

Professor Brian Due, Københavns Universitet

2025 - tættere på drømmen om den perfekte tjener?

Copenhagen
Review of
Communication



Hvilken drøm? Den som Jensen Huang, Nvidia CEO, har



List of largest companies in the world by market cap 2024

Rank	Company	Market Cap (in USD)	Sector
1	Nvidia	\$3.571 trillion	Semiconductors
2	Apple	\$3.366 trillion	Technology
3	Microsoft	\$3.123 trillion	Technology
4	Amazon	\$2.177 trillion	E-commerce
5	Alphabet (Google)	\$2.170 trillion	Technology
6	Saudi Aramco	\$1.775 trillion	Oil & Gas
7	Meta Platforms	\$1.444 trillion	Social Media
8	Berkshire Hathaway	\$1.010 trillion	Diversified Investments
9	TSMC	\$1.002 trillion	Semiconductors

Jensen fremlægger drømmen i sin keynote, CES 6 januar 2025

2012 ALEXNET



PERCEPTION AI

SPEECH RECOGNITION
DEEP RECSYS
MEDICAL IMAGING

GENERATIVE AI

DIGITAL MARKETING
CONTENT CREATION

AGENTIC AI

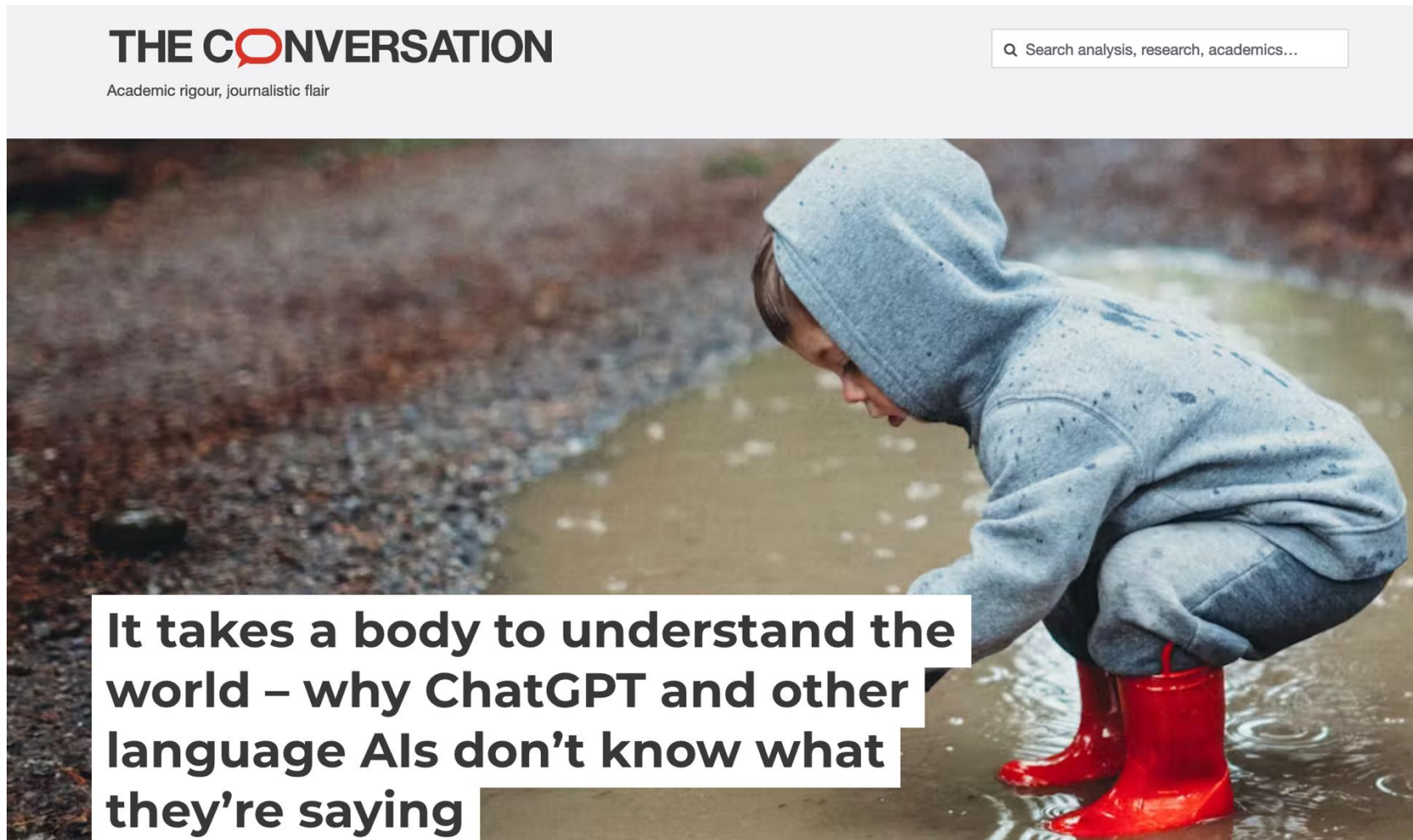
CODING ASSISTANT
CUSTOMER SERVICE
PATIENT CARE

PHYSICAL AI

SELF-DRIVING CARS
GENERAL ROBOTICS



Generativ AI og Agentic AI er sprogbaserede systemer. Problem: når omverdenen alene er forstået ud fra tekst/sprog-data(base)



En stor del af den menneskelige erfaringsverden er kropslig og tavs, baseret på kultur og sociale praksisser der ikke er (eller kan) nedskrives.

Sprog og tekst er et symbolsprog (derfor computere elsker det). Det kan repræsentere og beskrive det at køre cykel. Men det kan ikke faktisk køre cykel.

Fra large language models (LLM) til large behaviour models (LBM) (Embodied Foundation Models (EFMs) or Vision-Language-Action (VLA) models)

The Economist

Menu Weekly edition The world in brief Search

Science & technology | Large behaviour models

Robots can learn new actions faster thanks to AI techniques

They could soon show their moves in settings from car factories to care homes



Forbes

FORBES > INNOVATION > AI

Large Behavior Models Surpass Large Language Models To Create AI That Walks And Talks

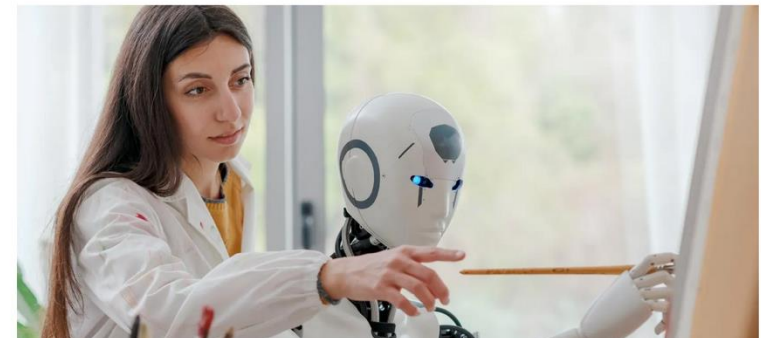
Lance Eliot Contributor

Dr. Lance B. Eliot is a world-renowned AI scientist and consultant.

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Nov 10, 2024, 12:44am EST



Baggrund: større modenhed i respektive udviklingsområder

Exhibit 1: Humanoids = Robotics x AI²

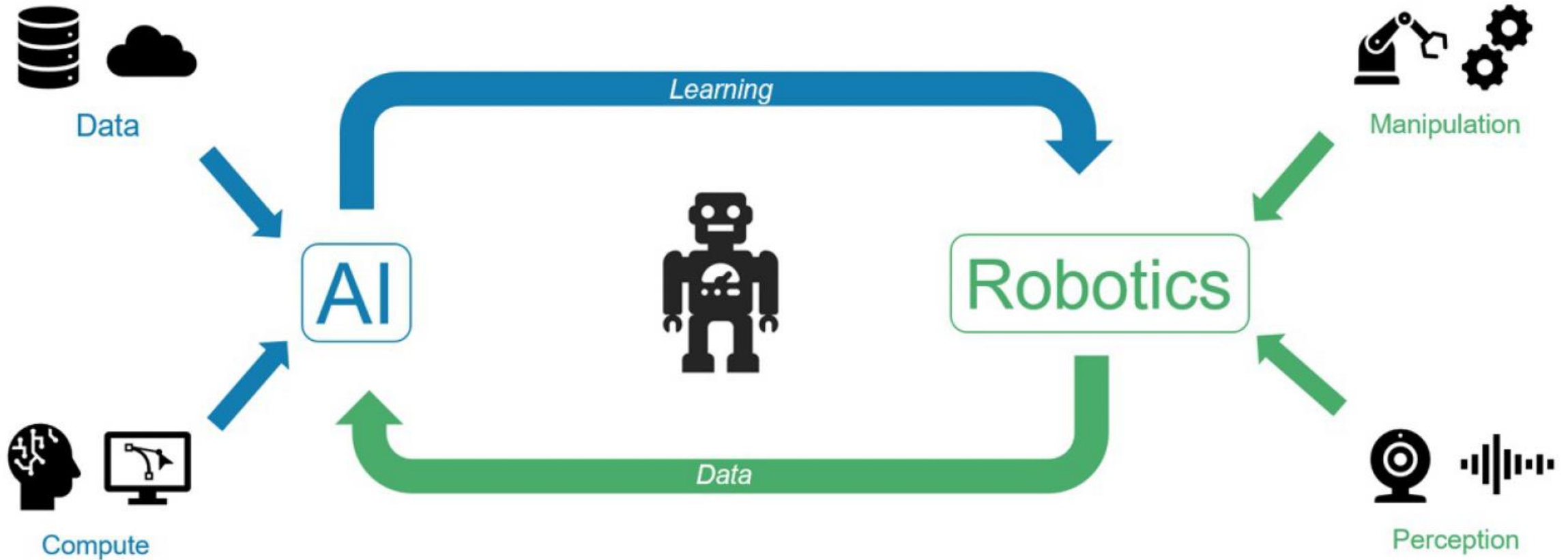
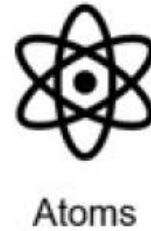
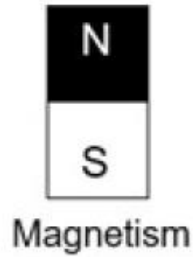


Exhibit 7: Seemingly Unrelated Areas of Science Can Combine With Profound Effect



Source: Morgan Stanley Research

08.22



Jim Fan · Følger
NVIDIA Senior Research M...
1u ·

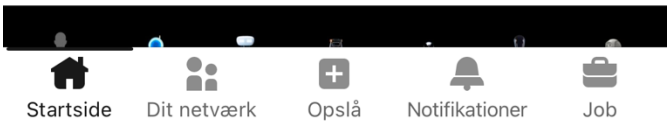
It gives me a lot of comfort knowing that we are the last generation without advanced robots everywhere. Our children will grow up as "robot natives". They will have humanoids cook Michelin dinner, robot teddy bears tell bedtime stories, and FSD drive them to school.

We are the generation of "robot immigrants", en route to a new world of ubiquitous Physical AI, much like our parents are "digital immigrants", learning to realign their lives on 6 inches of touch screen. It's a journey of both inventing sci-fi tech and reinventing ourselves.

Everything that moves will be autonomous.
Every year from now on will be the Year of Robotics.

Here's to a wild 2025 ahead 🍷🍷

Vis oversættelse





Robotics and autonomous systems are expected to be the largest net job displacer, with a net decline of 5 million jobs. P. 25

FIGURE 1.2 **Technology trends driving business transformation, 2025-2030**
Share of employers surveyed that identify the stated technology trend as likely to drive business transformation

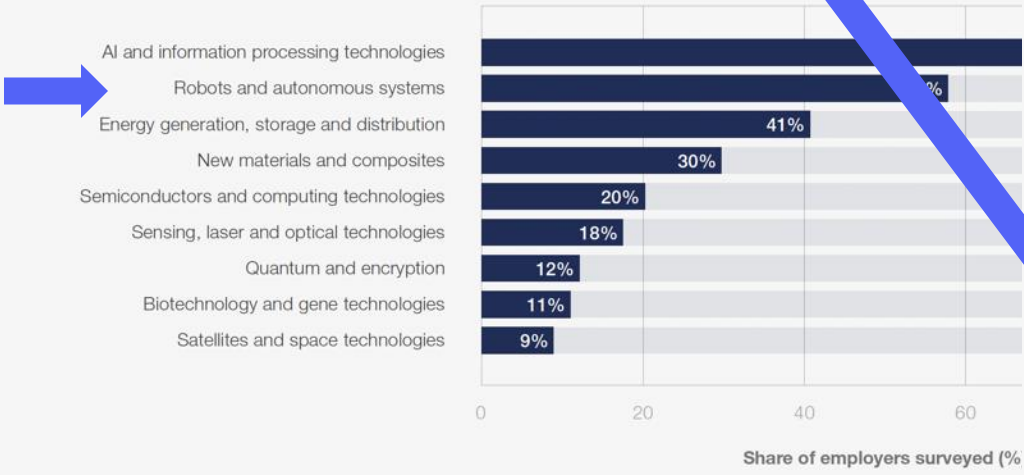
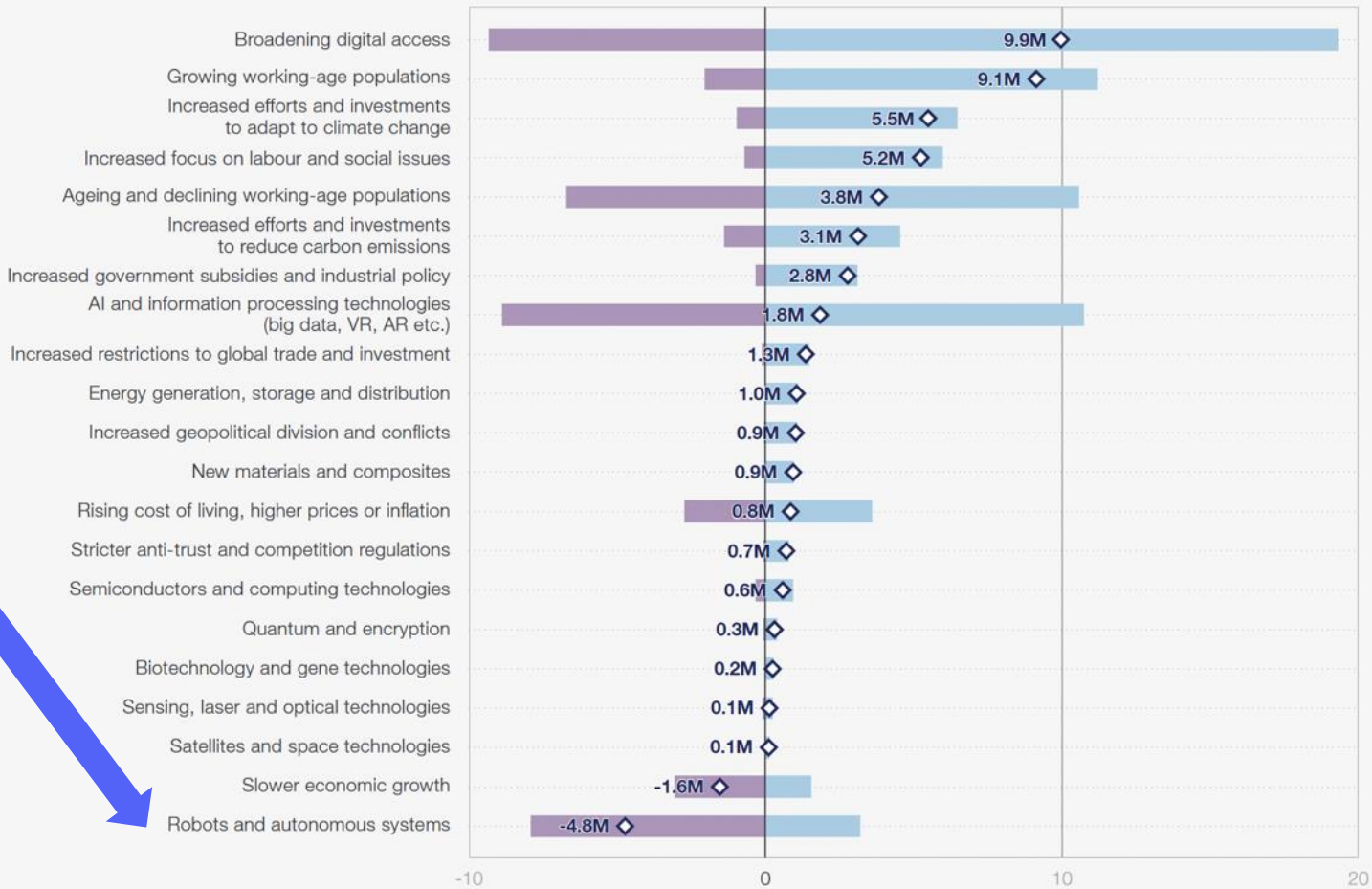


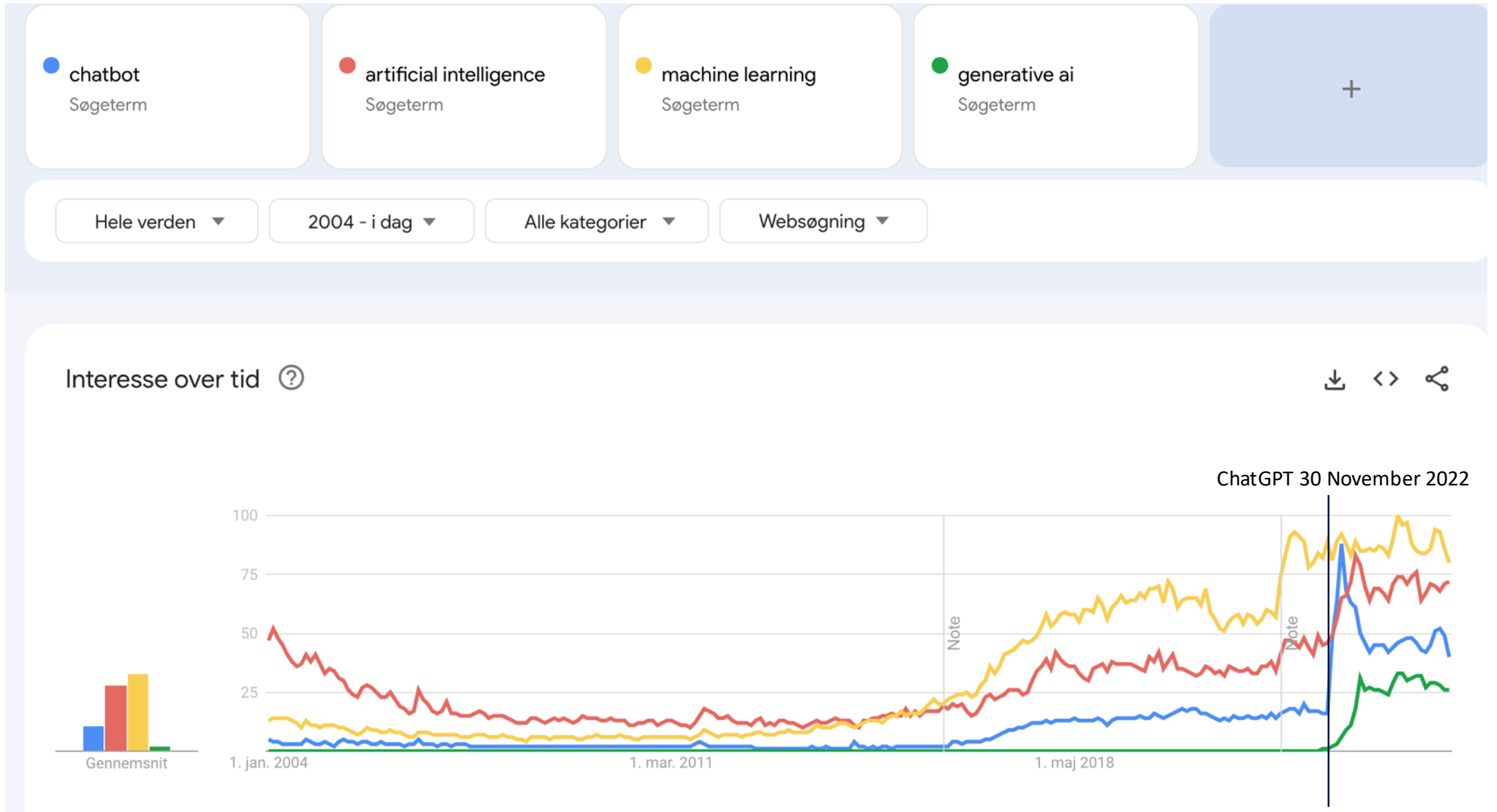
FIGURE 2.6

Expected impact of macrotrends and technology trends on jobs, 2025-2030

Projected job creation attributed to each trend (blue) and projected job displacement attributed to each trend (purple) between 2025 and 2030, based on the job growth and decline attribution expectations of surveyed employers and ILO employment figures by occupation. The projected net number of jobs created or destroyed attributed to each trend in the next five years (diamonds) is calculated by subtracting the total number of declining jobs from the total number of growing jobs. The Appendix provides additional details and the data behind this figure.



Physical AI vil nok have en bevægelse som generativ AI (nja, ikke helt)

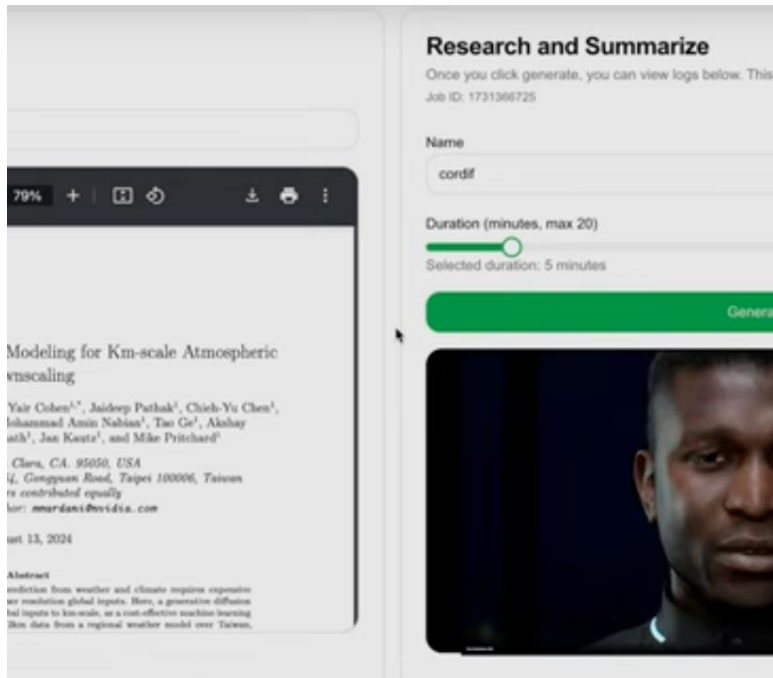


Physical AI findes allerede på måder vi knapt registrerer som sensationelle



Tre robotkategorier (ifølge Nvidia)

Agentic AI (digital robot)



Autonomous units



General-purposed robotics (humanoids)



Fourier GR-2 (for sale)

Mine egne projekter: robotter, social interaction og mobilitet



Due, Brian L. 2019. 'Laughing at the Robot: Incongruent Robot Actions as Laughables'. *Mensch Und Computer : Neue Digitale Realitäten*. doi: 10.18420/muc2019-ws-640.

Due, Brian L. 2021. 'RoboDoc: Semiotic Resources for Achieving Face-to-Screenface Formation with a Telepresence Robot'. *Semiotica* (238):253–78. doi: <https://doi.org/10.1515/sem-2018-0148>.

Due, Brian L. 2023a. 'A Walk in the Park With Robodog: Navigating Around Pedestrians Using a Spot Robot as a "Guide Dog"'. *Space and Culture*. doi: <https://doi.org/10.1177/12063312231159215>.

Due, Brian L. 2023b. 'Guide Dog versus Robot Dog: Assembling Visually Impaired People with Non-Human Agents and Achieving Assisted Mobility through Distributed Co-Constructed Perception'. *Mobilities* 18(1):148–66.

Due, Brian L., Simon Bierring Lange, Mie Femø Nielsen, Thomas L. W. Toft, Jeanette Landgrebe, Rikke Nielsen, and Liv Sassert. 2019. 'Den andens ansigt: Afdækning af deltagerorientering via multimodal interaktionsanalyse'. *NyS, Nydanske Sprogstudier* (56):10–51. doi: 10.7146/nys.v1i56.111286.

Hvilke humanoider er på vej (måske)?



Atlas 2024.

👤 178 🏠 N/A 🗳️ N/A 🏠 N/A

Atlas is a fully electric humanoid robot. Unlike previous generations of the robot, this version doesn't rely on hydraulic actuators and is faster and more compact while also being stronger and more dexterous. Capable of dynamic motions, the robot can move and bend its body in ways that exceed human capabilities. (IEEE)



Digit 2019.

👤 175 🏠 65 🗳️ 16 🏠 24

Digit is a humanoid robot designed to move in a more dynamic fashion than regular robots do. It has flexible joints and a torso packed with sensors that will allow it to navigate complex environments and carry out basic low payload delivery. (IEEE)



Phoenix 2024.

👤 117 🏠 70 🗳️ 25 🏠 75

Phoenix is the world's first general-purpose humanoid powered by Catapult, a proprietary AI control system. Designed to carry 100lbs, human-like intelligence and enable it to do a wide range of tasks in the real world, the user challenges affecting many organizations. (IEEE)



Figure-02 2024.

👤 168 🏠 70 🗳️ 20 🏠 N/A

Figure-02 is an improved version of Figure-01 with more integrated body joints and more human-like figure. It brings together the flexibility of the human form and cutting edge AI to do complex single-function robots and lend support across manufacturing, logistics, warehousing, and retail. (Figure)



Optimus Ge2 2023.

👤 178 🏠 99 🗳️ 20 🏠 N/A

Optimus Gen 2 is a general purpose, 100kg, humanoid robot capable of performing unscripted, essential, and boring tasks. Achieving that end goal requires building the software stacks that enable: perception, navigation, manipulation, and interaction with the physical world. (Tesla)



Apollo 2023.

👤 117 🏠 70 🗳️ 25 🏠 30

Apollo is designed to transform the industrial workforce and beyond in service of improving the human experience. It will first be used in logistics and manufacturing, but Apptek's production, industry partners, researchers, and users will benefit. (IEEE)



G1 2024.

👤 113 🏠 35 🗳️ N/A 🏠 N/A

The G1 is a small, flexible and cost-efficient humanoid robot. It can be operated with articulated, force-controlled, three-fingered hands, which can be further enhanced with tactile feedback. The robot's battery has an operating time of about 1 hour, and is designed to be quickly swapped out.



GR-1 2023.

👤 165 🏠 65 🗳️ 50 🏠 44

Fourier GR-1 offers embodied AI that combines AI technology with general robotics, providing a controllable, perceptible, interactive, and mobile body. The GR-1 has significant potential in industrial, rehabilitation, home and research applications. (Fourier Robotics)



Menteebot 2024.

👤 115 🏠 70 🗳️ 25 🏠 40

Menteebot is developed for both workloads and humanoid. It is equipped with advanced kinematic control and can increase the gap between simulation and reality. The highlight of the robot is the advanced semantic perception of the environment and the LLM interface. (Mentee Robotics)



CyberOne 2022.

👤 177 🏠 52 🗳️ N/A 🏠 21

CyberOne is a humanoid robot designed to be a general and flexible system for industrial applications and research. It has advanced joint structures, enabling it to deliver human motion as well as functionality allowing it to create 3D motion reconstructions of the real world. (Xiaomi)



4NE-1 2024.

👤 118 🏠 80 🗳️ 15 🏠 N/A

4NE-1 is capable of carrying out multiple daily and essential tasks like grocery shopping in the human world. It has a powerful mechanical structure, which can be changed as per the requirements to make it serve any specific purpose. (Neura Robotics)



NEO 2024.

👤 168 🏠 30 🗳️ 20 🏠 N/A

NEO body is engineered with mucro-like anatomy, making it more flexible and durable. It is one of the few humanoid robots covered fully by Tesla's existing AI21 for making video, text, and navigating your space naturally. As they move and perform tasks, they get even more efficient. (NEO)

Atlas 001



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Atlas[®] and beyond: the world's most dynamic robots

At Boston Dynamics, we're always innovating—pushing the limits of the robotics field and tackling the next commercial frontier with Atlas.

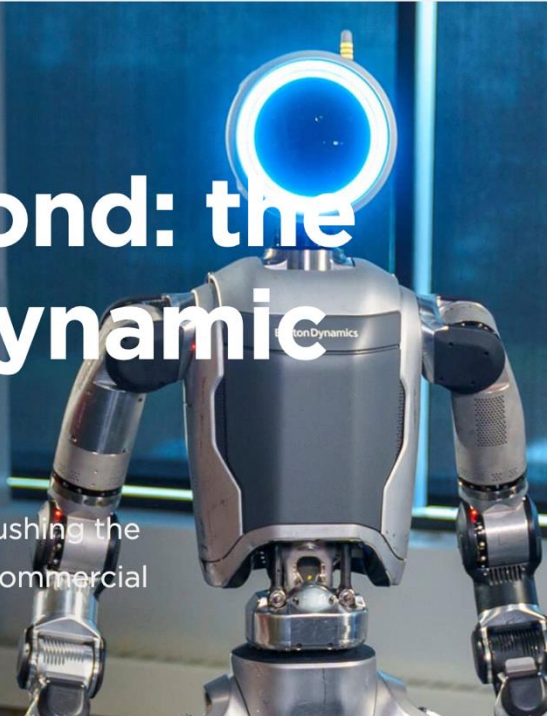


Figure02
BMW case.
Funded af
Microsoft og
OpenAI mfl.
Amerikansk.



Faster, 11-DoF
brand-new hands



Køb din egen robottjener fra Kina



XIAOMI CYBERDOG 2

★★★★★ 2 Reviews Add Your Review

\$2,999.00 Out Of Stock SKU XMCBD0G2

- Xiaomi CyberDog 2 is a bio-inspired quadruped robot.
- Powered by NX processor and two co-processors.
- Paired with 32GB of near-industrial grade SSD.
- 19 high-precision sensors, include an RGB camera, an interactive AI-backed camera, four ToF sensors, a LIDAR sensor, a depth camera, an ultrasonic sensor, etc.
- Have a maximum walking speed of 1.6m/s and a maximum payload of 1kg.
- Supports Xiaomi voice control(小爱同学), but only for Chinese.

♡ WISH LIST 🔗 SHARE



Unitree Go2

\$2,800.00 USD

📦 Order now and ship within 1 months

📦 Shipping costs \$399 per unit, Remote Countries \$499-\$1000

\$ Not include customs duties, Please comply with local customs laws pay customs duties and clear the goods

🗨️ Contact sales to get Go2 Edu price

Version

Go2 Pro (without controller)

Go2 Pro (with controller)

Go2 Air (without controller)

Go2 Air (with controller)

Quantity



1



Chat with us 🗨️

Unitree G1 (Contact us for the real price)

\$16,000.00 USD

📦 Contact sales to get G1 Edu price

🔧 Customize products according to your needs

📦 Please contact us for delivery time

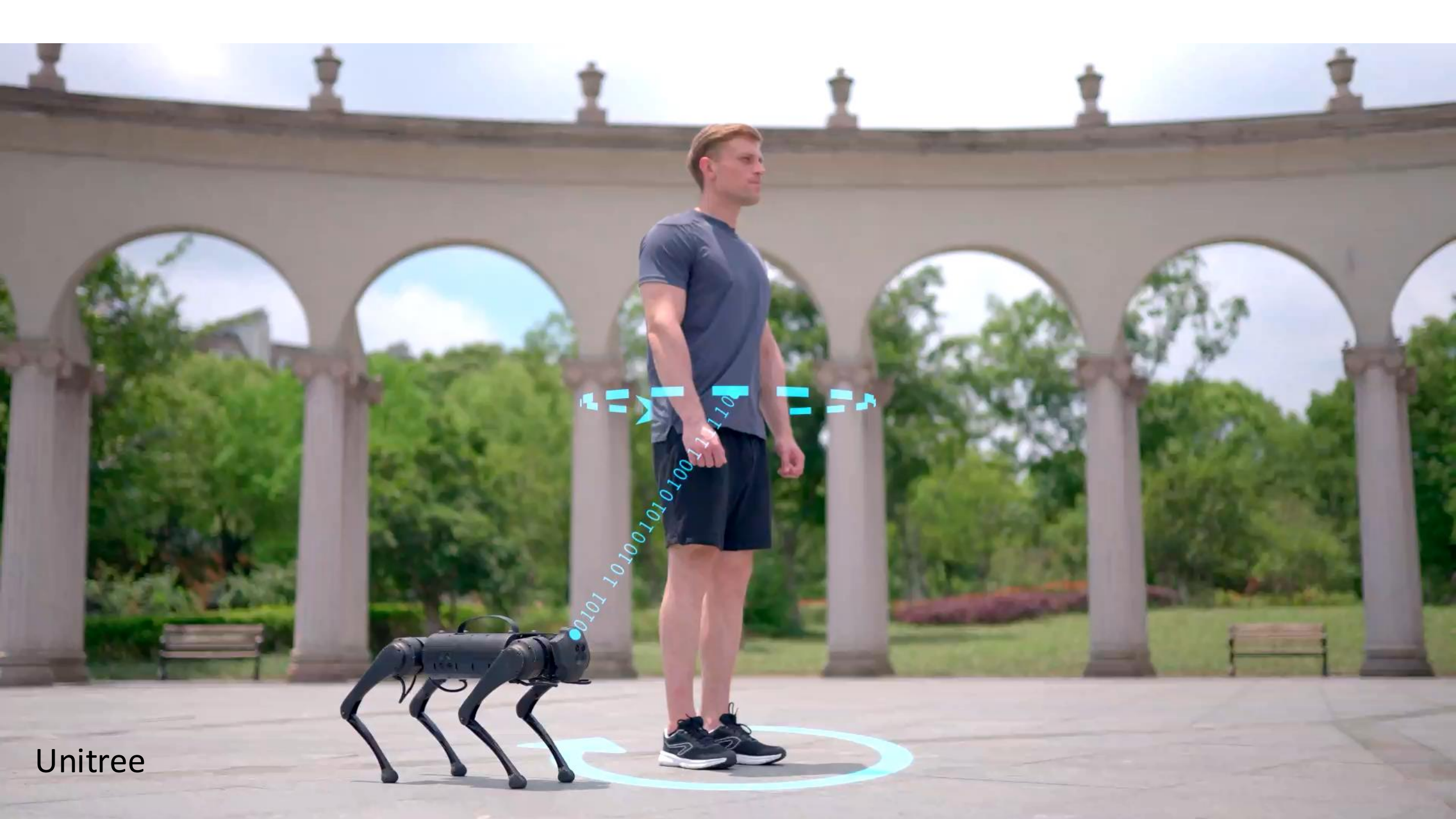
Product

G1

Contact Sales: sales_global@unitree.cc

Description

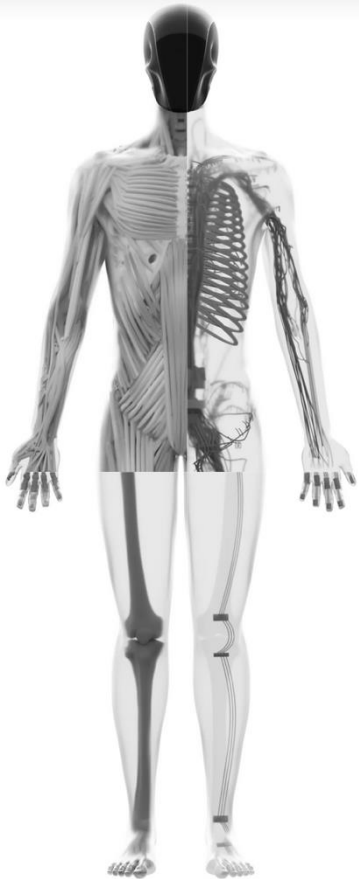
Chat w



Unitree

Eller din egen klon. Clone Alpha Android robot. NVIDIA Jetson Thor in the skull running Cybernet, Clone's visuomotor foundation model. (Norsk)

Skelet består af 206 knogler + syntetiske muskelfibre + nervesystem/perception (ca 400 sensorer) + "blod" kredsløb (væske pumpes rundt af et "hjerte")



Clone is manufacturing only 279 units of the limited edition Clone Alpha. These are musculoskeletal androids designed for the home with the Telekinesis training platform to attempt to teach the Clone new skills.

Pre-installed skills

- Memorizes your clean home layout
- Memorizes your kitchen inventory
- Capable of witty dialogue
- Shakes hands with your friends
- Pours drinks for you
- Makes you sandwiches
- Washes, dries, and folds your clothes
- Vacuums your floors
- Turns the lights on and off
- Sets the dining table
- Loads and unloads the dishwasher
- Follows you around
- Holds items for you



En driver (der måske er svær at acceptere): sexindustrien

realbotix

ROBOTS

USE CASES

GALLERY

• ABOUT

CONTACT



Perception is reality

What features can I customize on a robot?

Our robots are highly customizable. They can be made to replicate a celebrity, historical figure or your vision for a robot. You can provide your own images for face customization or have Realbotix create a fully custom face sculpt. The silicone body is also customizable, to complete the vision.





Hvordan sker det?

Step 1: Indsamling af Real-world data og digitalisering af det. Opbygning af databaser hvor fysikkens love gælder.

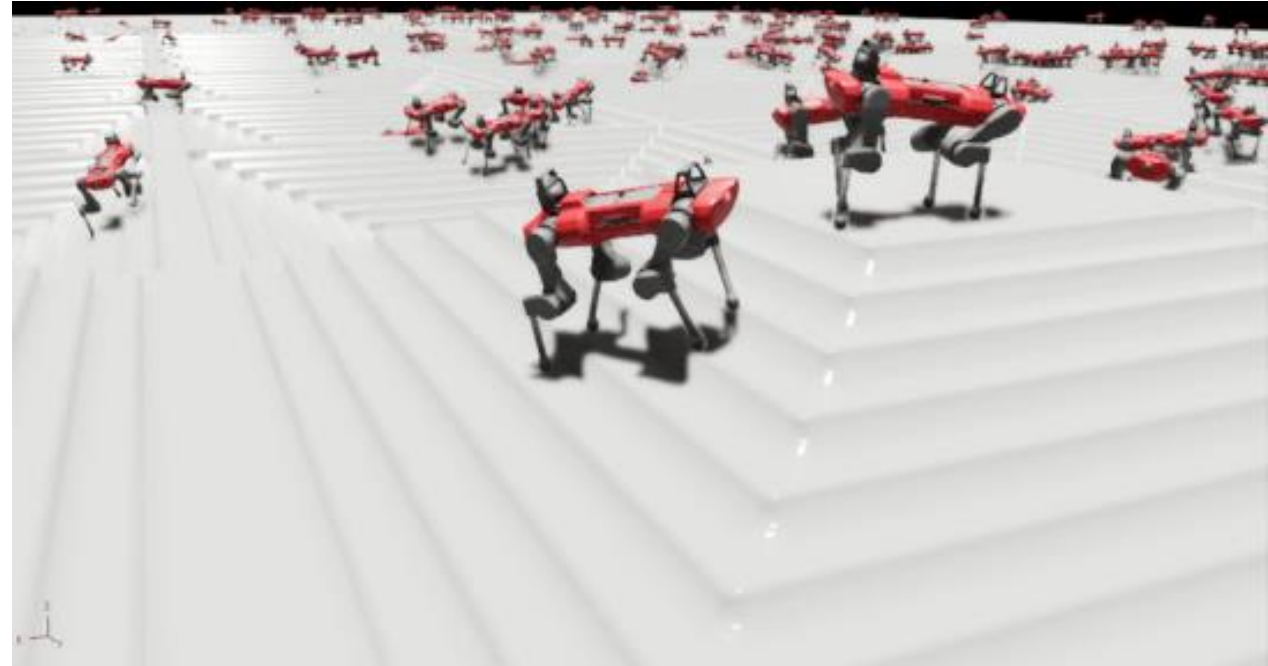


Step 2: Imitation learning: Adgang til en digital tvilling i et digital omnivers af ens robot via Virtual Reality. Træne den i handlinger og omverdensforståelse.

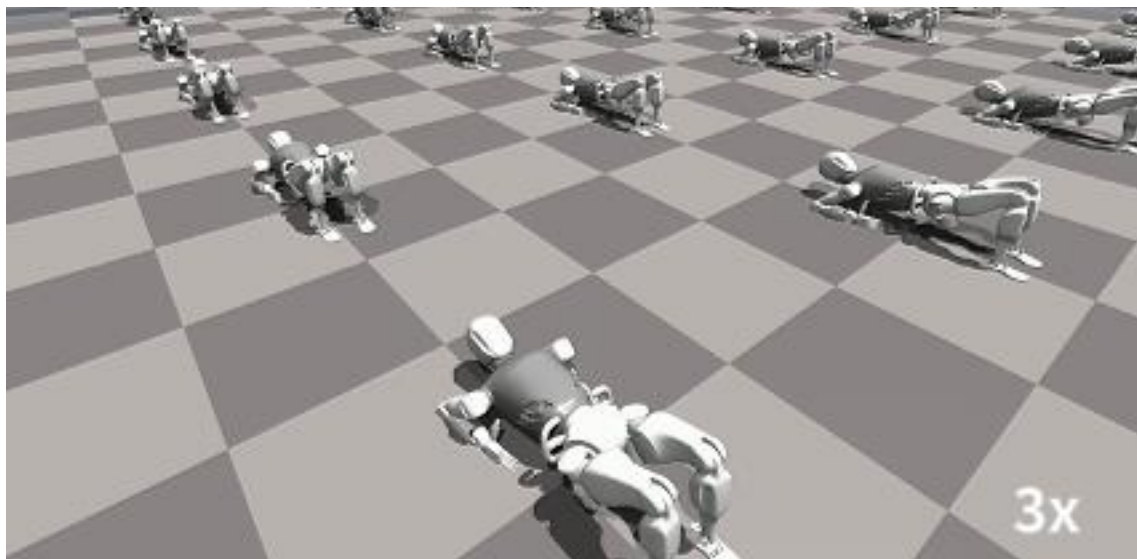
Spatial computing (AR/VR headsets, such as Apple's Vision Pro)



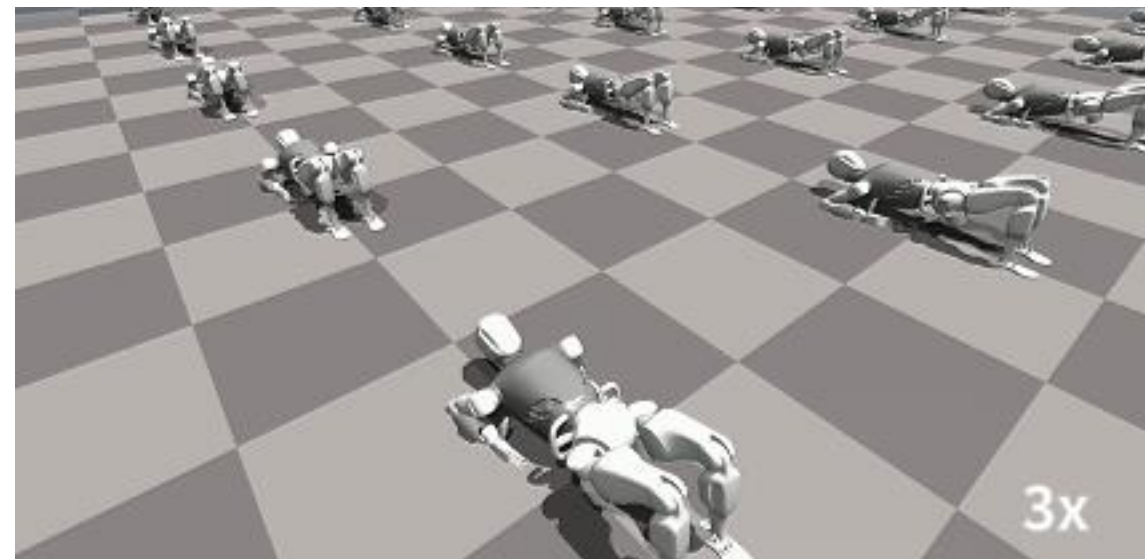
Step 3: Multiplicering. Syntetisk data. Træning i *isaac lab robot gym* simulering der har fysikkens love. Optimizing AI for real-world robotics



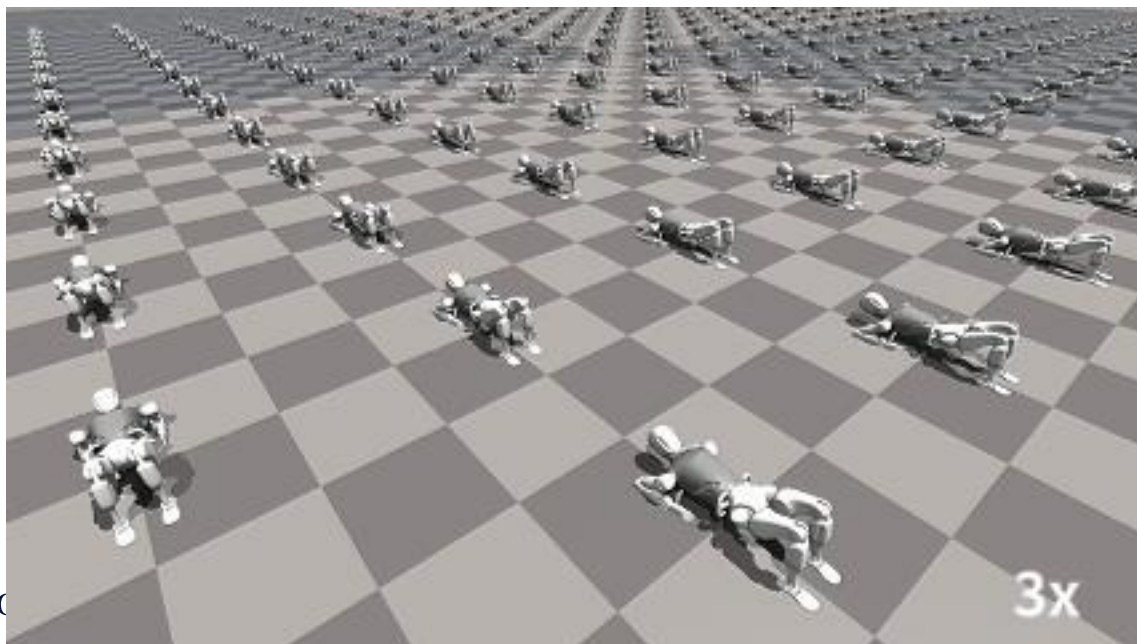
Træning i simuleringen er uendeligt og multiplicerbart og tusindvis af timer opnås på ingen tid



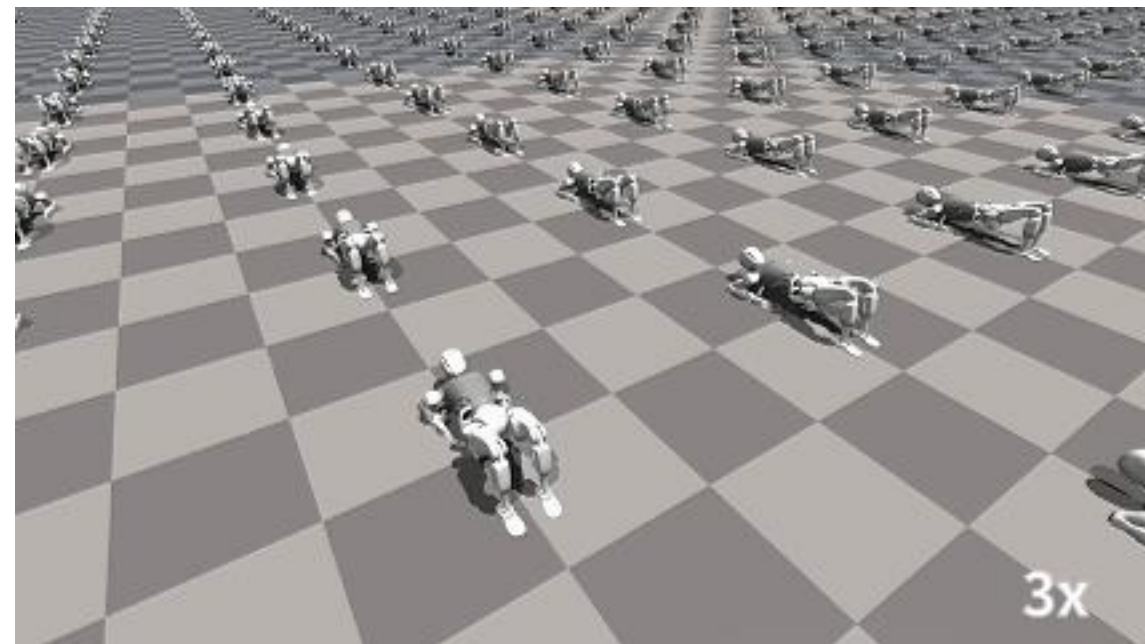
100 test iterationer



500 test iterationer



1600 test iterationer

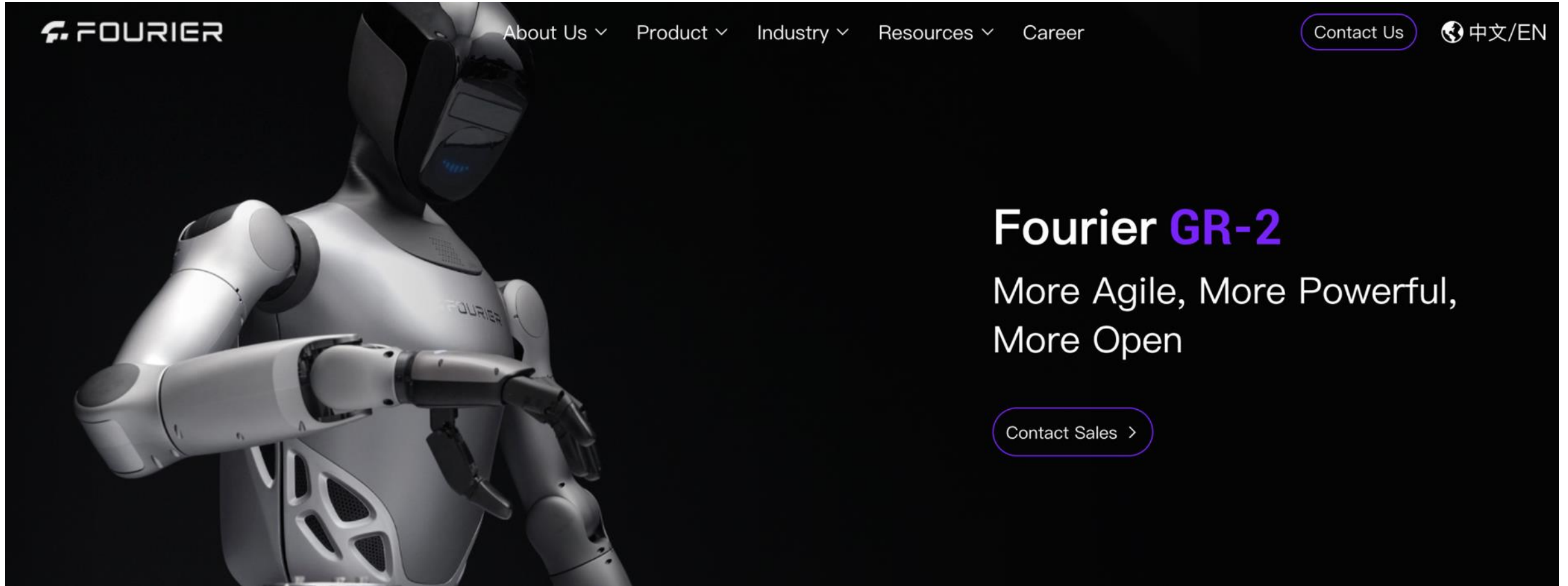


3000 test iterationer

Træning i digital tvilling omnivers med uendelige variationer



Step 4: applicering og forbedring i real world

A screenshot of the Fourier GR-2 website. The background is dark with a white humanoid robot on the left. The robot has 'FOURIER' written on its chest. The website header includes the 'FOURIER' logo, navigation links for 'About Us', 'Product', 'Industry', 'Resources', and 'Career', a 'Contact Us' button, and a language selector for '中文/EN'. The main content area features the text 'Fourier GR-2' in white and purple, followed by the tagline 'More Agile, More Powerful, More Open' and a 'Contact Sales >' button.

FOURIER

About Us ▾ Product ▾ Industry ▾ Resources ▾ Career

Contact Us 中文/EN

Fourier GR-2

More Agile, More Powerful,
More Open

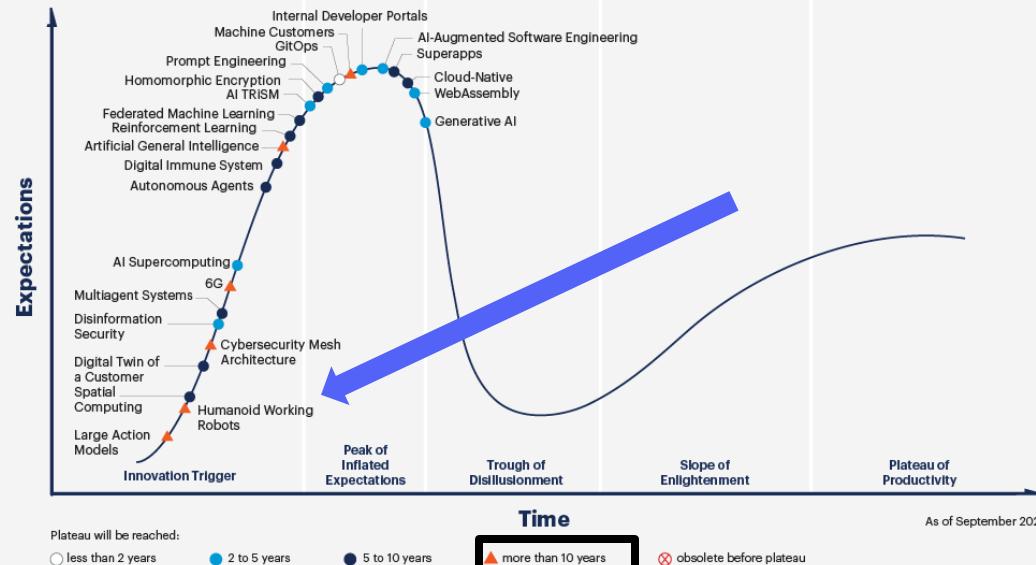
Contact Sales >

Hvornår kan vi få vores tjener så?

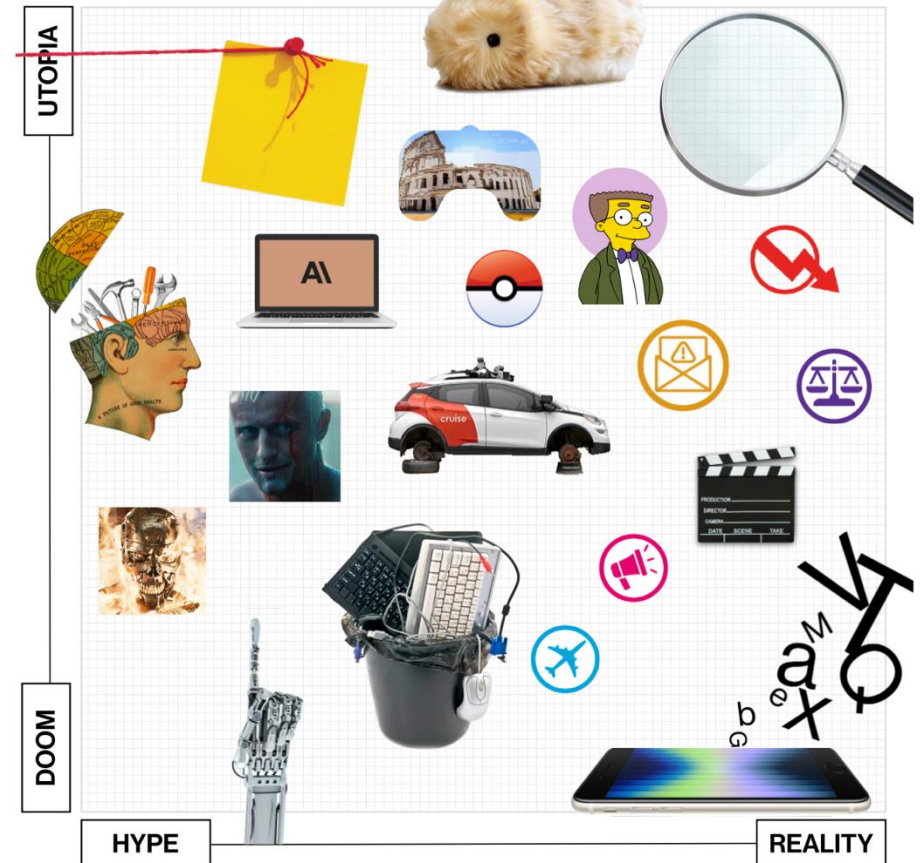
Robot developers keep making it seem like housebots are imminent when they're decades away

Published: October 18, 2024 2.42pm CEST

Hype Cycle for Emerging Technologies, 2024



Source: Gartner
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Hvad er konsekvenserne af den udvikling vi ser lige nu?

1. Vi får sjældent det vi tror vi får, men vi får en lang række spillover effekter

Roy Amara 1925–2007. American futurologist

We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run.

The Age 31 October 2006



Copenhagen Review of Communication Roborock, Saros 770



Teleoperated (rescue, fire, military, health, etc.)

2. Det handler om at samle data. Kampen bevæger sig væk fra digitale data til fysiske data.

Opbygning af et digitalt perceptionssystem.
Digitalisering af sanserne.

Your 8 Senses



Sight



Hearing



Taste



Touch



Smell



Movement



Balance



Interoception

Sensory Friendly Solutions

DEEP DIVE

Digital smell has arrived. Are we ready for Stinkygram?

Osmo has made a breakthrough in digitizing scent. Here's how it works

By CARLYN ZWARENSTEIN

PUBLISHED JANUARY 5, 2025 5:15AM (EST)
UPDATED JANUARY 6, 2025 11:23AM (EST)



Sanctuary AI Releases New Generation of AI Robots for High Quality Data Capture

OBSERVER BUSINESS | FINANCE | TECH | MEDIA | LIFESTYLE | ARTS | ENTERTAINMENT

BUSINESS · TECHNOLOGY

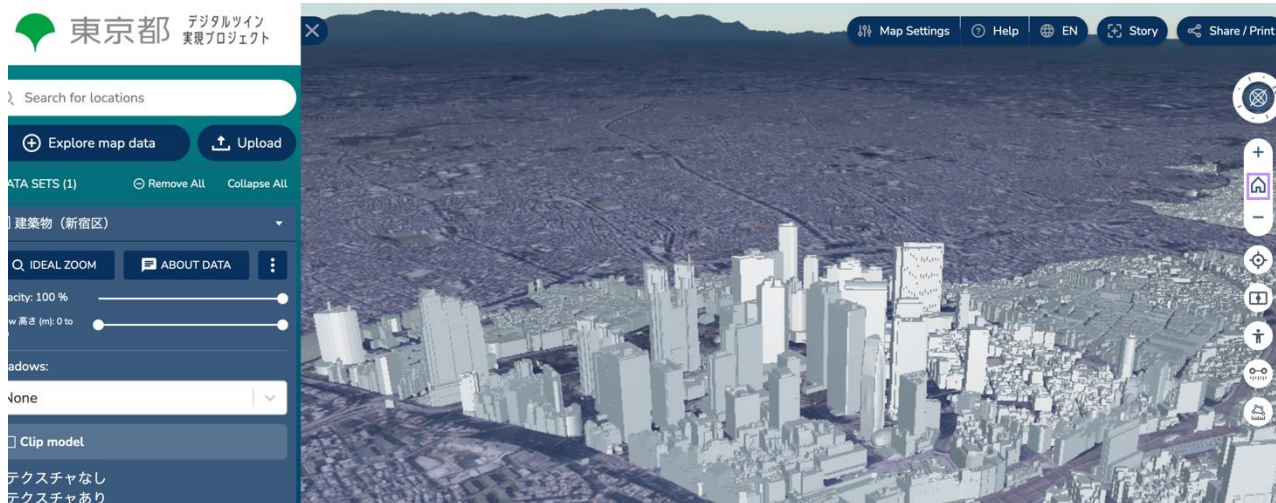
A.I. Companies Are Running Out of Training Data: Study

In the past year, around 25 percent of data from high-quality sources has been restricted from major datasets used to train A.I. models.

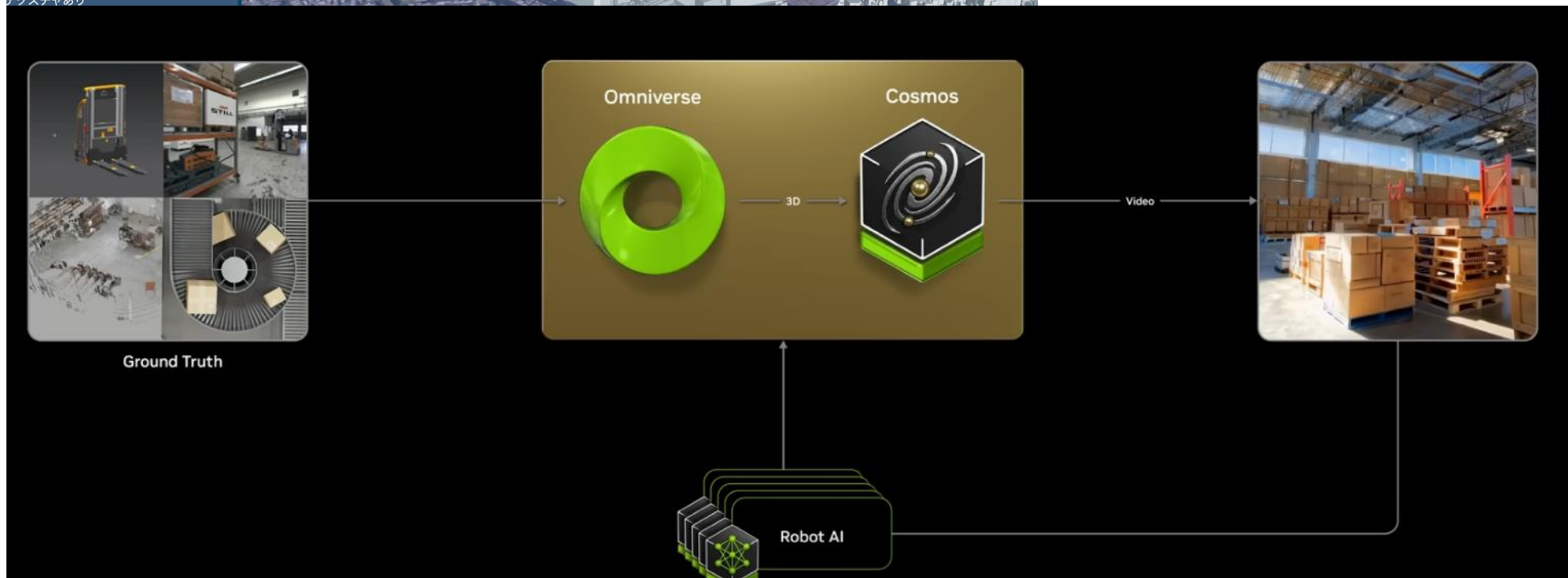
By Alexandra Tremayne-Pengelly · 07/19/24 1:06pm



4. Det handler om at bygge en digital tvillingeverden. Omniversets fulde potentialer.



1. Indsamle real world data (video og sensorer)
2. Omniverse. Skabe en digital tvilling af den "verden" med alle fysikkens love og træne AI'en til at gennemspille en række scenarier (brug spatial computing/VR)
3. Cosmos. AI'en producerer syntetiske videoer af "virkelige" mulige hændelser.
4. AI'en træner nu sig selv på uendeligt multiplicerede versioner af selv-producerede videoer



Det endelige simulacrum
- Er det troværdigt data?

Tvillingedrømmen lever alle steder



Latest Magazine Topics Podcasts Store The Big Idea Data & Visuals Case Select

Customer Strategy

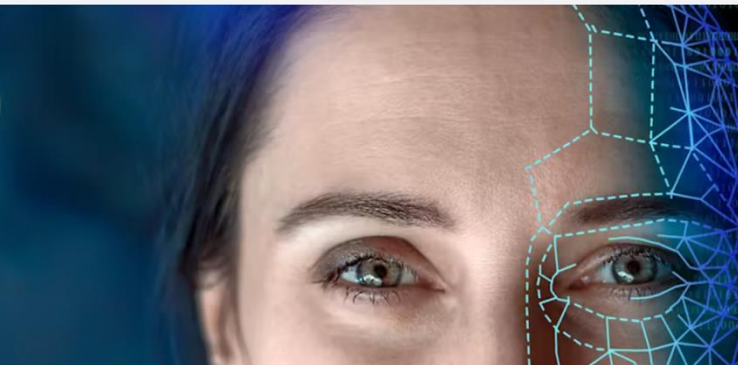
Digital Twins Can Help You Make Better Strategic Decisions

by Graham Kenny and Ganna Pogrebna

September 23, 2024

THE CONVERSATION

Academic rigour, journalistic flair

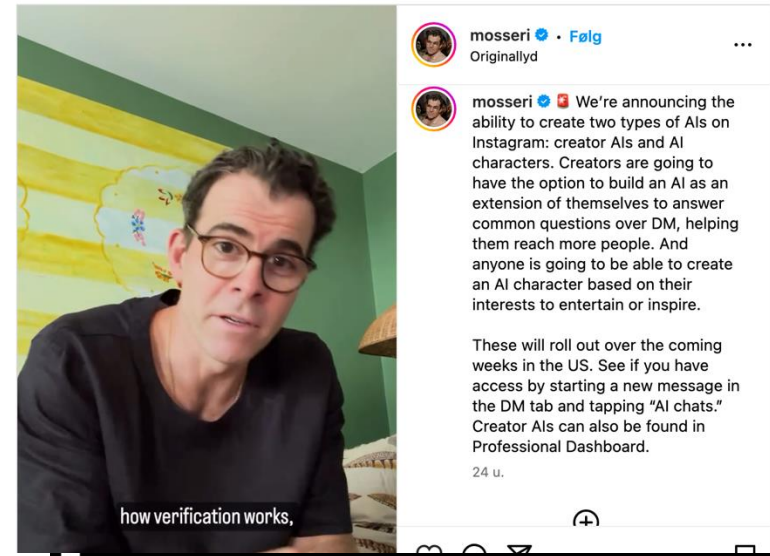


Talking to dead people through AI: the business of 'digital resurrection' might not be helpful, ethical... or even legal

Published: October 30, 2024 11.29am CET

Instagram

Log på



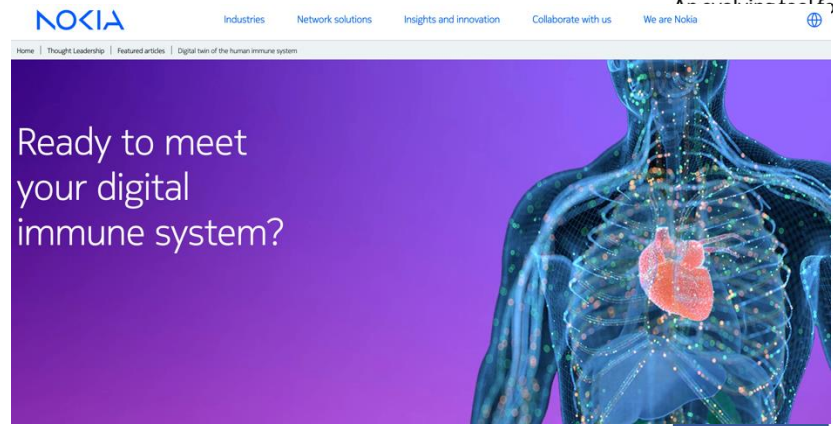
Ragan
PR Daily

SOCIAL MEDIA MEDIA RELATIONS CRISIS MARKETING WRITING & EDITING JOB BOARD EVENTS AWARDS MO

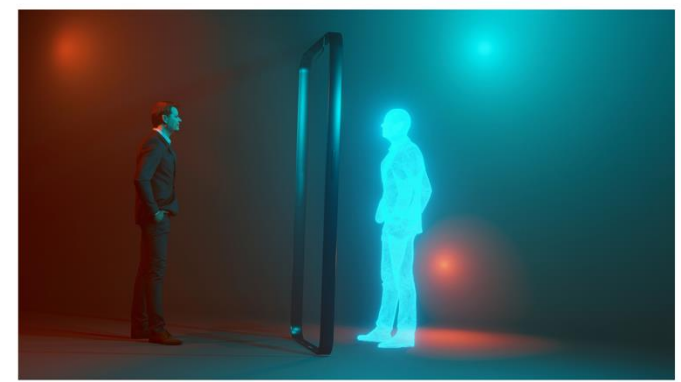
PR

Using custom digital twins to better target messaging

An essential tool for long-term strategies.



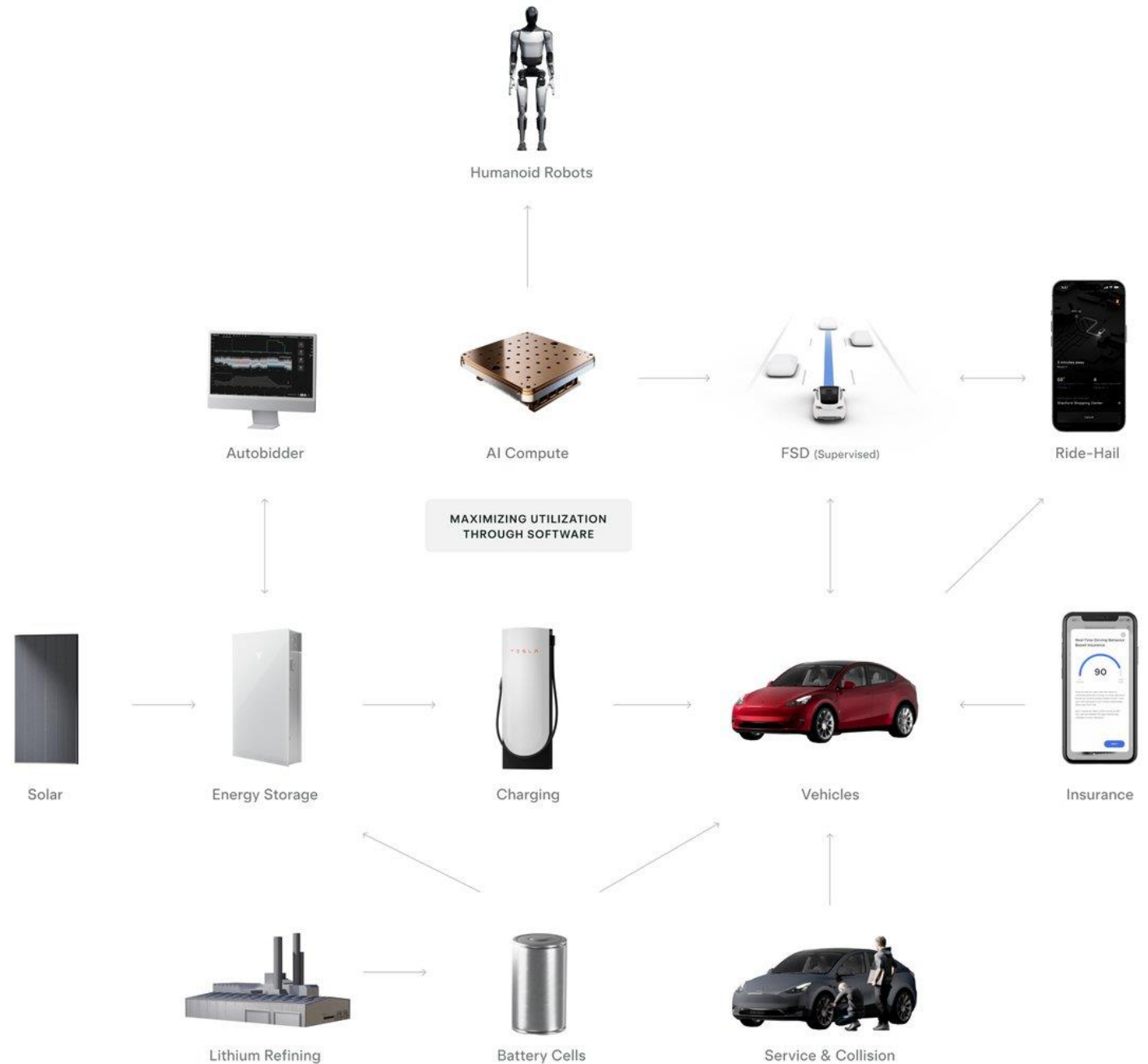
Facebook
Twitter / X
LinkedIn



The emergence of generative AI has brought significant changes to many areas of the public relations sector. One gaining traction right now is "digital twins" – virtual replicas of target personas.

Annoncer fra
Send feed
Hvorfor denne a

3. Det handler om at bygge en samlet digitaliseret økologi med synergi mellem automatisering, assistent-systemer, dataopsamling, energiproduktion og lagring = mao. eje ikke blot den digitale men *phygitale* infrastruktur



4. Det handler om The Chinese Century og kampen om geopolitisk herredømme



A screenshot of a news website. At the top left is a circular logo with an eagle and the text "INTERNATIONAL DEFENCE ANALYSIS". Below the logo is a navigation menu with links: HOME, NEWS, ARTICLES, ACQUISITIONS, EXPOS, CONFLICT, WEAPONS, GEOPOLITICS, and INTERVIEWS. A "LATEST NEWS" section is highlighted in yellow. Below it are two news items: "Australia Boosts Defense with \$100M Bushmaster Purchase" and "Turkish Bayraktar TB2 Gains Air Defense Jan...". The main content area features a large image of a silver, quadruped robot dog with the text "UNITREE" on its side, climbing a set of concrete stairs. Below the image is the caption "China Unveils B2-W: The First Rideable Robot Dog".

5. Det handler ikke om intelligens men om handling. Spørgsmålet om intelligens er uinteressant

What is AI? ANI vs. AGI vs. ASI



Artificial narrow intelligence (ANI)

Designed to perform specific tasks



Artificial general intelligence (AGI)

Can behave in a human-like way across all tasks



Artificial super intelligence (ASI)

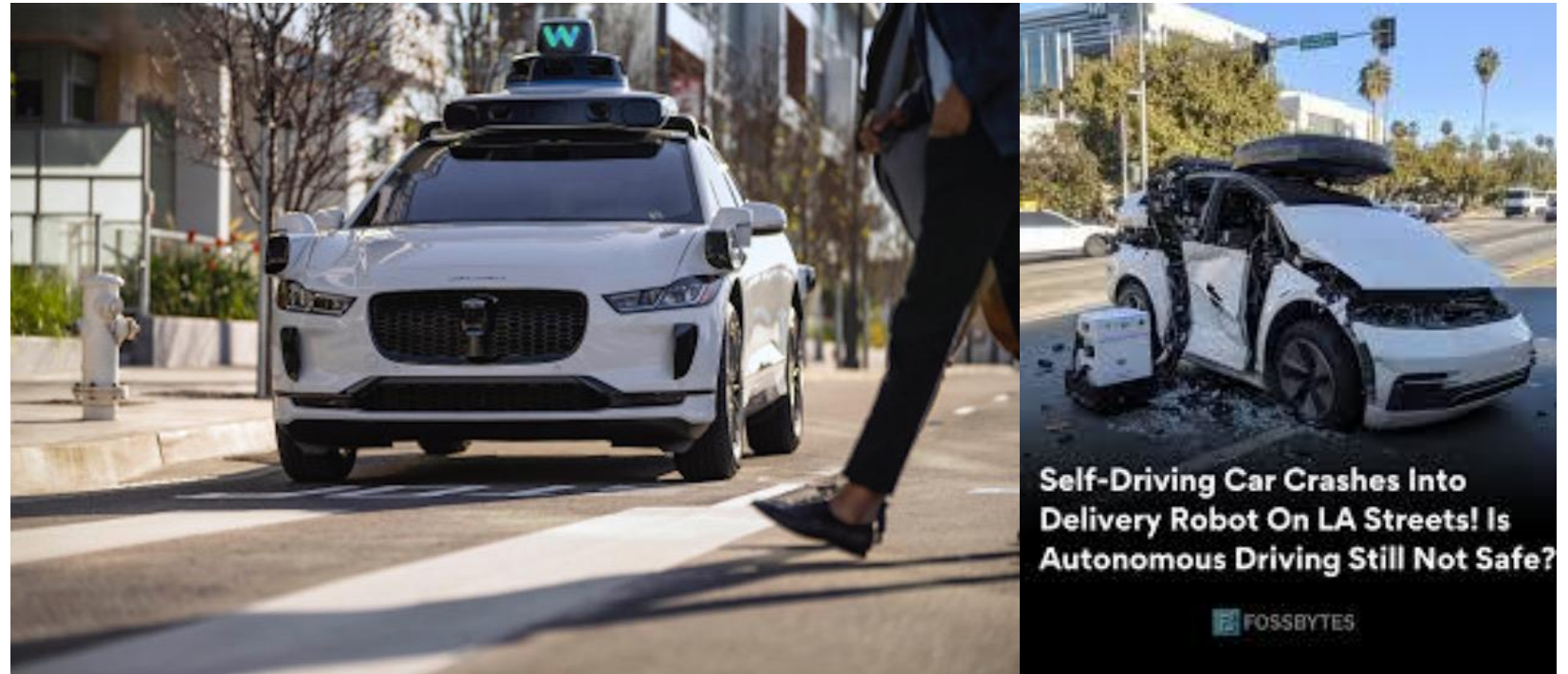
Smarter than humans—the stuff of sci-fi



28 år siden

6. Det handler om kampen for vores sociale liv og rutinerede praksisser

- De bedste selvkørende biler er 80-90 % "gode nok" - hvis vi accepterer de må slå ihjel.
- Historisk set tilpasser vi os "gode nok" teknologier der giver nye muligheder men også nye begrænsninger.
- Hvem skal tilpasse sig hvem?



7. Det handler om nye AI-afhængigheder

MIT Technology Review

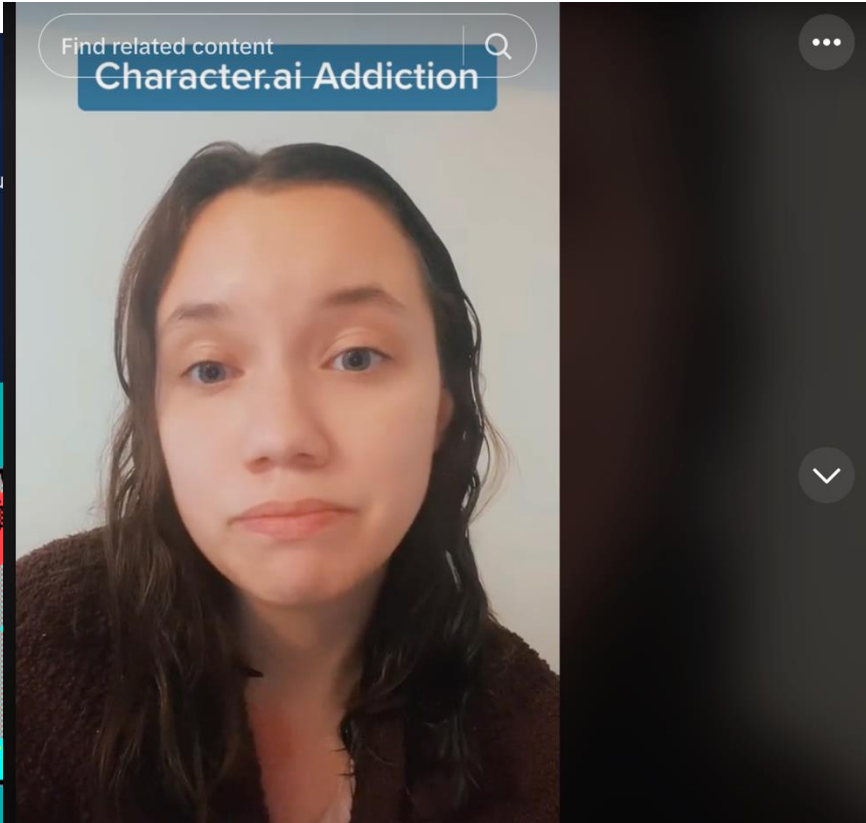
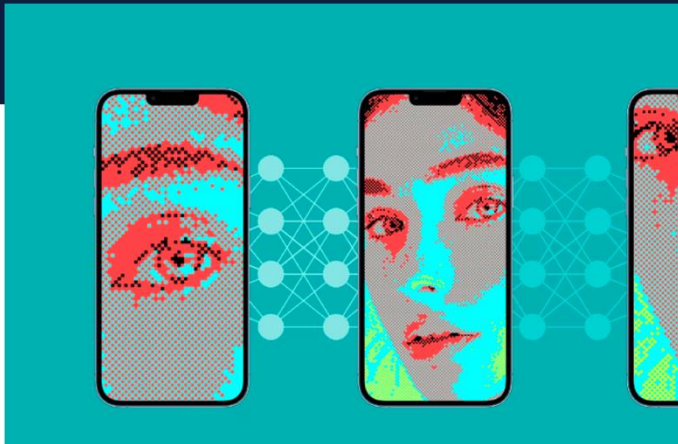
ARTIFICIAL INTELLIGENCE

We need to prepare for 'addictive intelligence'

The allure of AI companions is hard to resist. Here's how innovation in regulation can help protect people.

By Robert Mahari & Pat Pataranutaporn

August 5, 2024



Comments (251)

Creator videos

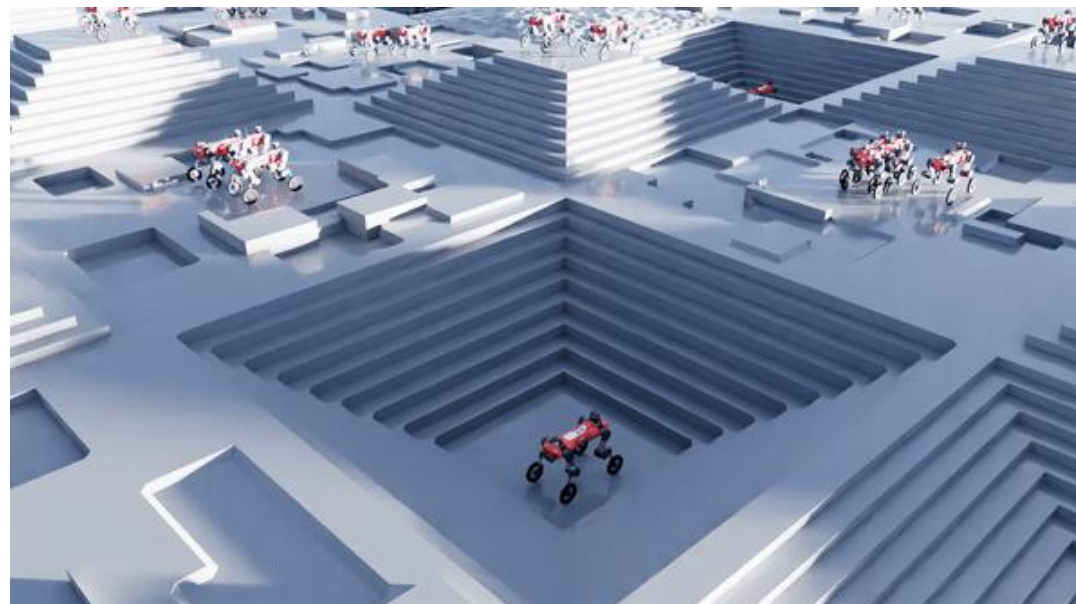
-  **mimikito**
ive tried so hard to stop using it but i cant. i think about it all day and i have so many hours pf screen time on it i dont know what to do :(209
2024-3-9 Reply
View 8 replies ▾
-  **Laura Rayne**
I quit c.ai in August, but I've found myself still wanting the feeling of safety and comfort that came with talking to the bots. I'm not sure how to either stop wanting that or (1/2) 21
2024-11... Reply
View 1 reply ▾
-  **Kiyaka**
I js can't stop. I keep finding more ideas. 4
2024-11... Reply
View 1 reply ▾
-  **f**
I recently deleted c.ai and I feel empty. I don't know what to do to fulfill that spot [disdain] Back to top ↗
2024-11... Reply

Hvad er det for en fremtid tech vil
have os til at bevæges os imod?

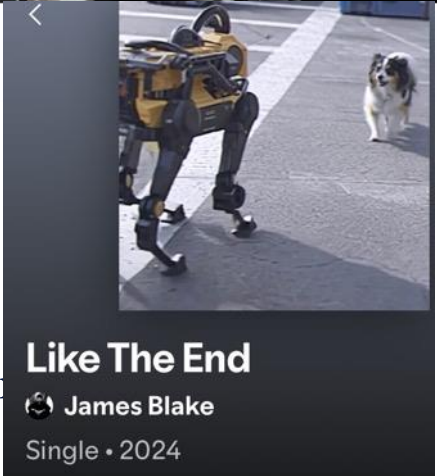
Nogle af spørgsmåle vi derfor må
forholde os til

1. En fremtid hvor AI har seriøst meget magt. Hvordan sikre vi os imod AI doom og det store simulacrum?

Elon Musk Warns AI Could Go Rogue—'It's 80% Likely to Be Great, But 20% Could Spell Disaster'



September 10, 2024 — 03:18 pm

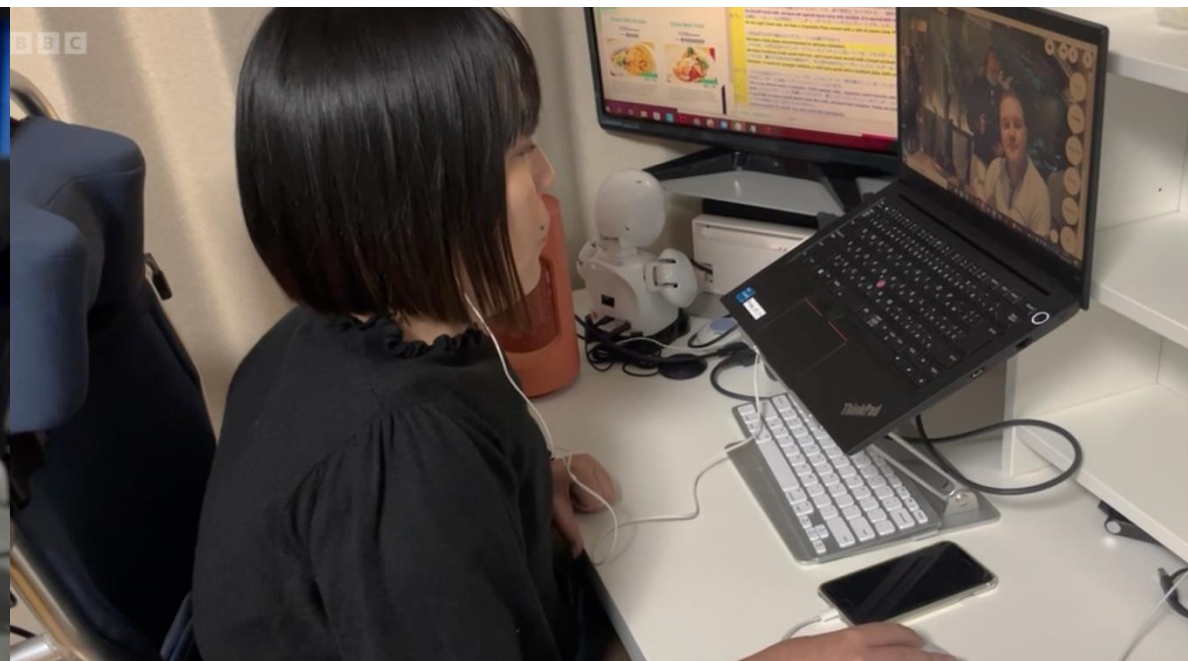


Black Mirror
afsnit
"Metalhead"

2. En fremtid hvor AI hjælper meget. Hvad er et menneske?

Når jeg ser fremad, ser jeg AI og teknologi som mine bedste allierede i kampen mod sygdommens fremmarch. Vi ser allerede de første skridt i udviklingen af tankestyrede computere og andre teknologier, der kan aflæse og reagere på vores tanker. Det giver mig ro i sjælen, for det betyder, at selv når min krop en dag slet ikke kan bevæge sig længere, vil jeg stadig kunne det samme som i dag.

- Simon Toftgaard Jespersen, formand for Muskelsvindfonden

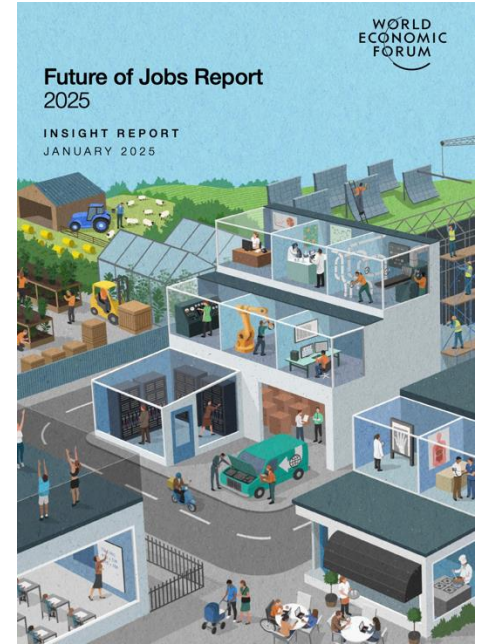
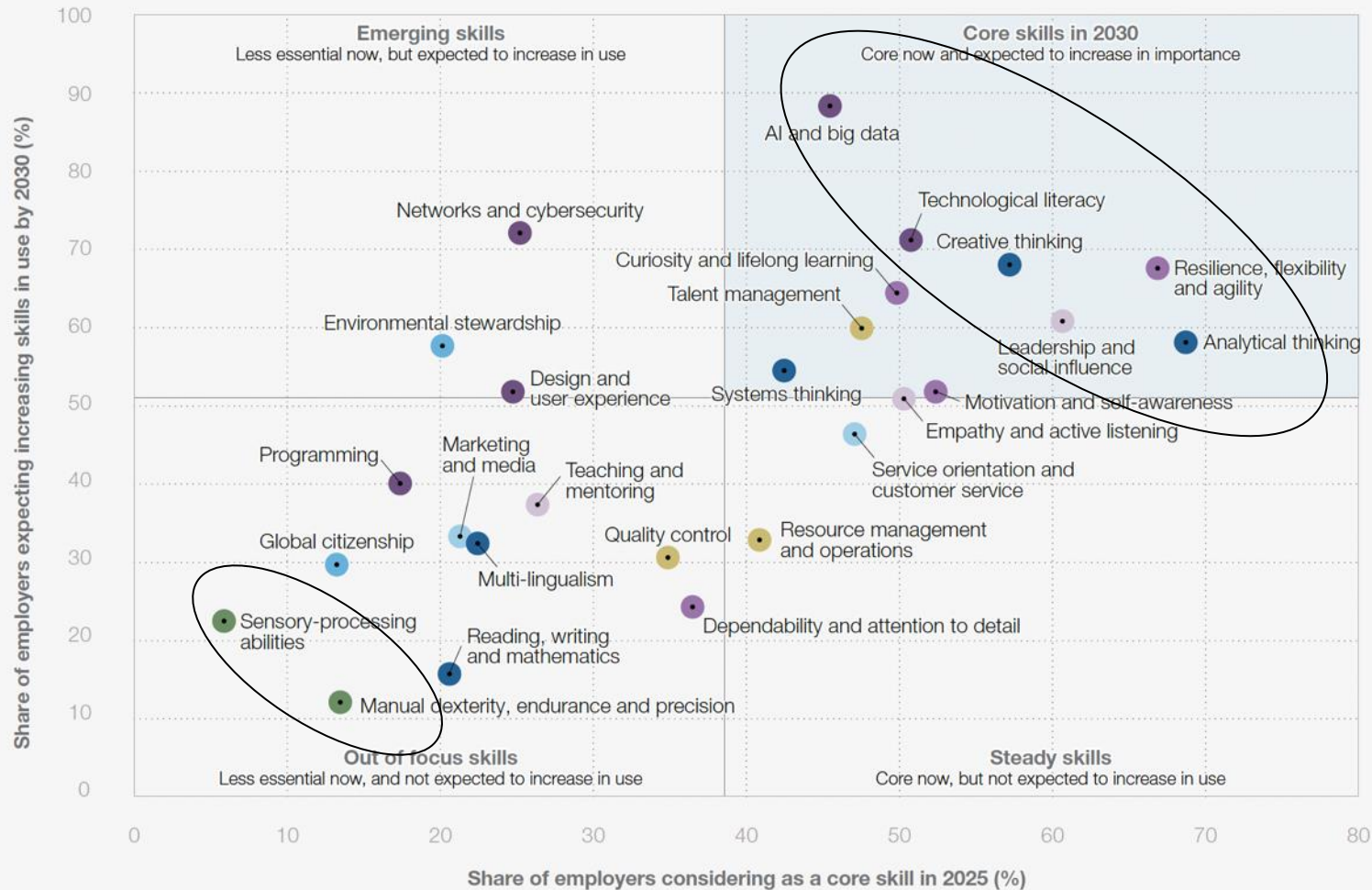


3. En fremtid der kræver nye kompetencer. Hvad er de?

FIGURE 3.6

Core skills in 2030

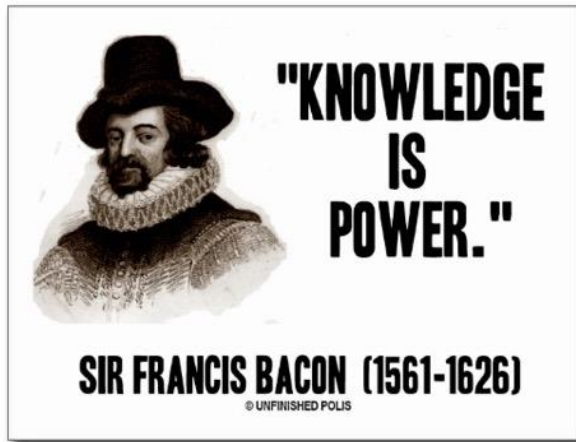
Share of employers considering skills to be a core skill in 2025 and share of employers expecting skills to increase in importance by 2030.



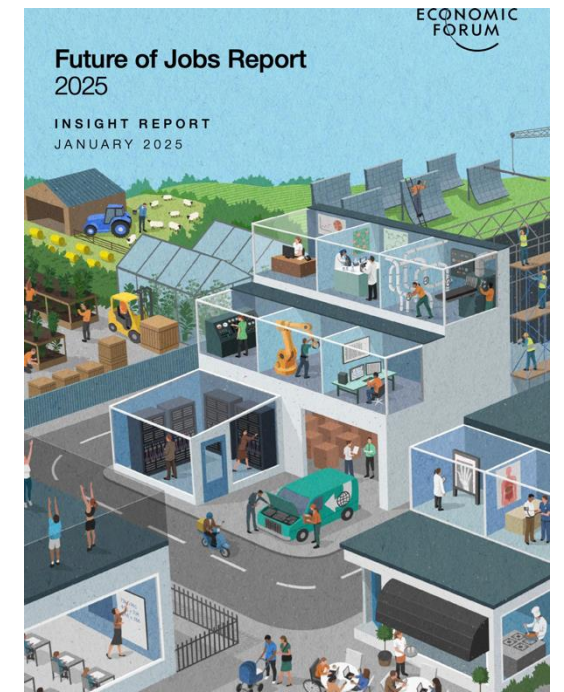
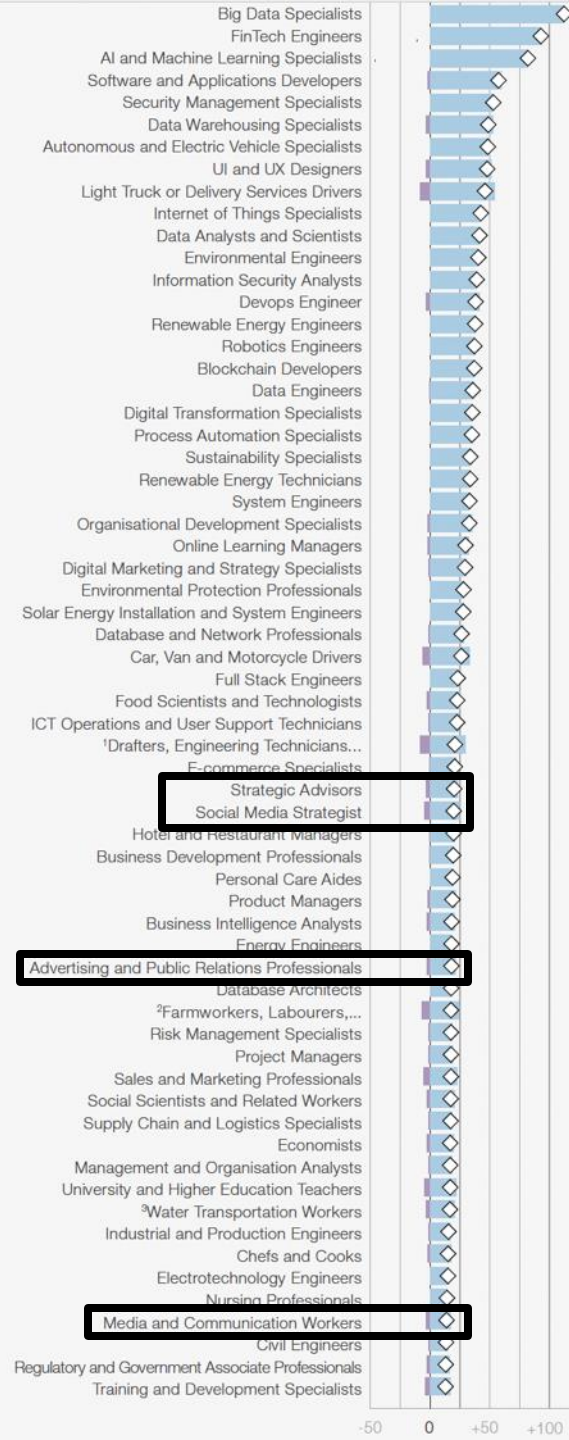
On average, workers can expect that two-fifths (39%) of their existing skill sets will be transformed or become outdated over the 2025-2030 period.

- Cognitive skills
- Engagement skills
- Ethics
- Management skills
- Physical abilities
- Self-efficacy
- Technology skills
- Working with others

4. Hvordan får vi det, vi ønsker, og ikke blot mere arbejde?



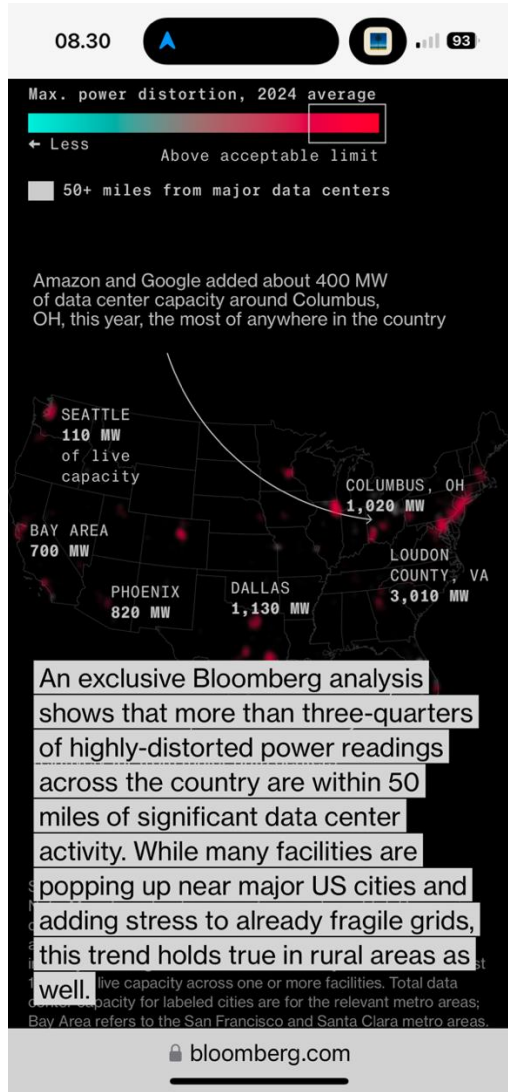
Menneskets nysgerrighed og videbegær har skabt teknologier og systemer, der tjener os, men som også intensiverer vores stræben efter at dominere naturen og hinanden og skaber mere arbejde.
Copenhagen Review of Commu



Job growth and decline (%), 2025-2030

Projected job creation (blue) and displacement (purple) between 2025 and 2030, as a percentage of total current employment in the corresponding job role. The projected net growth or decline for each occupation over the next five years (diamonds) is calculated by subtracting total job displacement from total job creation.

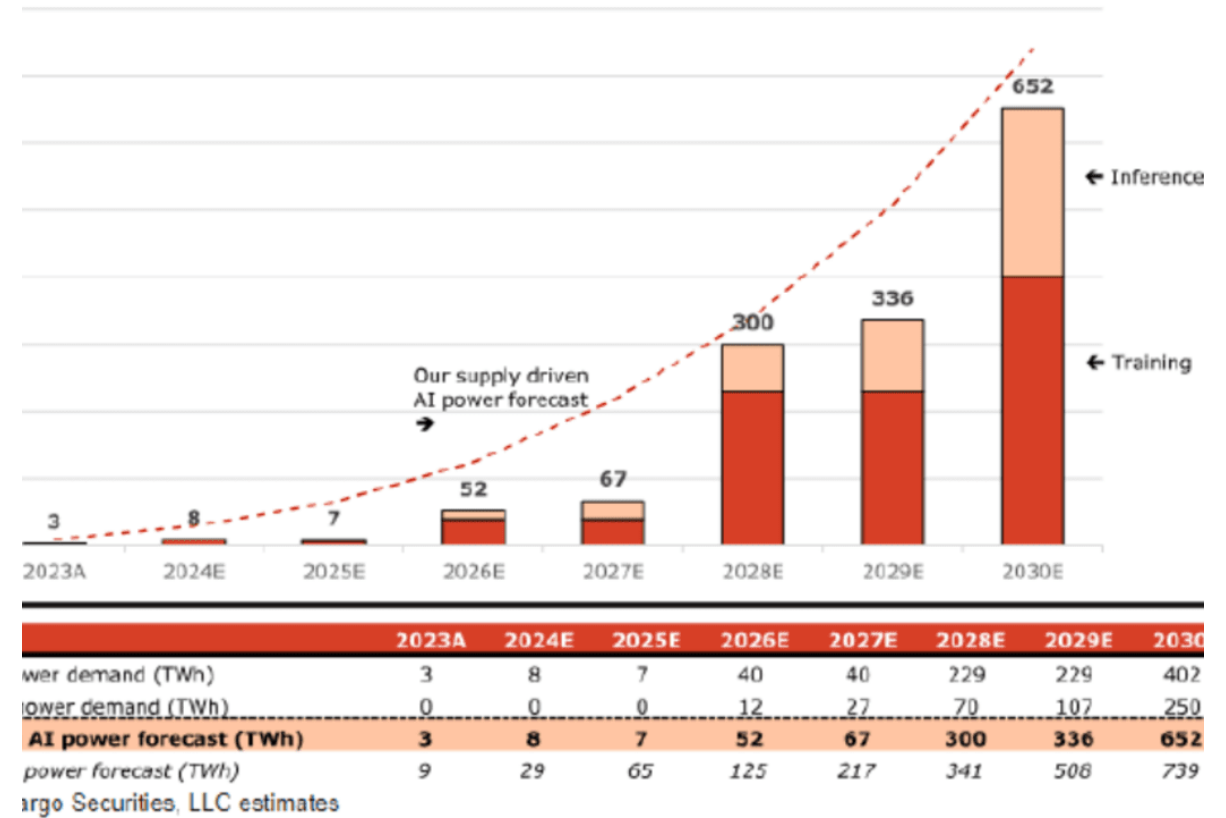
5. En fremtid med ekstrem tech-energiforbrug. Hvordan undgår vi AIs klimakatastrofe?



Summary of GenAI demand forecast

Source: Wells Fargo

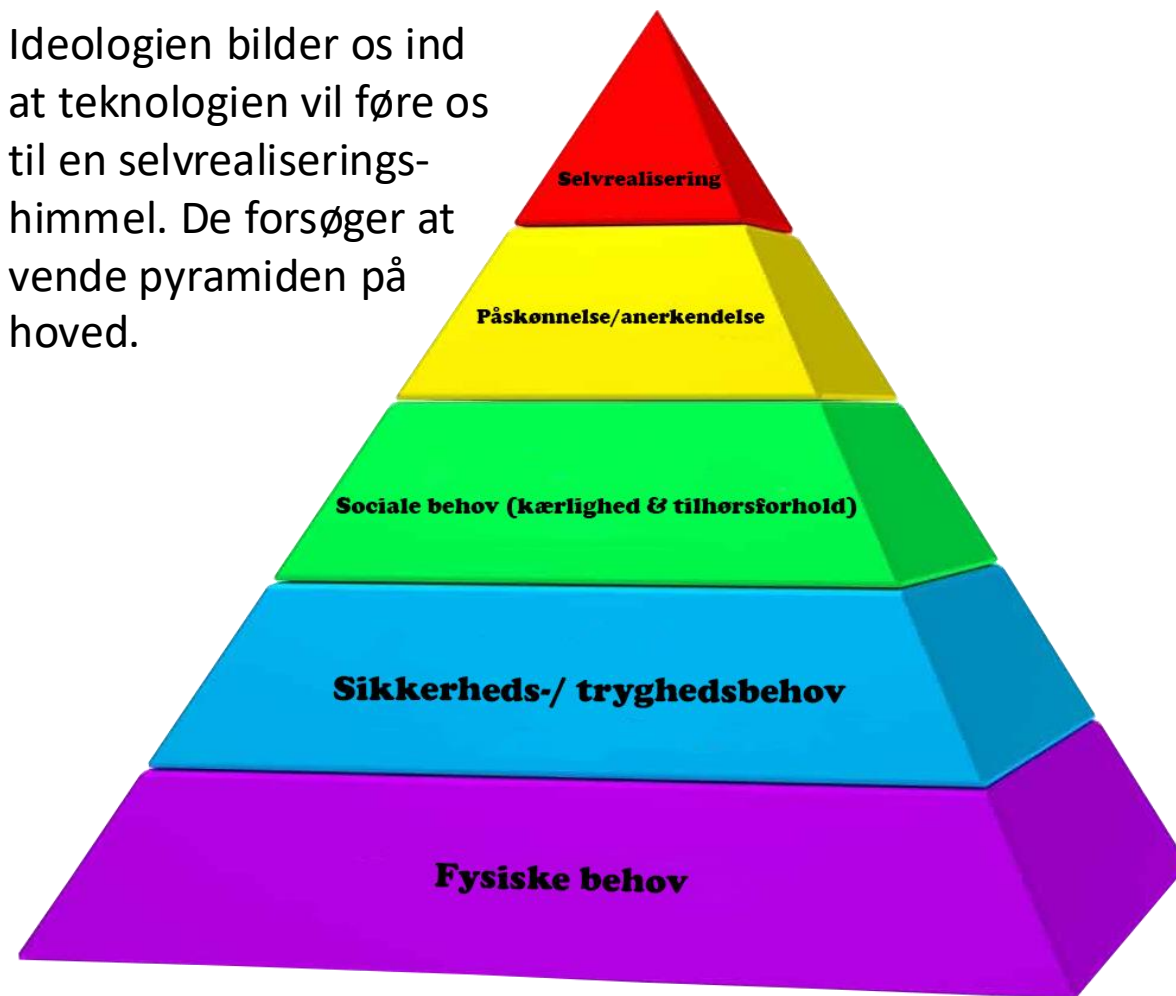
Note: Total US electricity demand – 4,000 TWh (2023)



6. En fremtid der ikke kan undværre tech. Hvordan undgår vi den autoritære techno-optimisme-determinisme-ideologien? (+ Big Tech oligarker)



Ideologien bilder os ind at teknologien vil føre os til en selvrealiserings-himmel. De forsøger at vende pyramiden på hoved.



Professor Brian Due, Københavns Universitet

Så velkommen til fremtidens tjener og tech-utopi 😊

Copenhagen
Review of
Communication

