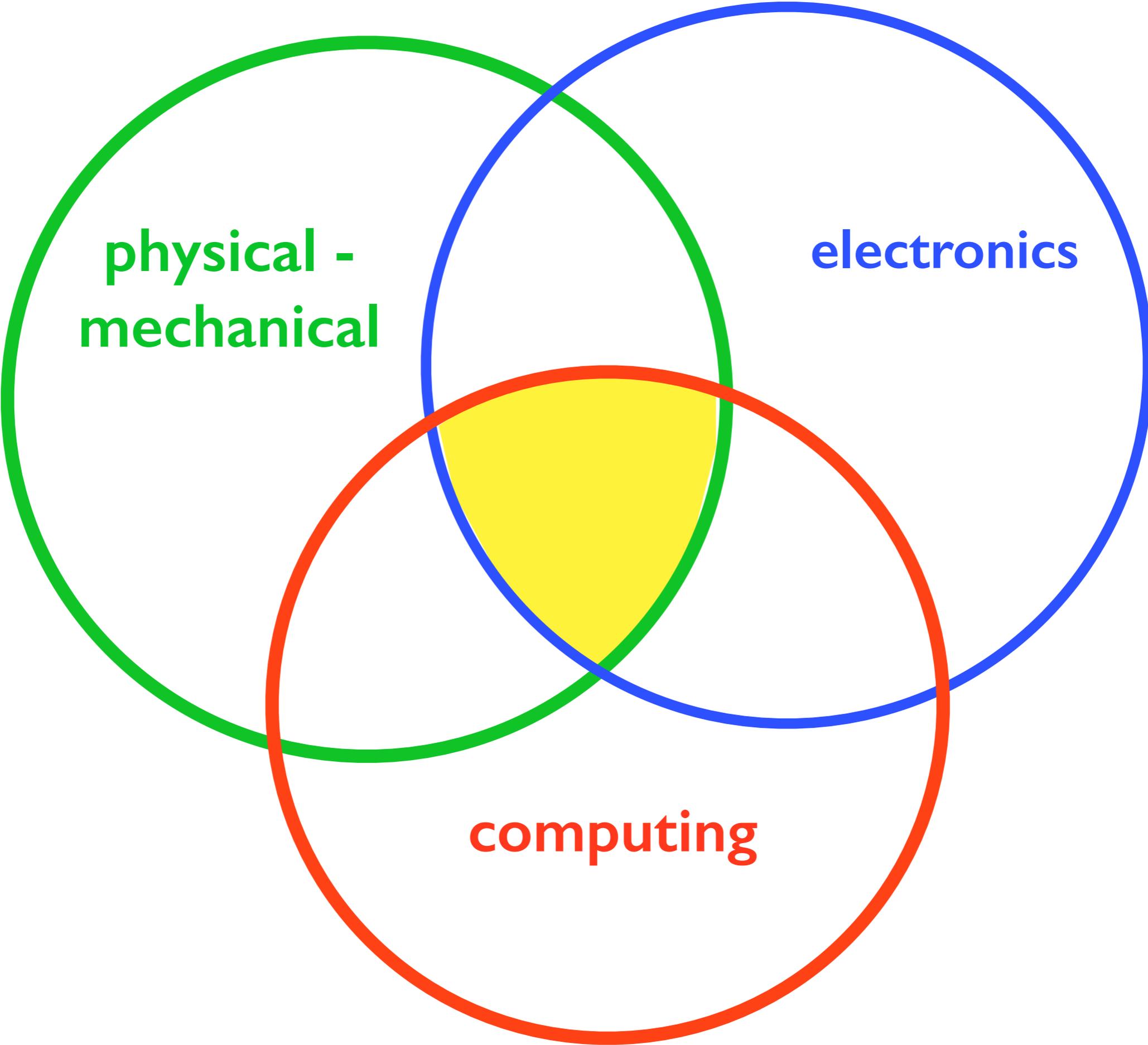






things are no longer just things

**things are programmable**



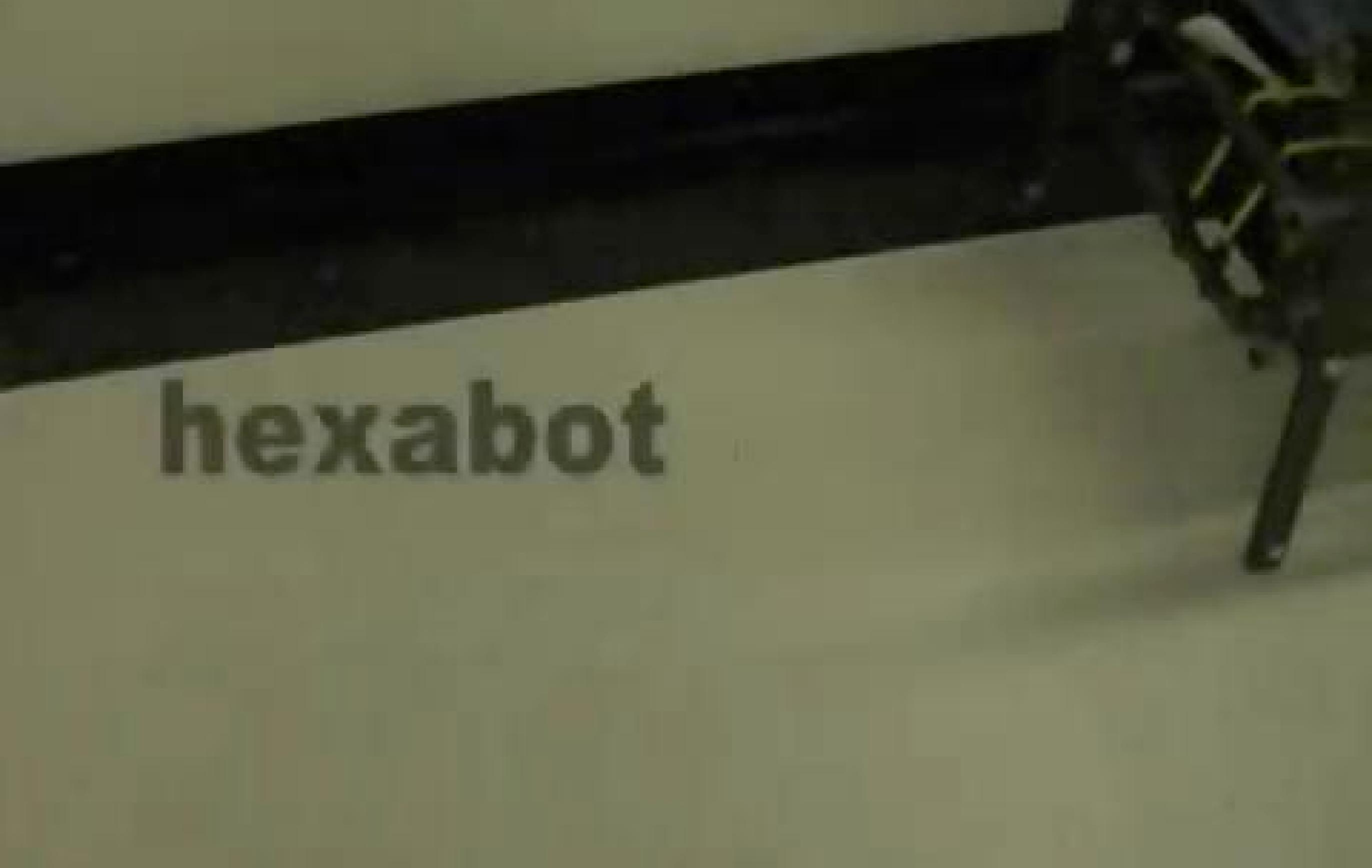
**physical -  
mechanical**

**electronics**

**computing**

the good news ...

people make *amazing* things



hexabot

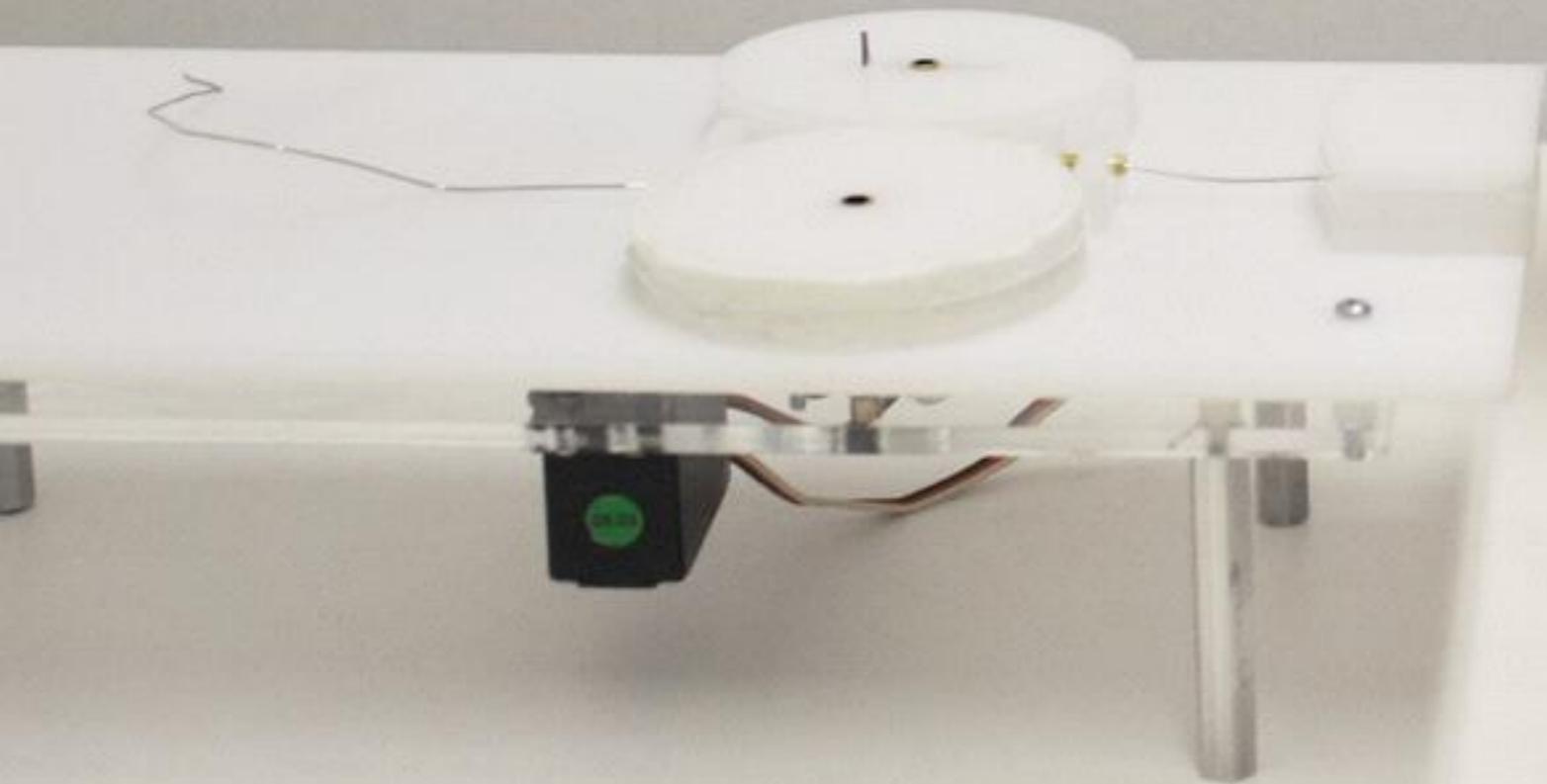
hexabot  
Rich Pantaleo (CMU)



iBuffy  
Katy Linn (CMU)



choreobots  
Charles Doomany, Luke Kambic



Rechargeable Battery

Wheel Animation

BlinkM Bike Light

BlinkM Bike Light

LED Strip

Motor Generator

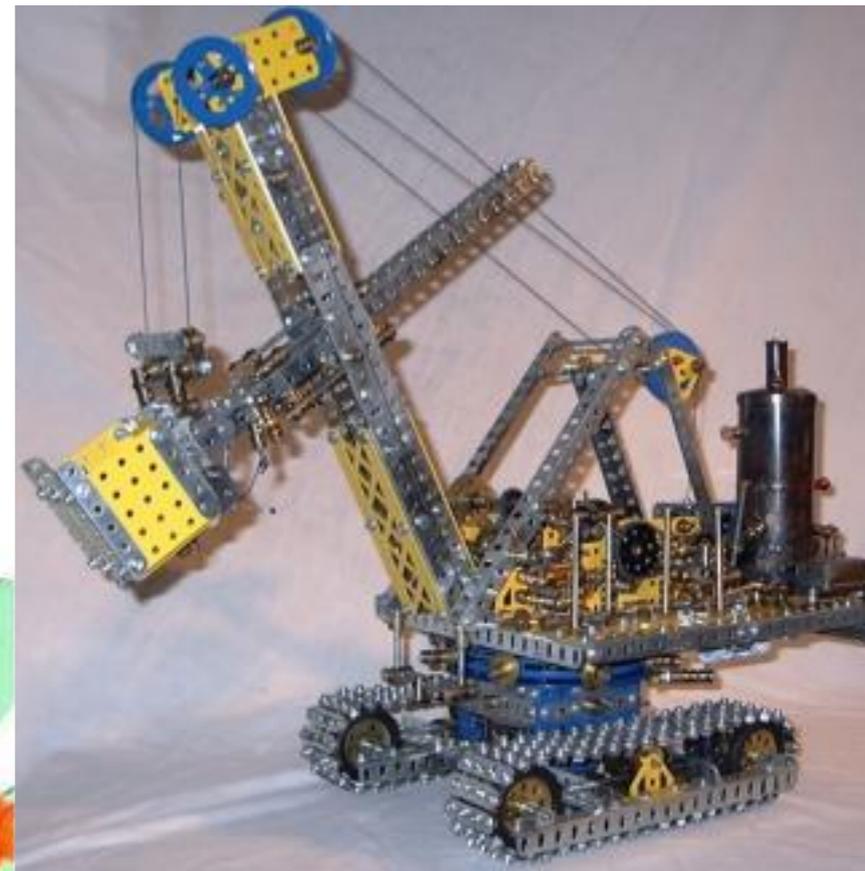
Rechargeable Battery



the problem:

making “things that think” is harder than it needs to be

construction kits  
abstract out the hard stuff  
& focus on the important stuff



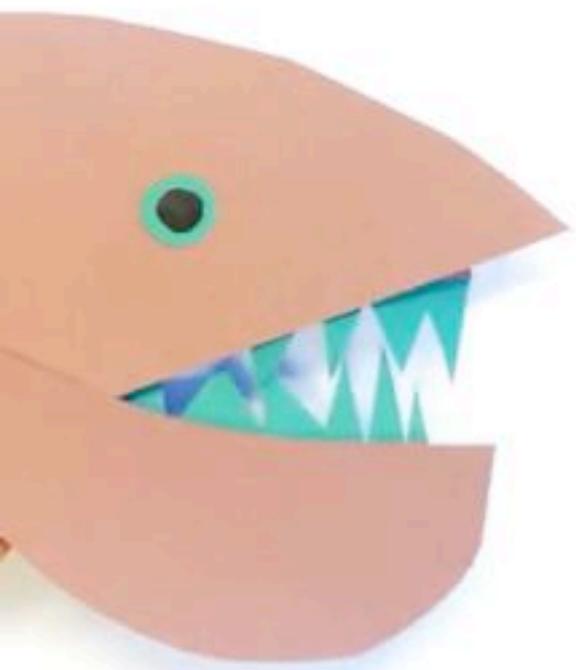


# Hack your kitchen!

the kitsch instrument  
with Jiffer Harriman & Michael Theodore

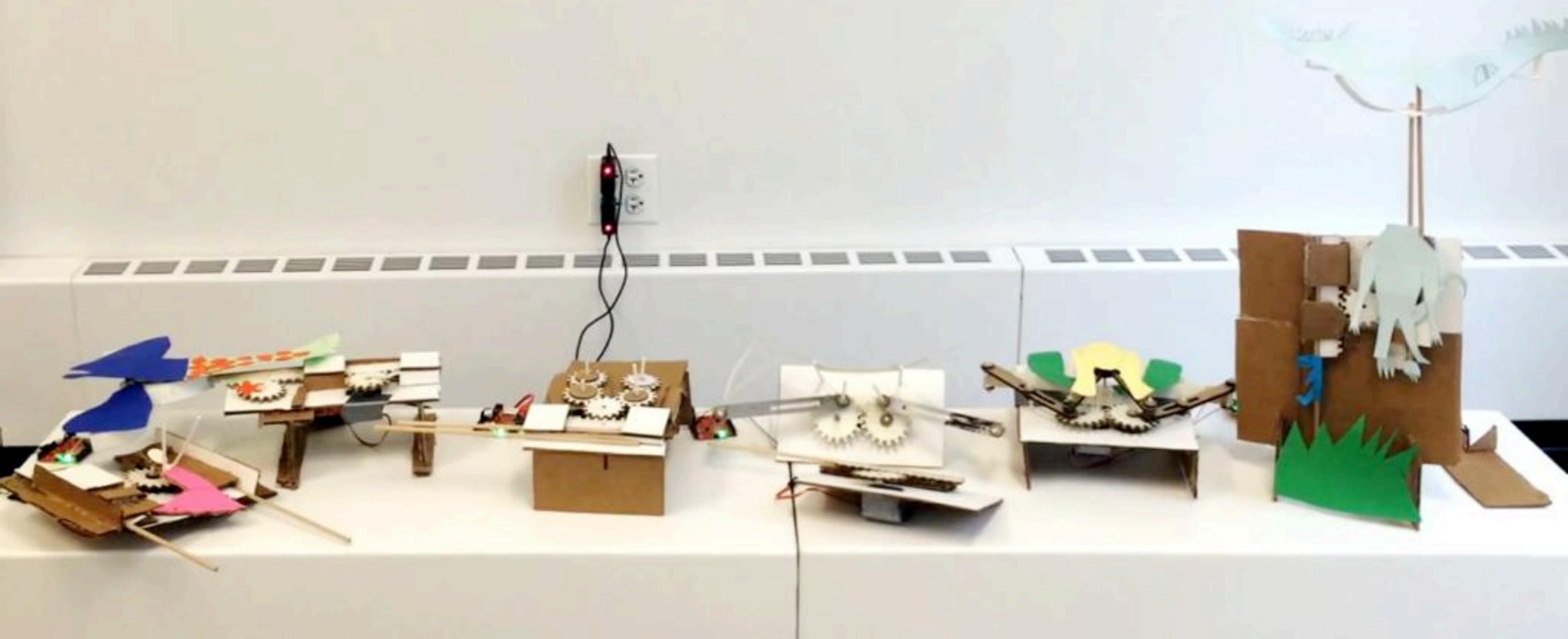


creating computational percussion  
with Hyunjoo Oh, Abhishek Narula, Jiffer Harriman



paper mechatronics  
with Hyunjoo Oh, Sherry Hsi, Mike Eisenberg

# Build Your Own Paper Mechatronics Invention



digital divas @ digital youth network (chicago)  
Hyunjoo Oh, Corey Morales, Kris Klipfel, Nicole Pinkard

The most exciting opportunities and powerful insights belong to polymaths who defy conventional disciplinary boundaries and apply expertise developed in one discipline to another.

euboloto

the robot is the program









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- Innovative Robotics and Novel Technologies Lab
- Blow Things Up Lab
- National Center Women & Information Technology
- Black Box Experimental Studio
  
- BS, MS, PhD programs

**thank you**

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