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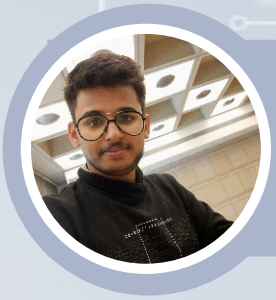

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WinUI 3.0: Future of windows app development

It is hard to choose a Windows UI framework. After all, there are so many of them i.e. WinForms, WPF, UWP etc. Each has its benefits and drawbacks, with different sets of controls, design tooling, and supported versions of Windows. They support different design languages, with only Universal Windows Platform (UWP) controls offering support for the latest Fluent look and feel. Microsoft has been working to backport the new Windows 10 UWP controls to older frameworks, with tools like XAML Islands. They're a good option but are limited to running on Windows 10.
In this article we are going to discuss about the future of windows app development i.e. WinUI 3.0.

What is WINUI 3?
WinUI is Microsoft's most advanced user interface technology for building Windows apps. There are two versions of WinUI in active development: WinUI 2 and WinUI 3. WinUI 2 is a library of Fluent-based UI controls & styles for UWP XAML apps. It was first shipped in Oct 2018 and its latest release is v2.4.

WinUI 3 is a currently-in-development, dramatic expansion of this library into a full-fledged, end-to-end, standalone UI framework. This UI framework continues the tradition of WinUI and UWP XAML, providing the very latest graphical capabilities and Fluent Design styling that embraces today's modern devices, hardware, and inputs. Technically, WinUI 3 decouples the XAML, Composition, and Input layers of Windows 10, and ships them independently via NuGet for any app targeting Windows 10 v1803 and above. It can be used in both C++ and .NET-based apps.

WinUI 3 Preview 1 is the first pre-release of WinUI 3 that can be used in both UWP *and* Desktop apps, allowing every developer a chance to tap into the very latest UI technologies from Microsoft for building Windows apps. You can learn more about WinUI from here.

Below is a comparison of WINUI 3 with other Microsoft's UI frameworks:

Capability/feature	WinUI 3	UWP XAML & WinUI 2	WPF	WinForms	MFC
Windows app types supported	Desktop	UWP	Desktop	Desktop	Desktop
Windows versions supported	Win10, 1809+ Win11 (all)	Win10, 1703+ Win11 (all)	Windows XP or higher	Windows XP or higher	Windows XP or higher
Native C/C++	✓	✓			✓
.NET 5 Support	✓		✓	✓	
WebView2 (Chromium-based engine)	✓		✓*	✓*	
Built-in Fluent Design controls	✓	✓			
Built-in support for modern input (e.g. touch, pen, gamepad)	✓	✓			
Uses latest DirectX version for graphics performance	✓	✓			
High performance data binding (x:Bind)	✓	✓			

Who's using WINUI?

WINUI is still in its early stages. However, there are some big players who have already entered the WINUI ecosystem i.e.

Magix , a developer of audio & video solutions for creators, who's showcasing how they've harnessed the power of WinUI to modernize some of the UI components in their Win32-based VEGAS Pro app

Esri, market leader in geographic information system (GIS) software, using ArcGIS Runtime, .NET and SwapChainPanel with WinUI 3 Preview 1 to render gigabytes of geospatial data in rich, high performance mapping components.

Telerik, a leading vendor of high-quality .NET and JavaScript components for building modern, high performance, feature rich web, mobile and desktop apps

Uno Platform, an open-source platform for building apps that span across mobile endpoints, Windows, macOS, and the Web.

And it's still counting.

Career Options in Windows App Development

- Windows Application Developer.
- Windows Communication Foundation Application Developer.
- Windows Server Administration Application Developer.
- Solution Architect.
- Surface App Developer.
- C++ Developer.
- User Interface Designer.

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Google health wants to enhance healthcare with AI and smartphones

In its second annual 'Check Up' online event, Google Health on Thursday (24th march) said that the company is rolling out a host of new features to help doctors quickly generate AI based accurate results. The company wants to integrate robust search features, and organize data in more useful ways.

The most important news is on the Artificial intelligence (AI) front. Google said its latest finding from a research has revealed that a smartphone's built-in microphone can be used to listen to heartbeats when they're placed over the chest.

“Our latest research investigates whether a smartphone can detect heartbeats and murmurs. We're currently in the early stages of clinical study testing, but we hope that our work can empower people to use the smartphone as an additional tool for accessible health evaluation,” Google said in a blog post.

Google's blog also talks about the ability to measure heart rate and respiratory rate with the phone's camera. This function is now available on over 100 models of Android devices, as well as iOS devices.

“Listening to someone's heart and lungs with a stethoscope, known as auscultation, is a critical part of a physical exam. It can help clinicians detect heart valve disorders, such as aortic stenosis which is important to detect early. Screening for aortic stenosis typically requires specialized equipment, like a stethoscope or an ultrasound, and an in-person assessment.”

According to a blog post by Dr Karen DeSalvo, Google's Chief Health Officer, the company is also rolling out a new scheduling feature that make booking doctor appointments simpler. “It can be a lot of friction when you're making a doctor's appointment. In the US the average wait time for a primary care appointment can be 20 days or more,” said Hema Budaraju, senior director of product, health and search social impact. “It shouldn't be this hard-to-get access to care.”

YouTube will also be adding feature to enhance health-related searches and videos in Brazil, India, and Japan. “This is our first step towards identifying and designating authoritative health sources on YouTube,” said Dr. Garth Graham, director and global head of healthcare and public health partnerships at YouTube.

New vortical sun waves detected with unexplained speed

Researchers from New York University, Abu Dhabi and the Tata Institute of Fundamental Research have discovered a set of new vorticities (spinning) waves coming from the Sun that move much faster than can be predicted with existing theories. The high-frequency retrograde (HFR) waves detected after 25 analysing 25 years of space and ground-based data moves in the opposite direction of the Sun's rotation and appears as a pattern of vortices (fluid-like revolving motions) on the surface of the Sun and move at three times the speed predicted by current theory.

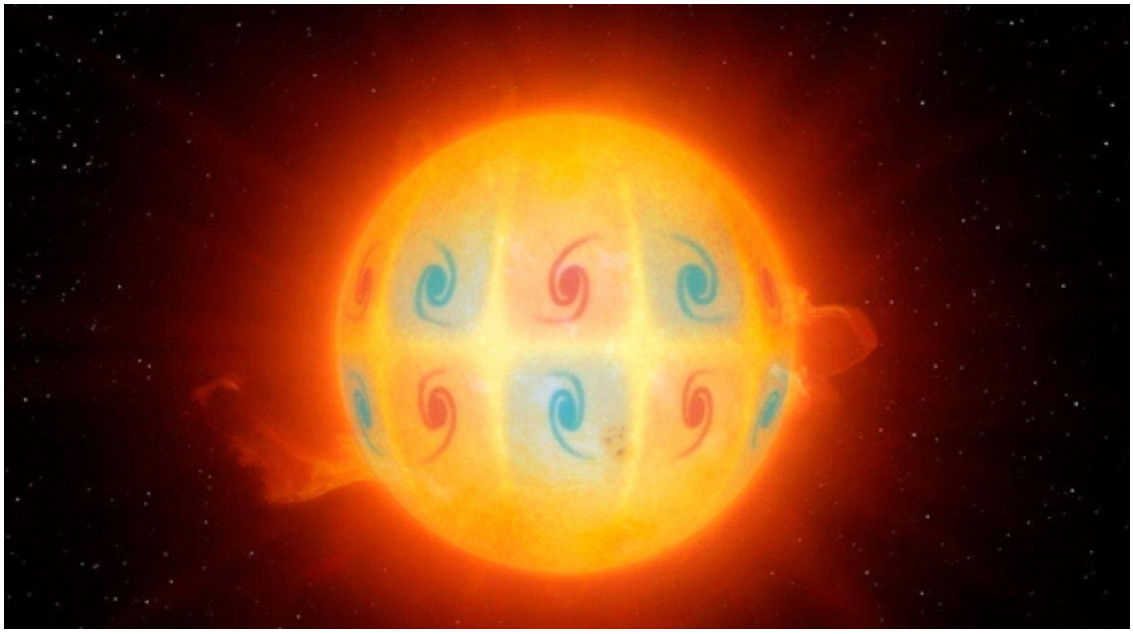
The researchers' observations have been published in the Nature Astronomy Journal.The unknown nature of these HFR waves makes it difficult to interpret and place them within the current context of solar dynamics and makes them difficult to explain.

The researchers tested three hypotheses that try to explain the waves: that they are caused by magnetic fields within the sun; that they come from gravity waves in the sun; and that they occur due to the compression of plasma. But none of the three hypotheses held up well against the data on the HFR waves.

But curiously enough, the behaviour of these waves is very similar to a type of wave found in Earth's oceans known as Rossby Waves, which also travel much quicker than researchers can explain.

“The very existence of HFR modes and their origin is a true mystery and may allude to exciting physics at play,” said Shravan Hanasoge, a co-author of the paper, to EurekAlert, a science news service. “It has the potential to shed insight on the otherwise unobservable interior of the Sun.”

With the lack of any convincing explanation for these HFR waves, researchers have concluded in the article that “there are evidently missing, or poorly constrained, ingredients in the standard models of the Sun, and determining the mechanism responsible for HFR modes will deepen our understanding of the interiors of the Sun and stars.”



RBI lists out all the ways scammers use to empty your bank accounts

In the view of rising financial frauds where cyber criminals have been using innovative methods to defraud gullible individuals and newbies, the Reserve Bank of India (RBI) released a 40-page booklet listing out all the ways scammers can steal your financial credentials and empty your bank accounts.

This booklet titled 'BE(A)WARE' emphasises the need to keep one's personal information safe, practicing due diligence while performing financial transactions. Here are all the popular ways RBI lists that scammers use frequently to steal your sensitive data.

Malicious links

Pushing out a malicious link is one of the most-simple method to scam an unsolicited individual. According to RBI, fraudsters might create a fake website which looks like an existing genuine website, such as bank's website or e-commerce website or search engine, etc. These links are then circulated by fraudsters through text messages or via social media, etc.

Malicious links are masked through authentic looking names of websites, but in reality, the customer gets redirected to phishing website. When customers enter secure credentials on these websites, the same is captured and used by the fraudsters

It should be noted that most of the time, customers enter secure credentials by just having a glance and clicking at the link but not checking the detailed URL. On e-commerce platforms, fraudsters might pretend to be buyers and show interest in your product. This is a very classic technique of defrauding individuals.

“Instead of paying money to you, they use “request money” option through UPI app and insist to approve the request to pull money from your bank account, RBI said in its research.

Unknown mobile apps

Malicious mobile apps are the easiest way for hackers to gain complete access to your device. These applications are shared as 'authentic' apps on social media platforms and WhatsApp group chats. The link is engineered in such a way that the customer is redirected to download unknown application. Once the app is downloaded, the fraudster gains complete access to your device.

RBI highlights that these apps are mostly screen sharing apps through which the scammers can watch, control your mobile phone to gain access to your financial credentials. Later, they make payments using your Internet banking and payment apps.

Through search engines

All of us rely upon Google to search for contact number of businesses, banks, and government offices. Scammers are well aware that search engines have become a source of trust. Taking advantage of this, scammers have listed out fake contact details on search engines such as Google, Yahoo, etc., to attract victims and steal their money.

Once a customer calls on these numbers, the impostors ask the customers to give their card credentials details for verification. Assuming this contact to be genuine, people compromise all their secure details and thus fall prey to frauds.

QR scans

Scanning QR codes has become very prominent during COVID times. Whether you're in a restaurant looking to access the menu, or want to make a contact less payment. Scammers often contact customers under various pretext and trick them into scanning QR codes using payment apps. This allows the fraudsters to withdraw money from customer's account.

Charging ports

This might sound unbelievable, but scammers have figured out a way to infect your devices and gain full access to it, using a charger. RBI in its research, notes that 'juice jacking' is a type of cyber stealing, where, once your mobile is connected to unknown or unverified charging ports, unknown apps are installed with which, the fraudsters can steal sensitive data, email, SMS, and even saved passwords.

How to stay safe

RBI lists out ways to stay safe online.

#Be wary of suspicious looking pop ups that appear during your browsing session.

#Always check for a secure payment gateway (https:// – URL with a Pad Lock Symbol) before making online payments.

#Keep your PIN (Personal Identification Number), password, and credit or debit card number, CVV private.

#Avoid saving card details on websites/devices/public laptop/desktops.

#Turn on two-factor authentication where facility is available.

#Never open emails from unknown sources containing suspicious attachment or phishing links.

#Do not share copies of cheque-book, KYC documents with strangers.

New technique for making wearable sensors allows faster and less costly prototyping of designs

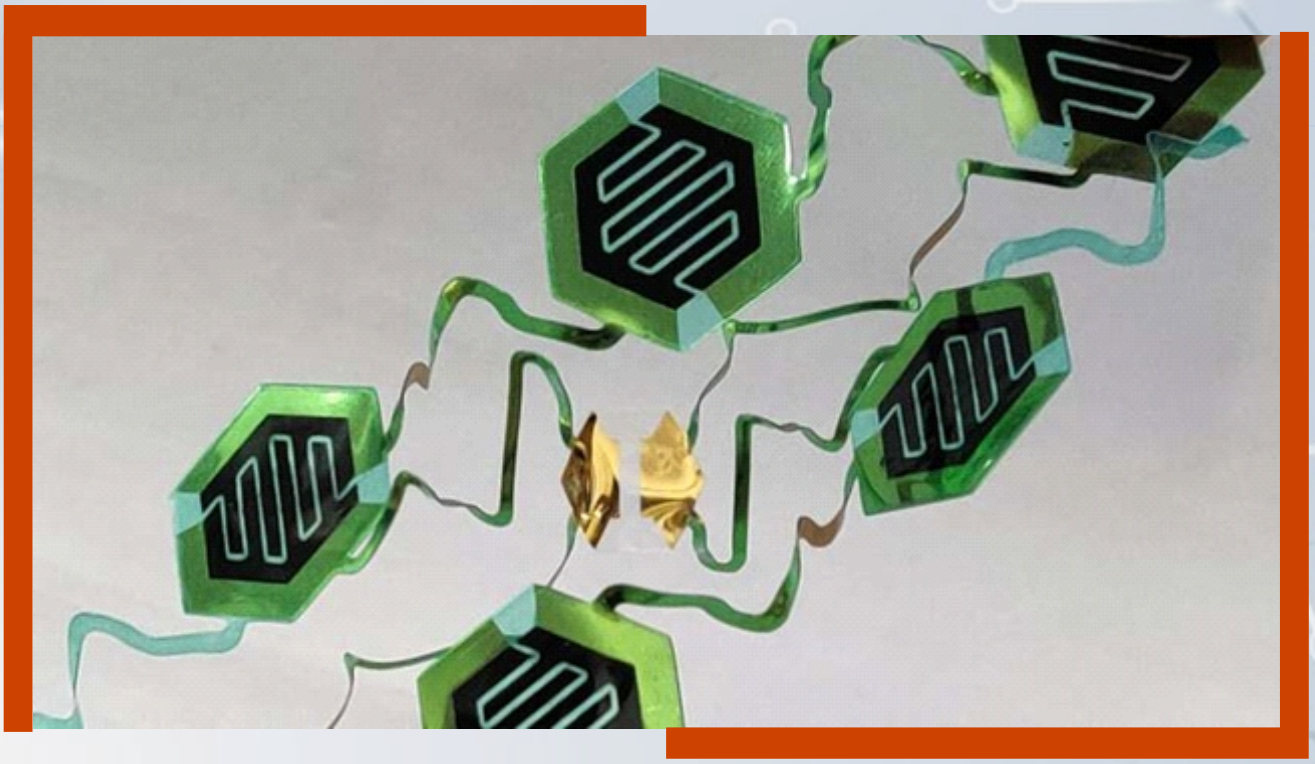
Engineers at UC Berkeley have developed a new technique for making wearable sensors that enables medical researchers to prototype test new designs much faster and at a far lower cost than existing methods.

The new technique replaces photolithography—a multistep process used to make computer chips in clean rooms—with a $200 vinyl cutter. The novel approach slashes the time to make small batches of sensors by nearly 90% while cutting costs by almost 75%, said Renxiao Xu (Ph.D.'20 ME), who developed the technique while pursuing his Ph.D. in mechnical engineering at Berkeley.

"Most researchers working on medical device have no background in photolithography," Xu said. "Our method makes it easy and inexpensive for them to change their sensor design on a computer and then send the file to the vinyl cutter to make."

A description of the technique was published Jan. 25 in *ACS Nano*. Xu, who now works at Apple, and Liwei Lin, professor of mechanical engineering and co-director of the Berkeley Sensor and Actuator Center, were the lead researchers.

Wearable sensors are often used by researchers to gather medical data from patients over extended periods of time. They range from adhesive bandages on skin to stretchable implants on organs, and harness sophisticated sensors to monitor health or diagnose illnesses



These devices consist of flat wires, called interconnects, as well as sensors, power sources and antennas to communicate data to smartphone apps or other receivers. To maintain full functionality, they must stretch, flex and twist with the skin and organs they are mounted on—without generating strains that would compromise their circuitry.

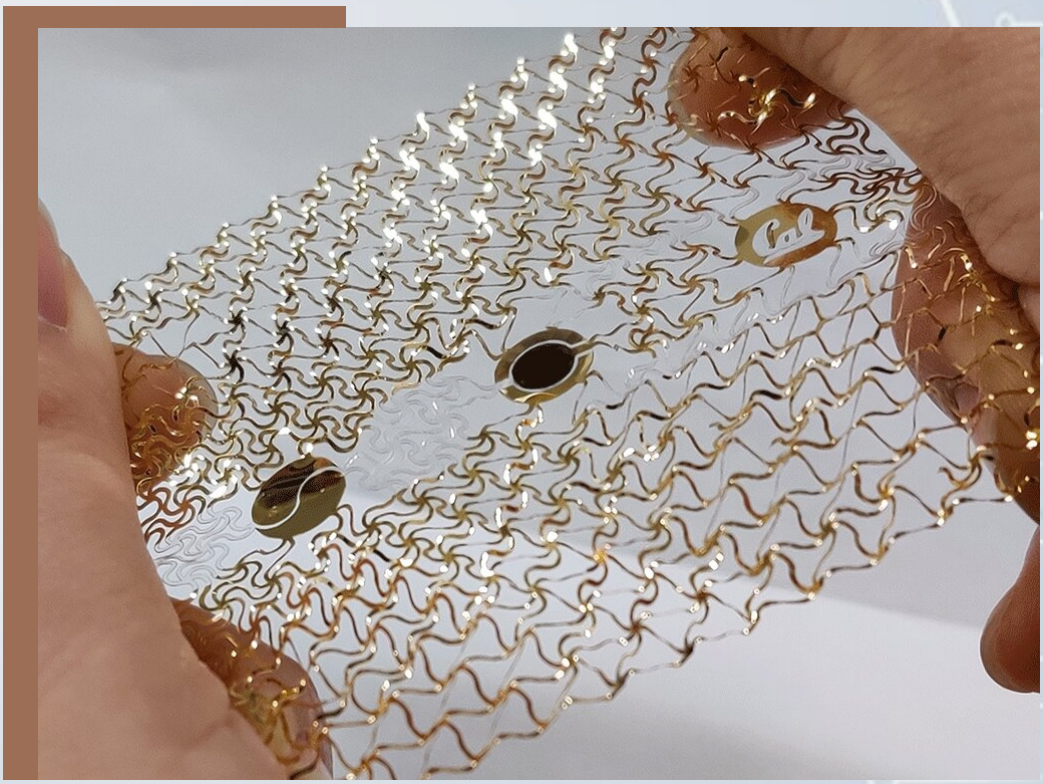
To achieve low-strain flexibility, engineers use an "island-bridge" structure, Xu said. The islands house rigid electronics and sensor components, such as commercial resistors, capacitors and lab-synthesized components like carbon nanotubes. The bridges link the islands to one another. Their spiral and zigzag shapes stretch like springs to accommodate large deformations.

In the past, researchers have built these island-bridge systems using photolithography, a multistep process that uses light to create patterns on semiconductor wafers. Making wearable sensorsthis way requires a clean room and sophisticated equipment.

The new technique is simpler, faster and more economical, especially when making the one or two dozen samples that medical researcher typically need for testing.

Making sensors starts by attaching an adhesive sheet of polyethylene terephthalate (PET) to a Mylar

(biaxially oriented PET) substrate. Other plastics would also work, Xu said.
A vinyl cutter then shapes them using two types of cuts. The first, the tunnel cut, slices through only the top PET layer but leaves the Mylar substrate untouched. The second type, the through cut, carves through both layers.
This is enough to produce island-bridge sensors. First, tunnel cuts are used in the upper adhesive PET layer to trace the path of the interconnects; then the cut PET segments are peeled off, leaving behind the pattern of interconnects on the exposed Mylar surface.
Next, the entire plastic sheet is coated with gold (another conductive metal could be used as well). The remaining top PET layer is peeled away, leaving a Mylar surface with well-defined interconnects, as well as exposed metal openings and contact pads on the islands.
Sensor elements are then attached to the contact pads. For electronic devices, such as resistors, a conductive paste and a common heat plate are used to secure the bond. Some lab-synthesized components, such as carbon nanotubes, can be applied directly to the pads without any heating.
Once this step is done, the vinyl cutter uses through cuts to carve the sensor's contours, including spirals, zigzags and other features.
To demonstrate the technique, Xu and Lin developed a variety of stretchable elements and sensors. One mounts under the nose and measures human breath based on the tiny changes in temperatures it creates between the front and back of the sensor.
"For a breath sensor, you don't want to something bulky," Lin said. "You want something thin and flexible, almost like a tape beneath your nose, so you can fall asleep while it records a signal over a long period of time."
Another prototype consists of an array of water-resistant supercapacitors, which store electrical power like a battery but release it more rapidly. Supercapacitors could provide power for some types of sensors.
"We could also make more complex sensors by adding capacitors or electrodes to make electrocardiogram measurements, or chip-sized accelerometers and gyroscopes to measure motion," Xu said.
Size is sensor cutting's one key limitation. Its smallest features are 200 to 300 micrometers wide, while photolithography can produce features that are tens of micrometers wide. But most wearable sensors do not require such fine features, Xu noted.
The researchers believe this technique could one day become a standard feature in every lab studying wearable sensors or new diseases. Prototypes could be designed using high-powered computer-aided design (CAD) software or simpler apps made especially for vinyl printers.



A simple diagnostic tool for gastrointestinal disorders

As food moves through the digestive tract, contracting muscles along the tract keep things flowing smoothly. Loss of this motility can lead to acid reflux, failure of food to move out of the stomach, or constipation.

Dysmotility disorders are usually diagnosed with a catheter containing pressure transducers, which can sense contractions of the GI tract. MIT researchers have now designed a new device that could offer a cheaper and easier-to-manufacture alternative to existing diagnostics for GI dysmotility, inspired by the design of an ancient Incan technology, the quipu — a set of knotted cords used to communicate information.In animal tests, the MIT researchers and their collaborators at Brigham and Women's Hospital showed that their simple device, a silicone tube filled with liquid metal and knotted many times, produces measurements similar to those generated by the state-of-the-art diagnostic technique, known as high-resolution manometry.

“This is a really simple, inexpensive setup, yet we're able to make a measurement that typically would require devices that cost thousands of dollars and require an instrument that is much more complicated,” says Giovanni Traverso, who is the Karl van Tassel Career Development Assistant Professor of Mechanical Engineering at MIT, a gastroenterologist at Brigham and Women's Hospital, and the senior author of the study. MIT research scientists Kewang Nan and Sahab Babaee are the lead authors of the study, which appears today in *Nature Biomedical Engineering*.

Diagnosing dysmotility

Contractions of the gastrointestinal tract are critical for moving food all the way through the tract, and interruptions of these contractions at any point can cause health problems. The gold-standard manometry diagnostic can be used to measure whether the muscles of the GI tract are working properly to generate those waves.

“High-resolution manometry can measure the pressure and speed with which the contractile waves are traveling, but those systems are fairly expensive, in the tens of thousands of dollars range, and they require maintenance and sterilization between patients,” Traverso says.

Traverso (who grew up in Peru) and Nan thought that the Incan technology of quipu could guide the design of a simpler diagnostic. Quipu devices, which consist of colored cords knotted in different ways, were used by the Inca and other ancient civilizations of the Andes to record information and send messages, before writing was developed.

“Our goal was to make a device comparable to the existing, commercially available, catheter-based pressure transducers, but at the same time, bring down the cost and make it easier to produce and deploy,” Nan says.

The researchers began with a simple catheter made of silicone, which they filled with gallium-indium eutectic, a liquid metal that is nontoxic in small quantities, and sealed it at both ends. In an unknotted state, this tube can respond to changes in pressure but is not sensitive enough to detect changes in pressure in the gastrointestinal tract. When they introduced knots at intervals along the tube, however, the researchers found that the catheter became much more sensitive to changes in pressure and could detect pressures up to about 200 millimeters of mercury, which is around the highest pressure seen in the human digestive tract.

That increased sensitivity is due to the fact that the knots elongate the cross-section of the tube, making it easier to compress, as the researchers showed using numerical models. Also, when the tube is knotted, three or four sections of the tube are stacked atop one another, which further enhances its sensitivity to pressure changes.

The researchers also showed that pressure sensitivity can vary based on the type of knot and how tightly they are tied. For use in the digestive tract, the researchers used knots spaced about 1 centimeter apart, to match the spacing of the pressure transducers in a manometer, but they could be placed closer together for other applications, the researchers say.

In tests in animal models, the researchers used the quipu-inspired sensor to measure pressure in the esophagus as food was swallowed. They also measured a reflex known as the rectoanal inhibitory reflex (RAIR). For both tests, the new devices generated pressure measurements similar to those of the gold-standard manometry technique.

Simpler alternative

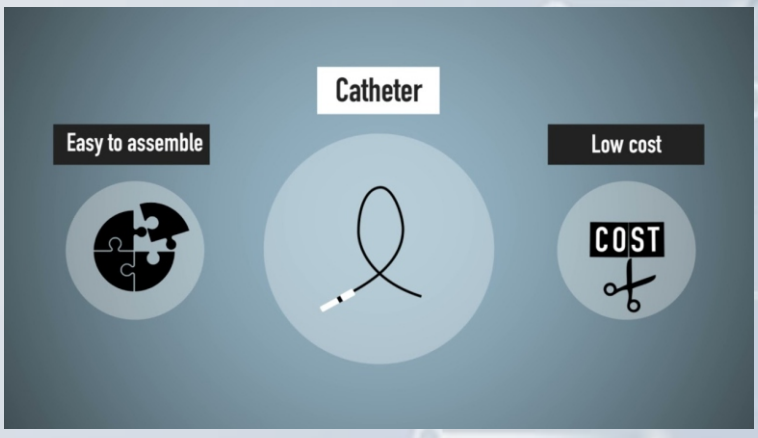
The researchers also showed that the devices can withstand high temperatures and can be treated in an autoclave, a common medical instrument used to sterilize objects with heat and pressure. This gives them an advantage over existing manometry catheters, which can't go in an autoclave and have to be chemically disinfected. Additionally, the devices are so inexpensive to make that they could be discarded after each use if autoclaves aren't available.

"They're super quick to build and super cheap," Nan says. "Another motivation for making GI manometers cheap and disposable is to promote decentralized diagnosis. Here, being cheap facilitates accessibility by bringing down cost, and being disposable further helps public acceptance by eliminating cost of maintenance and reducing complication during use."

The quipu-inspired sensors could be useful in places where there is no access to current manometry technology, but also in more industrialized areas as a less-expensive, easier-to-use alternative to manometry.

"I think this kind of diagnostic could be broadly applied both in developing and developed world settings," Traverso says. "The next step is identifying potential partners to help us manufacture these, and then testing them in patients."

Other authors of the paper include Walter Chan, director of the Center for Gastrointestinal Motility at Brigham and Women's Hospital; Johannes Kuosmanen, an MIT technical associate; Vivian Feig, a postdoc at MIT and Brigham and Women's; Yiyue Luo, an MIT graduate student; Shriya Srinivasan, a postdoc at MIT and Brigham and Women's; Christina Patterson, an MIT undergraduate; and Ahmad Mujtaba Jebran, a technical associate at MIT and Brigham and Women's



Harnessing the power of AI and Robotics to treat spinal cord injuries

A team of researchers at Rutgers University has successfully stabilised an enzyme that can degrade/cure scar tissue resulting from spinal cord injuries and promote tissue regeneration. This has been achieved with Chondroitinase ABC (ChABC) is an enzyme known to degrade scar tissue molecules and promote tissue regeneration. However, at the human body temperature of 98.6° F (37° C), it becomes highly unstable and loses all activity within a few hours, calling for multiple, expensive infusions at very high doses to maintain therapeutic efficacy.

To stabilise everything, synthetic copolymers can wrap around enzymes such as ChABC. Therefore, an AI-driven approach with liquid handling robotics was implemented to re-synthesise and maintain the activity of ChABC at 98.6° F.

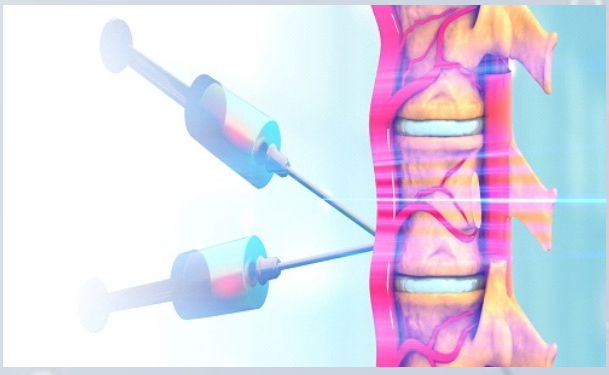
One of the motivators for Adam Gormley's research was his personal experience with spinal cord injury.

"I'll never forget being at the hospital and learning a close college friend would likely never walk again after being paralysed from the waist down after a mountain biking accident," he recalled. "The therapy we are developing may someday help people such as my friend lessen the scar on their spinal cords and regain function."

Through the above technique, researchers were able to identify several copolymers that performed well. In fact, one copolymer combination even continued to retain 30% of the enzyme for up to one week, a promising result for patients seeking care for spinal cord injuries.

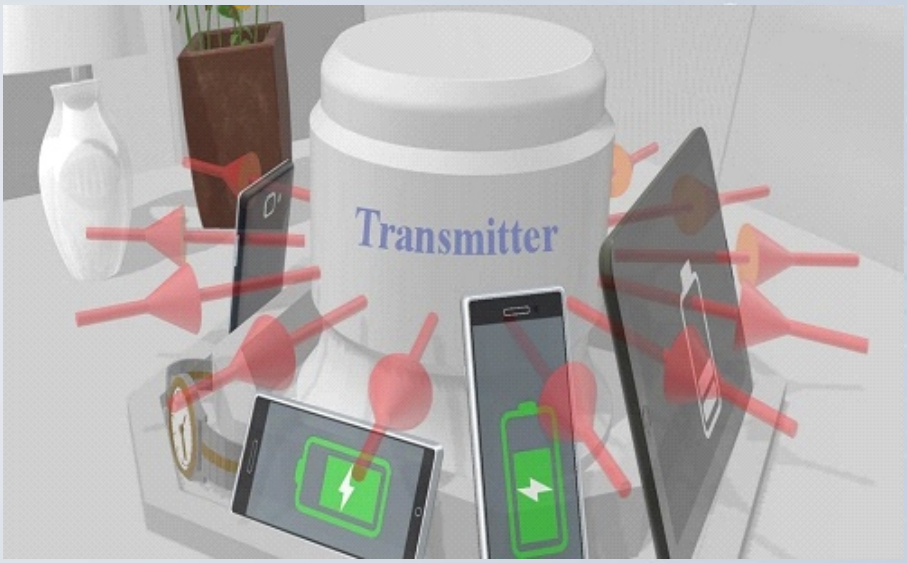
the help of artificial intelligence (AI) and robotics, which helped formulate therapeutic proteins. The development offers new hope for patients coping with spinal cord injuries.

"This study represents one of the first times artificial intelligence and robotics have been used to formulate highly sensitive therapeutic proteins and extend their activity by such a large amount. It's a major scientific achievement," said Adam Gormley, the project's principal investigator and an assistant professor of biomedical engineering at Rutgers School of Engineering (SOE) at Rutgers University-New Brunswick.



Spinal cord injuries, or SCIs, can negatively impact the physical, psychological and socio-economic well-being of patients and their families. Soon after an SCI, a secondary cascade of inflammation produces dense scar tissue that can inhibit or prevent nervous tissue regeneration.

Omnidirectional wireless charging system for home use



Although not a mainstay yet for power transfer, wireless chargers offer a unique and hassle-free way for charging portable electronic devices. No need for an electric outlet is required, which conventional wired chargers rely on.

But the main obstacle for creating a reliable wireless charger that is also omnidirectional is that power transfer occurs quite inefficiently owing to the fluctuating strength of the charging field in a location. Any orientation in the wrong spot wouldn't lead to efficient results. This issue can be solved by using several transmitter coils connected to several power sources for creating a strong charging field. However, this approach increases the complexity of the transmitter. While feedback can properly orient the charging field, the control systems themselves are also complicated and expensive.

To solve this problem, researchers at Aalto University have recently developed an omnidirectional charging system that allows devices placed anywhere around it to get charged with uniform strength. The development addresses the challenge present in existing power transfer system around offering a convenient and reliable design for consumer use.

The key to the new design is a cylindrical power coil. The wire at the top of the coil is wound in the opposite direction to the wire at the bottom of the coil, with a z-shaped bridge connecting them. Since the current flows through these windings in opposite directions, they produce complementary magnetic fields. One field flows out from the middle of the cylindrical coil, around the top winding, and back in through the top. The other flows out from the middle, around the bottom coil, and back in through the bottom.

This results in an even magnetic field around the middle of the charging coil. Receivers placed anywhere within that area charge efficiently, regardless of their position or orientation.

“This was just a proof of concept,” said Yining Liu, researcher and a doctoral candidate at Aalto University. “Now we can work to improve the efficiency – maybe to around 90% – and also the power.”

Based on simulations of the electromagnetic field around a consumer device, the researchers found that the level of exposure conformed to the requirements in safety regulations. However, further safety study is required for full usage.

The new design complements recent work from the same research group, which made it possible to transfer power to multiple, moving receivers in a charging area. The two technologies address different dimensions of the challenge of wireless charging: freedom of movement for industrial applications and free placement for consumer, tabletop devices.

New range of electrothermal MOSFET models to help design engineers validate circuits better

Nexperia recently announced the release of new, enhanced electrothermal models for its MOSFET device. The company claims that the models have higher accuracy as they are modeled for the complete operating temperature range from -55 °C to 175 °C. Furthermore, the overall accuracy is enhanced by the inclusion of device Electromagnetic Compatibility (EMC) performance and reverse diode recovery time. This new approach to supporting external activity is aimed to make device designing easier for every design engineer.

These models will help designers to create and simulate accurate models and validate the thermal, electrical, and EMC performance even before procuring materials or building a prototype. The wide temperature range will ensure accurate results which are required by the designers to ensure that their designs could operate under (unlikely) worst-case conditions, can now simulate their designs across specific temperatures ranges.

According to the company, these wide temperature ranged MOSFET models were developed along with a Tier 1 OEM whose requirements could not be satisfied by any other existing product produced by the company. “These new advanced electrothermal models are intended to give designers the ultimate degree of confidence in the results of their circuit simulations. Initial feedback from our collaborative partner indicates that these models are the most exact they have ever seen,” Andy Berry, applications engineer with Nexperia said.

Circuit Validation has always been resource intensive as the prototyping phase and testing are both expensive and time-consuming. Testing the dynamic characteristics is crucial for EMI consideration, but the lack of realistic accuracy in the existing models caused imperfect test results. But the advanced electrothermal MOSFET models will ensure that engineers can find and rectify the EMC problems and validate their circuits in the preliminary stage of the project, the company said.

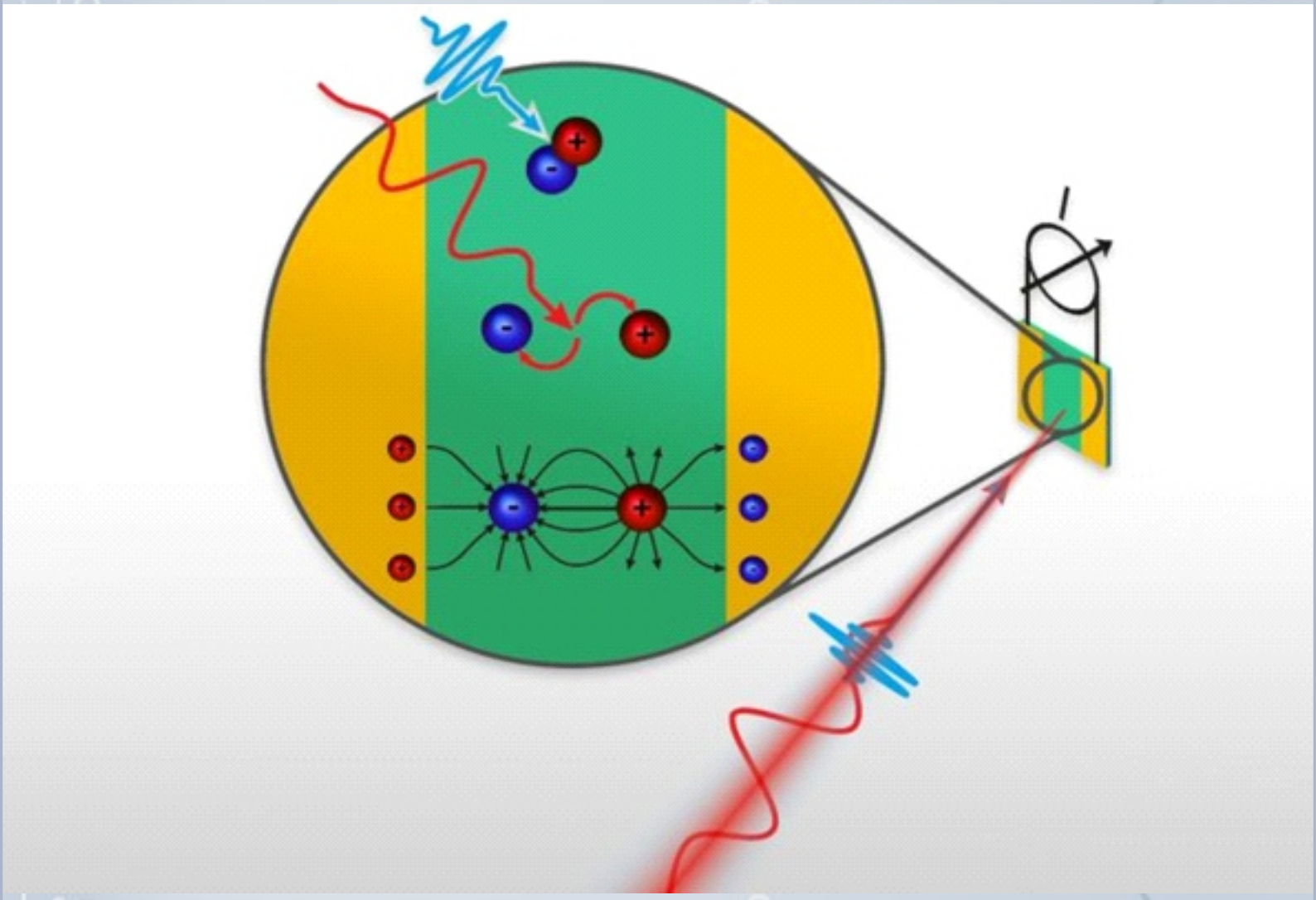
Researchers calculate the speed limit of optoelectronics

Optoelectronics, a sub-discipline of photonics, is the study and application of light-emitting or light-detecting devices. LEDs, optical fibres, photodiodes, etc are all optoelectronic devices. The signal transmission in optoelectronics is fast, but researchers at TU Wien (Vienna), TU Graz and the Max Planck Institute of Quantum Optics in Garching have now identified the limit for how fast optoelectronics could get.

According to their study published in the scientific journal "Nature Communications", the speed can definitely not be increased beyond one petahertz (one million gigahertz), even if the material is excited in an optimal way with laser pulses. This is because quantum-mechanical processes that are responsible for the generation of electric current take a certain amount of time, thus limiting the speed of signal generation and signal transmission.

Electric current and electromagnetic field are closely linked to each other since the electric current is controlled by electromagnetic fields in microelectronics. In order to derive the speed limit of the conversion of electromagnetic fields to current, the team used laser pulses – the fastest, most precise electromagnetic fields available. When any material is hit with laser pulses with a wavelength in the extreme UV range, electrons are excited and move to a higher energy level where they can move freely. This process is called the creation of free charge carriers, and this happens in a very short amount of time – on a time scale of atto- or femtoseconds.

"For a long time, such processes were considered instantaneous," says Prof. Christoph Lemell (TU Wien). "Today, however, we have the necessary technology to study the time evolution of these ultrafast processes in detail."



Embedded studio now supports hard real-time C++ applications

On 28th March 2022, SEGGER Micro controller released a new version (V 6) of its multi-platform IDE, Embedded Studio, which now uses real-time memory management. This improves efficiency and response time when allocating and freeing up memory, satisfying requirements for hard real-time in applications written in C++. The new version supports all common RISC-V 32-bit and 64-bit cores.

"C++ applications require a lot of memory allocation and deallocation behind the scenes, often without the programmer being aware of it", says Rolf Segger, founder of SEGGER. "C++ applications especially see an enormous benefit from our new real-time heap manager. Embedded Studio is the first tool chain that I know of that guarantees fast, constant-time heap operations. These responses are extremely fast, bringing true real-time to embedded systems programmed in C++."

This version of Embedded Studio comes with some additional features. **C++17 Compiler and C++17 Standard Library** is a feature that combines the efficiency and compact code of SEGGER's em Run run time and em Float floating-point libraries. This package includes generic container templates (such as sets, vectors, lists, queues, stacks, maps), standard algorithms (sorting, searching, transformations), function objects, iterators, localization, strings and streams, and utility functions for everyday use cases. **SEGGER Linker** which is also included in this version, is optimized to keep C++ applications small by removing the code duplication frequently encountered with template libraries.

Apart from these new features, Embedded Studio comes with a powerful project manager, source code editor, built-in debugger and can be integrated with J-Link. It is available for unlimited evaluation, and for educational and non-commercial purposes, free of charge, with no restrictions in terms of code size, features, or duration of use. Also, SEGGER software is not covered by an open-source or required attribution license and can be integrated with any commercial or proprietary product, without the obligation to disclose the combined source.