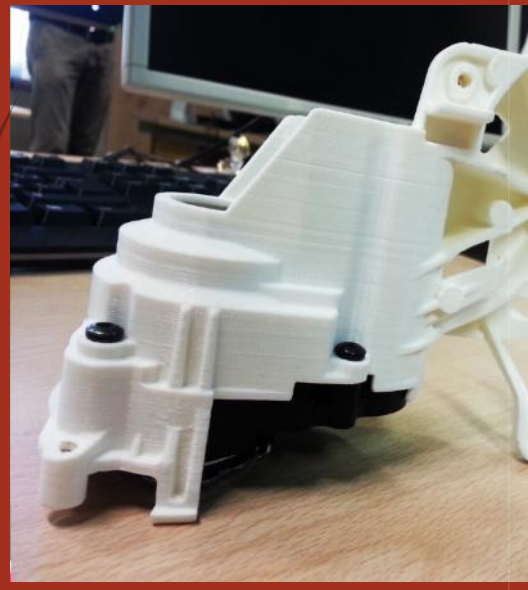
AUGUST

2018

DAuto Newsletter

Edition 2018

108th Edition



> *Design engineers turn designs into reality. Without them, a great idea but nothing more than,... well, a great idea.*

July 2018 refresh

- ✓ *Goodwood 2018: the Michelin Supercar Paddock*
- ✓ *New 3D printer can create complex biological tissues*
- ✓ *Graphene smart membranes can control water*
- ✓ *Rolls-Royce is developing a flying taxi propulsion system*
- ✓ *Electronic skin brings a sense of touch to prosthetics*
- ✓ *500-year-old Leaning Tower of Pisa mystery unveiled by engineers*
- ✓ *Technical Expertise & Collaboration Deliver Prestigious Industry Award For Newport Bridge Project*
- ✓ *Maserati unveils the 550hp Levante GTS*
- ✓ *BMW Motorrad Concept 9cento*

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Mercedes-Benz Vision EQ Silver Arrow Concept

At Pebble Beach Mercedes-Benz has unveiled the the Vision EQ Silver Arrow show car, a single-seater racer that blends the racing heritage with futuristic technologies and the brand's design DNA.

Presented at the Monterey Car Week, the Vision EQ Silver Arrow Concept applies the latest evolution of Mercedes-Benz "Sensual Purity" design language, blending inspiration from the legendary Silver Arrows with advanced technologies and modern stylistic elements..
The study also aims at evolving and establishing the "Progressive Luxury" aesthetics for the new EQ brand, under which Mercedes-Benz will market its electric mobility activities. According to the company, the design will feature "the conscious clash of digital and analogue elements as well as the seamless merging of intuitive and physical design."

In hindsight, the design and the inspiration behind the concept were anticipated by the "Aesthetics Progressive Luxury" design sculpture revealed by Mercedes-Benz back in April. Like the sculpture, the concept pays homage to the record-breaking W 125 car from 1937.

The interior combines traditional, high-quality materials such as genuine leather, polished aluminium and solid walnut, with a digital cockpit that includes a curved panoramic screen with back projection, as well as a touchscreen integrated into the steering wheel.

The electric drivetrain has a total output of 550 kW (750 hp) and is fed by a thin, rechargeable battery located in the underbody, which has a useable capacity of approx. 80 kWh and enables a projected range of over 400 km.

The paintwork in alubeam silver is reminiscent of the historic Silver Arrows which, for weight reasons, did not have a white paint layer.

Exterior Design

With its clear, seamless design, the design idiom of the Vision EQ Silver Arrow is a brand-specific embodiment of the design philosophy of Sensual Purity. The streamlined silhouette of the approximately 5.3-metre long and approximately one metre shallow one-seater vehicle is slender yet sensuous.

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Mercedes-Benz Vision EQ Silver Arrow Concept

These include saddle brown genuine leather on the seat and steering wheel, polished aluminium throughout the interior and solid walnut with darker coniferous wood pinstripes on the floor. This creates a bridge back to the historic racing cars of the Silver Arrow era. On the other hand, modern, high-tech solutions such as the large projection surface for the panoramic screen and innovative user experience solutions such as the virtual race option represent the EQ's typically visionary character. This contrast is an intentional merging of past and future.

The sitting surface and backrest have an unusual pattern which is aligned with the seat contour: Stars have been stitched in with the help of laser engraving. AIRSCARF neck-level heating is integrated into the seat. A four-point seatbelt inspired by motorsport holds the driver securely in place. The pedals can be adapted to the driver's specific stature, with a controller located on the seat for adjusting the pedals.

The show car's body structure is made of carbon fibre. The multiple layers of paintwork in alubeam silver appear like liquid metal over the top. This concept represents the design polar opposites of "hot" and "cold".

Functional attachment parts made of carbon fibre such as the front splitter epitomise the cool and rational aspect of this philosophy. The same applies to the front trim designed as a display, as well as the continuous lighting strip at the front. The side skirts also feature a lighting strip and the large, recessed EQ lettering in front of the rear wheels is illuminated blue as is characteristic of the brand.

Other highlights include the driver's cockpit, which can be folded forwards, and the partially free-standing multi-spoke wheels. The non-rotating hub caps and the partial trim on the wheels are other stylish and innovative highlights. The 168 spokes per wheel are made of lightweight aluminium and are painted a rose gold colour as is typical for EQ.

Offering exceptional traction and correspondingly fast acceleration, the Vision EQ Silver Arrow has slick 255/25 R 24 tyres at the front and 305/25 R 26 tyres at the rear. Attesting to the attention to detail, tyre partner Pirelli has helped to realise a star pattern on the tread.

The rear diffuser is reminiscent of motorsport. Two extendible rear spoilers act as an air brake by increasing the wind resistance when deceleration is desired.

Interior Design

The interior of the Vision EQ Silver Arrow represents the values of Progressive Luxury. The design idiom combines timeless aesthetic appeal with futuristic visions.

When the driver's cockpit is folded forwards, it provides a view of the surprisingly wide interior. A contrast brings it to life: On the one hand, it uses traditional, high-quality materials.

To match the exterior paint finish in alubeam silver, the side walls of the interior are covered in a luxurious, grey suede.

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Pseudo-Satellite Drone Flies for 25 Days Straight, Sets Endurance Record

A solar-powered drone designed to take on the multimillion-dollar market for satellites in space has set a record by staying in flight at high altitude for nearly 26 days. Airbus has plenty of plans for its so-called pseudo-satellite, including possible military reconnaissance and monitoring the spread of wildfires, among other activities.

The European aerospace consortium Airbus announced that the latest model of its Zephyr drone had landed near Yuma, Arizona, late last week, after staying on the wing continuously for 25 days, 23 hours and 57 minutes, and breaking a world record for long-endurance flight.

The drone was driven by electric power from solar panels on its wings during daylight, when it flew at altitudes above 70,000 feet (21,300 meters), Airbus spokesman Alain Dupiech told Live Science.

At night, the drone used stored battery power, dropping to around 50,000 feet (15,240 meters) by morning — well above any clouds and bad weather, and higher than regular air traffic, except military spy planes, Dupiech said.

Previously, the endurance record was held by an older prototype of the Zephyr drone, which stayed airborne 14 days in 2014.

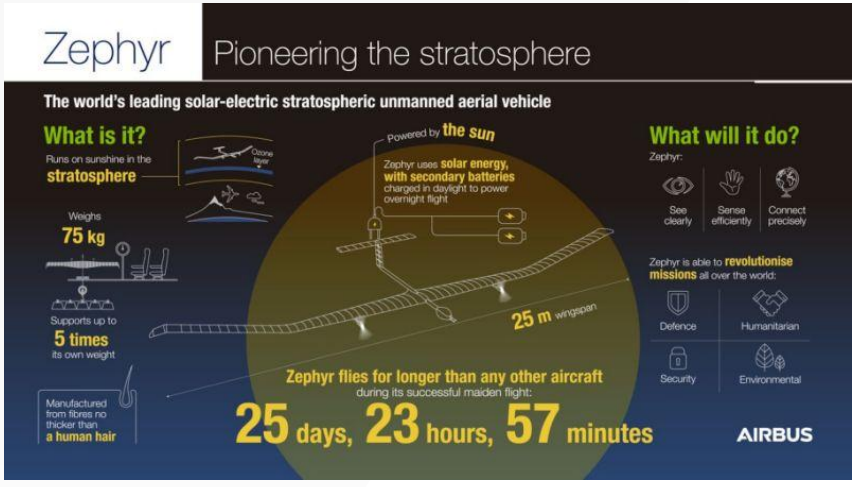
Airbus hopes the latest Zephyr drone will take on some of the commercial market for satellite launches into Earth orbit, by carrying out tasks like high-altitude photography and environmental monitoring for weeks or months at a time.

"It's pretty encouraging," Dupiech said. "We're demonstrating that the first production series unit is a lot better than the prototype.“

High-altitude pseudo-satellite

Airbus calls its Zephyr drone a HAPS, or high-altitude pseudo-satellite.

A typical rocket launch to put satellites into Earth orbitcan cost tens or hundreds of millions of dollars, and Airbus thinks that high-flying long-endurance drones like the Zephyr can do a better job at many tasks than satellites, and at much lower costs.



HAPS can also be refitted on the ground and redeployed on different missions – but satellites are usually committed to only one task, such as communications or environmental monitoring, and typically carry out the same task for many years.

The Zephyr project manager for the Airbus consortium, Sophie Thomas, told Live Science in an email that one of the key applications for the drone would be in providing internet connectivity to users on the ground.

Airbus faces competition in that potential market, from high-altitude balloon-based internet experiments like Project Loon from the X lab at Alphabet (formerly Google).

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Pseudo-Satellite Drone Flies for 25 Days Straight, Sets Endurance Record

The Defense News website reported in July that the MOD was paying around 13 million pounds ($17 million) for the first three Zephyr drones, which will be operated on their behalf by Airbus.

Although the military won't say what their Zephyrs will be used for, their capabilities for reconnaissance and communications have been noted by the news media.

Thomas said that while the military market for Zephyr drones was very important, "we see civilian applications as the largest potential market for Zephyr."

They include civilian tasks that might be unaffordable using satellites in orbit, or impractical with other high-altitude technologies, she said, such as monitoring the spread of wildfires and oil spills or recording the world's changing environmental landscape.

Thomas said high-flying drones like Zephyr could be much more maneuverable and flexible in Earth orbit than either high-altitude balloons or satellites.

"[Zephyr] can be re-tasked instantly to operate over a different location," she said. "We can land and swap out the payload to undertake different missions, or to take immediate advantage of technology upgrades for the payload.“

The altitudes that the Zephyr drone can fly at also made it more suitable than satellites in a geostationary Earth orbit (GEO) — which orbit Earth much higher up — for many applications, Thomas said.

"It operates at around 20 kilometers [12 miles] from the Earth, compared to GEO satellites at around 36,000 km [22,000 miles]," she said. "This means we can capture much higher-resolution imagery and video for applications such as disaster management. It also means we have a lower latency for communications.“

Weight breakthrough

Thomas said that one of the technical breakthroughs of the latest Zephyr drone was bringing down the total weight of the aircraft.

Although it has a wingspan of more than 80 feet (25 m), the Zephyr weighs only about 150 pounds (75 kilograms), including a 15-pound [7.5 kg] payload, and it is light enough to be launched by hand.

The new batteries on the latest Zephyr means it could stay in flight for more than 100 days; it also has a more efficient solar array and a more efficient propulsion system than the 2014 prototype, Thomas said.

"We have secured improvements across the whole design, and it is the combined effect which gives us such a capable system," Thomas said.

Airbus has already put the latest model of the Zephyr drone into production in the U.K., and its first customer is the British Ministry of Defence [MOD], which runs the country's armed forces.

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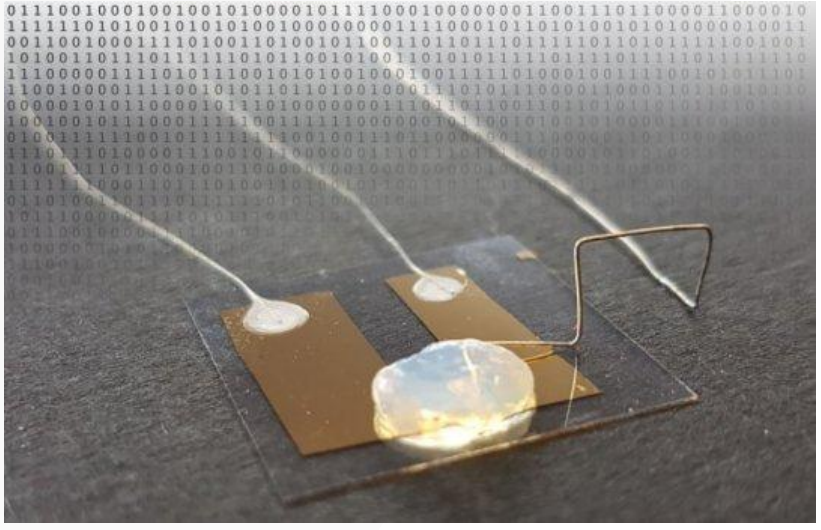
Smallest transistor switches current with a single atom in solid electrolyte



The single-atom transistor is based on an entirely new technical approach. The transistor exclusively consists of metal, no semiconductors are used. This results in extremely low electric voltages and, hence, an extremely low energy consumption. So far, KIT's single-atom transistor has applied a liquid electrolyte. Now, Thomas Schimmel and his team have designed a transistor that works in a solid electrolyte. The gel electrolyte produced by gelling an aqueous silver electrolyte with pyrogenic silicon dioxide combines the advantages of a solid with the electrochemical properties of a liquid. In this way, both safety and handling of the single-atom transistor are improved.

At Karlsruhe Institute of Technology (KIT), physicist Professor Thomas Schimmel and his team have developed a single-atom transistor, the world's smallest. This quantum electronics component switches electrical current by controlled repositioning of a single atom, now also in the solid state in a gel electrolyte. The single-atom transistor works at room temperature and consumes very little energy, which opens up entirely new perspectives for information technology. The transistor is presented in Advanced Materials.

Digitization results in a high energy consumption. In industrialized countries, information technology presently has a share of more than 10% in total power consumption. The transistor is the central element of digital data processing in computing centers, PCs, smartphones, or in embedded systems for many applications from the washing machine to the airplane. A commercially available low-cost USB memory stick already contains several billion transistors. In future, the single-atom transistor developed by Professor Thomas Schimmel and his team at the Institute of Applied Physics (APH) of KIT might considerably enhance energy efficiency in information technology. "This quantum electronics element enables switching energies smaller than those of conventional silicon technologies by a factor of 10,000," says physicist and nanotechnology expert Schimmel, who conducts research at the APH, the Institute of Nanotechnology (INT), and the Material Research Center for Energy Systems (MZE) of KIT. Earlier this year, Professor Schimmel, who is considered the pioneer of single-atom electronics, was appointed Co-Director of the Center for Single-Atom Electronics and Photonics established jointly by KIT and ETH Zurich.

In Advanced Materials, the KIT researchers present the transistor that reaches the limits of miniaturization. The scientists produced two minute metallic contacts. Between them, there is a gap as wide as a single metal atom. "By an electric control pulse, we position a single silver atom into this gap and close the circuit," Professor Thomas Schimmel explains. "When the silver atom is removed again, the circuit is interrupted." The world's smallest transistor switches current through the controlled reversible movement of a single atom. Contrary to conventional quantum electronics components, the single-atom transistor does not only work at extremely low temperatures near absolute zero, i.e. -273 °C, but already at room temperature. This is a big advantage for future applications.

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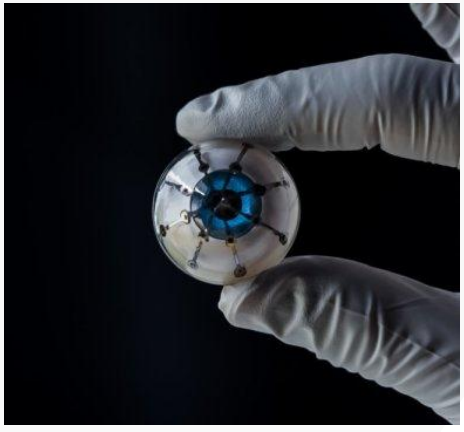
Researchers 3D print prototype for 'bionic eye'



"My mother is blind in one eye, and whenever I talk about my work, she says, 'When are you going to print me a bionic eye?'" McAlpine said.

McAlpine says the next steps are to create a prototype with more light receptors that are even more efficient. They'd also like to find a way to print on a soft hemispherical material that can be implanted into a real eye.

McAlpine's research team includes University of Minnesota mechanical engineering graduate student Ruitao Su, postdoctoral researchers Sung Hyun Park, Shuang-Zhuang Guo, Kaiyan Qiu, Daeha Joung, Fanben Meng, and undergraduate student Jaewoo Jeong.

The research was funded by the National Institute of Biomedical Imaging and Bioengineering of the National Institutes of Health (Award No. 1DP2EB020537), The Boeing Company, and the Minnesota Discovery, Research, and InnoVation Economy (MnDRIVE) Initiative through the State of Minnesota.

A team of researchers at the University of Minnesota have, for the first time, fully 3D printed an array of light receptors on a hemispherical surface. This discovery marks a significant step toward creating a "bionic eye" that could someday help blind people see or sighted people see better.

The research is published today in Advanced Materials, a peer-reviewed scientific journal covering materials science. The author also holds the patent for 3D-printed semiconducting devices.

"Bionic eyes are usually thought of as science fiction, but now we are closer than ever using a multimaterial 3D printer," said Michael McAlpine, a co-author of the study and University of Minnesota Benjamin Mayhugh Associate Professor of Mechanical Engineering.

Researchers started with a hemispherical glass dome to show how they could overcome the challenge of printing electronics on a curved surface. Using their custom-built 3D printer, they started with a base ink of silver particles. The dispensed ink stayed in place and dried uniformly instead of running down the curved surface. The researchers then used semiconducting polymer materials to print photodiodes, which convert light into electricity. The entire process takes about an hour.

McAlpine said the most surprising part of the process was the 25 percent efficiency in converting the light into electricity they achieved with the fully 3D-printed semiconductors. "We have a long way to go to routinely print active electronics reliably, but our 3D-printed semiconductors are now starting to show that they could potentially rival the efficiency of semiconducting devices fabricated in microfabrication facilities," McAlpine said. "Plus, we can easily print a semiconducting device on a curved surface, and they can't."

McAlpine and his team are known for integrating 3D printing, electronics, and biology on a single platform. They received international attention a few years ago for printing a "bionic ear." Since then, they have 3D printed life-like artificial organs for surgical practice, electronic fabric that could serve as "bionic skin," electronics directly on a moving hand, and cells and scaffolds that could help people living with spinal cord injuries regain some function.

McAlpine's drive to create a bionic eye is a little more personal.

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Infiniti QX50 multi-tone interior inspired by luxury resort hotels

Infiniti has released some insights on the design of the interior for the all-new 2019 QX50 SUV, for which designers took inspiration from luxury hotels.

A creamy Pantone colour, called Coconut Milk, represents the classic mainstay of a white and/or off-white, while a rich chocolate colour titled Emperador adds strength and substance and Pantone's classic navy-like Sailor Blue anchors the palette – just as the dark blue Ultrasuede® application does on the QX50 interior.

"The quest to find the perfect fit of materials, colours, forms and ergonomics have driven our designers and engineers to create the best interior INFINITI has ever produced," said Karim Habib, Executive Design Director.
"The unrivaled interior space, carefully curated application of colours, high quality materials and advanced craftsmanship make the cabin as welcoming and comfortable as it is luxurious. The QX50's asymmetrical layout and calm, controlled atmosphere is designed to meet different needs of the driver and passengers."

Below we report the official document released by Infiniti, which goes into details about the importance of color trends in modern car design and about the solutions and materials selected for the QX50, the SUV first presented at the 2017 Los Angeles Auto Show.

To create the multi-tone colour combination featured in the Autograph interior of the new QX50, Infiniti designers took inspiration from the look and feel of luxury resort hotels. The designers wanted a forward-thinking interior and to provide drivers with a luxury experience every time they entered their mid-size crossover.

For the unique colour combination, the design team drew inspiration from the experience one would have walking into a luxury resort beachfront hotel.

Starting with warmer colour tones, the rich chocolate brown replicates wood applications in the resort and the surrounding trees, followed by a creamy off-white representing the sand on a beach.

The highlights of a cooler dark navy blue on the center console, reminiscent of the ocean water, strike the proper balance between warm and cool, creating a comfortable, yet invigorating environment.

The QX50 interior is in line with modern design trends. In response to consumers' continued embrace of colour, designers are recognizing the need to show more colour in their collections, according to the Pantone Colour Institute.

Highlighting a more multi-faceted colour story, the three main colours of the QX50 Autograph interior are very similar to colour tones at the forefront of this year's PANTONE® Fashion Color Trend Report 2018.

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Infiniti QX50 multi-tone interior inspired by luxury resort hotels

The all-new QX50 interior is finished in supple leathers, tailored stitching and genuine open-pore wood. Where many luxury vehicle interiors use high-gloss wood surfaces to create the perception of quality, the all-new 2019 QX50 is finished in genuine, matte finish open-pore maple wood.

It is treated to retain its natural characteristics in texture and appearance. Running a hand over it, the grain of the wood is still detectable to the touch, demonstrating a high level of craftsmanship to create an authentic, modern and highly tactile dashboard.

Using bespoke manufacturing methods, wrap-and-sew detailing is a highlight of the handcrafted ambience. The leather on the dash is selected for its quality and is hand-wrapped over the edges of the panels. The seats, door panels and dashboard feature a laser hole-cut stitch pattern, tailored to follow the curves of the interior surfaces. Contrast colour stitching is used on the seats for a luxury look and feel.

The available moonroof stretches across the cabin, providing a dramatic, panoramic view of the sky for passengers. This visually enhances interior space, flooding the cabin with natural light.

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World's first-ever 4D printing for ceramics

"The whole process sounds simple, but it's not," said Professor Lu. "From making the ink to developing the printing system, we tried many times and different methods. Like squeezing icing on a cake, there are a lot of factors that can affect the outcome, ranging from the type of cream and the size of the nozzle, to the speed and force of squeezing, and the temperature."

A research team at City University of Hong Kong (CityU) has achieved a ground-breaking advancement in materials research by successfully developing the world's first-ever 4D printing for ceramics, which are mechanically robust and can have complex shapes. This could turn a new page in the structural application of ceramics.

Ceramic has a high melting point, so it is difficult to use conventional laser printing to make ceramics. The existing 3D-printed ceramic precursors, which are usually difficult to deform, also hinder the production of ceramics with complex shapes.

To overcome these challenges, the CityU team has developed a novel "ceramic ink," which is a mixture of polymers and ceramic nanoparticles. The 3D-printed ceramic precursors printed with this novel ink are soft and can be stretched three times beyond their initial length. These flexible and stretchable ceramic precursors allow complex shapes, such as origami folding. With proper heat treatment, ceramics with complex shapes can be made.

The team was led by Professor Jian Lu, Vice-President (Research and Technology) and Chair Professor of Mechanical Engineering, who is a distinguished materials scientist with research interests ranging from fabricating nanomaterials and advanced structural materials to the computational simulation of surface engineering.

With the development of the elastic precursors, the research team has achieved one more breakthrough by developing two methods of 4D printing of ceramics.
4D printing is conventional 3D printing combined with the additional element of time as the fourth dimension, where the printed objects can re-shape or self-assemble themselves over time with external stimuli, such as mechanical force, temperature, or a magnetic field.

In this research, the team made use of the elastic energy stored in the stretched precursors for shape morphing. When the stretched ceramic precursors are released, they undergo self-reshaping. After heat treatment, the precursors turn into ceramics.

The resultant elastomer-derived ceramics are mechanically robust. They can have a high compressive strength-to-density ratio (547 MPa on 1.6 g cm-3 microlattice), and they can come in large sizes with high strength compared to other printed ceramics.

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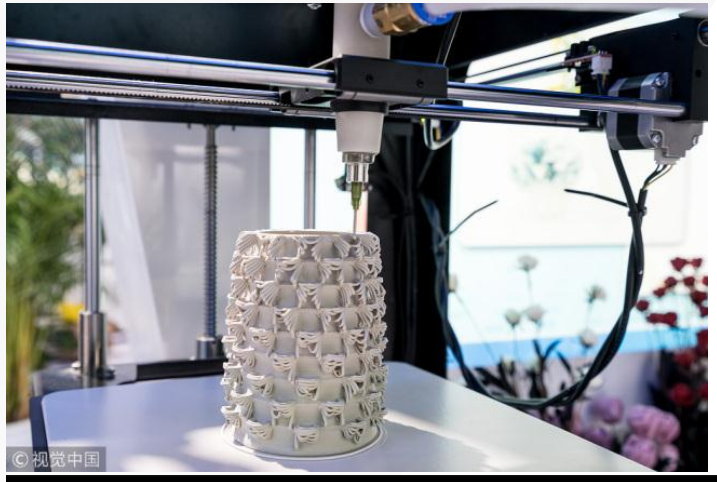
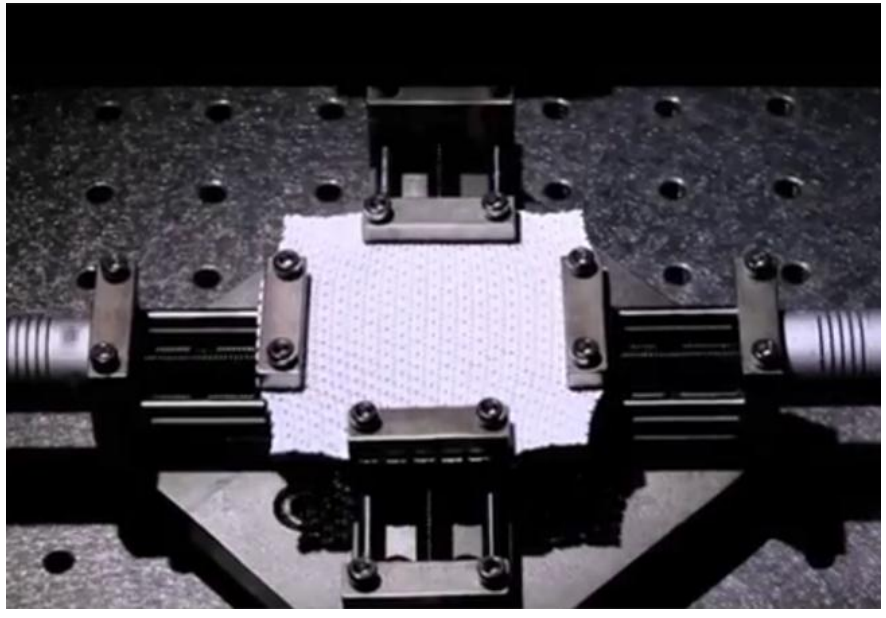
World's first-ever 4D printing for ceramics





It took more than two and a half years for the team to overcome the limitations of the existing materials and to develop the whole 4D ceramic printing system.

In the first shaping method, a 3D-printed ceramic precursor and substrate were first printed with the novel ink. The substrate was stretched using a biaxial stretching device, and joints for connecting the precursor were printed on it. The precursor was then placed on the stretched substrate. With the computer-programmed control of time and the release of the stretched substrate, the materials morphed into the designed shape.

In the second method, the designed pattern was directly printed on the stretched ceramic precursor. It was then released under computer-programming control and underwent the self-morphing process.

The innovation was published in the latest issue of top academic journal Science Advances under the title "Origami and 4D printing of elastomer-derived ceramic structures." All research team members are from CityU, including Dr LIU Guo, Research Assistant, Dr ZHAO Yan, Senior Research Associate, and Dr WU Ge, Research Fellow.

"With the versatile shape-morphing capability of the printed ceramic precursors, its application can be huge!" said Professor Lu. One promising application will be for electronic devices. Ceramic materials have much better performance in transmitting electromagnetic signals than metallic materials. With the arrival of 5G networks, ceramic products will play a more important role in the manufacture of electronic products. The artistic nature of ceramics and their capability to form complex shapes also provide the potential for consumers to tailor-make uniquely designed ceramic mobile phone back plates.

Furthermore, this innovation can be applied in the aero industry and space exploration. "Since ceramic is a mechanically robust material that can tolerate high temperatures, the 4D-printed ceramic has high potential to be used as a propulsion component in the aerospace field," said Prof Lu.

Riding on the breakthrough in material and 4D-printing technique advancement, Prof Lu said the next step is to enhance the mechanical properties of the material, such as reducing its brittleness.

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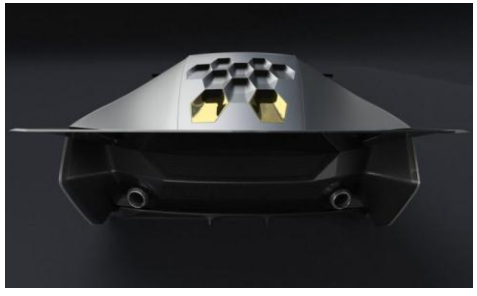
Salaff Design previews limited edition C2 supercar



At the Pebble Beach Concours d'Elegance Salaff Design will unveil the C2, a supercar based on the Lamborghini Gallardo and featuring a distinctive styling.

The distinctive styling treatment of the 2-seater C2 supercar takes inspiration from the spirit of vintage racing cars, yet uses a future-oriented, bold design language made of sharp lines and angles, and an interplay of surfaces and voids, facets and fluidity.

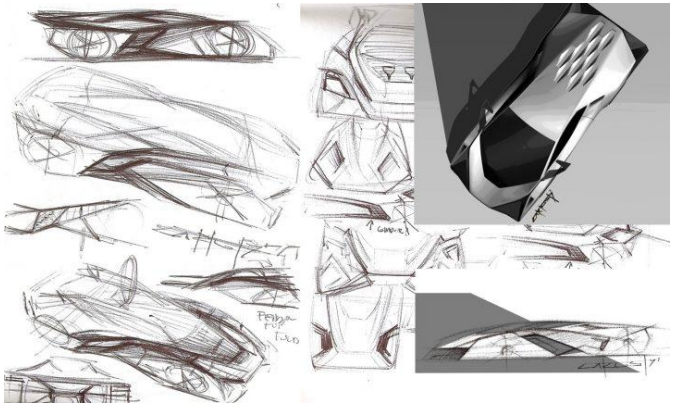
The man behind the project is Carlos Salaff, former Senior Exterior Designer at Mazda's Californian design studio, who founded his own company back in 2015.

Speaking about the C2, he explains "the exterior forms hint at timeless classics like the Ferrari 330 P4, Porsche 917 and Peugeot 905, while at the same time expressing a modernity found in architecture and fashion."

The body will be built in carbon fiber and/or optional hand-beaten aluminum metal sheets.

The cockpit features robust toggle switches, machined aluminum details, carbon fiber and durable leathers, which contribute to a timeless design enhancing the driving experience and the connection between man and machine.

The vehicle is planned to be handbuilt to order: customer will provide the donor Gallardo, which will be then modified both mechanically (mainly drivetrain and suspensions) and aesthetically.



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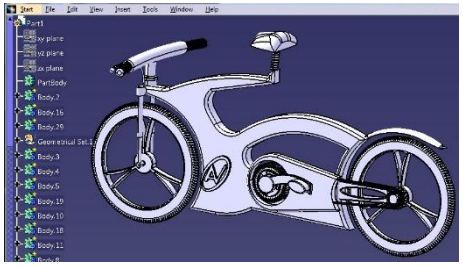
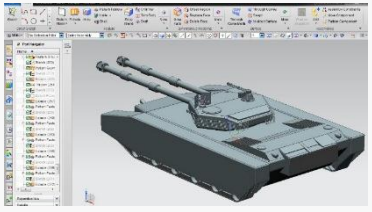
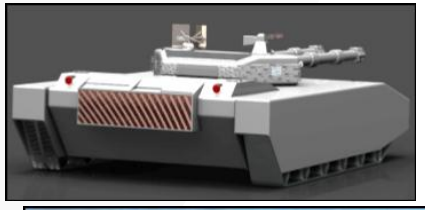
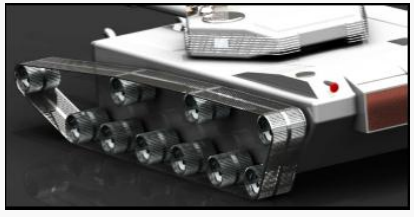
Student's Corner

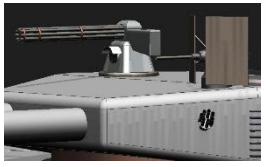








By :
Archit R Das
(TIT Advance) BHOPAL
Design Tool : UG Nx 9



By :
Ashutosh Keshri
(NRIIST) BHOPAL
Design Tool : CATIA V5

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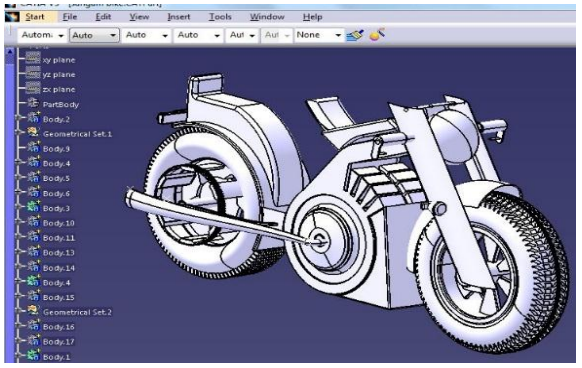

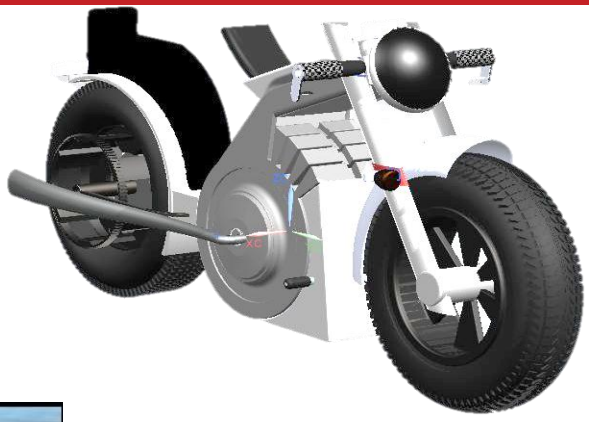

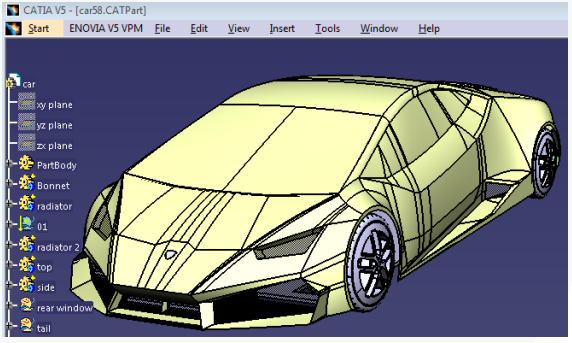

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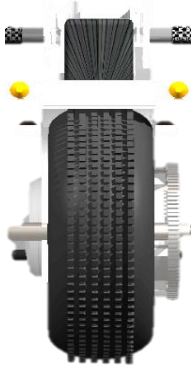

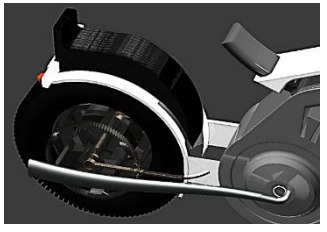

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August 2018

Student's Corner

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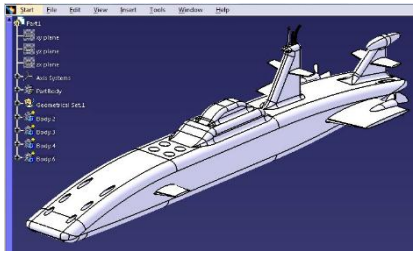

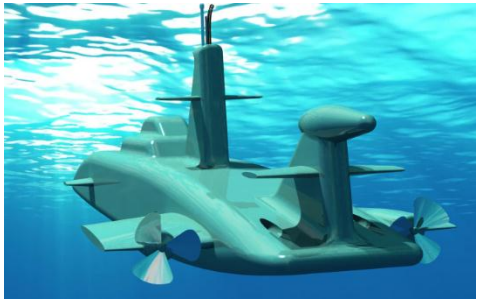

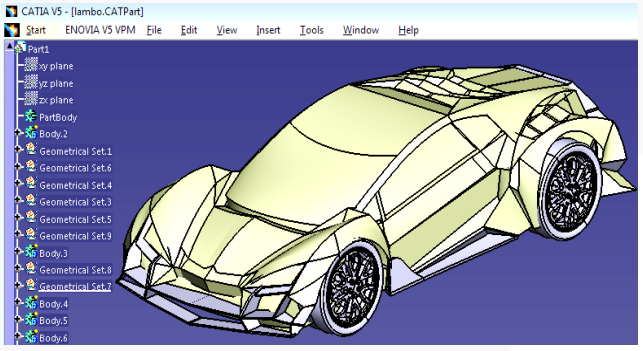

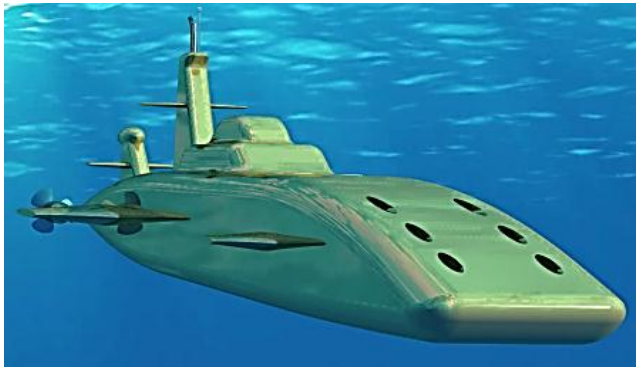

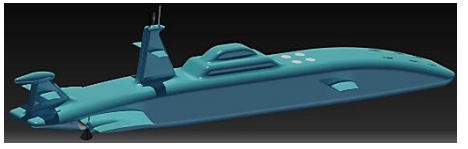

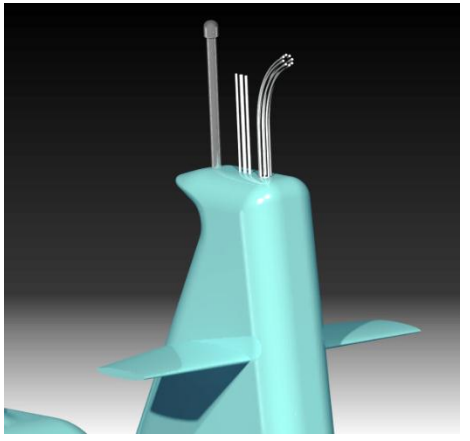

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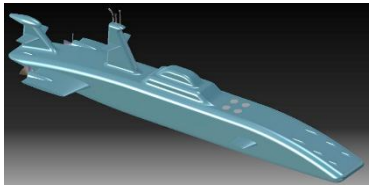

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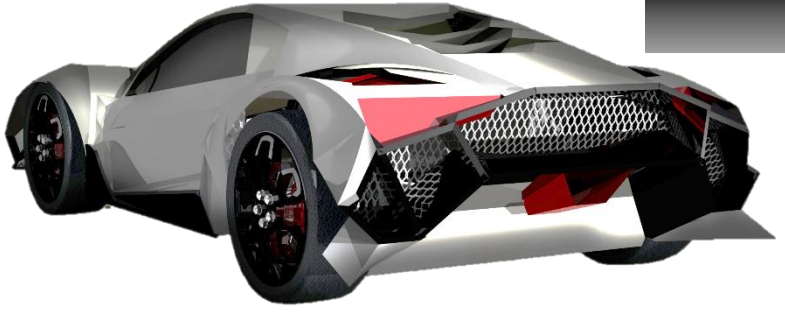

“Never be satisfied with inaction. Question and redefine your purpose to attain progress”

Jeffrey K. Liker, The Toyota Way

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