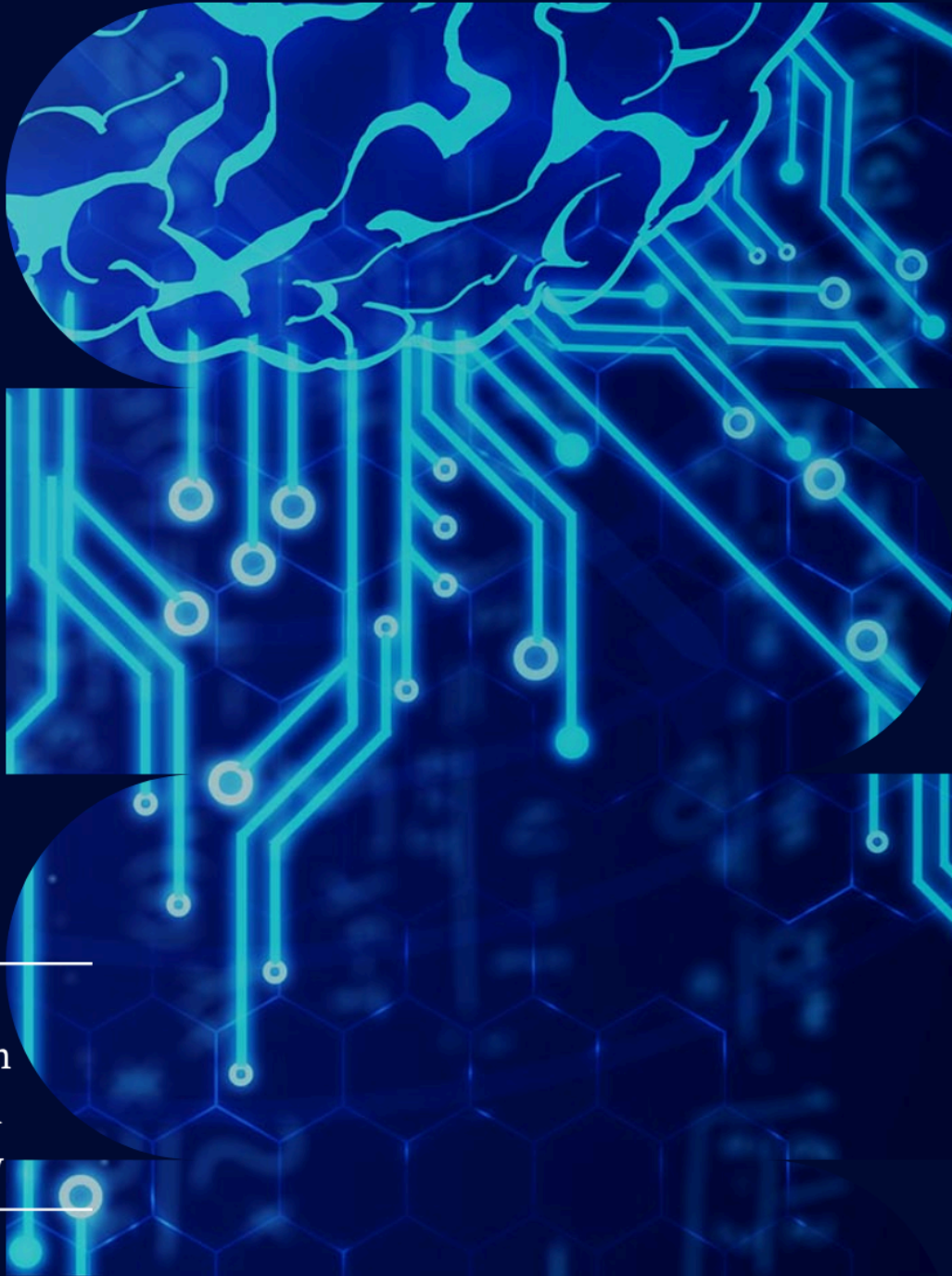


# FUTUREM

HORACE MANN'S TECH TREND JOURNAL

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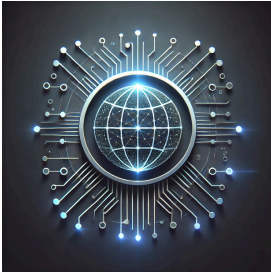
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Art  
Animation  
Education  
Electricity

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**What awaits at the intersection of  
technology, art, and education**

# From the Editor



"I want AI to do my laundry and dishes so that I can do art and writing; not for AI to do my art and writing so that I can do my laundry and dishes."

- author, Joanna Maciejewska

Dear Reader,

Welcome to the first edition of Futurum, where we explore the innovations shaping our daily lives and our futures. Technology is evolving at an unprecedented pace, influencing everything from the way we work and communicate to the ethical dilemmas we now face. In this issue, we explore the shifting landscape of technological innovation. Our Features section dives into new gadgets, the energy usage of AI, and the impact of AI on the arts and education, examining how these advancements challenge our existing frameworks and push the boundaries of possibility.

I am immensely grateful to all of the writers and editors for their dedication to making this publication a reality. Special thanks to Ms. Bahr, Ms. Feng, and Sr. Dalo for their support and guidance throughout this process.

As you navigate these pages, I encourage you to think beyond the headlines and reflect on the role of technology in your life. Stay curious, stay critical, and most importantly—stay ahead of the trend.

Happy reading!

*Ciana Tzu*  
Ciana Tzu

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# SOLVING THE PROTEIN PROBLEM USING AI

Katherine Wan

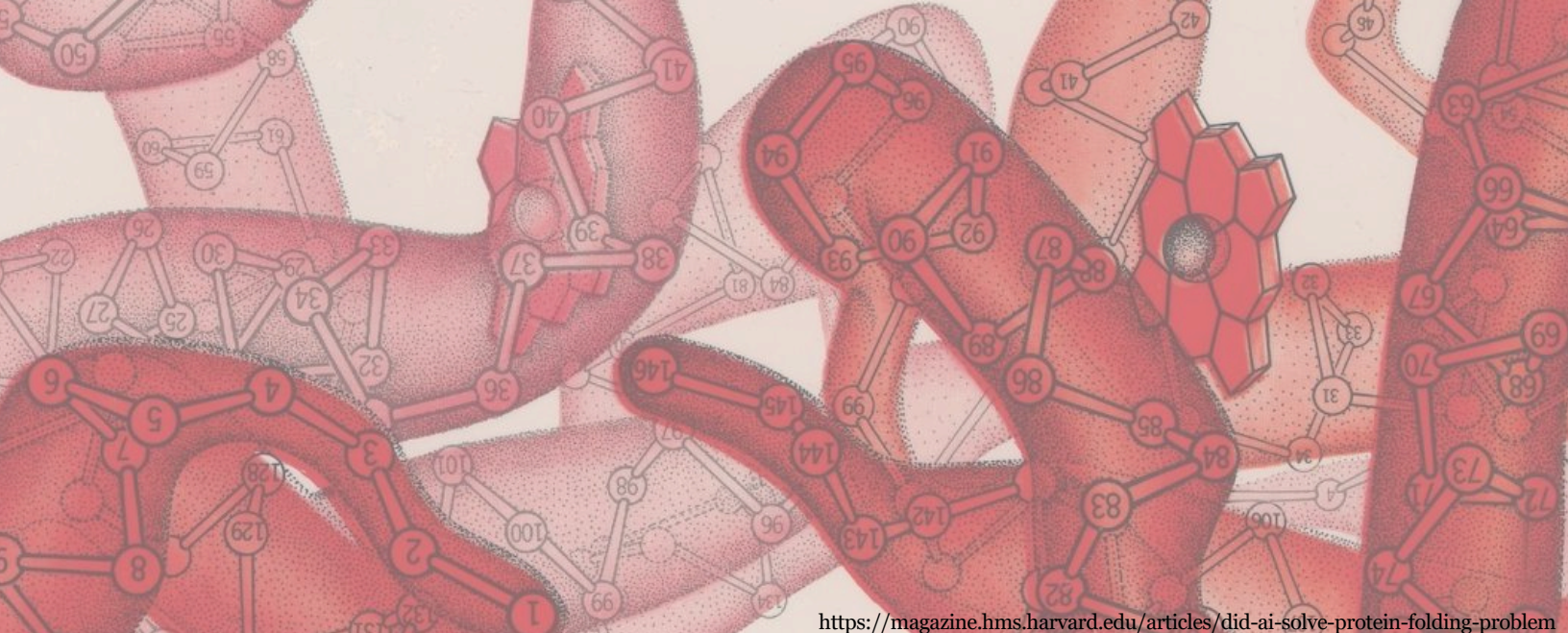
This year, the 2024 Chemistry Nobel Prize was awarded to Demis Hassabis and John M. Jumper “for protein structure prediction” and David Baker “for computational protein design.” To set the context for the importance of their work, we must go back in time to 1972, in which the chemist Christian B. Anfinsen won the prize for his research on ribonuclease. He found that in ribonuclease, a common enzyme found in most cells, the specific order of its amino acids determines its final shape – that is, the same amino acid strand will always fold into the same ribonuclease spontaneously. Generalized to other proteins, interactions of amino acid R groups causes

the polypeptide to fold from a chain into a compact, low-energy, and stable structure. While the notion that the order of amino acids determines the final 3D structure of a protein is well known, Anfinsen’s work was key to allowing this concept to be written ubiquitously in biology textbooks. His work also highlighted the possibility of technology that can calculate and model how a protein folds given its polypeptide chain structure.

However, this hypothesized technology faced obstacles. In 1969, molecular biologist Cyrus Levinthal proposed his famous paradox: the sheer number of possible configurations a polypeptide chain could take on would force a computer billions of years to predict a stable structure, rendering a brute-force

calculation method to structure to find the 3D structure seemingly impossible to implement. Thus birthed the “protein problem” and a new era of scientists tirelessly attempting to devise a solution. A team at Google DeepMind attempted to solve this problem using modern neural networks. Drawing from a large database of amino acid chains and corresponding structures, they trained a model, AlphaFold2, to generate a 3D structure from an input. AlphaFold2 aligns inputted sequences with sequences of already known sequences, enabling it to predict the interactions and locations of amino acids.

The existence of the protein problem – identifying

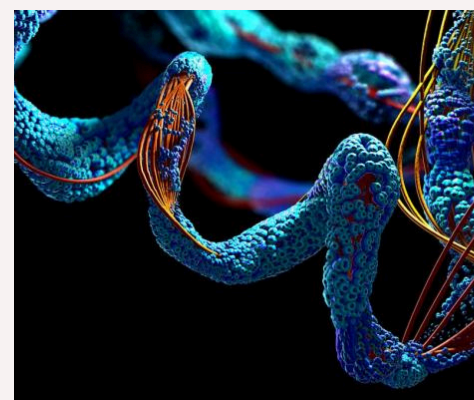


<https://magazine.hms.harvard.edu/articles/did-ai-solve-protein-folding-problem>

structure based on sequence – also implies the existence of an inverse: identifying sequence based on structure. David Baker was awarded the Chemistry Prize for his work on the “inverse” problem. At the University of Washington in Seattle, Baker worked to develop Rosetta, a neural network software originally intended to solve the original, “forward” protein problem. However, the field of de novo design, where entirely new proteins are constructed from scratch, called for a different use of Rosetta: the “inverse” protein problem. The efficacy of the novel application of the software was tested in the protein Top7. The researchers introduced the prediction into bacteria to produce a protein whose 3D structure

was then analyzed with X-ray crystallography – a method that relies on empirical results to derive the structure of a molecule or protein. Extraordinarily, Rosetta accurately predicted the sequence of Top7 – indicating that the inverse protein problem had been solved. These two discoveries in biochemistry will fundamentally alter the pace at which researchers can name structures and sequences of proteins. The implications in medicine are obvious – what once took months of careful data collection to generate sequences or structures of previously unidentified proteins can now be achieved by AI in a few days. One application of this discovery is in antigen identification – the identification of proteins presented by a virus or

bacteria - which already contributes heavily in vaccine development. The recognition of sequences of proteins present in novel diseases would allow immunizations to move faster down the production pipeline. Perhaps, Rosetta and AlphaFold2 could even help prevent the next COVID-19.



<https://www.newscientist.com/article/2261156-deepminds-ai-biologist-can-decipher-secrets-of-the-machinery-of-life/>

# The Rise of Smart Glasses: Ray Ban Meta Glasses

Ciana Tzuo

In a world where technology is finding more ways to be more incorporated into daily life, the rise of wearable technology, like smart glasses, shows the fusion of technology and fashion. These devices combine artificial intelligence (AI) with augmented reality (AR) to create new ways for users to interact with the world. From displaying real-time information to enabling immersive experiences, smart glasses are increasingly shaping the future of digital interactions.

Apple's Vision Pro and Meta's collaboration with Ray-Ban are great examples for where smart glasses technology is heading. Apple's Vision Pro, announced in 2024, uses AR

to merge physical space with a virtual environment allowing users to interact with digital content while going through life. On the other hand, the Ray-Ban Meta Smart Glasses aim for more subtle everyday use. These glasses are not only stylish but allow the user to take photos, make calls, and listen to music without other devices. Recently, they have also integrated AI capabilities.

What makes the Ray-Ban Meta Smart Glasses stand out is its design - it includes advanced technology without compromising comfort and style. By maintaining Ray-Ban's iconic Wayfarer and Aviator frames, the glasses include tech in a subtle manner, appealing to people who value both aesthetics and utility. The glasses also maintain the same lightweight and durable

construction as other Ray-Ban glasses. After earlier generations of wearable tech being criticized for being overly "techy" in appearance, the Meta Smart Glasses aim to be more discreet, making the glasses not just a piece of tech, but also a piece of fashion.



<https://www.wired.com/review/review-ray-ban-meta-smart-glasses/>

The glasses are not only about looks, they are also packed with cutting-edge technology. With dual 12-megapixel cameras integrated into the frame, users can capture high-



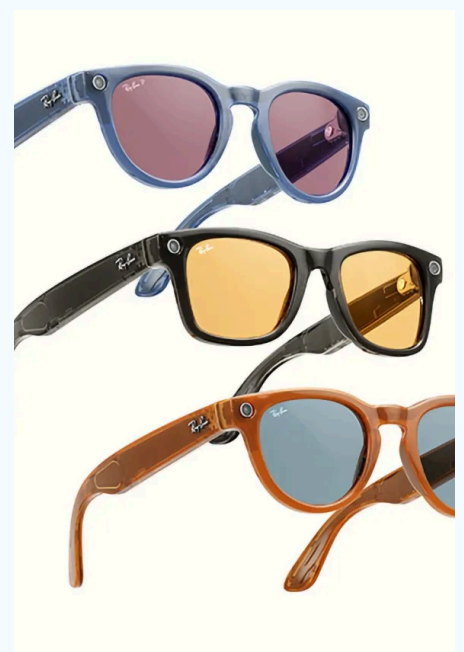
<https://www.hindustantimes.com/technology/rayban-meta-2nd-gen-smart-glasses-features-prices-buy-online-mark-zuckerberg-news-101696051633782.html>

high-quality photos and videos hands-free. They also include open-ear speakers and multiple microphones, enabling clear phone calls and listening to music without headphones. A bigger innovative aspects are the touch-sensitive arms allowing for control over the glasses without extra buttons and the built in voice control AI that can carry out tasks through voice commands. However, despite these advancements, the Meta Smart Glasses currently lack AR capabilities for displaying information in real-time in front of a user.

While such advancements can be beneficial and increase the efficiency of everyday life for users, the integration of cameras and recording

capabilities in public without detection has raised privacy and ethical concerns. The discrete nature of the feature can lead to invasions of privacy, similar to scenarios in dystopian stories like “The Entire History of You” in the popular TV show *Black Mirror*, where people could record and replay everything they see, leading to a breakdown in personal privacy and trust. While Meta has attempted to address these concerns by including a LED light that turns on when recording, public opinion remains divided. A project done by Harvard students AnhPhu Nguyen and Caine Ardayfio showcase the negative capabilities of smart glasses technology. In a [video](#) posted on X, Nguyen uses his own smart glasses with a hidden camera and AI system to display a

scenario where a user can gain access to tons of personal information, such as addresses and personal background, just by having an AI detect a passerby’s face.



<https://9to5mac.com/2024/12/17/ray-ban-meta-shazam/>

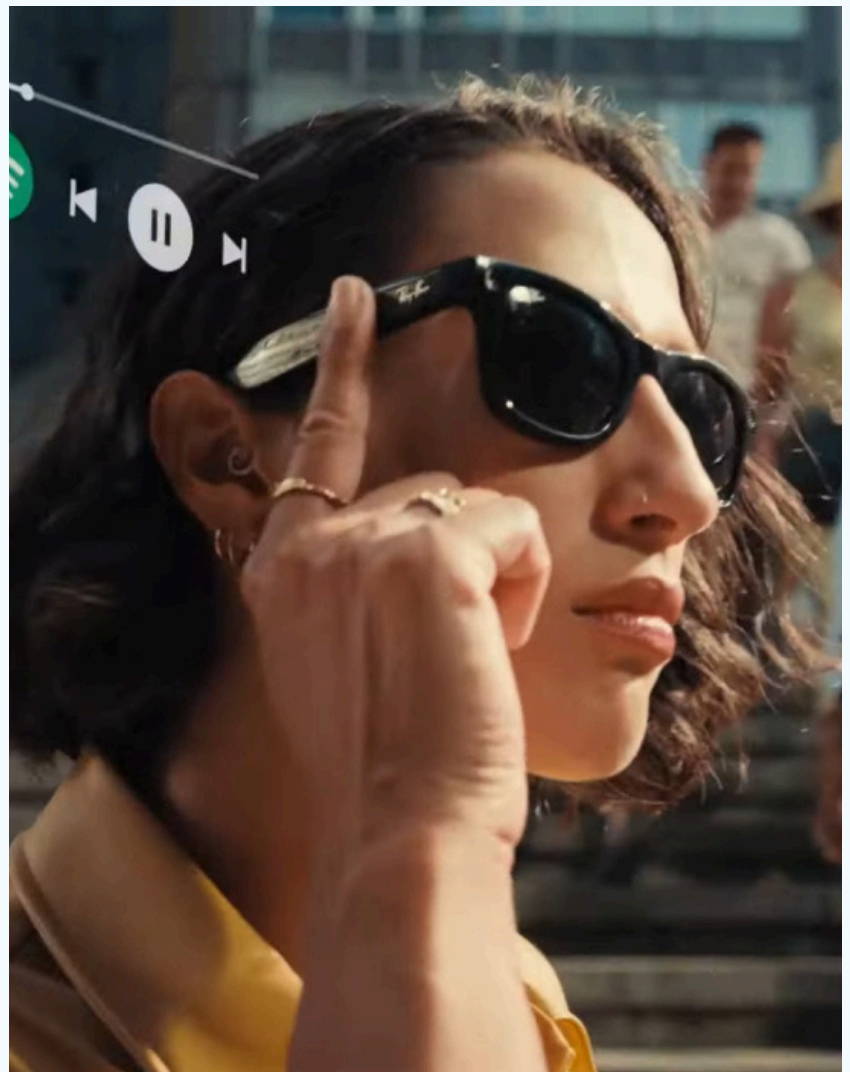
Looking forward, as wearable tech becomes more prevalent, creating stricter guidelines to counter

privacy challenges will remain an important aspect of innovation. The future of smart glasses seems to be geared towards more immersive AR experiences and more seamless AI integration. Big companies like Meta, Apple, and Google are already pushing the boundaries to incorporate tech into daily life.

The Ray-Ban Meta Smart Glasses are an exciting new combination of fashion with technology. While they offer significant advancements in hands-free technology incorporated with comfort, there are still challenges related to privacy and inclusion of AR features. As technology develops, it will be interesting to see how wearable technology can become an essential tool in daily life.



[https://www.researchgate.net/figure/Technology-components-of-Ray-Ban-Meta-smart-glasses-Reprinted-without-changes-from\\_fig1\\_376223850](https://www.researchgate.net/figure/Technology-components-of-Ray-Ban-Meta-smart-glasses-Reprinted-without-changes-from_fig1_376223850)



<https://www.mansworldindia.com/lifestyle/tech/12-upcoming-gadgets-you-should-keep-an-eye-on>

# THE GROWING ENERGY NEEDS OF ARTIFICIAL INTELLIGENCE

Albert Lee

In the past couple of years, we have witnessed a rapid increase in scope and size of large language AI models (LLM), such as Open AI's o1 or Google DeepMind's Gemini model. However, with this rise, we are facing an unprecedented need for energy to power such models. By 2026, the electricity used by Data Centers, which house these models, are projected to reach 1,000 terrawatts. This increase in such a short span of time requires drastic measures to keep up with demand.

AI models, especially those that are more complex, can do quadrillion to quintillion calculations per second. To perform a calculation, a machine requires a small amount of energy; however, running at a

larger scale, the small amounts of energy add up very quickly. To run these calculations, most companies use GPUs (Graphical Processing Units), which were originally designed for rendering graphics for video games or 3D modeling.

superior when it comes to working with AI – as they are more efficient and can speed up processing times – they are still not widely available on the market, which is why many companies still opt for GPUs.



<https://engineersschool.medium.com/future-of-artificial-intelligence-in-electrical-engineering-how-ai-is-transforming-electrical-1b26af6df987>

However, more recently, TPUs (Tensor Processing Units), which are processing units specifically designed for AI, have started to gain traction. While TPUs are considered

It is almost inevitable that new infrastructure will be needed to handle the energy requirements of these models, meaning companies have found unique solutions,

one of them being nuclear power. In 2024, Google signed a deal with power company Kairos Power to use small nuclear reactors to power their data centers. Similarly, Microsoft signed a 20 year deal to purchase power from the infamous Three Mile Island nuclear power plant to meet their AI's demand for power. Companies have also been finding ways to more effectively cool their data centers. Previously this would be done by using more energy to remove the heat; however, new startups have been experimenting in putting data centers underwater as a method of cooling. So far, many major AI companies are finding that it could be a viable and greener solution to the issue. However, with these methods still in research and planning, companies currently have tapped into sources of energy that have not been green, such as gas or coal. From the past four years, the emissions from companies that produce AI models have significantly increased. For example, Google's emissions jumped 48% and Microsoft's jumped 29%

Looking into the future, it is not reasonable to continue providing more energy to meet the demand of these models. Companies must take a more active role in reducing the model's energy demands, which will improve the long term sustainability of AI. This could be done in several

environmental impact of running and training AI becomes detrimental, it is important to find greener and more viable solutions.



<https://www.zreality.com/ai-systems-could-account-for-20-of-global-electricity-consumption-by-2025/?lang=en>

ways. First, by improving algorithms and reducing the number of calculations, companies can reduce the amount of energy used. Additionally, using TPUs or future processing units that are more efficient and have less energy loss can reduce the energy requirements of AI models. Finally, companies can take a more active approach in innovation of processing units, which will, in the long run, speed up development and efficiency of AI. As technology develops and the



continues, “If students can turn to ChatGPT or other AI language models for quick and easy answers then there is a problem with the lesson.” By using AI in educational settings, students are pushed to use their creativity rather than search for easy answers. One example of this is written by Harouni in an article for Wired. He describes a challenging assignment he gave to his students that used “ChatGPT to spur higher-level thinking.” The students quickly realized that their initial answers were no better than the chatbot, “it was after ChatGPT reflected to the students their failure of imagination that they could begin to think of options that they, or any automatic language scrawler, would not have readily reached for”, Harouni recalls. Despite the criticisms of student plagiarism with AI, it should be embraced in schools as a new tool to promote a better education of creativity among students.

Lastly, AI can help create personalized learning. A key characteristic of AI is its ability to gather information. It can observe

a student's study patterns or wrong answers and know how to help the student improve. Recently, Khan Academy has been testing a new learning technology, an AI called Khanmigo that interacts with students by asking questions and promoting thinking. In addition, Duolingo has also



<https://www.change.org/p/implement-ai-technology-in-schools-for-enhanced-learning>

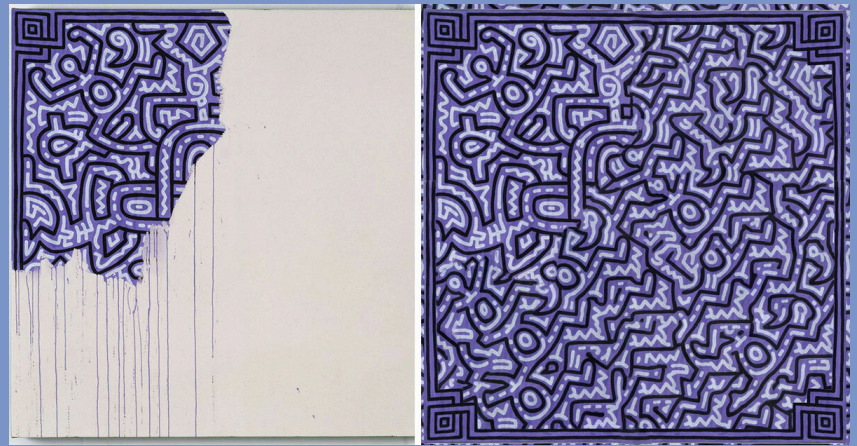
announced an AI feature that involves explaining wrong answers, and using role play to learn languages. This will greatly improve the learning capabilities of individual students as not all students learn the same way. By providing a way for students to learn in a way they are comfortable with, we can make learning more efficient for students. Additionally, this can also help students with learning disabilities who struggle to keep up with class. AI can improve education and the way

information is absorbed based on the student.

This is just the beginning of AI, and it doesn't seem to be going away. It will continue to develop and expand, creating more tools that the world will have to learn to adapt to. To conclude, even with the

many criticisms of the abuse of AI in schools, AI is a helpful tool that can improve productivity of students and teachers, promote creativity, and create personalized learning.

# THE AI ART BATTLE OVER CREATIVITY, CONTROVERSY, AND COPYRIGHT BATTLES



<https://www.designboom.com/art/ai-keith-haring-unfinished-painting-ethical-copyright-concerns-01-11-2024/>

Angel Zhao

Generative Artificial Intelligence (Gen AI) is rapidly changing the landscape for arts and animation industries – not only increasing innovation, but also stirring up controversies over the implication of machine involvement in creative processes. This new technology is redefining what it means to be an artist and changing the way artists work with each other.

The rise of Gen AI has enhanced creativity and efficiency among artists and animators. AI algorithms are now capable of generating complex animations and images from simple text descriptions in seconds, speeding up the creative process. Websites like DALL-E and MidJourney allow

creators to visualize concepts quickly, and rapidly create multiple iterations of ideas. In the realm of interactive media and video games, generative AI is playing a crucial role in creating more immersive and personalized experiences. AI-driven animation can alter characters in real-time based on player behavior and interactions.

As gen AI tools become more advanced, there are also changes to the traditional role of the artist or animator. Some professionals view these tools as collaborators, where AI can be used to explore new artistic possibilities and expand the boundaries of traditional media. However, others are concerned about how such technologies might

dilute the personal expression and individuality of artists.

The integration of AI into art and animation also raises significant ethical and copyright questions. If the AI uses existing intellectual property, how should the image be attributed, and who owns the product? These changes in the industry



<https://variety.com/2024/film/focus/artificial-intelligence-concerns-for-animators-1236026422/>

challenge existing laws on intellectual property and create a need for new considerations. Furthermore, the use of AI to generate derivative work based on existing art without proper

attribution or compensation poses a threat to the original creators' rights and livelihoods.

Essentially, AI image generators are trained on datasets of images – thousands, tens of thousands, maybe millions – from all over the internet. The machines look at the values of pixels and learn to detect patterns within objects. Take, for example, a banana: the machine learns to identify color (yellow), shape (a slight curve), luster (none, bananas are seldom shiny), and a plethora of other features that make a banana, a banana. Eventually, with enough training, it can create a convincing imitation of a banana that includes all the qualities it's picked up from all the images in the dataset. This is an extreme oversimplification of an incredibly complicated process that is nearly impossible, even for top researchers, to grasp, but all data training works more or less with these steps.

This process gets more morally and ethically complicated when it narrows down to specific artist's work, or styles. All artists,

regardless of if they are world renowned or simply hobbyists, have a distinguishable style that they work on and develop. Whether it's Salvador Dalí's mind-boggling melting clocks or an amateur 11 year old's fanart of their favorite anime – like snowflakes, no two art styles are ever the same.



<https://www.sothebys.com/en/articles/artificial-intelligence-and-the-art-of-mario-klingemann>

But AI can come close.

A particularly controversial example was when a social media user posted a version of American artist Keith Haring's famous "Unfinished Painting." Haring had used his art to support social and political causes in addition to spreading awareness about AIDS, which he himself had tragically passed away from in 1990. His painting had purposefully been left unfinished to commemorate the lives and communities destroyed by the AIDS pandemic, as well as to mourn "completed" part, while it

all the art he would no longer be able to create, knowing that his death was imminent. The user had used AI to supposedly "complete" the painting. The AI created a relatively realistic result, but opened the gates to many other criticisms and concerns – the

looks homogenous with the rest of the piece from afar, really only consists of a hodgepodge of random, misplaced lines and zigzags. Many users responded to it negatively, considering this action ignorant of the meaning behind the blank canvas and an insult to the craft and style that Haring dedicated his life to. Beyond sentimental and aesthetic concerns rose more urgent ethical and legal ones: Keith Haring could not consent to his art being used to create what many considered a "bastardization"

of his unique style. While there are no limits or laws against AI datasets at the moment, there is something undeniably disrespectful and grotesque about taking



[https://roozrang.com/page/10/?p=works\\_d&l=407991](https://roozrang.com/page/10/?p=works_d&l=407991)

somebody's creation (especially someone who has passed) and essentially, feeding it through a machine again and again until it produces enough imitations to Frankenstein them into a half-convincing visual.

Haring and "Unfinished Painting" are just one example out of many. This happens to living artists too, and frequently without their knowledge or permission. Anybody who has ever posted their art to the internet is at risk of it being scraped from the web and being used to train another AI model.

While some artists are indifferent, many are, rightfully, incensed that their work can be taken at any moment and used to create shoddy imitations of it without their explicit consent. Many of these cases infringe on copyright and open the way to lawsuits, but for many artists, even knowing which of their drawings have been used in datasets is a near impossible task. And for artists, especially ones who rely on art for income, they are no match for these machines: increasingly, more and more consumers turn to AI for their requests, instead of commissioning those who have dedicated their lives to their craft. Although quick learners and fast at output, it is clear that AI lacks the emotional complexity and intentionality used to create many of humanity's greatest pieces. It will never be able to consciously carve the muscle extensor (*digiti minimi*) that is only visible when the little finger is moved (Michelangelo's Moses), or paint Francisco Pizarra's face over Judas' as a means to resist colonial narratives (The Last Supper, by Marcos Zapata), or leave three-fourths of a canvas stark white as a mourning song to all the lives cut short by AIDS

(the aforementioned Unfinished Painting, Keith Haring.) For now, it can only copy, imitate, and paste some more.

Looking forward, the continued evolution of gen AI promises even more changes in the art and animation industries. As technology develops, we can expect it to become more advanced and sophisticated, potentially automating even more complex creative decisions. This progression calls for an approach that not only respects artistic integrity and copyright, but also embraces the benefits of innovation.



<https://art-recognition.com/>

## LOOKING AHEAD: 2025 AND BEYOND

With 2024's breakthrough in so many different fields of technology, especially with the help of AI, tech in 2025 will continue to flourish and bring these innovations from experimental to mainstream. Here are some predictions for the next year:

- Continued development of AI and a focus on **AGI (Artificial General Intelligence)**, attempting to get closer to human reasoning
- Lawmakers will start deciding how to **regulate AI**
- **Brain-Computing Interfaces** will become more mainstream especially **neural interfaces** like the ones developed by Neuralink and Synchron
- **Quantum computing** allows for faster computation and creates breakthroughs in the **medical** and **cybersecurity fields**
- **Autonomous driving and driverless taxis** will spread to more cities

## AI REVOLUTION: BIG STEPS FOR AI

Artificial Intelligence (AI) went from a buzzword to something deeply embedded in every industry. Key breakthroughs in big companies like OpenAI, Google DeepMind, and Anthropic helped roll out next-gen multimodal AI models.

- GPT-5, Gemini Ultra, and Claude 3 pushed AI into **real-time reasoning**, allowing models to process text, images, video, and audio simultaneously with greater context awareness.
- **AI Agents** became mainstream, integrating into Google Workspace, Microsoft Copilot, and Apple Intelligence, automating tasks like email drafting, calendar scheduling, and customer support.
- **AI-Generated Content Boom**—AI-driven tools like Sora (by OpenAI) made ultra-realistic video generation accessible, disrupting marketing, film, and media industries.

## ENERGY AND SUSTAINABILITY: THE FUSION BREAKTHROUGH

More awareness of the environment pushed companies and researchers to find better ways to generate power. A key breakthrough is the world's first sustained fusion reaction generated net-positive energy.

- **Helion Energy & MIT's SPARC Project** achieved sustained fusion energy for over 300 seconds, marking a step toward limitless, clean power.
- **Nuclear Fission Mini-Reactors gained traction**, with Bill Gates' TerraPower deploying small modular reactors (SMRs) for urban grids.
- **AI-Powered Energy Management**—Google DeepMind's GridZero optimized power distribution, cutting global energy waste by 15%.

## BIOTECH AND HEALTHCARE: BIG DISCOVERIES IN DISEASE TREATMENTS

As technology improves, designing drugs and treating diseases has become a much faster process with more accurate research

- **AlphaFold 3 (by DeepMind)** predicted protein-ligand interactions, accelerating the discovery of cancer treatments and antibiotics.
- CRISPR-based gene-editing therapies treated **sickle cell disease** and **muscular dystrophy**, setting the stage for wider genetic medicine.

## QUANTUM COMPUTING: BREAKING BARRIERS

Quantum computing has always been a promising yet elusive technology. This year, companies had significant advancements in quantum error correction, making quantum computers more reliable for real-world uses.

- IBM Unveils the first **commercially available 2,000 + Qubit Quantum Processor** a can solve **complex simulations** from drug discovery, to climate modeling at rapid paces.
- **Quantum Encryption Networks** gained popularity in financial institutions and government agencies to prevent data breaches. Unlike traditional encryption, **quantum key distribution (QKD)** is theoretically unhackable.

## SPACE AND AEROSPACE: GETTING CLOSER TO MARS

Public and Private companies have made great strides in aerospace, with huge breakthroughs coming from NASA and SpaceX.

- First time since Apollo, **NASA's Artemis II mission** to send humans on a journey **around the moon** in late 2024 to prepare for human exploration of Mars.
- **SpaceX's Starship** – world's most powerful rocket – finally completed a **full orbital launch and return**, proving its potential for ultra-fast global travel and deep-space missions.

## CONSUMER TECH: AI EVERYWHERE

With the AI boom, AI has been integrated into most consumer products that came out this year.

- Apple's long-awaited **Vision Pro** mixed-reality headset launched, delivering a **high resolution augmented reality (AR) experience**, though it was not as popular as predicted.
- **AI-Driven Autonomous Taxis** with Level 4 and 5 autonomy from Waymo in Arizona and cities in California that can drive themselves in most conditions **without human intervention**.
- **Wearable health devices**—Apple Watch Ultra 3, Fitbit Sense 3, Oura Ring—introduced continuous glucose monitoring and AI-driven diagnostics.

2025 is filled with unknowns and who knows where tech will develop towards in the future. Based on last year's breakthroughs, these are some possible predictions.

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