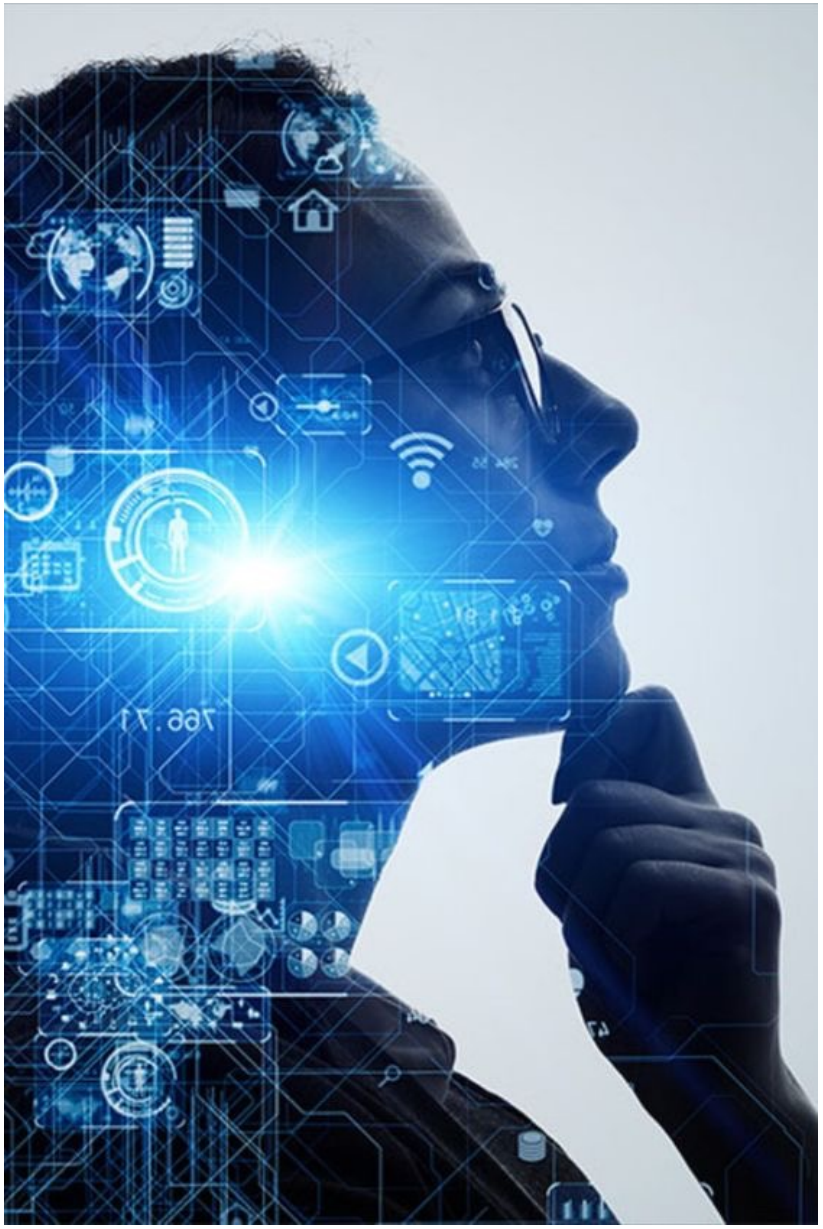


Human Computer Interaction

COMP630054 人机交互

Li Shang

With content borrowed from online materials on human computer interaction, ubiquitous computing, and machine learning.

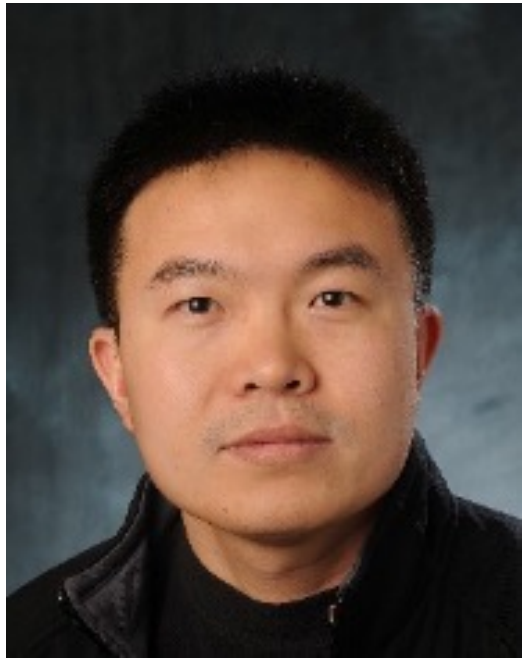
Disclaimers

This course has been offered before and this is my second time teaching it. However, due to recent disruptive technological advances, we need to make significant changes to the curriculum.

Wearable AGI focuses

Results: Research publications

Who Am I

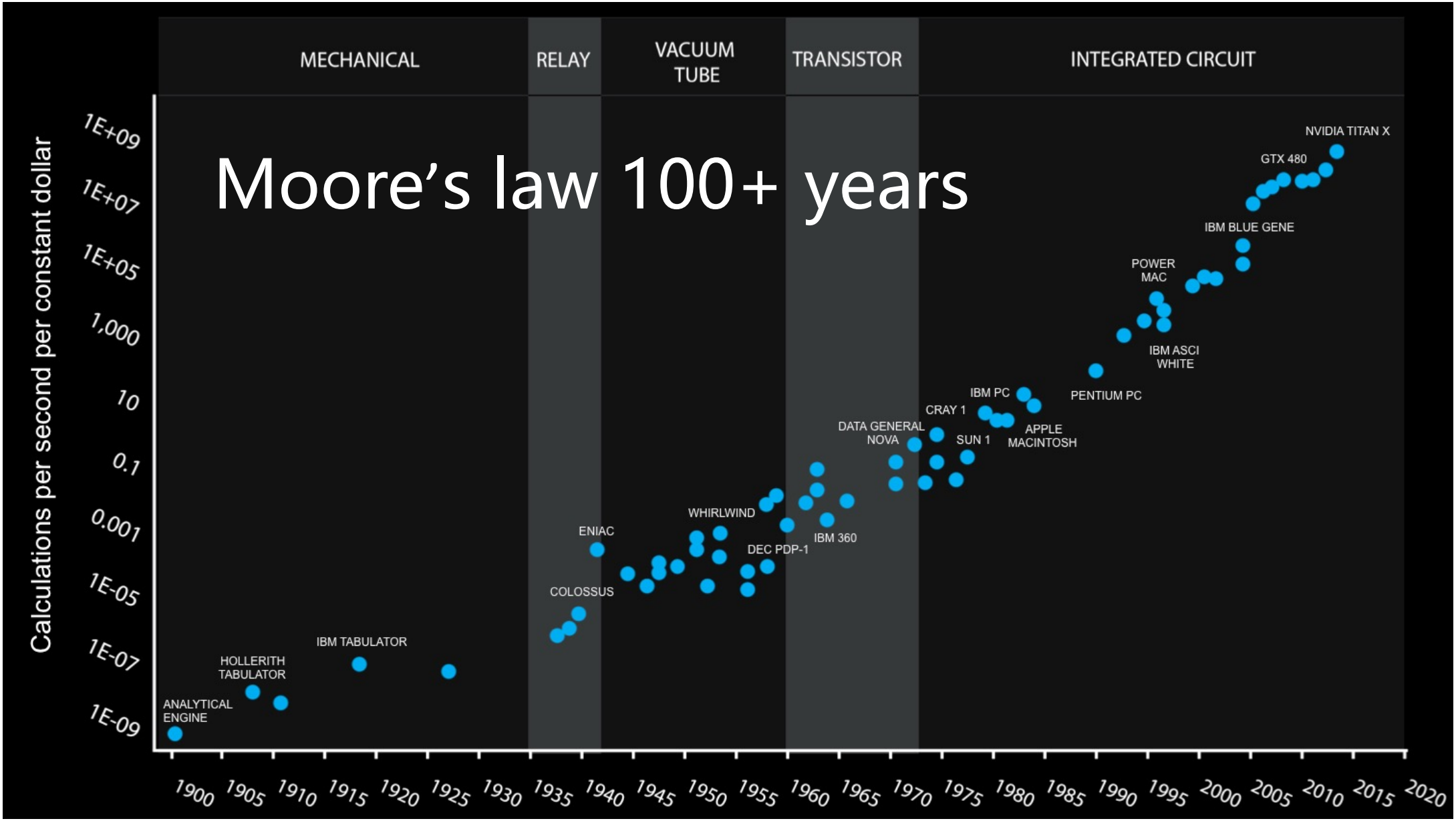


Dr. Li Shang is a Professor of School of Computer Science, Fudan University. He received his Ph.D. degree from Princeton University. He was the Deputy Director and Chief Architect of Intel Labs China, and an Associate Professor of CU Boulder (tenured). He has over 150 publications, multiple best paper awards and nominations, and over 8000 citations. He was a recipient of NSF Career Award.

His current research focuses on wearable AGI, a vision to empower every and each of us with artificial general intelligence technologies.

Topics for Today

- The purpose: Why this course?
- Ubiquitous computing/HCI
- Course logistics/evaluation
- Watching movie “Her”


MECHANICAL
RELAY
VACUUM TUBE
TRANSISTOR
INTEGRATED CIRCUIT
Moore's law 100+ years
Calculations per second per constant dollar
1E+09
1E+07
1E+05
1,000
10
0.1
0.001
1E-05
1E-07
1E-09
NVIDIA TITAN X
GTX 480
IBM BLUE GENE
POWER MAC
IBM ASCI WHITE
PENTIUM PC
IBM PC
CRAY 1
DATA GENERAL NOVA
SUN 1
APPLE MACINTOSH
WHIRLWIND
ENIAC
IBM 360
DEC PDP-1
COLOSSUS
IBM TABULATOR
HOLLERITH TABULATOR
ANALYTICAL ENGINE
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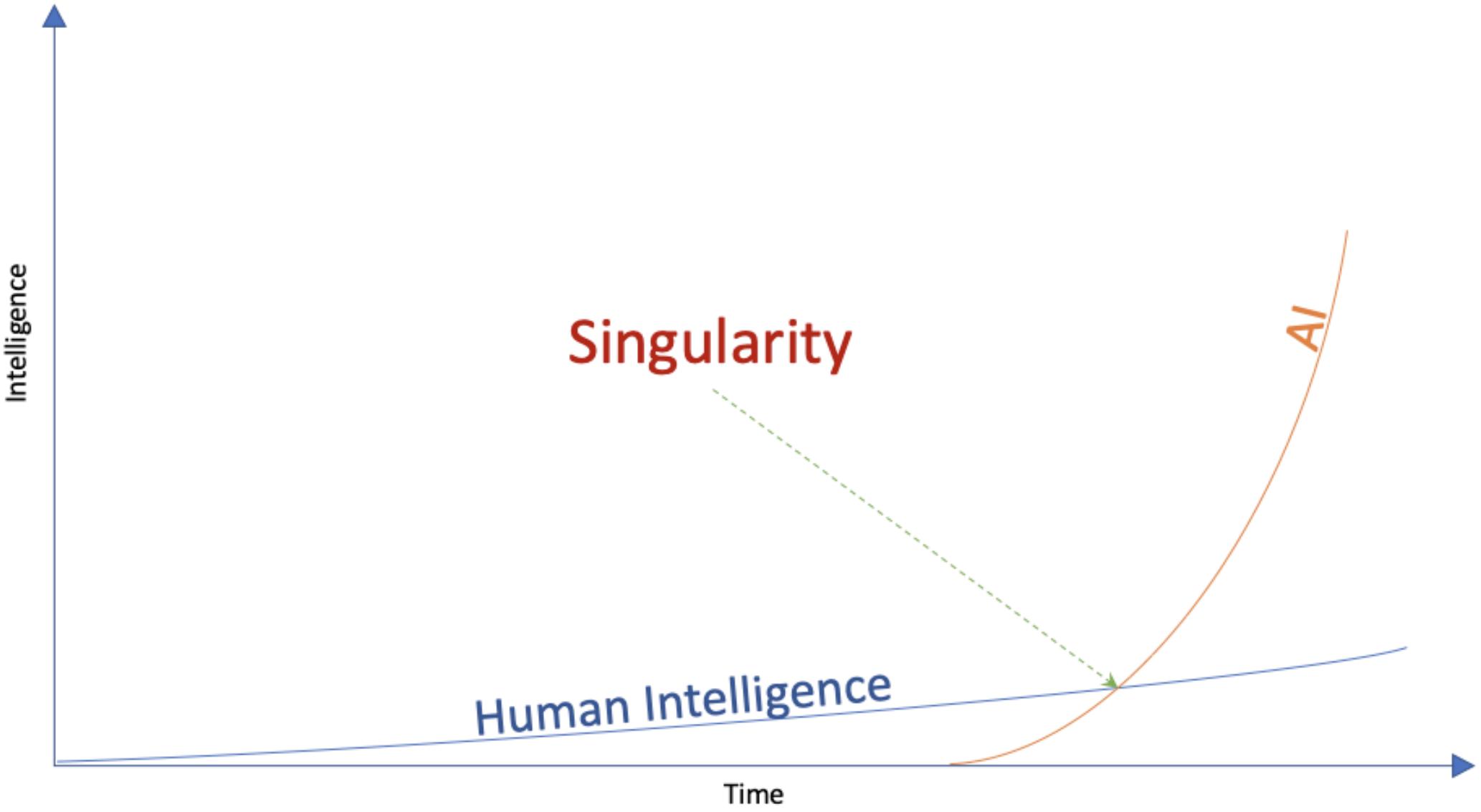
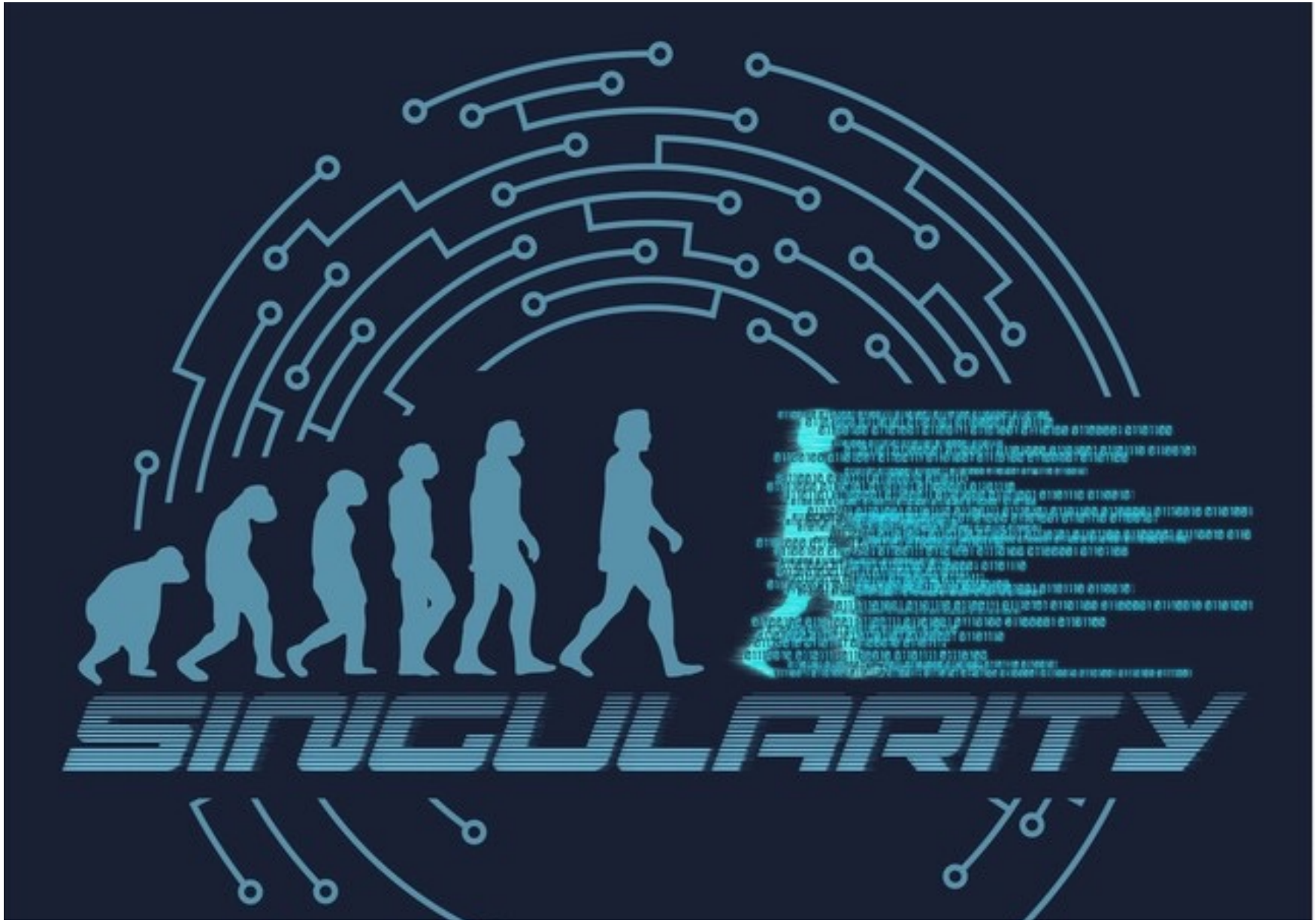
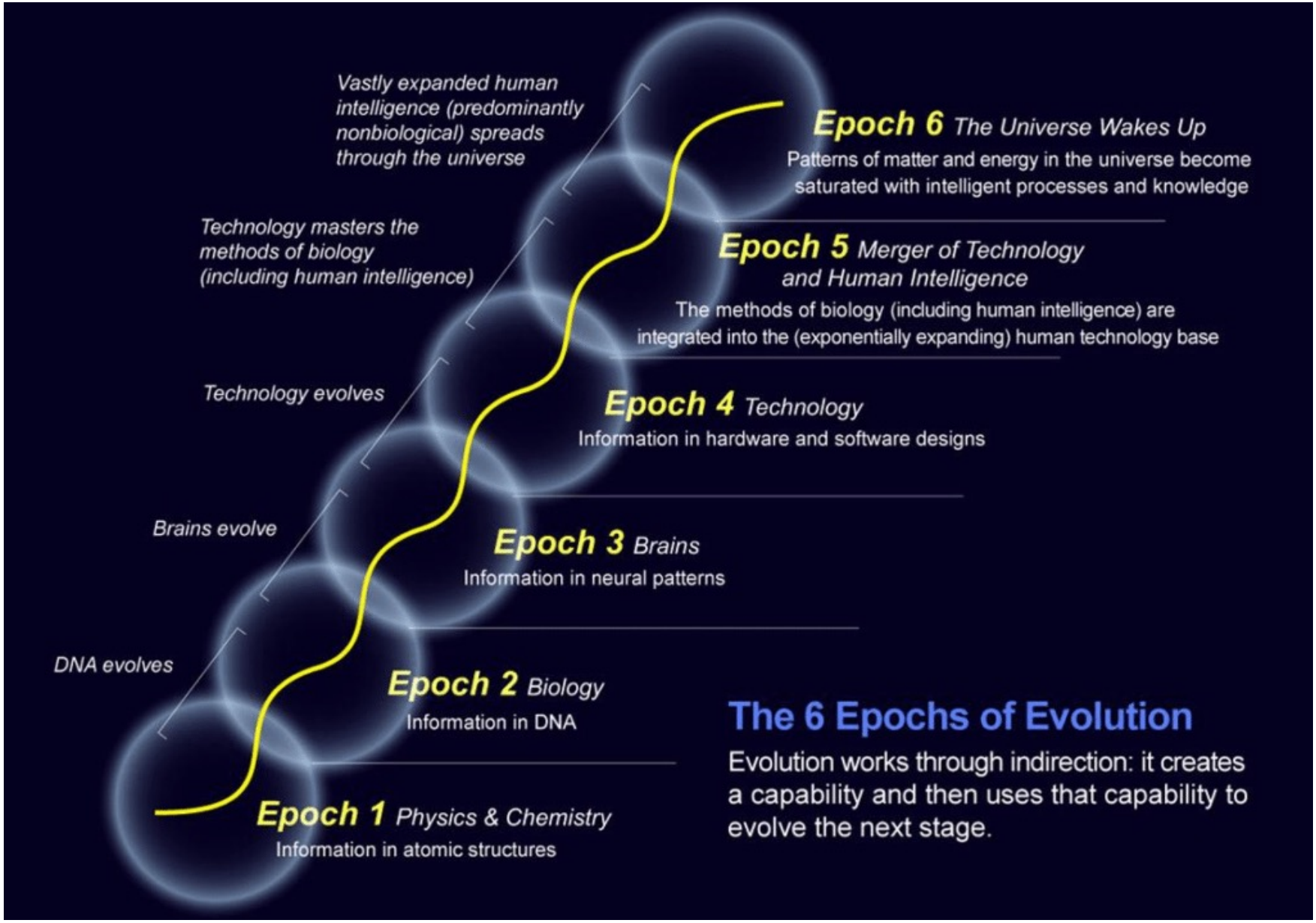

Intelligence
Singularity
AI
Human Intelligence
Time

Superhuman Intelligence



Digital immortality



Lecture Logistics

Mondays, 18:30 - 21:00 PM (JB205)
Instructor: Li Shang (office A2019)

Definitions of HCI/UbiComp

Computing that moves beyond the desktop

Computing that is embedded everywhere in the environment

A technology where serving humans is the focus, not the technology itself

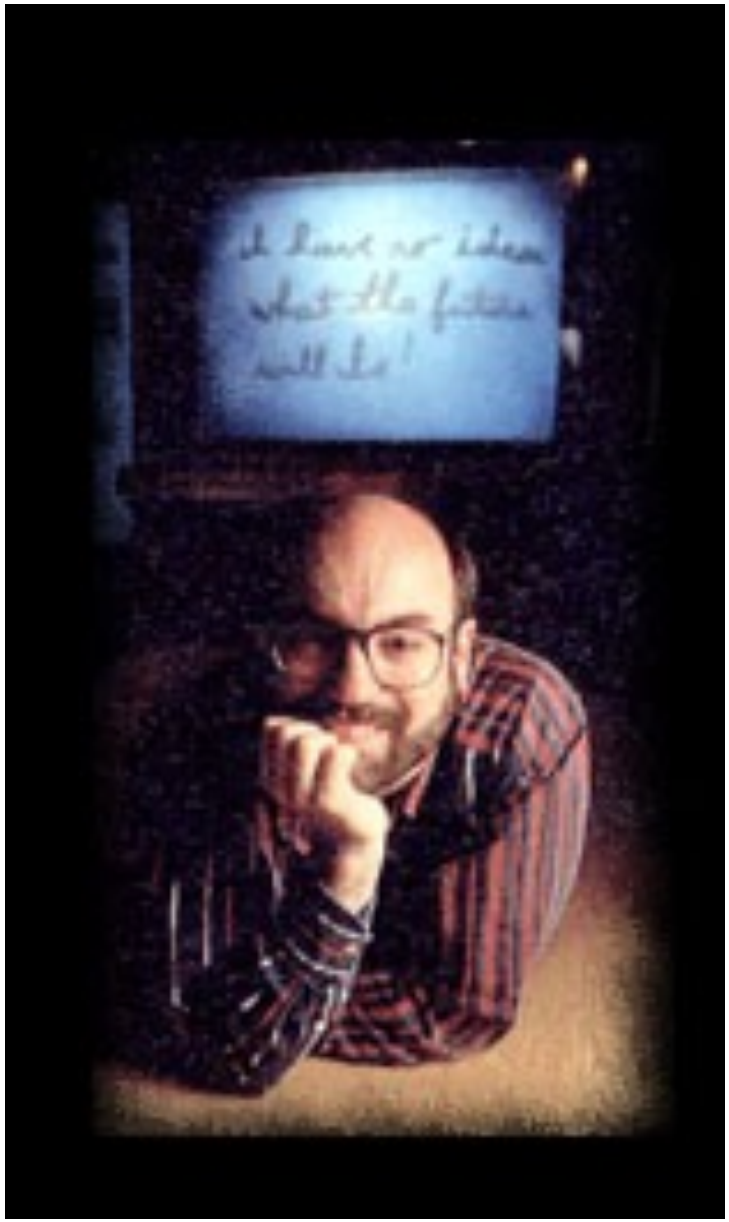
1. Automated capture and access
2. Context-awareness
3. Natural and implicit feedback
4. Comparable intelligence

Mark Weiser (1952 – 1999)

CTO of Xerox PARC

Notion of "calm technology"

- "The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it"
- Computing should be as "refreshing as a walk in the woods"



Generations of Computing

1. **The mainframe era**: one computer to many individuals
   - Killer apps = scientific calculations

2. **The PC era**: one computer per individual
   - Killer apps = spreadsheets, text editing

3. **Ubiquitous computing era**: many computers per individual
   - Killer apps = social networks, ridesharing apps

4. **Artificial intelligence era:** human-comparable intelligence
   -- Killer apps = anywhere, anytime, everything, forever

Course Topics

Interactive modalities: Gesture, voice, visual

ML algorithms: Image/video, NLP/LLM, RL, causality

Computer systems: Wearable technologies

Intelligence: Human vision/brain, AGI, human-robot interaction

Course Components

Participation: Active discussion & engagement is a must

Paper presentations: Comprehensive & in-depth review of the related work with insightful comments

Research project: A new & impactful research problem with novel & solid research contributions, submitting to a top-tier HCI/UbiComp/ML conference by the end of the semester.

Course Syllabus

Components	Percentage
Class participation & discussion	25%
Paper presentations	25%
Research project	50%

HW#1: Position Paper

Position paper title: Towards human-level intelligence
Deadline: Two weeks, 3-4 pages IEEE/ACM Double column format

Suggested references:

- Y. Ma, D. Tsao, H.-Y. Shum, "On the principles of parsimony and self-consistency for the emergence of intelligence", 2022
- J. Browning and Y. Lecun, "AI and the limits of language", 2022
- Y. Lecun, "A path towards autonomous machine intelligence", 2022
  - https://youtu.be/OKkEdTchsiE?si=ijccPWW_hGWqH1mD
- B. Lake, "Build machines that learn and think like people", 2016
- R. Fjelland, "Why general artificial intelligence will not be realized", 2020

How to write a position paper:

- Writing a position paper (provided)
- Examples: Position Paper: Towards Transparent Machine Learning
  - https://arxiv.org/pdf/1911.06612.pdf

Position Paper

A position paper presents an arguable opinion about an issue. The goal of a position paper is to convince the audience that your opinion is valid and worth listening to. Ideas that you are considering need to be carefully examined in choosing a topic, developing your argument, and organizing your paper. It is very important to ensure that you are addressing all sides of the issue and presenting it in a manner that is easy for your audience to understand. Your job is to take one side of the argument and persuade your audience that you have well-founded knowledge of the topic being presented. It is important to support your argument with evidence to ensure the validity of your claims, as well as to address the counterclaims to show that you are well informed about both sides.

--Quoted from "Writing a position paper"

Sample Outline for a Position Paper

I. Introduction

   A. Introduce the topic
   B. Provide background on the topic
   C. Assert the thesis (your view of the issue)

II. Counter Argument

   A. Summarize the counterclaims
   B. Provide supporting information for counterclaims
   C. Refute the counterclaims
   D. Give evidence for argument

III. Your Argument

   A. Assert point #1 of your claims
      1. Give your opinion
      2. Provide support
   B. Assert point #2 of your claims
      1. Give your opinion
      2. Provide support
   C. Assert point #3 of your claims
      1. Give your opinion
      2. Provide support

IV. Conclusion

   A. Restate your argument
   B. Provide a plan of action