IAT 884
Tangible Computing

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Week 2, Terms/Analysis/History/Deconstructing Examples

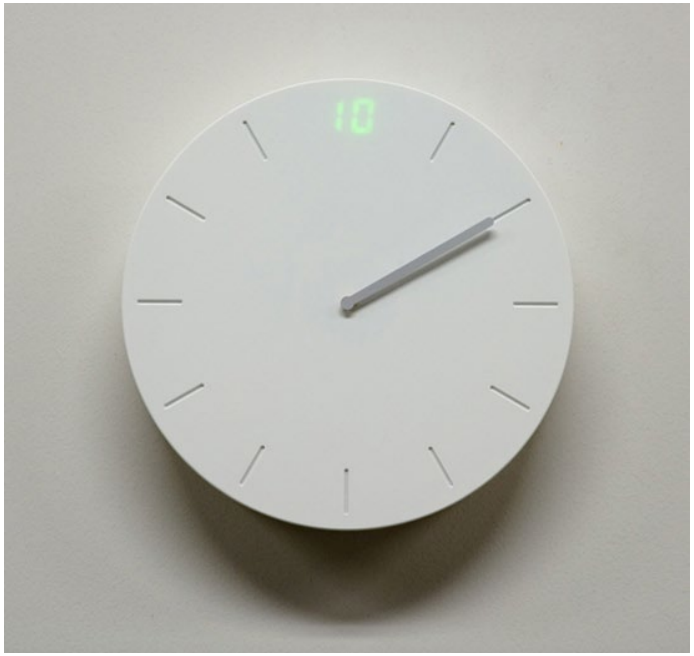
Spring 2022

Today

- Terms
- Analysis: Concept, Design, Technology, Cognition (Theory), Aspirations
- Analysis: MCRpd
- Analysis: Example
- History
- Share student examples (homework)
- Try it out - Prior 884 examples

- Workshop - -Technical analysis

Analog vs. Digital Computer



Representations

Physical object represents

- itself (an apple, which is a word, which is made up of letters, which are symbols)
- an exemplar of a category(food)
- a property of itself (colour: red, texture: smooth, shape: round, location etc)
- symbolic (healthy living)
- iconic (fruit section in grocery story or a Apple technology),
- a metaphor (Apple of his eye)

- Physical
- Digital

Interaction vs Interface

- Interaction – human-computer activity
- Interface: input and output/display
- Interaction model - computational: I-Mapping-O
  - E.g. type T key (I) and T appears on screen in document (O) – mapping is the relationship

Control

- How user controls the system e.g. enters data, triggers a program, etc.

Done using:

- Controller (mouse, console remote)
- Keyboard
- Voice
- Brain

Weaving Fire Analysis Structure

1. Concept – what it is/how it works/usage scenario w/ reasoning
2. Design (Interaction design) – physical and digital representations, physical form, affordances for action/perception, control, contextual factors (MCRpd)
3. Technology – how it's implemented w/ hardware/software (UI/system)
4. Cognition – underlying theories around humans about how and why it should achieve intended effects … broaden this to be theories about humans (e.g. culture level vs individual level, experiential/embodied/perceptual-motor vs just cognition)
5. Aspirations – how generalize into wider world, broader audiences etc.

MCRpd Analysis Structure

- View: Physical representation
- View: Digital representation
- Control
- Model
- Missing?

Example: PhonoBlocks

Weaving Fire Chapter 8.1

PhonoBlocks: Weaving Fire

Concept

Design

Technology

Cognition (epistemic actions, multimodal processing)

Aspirations

PhonoBlocks: MCRpd

View: Physical representation

View: Digital representation

Control (input/output)

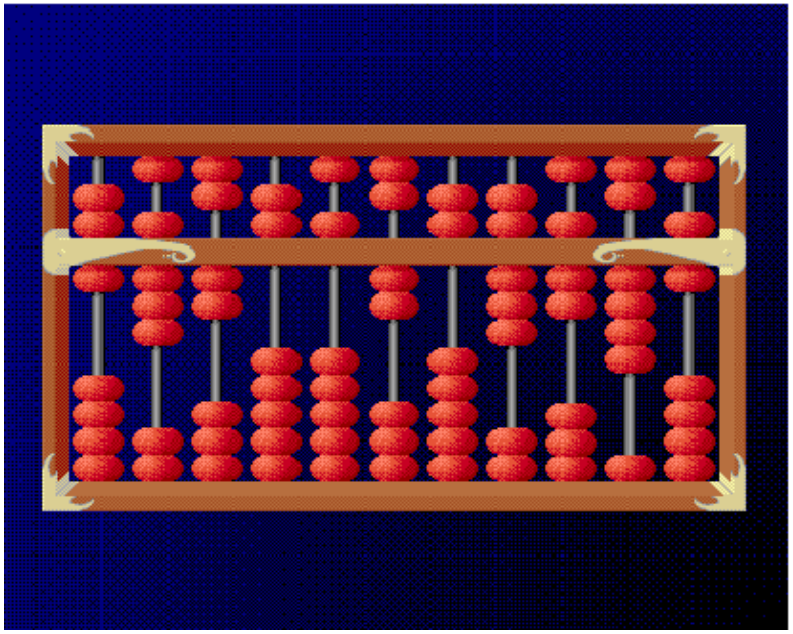
Model (system/program)

History of human-computer interaction

- When was the earliest computer?

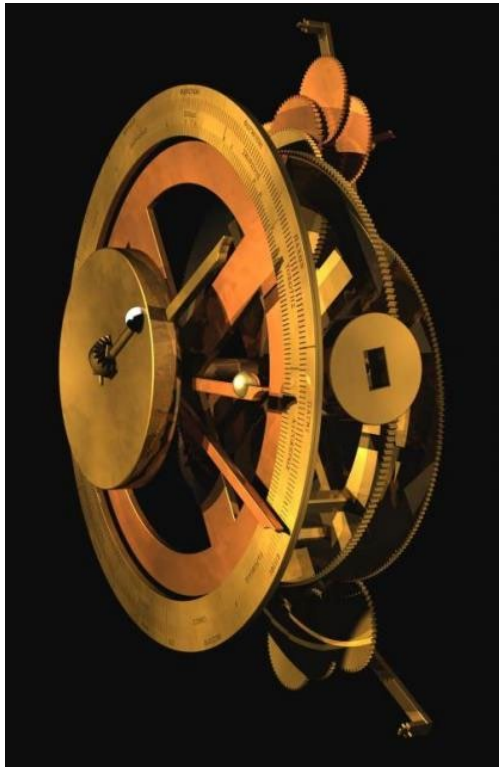
History 2500 BC

- Abacus
- Circa 2500 BC
- Digital (up/down)
- Hand powered
- Accounting



History 100 BC

- Antikythera
- Romano-Greco 100 BC
- Analog
- Mechanical computation - knob, levers and wheels
- Hand-powered
- 19 year Calendar (moon, sun …)
  - Predict
    - Dates for Olympics
    - Eclipses (sun, moon)



Dark Ages (200-1200 AD)

- Collapse of Roman Empire
- Collapse of Han Empire
- Norse Invasions
- Mongolian Invasions
- What a mess for 1000 years!

Not all was lost … 1500 AD

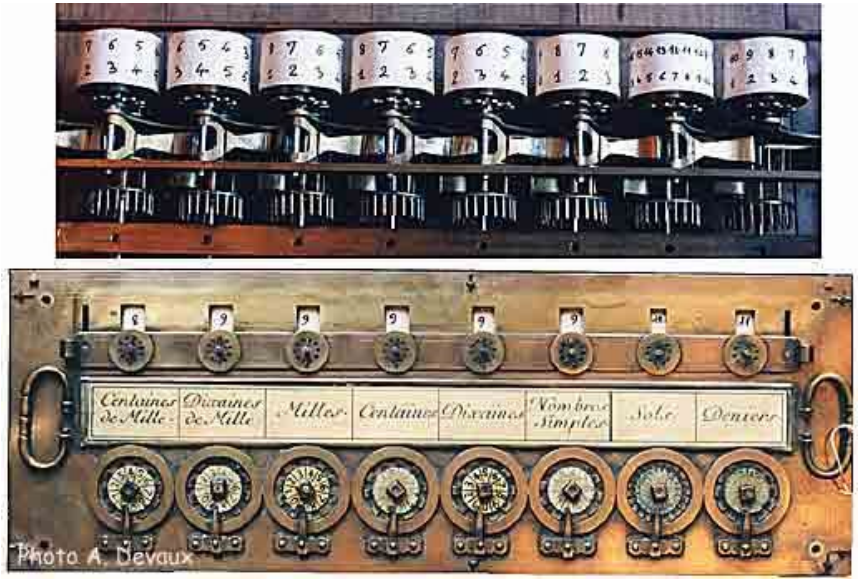
- Astrolab
- Arabic 150 BC
- British 1500 AD
- Analog
- Mechanical computation -- knob, levers and wheels
- Hand-powered
- Navigation (latitude …)

History: jump to 1600 AD

- Adding machine
- Europe1600s (Blaise Pascal)
- Analog
- Mechanical computation

levers and wheels

- Hand powered
- Taxes!



History: 1800 AD

- Mechanical Loom (Jacquard)
- Binary!

History : 1830

Difference Engine (V1&2)

Europe Charles Babbage

Mechanical

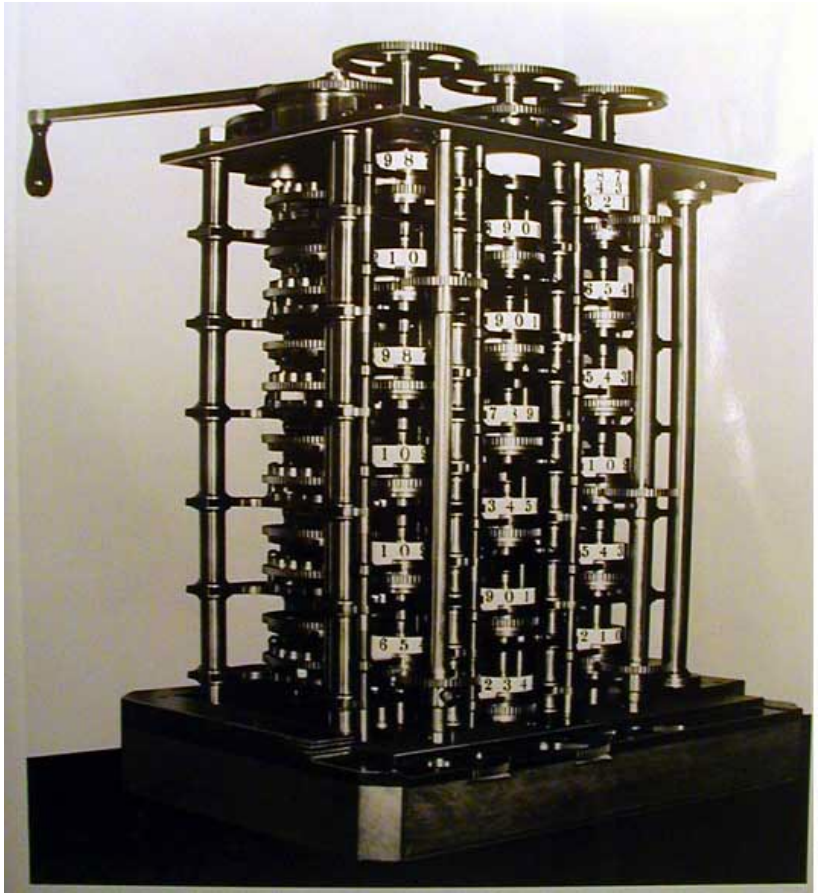
Hand powered

Calculate polynomials

Number tables

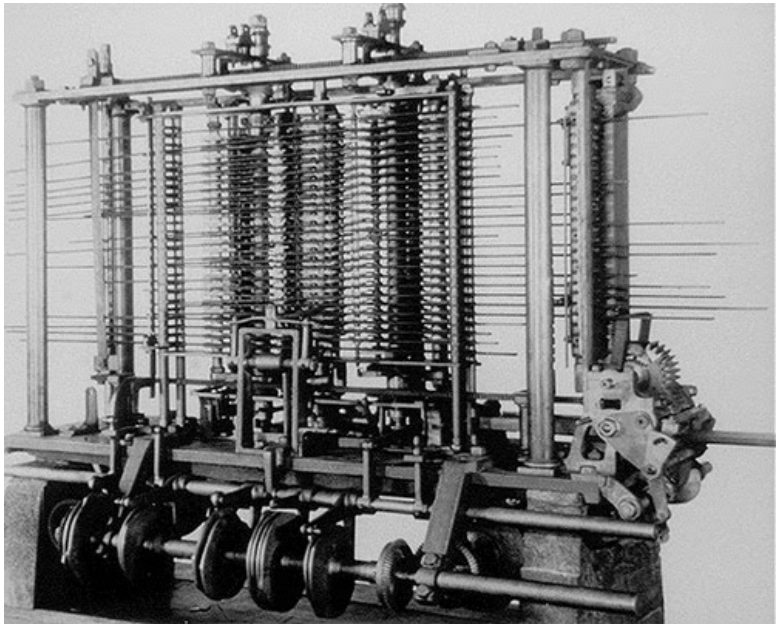
Modeling in science, eng

And navigation



History Interaction 1815-1852

- Ada Lovelace – first programs on mechanical device working with Babbage



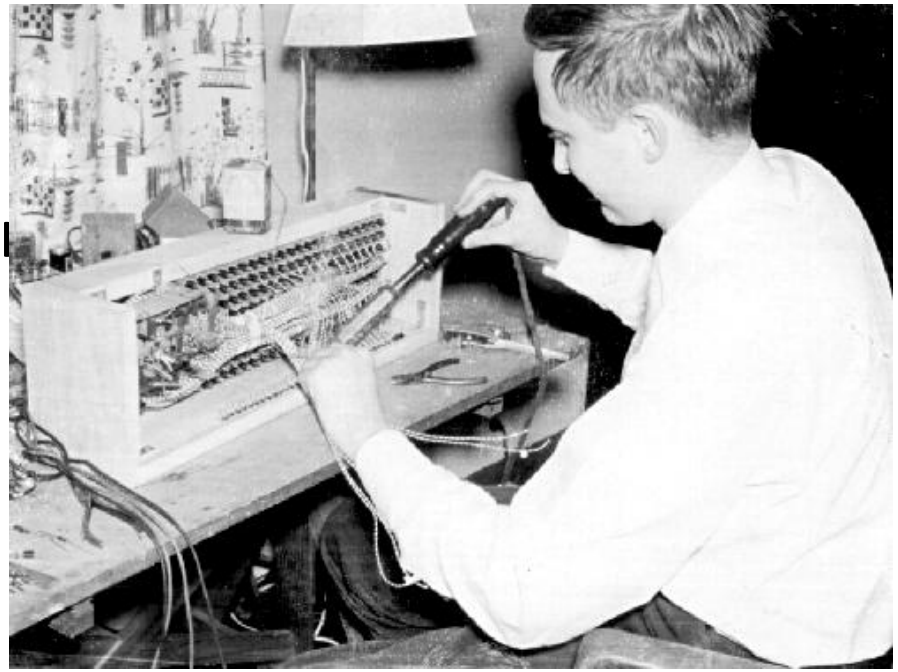
Second “dark ages”: 1890 - 1930

Then World War II drove advances

- Cryptology
- Atom bomb
- Civil engineering
- Naval architecture

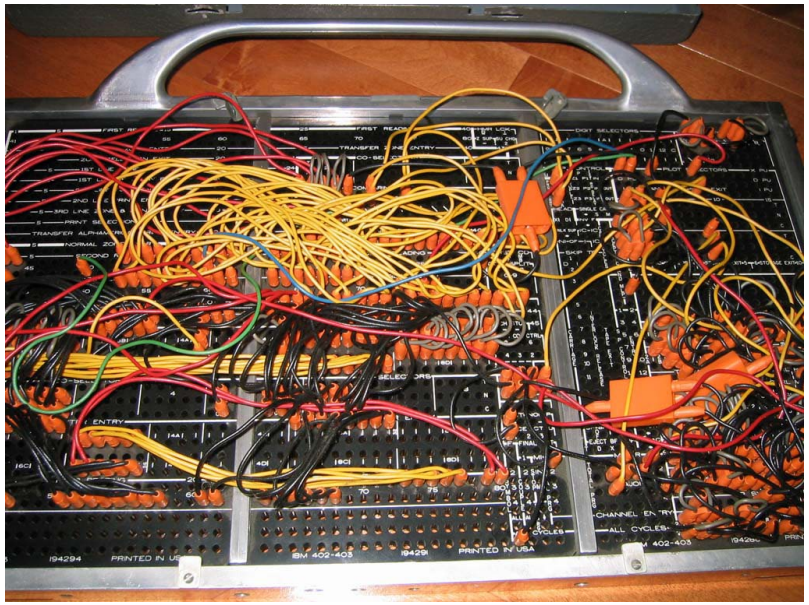
History: 1940s

- Analog
- Electrical
- Wires and lights
- Interaction: Soldering iron
- Code breaking



History: 1940-1950s

- Analog
- Electrical
- Wires and lights
- No more soldering
- Engineering
- Military



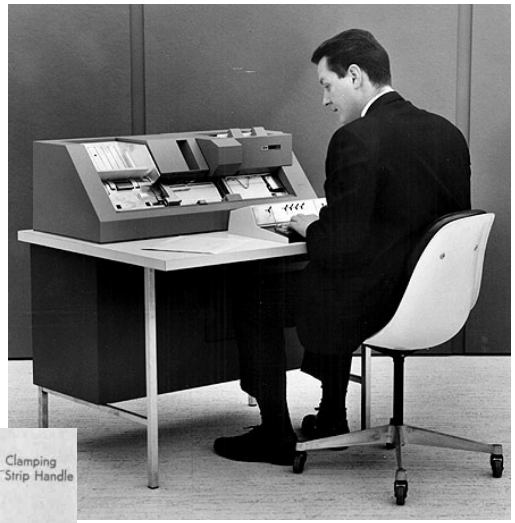
History: 1950s

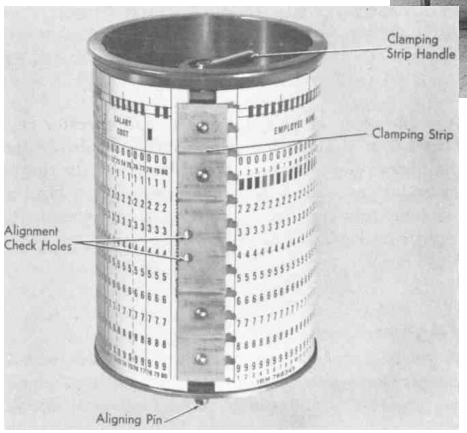
Digital

Electrical

Symbolic!

Interaction: punch cards





History: 1960s

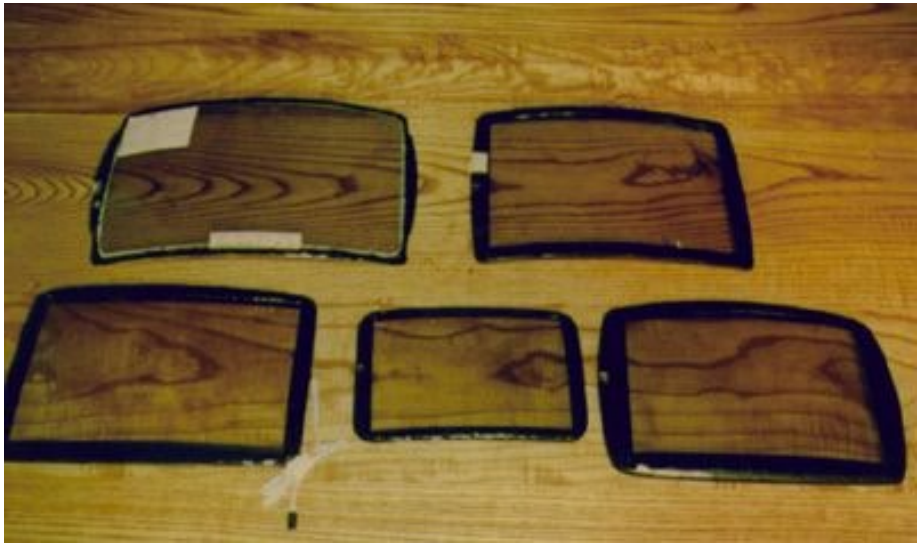
- Digital
- Electrical
- Interaction: At last language!
- Fortran 1954
- Input and output are text

History: 1970s

- Digital
- Electrical
- Graphical interface
- Keyboard
- Pointing device
- Productivity apps

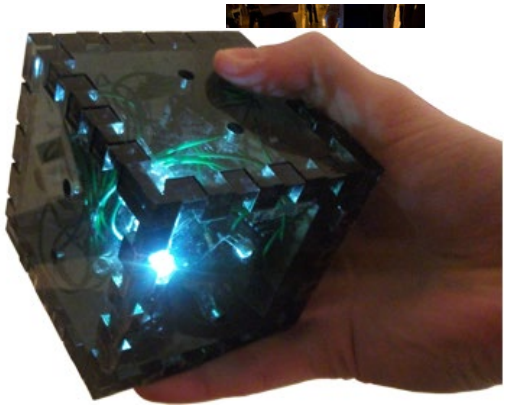
History: 1970s

- FYI: First Touch screen
- Hurst 1973
- Siemens Corporation 1977



History: 1990s

- First tangible user interfaces
- Buxton, Ishii, others 1990s
- or 2500 years ago?



History: When was …

- First wearable?

History: 1955

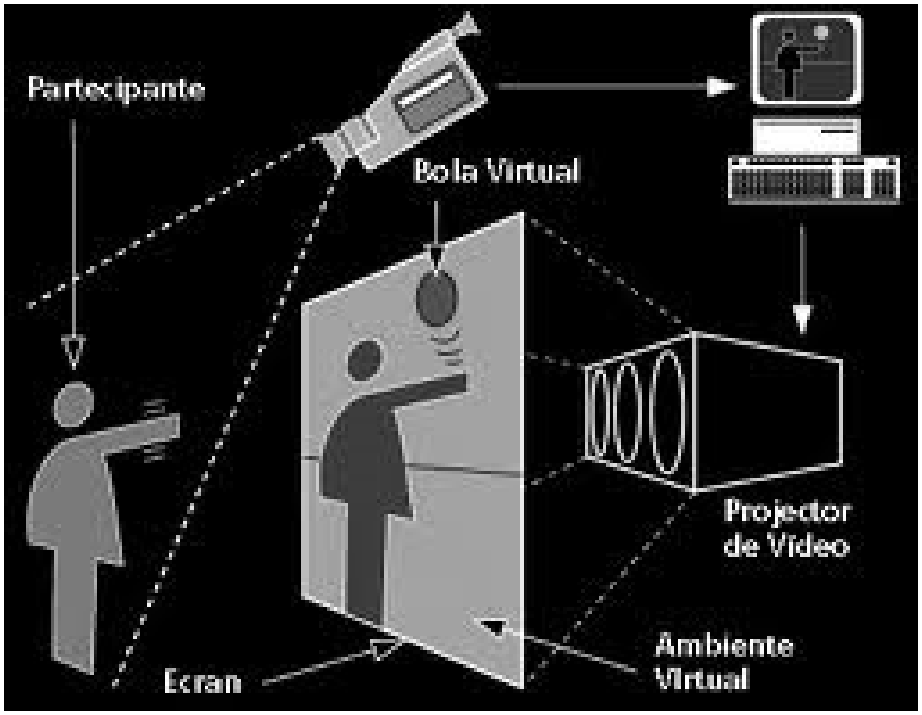
- Roulette jacket
- Fifty years ago

History: When was …?

- First responsive environment?

History : 1969

- GlowFlow (Myron Krueger)
- Almost 50 years ago!



Why care about history?

Trends

1. From interaction metaphor of dialogue to … ?
2. Computational power everywhere in our world
3. More integrated into our body space
4. Enhancing wider range of skills and abilities
5. Augments our experience with the world
6. Reforms our social structures, norms and skills
7. Continues to co-evolve with us … where are we going?

History repeats itself

A return to

- Physicality (and spatiality)
- Digital
- Wide range of human actions
- Aesthetic qualities of design

Largely still using hands and eyes for interaction

- Moving past this as computation becomes integrated into objects, body, environment
- = IAT 267/320/884.

Things to think about

- All computation extends or supports human abilities and skills.
- What has been gained with digital computation?
- What has been lost … ?
- What human abilities have not been augmented?

Student Examples MCRpd

Prior 884 prototype examples

- Pick one … pick one analysis approach … 10 minutes … present.

Workshop

- Technology analysis of tangible
- See wiki handout