

Creative Computing DESIGN ART MUSIC COMPUTATIONAL THINKING TINKERING



Daniel Spikol: Kickstart 2023



Datalogisk Institut

- Founded 1970 by Peter Naur
- Computer science has been practised in Denmark under Peter Naur's term “datalogy”, the science of data processes.
- Naur won the 2005 Association for Computing Machinery (ACM) A.M. Turing Award for his work on defining the programming language ALGOL 60.
- He is best remembered as a contributor, with John Backus, to the Backus–Naur form (BNF) notation used in describing the syntax for most programming languages.



Research Sections of DIKU

- Algorithms and Complexity (AC)
- Human-Centered Computing (HCC)
- Image Analysis, Computational Modelling and Geometry (IMAGE)
- Machine Learning (ML)
- Natural Language Processing (NLP)
- Programming Languages and Theory of Computing (PLTC)
- Software, Data, People and Society (SDPS)
- AI Pioneer Center (Joint with DTU, AU, ITU, AAU)

DIKU Research



HCC Courageous Collaborative Science -
understanding how we cooperate and collaborate in groups



ML Prediction from our Brains : Reading our Thoughts



IMAGE together with Cerebriu, and
Danish hospitals, The research project Stroke will deliver the
world's first solution to improve MRI-based stroke
treatment and clinical workflow efficiency.

DIKU Research



NLP Training sets for Machine Learning are normally created in English. This introduces cultural bias. A new image-grounded benchmark developed by researchers from the University of Copenhagen enables a more diverse approach.



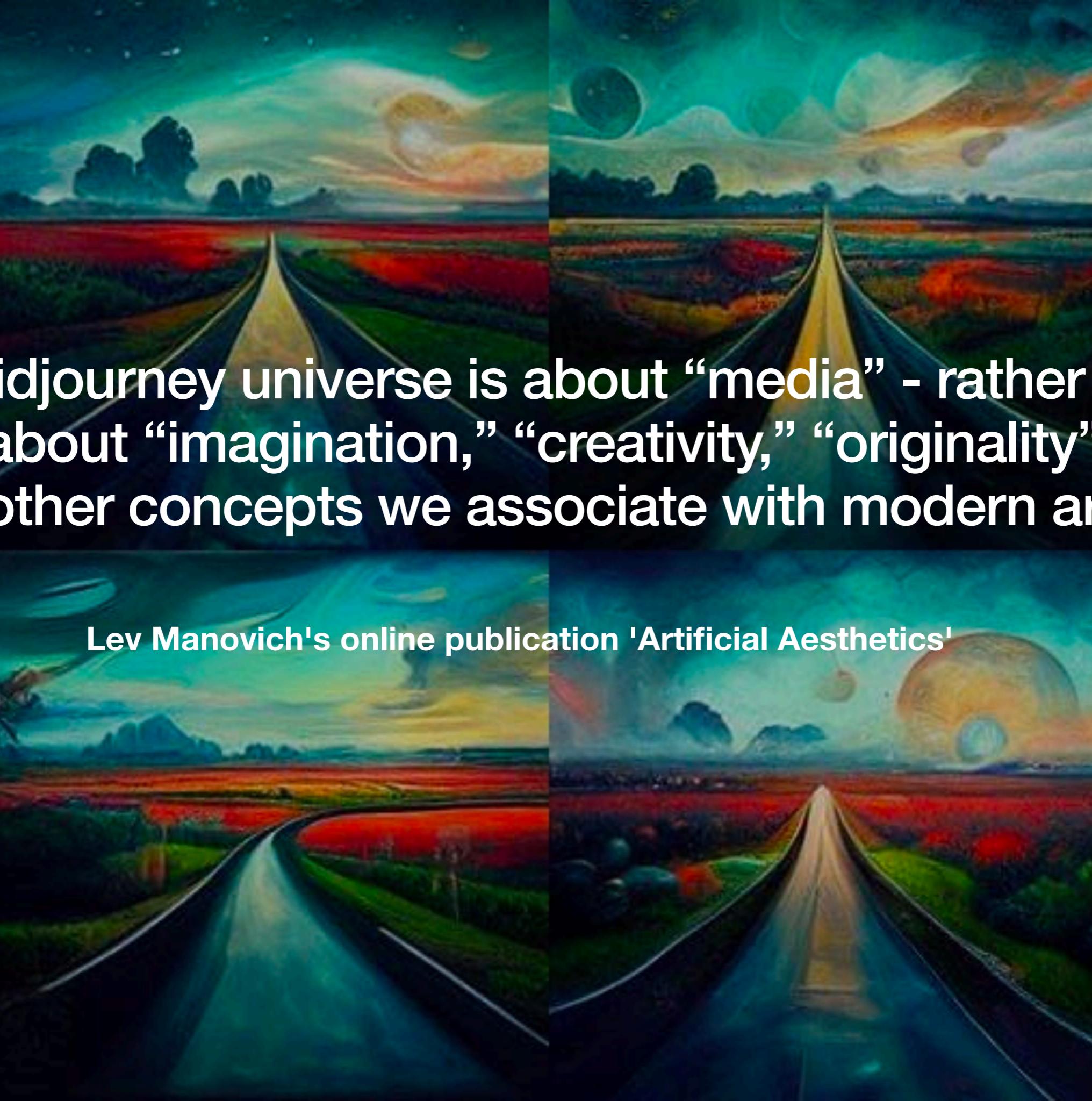
PLTC Two young researchers from the University of Copenhagen and Aarhus University are working together to add so-called effect systems to programming languages, which makes it easier to maintain programs and detect vulnerabilities.



ARTIFICIAL INTELLIGENCE algorithm can predict when narwhals hunt – a task once nearly impossible to gain insight into. Mathematicians and computer scientists at the University of Copenhagen, together with marine biologists in Greenland

Some DIKU facts

- In 2021, DIKU had just under 200 employees, of whom approximately 160 are in academic positions (including assistant lecturers, external examiners and external lecturers) and 34 in administrative positions
- Just under 1200 students are enrolled in DIKU's three study programmes – Computer Science (Bachelor's programme and Master's programme), Computer Science and economy (Bachelor's programme), as well as Machine learning and data science (Bachelor's programme)
- In practice, the Department teaches even more students, as DIKU also contributes to the study programmes Health Informatics, Communication and IT, and Cognition and Data Science.
- 120 PhD students

A collage of four panels showing a road leading to a horizon under a colorful sky. The panels are arranged in a 2x2 grid. The top-left panel shows a road with red fields on either side. The top-right panel shows a road with green fields on either side. The bottom-left panel shows a road with red fields on either side. The bottom-right panel shows a road with green fields on either side.

Midjourney universe is about “media” - rather than about “imagination,” “creativity,” “originality” or other concepts we associate with modern art.

Lev Manovich's online publication 'Artificial Aesthetics'

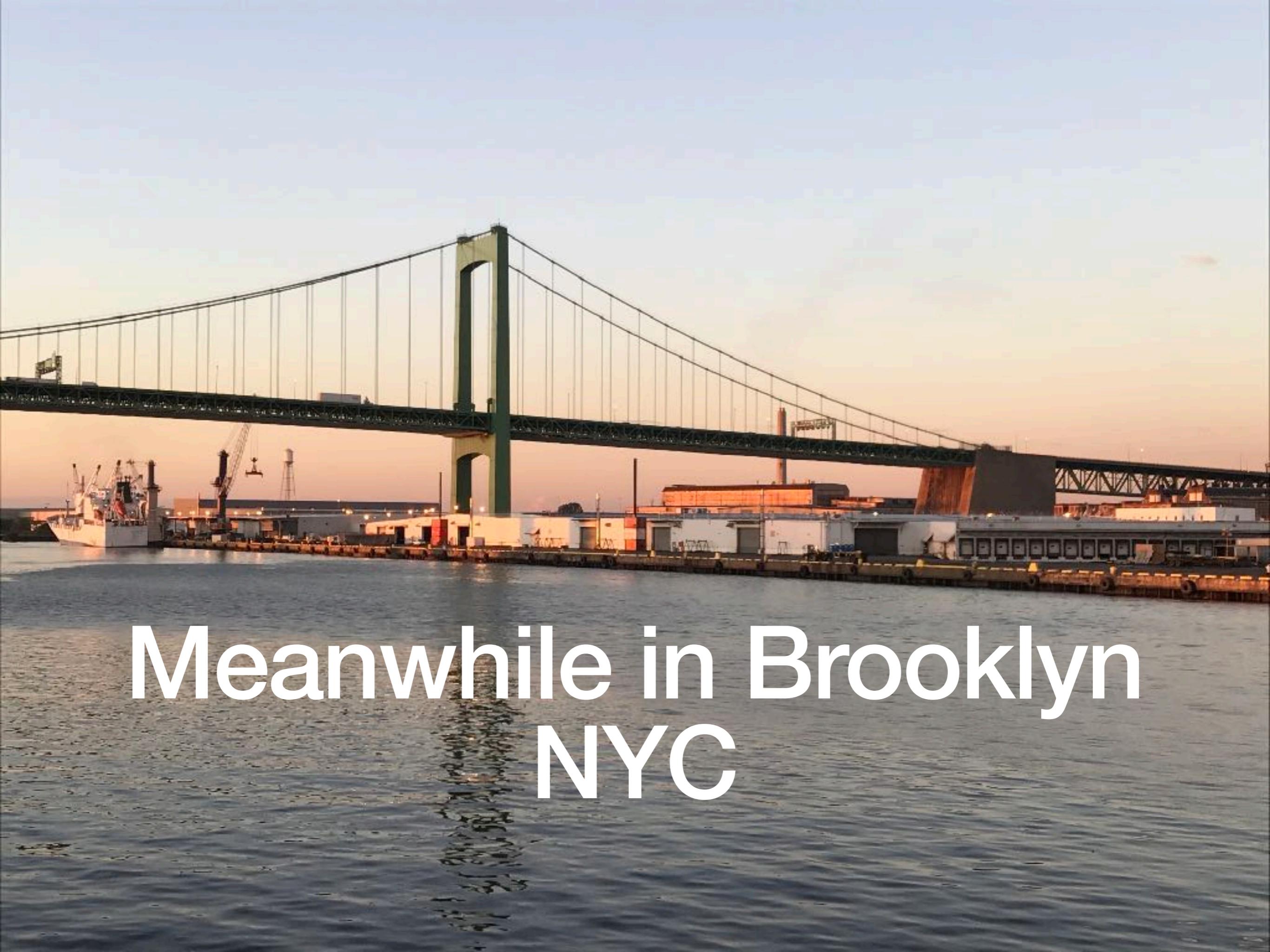


Papert's Turle 1976

Context





A wide-angle photograph of a suspension bridge, likely the Verrazano-Narrows Bridge, at sunset. The sky is a warm orange and yellow. In the foreground, there's a body of water with some ripples. On the far left, a white cargo ship is docked at a pier. Along the pier, there are several industrial buildings, some with red roofs and others with grey or white facades. A tall, dark industrial building stands prominently on the right side of the pier. The bridge itself has two main towers and many cables. The overall atmosphere is calm and scenic.

Meanwhile in Brooklyn
NYC



Ventilation Shaft

Score: 0/0

HIBERNATED 2

A Science Fiction Story by Stefan Vogt
(Type "about" for game information.)
Release 1 / Serial number 200702 /
PunyInform v1.0 / Inform v6.34

Ventilation Shaft

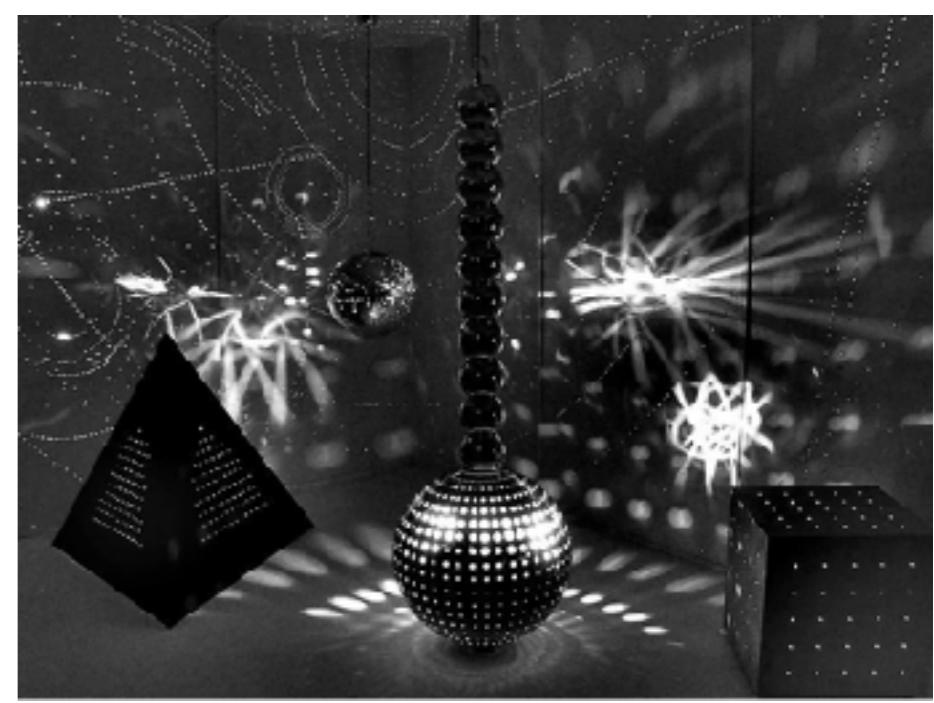
It takes a moment before you realize that you must have missed your destination. Instead you find yourself in a narrow shaft, lying on your stomach, because there is not enough room to stand or turn around. Solid, impenetrable metal surrounds you. An object is preventing you from going backwards, you can feel it, but you cannot see what it is.

The way north is blocked by a rusty grating. Artificial light from the location behind floods this place.

> ■

Art, Engineering, and Technology

E.A.T. and C.A.V.S.



Jump forward to 2022

People should be provoked in their scientific, learning, analytic, creative, playing and personal activities and pursuit.

Rogers, Y. (2006). Moving on from weiser's vision of calm computing: Engaging ubicomp experiences. *UbiComp 2006: Ubiquitous Computing*, 4206, 404–421. Springer.

Computational: Thinking

Computational thinking is taking an approach to solving problems, designing systems and understanding human behaviour that draws on concepts fundamental to computing - (Wing, 2006)



Computational:

Thinking

Action

A new framing for computing education, proposes that while learning about computing, young people should also have opportunities to create with computing that have direct impact on their lives and their communities ...we can make computing education more inclusive, motivating, and empowering for young learners. -
(Tissenbaum, Sheldon, & Abelson 2019)



Computational:

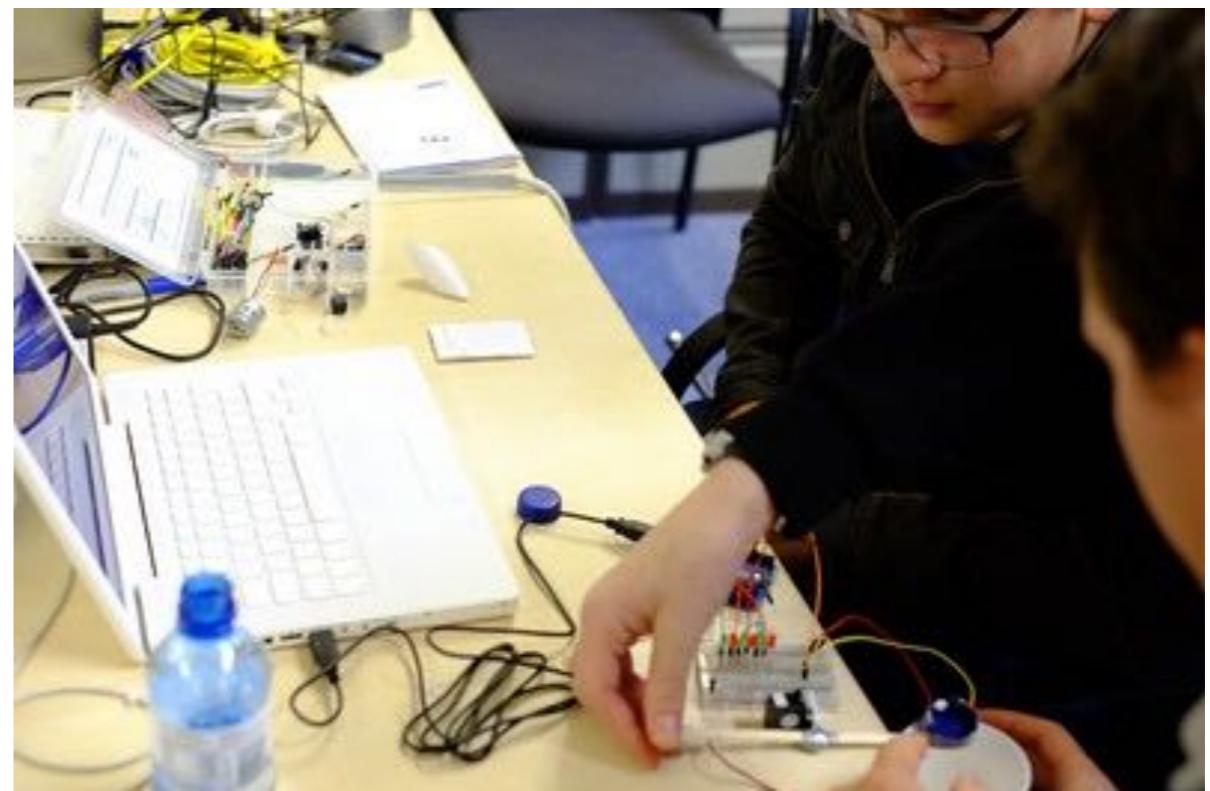
Thinking

Action

Inquiry

The essence of Computational Thinking (CT) lies in the creation of “logical artifacts” that externalize and reify human ideas in a form that can be interpreted and “run” on computers. Accordingly, CT sets a focus on computational abstractions and representations—i.e., the computational artifact and how it is constituted is of interest as such and not only as a model of some scientific phenomenon.

(Hoppe & Werneburg, 2019)



Computational:

Thinking

Action

Inquiry

Play and Tinkering



The tinkering orientation is essentially a theoretic—tinkering, bricolage, and playful experimentation describe the act of either having or needing no plan in the process of creating or modifying a computer program. The set of activities described as tinkering include trial and error, messing around or fussing, finding and using feedback mechanisms (such as testing), or combinations of those activities. (Berland and colleagues, 2013)

Computational:

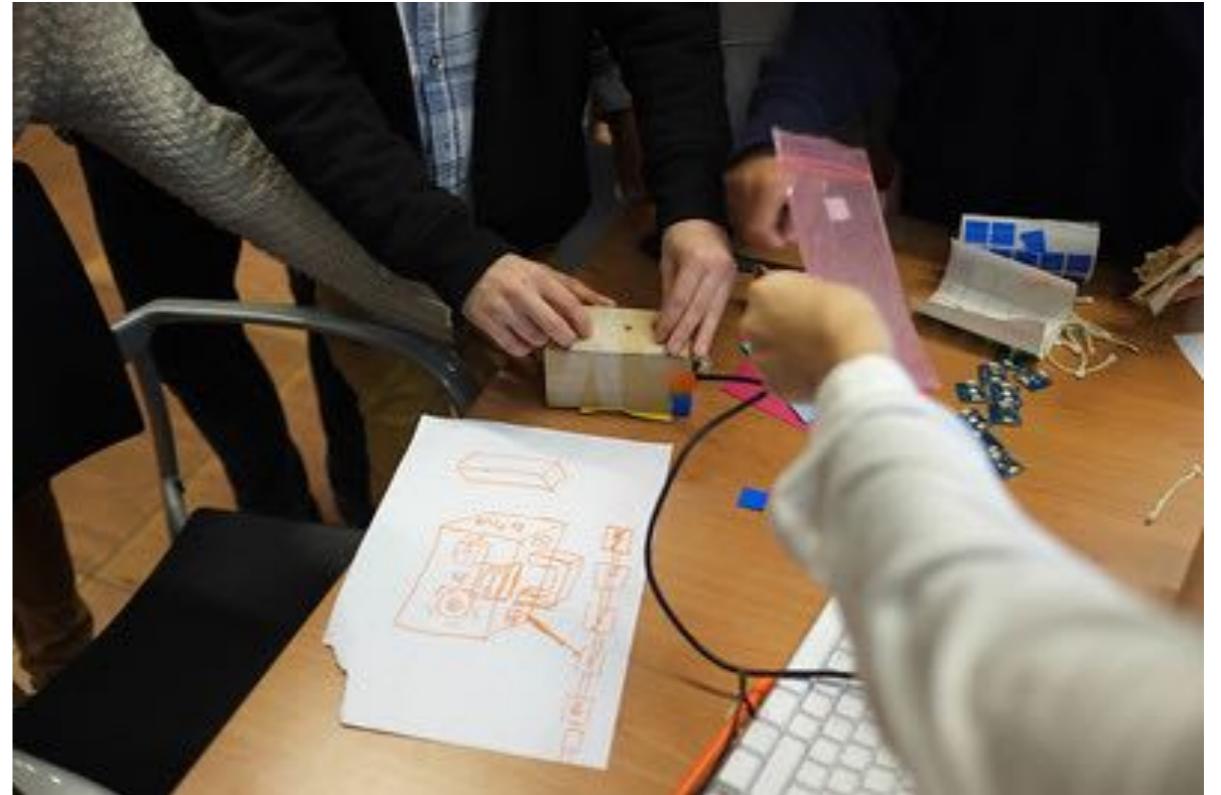
Thinking

Action

Inquiry

Tinkering

Design



Design is making sense of things. It is by necessity both a science of making and a philosophy of realizing artifacts with and for others. A systematic inquiry into how people attribute meanings to artifacts and interact with them accordingly" and "a vocabulary and methodology for designing artifacts in view of the meanings they could acquire for their users and the communities of their stakeholders".(Krippendorf, 2006)

Computational:

Thinking

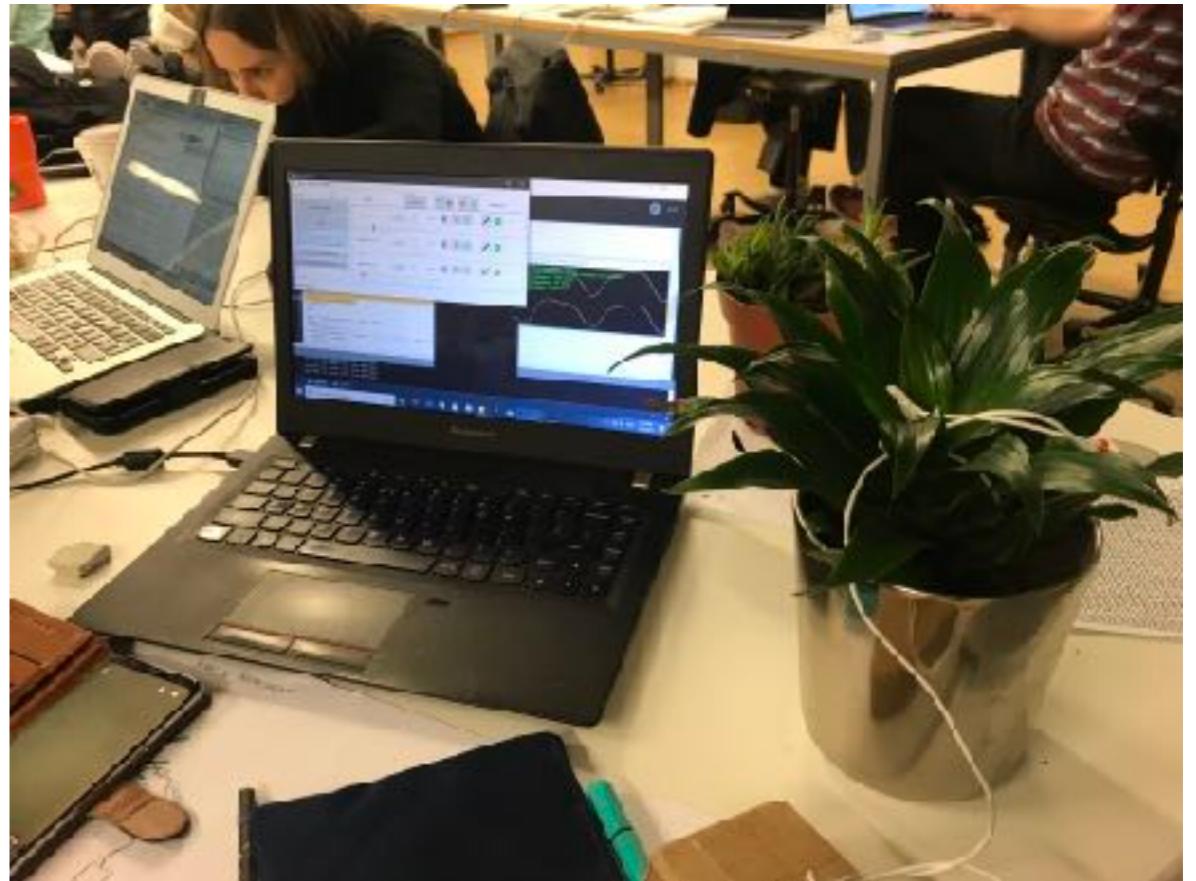
Action

Inquiry

Tinkering

Design

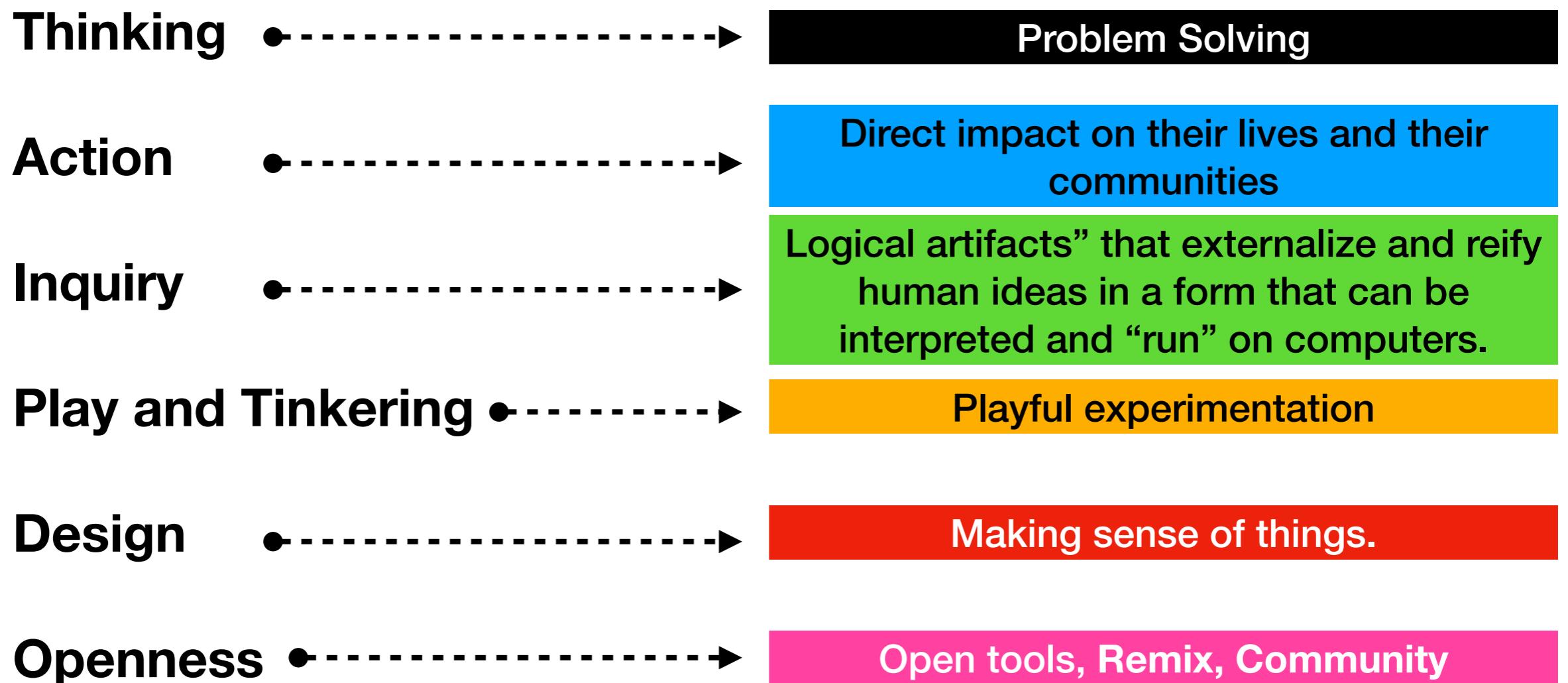
Openness



From "from scratch" creation to "remixing." These new, networked communities focus on *remixing*. Students once created programs from scratch to demonstrate competency. Now they pursue seamless integration via remixing as the new social norm, in the spirit of the open source movement. Sharing one's code encourages others to sample creations, adjust them, and add to them.

(Kafai, 2016)

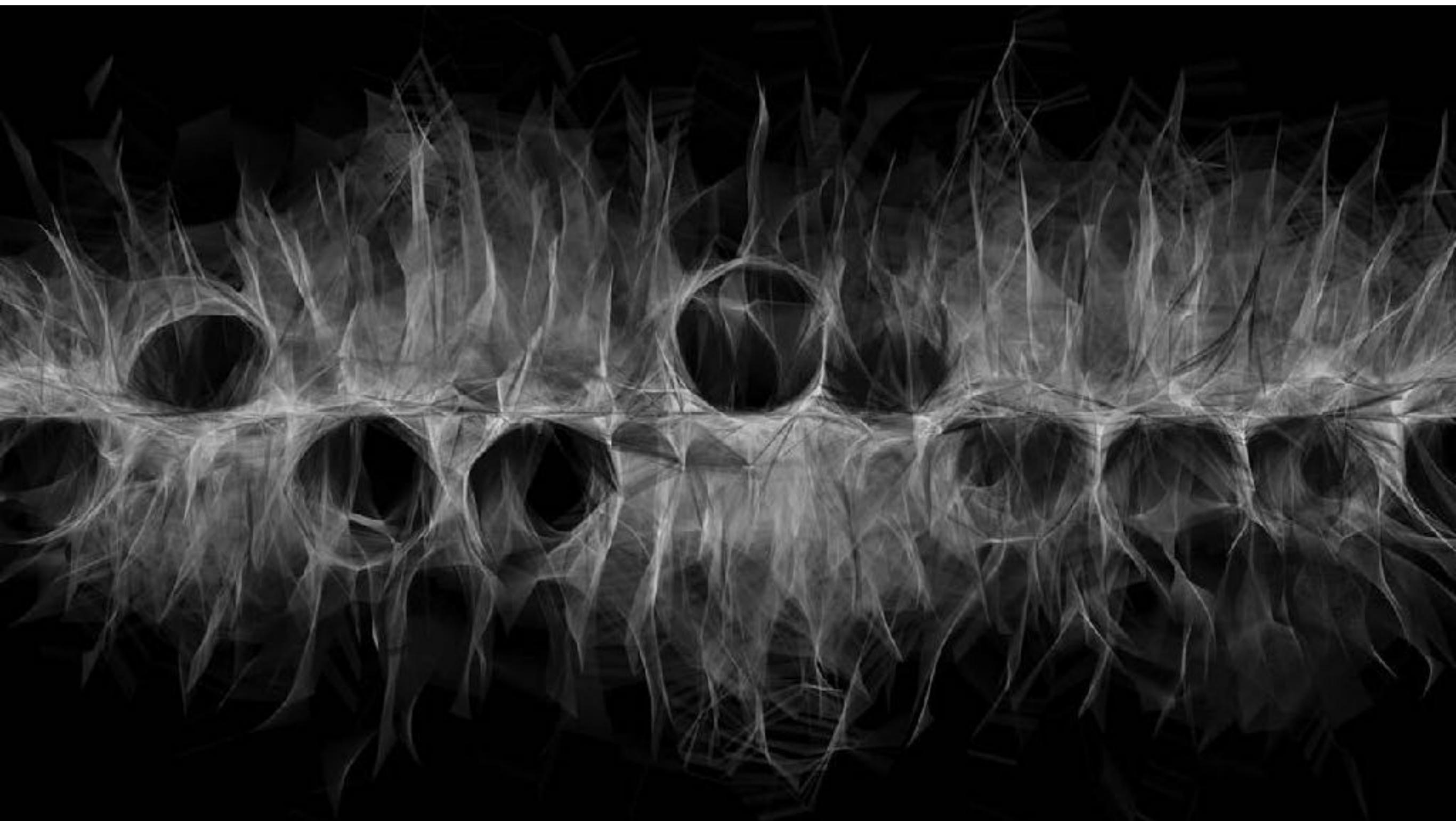
The way of the Computational:





How do you teach programming?

Casey Reas

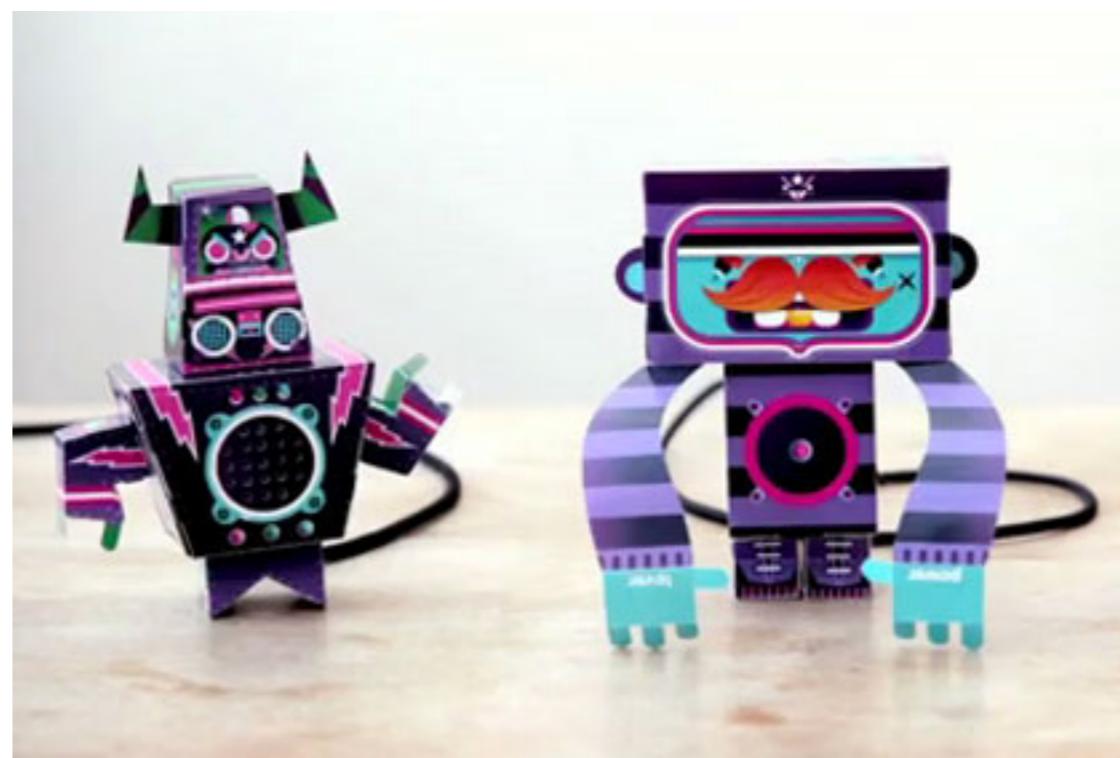


Processing Show Reel - Joshua Davis +

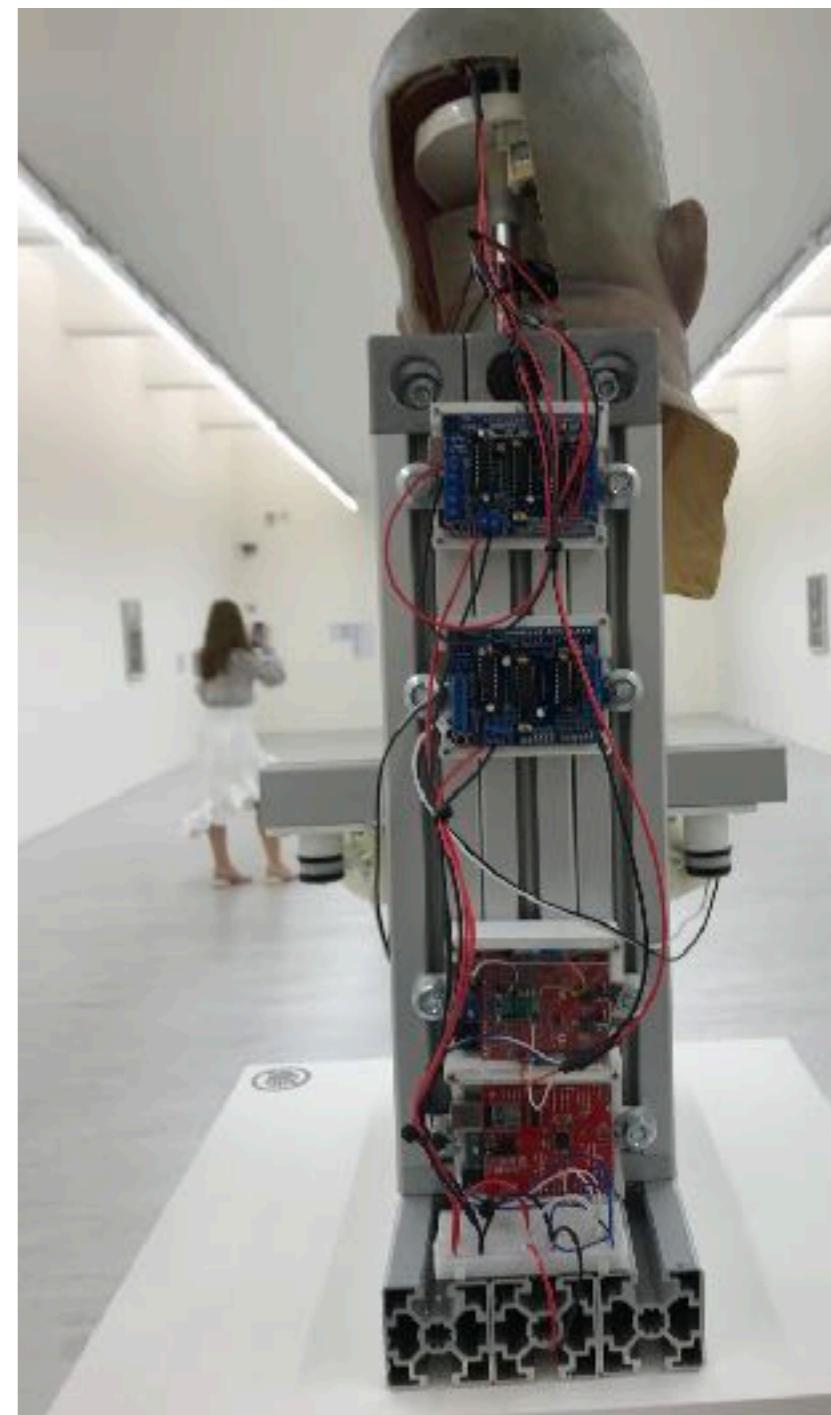


Playful Engineering, Art, and Technology

Arduino and Art



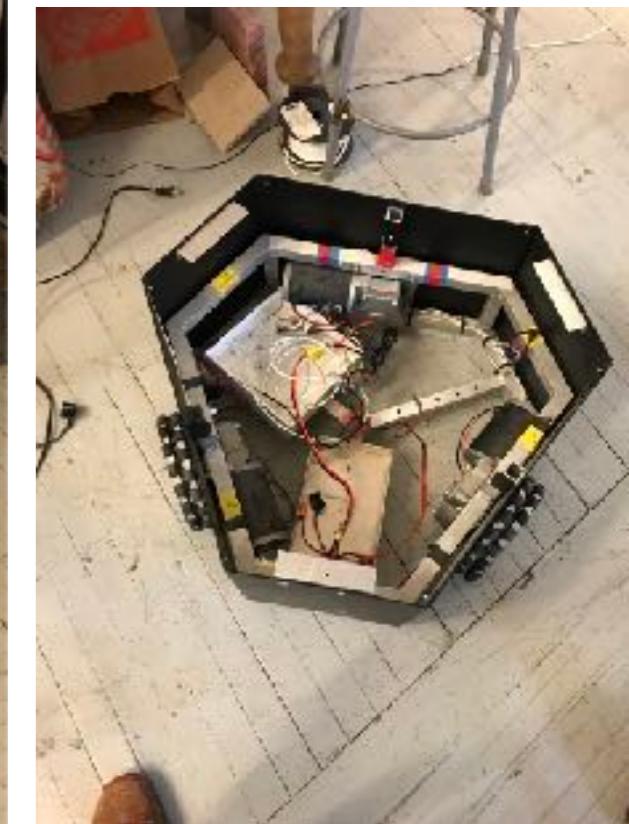
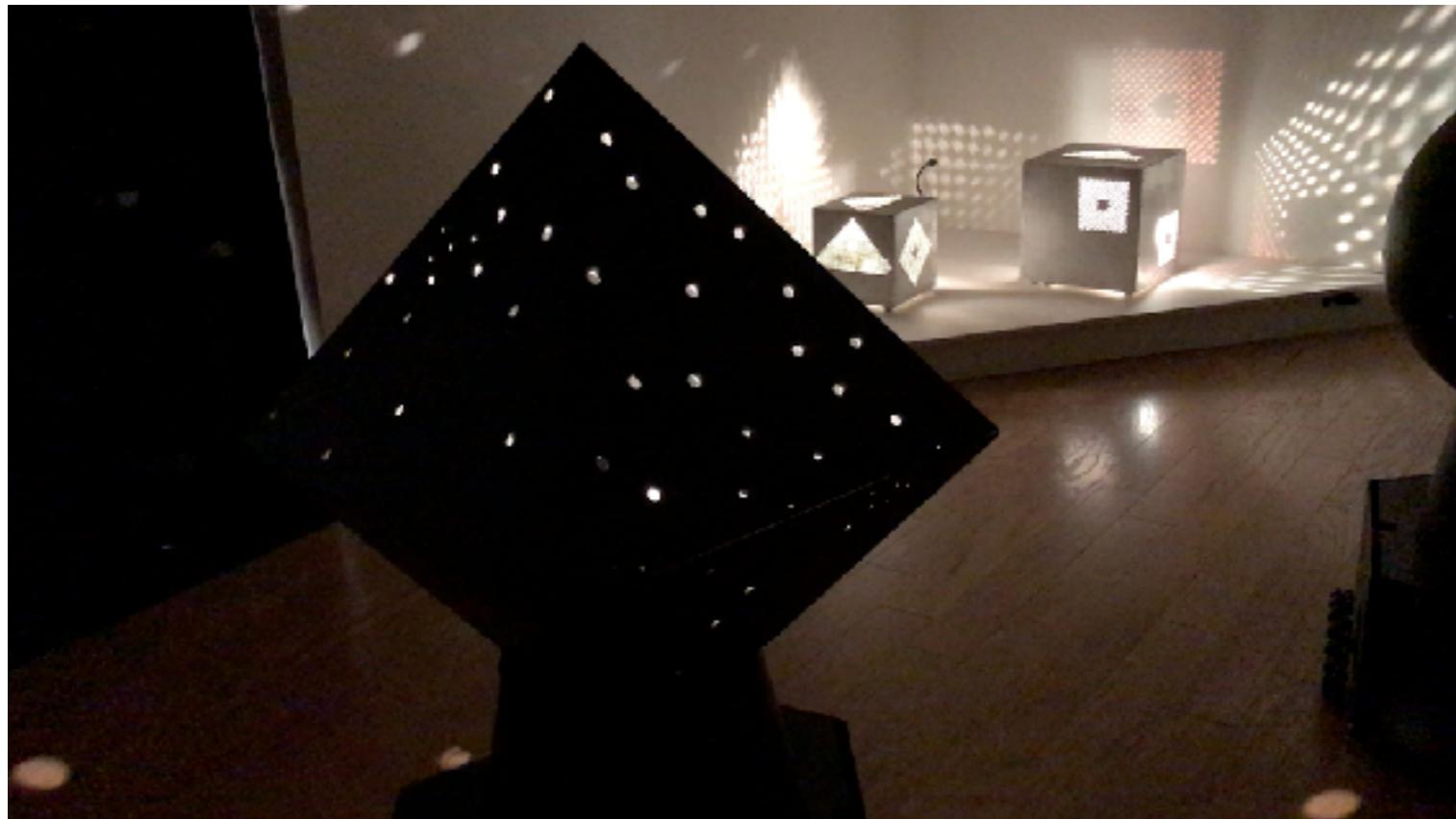
Chang Ting Tong



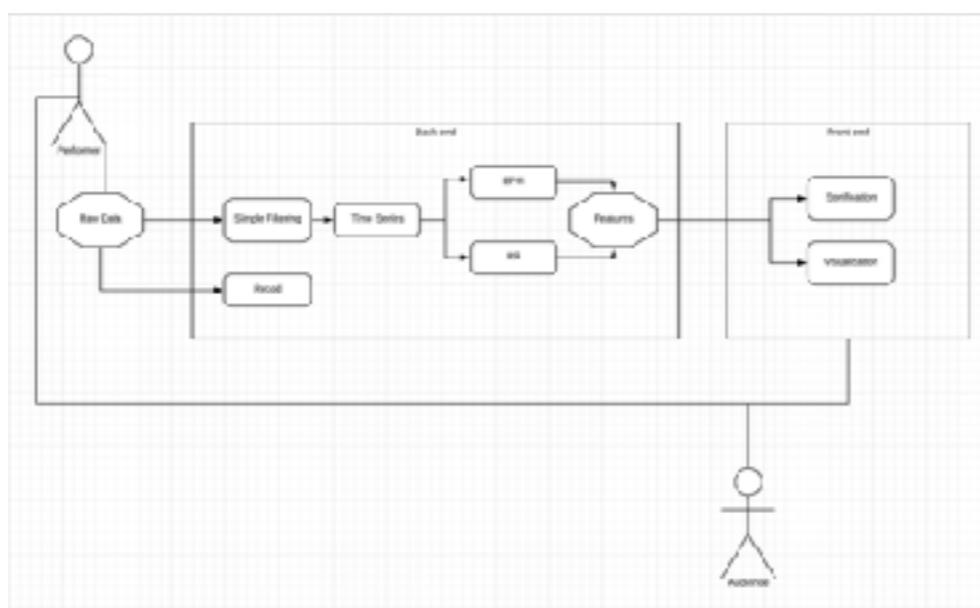
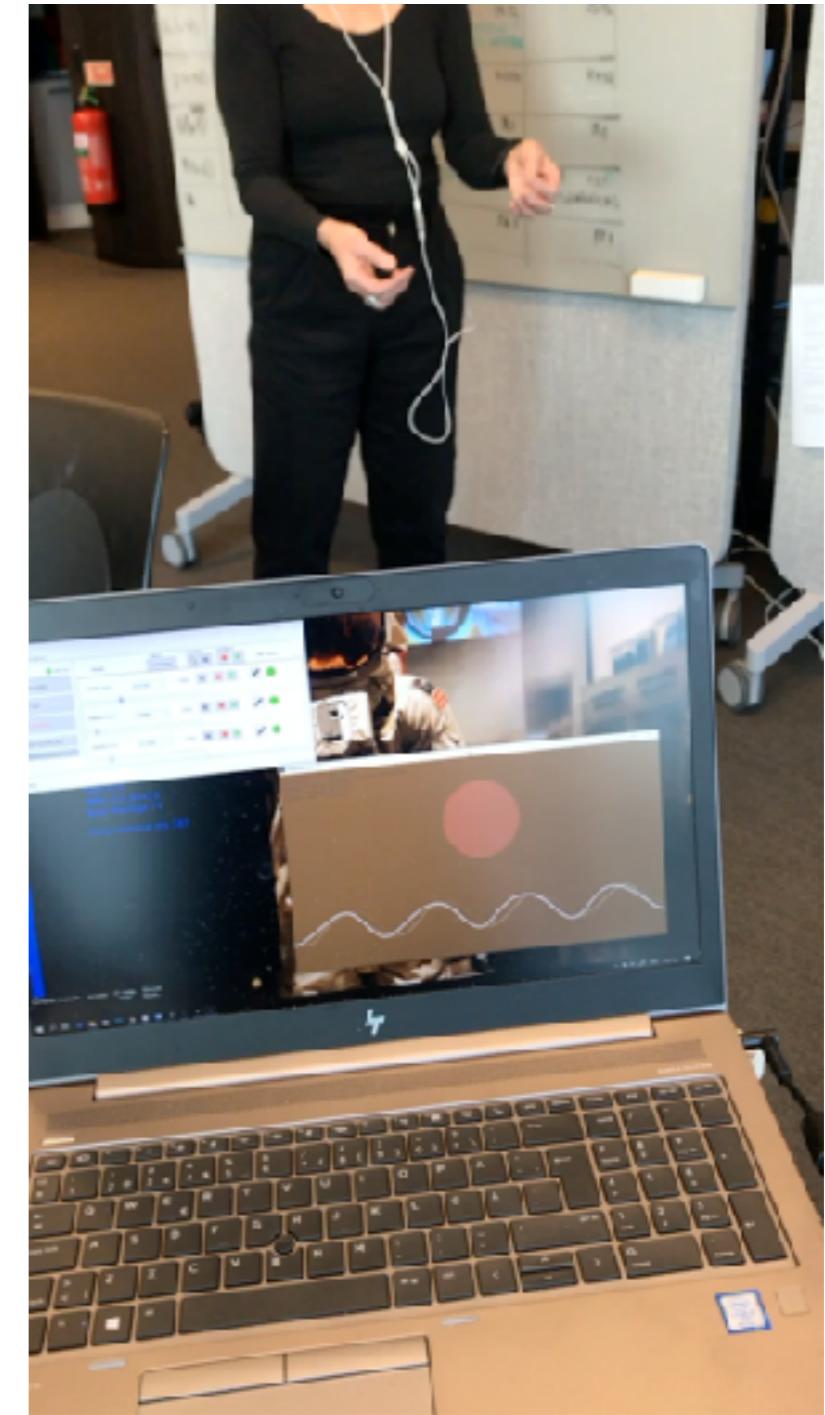
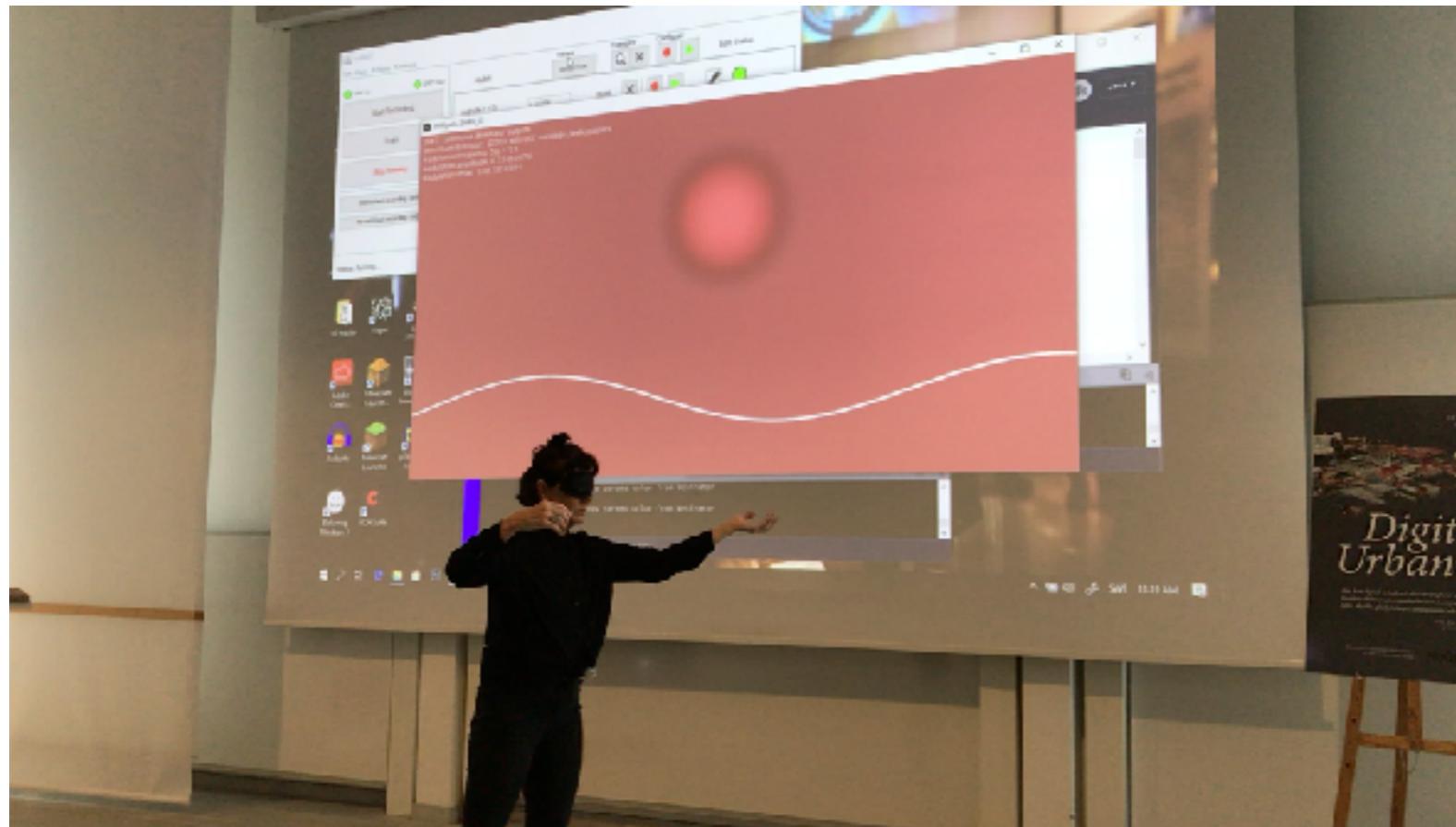
Recent Projects



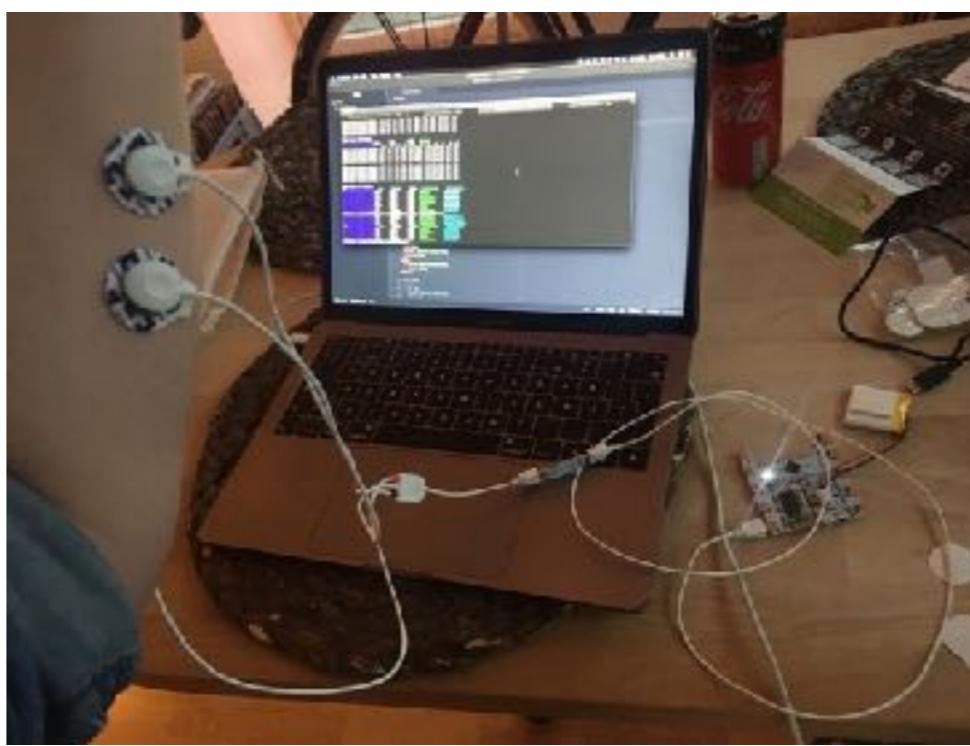
Otto Piene



Jeannette Ginslov



Student Projects



X

BOOMERANGS



“As formal teaching and training grow in extent, there is the danger of creating an undesirable split between the experience gained in more direct associations and what is acquired in school. This danger was never greater than at the present time, on account of the rapid growth in the last few centuries of knowledge and technical modes of skill.”

— John Dewey, Democracy and Education: An Introduction to the Philosophy of Education

Inspiration

- <https://processing.org/>
- <https://www.arduino.cc/education>
- <http://www.wekinator.org/>
- <http://act.mit.edu/cavs>
- <https://www.fondation-langlois.org/html/e/page.php?NumPage=236>
- <http://arduinoarts.com/2014/05/9-amazing-projects-where-arduino-art-meet/>
- <https://magenta.tensorflow.org/>
- <https://experiments.withgoogle.com/collection/ai>
- <https://www.edgeimpulse.com/>