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TECHNOTRENDS® NEWSLETTER

The biggest ideas that are changing everything

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Virtual Reality and Subliminal Marketing

By Daniel Burrus, CEO of Burrus Research

2016 is set to be the year that VR becomes a reality as a wealth of headsets begin to bombard consumers and is seen by many as a watershed moment that this technology becomes mainstream.

Facebook-owned Oculus Rift, PlayStation VR, and the HTC Vive are just a few examples of household names launching VR headsets in the next few months after investing very heavily to make this the year of the immersive experience.

There is little doubt that VR has the potential to revolutionize the entire entertainment, tourism and even learning industry if audiences adopt the concept of strapping a device to their heads. Equally, there will be those that will instantly feel compelled to compare it to the fad of the first 3D television sets a few years ago.

CES, also known as the Consumer Electronics Show recently offered an early indicator of consumer trends in Las Vegas in the first week of January. This year's show was dominated by virtual reality, and tech journalists across the globe were frantically tapping away "2016 year of VR" after being surrounded by headsets to fit any budget made of cardboard or plastic to even bring your smartphone to life too.

However, if mainstream audiences will embrace VR as predicted, should we be concerned that this completely immersive experience could lead us down the dark road of sinister subliminal advertising again?

The problem today is, who is regulating the same practice applied to VR equipment and other technology, that has the increasing capability of a much deeper subliminal impact on the unknowing user given the deep, immersive environment of VR.

> *"Our brains are already receiving subliminal messages found in the music we listen to.*

There are already attempts to create music apps and a smartwatch that claim to play subliminal messages when listening to music at a frequency that your ear does not detect, but your brain does.

You can also bet your bottom dollar that the concept behind this seemingly harmless idea could be incredibly valuable in the hands of advertising agencies as well as candidates running for office.

Before plugging ourselves into the Matrix en masse, maybe we should consider the potential implications involved of those that might use

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TECHNOLOGY NEWS HIGHLIGHTS

Solar Sand

The same Middle Eastern deserts that have become synonymous with oil may soon be the key to expanding solar energy reserves as researchers turn to using sand as a storage medium for solar thermal energy. The results of a feasibility project known as Sandstock were recently released, which demonstrated the usability, practicality and stability of storing energy at temperatures of up to 1,000 degrees Celsius (1,800 degrees Fahrenheit).

The system was inspired by a traditional sand hourglass with two tanks – a cold tank on top and a hot tank directly below it. The cold tank is essentially a hollow cylinder that allows concentrated solar energy to penetrate. The heated sand moves by gravity to the hot tank where it can be discharged on demand. A three-step heat exchanger immersed in the hot sand produces super-heated steam that flows into a turbine to generate power. A mechanical conveyer then transfers the cooled sand back to the upper tank.

The types of sand best suited for the process are characterized using advanced microscopy to examine the size and shape of the grains and ensure that they can be transported via gravity efficiently. The method, which utilizes the sand both as a solar absorber and as a thermal energy storage material, could greatly reduce the cost of solar energy production. It has been estimated that, between the Middle East and North Africa, sufficient solar energy could be harvested to supply 50 to 70 percent of worldwide demand for electricity.

For information: Nicolas Calvert, Masdar Institute, P.O. Box 54224, Abu Dhabi, United Arab Emirates; phone: +971-2-810-9333; fax: +971-2-810-9901; email: info@masdar.ac.ae; Web site: www.masdar.ac.ae/

Ancient Gene Combats Cancer

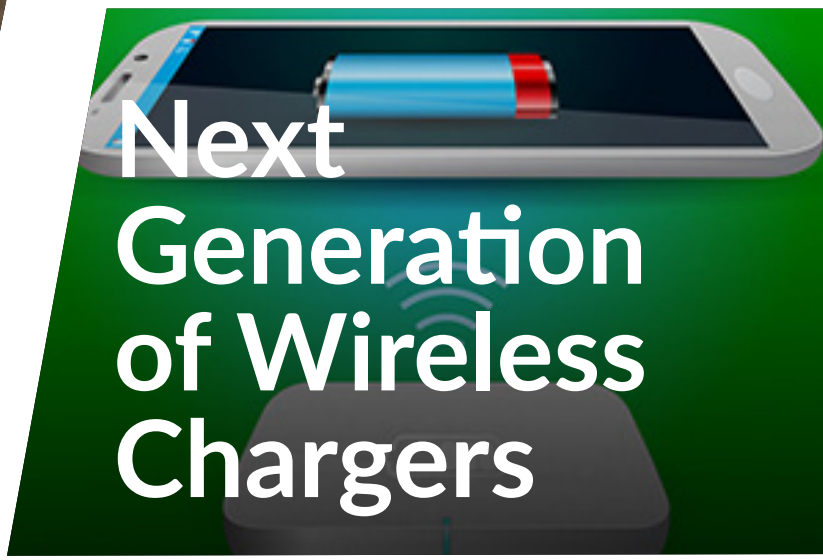
One would expect that large and long-lived animals – such as elephants – would be more susceptible to cancer due to the fact that their cells need to divide many more times, paving the way for possible mutations. But it turns out that's not the case. According to zoo necropsy records of elephants, less than 5 percent die from cancer, whereas in humans the estimates range up to 25 percent.

Recently published research indicates that the gene responsible for this discrepancy is known as p53, an ancient gene found in all multicellular animals. The purpose of p53 is to detect cell damage and prevent further division until it has been repaired. In humans, one copy is inherited from each parent. However, at least 20 copies from each parent have been found in samples of African elephant blood.

In order to examine the effects of these higher concentrations, researchers exposed elephant cells to radiation, hypothesizing that they would more effectively repair DNA damage. But the results were just the opposite. In fact, the cells with damaged DNA were twice as likely to die, effectively killing off the cancer.

Once again, taking a lead from evolution and nature could have profound implications for new approaches to cancer prevention and treatment.

For information: Joshua Schiffman, University of Utah, Pediatric Administration, 295 Chipeta Way, Room 2S010, Salt Lake City, UT 84108; phone: 801-587-4745; email: Joshua.schiffman@hci.utah.edu; Web site: www.utah.edu



Next Generation of Wireless Chargers

A new wireless charging system called Cota recently debuted at the 2016 Consumer Electronics Show, and it has mobile device manufacturers buzzing. Capable of charging dozens of devices simultaneously, the system could turn charging pads and wall chargers into relics of the past.

The base station consists of hundreds of compact, omnidirectional antennas and a small power receiver that detects any Cota-enabled devices within 30 feet.

Transceivers in the devices send packets of information to the base station – including their current location and power level – and Cota automatically directs the necessary power to charge the battery.

The system operates at 2.8 Gigahertz – well out of range of interference from other radiofrequency devices such as Bluetooth and WiFi. The system also monitors patterns in device usage to ensure that they're all charged

to capacity, and unlike traditional chargers that are "always on," Cota hibernates when not in use to conserve energy.

The small package can be integrated easily and cost-effectively into virtually any rechargeable device. Base stations could be installed at home, office, restaurants, and other public spaces to provide continuous charging anywhere, anytime.

For information: Ossia Inc., 11235 SE 6th Street, Bellevue, WA 98004; phone: 425-406-6477; Web site: www.ossia.com/cota

Digital Tattoos

The first truly wearable, flexible sensors to hit the market are designed to help you keep an eye on your health. The technology, created by researchers at the University of Illinois, is slated to be launched in two different products – one for research and one for personal use.

BioStamp® is a high-end product designed to collect large volumes of physiological data and combine them with advanced analytics to study the efficacy of various therapeutic approaches to disease.

It contains a three-axis accelerometer and gyroscope, surface electromyographic sensors to monitor muscle movement and electrodes for recording cardiac activity.

On-board Bluetooth Smart® communication transfers information to a tablet for storage and analysis, and cloud-based storage enables collaboration between multiple clinicians.

My UV Patch was developed in collaboration with L'Oreal to monitor skin exposure to UV radiation and to educate consumers about UV-induced sun damage. The thin stick-on patch contains dyes that change color to measure exposure over time. By photographing the patch with their smartphone, users can determine when it's time to seek out shade.

For information: John Rogers, MC10 Inc., 10 Maguire Road, Building 3, First Floor, Lexington, MA 02421; phone: 617-234-4448; fax: 617-234-0093; email: info@mc10inc.com; Web site: https://mc10inc.com/ (NOTE: Rogers' work was also highlighted in the May 2014 and November 2014 issues of Technotrends Newsletter)

Smart Ski Vest

A new addition to the ever-growing line of wearable technologies is designed to keep skiers safer on the slopes.

The Smart Ski Airbag Vest employs an array of sensors – including GPS, a gyroscope and an accelerometer – to detect changes in motion that are likely the result of a loss of balance and quickly inflate to protect the

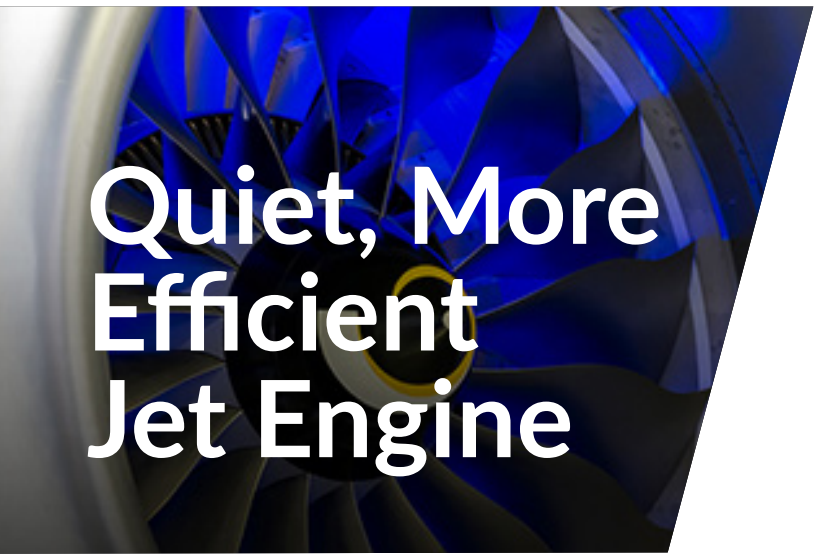
most vulnerable parts of the body.

A built-in processor samples the skier's position at a rate of 1000 samples per second. When a sudden change in speed or orientation is detected, the vest automatically inflates in less than 100 milliseconds offering protection to the spine, chest, abdomen, neck and hips.

The system also analyzes the data to upgrade its detection capabilities, and sends information to a smartphone app so that the user can better understand the reason for the fall.

The Smart Ski Airbag Vest has been shown to offer four times better energy absorption than standard dorsal protection, and unlike automobile airbags, the vest is reusable after it has been inflated. Although it's currently available only to professional skiers, it's expected to hit stores in July 2016 at a price of about $1,200.

For information: In&motion, 178 Route de Cran-Gevrier, 74650 Chavanod, France; phone: +33-4-50-60-07-99; Web site: www.inemotion.com/



Quiet, More Efficient Jet Engine

Advances in material engineering continue to impact our daily lives in ways we may not even notice. For example, thanks to a new titanium aluminide alloy with twice the strength of conventional cast alloys, aircraft engines will soon become quieter and more environmentally friendly than ever before.

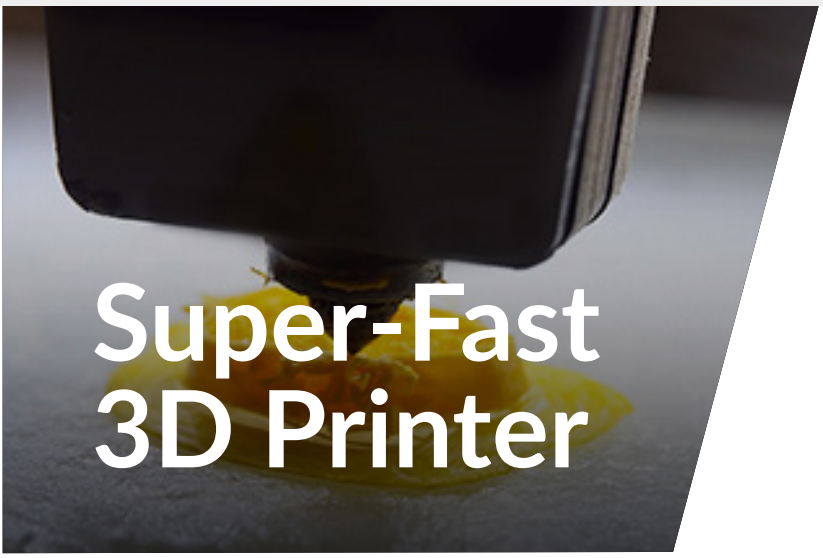
A new design known as a geared turbofan and branded by Pratt & Whitney as "PurePower" is scheduled to be rolled out in the coming year as an option on the A320neo from Airbus, Europe's largest aerospace producer.

Geared turbofans represent a third generation of jet engine design. Starting with turbojets, aircraft engines are basically designed to channel incoming air into a compressor where it is mixed with fuel and ignited to create thrust. Turbofans were added to direct a portion of the air around, rather than through, the compressor core, creating additional thrust while making the system quieter and more efficient. But as the fans have increased in size and their tips are traveling at rates approaching the speed of sound, further acceleration could result in shock waves and potentially dangerous vibrations.

The addition of a gearbox allows the fan blades to travel at a slower speed while allowing other parts of the engine to operate at optimal performance levels and direct an even greater volume of air around the core to produce more thrust. The result is a reduction in fuel consumption of 15 percent on the A320 – an annual savings of $1.5 million in fuel costs per aircraft. The only downside appears to be that the geared turbofan requires a longer cool down period between restarts, which could become an issue at busy airports.

It has been reported that about one-third of the 4,400 A320neos currently on order will be equipped with PurePower engines.

For information: Pratt & Whitney, A United Technologies Company, 400 Main Street, East Hartford, CT 06118; phone: 860-565-4321; Web site: http://www.pw.utc.com/



Super-Fast 3D Printer

A recent advancement in 3D printing known as Direct Light Processing (DLP) works by projecting an image, layer by layer, onto a build-plate that's submerged in a vat of resin. Wherever the light is projected, the resin hardens.

The print base is then lowered so that the next layer can be projected. The benefit is that DLP printers are much faster than traditional 3D printers which can take hours. In addition, the DLP process doesn't slow down when other objects are added to the build plate.

But a new line of printers is taking DLP printing to a different level. Instead of printing in broken layers, they print without any breaks between frames. The developer calls it "animated printing" and the result is extraordinarily fast printing speeds. For example, a 150mm x 80 mm x 26 mm object can be printed in only six minutes. And depending on the print speed, resolution can be as high as 57 microns.

Although the details of the design are being kept secret pending patent protection, one of the keys to the printer's speed is the fact that, instead of building objects from the bottom-up like traditional 3D printers, Gizmo printers use a top-down approach. They will also be able to print multiple objects in different colors.

A handful of printers are currently in beta testing, with plans to begin taking orders via a Kickstarter campaign in the near future. Three models will be available, varying in price from approximately $3,000 to $5,000.

For information: Kobus du Toit, CEO, Gizmo; email: info@gizmo3dprintewrs.com.au; Web site: www.gizmo3dprinters.com.au/ or http://3dprint.com/53286/gizmo-3d-printers-fastest/

Touchable Holograms

Japanese researchers have developed the world's first aerial hologram that can be physically touched and manipulated. It's created using infrared laser light that's precisely focused to ionize air molecules at the focal point and generate a flash of bluish-white plasma in midair.

Now, anyone familiar with plasma might ask, "Isn't that dangerously hot?" and the answer would be, "Yes" but only if it's generated at rates of two hundred thousand flashes per second, or thereabouts. When the bursts of light are shortened from nanoseconds to femtoseconds (quadrillionths of a second) the plasma is actually safe to touch.

And when it comes into contact with skin, ionization creates tiny shock waves across the skin surface that results in a tingling sensation which feels somewhat like touching sandpaper. It also generates bright

flashes of light that could be useful as a visual cue for video tracking or interactive holograms. The researchers envision future applications to include aerial markers for roads and runways or immersive holographic experiences in theaters and stadiums.

For information: Yoichi Ochiai, University of Tokyo; Web site: www.u-tokyo.ac.jp/ or Tsukuba University; Web site: www.tsukuba.ac.jp/; email: yoichi.ochiai@me.com

Virtual Reality and Subliminal Marketing

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this technology as an opportunity to manipulate users in a medium that is currently unregulated. Removing the everyday distractions of modern life and stopping consumers from staring down at their smartphone every few seconds to lock them away in an entirely immersive experience is every marketers dream.

When we take a closer look at the products and advertising that surround us, it's very easy to see that subliminal messaging is very real. The concept of the global community strapping VR sets to their heads in an entirely immersive experience could illustrate why Facebook's $2 billion acquisition of Oculus Rift was a bargain.

The power of subliminal messaging was illustrated perfectly last year by a Brazilian advertising agency who placed a billboard of people yawning at a busy metro station in Sao Paulo. The so-called "contagious billboard" was fitted with a motion sensor that automatically detected when commuters were passing by and displayed a video of somebody yawning.

The campaign aimed to convince passers-by that they were tired by using infectious yawning and the billboards also asked "Did you yawn too? Time for coffee".

If it is possible to convince commuters during rush hour to buy coffee by throwing a few subliminal messages in their direction, can you imagine the power of an immersive 360-degree virtual reality experience that is completely free from distraction.

The gathering of data from our online purchases already allows subtle messaging of services or products we might buy next due to our spending pattern, purchase type or

online browsing history, so the adverts that pop up and messages we receive are certainly no accident or coincidence.

Everywhere we turn we are often unwittingly subjected to a cringe fest of product placements in video games and movies where everyone seems to own a MacBook Pro, but we congratulate ourselves on being able to see the messages and refuse to be affected by them. However would we be able to say the same if completely immersed in a VR enabled digital world?

There is an enormous responsibility for any advertising agency considering bringing any form of advertising or marketing to the brave new virtual reality world.

If the consumer experience is in any way tainted by the out of date and detested marketing messages from our past, they will fail to even adopt the medium.

The main problem is that the current method of advertising is broken, and billions of dollars are wasted on ads that are either not seen or potential customers deem them irrelevant to their lifestyle. This change in customer behavior is ushering in a new era of marketing called targeted display advertising (TDA) that uses our own data to deliver personalized ads that resonate with us.

Organizations are finally getting to grips with big data; they will be able to follow their customer's digital footprints based on their browsing history and point them in the direction of tailored consumer experience where your device knows what you will be interested in before even you do.

As we drift seamlessly from up to 5 devices or screens, there is a wave of white noise that is proving to be a frustrating obstacle for anyone wanting to make their voice heard amongst a crowd that consists of the easily distracted.

However, a headset that removes any form of interruption by pumping sound into your ears and preventing your eyes from wandering could make any such subliminal messaging hard to avoid.

Before fearing an Orwellian dystopia full of global citizens sat in a dark room with a headset strapped to their heads as they become increasingly desensitized from the real world or worse still brainwashed, it is important to understand how this technology can also be used or the greater good too.

VR technology opens up fantastic opportunities for medical learning, rehabilitation, teaching and tourism and could be utilized as a tool to make a difference to society.

However, I would like to see more conversations and debates around the subliminal marketing messages being used in this evolving medium for advertising and who knows what else before we all rush in.

What are your thoughts on the immersive experience VR will bring audiences this year and the benefits or concerns it offers both audiences and businesses if subliminal messages are added in?

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