

# Ted Talk: The Environmental Impacts of AI and Frontier Technologies – Safeguarding A Sustainable Future

Dr. Christina Yan Zhang  
CEO

The Metaverse Institute  
26 September 2024  
Cambridge, UK



**"Right now, we are facing a man-made disaster of global scale. Our greatest threat in thousands of years. Climate change."**

**David Attenborough**  
Broadcaster and naturalist



# My Story











# EDUCATION IS GREAT

BRITAIN & NORTHERN IRELAND

*Christ Church College  
University of Oxford*

[www.britishcouncil.org](http://www.britishcouncil.org)



# A Metaverse Pioneer since 2006, full scholarship PhD in using digital twins in the metaverse for the AEC industry



## 1st for Communication and Media Studies

The Complete University Guide 2024



### The Use of Second Life as a Tool for Higher Education Internationalisation



by  
Yan Zhang

A research dissertation submitted in partial fulfilment of the requirements of the award of the degree of Master of Arts Of Loughborough University

September 2007

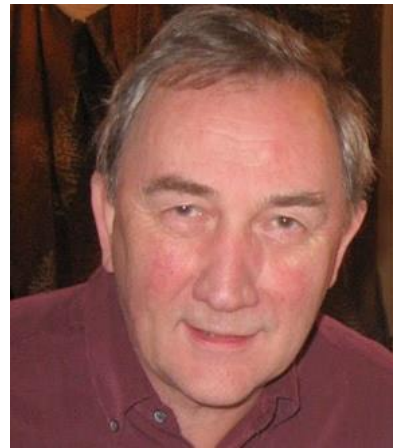
Supervisor: Prof. Graham Murdock  
School of Social Sciences

### The Use of Massively Multiplayer Online Games to Augment Early-Stage Design Process in Construction

by  
Christina Yan Zhang

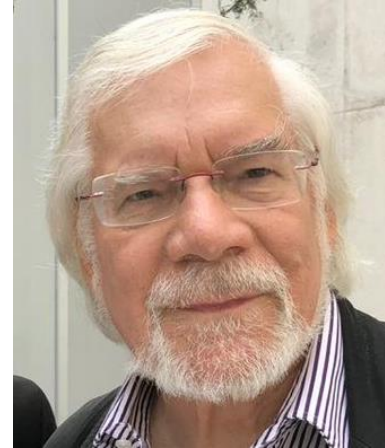
A Doctoral Thesis submitted in partial fulfilment of the requirements for the award of Doctor of Philosophy of Loughborough University

April 2012  
©Christina Yan Zhang, 2012



### Prof. Michael Pickering Emeritus Professor of Media and Cultural Analysis

- ❖ The UK's Arts and Humanity Research Council Peer Review College(2002-2012)
- ❖ Reviews Editor for the European Journal of Communication
- ❖ Editorial board of Memory Studies and the Folk Music Journal
- ❖ Founding member of the Communications and Media Studies course



### Prof. Graham Murdock Professor Emeritus of Culture &Economy

- ❖ World renowned founding expert in critical political economy of culture and communications
- ❖ Vice President of the International Association of Media and Communciation Research (IAMCR) (2016-2020)
- ❖ Member of the European Science Foundation's Expert Panel of Research Proposal Evaluators
- ❖ Founding member of the Communications and Media Studies course



### Prof. Peter Golding Emeritus Professor of Sociology

- ❖ World renowned founding expert in critical political economy of culture and communications
- ❖ Pro-Vice-Chancellor (Research & Innovation) at Northumbria University (2009-2014)
- ❖ Pro-Vice-Chancellor (Research) at Loughborough University (2006-2009)
- ❖ Chair of the communications, media and cultural studies sub-panel for 2008, 2014 REF(Research Exercise Framework).
- ❖ Chair of the Higher Education Funding Council for England Media Studies Advisory Committee.



### Dame Shirley Pearce DBE Emeritus Professor of Health Psychology

- ❖ Vice-Chancellor of Loughborough University 2006-2012
- ❖ The inaugural Chair of the College of Policing (the first professional body for policing) 2013-2016
- ❖ Chair of Governors of the London School of Economics and Political Science 2016-2020
- ❖ Board member at the Higher Education Funding Council for England (HEFCE) 2009 -2015
- ❖ Previous Board member of University of Cambridge, the Healthcare Commission and Health Education England

**“The Metaverse has increasingly become a convergence of a whole range of technologies coming together to form the next generation of the internet, which is more interactive, intuitive and immersive.”**

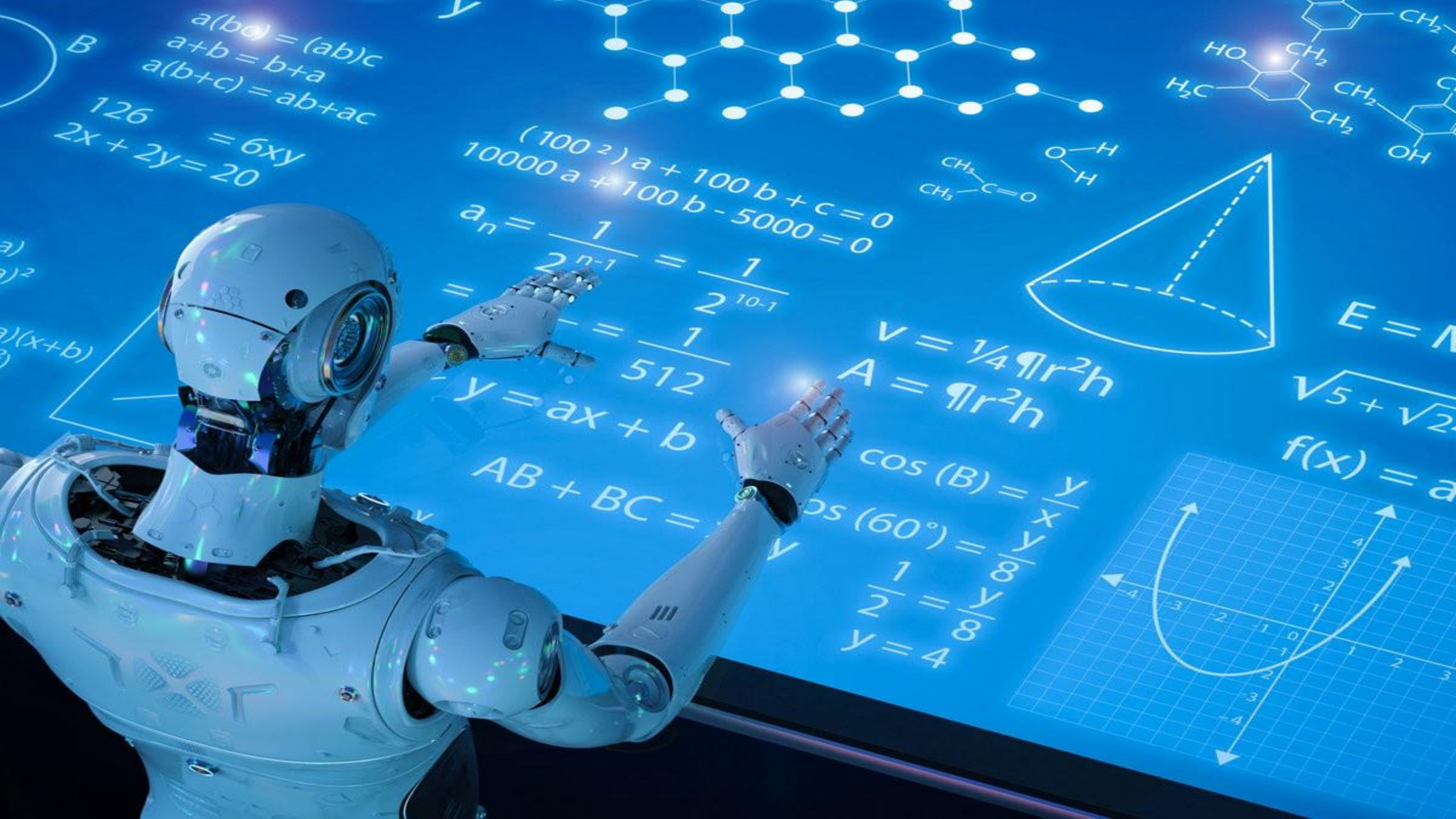
**Dr. Christina Yan Zhang**  
Chief executive, The Metaverse Institute



**Enterprise Metaverse Summit**

June 28th-29th 2023 | London and virtual





$a(b+c) = (ab)+c$   
 $a+b = b+a$   
 $a(b+c) = ab+ac$   
 $126 = 6xy$   
 $2x+2y=20$

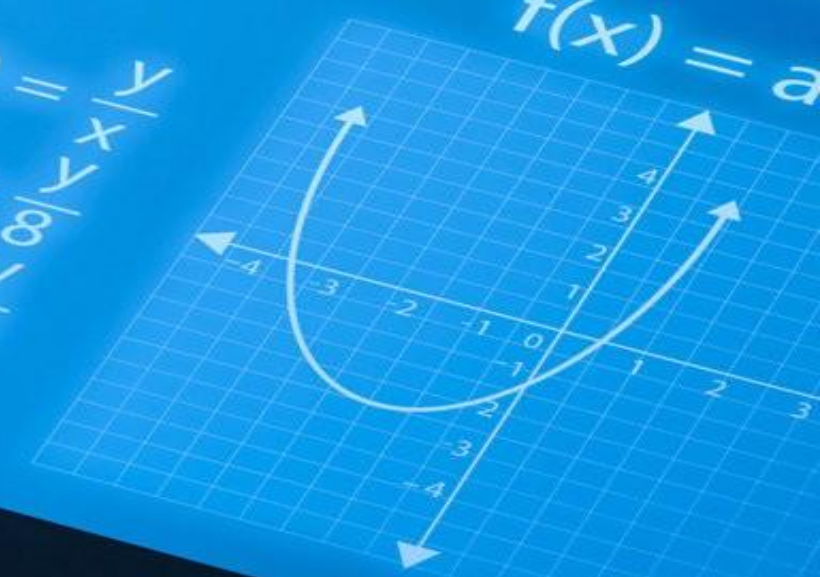
$(100^2)a + 100b + c = 0$   
 $10000a + 100b - 5000 = 0$   
 $a_n = \frac{1}{2^{n-1}} = \frac{1}{2^{10-1}}$   
 $= \frac{1}{512}$   
 $y = ax + b$   
 $AB + BC =$



$V = \frac{1}{4}\pi r^2 h$   
 $A = \pi r^2 h$

$E = M$   
 $\sqrt{5 + \sqrt{2}}$   
 $f(x) = a$

$\cos(B) = \frac{y}{x}$   
 $\cos(60^\circ) = \frac{y}{8}$   
 $\frac{1}{2} = \frac{y}{8}$   
 $y = 4$





Godmother of AI built \$1bn spatial intelligence AI start-up in 4 months: World Labs is developing a model to understand the 3D physical world. This represents a big breakthrough in AI, helping it to interact with real-world environments and advancing more sophisticated autonomous systems. On 13 Sept 2024, she raised Series A \$230M to train AI to understand 3D world with world's top investors and tech leaders backing.



**Fei-Fei Li**  
WORLD LABS  
FOUNDER



AI HELPING HUMANS BUILD BETTER WORLDS

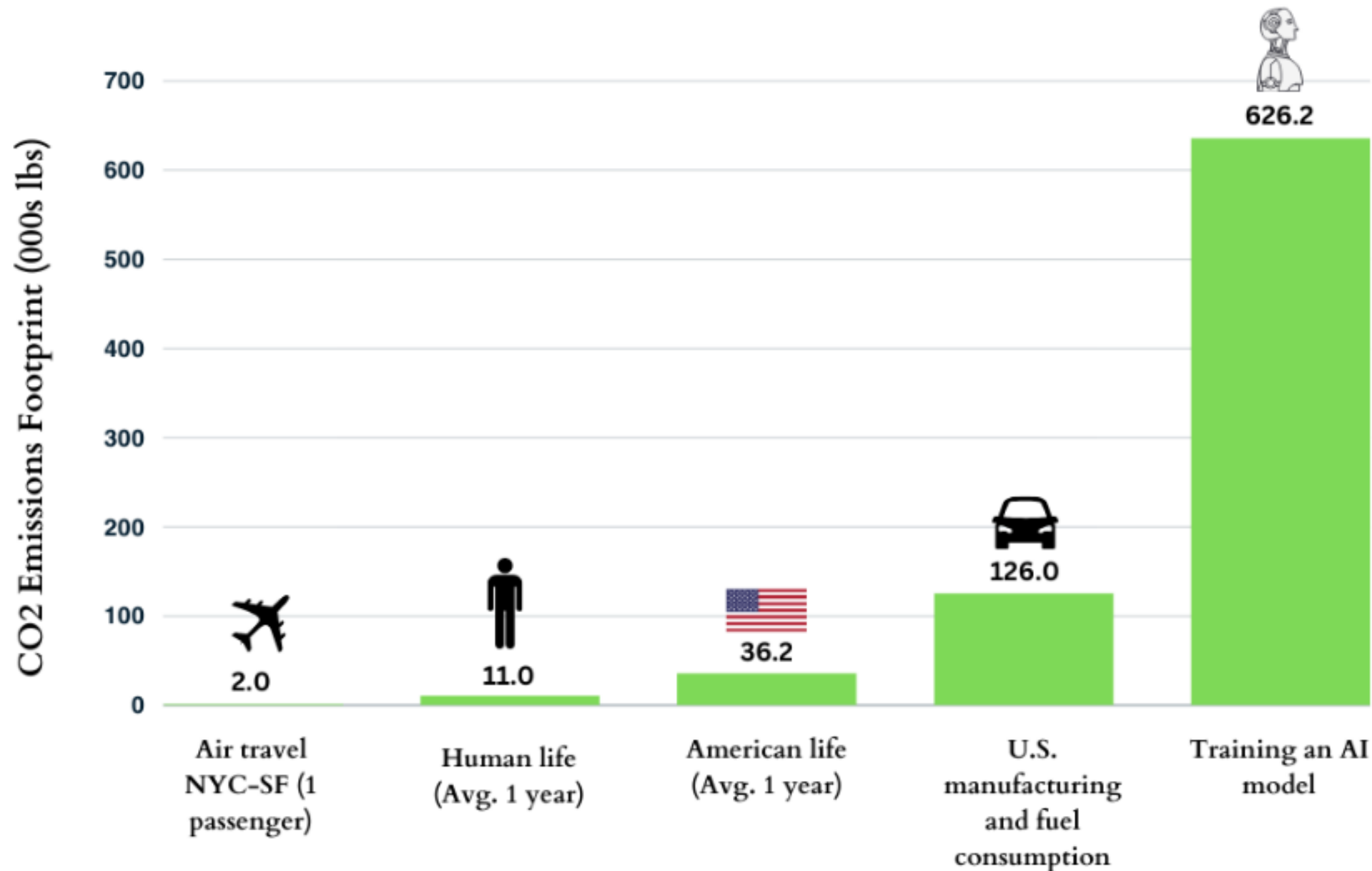


CO<sub>2</sub>





University of Massachusetts Amherst (June 2019): training one 213M parameters Large language Model(GPT 4 is 1.7 trillion parameters) emit more than 626,000 pounds of carbon dioxide equivalent, 5X more of one American car, 315 rounds of air travel between New York Cities and San Francisco.





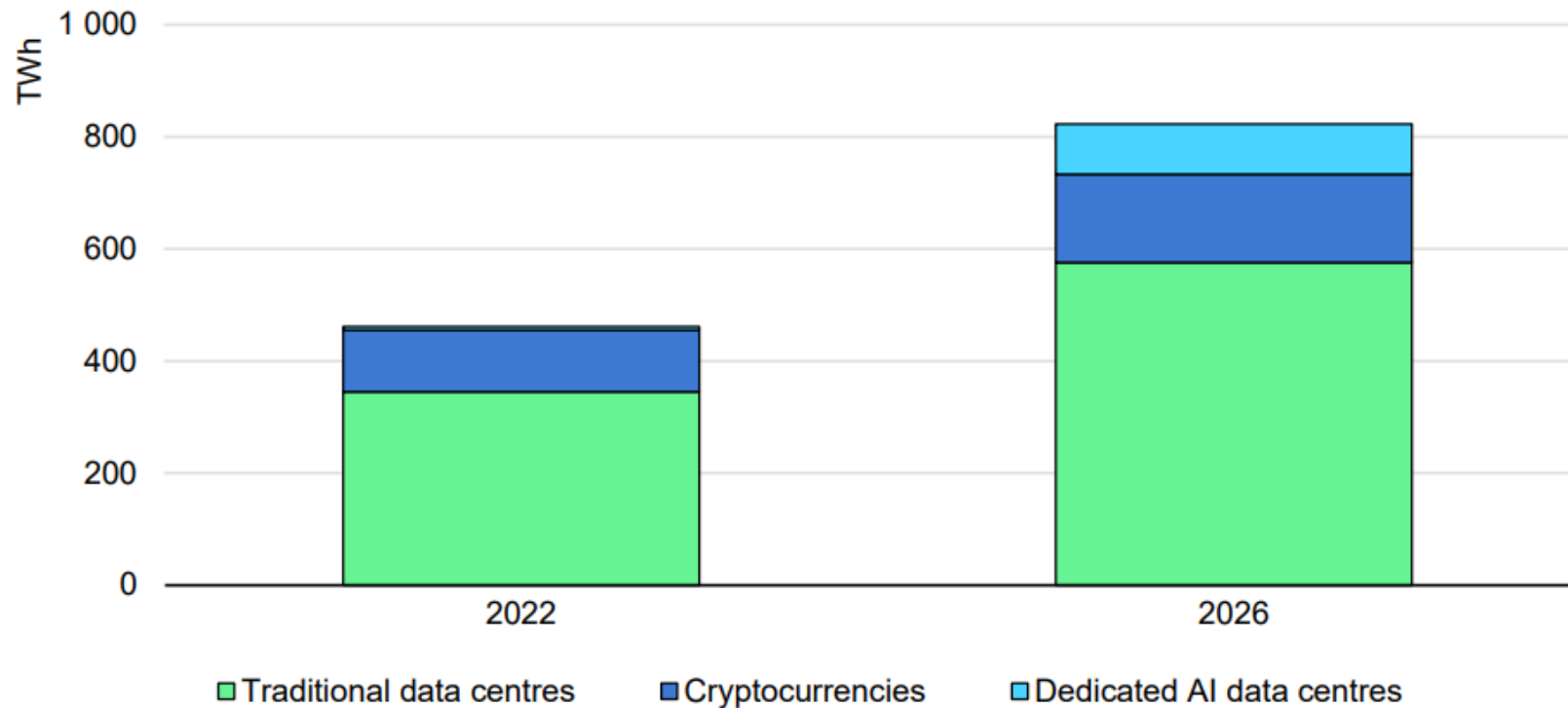




International Energy Agency(Jan 2024): The AI server market is currently dominated by tech firm NVIDIA with 95% market share. In 2023, NVIDIA shipped 100 000 units that consume an average of 7.3 TWh of electricity annually. By 2026, the AI industry is expected to consume 10 X its demand in 2023, ranked 45<sup>th</sup> out of 212 countries, more than the annual consumption of Kuwait, Finland, Switzerland, Austria, Singapore, Qatar, New Zealand etc.

- Electric

**Estimated electricity demand from traditional data centres, dedicated AI data centres and cryptocurrencies, 2022 and 2026, base case**



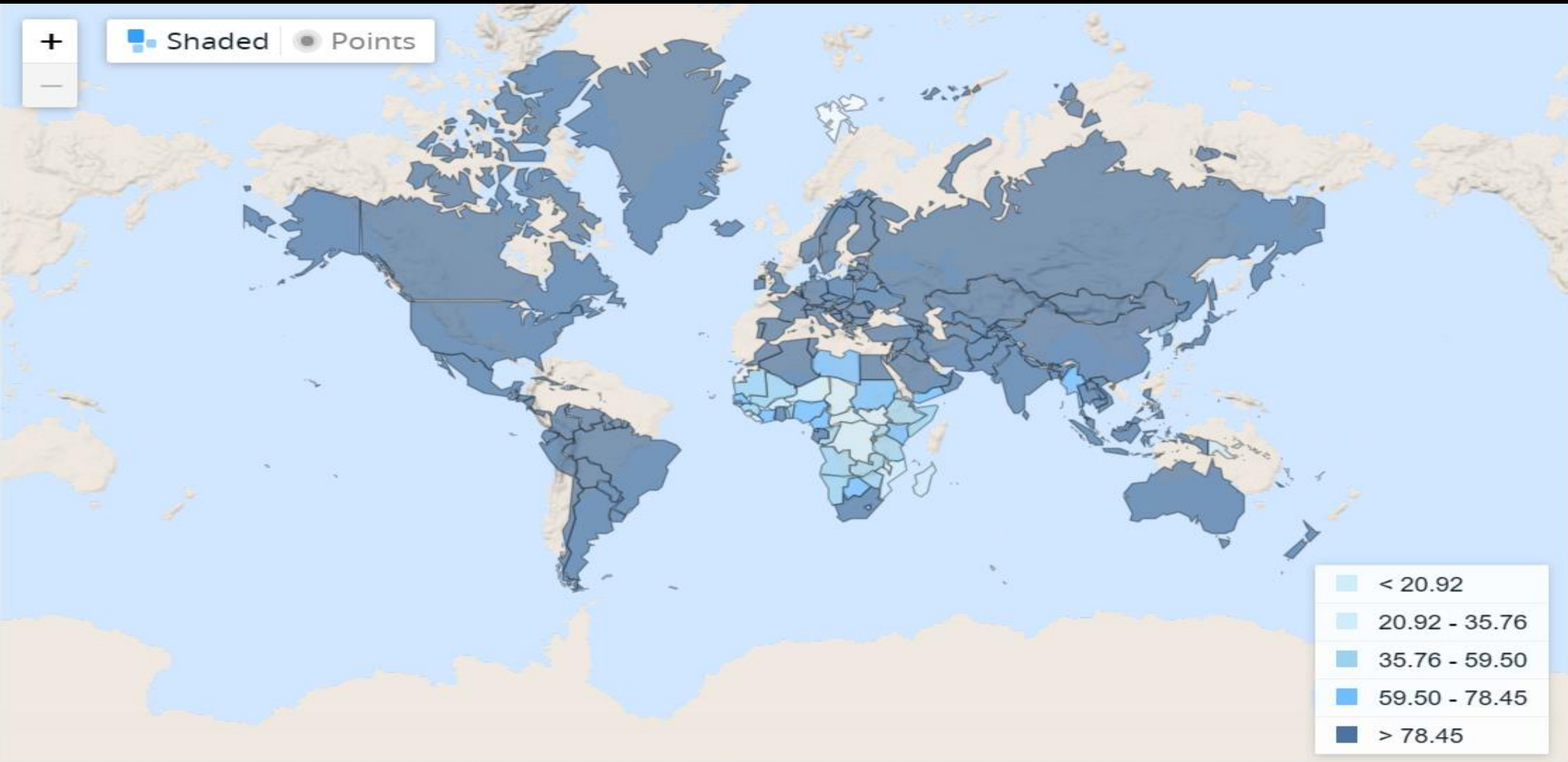
IEA. CC BY 4.0.

Note: Data centre electricity demand excludes consumption from data network centres.

Sources: IEA forecast based on data and projections from [Data Centres and Data Transmission Networks](#); Joule (2023), Alex de Vries, [The growing energy footprint of artificial intelligence](#); Crypto Carbon Ratings Institute, [Indices](#); Ireland Central Statistics Office, [Data Centres Metered Electricity Consumption 2022](#); and Danish Energy Agency, [Denmark's Energy and Climate Outlook 2018](#).



World Bank: over 1.2 bn population, 16% of the world's population have little or no access to electricity (basic lighting, charge a phone, or power a radio for 4 hours/day), 620 million Africans (2/3 population)

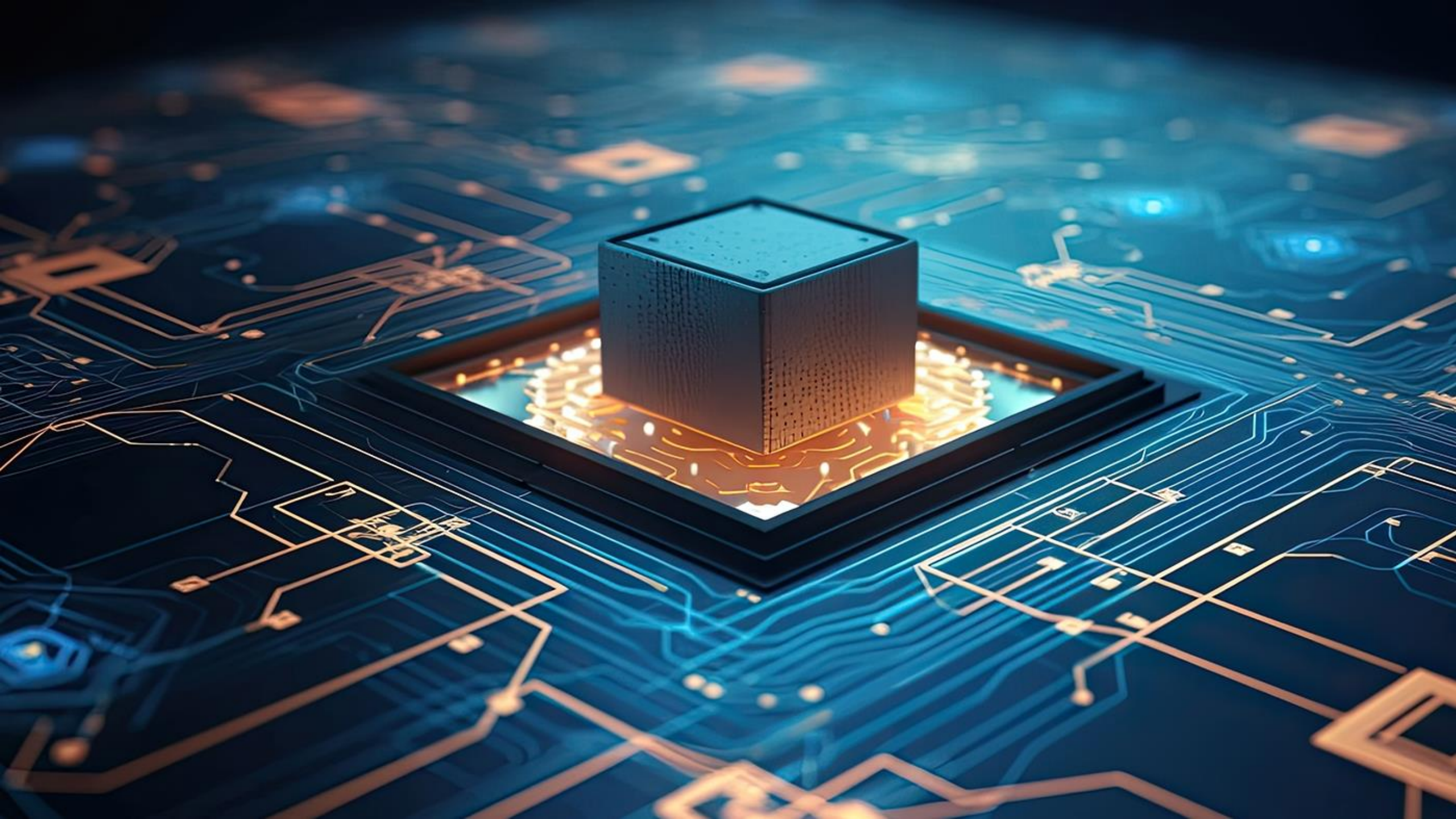




A dramatic scientific visualization of a nuclear fusion experiment. In the center, a glowing, spherical plasma core, resembling a miniature sun, is contained within a dark, cylindrical chamber. This core is surrounded by a complex, multi-layered structure that appears to be a magnetic confinement system. From the top and bottom of the frame, numerous bright blue laser beams converge towards the central plasma core, creating a sense of intense energy and focus. The overall scene is set against a dark background, emphasizing the luminous elements of the experiment.

**U.S. scientists achieve  
nuclear fusion breakthrough**







Intel have built the world's largest neuromorphic computer (structured to mimic the human brain) which can perform AI workloads 50 times faster and use 100 times less energy than conventional computing systems that use central processing units (CPUs) and graphics processing units (GPUs).

## Hala Point, the World's Largest Neuromorphic System

**Largest capacity:** 1.15 billion neurons and 128 billion synapses

**Scalable:** 1,152 Loihi 2 processors with 140,544 neuromorphic cores and 2,304 x86 cores



**Fast:** 380 trillion synaptic operations per second, 240 trillion neuron operations per second, 16 petabytes per second of memory bandwidth

**Efficient:** 15 TOPS/W executing sparse deep neural networks with an equivalent 20 quadrillion 8-bit operations per second\*

Introducing Intel's most advanced neuromorphic system to date, code-named Hala Point. This system demonstrates state-of-the-art computational efficiencies for more efficient and sustainable AI.

Hala Point could enable advancements in future real-time continual learning, inference, and optimization for applications like science and engineering problem-solving, logistics, smart city infrastructure management, large language models (LLMs) and AI agents.

\*Characterization performed with a multi-layer perceptron (MLP) network with 14,784 layers, 2,048 neurons per layer, 8-bit weights stimulated with random noise. The Hala Point implementation of the MLP network is pruned to 10:1 sparsity with sigma-delta neuron models providing 10% activation rates. Results as of testing in April 2024. Results may vary.

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**intel.**



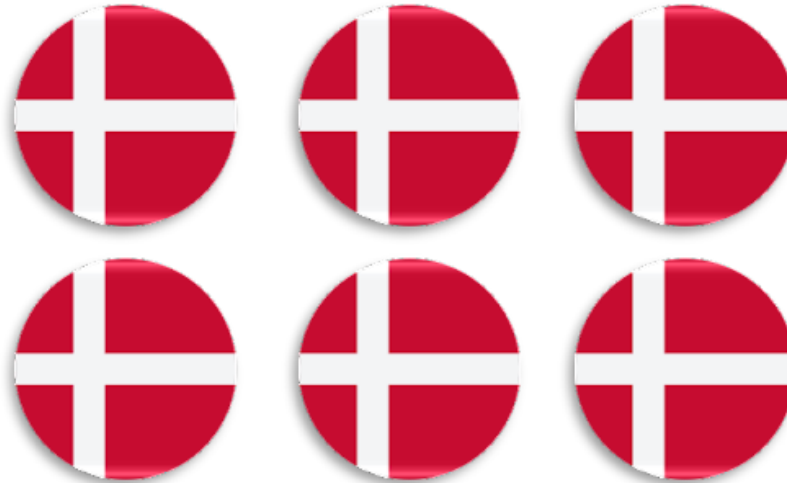
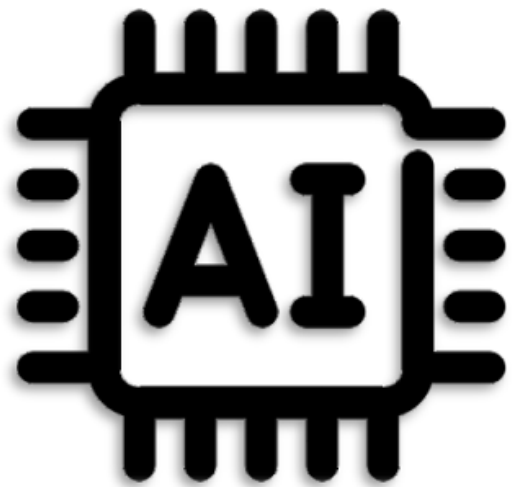




OCED(Nov 2023) "How much water does AI consume? The public deserves to know" article quote Cornell University findings(Oct 2023) that the global AI demand may be accountable for 4.2 -- 6.6 billion cubic meters of water withdrawal in 2027, which is more than the total annual water withdrawal of 4 – 6 Denmark.

## Global AI's Scope 1 & 2 Water Withdrawal in 2027

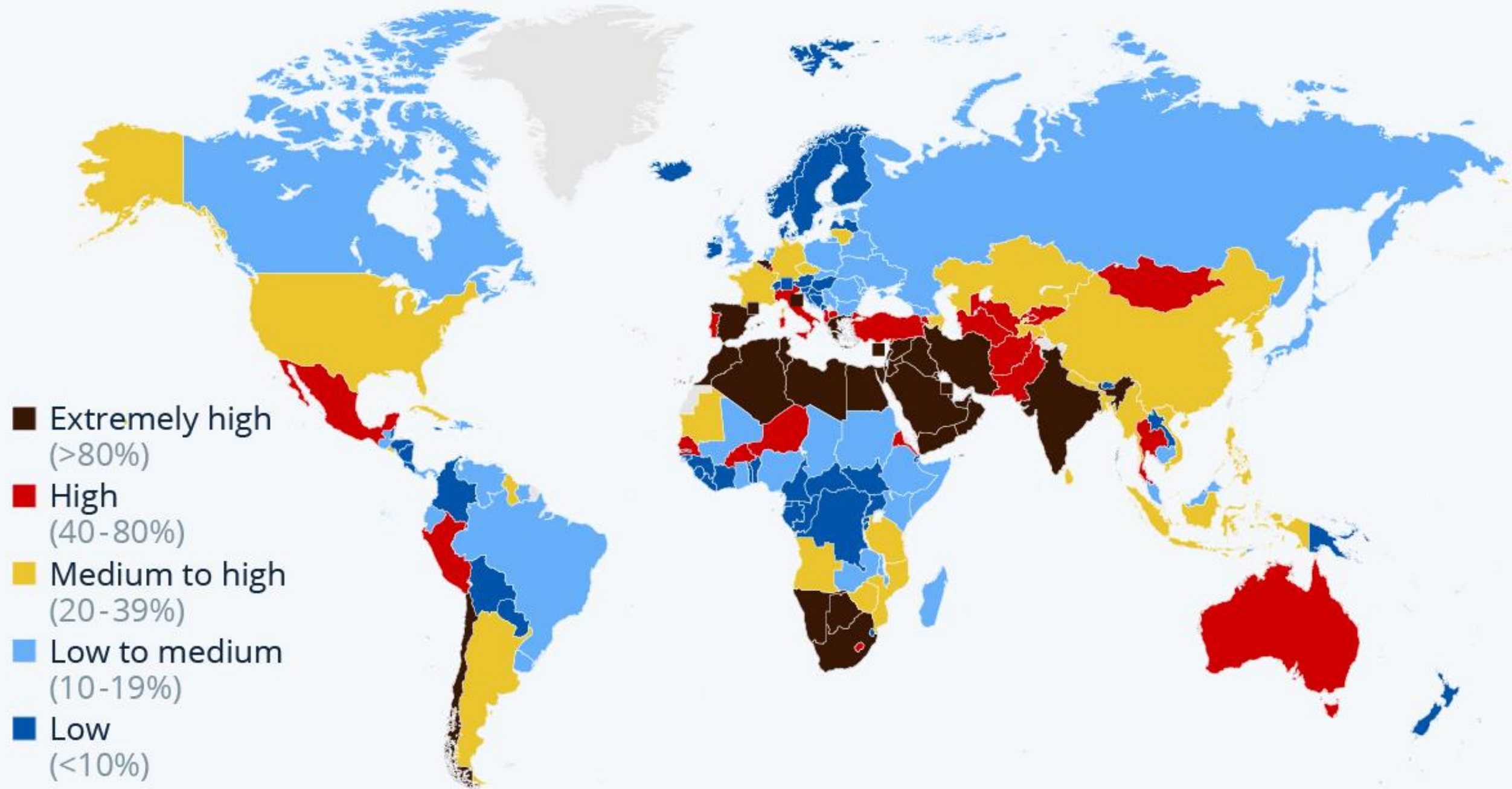
Est. **4.2~6.6** Billion Cubic Meters



**4~6x Annual Water Withdrawal of Denmark**



UN(Nov 2023): 2/3 of global population, 6 bn people will face water scarcity by 2050.





CNBC(June 2024): The EU's \$2.1 million ASCEND study( 11 partners including Orange, HP, Airbus) concluded after 16 months of studies that launching data centres into orbit is technically, economically and environmentally feasible. They aim to deploy 13 space data centres building blocks with a capacity of 10 megawatts in 2036, and 1,300 building blocks by 2050 to achieve 1 gigawatt(power one million home by one hour).



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ASCEND is a feasibility study led by Thales Alenia Space, for the European Commission as part of Horizon Europe programs. Study objectives are to demonstrate the technical feasibility and the environmental benefits to deploy large capacity data centre in space. Space environment is offering high solar illumination position and cold space view, that would benefits to data centres application.

Space Data centres are foreseen as a promising alternative to reduce environmental footprint and energy consumption of digital application on earth.

ASCEND preliminary conclusion drives to a paradigm change for space application with a hyper-structure of several thousands of tons deployed and hundreds of launch per year strategy.

## Horizon Europe

**Research and Innovation EU Actions.**

This project has received funding from the European Union's Horizon Europe research and innovation Actions under grand agreement n°101082517

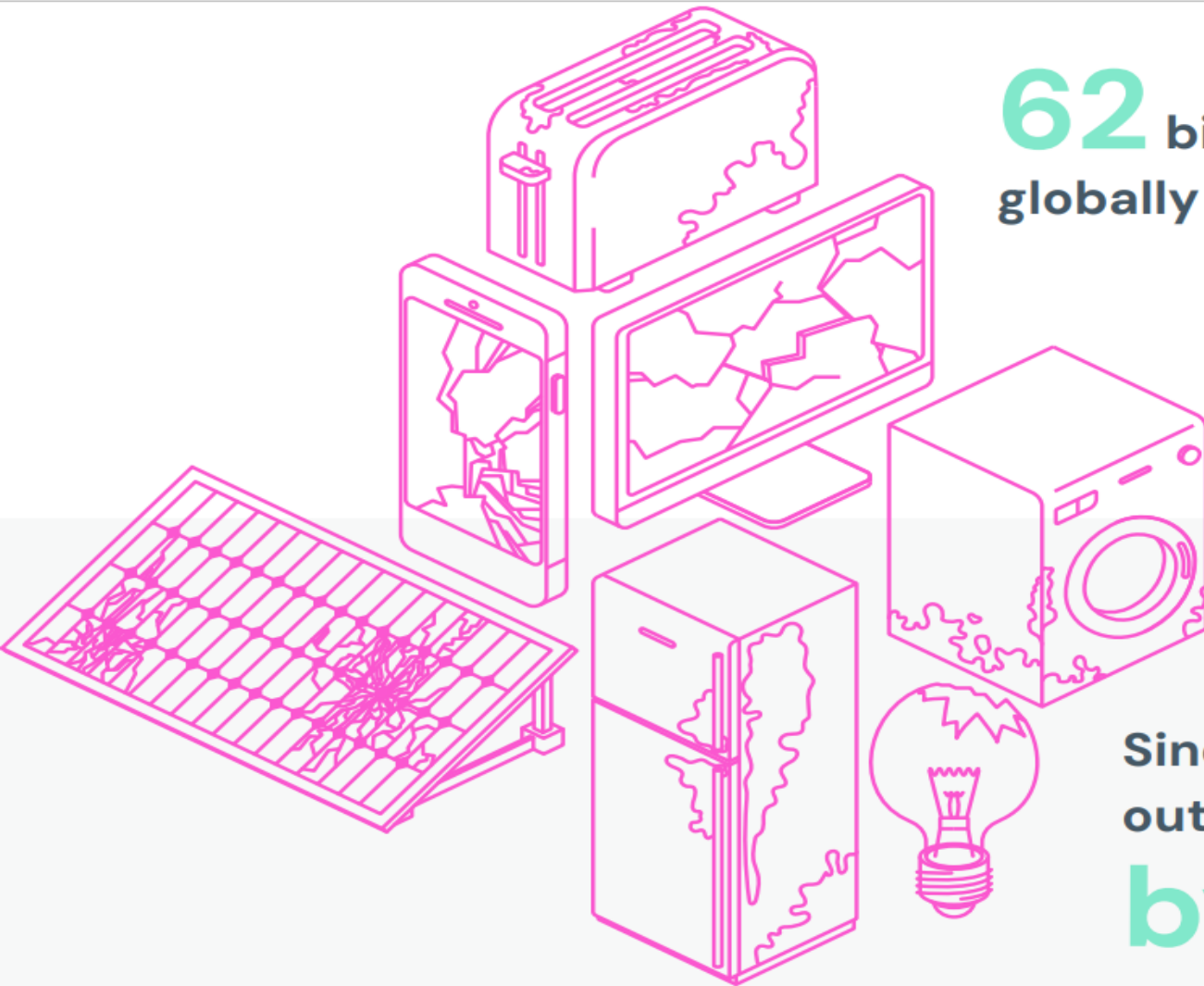








The Global E-waste Monitors 2024(UN): In 2022, 62 bn kg of e-waste was generated, 7.8 kg per capita per year, 22.3% of e-waste was recycled in an environmentally sound manner. Since 2010, the growth of e-waste generation is outpacing the formal recycling by 5X.



**62** billion kg of e-waste generated globally in 2022.

**7.8** kg per capita.

**22.3%** of this e-waste was documented as formally collected and recycled in an environmentally sound manner.

Since 2010, the growth of e-waste generation is outpacing the formal collection and recycling


**by almost a factor of 5.**







UN (March 2024): Food Waste Index Report 2024, 30% of food is lost or wasted globally, that is one billion meals a day, contribute 10% of greenhouse gas emission, costing the global economy \$1 trillion per year.



**30%** of all food produced globally is **lost** or goes to **waste**.

This waste accounts for approximately **10%** of human-caused **greenhouse gas (GHG) emissions**.

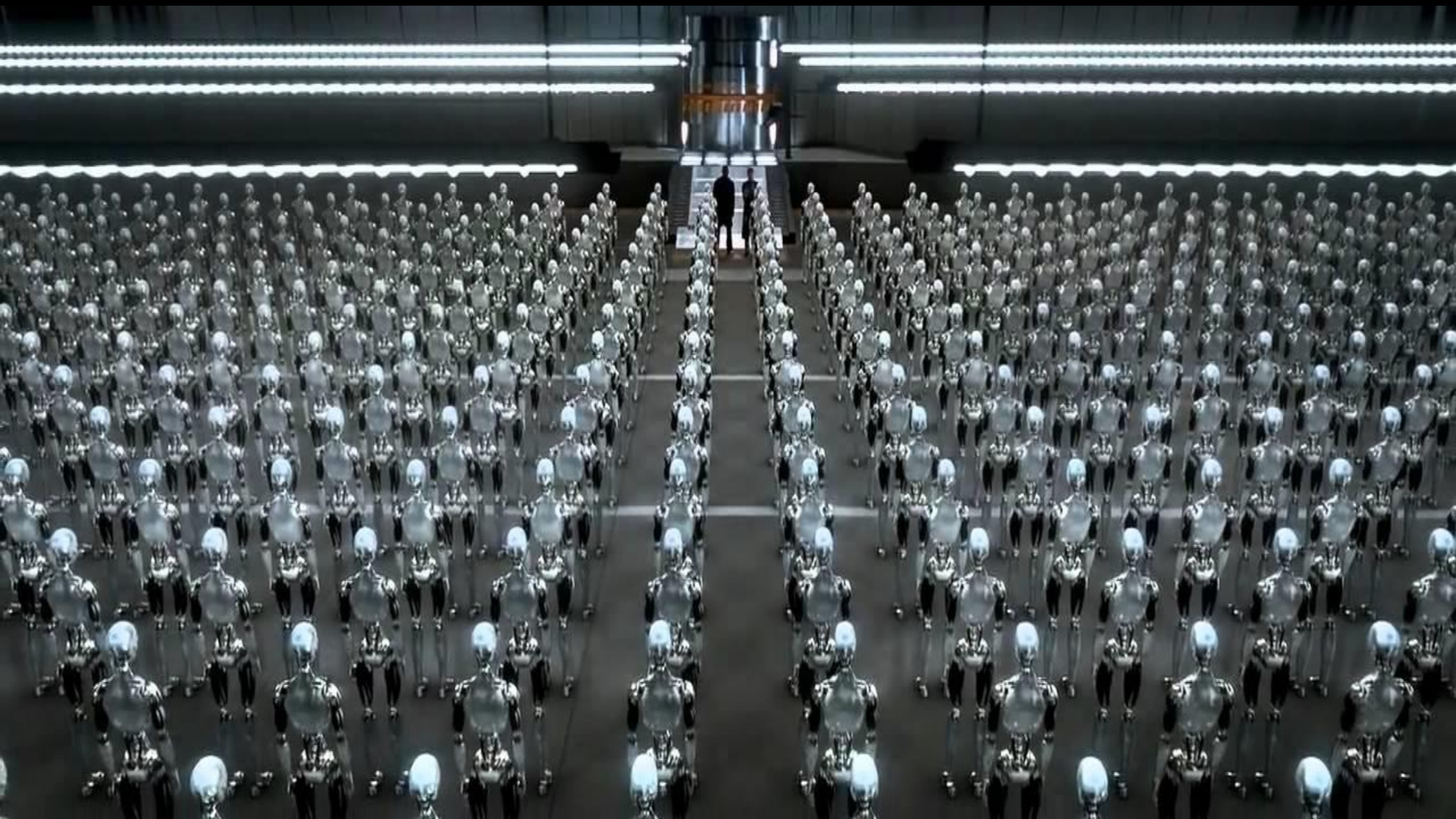
**= 1 billion tons** and **US\$1tn** per year.



Wiley(July 2024): An EU funded project to develop a fully functional electronic components using 100% food waste(discarded orange, grapefruit, lemon, apple, banana, potato, and carrot peels), undergo dehydration, pulverization to obtain fine powder. Natural adhesives like water, honey, sugar, starch, and gelatin are used to interconnect the materials.









**“Who doesn’t want to see (Star Wars character) C-3PO? I think everyone will want one. So I think the ratio of humanoid robots to humans will probably be at least two to one, something like that.**

**So, which means like somewhere on the order of 10 billion humanoid robots, maybe 20 or 30 billion”.**

**Elon Musk  
CEO of Tesla  
Annual Meeting of Tesla  
June 13, 2024**





A close-up, high-contrast photograph of a Terminator's face. The Terminator is wearing dark, wrap-around sunglasses. The lighting is dramatic, with strong highlights on the right side of its face and deep shadows on the left. The background is dark and out of focus.

**THE TERMINATOR (1984)**

**I'LL BE BACK**

**SCENE**

THE  
TERMINATOR  
FANS



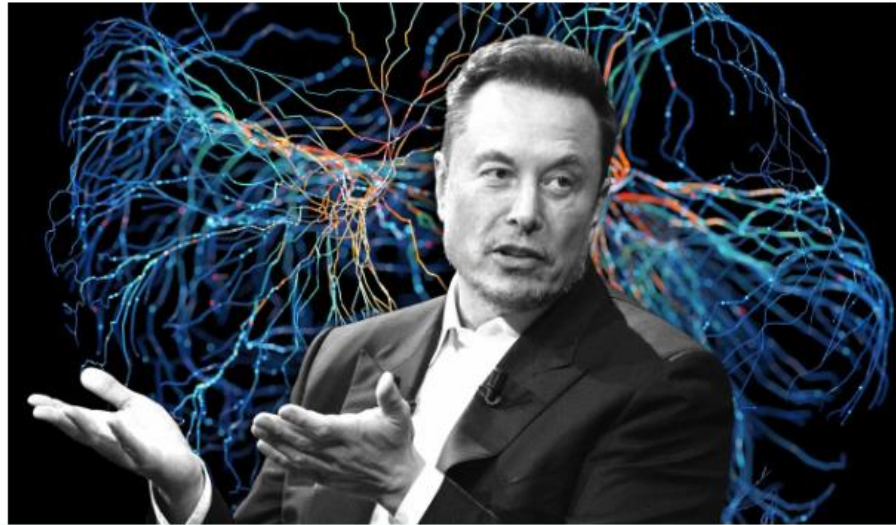
# Inc.

FUTURE OF HEALTHCARE INNOVATION

## Neuralink Brain Implant Wins an FDA Nod to Tackle Blindness

The regulatory approval is just the first phase of a long project, but Neuralink owner Elon Musk is already touting his brain implant tech as a world-changing solution for people with vision loss.

BY KIT EATON @KITEATON  
SEP 18, 2024



MARKETS BUSINESS INVESTING TECH POLITICS CNBC TV INVESTING CLUB PRO

## Brain implant startup backed by Bezos and Gates is testing mind-controlled computing on humans

PUBLISHED SAT, FEB 18 2023 9:00 AM EST

Ashley Capoot @ASHLEYCAPOOT

SHARE f t in

### KEY POINTS

- Synchron is part of an emerging crop of companies testing technology in the brain-computer interface industry.
- The system is implanted through the blood vessels and allows patients to operate technology using only their minds.
- “It helps them engage in ways that we take for granted,” Synchron CEO Tom Oxley said.

A photograph of Philip O'Keefe, a patient in the SWITCH clinical trial, using his brain-computer interface (BCI) to interact with a computer screen.

Philip O'Keefe, one of Synchron's patients in the SWITCH clinical trial, using his BCI.  
Source: Synchron

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## NEWS

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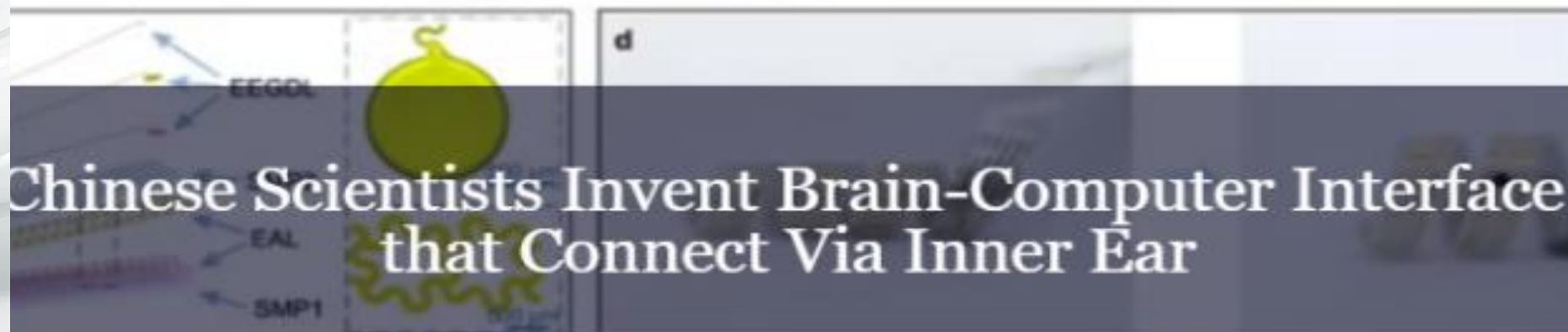
## Brain implants help paralysed man to walk again

24 May 2023

A photograph of a man using a robotic exoskeleton to walk outdoors near a body of water.

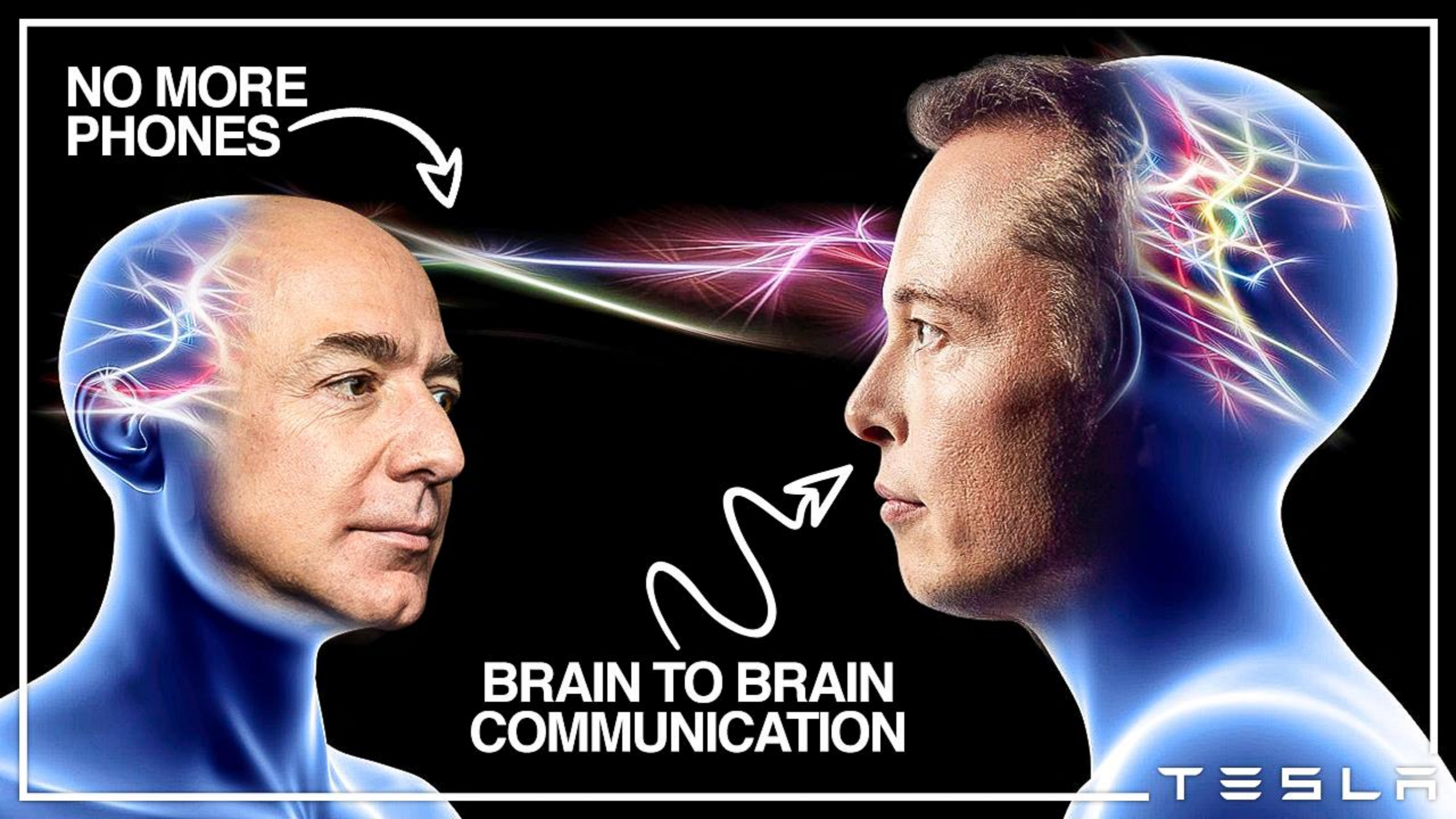


# Tsinghua University(July 2023) None Invasive, none surgical Brain Computer Interface- the ultimate solution for human to survive the technological singularity?





**NO MORE  
PHONES**



**BRAIN TO BRAIN  
COMMUNICATION**

TESLA



Work across many different UN agencies to lead international standards for emerging technologies. This includes Co-Chair of the UN ITU Task Group on Pre-standardisation for CitiVerse: work with members states to develop the first UN Roadmap on how emerging technologies can be used to create People-centred digital future to support UN Sustainable Development Goals.



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**ASU**  
ASIA UNIVERSITY





AIM CONGRESS | قمة AIM للاستثمار  
7 - 9 May 2024, Abu Dhabi, United Arab Emirates

**TOURISM INVESTMENT FORUM - UN TOURISM**  
INTERNATIONAL PARTNERS TRACK

Investing in Innovation and Enabling Women Entrepreneurs

**MODERATOR**



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Regional Director  
Middle East  
UN Tourism



**MRS. DINA RAQABAN**  
HR Director  
Almosafer



**MRS. CHRISTINA ZHANG**  
CEO  
The Metaverse Institute



**MR. AHMED DAOUD**  
Executive Director  
Innovation The Royal  
Commission for AIUla



**MRS. TARYN ANDERSON**  
CEO  
Impulse4women

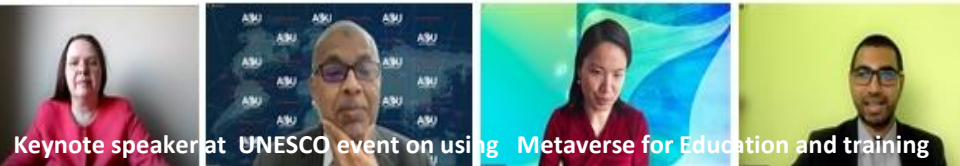


**ABIR LEHETA**  
CEO  
EGYTRANS

**WEDNESDAY**  
8<sup>TH</sup> MAY 2024  
10:15 - 10:50



# How Versed Are You in Metaverse?



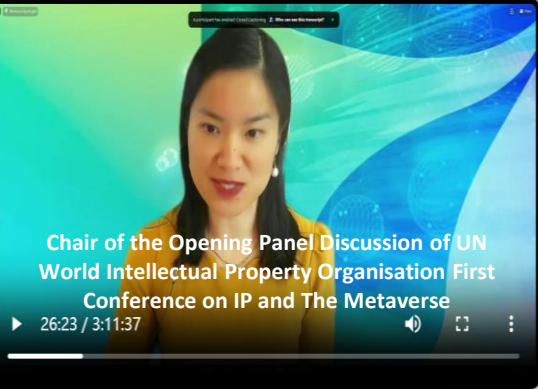
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SEVENTH SESSION OF THE WIPO CONVERSATION INTELLECTUAL PROPERTY AND THE METAVERSE - WIPO IP CONV GE 23 DAY 1 MORNING  
29 Mar 2023 8:49:59 GMT+1



TRANSCRIPT

INTERPRETATION

OPTIONS

**TIMELINE**

00:10:03 Meeting in the Metaverse

00:12:52 CHAIR

00:12:53 Opening

00:22:18 Pulse check: Have you been in the Metaverse?

00:23:45 Panel 1: "All information looks like noise until you break the code" - Decoding the Metaverse

00:23:46 CHAIR

00:24:47 **Dr. Christina Yan Zhang**

00:27:41 Mr. Luis Bravo Martins

00:45:17 Dr. Christina Yan Zhang

00:46:25 Dr. Recep Erdem Erkul



**Christina Yan Zhang**  
CEO  
Metaverse Institute

**Beyond the Metaverse**  
The future of virtual worlds

18 September  
(15:00-16:00 CEST)

Join me at the ISO Annual Meeting for the virtual session!

#ISOannualmeeting  
annualmeeting.iso.org





International Civil Aviation Organization  
2024 Innovation Fair "Digital Aviation: the Future is Now"

**Innovate the Aviation Industry Through the Metaverse**

Dr. Christina Yan Zhang  
CEO  
The Metaverse Institute  
Montreal, Canada  
14 March 2024





**“If working apart we are a force powerful to destabilise our planet, surely working together we are powerful enough to save it...”**

**In my lifetime I’ve witnessed a terrible decline.**

**In yours, you could and should witness a wonderful recovery.”**

**Sir David Attenborough  
COP 26  
UN climate conference**



**United Nations  
Climate Change**



**UN CLIMATE  
CHANGE  
CONFERENCE  
UK 2021**

IN PARTNERSHIP WITH ITALY





Thank  
you







[Christina@metaverse-institute.org](mailto:Christina@metaverse-institute.org)



Christina Yan Zhang



ChristinaYZhang