

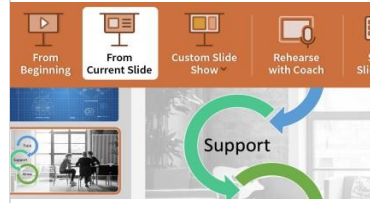
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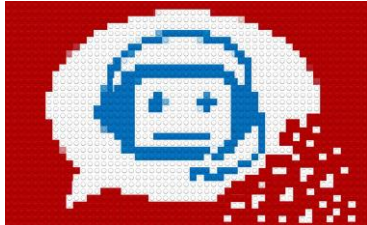
### Featured Course

Introduction to Prompt Engineering for Generative AI  
1h 3min

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AI

### How AI Companies Accidentally Made Their Chatbots Worse: Even After Language Models Were Scaled Up, They Proved Unreliable on Simple Tasks



"AI chatbots such as ChatGPT and other applications powered by large language models have found widespread use, but are infamously unreliable. A common assumption is that scaling up the models driving these applications will improve their reliability—for instance, by increasing the amount of data they are trained on, or the number of parameters they use to process information. However, more recent and larger versions of these language models have actually become more unreliable, not less, according to a new study.

Large language models (LLMs) are essentially supercharged versions of the autocomplete feature that smartphones use to predict the rest of a word a person is typing. ChatGPT, perhaps the most well-known LLM-powered chatbot, has passed law school and business school exams, successfully answered interview questions for software-coding jobs, written real estate listings, and developed ad content.

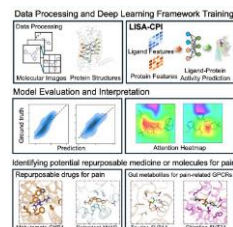
But LLMs frequently make mistakes. For instance, a study in June found that ChatGPT has an extremely broad range of success when it comes to producing functional code—with a success rate ranging from a paltry 0.66 percent to 89 percent—depending on the difficulty of the task, the programming language, and other factors.

Research teams have explored a number of strategies to make LLMs more reliable. These include boosting the amount of training data or computational power given to the models, as well as using human feedback to fine-tune the models and improve their outputs. And LLM performance has overall improved over time. For instance, early LLMs failed at simple additions such as "20 + 183." Now LLMs successfully perform additions involving more than 50 digits."

Source: [IEEE Spectrum](#) (3 Oct 2024)

AI

### Researchers Seek to Improve Advanced Pain Management Using AI For Drug Discovery



"An estimated one in five Americans live with chronic pain and current treatment options leave much to be desired. Feixiong Cheng, PhD, Director of Cleveland Clinic's Genome Center, and IBM are using artificial intelligence (AI) for drug discovery in advanced pain management. The team's deep-learning framework identified multiple gut microbiome-derived metabolites and FDA-approved drugs that can be repurposed to select non-addictive, non-opioid options to treat chronic pain.

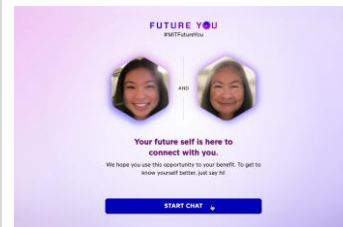
The findings, published in Cell Press, represent one of many ways the organizations' Discovery Accelerator partnership is helping to advance research in healthcare and life sciences.

Treating chronic pain with opioids is still a challenge due to the risk of severe side effects and dependency, says co-first author Yunguang Qiu, PhD, a postdoctoral fellow in Dr. Cheng's lab whose research program focuses on developing therapeutics for nervous system disorders. Recent evidence has shown that drugging a specific subset of pain receptors in a protein class called G protein-coupled receptors (GPCRs) can provide non-addictive, non-opioid pain relief. The question is how to target those receptors, Dr. Qiu explains."

Source: [EurekaAlert!](#) (4 Oct 2024)

AI

### AI Simulation Gives People A Glimpse of Their Potential Future Self



"Have you ever wanted to travel through time to see what your future self might be like? Now, thanks to the power of generative AI, you can.

Researchers from MIT and elsewhere created a system that enables users to have an online, text-based conversation with an AI-generated simulation of their potential future self.

Dubbed Future You, the system is aimed at helping young people improve their sense of future self-continuity, a psychological concept that describes how connected a person feels with their future self.

Research has shown that a stronger sense of future self-continuity can positively influence how people make long-term decisions, from one's likelihood to contribute to financial savings to their focus on achieving academic success.

Future You utilizes a large language model that draws on information provided by the user to generate a relatable, virtual version of the individual at age 60. This simulated future self can answer questions about what someone's life in the future could be like, as well as offer advice or insights on the path they could follow."

Source: [MIT](#) (1 Oct 2024)

AI

### ASU Researchers Use AI To Help People See More Clearly



"Myopia, also known as nearsightedness, is on the rise, especially among children.

Experts predict that by the year 2050, myopia will affect approximately 50% of the world's population. Researchers believe that an increase in what's called "near work" — when we interact with close objects like phones and screens — is partially to blame.

For many people, the struggle to see faraway objects is a problem easily managed with glasses or contacts, but for others this develops into a far more serious condition called myopic maculopathy.

A team of researchers in the School of Computing and Augmented Intelligence, part of the Ira A. Fulton Schools of Engineering at Arizona State University, is developing new diagnostic tools that use the power of artificial intelligence to more effectively screen for this disease. They have recently published the results of their work in the peer-reviewed research journal JAMA Ophthalmology.

Myopic maculopathy occurs when the part of the eye that helps us see straight ahead in sharp detail is stretched and damaged. Over time, the eye's shape becomes elongated — more like a football and less like a sphere. When this happens, vision is distorted.

This serious condition is the leading cause of severe vision loss or blindness. In 2015, myopic maculopathy resulted in visual impairment in 10 million people. Unless things change, more than 55 million people are predicted to have vision loss and approximately 18 million people worldwide will be blind due to the disease by 2050.

Because myopic maculopathy is irreversible, experts want to intervene early. Catching the condition as soon as possible can improve health outcomes, a particularly urgent goal when children are concerned. Ophthalmologists can prescribe special contact lenses or eye drops that slow the progression of the disease."

Source: [ASU](#) (1 Oct 2024)

ARCHITECTURE

### "Hotel In Nature" In Singapore Named Best Tall Building Worldwide



"The 23-storey Pan Pacific Orchard skyscraper in Singapore by architecture studio WOHA has won the Council on Tall Buildings and Urban Habitat's award for the world's best new tall building.

Set in the city's Orchard Road district, the 350-room hotel has four large planted terraces cut into the building's rectangular form.

The Council on Tall Buildings and Urban Habitat (CTBUH), which described the building as "a hotel in nature", gave the building its top award – Best Tall Building Worldwide – for the way it demonstrates Singapore's sustainable vision."

ARCHITECTURE

### Step By Step: Exploring 12 Projects Featuring Staircase or Terraced Roof Designs

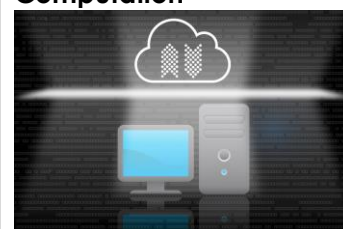


"Pitched roofs and terraced lots or hillsides are some of the oldest, yet still highly functional, solutions for rainwater dispersal, redirection, and erosion management. While most constructions today still opt for traditional pitched or flat roofs, advancements in construction materials and techniques are leading to greater design exploration and layout variations. This has resulted in a rise in green roofs, passive insulation solutions, and more innovative uses of rooftops. One particular case has been the recurrence of the staircase or terraced roofs that often bring about a smooth continuity with the site and provide additional functional spaces to the project.

Depending on the existing site and programmatic needs, the terraced roof setup can be implemented differently through various means. Residential projects, tend to have a simple single-terraced roof, leveled to allow more depth and accommodate plants or vegetable garden growth. Other commercial spaces, such as cafés or community gathering spots tend to provide an open view to the user, and a comfortable seating position, thus focusing on widening the levels' span and spreading the seating areas. No matter the result or look, staircase roofs create unique and interesting cases of structural distribution, flexible

CYBERSECURITY

### New Security Protocol Shields Data from Attackers During Cloud-Based Computation



"Deep-learning models are being used in many fields, from health care diagnostics to financial forecasting. However, these models are so computationally intensive that they require the use of powerful cloud-based servers.

This reliance on cloud computing poses significant security risks, particularly in areas like health care, where hospitals may be hesitant to use AI tools to analyze confidential patient data due to privacy concerns.

To tackle this pressing issue, MIT researchers have developed a security protocol that leverages the quantum properties of light to guarantee that data sent to and from a cloud server remain secure during deep-learning computations.

By encoding data into the laser light used in fiber optic communications systems, the protocol exploits the fundamental principles of quantum mechanics, making it impossible for attackers to copy or intercept the information without detection.

Moreover, the technique guarantees security without compromising the accuracy of the deep-learning models. In tests, the researcher demonstrated that their protocol could

DESIGN

### Japanese Food Replicas "Trigger Your Memory and Stimulate Your Appetite"



"Gleaming sushi and an "earthquake-proof burger" are among the hyperrealistic food models on display at Japan House London as part of the exhibition Looks Delicious! Exploring Japan's Food Replica Culture.

Opening today, the show documents Japan's history of food replicas, known as food samples or shokuhin sampuru in Japanese, which dates back to 1923 and continues as a contemporary trend.

The bespoke replicas are scale models of dishes from the country's 1.4 million restaurants, produced by craftspeople for eateries wishing to advertise hyperrealistic versions of their menu items to prospective diners.

Simon Wright, director of programming at Japan House London, explained that the meticulous detailing and bright colours synonymous with the world-famous replicas intend to "stimulate how delicious the food actually is".

"There's a slight exaggeration to trigger your memory and stimulate your appetite," he told Dezeen at the gallery.

Among the works is a dedicated section revealing how the replicas are made,

usability, and smart water management.

Through the below listing, we review the different renditions of the terraced roof, as more architects adopt this functional and dynamic design in educational, cultural, hospitality, or residential settings."

Source: [Dezeen](#) (2 Oct 2024)

Source: [Archdaily](#) (5 Oct 2024)

maintain 96 percent accuracy while ensuring robust security measures.

"Deep learning models like GPT-4 have unprecedented capabilities but require massive computational resources. Our protocol enables users to harness these powerful models without compromising the privacy of their data or the proprietary nature of the models themselves," says Kfir Sulimany, an MIT postdoc in the Research Laboratory for Electronics (RLE) and lead author of a paper on this security protocol."

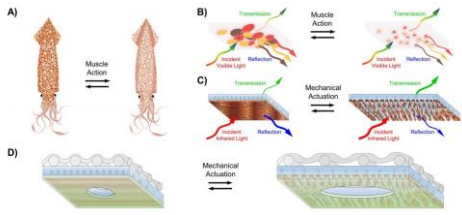
Source: [MIT](#) (26 Sep 2024)

including moulds and stencils such as a screenprint stencil used to create fish scales, arranged in a factory-style layout atop colourful crates."

Source: [Dezeen](#) (2 Oct 2024)

MATERIALS

**Squid-Inspired Fabric for Temperature-Controlled Clothing**



"Too warm with a jacket on but too cold without it? Athletic apparel brands boast temperature-controlling fabrics that adapt to every climate with lightweight but warm products. Yet, consider a fabric that you can adjust to fit your specific temperature needs.

Inspired by the dynamic color-changing properties of squid skin, researchers from the University of California, Irvine developed a method to manufacture a heat-adjusting material that is breathable and washable and can be integrated into flexible fabric. They published their proof-of-concept for the advanced bioinspired composites in APL Bioengineering, by AIP Publishing.

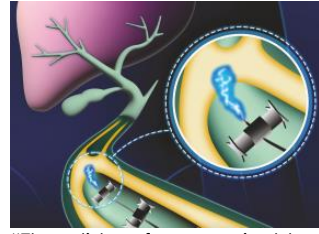
"Squid skin is complex, consisting of multiple layers that work together to manipulate light and change the animal's overall coloration and patterning," said author Alon Gorodetsky. "Some of the layers contain organs called chromatophores, which transition between expanded and contracted states (upon muscle action) to change how the skin transmits and reflects visible light."

Instead of manipulating visible light, the team engineered a composite material that operates in the infrared spectrum. As people heat up, they emit some of their heat as invisible, infrared radiation (this is how thermal cameras work). Clothing that manipulates and adapts to this emission and is fitted with thermoregulatory features can finely adjust to the desired temperature of the wearer. The material consists of a polymer covered with copper islands, and stretching it separates the islands and changes how it transmits and reflects infrared light. This innovation creates the possibility of controlling the temperature of a garment."

Source: [AIP](#) (1 Oct 2024)

ROBOTICS

**Stronger Together: Miniature Robots in Convoy for Endoscopic Surgery**



"The list of conceivable applications for miniature robots in medicine is long: from targeted drug application to sensing tasks and surgical procedures. An arsenal of robots has already been developed and tested for this range of tasks, from the nanometer to the centimeter scale.

However, the little helpers available today reach their limits in many tasks. For example, in endoscopic microsurgery. The required instruments are often too heavy for a single millimeter-sized robot to carry to its destination. Another common problem is that the robots often have to move by crawling. However, the surfaces of numerous body structures are covered with mucus on which the robots slip and cannot move.

**"Spikes" on the feet provide three times the propulsive force**

A team led by Tian Qiu at the DKFZ in Dresden has now developed a solution for both of these problems: their TrainBot connects several individual robots on the millimeter scale. The units are equipped with improved anti-slip feet. Together, they are able to transport an endoscopic instrument. The TrainBot unit works wireless; an rotating magnetic field simultaneously controls the individual units. The magnetic control enables movements in a plane with the control of rotation. The external actuation and control system is designed for the distances at the human body scale."

Source: [DKFZ](#) (5 Oct 2024)

SUSTAINABILITY

**Waste Management Won't Solve the Plastics Problem — We Need to Cut Consumption**



"Machine learning has been used to turn a survey of local waste-management practices into a global inventory of plastic emissions. The data show that tackling plastic pollution will require reduced production and consumption.

In a paper in Nature, Cottom et al. present an inventory of plastics that pollute the environment, derived from measurements taken at a local scale around the world. The inventory could support policy actions to reduce emissions of plastic, and provides a global baseline for researchers who are modelling the effects of plastic pollution under alternative policy scenarios. It also highlights the fact that strategies for dealing with large pieces of plastic litter can exacerbate emissions of other pollutants, including microplastics, hazardous air pollutants and greenhouse gases.

Cottom and colleagues' inventory is not the first of its kind for plastic emissions, but both its breadth and its resolution set it apart from its predecessors. The emissions catalogued in the study encompass any material that was once in a contained state and has been released into the environment with no form of control. This means that the inventory documents both debris (defined as particles larger than 5 millimetres) and material that has been combusted in uncontrolled fires — but not the emissions from those fires.

The authors started by collecting data about management practices for plastic waste in low-, middle- and high-income countries around the world. The available data covered areas in which only 12.2% of the global population live, so Cottom et al. extrapolated to global coverage using machine learning, and by modelling the way plastic flows through societies (Fig. 1). The resulting inventory comprises estimates of plastic emissions from around 50,000 municipalities, and from 5 key sources: uncollected waste, littering, waste-collection systems, uncontrolled disposal and products rejected from sorting and reprocessing processes."

Source: [Nature](#) (4 Sep 2024)

WI-FI

**Wi-Fi Goes Long Range on New WiLo Standard: The New Approach Could Underpin Agricultural Sensor Networks and Smart Cities**



"Researchers have developed a hybrid technology that would combine Wi-Fi with the Long Range (LoRa) networking protocol, yielding a new long-distance wireless concept called WiLo. The research team has designed their proposed WiLo tech to be used on existing Wi-Fi and LoRa hardware.

The advance may find applications in Internet of Things (IoT) technologies—such as networks of long-range sensors used in agriculture or smart cities.

Demin Gao, a professor in the College of Information Science and Technology at Nanjing Forestry University in China, notes that Wi-Fi has limitations today in its range and its high power consumption. By contrast, LoRa is based on low power requirements that yield long-range communication capabilities and is often used for IoT applications.

In WiLo, the two communications protocols have been combined to maximize advantages of each one, without the need for additional tech to bridge the two systems. "This reduces costs, complexity, and potential points of failure, making IoT deployments more efficient and scalable," Gao says.

The researchers—hailing from universities in Hong Kong, mainland China, South Korea, the United States, and the United Kingdom, as well as Intel employees in Germany—conducted their WiLo experiments used an off-the-shelf SX1280 LoRa transceiver produced by Semtech. And while the SX1280's 2.4 GHz communications band is shared with Wi-Fi (and a host of other standards and technologies), Wi-Fi and LoRa signals are not compatible.

So the researchers developed an algorithm to manipulate the frequency of Wi-Fi's data transmission signals to match the signals that the LoRa device uses to communicate with other devices. In technical terms, they manipulated Wi-Fi's data multiplexing standard (called OFDM) to emulate the longer-ranged chirp signals used in LoRa's chirp-spreading standard (called CSS)."

Source: [IEEE Spectrum](#) (5 Oct 2024)

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