



— TechEdge —

Technical Newsletter

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Alumni Section

Madhur Maheshwari
Application Development Associate



What Is Salesforce?

Salesforce started as Software as a Service (SaaS) CRM company. Salesforce now provides various software solutions and a platform for users and developers to develop and distribute custom software. Salesforce.com is based on multi-tenant architecture. This means that multiple customers share common technology and all run on the latest release. You don't have to worry about the application or infrastructure upgrades they happen automatically. This helps your organization focus on innovation rather than managing technology.

Below is an image which shows the power of Salesforce in today's tech-savvy world. From tech giants like Google and Facebook to your nearby call center, all of them use Salesforce services and products to solve their problems.



What does Salesforce do?

Okay, so you've got some customer data. But what do you do with it? How can you use that data to grow lasting relationships and your business? Many companies come to us frustrated because they can't easily answer these questions. Sales doesn't share data with marketing. Marketing doesn't know when a customer has an open service ticket. Commerce doesn't have transparency on marketing campaigns. You get the picture. Data silos are real and painful.

With customer expectations at an all-time high, plus a challenging economy, you need to be as efficient and effective as possible. Salesforce's customer relationship management (CRM) software breaks down the technology silos between departments.

We call our entire portfolio of products and services Customer 360. It's how you can unite all of your teams marketing, sales, commerce, service, and IT with a single shared view of every customer, so your employees have all the relevant data they need to create incredible customer experiences and grow relationships.

The result? Customer information from tech support chats, recent purchases, website behavior, and more flow throughout your company in real time. Your sales team knows exactly what products to offer. Your service team helps customers faster. Or better yet, customers are empowered to resolve issues on their own with self-service automated tools. The ability to automate and unify millions of data points in real time creates a special kind of customer magic. Customer needs are exceeded and their trust in you grows.

Customer 360 helps you lower costs with your entire organization using one trusted platform, it increases productivity with built-in automation and intelligence, and it drives efficient growth by empowering your employees to exceed customer expectations.

Want to know the best part? Customer 360 works for every industry, every size of business at any stage of growth. And it is flexible, which means you can customize the apps and tools you need to meet the needs of your business today, and scale as you grow or needs change.

How does Salesforce work?

Another thing about our CRM platform: it lives in the cloud. This means all your teams are connected on one platform no matter where they're physically located. Our platform is built on Hyperforce, our next-generation infrastructure, which allows Salesforce applications to scale rapidly and enables you to choose where in the world your Salesforce apps run.

On top of Hyperforce is our latest innovation, Genie Customer Data Cloud, which helps you make the most of all your data. Genie helps you connect your historical, web, mobile, API, CRM, and even real-time data so all your teams have a complete picture of customers and their interactions with your business. This helps your teams make every customer touchpoint hyper-personalized, so you can build stronger customer relationships at scale.

And now with Slack, Customer 360 simplifies communication and information sharing with customers, teams, and partners to power digital workflows for a new way to work. All in all, Salesforce Customer 360 is your solution for success right now.



A new vaccine to fight fungal infections has passed clinical trials

The University of Georgia has developed a new vaccine that has the potential to become the first vaccine to receive clinical approval for the protection against invasive fungal infections.

Invasive fungal infections have recently become a significant concern due to the increasing resistance to antifungal drugs. The new vaccine, if clinically approved, could provide a much-needed solution to this growing problem and help prevent the spread of these infections.

1.5 million deaths worldwide every year

Fungal infections are a major public health problem that results in a significant number of deaths each year. According to estimates, these infections cause over 1.5 million deaths worldwide every year and result in billions of dollars in economic costs. The impact of these infections is particularly severe in hospitalized patients, where they increase the duration of stay in a hospital and double the risk of death.

A previous study by the University of Georgia (UGA) found that fungal infections also double the cost of hospitalization. Despite the significant impact of fungal infections, there are currently no effective vaccines available to protect vulnerable patients from these infections. This highlights the urgent need for a safe and effective vaccine to address this growing public health problem.

"There is a pressing need for both prevention and treatment solutions for fungal infections, especially among individuals with weakened immune systems," said Karen Norris, the new study's lead researcher and a professor at the College of Veterinary Medicine. "The number of patients at risk for invasive fungal infections has risen significantly in recent years."

How the new vaccine works

The newly developed vaccine targets the three most prevalent fungal pathogens responsible for most fatal fungal infections. In the study, the vaccine's efficacy was evaluated in four preclinical animal models, including non-human primates.

The researchers used various immune-compromised models, mirroring drug regimens that are common among transplant recipients, people with HIV, and cancer patients groups that are among the most vulnerable. The vaccine was found to effectively trigger the production of protective antibodies in all models.

"With its ability to address three different pathogens, this vaccine has the potential to revolutionize the way we approach invasive fungal infections," Norris, who is also a faculty member of the university's Center for Vaccines and Immunology, stated. "Plans are underway to proceed with a Phase I safety trial for human use."

Justin Beardsley, a researcher in infectious diseases from the University of Sydney, collaborated with the WHO to create the Fungal Priority Pathogen list in 2022. According to Beardsley, fungi are the "neglected" infectious microorganisms that cause serious illnesses, yet their extent remains largely unknown. He stressed the importance of researching current and emerging fungal pathogens, which have long been overlooked.

The study, published in PNAS Nexus, was a collaboration between authors from the College of Veterinary Medicine and the Franklin College of Arts and Sciences. The research was funded and supported by the Centers for Disease Control and Prevention, the National Institutes of Health, the Georgia Research Alliance, and the University of Georgia Research Foundation.



Green hydrogen: The Future of Clean Energy

- Hydrogen can serve as an energy carrier just like fossil fuels do.
- Green hydrogen is an emission-free energy source for heavy industries and long-haul transport.
- The high cost of making green hydrogen is slowing its adoption.

Green hydrogen is hydrogen that is produced by splitting water by electrolysis, using electricity that has been generated using renewable energy. This process produces only hydrogen and oxygen. We can use the hydrogen and vent the oxygen to the atmosphere with no negative impact. This is one of the cleanest ways to generate hydrogen, which can then be used as fuel.

Burning of hydrogen produces water and no carbon emissions, making it an ideal fuel to power our industrial requirements. However, the use of green hydrogen is not economically feasible yet. In this explainer, you will learn about green hydrogen and how it could play a major role in the carbon emission-free future that we want to pursue.

With most countries around the world looking for ways to achieve their net zero goals, alternate sources of energy such as wind and solar have picked up steam. Companies are building the biggest wind turbines ever, and solar farms are increasing in size rapidly. However, both these energy forms suffer from intermittency problems they do not always generate power continuously or on demand.

For a long time, fossil fuels have provided the energy security needed by industries and nations alike, and until renewable sources of these forms of energy scale up to meet demand, a carbon-free fuel could be used to fill the gap or act as a backup when renewables do not deliver.

Since fossil fuels are currently delivered and in use all over the planet, their replacement must also have the same reach, and for hydrogen, this means massively scaling up its production.

How is hydrogen produced?

In its elemental form, hydrogen serves as an energy carrier. It can transport energy from one place to another, just like we do with fossil fuels. There are several methods of producing hydrogen, but we will discuss two major ones.

- Thermal process

This method typically involves the use of high temperatures on a hydrocarbon fuel to release hydrogen. The process called steam reforming can be applied to a wide variety of hydrocarbon fuels such as diesel, natural gas, gasified coal, or biomass.

- Electrolytic Processes

Hydrogen can be produced by splitting water molecules in an electrolyzer in a process called electrolysis. The process is the opposite of what happens in a fuel cell, where hydrogen combines with oxygen to form water and release energy. In electrolysis, energy is used to split the water molecule.

Making hydrogen production green

Steam reforming currently accounts for around 95 percent of all hydrogen production in the U.S. today. Most of the hydrogen manufacturers use methane (CH_4), found in natural gas, as the starting material for steam reforming, where the carbon atom is split from the hydrogen using high heat under moderate to high pressure (3- 25 bar) in the presence of a catalyst.

In addition to hydrogen, the process also creates carbon monoxide and a small amount of carbon dioxide, which is undesirable since it increases our carbon emissions. It is also an energy-intensive process. Electrolysis, on the other hand, does not produce any by-products other than hydrogen and oxygen, depending on the fuel used to power the electrolysis process.

Depending on the fuel type used to produce the gas, hydrogen is classified into different types, such as green, yellow, brown, grey, blue, etc. Grey hydrogen is the most abundant type of hydrogen. It is produced by steam reforming, but without capturing the greenhouse gases made in the process, so it produces carbon emissions. Coal is also commonly used to produce hydrogen gas, which is then known as black or brown hydrogen.

Blue hydrogen is produced from natural gas, but the CO₂ generated during the manufacturing process is captured and stored permanently underground. In blue hydrogen production, hydrogen is still produced using fossil fuels; however, the emissions from the process are captured using industrial carbon capture and storage (CCS), making it cleaner than black and grey hydrogen.

Green hydrogen is the cleanest form of hydrogen production. It is energy produced from renewable sources, which can be a mix of hydro, wind, and solar power (hydrogen produced using solar power is sometimes referred to as yellow hydrogen). Although the installation of renewable energy farms is on the rise, only 0.1 percent of overall hydrogen production is actually green today.

Why do we need green hydrogen?

To understand the need for the production of green hydrogen, we must also understand the other types of hydrogen production techniques, such as blue or turquoise hydrogen (produced using a process called methane pyrolysis to produce hydrogen and solid carbon).

Another energy source being explored for the production of hydrogen is nuclear power. Hydrogen produced using nuclear power is called pink hydrogen or sometimes also referred to as red hydrogen. This process does not create carbon emissions but may contribute to a future problem of producing nuclear waste that will need to be dealt with.

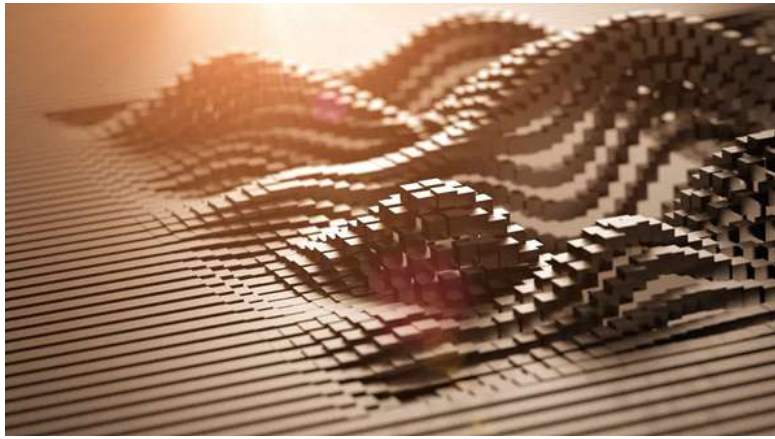
Green hydrogen, on the other hand, provides the best of both worlds since it delivers an eco-friendly fuel in an eco-friendly way. As countries look to transition to greener sources of energy, hydrogen is expected to play an important role. To ensure that we make this shift without adding more carbon dioxide to the atmosphere and further warming the world, some have argued that we need to speed up production and adoption of green hydrogen now.

Where can green hydrogen be used?

Green hydrogen can be a replacement energy source in almost every application where fossil fuels are currently used. Aviation and shipping, for instance, are facing challenges with electrification since currently available technology cannot support long-haul trips with heavy loads. In such a scenario, hydrogen, which packs three times as much energy as the same weight of gasoline, and nearly seven times that produced by coal, could be an alternative. Using green hydrogen will also ensure that these trips are emission-free.



This tech can print 3D objects with sound in 'one-shot' process



German scientists have created a new technology that helps them print 3D objects with sound waves.

The new method of 3D matter assembly was developed by researchers from the Institute for Molecular Systems Engineering and Advanced Materials and the Micro, Nano, and Molecular Systems Lab at the Max Planck Institute for Medical Research at Heidelberg University.

The design creates pressure fields using several acoustic holograms, which can be used to print solid particles, gel beads, and even living cells, according to the study released on 9th Feb 2023.

"We were able to assemble microparticles into a three-dimensional object within a single shot using shaped ultrasound," said Kai Melde, a postdoc researcher and first author of the study.

"This can be very useful for bioprinting. The cells used there are particularly sensitive to the environment during the process," added Peer Fischer, professor at Heidelberg University.

Utilizing functional or biological materials, additive manufacturing techniques such as 3D printing allow for the creation of complex parts.

Traditional 3D printing, in which items are built one line or layer at a time, can be a tedious procedure. However, the researchers from Heidelberg and Tübingen have now shown how to construct a 3D shape out of smaller parts in a single step.

3D cell cultures and tissues

Any concertgoer who has experienced the pressure waves from a loudspeaker knows that sound waves impose forces on matter.

The wavelengths can be pushed below a millimeter into the microscopic realm using high-frequency ultrasound, which is audible to human ears and is employed by the researcher to influence incredibly small building pieces, including biological cells.

In earlier research, Peer Fischer and associates demonstrated how to create ultrasound using acoustic holograms, which are 3D-printed plates that encode a particular sound field.

They showed that materials might be assembled into two-dimensional patterns using those sound fields. The scientists developed a fabrication concept in light of this.

"The crucial idea was to use multiple acoustic holograms together and form a combined field that can catch the particles," said Melde.

"The digitization of an entire 3D object into ultrasound hologram fields is computationally very demanding and required us to come up with a new computation routine," added Heiner Kremer, who wrote the algorithm to optimize the hologram fields.

Ultrasound has the benefit of being soft enough to use biological cells and having the ability to penetrate far into tissue. In this manner, it is safe to remotely modify and push cells.

The researchers claim their approach offers a potential foundation for developing 3D cell cultures and tissues.

This novel underwater robot can explore extra-terrestrial oceans



Scientists are certain that Europa, the smallest of the four Galilean moons orbiting Jupiter, harbors a vast ocean beneath its icy shell. According to them, Europa's salty ocean could hold more water than all of Earth's combined.

To explore further, Europa Clipper, a Jupiter-orbiting spacecraft carrying science instruments, will take off in 2024 to study Europa. And so, a new underwater robot developed by scientists at the University of Bristol could not have come at a better time.

Called RoboSalps, the robotic units have been modeled on the design and life of mysterious zooplankton. Their unique selling proposition? They have been engineered to operate in unknown and extreme environments, such as extra-terrestrial oceans, as per a press release.

RoboSalps can function on their own and in 'colonies'

With their semi-transparent barrel-shaped bodies, salps resemble jellyfish, but they belong to the family of Tunicata and have a complex life cycle and change between solitary and "aggregate" generations by forming colonies.

"RoboSalp is the first modular salp-inspired robot. Each module is made of a very lightweight soft tubular structure and a drone propeller which enables them to swim. These simple modules can be combined into 'colonies' that are much more robust and have the potential to carry out complex tasks," researcher Valentina Lo Gatto of Bristol's Department of Aerospace Engineering, who is leading the study, said in a statement.

"Because of their low weight and their robustness, they are ideal for extra-terrestrial underwater exploration missions, for example, in the subsurface ocean on the Jupiter moon Europa," she said.

It is to be noted that each module of RoboSalps can also swim on its own, thanks to a small motor with rotor blades in the soft tubular structure.

And when multiple units are joined together, they form a "redundant" system and can still function despite failure. The whole colony can move even if one module breaks.

A novel concept for a wide range of applications

Such a colony of soft robots is a novel concept and has a wide range of interesting applications. Their energy-efficient feature makes them ideal for autonomous missions.

"These include the exploration of remote submarine environments, sewage tunnels, and industrial cooling systems. Due to the low weight and softness of the RoboSalp modules, they are also ideal for extra-terrestrial missions. They can easily be stored in a reduced volume, ideal for reducing global space mission payloads," said Dr. Helmut Hauser of Bristol's Department of Engineering Maths.

It also provides safer interaction with delicate ecosystems, both on earth and extra-terrestrial, thereby reducing the risk of environmental damage. Interestingly, RoboSalps can also split into multiple segments, each exploring in a different direction and later reassembled in a new configuration for a different objective.

The team is also developing control approaches that can "exploit the compliance of the modules to achieve energy-efficient movements close to those observed in biological salps."

Active compound in an edible mushroom is found to boost memory

An active compound found in an edible mushroom may just be able to improve nerve growth and enhance memory leading to treatments for debilitating diseases such as Alzheimer's.

Professor Frederic Meunier from the Queensland Brain Institute revealed in a report published last Friday that his team of researchers had identified new active compounds from the mushroom, *Hericium erinaceus*, commonly known as the Lion's Mane Mushroom.

The mushroom can be found in North America, Europe, and Asia. In traditional Chinese medicine, it is used to boost the immune system and improve digestive health.

Boosting brain cells

So far, the researchers have conducted pre-clinical trials with very promising results.

"Extracts from these so-called 'lion's mane' mushrooms have been used in traditional medicine in Asian countries for centuries, but we wanted to scientifically determine their potential effect on brain cells," Professor Meunier said in the press release.

"Pre-clinical testing found the lion's mane mushroom had a significant impact on the growth of brain cells and improving memory."

Promoting neuron projections

"Laboratory tests measured the neurotrophic effects of compounds isolated from *Hericium erinaceus* on cultured brain cells, and surprisingly we found that the active compounds promote neuron projections, extending and connecting to other neurons," added Meunier.

"Using super-resolution microscopy, we found the mushroom extract and its active components largely increase the size of growth cones, which are particularly important for brain cells to sense their environment and establish new connections with other neurons in the brain."

Co-author UQ's Dr. Ramon Martinez-Marmol added that the newly discovered compound may have applications in the treatment and protection against neurodegenerative cognitive disorders such as Alzheimer's disease.

"Our idea was to identify bioactive compounds from natural sources that could reach the brain and regulate the growth of neurons, resulting in improved memory formation," Dr. Martinez-Marmol said.

Dr. Dae Hee Lee from CNGBio Co, which was part of the research project, said lion's mane mushrooms had been used in traditional Chinese medicine since antiquity to treat various conditions and maintain overall well-being.

"This important research is unraveling the molecular mechanism of lion's mane mushroom compounds and their effects on brain function, particularly memory," Lee said.

In the past, psilocybin, a hallucinogenic ingredient found in so-called magic mushrooms, has shown promise in a rising number of small studies for treating depression and end-of-life anxiety. Mushrooms have even been found to fight climate change.



Scientists engineered a wood that gets stronger as it captures CO₂

Although wood is a renewable resource, it takes years to grow and replace, while human activities already ravage forests. A more sustainable alternative made from smaller pieces of wood bonded together, called engineered wood, uses less material than solid wood.

Thus, engineered wood has emerged as a sustainable and environmentally friendly alternative to traditional building materials. However, this wood is prone to warping and deterioration of structural integrity, diminishing its life span.

Scientists at Rice University, Texas, have now developed a special wood that's stronger than its natural counterpart and helps reduce carbon emissions by sequestering carbon dioxide (CO₂) from the surrounding air.

A multiaxial top-down strategy

Humans' fight against climate change requires devising integrated concepts that innovate current processes by making them sustainable. Rice University researchers have multiaxially addressed the issues of engineered wood durability and carbon dioxide emissions by developing a special wood infused with a material with a strong affinity for CO₂.

In a top-down approach, the team delignified wood; parts of the wood that give it its color was removed, thus creating a hierarchical, porous structure. The porous structure was then infused by soaking it in a solution containing microparticles of a high-performance absorbing material called Metal-Organic Framework (MOF).

MOFs possess a strong affinity for carbon dioxide molecules. The chosen MOF, Calgary framework 20 (CALF-20), outperforms its counterparts regarding performance level and versatility under varied environmental conditions.

Following a top-down approach allowed the researchers to create a structure that closely mimics the natural structure of wood while also making infusing the material throughout the entire structure easier. The result is a functional wood structure that captures and retains CO₂ with high selectivity over nitrogen and water vapor.

A simpler and greener process

In the absence of environmentally friendly and sustainable materials for Co₂ capturing, the novel enhanced wood structure can be used as a flexible support to deploy Co₂ capturing materials in various applications.

"Our process is simpler and 'greener' in terms of both substances used and processing byproducts," says Muhammad Rehman, an assistant research professor in materials science and nanoengineering at Rice University.

The team believes this new type of wood, which can be easily produced using existing technologies, can be used in a wide range of applications, from construction to furniture making, as an eco-friendlier alternative to traditional materials.

The team plans to determine sequestration processes and perform a detailed economic analysis to understand the scalability and commercial viability of the new material.



This autonomous ground robot helps firefighters in enclosed spaces



An autonomous ground robot was developed by researchers at Universidad Rey Juan Carlos and Universidad Autónoma de Madrid. It could help firefighters deal with situations in enclosed spaces.

This method could help firefighters plan interventions more effectively by paving safe access routes to the impacted areas and assisting them during evacuations.

Undoubtedly, firefighters would profit from the assistance of trustworthy mobile robots in their high-danger duties. Regarding this, researchers led a study called "HelpResponder" in 2021, which aims to reduce accident rates and mission times of intervention teams, as reported by Tech Xplore.

"This is achieved using fixed beacons, drones, and ground robots. The ground robot was developed as part of a BSc project and supports emergency teams by acquiring environmental parameters in real-time," says Noelia Fernández Talavera, one of the researchers who carried out the study.

How does the robot help firefighters?

The robot, developed by Talavera and her colleagues, can monitor its surroundings. It also shares the collected data with firefighters. This is accomplished by using numerous sensors that can measure the temperature, humidity, and air quality in an interior setting and its own and other objects' positions. This information is kept in a database, which firemen can access remotely via a smartphone app.

"While in autonomous mode, the robot can cover entire rooms and corridors, providing local information on the environmental conditions," Talavera said.

"Finally, the evacuation mode creates fast and safe routes toward targets. This mode uses the prior knowledge of the scene to compute the shortest path from the current position to the target one. This target position can be the exit of the building or the location of a victim, among other things," she added.

Talavera and her colleagues put their robot through a battery of testing, including simulations and field experiments.

"The next steps in our research will be to improve the autonomous navigation system by integrating ROS and enhance the simulator to reproduce dynamic scenarios where fire and smoke advance in the same way as they would in real situations," Talavera added.

ISRO to launch India's first solar mission Aditya-L1 by July 2023

The Indian Space Research Organization (ISRO) is aiming to launch the Aditya-L1 mission by June or July this year. The Aditya-L1 is the first Indian space mission to observe the Sun and the solar corona. Scientists at the Indian Institute of Astrophysics (IIA), Bengaluru have spent over 15 years building and assembling nearly 40 different optical elements in a payload.



On 26, January 2023, the team of scientists at IIA handed over one of the most challenging scientific payloads to the Indian Space Research Organization (ISRO).

The critical payload, which is almost the size of a mini satellite, is being transported to the UR Rao Satellite Centre in Bengaluru on Friday, January 27. There it will be integrated into the complete satellite and if all goes well, the ISRO may launch the mission this June-July, The Hindu reported.

The mission, originally known as Aditya-1, was intended to be put into an 800 km low-Earth orbit (LEO) as a 400-kg class satellite but it was later decided that the satellite will be placed in a halo orbit around the Sun-Earth system's first Lagrangian Point (L1). This was done as the Sun may be seen constantly from this position without any occultation or eclipses. Hence, the new mission was named Aditya- L1.

The Aditya-L1 satellite will carry six additional payloads, including a magnetometer, the solar ultraviolet imaging telescope (SUIT), the plasma analyser package for Aditya (PAPA), the Aditya Solar Wind Particle Experiment (ASPEX), the high energy l1 orbiting X-ray spectrometer (HEL1OS), the solar low energy X-ray spectrometer (SoLEXS), and the solar low energy X-ray. These payloads will conduct comprehensive remote and on-site observations of the Sun to expand the science scope and objectives of the mission.

Mission Aditya L-1 is being regarded as a major milestone in India's space history. It comes after NASA's Parker Probe made headlines for becoming the first-ever mission to 'touch' the Sun, last year. The US probe went in and out of Sun's corona and became the first instrument to enter its atmosphere.

Can Google Bard outcompete ChatGPT

For the unversed, there is a new Artificial Intelligence-enabled conversational chat service in the town. It is Google Bard, which has been launched by Google to steal a march from ChatGPT. It's well known that ChatGPT belongs to OpenAI.

As per users, Bard is throwing up gaffes in what has been described as a "botched and rushed" launch. Google CEO Sundar Pichai has asked his engineers to spend more hours rectifying Bard. Google's stocks fell significantly after the launch of Bard.

As of now, Bard is not anywhere near ChatGPT in terms of image and user experience. Recently, writer and AI expert Nabil Alouani said that Google announced Bard to compete with Bing, which is Microsoft's search engine. And Bing will use some version of ChatGPT as an additional feature, he added.

There is also a view that ChatGPT is soon going to replace Google Search. But is it going to be instant? No. "I actually think it will be ChatGPT + 50 competitors, opening an entire new market," a Twitter user opined. "I don't think ChatGPT and other apps like it are going to replace Google Search anytime soon. Many people search, and Google Search is pretty good. But some are going to replace searching with chatting. They will have a dialog with data/services. Chat is the new UX," wrote HubSpot co-founder Dharmesh.

The future of Internet-based user search is set to undergo change. "Instead of having one entry point to general search, you might see a verticalization of search with different entry points: search for work, search for shopping, search for health," analyzed Ben Marcilhacy.



Bionic fingers create 3D maps of human tissue, electronics and other complex objects

What if, instead of using X-rays or ultrasound, we could use touch to image the insides of human bodies and electronic devices? In a study published in the journal *Cell Reports Physical Science* on February 15, researchers present a bionic finger that can create 3D maps of the internal shapes and textures of complex objects by touching their exterior surface.

We were inspired by human fingers, which have the most sensitive tactile perception that we know of," says senior author Jianyi Luo, a professor at Wuyi University. "For example, when we touch our own bodies with our fingers, we can sense not only the texture of our skin, but also the outline of the bone beneath it."

"Our bionic finger goes beyond previous artificial sensors that were only capable of recognizing and discriminating between external shapes, surface textures, and hardness," says co-author Zhiming Chen, a lecturer at Wuyi University.

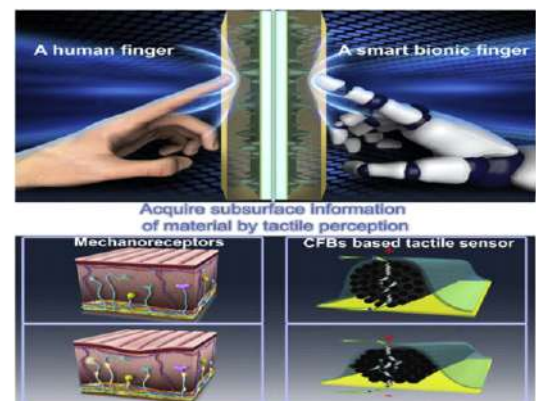
The bionic finger "scans" an object by moving across it and applying pressure think of a constant stream of pokes or prods. With each poke, the carbon fibers compress, and the degree to which they compress provides information about the relative stiffness or softness of the object. Depending on the object's material, it might also compress when poked by the bionic finger: rigid objects hold their shape, while soft objects will deform when enough pressure is applied. This information, along with the location at which it was recorded, is relayed to a personal computer and displayed onscreen as a 3D map.

The researchers tested the bionic finger's ability to map out the internal and external features of complex objects made of multiple types of material, such as a rigid "letter A" buried under a layer of soft silicon, as well as more abstractly shaped objects. When they used it to scan a small compound object made of three different materials :-a rigid internal material, a soft internal material, and a soft outer coating-:the bionic finger was able to discriminate between not only the soft outer coating and the internal hard ridges, but it could also tell the difference between the soft outer coating and the soft material that filled the internal grooves.

Next, the researchers tested the finger's ability to sense and image simulated human tissue. They created this tissue consisting of a skeletal component, made of three layers of hard polymer, and a soft silicone "muscle" layer using 3D printing. The bionic finger was able to reproduce a 3D profile of the tissue's structure and locate a simulated blood vessel beneath the muscle layer.

The team also explored the bionic finger's ability to diagnose issues in electronic devices without opening them up. By scanning the surface of a defective electronic device with the bionic finger, the researchers were able to create a map of its internal electrical components and pinpoint the location at which the circuit was disconnected, as well as a mis-drilled hole, without breaking through the encapsulating layer.

"This tactile technology opens up a non-optical way for the nondestructive testing of the human body and flexible electronics," says Luo. "Next, we want to develop the bionic finger's capacity for omnidirectional detection with different surface materials."





GPS Map Camera

Muradnagar, Uttar Pradesh, India
NH24, near SRM University, Phase - I,
Muradnagar, Uttar Pradesh 201206, India
Lat 28.753234°
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GPS Map Camera

Muradnagar, Uttar Pradesh, India
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Lat 28.753234°
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GPS Map Camera

Muradnagar, Uttar Pradesh, India
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GPS Map Camera

Muradnagar, Uttar Pradesh, India
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GPS Map Camera

Muradnagar, Uttar Pradesh, India
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GPS Map Camera

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GPS Map Camera

Muradnagar, Uttar Pradesh, India
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GPS Map Camera

Muradnagar, Uttar Pradesh, India
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Glimpses