

INTRODUCTION TO SYSTEMS SCIENCES

Systems Sciences Foundations

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Outline

1 Definitions

2 The History

3 Artificial Intelligence

4 Cybernetics

5 Application Fields



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Systems Sciences

- Systems Sciences is an interdisciplinary field that studies the nature of **complex systems** in nature, society, and science.
- Systems Sciences uses a **holistic** approach to study the **interactions** and **interdependencies** between the parts of a system.
- Systems Sciences is used to study a wide range of systems, including **biological**, **social**, and **technological** systems.
- Systems Sciences is used to develop **models** and **theories** that can be used to understand and predict the behavior of complex systems.



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- Artificial Intelligence is based on the idea that machines can be **taught** to think and act like humans.
- Artificial Intelligence is used to develop **algorithms** and **models** that can be used to solve complex problems.
- Artificial Intelligence is used in a wide range of fields, including **robotics**, **healthcare**, and **finance**.
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Cybernetics

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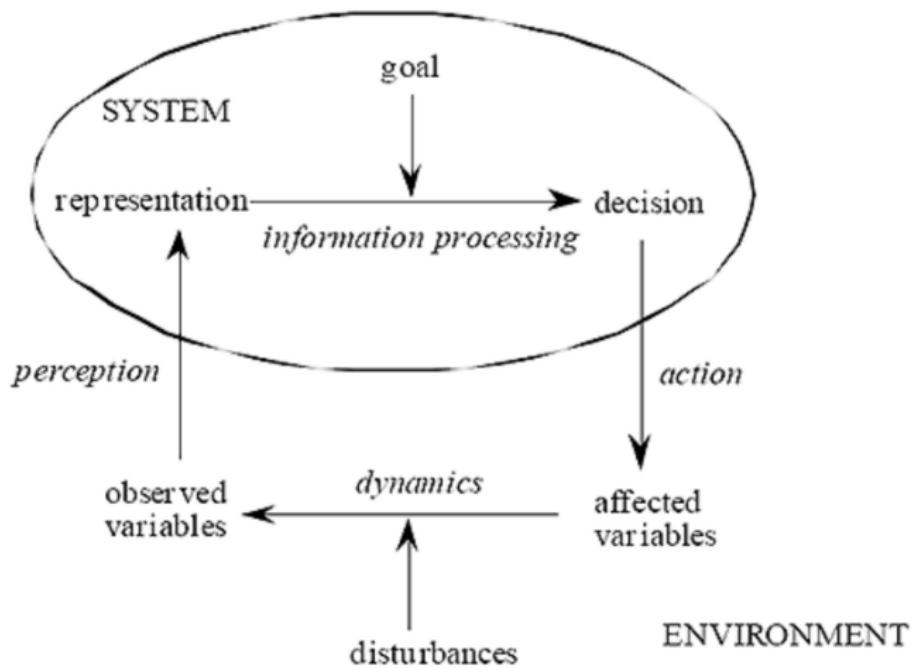


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Typical Cybernetics System



Robotics

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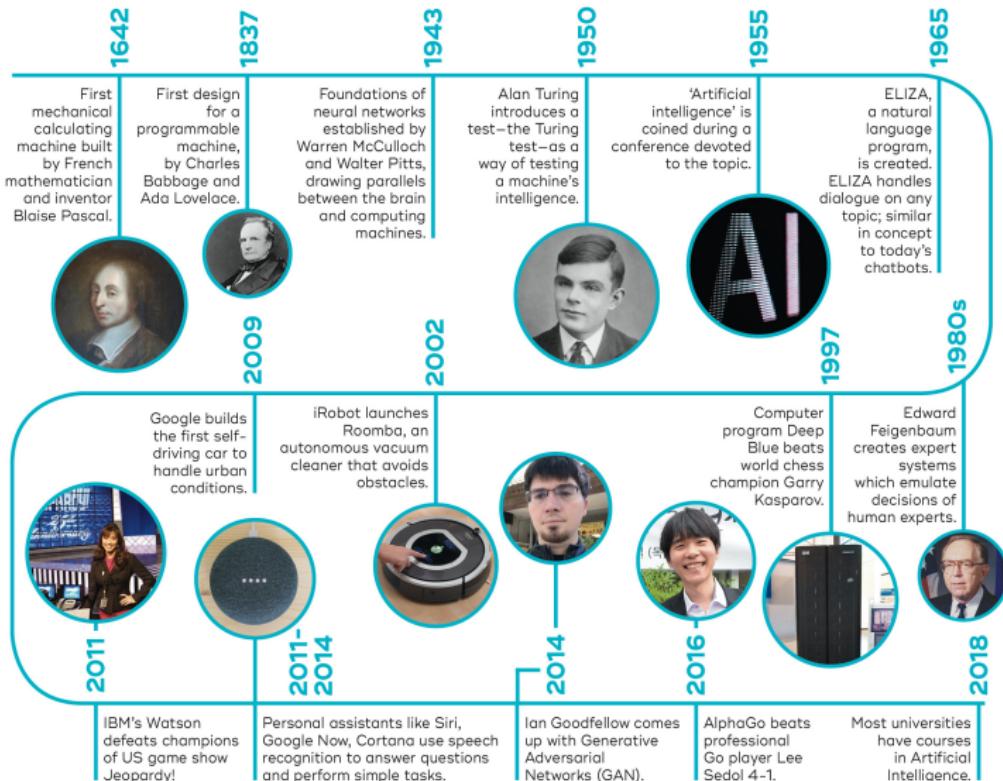
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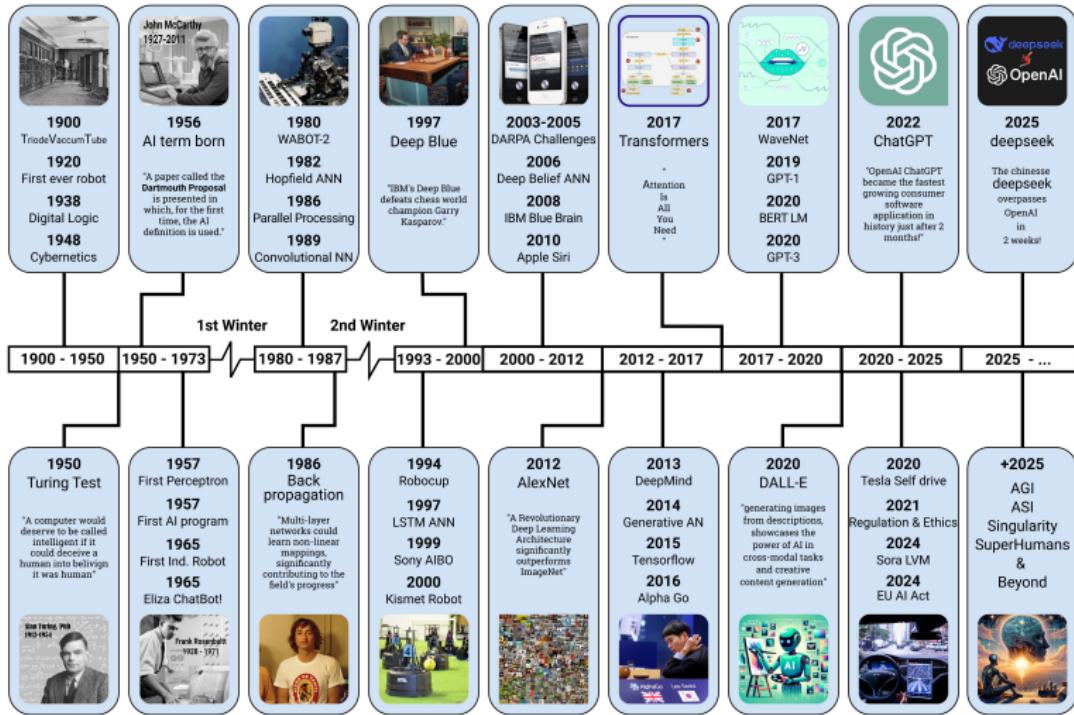
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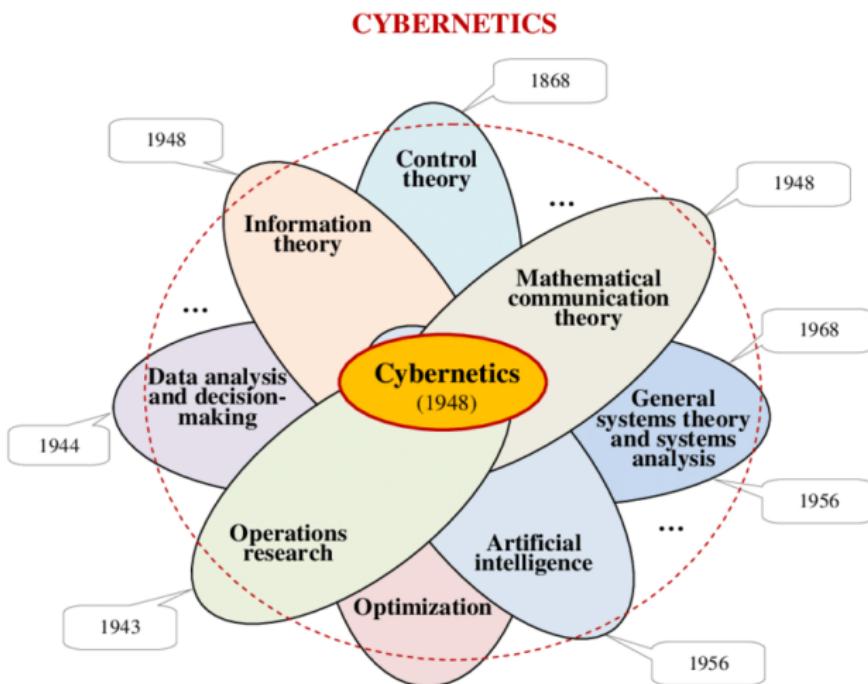
Artificial Intelligence Timeline I



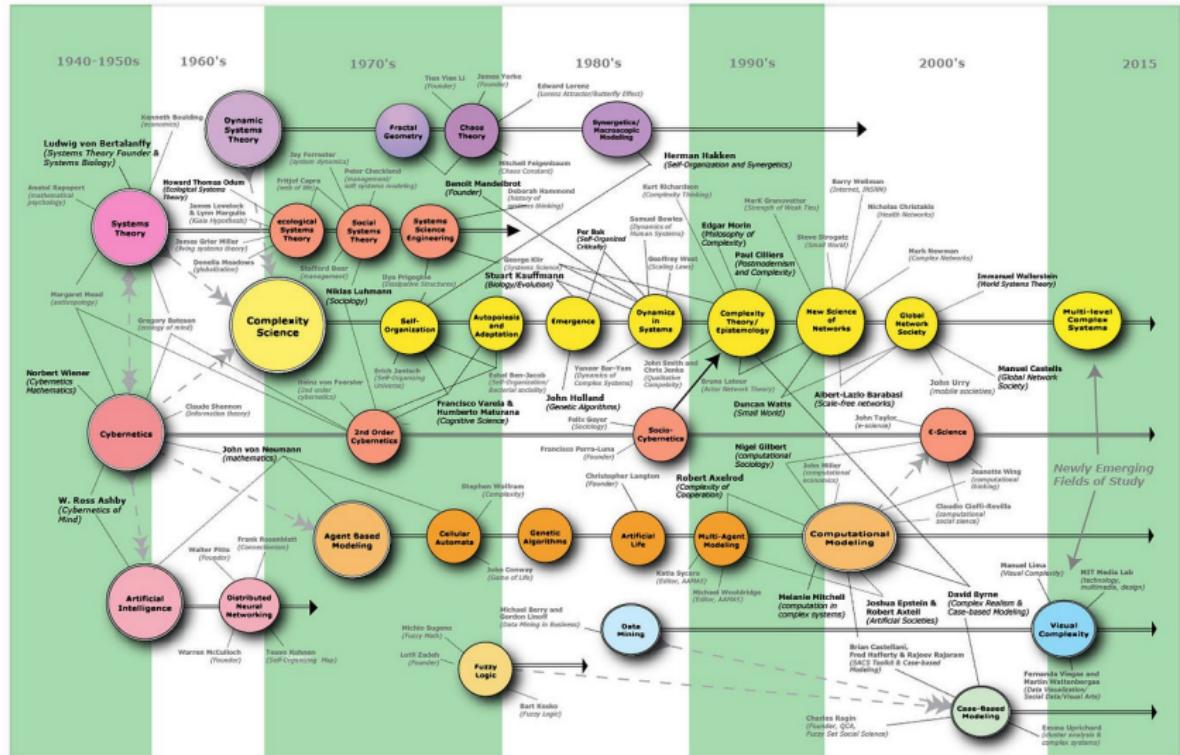
Artificial Intelligence Timeline II



Cybernetics Timeline



Systems Sciences Timeline



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Main Brances of AI

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Main branches of AI



AI Types

- **Artificial Intelligence** can be divided into **two main types**:
 - **Narrow AI**: Also known as **Weak AI**, this type of AI is designed to perform a specific task, such as playing chess or driving a car.
 - **General AI**: Also known as **Strong AI**, this type of AI is designed to perform any intellectual task that a human can do.
- Also, there is a **third type of AI**:
 - **Superintelligent AI**: This type of AI is designed to perform intellectual tasks that are beyond human capabilities.



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Weak AI vs Strong AI

Criteria	Weak AI (Narrow AI)	Strong AI (General AI)
Definition	Designed to perform a specific task.	Designed to perform any intellectual task that a human can do.
Examples	Chatbots, self-driving cars, and recommendation systems.	Human-like robots and superintelligent AI.

Table: Comparison between Weak AI and Strong AI



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Types of Cybernetics

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 - First-order Cybernetics: This type of cybernetics focuses on the **control** and **communication** in living organisms and machines.
 - Second-order Cybernetics: This type of cybernetics focuses on the **observer** and the **observed** in living organisms and machines.



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Sub-areas of Cybernetics

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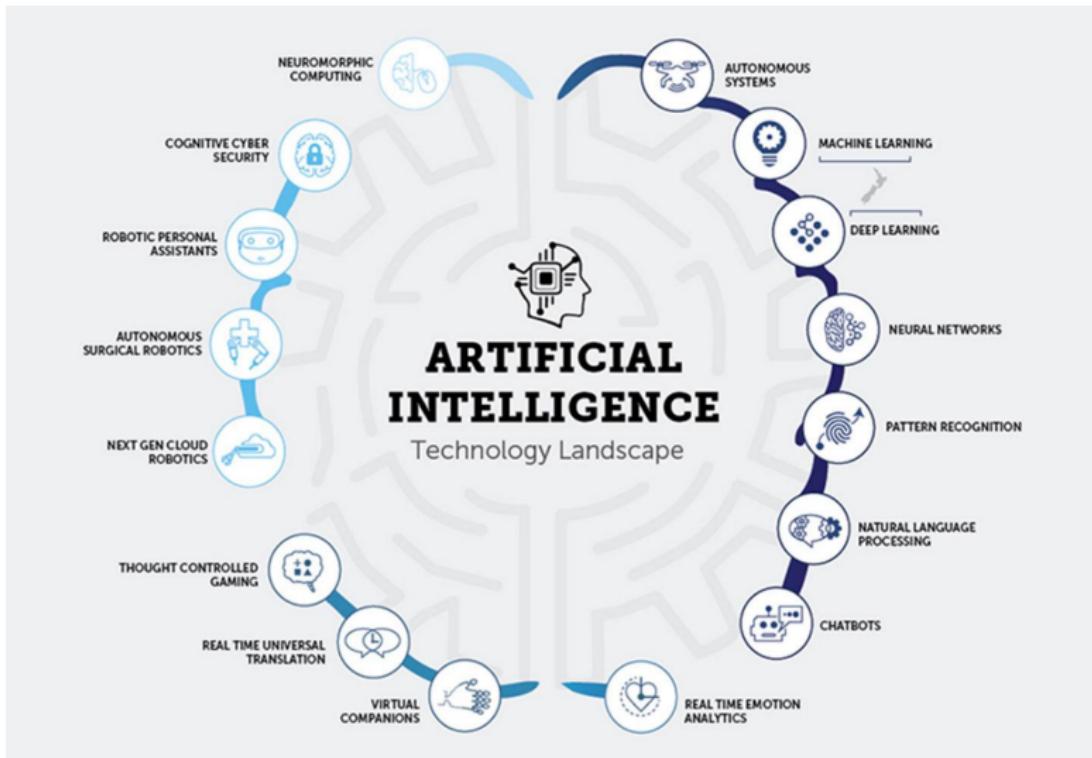
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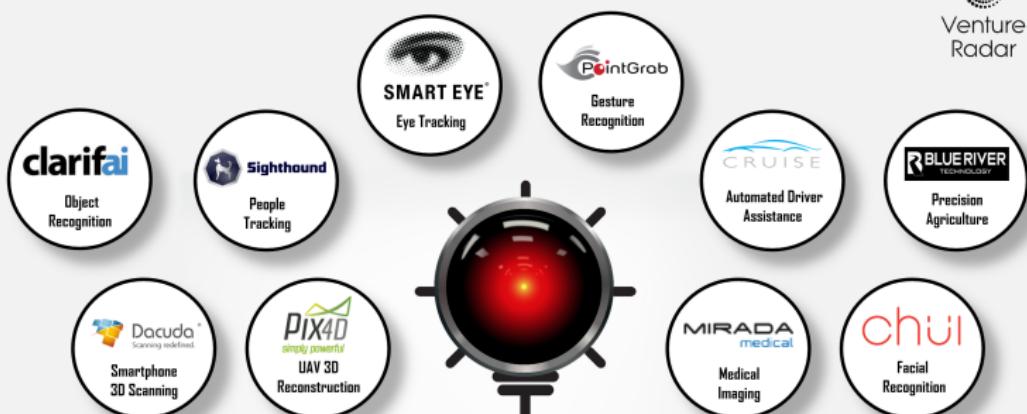


AI Landscape



Computer Vision Startups — 2015

Leading Computer Vision Innovators

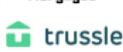
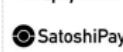
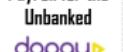
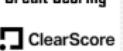
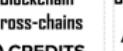
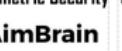


More: <https://www.ventureradar.com/>



UK Fintech Startups — 2015

Top 25 Emerging UK Fintech Startups

Compliance 	Smart Retail Bank 	Insurance 	Bond Marketplace 	Mobile Payments 	Student Finances 	Smart Retail Bank 
Credit Scoring 	Big Data Privacy 	Top 25 Emerging UK Fintech Startups				Fraud Detection 
Invoice Trading 	Mortgages 	Nanopayments 	Mobile Security 	Shared Expenses 	Payroll for the Unbanked 	Personal Finance 
Personal Finance 	Financial Planning 	Credit Scoring 	Smart Retail Bank 	Blockchain Cross-chains 	Biometric Security 	Emerging Markets Crowdfunding 



VentureRadar

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Artificial Intelligence Startups — 2017



Artificial Intelligence Startups

Augmenting knowledge work using AI



25% of all job-based tasks will be automated by 2019
- Forrester Research

Many experts believe that by 2050 machines will have reached human level intelligence

Hundreds of startups are already using AI to augment knowledge work



Law & Contracts	Customer Service	Sales	Personal Assistants
ROSS Okira Kelson LEGAL ROBOT	FinGenius DigitalGenius CAPITO SYSTEMS COGNICOR Wise.io	AVISO CONVERSICA re:infer sensai	x.ai VANARE WEALTHARC INOVANCE
BEAGLE DOXAII	agolo	NarrativeScience SYNAPSIFY	Business Intelligence, Journalism, Research
Audit & Compliance	Medical & Other Image Analysis	clarifai	Other Medical
AppZen	MetaMind	enlitic	Tractable Wired Informatics

Humans focus more on creativity, social intelligence, manual dexterity, and...

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Thanks!

Questions?



Repo: <https://github.com/EngAndres/ud-public/tree/main/courses/systems-sciences-foundations>

