



# 跨越電腦科學領域與地域的 人工智慧革命

郭大維 教授/技術長

Dr. Tei-Wei Kuo

Distinguished Professor, NTU/CTO, Delta Electronics, Inc.

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# The World in Technology Revolution

1

2

Internet, IOT, Automation

PC



• Intel - first microprocessor 4004



• IBM - first PC



• Apple - Macintosh



• World Wide Web - opened to the public



• Google - search engine - data center



• Amazon - cloud computing platform

• ITU - 4G later 5G&6G



• Meta - first center



• Nvidia GPUs proved well-suited for the matrix calculations and deep learning algorithms

1971 1981 1984

1991 1997 1999 2005 2006 2008 2010

2016 2023 2024



• Kyoto Protocol: -set emissions reduction targets for developed countries



• Paris Agreement - required to combat climate change



• Tesla - first pure EV Roadster



• Google DeepMind's AlphaGo defeated a world champion



• The rise of models like ChatGPT4 (2023), Gemini (2024), and Sora (2024) - Generative AI.



3

Energy and Sustainability

4

AI

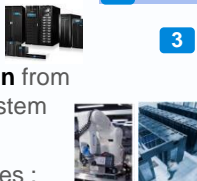
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- Switching power supply
- Carbon-free DC fan



2

- UPS system
- System integration from component and system supply
- Business categories :
  - Automation
  - Infrastructure
- Solution business starting from data center business



3

- EV power systems and relevant products development
- Taiwan's first full-scale EV charging station for vehicle centers
- Internal carbon pricing mechanism



4

Delta is leveraging AI technologies to drive its expansion with our four business categories





2

(Sources: Delta Electronics, Intel, IBM, Apple, Google, Amazon, Meta, Nvidia, OpenAI)

# Generative AI for the World

- LLM models evolve from text to multimodal models (image and video).
- Open-source and proprietary LLM models compete, with open-source performance nearing that of proprietary.
- LLM models are rapidly expanding in vertical applications.

Open-source:   
 Proprietary: 


## GPT 4 (Confidential, >1T from wiki)

- **Human-level performance** on various professional and academic benchmarks
- **Image understanding**: writing code for a website from a picture.
- Context window : **32k tokens**


## LLaMA 2 (7,13,70B)

- **The first open-source commercial licensed** models led to the creation of **numerous commercial models**.
- Context window : **4k tokens**

## Gemini/Gemma

- (Confidential / 2,7B) 
- Advanced **reasoning and planning** capabilities
  - Context window : **1M tokens**, aiming **10M**
  - **Natively multimodal** models

## Sora

- (Confidential) 
- The first generative video model that can create **one-minute videos** from text.

Video



## ChatGPT (175B)

**Human-like text** understanding and generation

## LLaMA (7,13,30,65B)

- The 13B **model outperforms** GPT-3 on most benchmarks.
- Context window : **2k tokens**



## LLaMA 3 (8,70B)

- The **most capable openly** available LLM to date.
- Context window : **8k tokens**

Image

## Mixtral 8x22B

- (8x22B)
- An open **sparse mixture of experts (SMoE)** model.
  - Context window : **64k tokens**



Text



2022.11

2023.2

2023.3

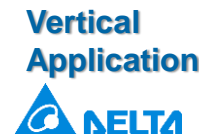
2023.7

2023.9

2023.12

2024.2

2024.4



# Big Tech Companies and the World

## Statement from Big Tech Company CEOs



“  
ChatGPT is the **iPhone Moment** for AI. **Artificial general intelligence (AGI)** will arrive soon.  
”



“  
The **PC client server** was the first. The second was the **web**. The third was the **mobile and cloud**, and now **the fourth is AI**.  
”



“  
We believe the world needs more ai infrastructure--**fab capacity, energy, datacenters**, etc.  
”



“  
AI is critical to solving some of the world's biggest challenges in areas like **healthcare, climate change, and education**.  
”



“  
..new goal is creating **artificial general intelligence**,... at least match human cognitive abilities like **learning, reasoning, planning, creating and remembering information**.  
”



“  
Generative AI and large language models let you **talk to your machines** in natural language as if they were human.  
”

## Current Events

### Transformations in Working Literacy



Image by ChatGPT/DALL-E

- [Harvard Business School's study](#) (2023.10) : Generative AI can improve a highly skilled **worker's performance** by as much as 40%.
- Hollywood Strikes(2023.11) : a new precedent in the tension between **workforce automation** and **workforce augmentation**

### Transformations in the AI Industry

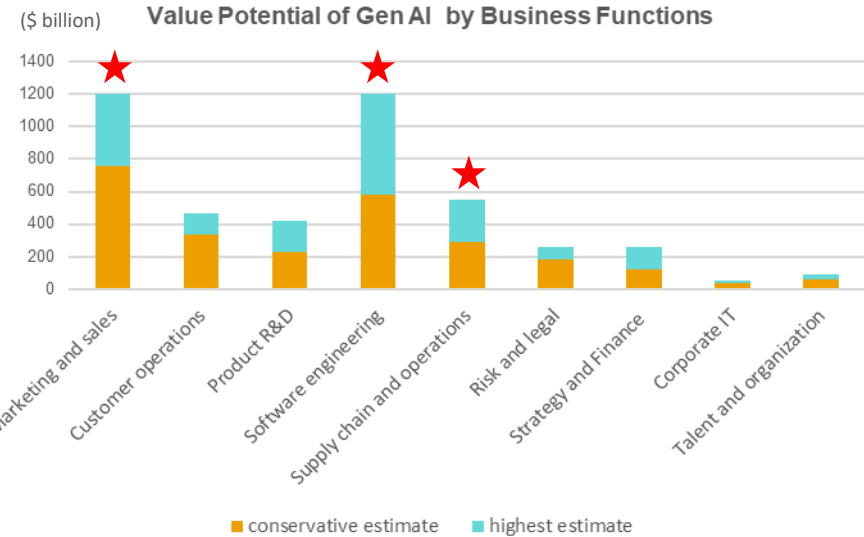
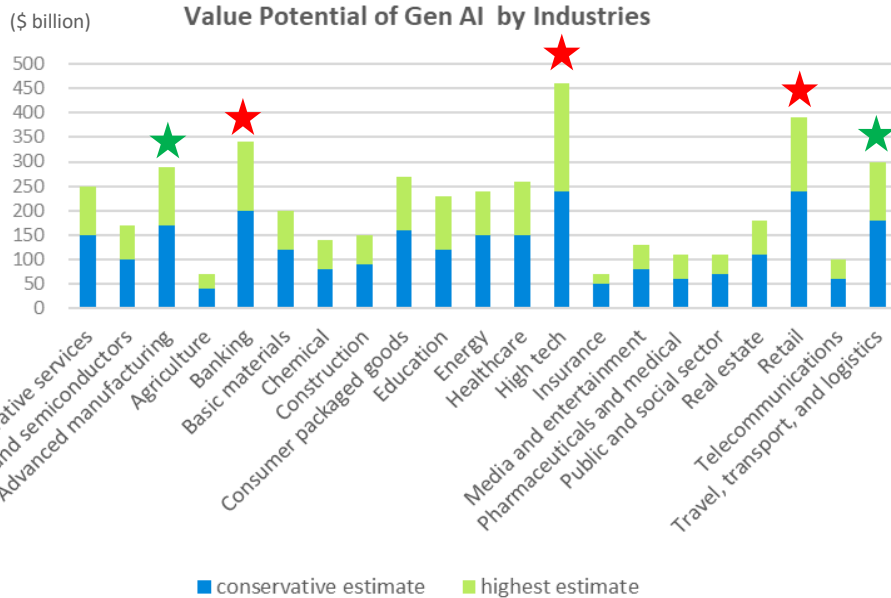


Image by ChatGPT/DALL-E

- Big tech companies develop their own **AI chips** (2023.11) : Microsoft, OpenAI, Google, Meta, Amazon, Tesla
- AI-RAN Alliance for **edge AI** services (2024.1) : Microsoft, Amazon, Nvidia, Arm, Samsung, T-Mobile, Nokia

# Generative AI Waves

- **The industries** most affected by Gen AI in terms of revenue increase are **high technology, retail, and banking**, followed by transportation and logistics, and **advanced manufacturing**\*
- **The corporate functions** most affected by Gen AI in terms of revenue increase are **marketing & sales, software engineering, and supply chain**.



\*Includes aerospace, defense, and auto manufacturing

Source: the economic potential of generative AI (McKinsey, 2023/6)

# Impacts over Infrastructure Development

Infrastructure innovations are addressing *the high power consumption challenges in AI systems*

## Innovative Power Supply Design

Innovative power management technology for GPU, AI data centers, etc.

### Present

180 MW data center with  
10% GPUs + 90% CPUs



### Near Future

Same data center with  
70% GPUs + 30% CPUs



image: Nvidia

Standard CPU Rack 30 kW  
→ 250 kW AI GPU Rack

Provides a **0.65 GW-level** computing capacity

## Energy-efficient Hardware

- Specialized AI chips
- In-Memory Computing
- Silicon photonics, etc.

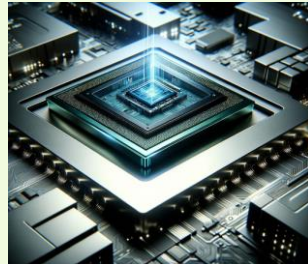


Image generated by DALL · E

## Energy Management

Real-time monitoring and management of server energy consumption can identify and reduce energy wastage.



Image generated by DALL · E

## Eco-Friendly Energy Sources

- Power data centers with **renewable energy** sources.
- **Energy storage system** will improve the energy efficiency & reliability.



Image generated by DALL · E

# Impacts over Supply Chain

From “Just-in-Time” to “**Just-in-Case**”, building **resilience** has emerged as the key issue.

## From Demand forecast, Risk Detection, to Manufacturing & Inventory Optimization

**Demand Sensing**

**Event Watch**

**Risk Assessment**

**Capacity Planning**

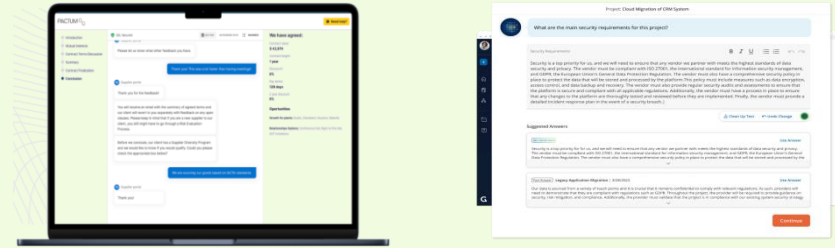
**Logistics & Inventory Planning**

**Multi-Tier Supplier Mapping**

(Source: Resilinc)

(Source: ThroughPut)

## Automate Vendor Negotiation & Procurement



Re-negotiates **repetitive** contracts in minutes by scanning a contract, extracting key priorities, and setting **negotiating terms** with the supplier through a chatbot.

- ✓ **Commercial Term Negotiations**
- ✓ **Cost Negotiations**
- ✓ **Purchasing Negotiations**

(Source: Pactum)

Globality’s AI bot walks users through scoping questions to automatically compose **procurement documents**.

- ✓ **Generative AI-powered Interactive Dialogue**
- ✓ **Smart Brief** to help suppliers understand your specifications better.

(Source: Globality)

# Towards an AI-enabled Future



# AI vs. Data

## From Data Collection, Cleansing, Sharing to Synthesis

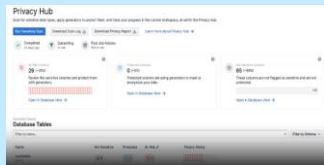
**If your data isn't ready for generative AI, your business isn't ready for generative AI.**

(Source: McKinsey, 2023)

- **Domain-specific data collection** is a growing priority as industrial applications of AI take off.
- **Data cost and data scarcity** will drive up demand for **synthetic datasets**, enabling **privacy** preservation, data **accessibility**, **bias mitigation**, secure **data sharing**, etc.

How **synthetic data** impact manufacturing:

Generate **new, anonymous datasets** to optimize model training, like **PdM, digital twin**, etc.



Mimics sensitive data, like production, and ensures a private version carrying all of the original value (source: [tonic.ai](#))

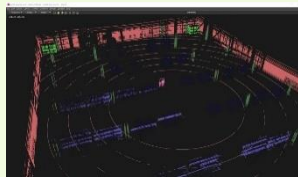


Multi-Model Synthetic Data Generation Tools (source: [gretel.ai](#))

Synthesize **images, video, 3D environments** for training or simulation, like **robots, ADC**, etc.



With just five images, Simerse can generate tens of thousands of synthetic defect images which are automatically labelled (source: [Simerse](#))

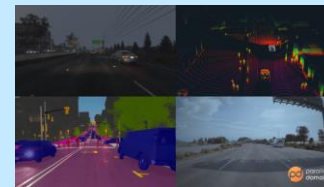


Simulate sensors accurately: RGB cameras, LiDAR, NIR, and more (source: [Anyverse](#))

Generate **synthetic digital humans or scenario** for **HCI, autonomous driving simulations**, etc.



Synthetic data for teleconferencing, identity verification, driver monitoring, and digital humans. (source: [Synthesis ai](#))

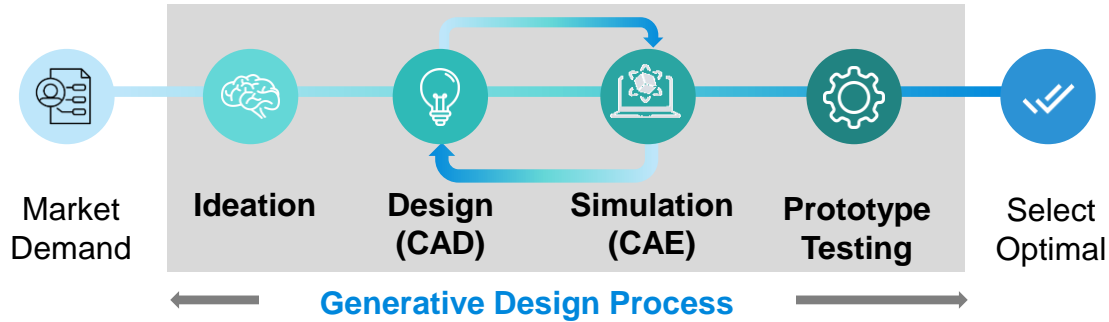


Synthetic data platform for training and testing perception models (source: [Parallel Domain](#))

\* PdM = Predictive Maintenance

\* ADC = Automatic Defect Classification

# AI Accelerates Product Design and Testing

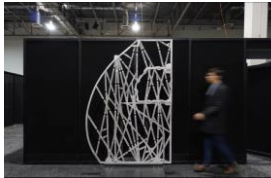


## Benefits:

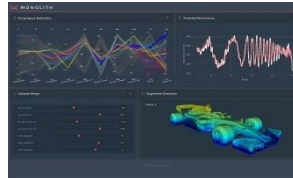
- ✓ **Accelerate design iteration** through integrating AI into modeling, simulation, and validation **in one go**.
- ✓ **Less simulation, less testing, more learning**, and ultimately developing **better quality products in half the time**.
- ✓ Identify ways to enhance **manufacturability**, optimize components for assembly, and **reduce costs**.

Ex. *Airbus* used *Autodesk's* generative design software to develop a partition for its A320 aircraft. The new design was **45% lighter** than previous designs, reducing the amount of fuel needed per flight (and overall emissions) and **shrinking raw material use by 95%**.

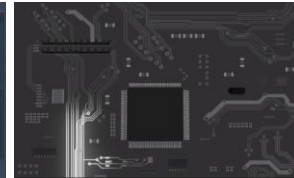
(Source: Autodesk, 2020)



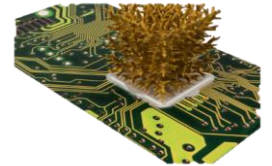
**Manufacturing & product design**  
(Source: Autodesk)



**Validation & testing**  
(Source: Monolith AI)



**Chip & PCB design**  
(Source: InstaDeep)



**Design for additive manufacturing**  
(Source: TOffeeAM)

# Case: Redefining Production Lines and Industrial Inspection With Digital Twins and Synthetic Data

By partnering with NVIDIA, Delta is virtually linking specific production lines, aggregating 3D data from a diverse range of equipment to create a digital twin.

Then, with the NVIDIA's simulation application, Delta generates physically accurate, photorealistic synthetic data for training their computer vision models and simulating the performance of their inspection cameras.

This lets Delta optimize every part of the factory process before actual production starts.



Optimizing Production Lines With Simulation

A Unified Asset Pipeline for Building Digital Twins

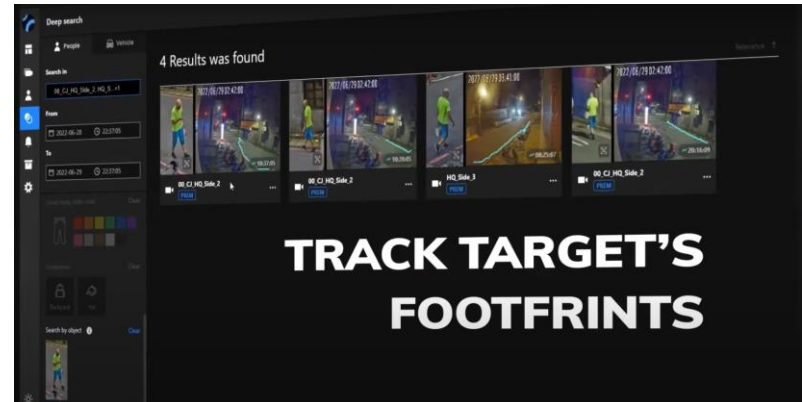
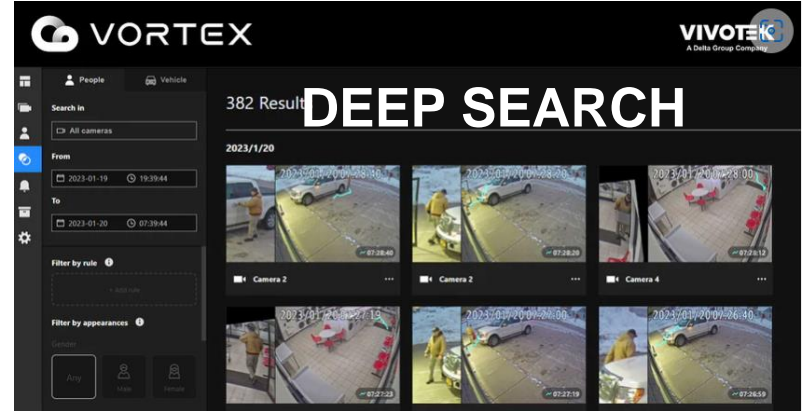
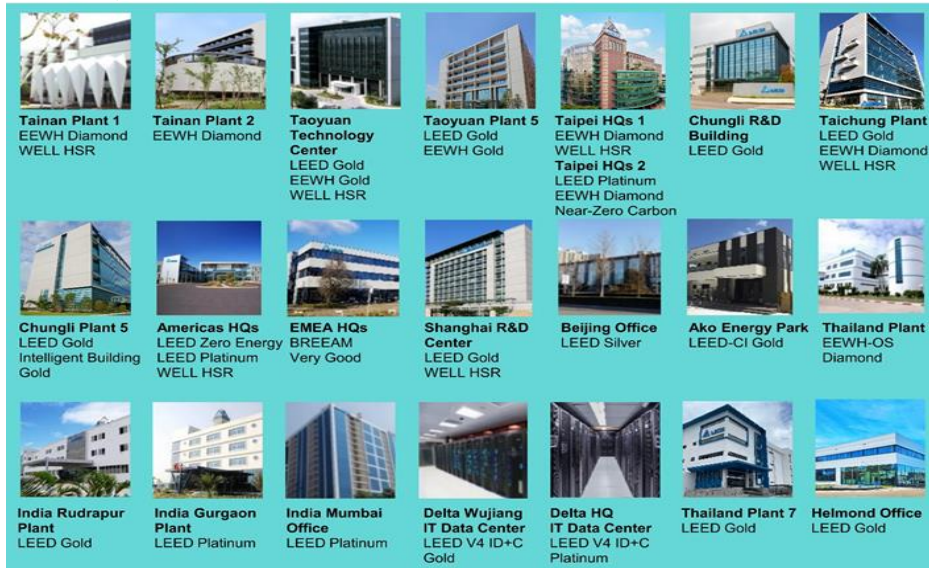
Accelerating Industrial Inspection with Synthetic Data

# Green Building & Smart Surveillance

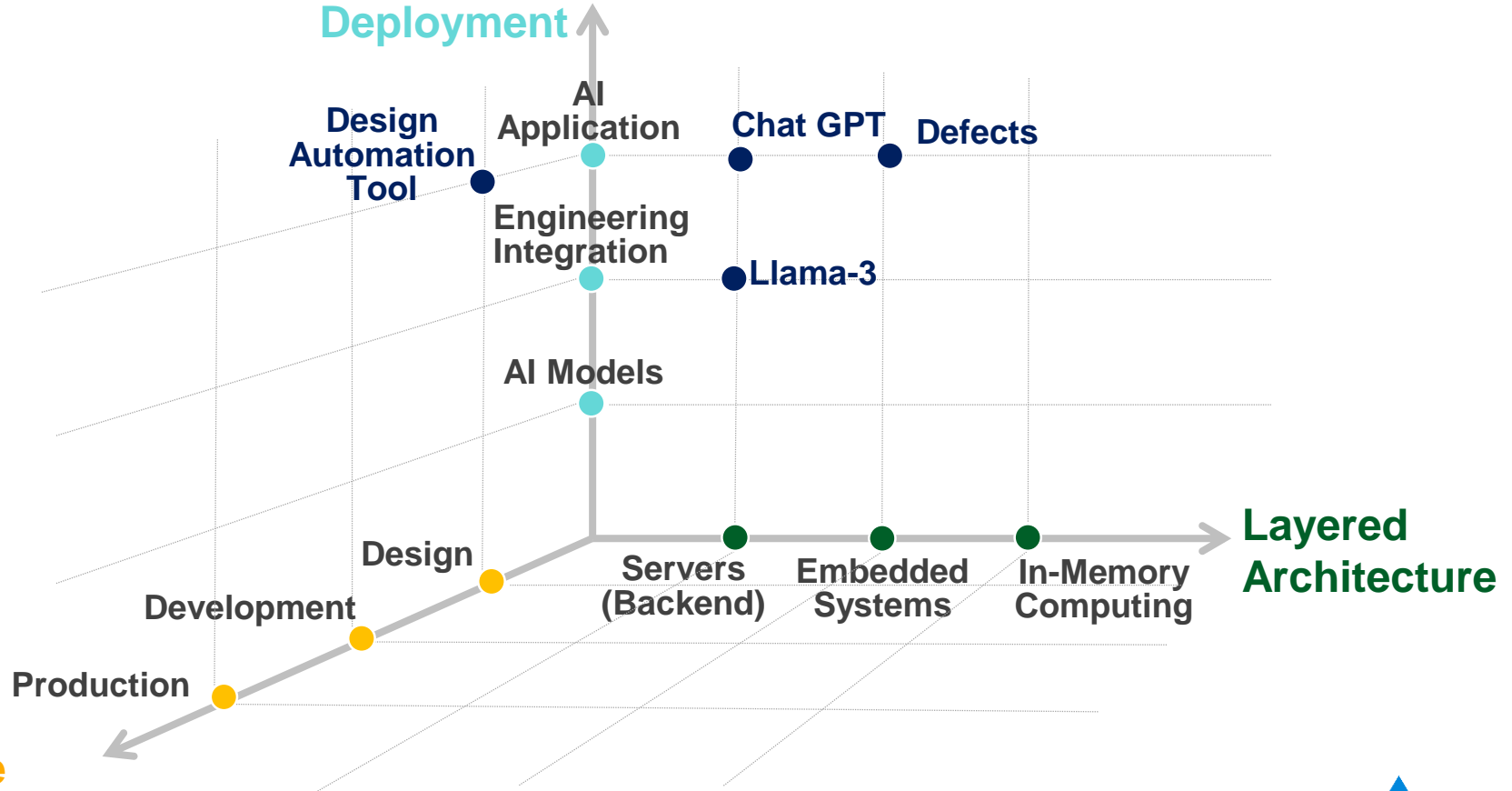
From 2006 to 2023, Delta established **33 green buildings** and **2 certified green data centers**.

In 2022, Delta's 17 certified green factory/office buildings and 5 donated campus buildings saved

- **26.91 million kWh of electricity**
- **15,400 tons of CO2 emission**



# Navigating Dimensions of AI for Industry Innovation



# AI Changes Customer Engagement

*Beyond content generation, Gen AI is transforming the landscape of marketing and sales in three areas ↓*

## Content Generation for Marketing & Sales



**Jasper**  
Social media & marketing content

**copy.ai**  
Social media & marketing content

**runway**  
Video editing & generation

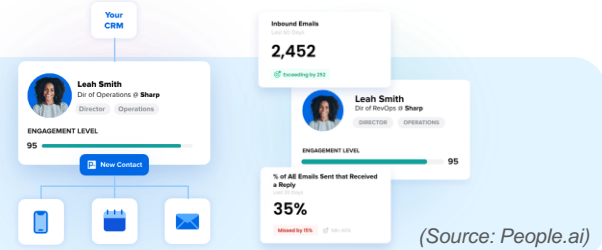
**synthesia**  
Synthetic video creation

**LAVENDER**  
Sales email & outreach

**Omneky**  
Generate social media ads

(Source: Jasper, Copy.AI, Runway, Synthesia, Lavender, Omneky)

✓ **Sales & Outreach:**  
Targeted sales strategies & maximized productivity



✓ **Customer Relationship:**  
Enhanced customer segmentation & personalized customer interaction



✓ **Customer support operations:**  
Automated and optimized customer service



# AI's Impacts over Healthcare



## Protein & drug design

Pharma companies can use generative AI to predict molecular structure, bringing protein and drug discovery timelines down drastically.



## EHR\* documentation

Generative AI is helping summarize complex doctor-patient interactions, make EHR entries more precise, and enhance diagnostic imaging.

*\*Electronic Health Records*



## Empowered patients prompt better outcomes

AI bots improve the patient experience by offering search-based self-diagnosis and personalized care advices.



## Synthetic patient data

Generative AI creates synthetic datasets that mimic real-world patient data, protecting patient privacy while improving the scale of training data.



## Wellness Tech

Wellness companies are using generative AI to create adaptable wellness music, immersive VR experience, virtual companions, etc. based on physiological data.

# Elli Q: an AI-Driven Social Robot to Alleviate Loneliness



- Health Checks
- Wellness Updates



- Daily Conversation
- Cognitive Games



- Video Calling
- Photo Sharing
- Memory Sharing

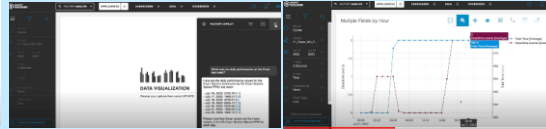


- Generative AI functions:
- Open-ended conversations
  - Paint or write poems together

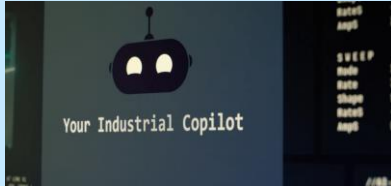


# AI's Impacts over Robotics

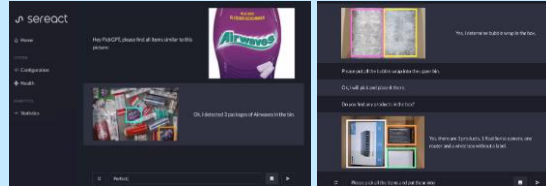
## Factory CoPilot



(Source: Sight Machine)



(Source: Siemens)



(Source: [Sereact.ai](#) PickGPT)

## Manufacturing AI Copilot

- ✓ No-code, user-friendly Interface
- ✓ Data-driven insights for quick diagnosis
- ✓ Troubleshooting copilot
- ✓ Code copilot
- ✓ Instructing robots via natural language (ex. pick & pack)

## GenAI-powered Robots

Generative AI (LLM, VLM) and reinforcement learning are accelerating robot development and unlocking new capabilities.

 OpenAI partner with  Figure  NVIDIA. Project  GR00T

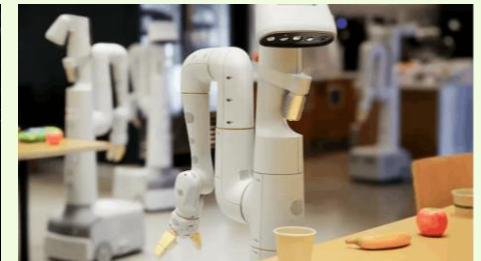
 Google  AutoRT



(Source: OpenAI)

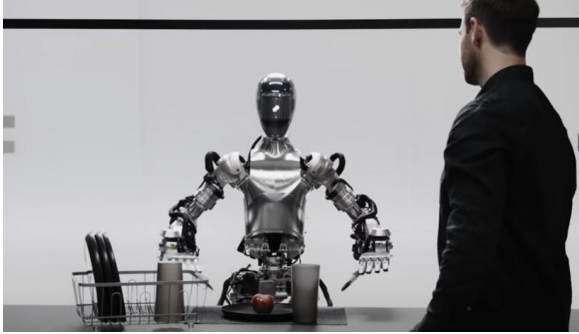


(Source: Nvidia)



(Source: Google)

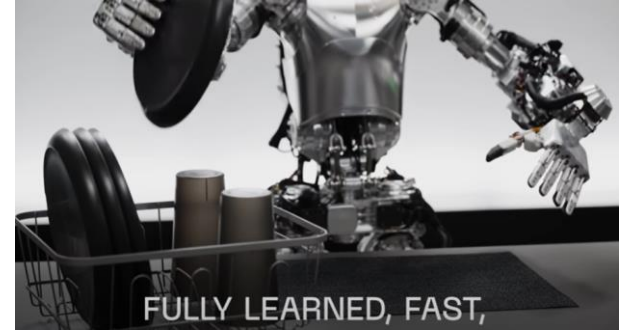
# Figure One: The Next Generation Robot Powered by OpenAI



The man asks, "Can I have something to eat?" Figure 01 grabs the apple, clearly recognizing that it's the only edible object on the table, and hands it to him.



"Can you explain why you [gave me the apple] while you pick up this trash?" While recognizing what's trash (and what's not) and placing the proper items into what Figure 01 identifies as a bin, the robot explains that it offered the man an apple because it was the only thing in front of him that can be eaten.



Finally, the man asks Figure 01 how well it thinks it did. In a conversational manner, the robot says, "I think I did pretty well. The apple found its new owner, the trash is gone, and the tableware is right where it belongs."

Source: Figure

# AI's Impacts over Education and Learning

Generative AI will revolutionize education and learning by offering **personalized learning experiences**, **adaptive and interactive learning activities** (such as games and simulations), **virtual teachers with 24/7 support**, etc.

## Personalized Learning

### ■ Khan Academy(可汗學院): Khanmigo Chatbot (GPT-4-powered)



**For learners:** Khanmigo challenges the learners to think critically and solve problems without giving direct answers.

**Ex.**

**Math:** If you make a math mistake, the AI doesn't solve it but points out there might be a small error and shows you how to fix it.

**History:** the AI acts like **historical figures**, letting you "meet" and talk to people like George Washington or Zeus.

**Prepare for exam:** the AI figures out what you're good at and what you struggle with, then gives you specific practice to improve.

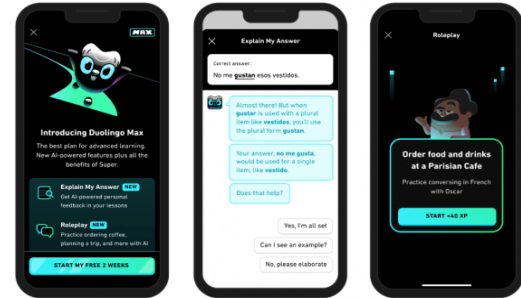
**For teachers:** Khanmigo helps create lesson plans, **identifies struggling students**.



(Source: Khan Academy)

## Language Learning Reinvented

### ■ Duolingo: Duolingo Max (GPT-4-powered)



(Source: Duolingo Max)

1

2

#### Explain My Answer:

The AI provides simple explanations for why their answers were correct or incorrect and offers additional examples and clarifications upon request.

#### Roleplay:

AI plays specific roles within various scenarios, interacting with learners, such as planning a vacation with Lin, ordering food in a Parisian café, etc.

# Transportation

## AI Assisted Drive Experience



(Source: Volkswagen, Mercedes Benz)

- Virtual Assistant with AI delivering a hyper-personalised user experience
  - Natural and empathetic interaction
  - Surround navigation

## Automated Valet Charging

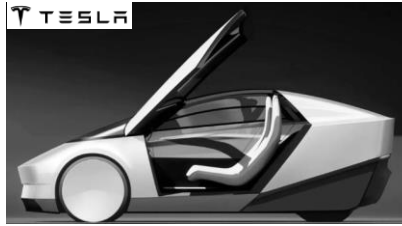


(Source: Bosch, BMW)

## Teleoperated Remote Parking



## Autonomous Vehicles



ZOOX



(Source: Tesla, Zoox, Aurora)

- Autonomous vehicles developed as robotaxis, shuttles and commercial trucks.

## AI Empowered Logistics



- Fleet management platform for cost reduction and minimizing carbon footprint.



(Sources: [Uber](#), DB Schenker) 

# Essential Modules

## Computing



Hardware

Software & Libraries

Energy and Cost

Architecture

more...

## Data



Availability

Quality

Management

Synthetic Data

more...

## AI Core Technology

Machine Learning

Large Language Models

Human-Computer Interaction

Computer Vision

more...

## Open Source



Llama

Mistral

Gemma

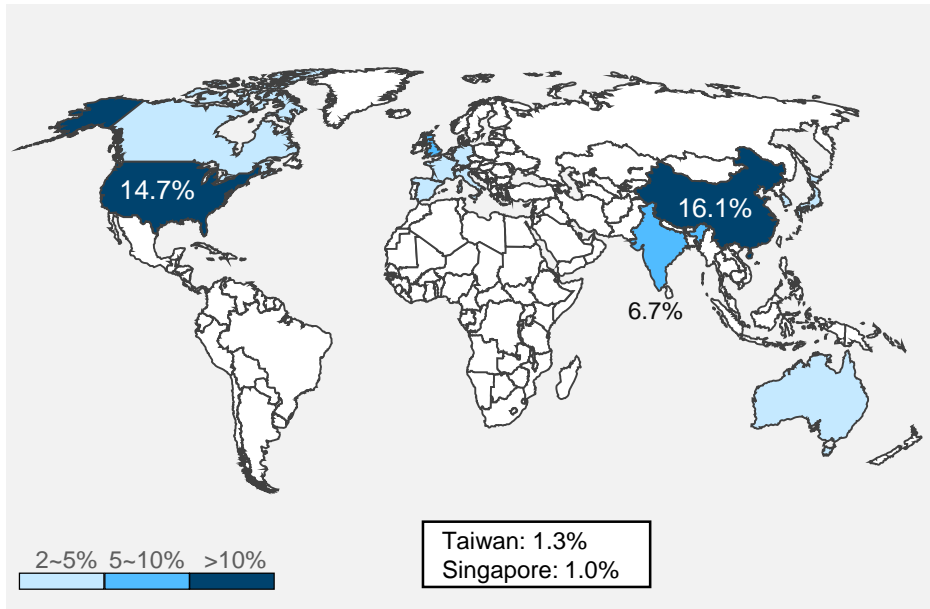
MPT

Bloom

more...

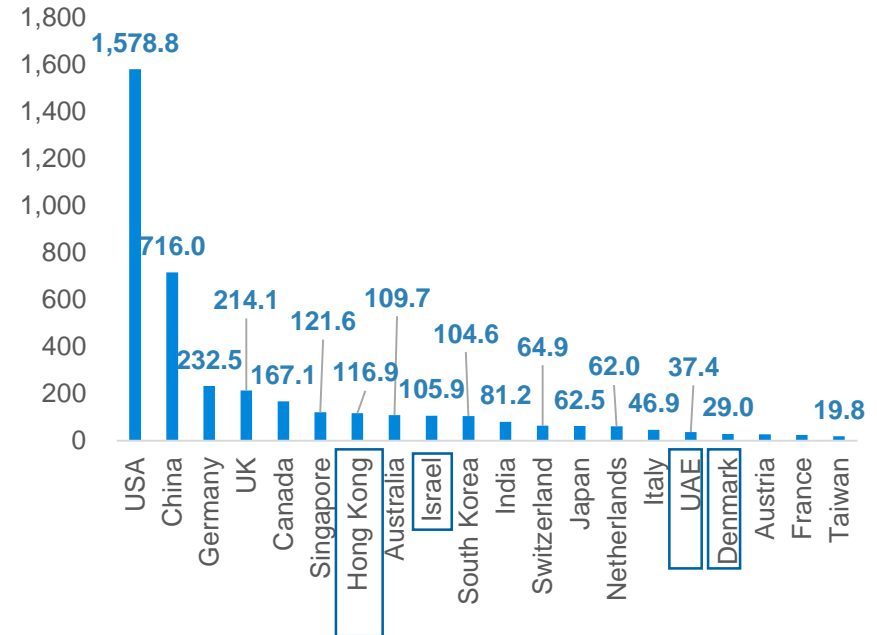
# AI Talent Distributions

Artificial intelligence literal distribution by country, 2010~2024



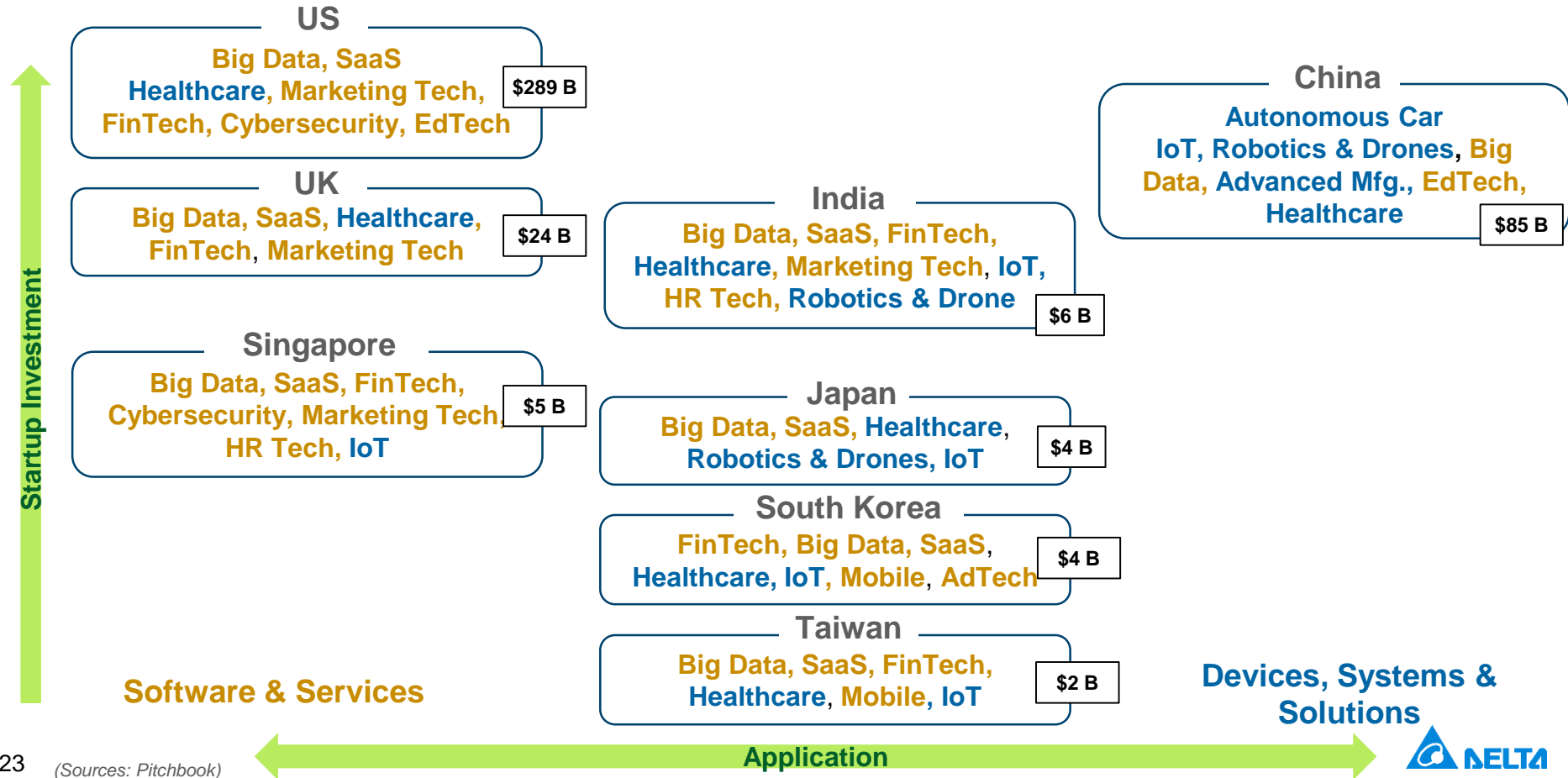
(Sources: Scopus)

Counts of CS Prestigious AI Publications by Top 20 Countries, 2010~2024



(Sources: CS Ranking)

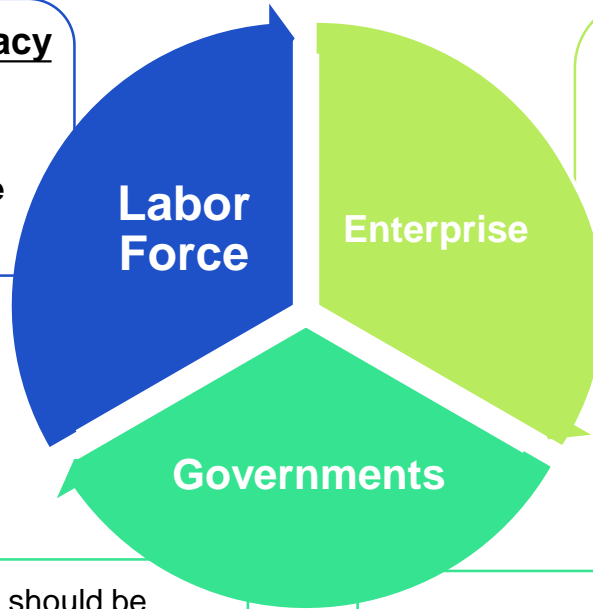
# Investment in AI Startups



# What's happening

## Transformations in Working Literacy

- Hollywood Strikes(2023.11) : a new precedent in the tension between **workforce automation** and **workforce augmentation**



## Work Efficiency vs Data Security

- [Harvard Business School's study](#) (2023.10) : Generative AI can improve a highly skilled **worker's performance** by as much as **40%**.
- Companies, like Samsung, Apple, Spotify, Verizon, **ban use of generative AI tools** like ChatGPT preventing data leak.



- **AI Ethics Guidelines:** Trustworthy AI should be lawful, ethical, and robust. (2019.4)
- **AI act:** Safety and fundamental rights of people and businesses guaranteed when it comes to AI. (2024.3)

(Source: [AI ethic guideline](#), [AI act](#))



Executive Order(EC) issued to ensure the risk management of artificial intelligence (AI) on safe, secure, and trustworthiness (2023.11).

(Source: [The White House](#))

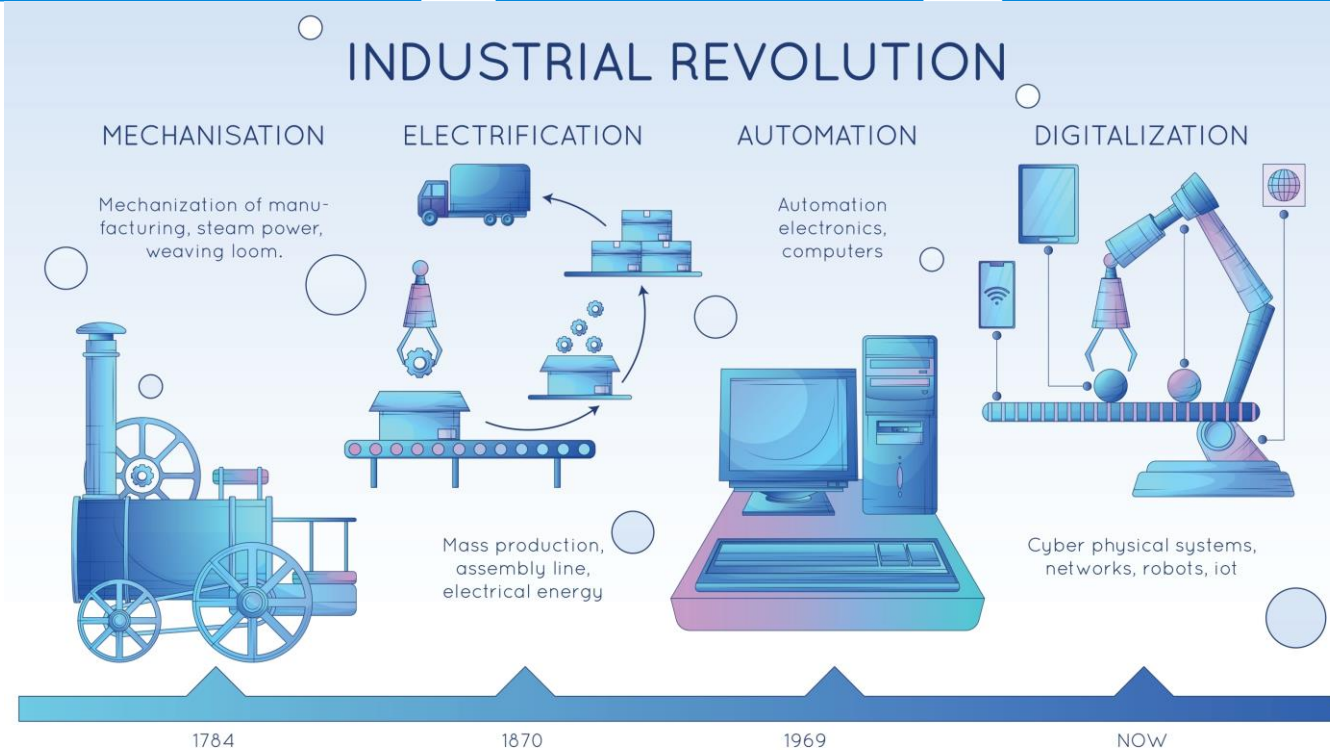


# Do We Have Any Choice?

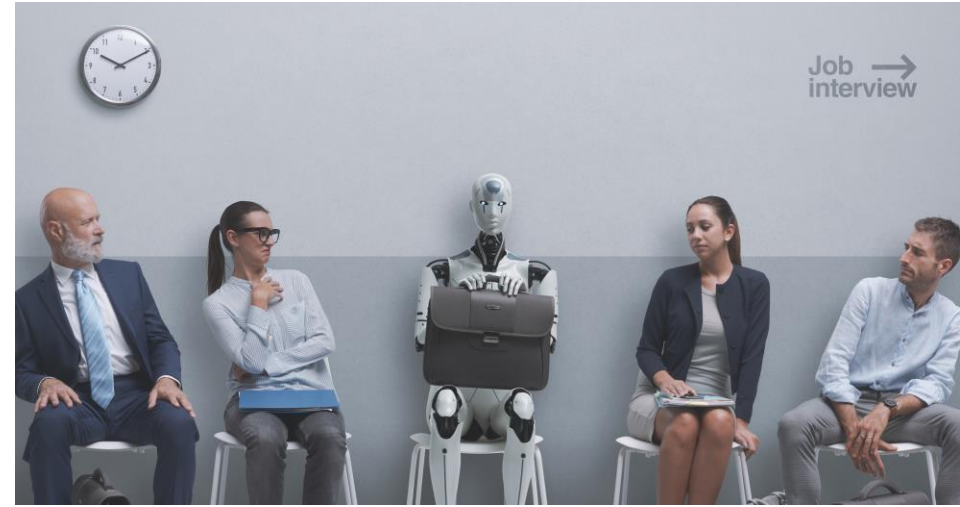
Industrial Revolution

IT Revolution

AI Revolution



# Do We Have Any Choice?



Thank You

