

Systems Tinkering: The Philosophy of Making

Hamfesters Meeting Feb. 1, 2019

Some notes added by W9HLQ

Idea Realization Lab DePaul University, Chicago

Maker space the the Space Lab Mokena, Illinois



Maker Fest - August 2018



Everything around us is magic. Nobody knows how anything works.









How does a simple switch work?



What is an electromagnet?



There are a fast growing number of maker sites

Typical hands on tab for all craft/art/technical disciplines

Student/learner must build their own 3-d printer - it is not given to them

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Parts for the 3-D printer are printed from another printer

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The New Resources Driving Makerspaces

"The complexity for minimum component costs has increased at a rate of roughly a factor of two per year. Certainly over the short term this rate can be expected to continue, if not to increase. Over the longer term, the rate of increase is a bit more uncertain, although there is no reason to believe it will not remain nearly constant for at least 10 years."

Costs of Technology

- Arduino
- Raspberry Pi
- ESP 8266
- Rep Rap
- Wearables



Prices are dropping - if we break something while learning - we loose little

"Computing was once an occasion, an event. It happened in a dedicated space for a limited amount of time. Over the last few decades, the barriers between computing devices and their users have slowly dissolved. The physical world is becoming a key interface for computing and the internet of things is becoming the next generation of connectivity."













What's the Difference?

IT REQUIRES A NEW WAY OF DOING



How do we achieve this?



Design Thinking

- Problem solving process
- Applied to an idea
- Outcome/output



Creative Intelligence

"Design thinking is a failed experiment."

"From the beginning, the process of Design Thinking was a scaffolding for the real deliverable: creativity. But in order to appeal to the business culture of process, it was denuded of the mess, the conflict, failure, emotions, and looping circularity that is part and parcel of the creative process."





Design Makes Problems

- Designers are creating new problems
- Question of whether problems are worth solving in the first place
- Object Oriented (Focused on how people interact with objects)

Design Hubris

Designers approach users with empathy, understanding what humans need or might need

Creative Thinking

- Unlearning
- Problem Making
- Gathering and Tracking
- Propelling
- Perceiving and Conceiving
- Seeing Ahead
- Connecting
- Pausing
- Continuing



Creative Hubris

Does not require engagement with the real world. Comes along with many preconceptions

Engaging with the physical and constructing knowledge added to...



Systems Tinkering

Benefits

- Shifts away from design thinking where you are "making a thing for someone"
- Also moves away from the notion that an idea can be divined out of thin air
- Gets rid of pre-conceptions that come along with thinking, then doing

How Jay designed his Thotcon

Steps are shown in next 9 visuals

visual added by w9hlq



game manual like (mames correpts n) = success 10? Cooper Hewitt - per ARG For museum Thortcor Tostes Turn pot to 7 01 = Turn pot to 2 0 01 2 01,2 0 etc. 0 70 0 0 LED 1,23 0 0410 3 LEO 101,2 0 9/1,2,3 20 0 0 part Ø 0 Seed 0 0 A, B, C, D, E, 0 0 6 2: color code 2: moise code 0 Smile 0 Stra 0







Affordances







Knob - Rotate

Button - Push

Switch - Flip

Light Feedback

• 4 LEDs

- Colors
- Positions
- 3 Potentiometers
 - \circ Letters
 - o Numbers
- ATMega32u4 Chip
 - \circ We can save data
 - We can interface with computer
 - We can re-write data

event · piarios Øx8 4.2 4 Ø 10 2



- There is a difference between what you want to do, and what the object or material wants you to do
- Exposure to objects outside of the current paradigm
- Deconstructing the system
- Making is thinking

Programming

ALRIGHT. WHAT DOES THIS MEAN FOR YOU?

 The maker economy will require a new set of tools TIME TO BECOME A MAKER

- A return to making with our hands
- A mixture of the physical act of making with the digital





ore's Law – The number of transistors on integrated circuit chips (1971-2016)

re's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. advancement is important as other aspects of technological progress – such as processing speed or the price of electronic products – are gly linked to Moore's law.



- Being users is not good enough
- As the pace of technology advancement continues to slow, we will have the chance to catch up
- We must learn to manipulate the technology that we create through



STRATEGIES + RESOURCES

Scaffolding

- Basic Circuits
- Complex Circuits
- Schematics Reading & Writing
- Makey Makey
- Basic Arduino
- Complex Arduino
- Interconnected Devices (ESP8266)
- Printed Circuit Board Development



Books



Craeft

TIM INGOLD ANTHROPOLOGY, ARCHAEOLOGY, ART AND ARCHITECTURE Making:

Anthropology,

Archaeology, Art and Architecture



The Hardware Hacker





The Toaster Project

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This Should Work WWW.Shouldworkmedia.com Episodes Blog

FEATURED EPISODE

Session 5 – Conducti, STEM Kits for Kids, and Hackerspaces with Rachel Hellenga



NEXT TIME ON THIS SHOULD WORK

Session 6 – Mystery Guest! We talk about STEM Learning for Kids, The Influence of Systems Thinking, and More

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PODCAST

Session 4 - Physics of Music and Teaching Makers with Andrew Morrison

In this session I talk with Andrew Morrison, board member at Workshop 88 and professor at Joliet Junior College. Andrew and I talk about his work with the physics of music on steelpan drums, teaching...Read More

Circuits

SparkFun - What's a Circuit

Paper Circuits

- SparkFun Great Big Guide to Paper Circuits
- AgIC Conductive Ink
- Electronic Popables
- <u>https://chibitronics.com/</u>

- ISAM Whitepapers: http://bit.ly/2D1V9pC
- Project Zero: <u>http://</u> www.pz.harvard.edu/

CREDITS

Special thanks to the following works cited:

- Tinkering Platforms Tom Jenkins and Ian Bogost
- Play Anything Ian Bogost
- Making: Anthropology, Archaeology, Art and Architecture Tim Ingold
- Mindstorms Seymour Papert
- Creative Intelligence Bruce Nussbaum
- Diject-Oriented Ontology: A New Theory of Everything Graham Harman

THANK YOU



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