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ChatGPT

KEY POINTS

- ChatGPT has gone viral since OpenAI released the text-based artificial intelligence tool last month.
- It's the latest development in the world of generative Artificial Intelligence (AI), which has attracted billions of dollars in funding from tech investors.
- "ChatGPT, as currently conceived, is a parlor trick," said Bern Elliot, a vice president at Gartner.



What is ChatGPT?

ChatGPT is essentially a variant of OpenAI's popular GPT-3.5 language-generation software that's been designed to carry conversations with people. Some of its features include answering follow-up questions, challenging incorrect premises, rejecting inappropriate queries and even admitting its mistakes, according to an OpenAI summary of the language model.

ChatGPT was trained on an enormous amount of text data. It learned to recognize patterns that enable it to produce its own text mimicking various writing styles, said Bern Elliot, a vice president at Gartner. OpenAI doesn't reveal what precise data was used for training ChatGPT, but the company says it generally crawled the web, used archived books and Wikipedia.

OpenAI declined to comment for this story.

Elliot said that for now ChatGPT is more of a way for OpenAI to gain publicity and to show what's possible for large language models, as opposed to a useful piece of software for businesses to incorporate. While ChatGPT is free, OpenAI sells access to its underlying language and related AI models for businesses to use.

"ChatGPT, as currently conceived, is a parlor trick," Elliot said. "It's something that isn't actually itself going to solve what people need, unless what they need is sort of a distraction."

On November 30, a tool called ChatGPT was released on the internet. It created quite a stir especially among the artificial intelligence (AI) crowd because this tool 'knew' every topic under the sun; it could answer questions and carry on a conversation. Experts in the AI community call this an epochal moment, stressing how powerful ChatGPT is.

This tool interacts with humans in natural language and is impressive because aside from answering general queries, it has many other functions. ChatGPT has been developed by OpenAI, which is a research institute and company that focuses on developing artificial intelligence technology in a responsible and safe way. It was founded in 2015 by a group of entrepreneurs and researchers, including Elon Musk, Sam Altman, and Greg Brockman.

Language models

ChatGPT is much more than a chat bot. For example, you can ask it to write a program or even a simple software application. It can also do creative tasks such as writing a story. It can explain scientific concepts and answer any question that needs factual answers. ChatGPT is what is called a Language Model, rather than a chat bot. A language model is a software that prints out a sequence of words as output that are related to some words given as input with appropriate semantic relation; in practical terms, it means that it can perform tasks like answering questions and carrying on a conversation with humans. It is often used in natural language processing (NLP) applications, such as speech recognition, automatic translation, and text generation.

It is also a neural network. A neural network can be thought of as a large network of computers that can fine tune its output of words based on the feedback given to it during stages of training: this training process and the technology together are called Reinforcement Learning. The input data is typically huge corpus of text. All these technologies are part of the artificial intelligence (also called Machine Learning) that has been witnessing tremendous advancements.

While one tries to understand how a language model works, we should also look at “word embedding” which represents words as a matrix of numbers that can be manipulated inside computers. When a neural network processes these numbers, it can differentiate words according to different contexts: for example, when “shoot” appears with “gun” the neural network knows that the words that will follow may mostly be “bullets” or “victims”, whereas when “shoot” appears with “camera”, the neural network knows that the following words may be “picture” or “pixel”. With a further refining technique called “Transformer”, a neural network can accurately “understand” the context of a sentence or a paragraph. This “comprehension” can be used for multiple purposes like answering a question, summarising a paragraph or an article, translating documents and so on.

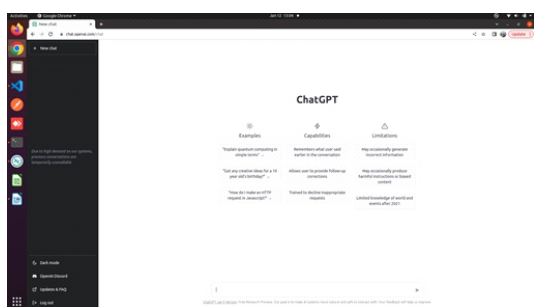
conversational AI

The accuracy of ChatGPT or any language model can be measured using standard techniques. One such technique is “Recall-Oriented Understudy for Gisting Evaluation” or the ROUGE metric which compares ChatGPT's output of content against a standard expected content and measures the overlap as success percentage. For language models like GPT that are also used in

translation, another metric called the BLEU metric (Bilingual Evaluation Under Study) is employed; this metric compares overlap in translated content with a standard translation.

In addition to the conversational nature of the tool, the creative generating capability is very appealing. ChatGPT can become a powerful pedagogy tool on any topic to anyone, because we can instruct it to “explain it to me like I am a six year old”. It can explain in simple terms anything from philosophy to cooking recipes, including new recipes of its own. If you are in mood for some fun, you can ask ChatGPT to narrate a new story to you!

Is ChatGPT the most powerful NLP tool? For conversational purposes, the answer is yes. However, it may not be equally powerful in specialised contexts. For example, if a doctor needs an automatic conversational



assistant for medical queries, the neural networks behind ChatGPT need to have been trained on specialised data. Considering that ChatGPT can write programs, it should be possible to make it knowledgeable on any specialised topic eventually. For general purposes, ChatGPT can be considered the most powerful for now. (The tool can be accessed by anyone from this site, <https://chat.openai.com/chat>)

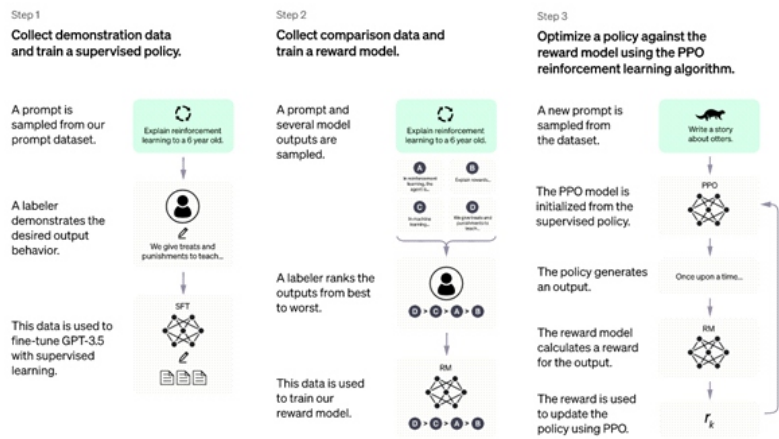
SAMPLE

In the following sample, ChatGPT asks the clarifying questions to debug code

User

```
resultWorkerErr := make(chan error)
defer close(resultWorkerErr)
go func() {
    defer cancel()
    resultWorkerErr <- b.resultWorker(ctx)
}()

err := b.worker(ctx)
cancel()
if err == nil {
    return <-resultWorkerErr
}
return multierror.Append(err, <-resultWorkerErr)
```



ChatGPT

It's difficult to say what's wrong with the code without more context. Can you provide more information about what the code is supposed to do and what isn't working as expected? Also, is this the entire code or just a part of it?

User

just part of it — the error never surfaces. I think there is something wrong with the channel

ChatGPT

It's difficult to say without more information about what the code is supposed to do and what's happening when it's executed. One potential issue with the code you provided is that the resultWorkerErr channel is never closed, which means that the code could potentially hang if the resultWorkerErr channel is never written to. This could happen if b.resultWorker never returns an error or if it's cancelled before it has a chance to return an error.

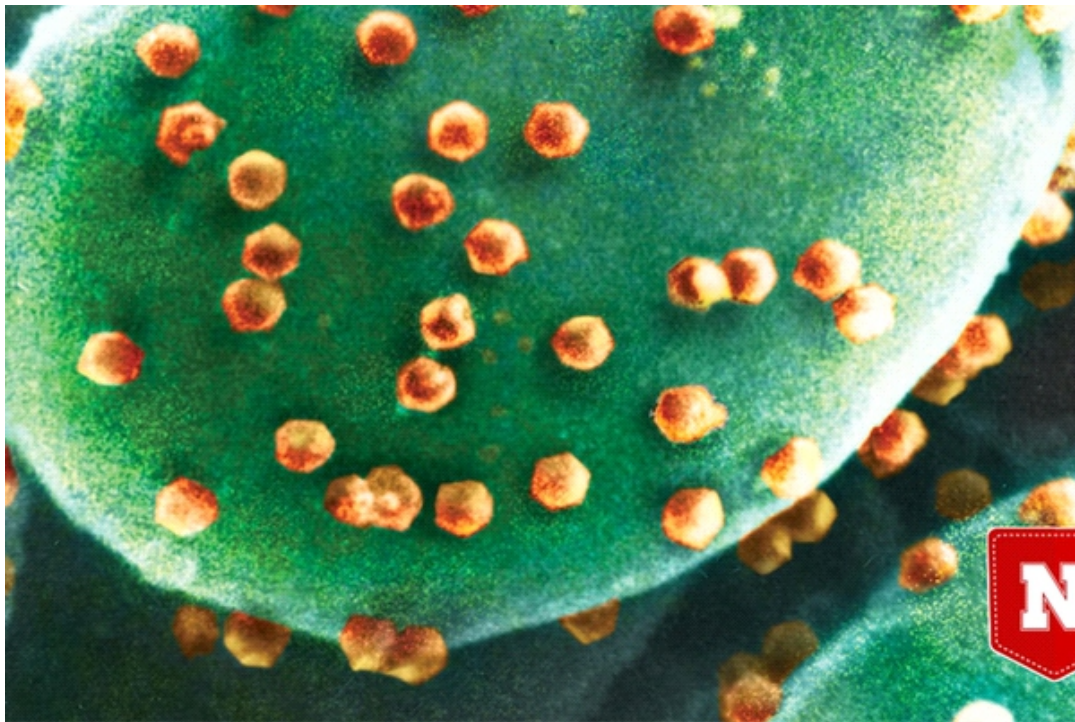
To fix this issue, you could close the resultWorkerErr channel after writing to it. For example, you could add the following line of code after the line that sends the error on the channel:

```
close(resultworkerErr)
```

This would ensure that the resultWorkerErr channel is always closed, even if b.resultWorker never returns an error. Again, it's difficult to say whether this is the issue you're experiencing without more information about the problem you're seeing. Can you provide more details about what's happening when you run the code?

Limitations

*ChatGPT sometimes writes plausible-sounding but incorrect or nonsensical answers. Fixing this issue is challenging, as: (1) during Reinforcement Learning(RL) training, there's currently no source of truth; (2) training the model to be more cautious causes it to decline questions that it can answer correctly; and (3) supervised training misleads the model because the ideal answer depends on what the modle knows, rather than what the human demonstrator knows.



First "virovore" discovered: An organism that eats viruses

Plants, meat, algae, insects, and bacteria are all consumed by different creatures, but now scientists have discovered something new on the menu named as viruses.

Since viruses are found everywhere, it's inevitable that organisms will consume them incidentally. But researcher John DeLong at the University of Nebraska-Lincoln wanted to find out if any microbes actively ate viruses, and whether such a diet could support the physiological growth of individuals and the population growth of a community.

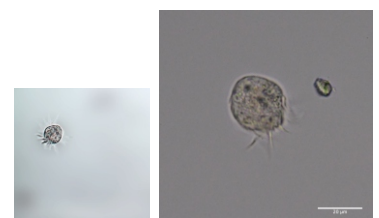
"They're made up of really good stuff: nucleic acids, a lot of nitrogen and phosphorous," said DeLong. "Everything should want to eat them. So many things will eat anything they can get ahold of. Surely something would have learned how to eat these good raw materials."

To test the hypothesis, DeLong and his team collected samples of pond water, isolated different microbes, and then added large amounts of chlorovirus, a freshwater inhabitant that infects green algae. Over the next few days, the team tracked the population size of the viruses and the other microbes to see if the latter was eating the former.

And sure enough, one microbe seemed to be snacking on the viruses – a ciliate known as Halteria. In water samples with no other food source for the ciliates, Halteria populations grew by about 15 times within two days, while chlorovirus levels dropped 100-fold. In control samples without the virus, Halteria did not grow at all.

In follow-up tests, the team tagged chlorovirus DNA with fluorescent dye, and found that Halteria cells soon began to glow. This helped confirm that Halteria was indeed consuming the virus.

These experiments show that the newly coined term "virovory" can now take its place among herbivory, carnivory et al, with Halteria crowned the first known virovore. But of course, it is unlikely to be the only one out there, and the researchers plan to continue investigating the phenomenon, including its effects on food webs and larger systems like the carbon cycle.





Monitoring space weather from the ground

Space weather kills satellites—as was the case last February when a solar storm killed a SpaceX Starlink launch, casting US \$50 million worth of hardware back into the atmosphere to burn up like kindling into a fire. And of course, space weather threatening terrestrial power grids—as happened in Quebec in 1989, when an entire grid went dark because of a geomagnetic storm—always looms over electric utilities around the world.

Yet monitoring space weather can be a complex and costly business. The Space Weather Prediction Center in the United States, for instance, employs a variety of ground- and space-based technologies and gets help from the U.S. Air Force and its network of optical observatories to provide space-weather forecasts. Such sophisticated monitoring does not come cheap. Satellites made for this purpose cost millions of dollars and take years to build and test. And ground-based high-sensitivity fluxgate magnetometers, used to measure changes in Earth's magnetic field brought about by changes in the magnetosphere, can cost as much as \$30,000, putting them beyond the means of many researchers.

So, scientists at the Institute of Space-Earth Environmental Research (ISEE) at Nagoya University, in central Honshu, Japan, are developing a low-cost system to measure and observe space weather entirely from the ground using magneto-impedance (MI) sensors. Discovered in 1993 by scientists at Nagoya University, magneto-impedance, or giant magneto-impedance (GMI), as it is now called, is the change in electrical impedance in some materials when subjected to an external magnetic field.

Masahito Nosé, an associate professor at ISEE, had the idea that an inexpensive MI sensor costing the equivalent of just a few thousand dollars could be adapted to observe and monitor changes in the geomagnetic field brought about by changes in space weather—just like the far more costly fluxgate magnetometers.

“Currents generated by ionized particles flowing in the magnetosphere tens of thousands of kilometers above Earth produce magnetic field variations,” Nosé explains. “When the magnitudes of these currents change, the effect can be observed in the changes in the magnetic field on Earth.” This means, he adds, we can determine the status of space weather from the ground.

“Pushing down the cost of such instrumentation would enable denser networks of observation stations and a finer-scale structure to be resolved,” says Matthew Owens, professor of space physics at the University of Reading, in the United Kingdom. “So, MI sensors have great potential for space-weather observations.”

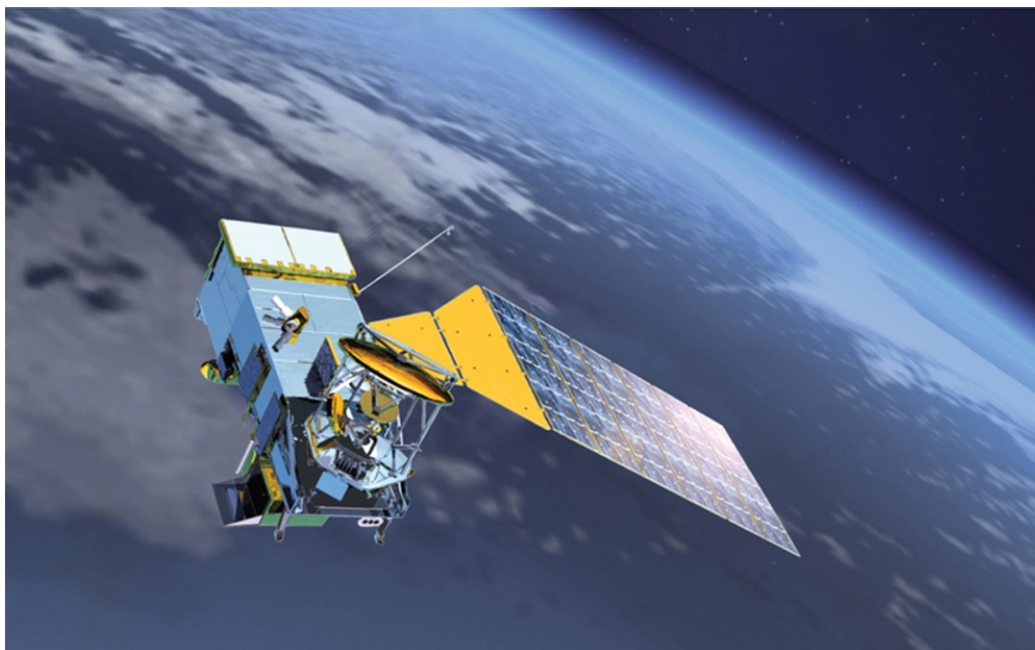
In 2017, Nosé contacted Aichi Steel Corp., a local manufacturer of MI sensors. Although these sensors are made for industrial uses such as detecting the presence of metal during the processing of foods, and also in smart phones as compasses, Nosé convinced company engineers that there was a business opportunity to be had in modifying the sensor's functionality if his idea proved successful.

“I tested the results in the field and provided feedback,” said Nosé. Eventually, the company was able to improve the sensitivity of an MI sensor using amorphous wire, a pickup coil, control components, and a magnetic-flux locked loop circuit to extend the measurement range. All these components were mounted on a 55-by-13.5-by- 4.6-millimeter PCB. “The sensor can detect very small geomagnetic field variations of about 0.1 nanotesla, which is necessary for space-weather study,” he says. “Existing sensors for electric-compass use operate at around 100 nT.”

In the initial test installation, three MI sensors were mounted on a jig stored in a plastic box and buried in the ground at a depth of at least 20 centimeters. The point of staging the experiment this way was to minimize movement and changes in temperature, given that both variables can cause errors. A cable connected the sensors to an observation hut located more than 25 meters away; recorded measurements were stored on a hard disk.

The results detected by the MI sensors were compared with those of a fluxgate magnetometer in the same location. “We found very good agreement between the two,” says Nosé. “The MI sensors detected various geomagnetic phenomena, including geomagnetic storms, solar quiet variations, and sudden storm commencements.” The findings were published in the *Journal of Geophysical Research: Space Physics* in October 2022.

“The results look promising,” says Owens. “But a longer-term comparison between the two instruments is needed for confirmation.”



Scientists steer lightning bolts with lasers for the first time

Scientists have steered lightning bolts with lasers for the first time in the field, according to a demonstration performed during heavy storms at the top of a Swiss mountain.

The feat, which involved firing powerful laser pulses at thunderclouds over several months last year, paves the way for laser-based lightning protection systems at airports, launchpads and tall buildings.

“Metal rods are used almost everywhere to protect from lightning, but the area they can protect is limited to a few metres or tens of metres,” said Aurélien Houard, a physicist at École Polytechnique in Palaiseau. “The hope is to extend that protection to a few hundred metres if we have enough energy in the laser.”

Lightning bolts are huge electrical discharges that typically spark over two to three miles. The charge carried in a bolt is so intense that it reaches 30,000°C, about five times hotter than the surface of the sun. More than a billion bolts strike Earth each year, causing thousands of deaths, 10 times as many injuries, and damage that runs into tens of billions of dollars.

Traditional lightning rods date back to Benjamin Franklin who used to chase thunderstorms on horseback before his famous kite experiment in 1752. But in more recent times, scientists have looked for other ways to protect buildings and objects from damaging strikes.

Writing in the journal *Nature Photonics*, Houard and colleagues in Switzerland describe how they carted a powerful laser to the top of the Säntis mountain in north-eastern Switzerland and parked it near a 124m-high telecoms tower that is struck by lightning about 100 times a year.

The scientists waited for storms to gather and between July and September last year, fired rapid laser pulses at thunderclouds for a total of more than six hours. Instruments set up to record lightning strikes showed that the laser diverted the course of four upward lightning discharges over the course of the experiments.

Only one strike, on 21 July, happened in clear enough conditions for the researchers to film the path of the lightning from two directions using high speed cameras several kilometres away. The footage shows that the lightning bolt followed the laser path for about 50 metres, suggesting that the pulses helped steer the strike.

The laser diverts lightning bolts by creating an easier path for the electrical discharge to flow along. When laser pulses are fired into the sky, a change in the refractive index of the air makes them shrink and become so intense that they ionise air molecules around them. This leads to a long chain of what the researchers call filaments in the sky, where air molecules rapidly heat up and race away at supersonic speeds, leaving a channel of low density, ionised air. These channels, which last for milliseconds, are more electrically conductive than the surrounding air, and so form an easier path for the lightning to follow.

The laser is powerful enough to be a risk to the eyes of overflying pilots, and during the experiments air traffic was closed over the test site. But the scientists believe the technology could still be useful, as launchpads and airports often have designated areas where no-fly restrictions apply. “It’s important to consider this aspect of safety,” said Houard.

More powerful lasers that operate at different wavelengths could guide lightning over longer distances, he added, and even trigger lightning before it becomes a threat. “You avoid it going somewhere else where you cannot control it,” Houard said.

“The cost of the laser system is very high compared with that of a simple rod,” said Professor Manu Haddad, director of the Morgan-Botti Lightning Laboratory at Cardiff University. “However, lasers could be a more reliable way to direct the lightning discharge, and this may be important for the lightning protection of critical ground installations and equipment.”

The Facebook portal died, this is how it almost lived

In November, Meta announced it would be discontinuing the Portal, its stand-alone video-chatting device. The decision came as Meta announced its first-ever mass layoffs amid a falling stock price and concern over its ambitions in the metaverse.

Over the years, BuzzFeed News' coverage of Meta and Facebook has been unflinchingly rigorous and at times adversarial. Our reviews of the Portal have also spoken the truth: This was a truly outstanding product. We loved it. I loved it. Rest in peace, Portal — you were a good little device.

The Portal was born into a harsh world. Released in fall 2018, the Cambridge Analytica pseudo-scandal about Facebook's botched user data handling and overstated claims about its influence on the 2016 elections-was still fresh in the public's mind. It was also still fresh in the minds of the tech press that would be reviewing the devices. For many, the idea of allowing a Facebook gadget that was an always-on camera into your home was akin to sending your Pornhub history directly to the Kremlin.

Despite this, the Portal did sell well, Andrew Bosworth, Chief Technology Officer (CTO) of Meta, told BuzzFeed News in an interview. (Meta declined to disclose exact sales figures, but Bosworth put the number of units sold in the “millions.”) And crucially, Bosworth added, “This was a product that the people who bought it, fucking loved it.” And it appealed to a different demographic than most gadgets: It sold far more with women and people over 40.

Ultimately, the decision to pull the plug came because executives didn't see a path to the Portal becoming a massive business (instead of just a nice business), and with shifting priorities at Meta, it didn't make the cut. “We're super sad about it,” Bosworth said. “You know the saying, 'It's not prioritization unless it hurts'? This one hurts.” (It's not a total loss though: Existing Portal devices will continue to work and receive support.)

Bosworth said that “the entire smart home category has underwhelmed expectations for a while now.” He added, “I think if you go back to where we expected smart home to be as an industry when Portal entered the market versus where it is today, it's just not been nearly successful as we expected.”

BuzzFeed News can report that there was one missed opportunity for the Portal to live on. In summer 2020, Facebook was deep in talks with Amazon to license the Portal technology and platform to make a deal where the Portal tech (and its valuable Messenger contact lists) could be licensed to Amazon smart devices. Amazon's Echo Show, a competitor to the Portal, is a stand-alone video-chatting device that is Alexa-enabled and features a smart camera and touchscreen. However, the Echo Show only allows you to video call people with either another Show or through the Alexa app on their phone, which... When was the last time someone called you through the Alexa app? With the Portal, you can call any of your friends via Messenger or WhatsApp.

“We were maybe two days away from signing an agreement with Amazon,” Bosworth said. “But this is the middle of the pandemic, and so Portal sales are spiking — they're going kind of through the roof — and we don't have the resources to do both.”

He added that Meta CEO Mark Zuckerberg “in particular felt really strongly” about not going through with the Amazon deal. “The pandemic was potentially a secular shift in how people engaged with services that would last after [the pandemic] receded,” Bosworth said. “You're seeing a behavior in the marketplace that, *hey, the curve is bending here. Maybe it stays bent indefinitely.*” But it did not. Eventually, grandparents were able to see their grandkids again, and sales of the Portal slowed, even as Meta launched the Portal Go, a cordless version that is, in my opinion, a near-perfect device for kids. Having tested it out with my own family, I can confirm it is truly a far superior way to video chat between a 4-year-old and a 74-year-old — two cohorts notorious for angling the phone at their chins or foreheads during a typical FaceTime call.

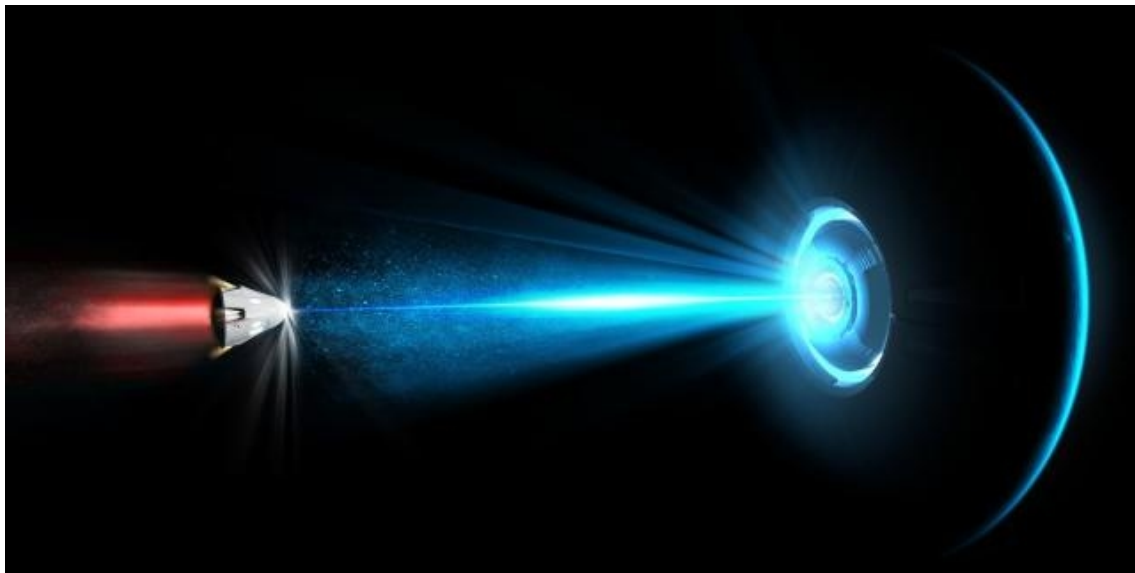
Meta today is a company in a moment of existential change. Not just battered by a harsh macroeconomic climate that has affected the tech sector in general but facing a huge threat from TikTok. There is a growing dissatisfaction among young people with Instagram and social media in general. Amid this shift, Meta is making a huge bet on metaverse and AR/VR gaming — something that will rely on its ability to build a profitable gadget business.

“We don't regret the time we spent on [the Portal],” Bosworth said. “We've actually tied a lot of the lessons we learned from it into our other devices, and it helped us a tremendous amount both personally and professionally during the pandemic. So, we were glad to have done the Portal.”

Bosworth said that one big takeaway from the Portal experience is that it's hard to compete at a major level on anything that is basically something you can just do on your phone. Which, true. I loved the Portal and recommended it to friends, but it did seem a little hard to explain why it was worth paying \$100 for something that you can do slightly less well on the phone you already own.

“I feel like if we could have swung one more year to start to crack some of the work-from-home stuff — if the pandemic hadn't kind of disrupted all of our signals and we would've proceeded with this third-party software play that could have been a better outcome,” Bosworth said. “I have regrets about how we could have done differently in hindsight, but I will admit it would've been very hard to change those calls at the time that we made them.”





Scientists actually did it: they built a real working tractor beam

Tractor beams have long been a staple of sci-fi, but you might not know that they have also existed in the real world for some time, albeit at a very small scale. Microscopic tractor beams, better known as optical tweezers, can pull atoms and nanoparticles for use in medicine and research. But we have never actually been able to see this happen.

But now we can.

In a new study published in the journal *Optic Express*, Chinese scientists created the first tractor beam strong enough to manipulate *macroscopic* objects. That means you can watch the thing work with the naked eye.

Sure, the initial experiment was done in a highly controlled lab, manipulating a specific type of Graphene composite and under a rarefied gaseous environment with a lower pressure than Earth's atmosphere. But come on! They used a friggin' laser to move an object!

The scientists write:

“With our new approach, the light pulling force has a much larger amplitude. In fact, it is more than three orders of magnitudes larger than the light pressure used to drive a solar sail, which uses the momentum of photons to exert a small pushing force.”

In the experiments, a torsional pendulum device presented the laser pulling phenomenon. By controlling the interactions between the light, object, and medium, the new study shows that flexible light manipulation of macroscopical objects is feasible. It also highlights the complexity of laser-matter interactions.

Expect the team, led by Lei Wang, to continue pushing the possibilities. “Our technique provides a non-contact and long-distance pulling approach, which may be useful for various scientific experiments,” Wang said, via *Universe Today*.

There is more to come. From the study:

“This work expands the scope of optical pulling from microscale to macroscale, which has great potential in macroscale optical manipulations.”

Humans may be shockingly close to decoding the language of animals



A nonprofit called Earth Species Project (ESP) has one goal: decode non-human communication. The organization believes the nonstop advancements in artificial intelligence can help seal the deal—fast.

“We believe that an understanding of non-human languages will transform our relationship with the rest of nature,” the organization’s website says. Of course, not only does Earth Species Project want to decode animal languages—it also wants to start communicating with the animals.

The World Economic Forum (WEF) has given Earth Species Project and its CEO Katie Zacarian a platform. “We are on the cusp of applying the advances we are seeing in the development of AI for human language to animal communication,” Zacarian says, according to the WEF. “With this progress, we anticipate that we are moving rapidly toward a world in which two-way communication with another species is likely.”

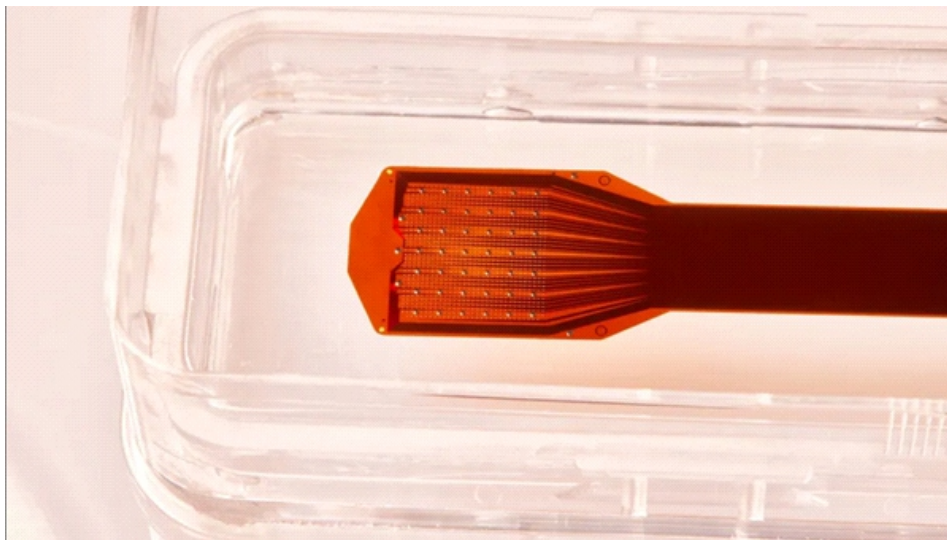
The nonprofit believes it can develop machine learning systems to decode animal communication by identifying patterns in animal language and then analyze that data to understand the chatter. Along with recognizing communication patterns, scientists need to also link back the communication to behavior in order to have any hope of figuring out what the patterns could potentially mean, says Karen Bakker, a University of British Columbia professor, via the WEF.

That’s the focus of ESP, which is tracking animals—including birds, dolphins, primates, elephants, and honeybees—to match their communication with their behavior. And ESP believes the first breakthrough could come from marine mammals, since the bulk of their communication is done acoustically.

Of course, this concept expands significantly when we can start having conversations with animals and letting them make decisions for us, *Doctor Dolittle*-style.

“Understanding what animals say is the first step to giving other species on the planet ‘a voice’ in conversations on our environment,” says Kay Firth-Butterfield, the WEF’s head of AI and machine learning. “For example, should whales be asked to dive out of the way of boats when this fundamentally changes their feeding or should boats change course?”

The answer may be here sooner than we think.



A brain implant thinner than a human hair

The human cerebral cortex is made up of six cellular layers, but at Precision Neuroscience, a team of scientists and engineers is working to build a device that is reminiscent of a seventh.

The device is called the Layer 7 Cortical Interface, and it is a brain implant that aims to help patients with paralysis operate digital devices using only neural signals. This means patients with severe degenerative diseases like ALS will regain their ability to communicate with loved ones by moving cursors, typing, and even accessing social media with their minds.

The Layer 7 is an electrode array that resembles a piece of scotch tape and is thinner than a human hair, which helps it conform to the brain's surface without damaging any tissue.

Precision, founded in 2021, is one of many companies in the emerging brain-computer interface, or BCI, industry. A BCI is a system that deciphers brain signals and translates them into commands for external technologies, and several companies have successfully created devices with this capability.

Precision was co-founded by Benjamin Rapoport, who also co-founded Elon Musk's BCI company, Neuralink, and Michael Mager. But while Neuralink's BCI is designed to be implanted directly into the brain tissue, Precision relies on a surgical technique that is designed to be less invasive.

In order to implant the Layer 7 array, a surgeon makes a very thin slit into the skull and slides in the device like a letter into a letter box. Mager, who is also Precision's CEO, said the slit is less than a millimeter thick – so small that patients do not even need their hair shaved for the procedure.

“I think that's a big advantage compared to technologies that require, for example, a craniotomy, removing a significant portion of the skull, which takes a lot of time and has a lot of risk of infection,” he told CNBC. “I've never met anyone who wanted a hole drilled into their skull.”

The nature of the procedure allows Precision to easily scale up the number of electrodes on the array, which Mager said will eventually allow the device to be used for neurological applications beyond paralysis.

The procedure is also reversible if patients decide they no longer want the implant or want newer versions in the future.

“As you start thinking about rolling this out to larger patient populations, the risk-reward of any procedure is a fundamental consideration for anyone considering medical technology,” Mager said. “If your system is either irreversible, or potentially damaging upon explantation, it just means the commitment that you're making to getting the implant is that much greater.”

Jacob Robinson, associate professor of electrical engineering at Rice University and founder of the BCI company Motif Neurotech, said Precision is making exciting strides in the minimally invasive BCI space.

He said that it's not just patients who have to weigh the risks and benefits of a procedure, but physicians and insurance companies as well.

Robinson said physicians have to weigh procedures quantitatively and based on existing literature, while insurance companies have to weigh the costs for their patients, so the less invasive surgery makes it easier on all three parties.

"It's lower risk, but it also means that there's an opportunity to treat more people, there's greater adoption," he said.

But because the device isn't inserted directly into the brain tissue, Robinson said the resolution of the brain signals is not going to be as strong as it is in some other BCI devices.

"You get much better resolution than you would from outside the skull, not quite as high resolution as you go into the tissue," he said. "But there's a lot that you can do with this kind of medium scale."

Precision has successfully used its Layer 7 device to decode neural signals in animals, and Mager said he hopes to get FDA approval to test the technology in humans in coming months.

The company announced a \$41 million Series B funding round on 25th January 2023, bringing its total to \$53 million in under two years. The funding will allow Precision to hone its product, hire more employees and accelerate toward Food & Drug Administration(FDA) regulatory review, a goal Mager said Precision is working toward quickly.

"We don't want the next 15 years to be like the last 15 years, where this helps a few dozen people. So I think we're in a hurry," he said. "What we hear consistently from patients is, 'We want this, and we want it sooner rather than later.'"

Mager said he thinks this year is proving to be a "watershed year" in neurotechnology, and that there has been a lot of positive momentum in the BCI space in terms of funding.

Though he said he understands the skepticism that exists around BCIs and technology as a whole, Mager said he thinks there is a real potential to make a difference for millions of people suffering from neurological conditions.

"I think that the brain is, in a lot of ways, the next frontier for modern medicine," he said. "The fact that there are so many people who have neurological impairments of one sort or another, and that we have such crude tools to offer them, is going to change. It is changing."

