

DANIEL BURRUS'

TECHNO TRENDS

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THE BIG IDEAS THAT ARE
CHANGING EVERYTHING

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Humanizing Your Digital Communications

By Daniel Burrus, CEO of Burrus Research

Video conferencing has been around for a long time. The equipment is usually kept in a special room filled with expensive equipment that's always booked by executives because of the high value they derive from using it to enhance their communications and collaborations.

Visual communications on the other hand, is very different by my definition. Visual communications can take place using your laptop, your tablet, your smartphone and even your watch, the software is free and the quality of the video today is quite good.

Skype and Apple's FaceTime are good examples of this and they both offer services that are now reliable enough that companies have begun using them as a primary means of communication. They are rapidly becoming simpler and better in quality to the more traditional video conferencing systems I referred to earlier. They also offer relatively good security assurance.

In fact, Microsoft recently announced that it would be replacing its own communications and web conferencing service, Lync, with Skype for Business in Office 365. This move has a lot of implications for businesses, which I will get to in a moment.

Yet again, digitization is disrupting our everyday business activities. But this isn't exactly a surprise; as I've said and continue to say, digital disruption comes in waves, and every single industry, from agribusiness to IT security, will be disrupted. If your industry

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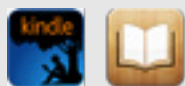


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TECHNOLOGY NEWS HIGHLIGHTS

Un-Hackable Computers

Obfuscation is a ten-dollar word for a fairly simple concept. When applied to language, it refers to making a message confusing or difficult to understand through unnecessary wordiness or use of jargon. As it relates



to software, obfuscation refers to security measures that prevent tampering or reverse engineering by concealing the purpose or logic of computer code. Programs known as obfuscators are used to transform a readable program into obfuscated code, and only by knowing the key can the original program be unlocked.

About two years ago, two independent groups of researchers came up with an approach that uses complicated mathematical operations to keep a source code secret. Called "indistinguishability obfuscation" (IO), it was touted to be unbreakable. But IO had two major problems. First, performing all of the mathematical operations needed to achieve true indistinguishability would have taken years... in fact, hundreds of years. Second, further research concluded that it was not as secure as originally thought.

In recent months, however, much headway has been made toward making IO a practical reality. By breaking large, open-ended computations into smaller, discrete steps and tying them together at the end, an entire program can be protected in a shorter period of time. In addition, a technique from lattice-based cryptography known as "learning with errors" (LWE) is being evaluated as a way to make IO truly non-hackable. At the pace things are progressing, the team believes that near-perfect computer security may be possible in as little as 10-15 years.

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World's Largest Air Purifier

An attractive 23-foot tower in the center of Rotterdam is not only nice to look at, it's useful too – creating spaces where people can experience clean,



smog-free air. The Smog Free Tower can purify up to one million cubic feet of air per hour – enough to provide clean air for a small neighborhood.

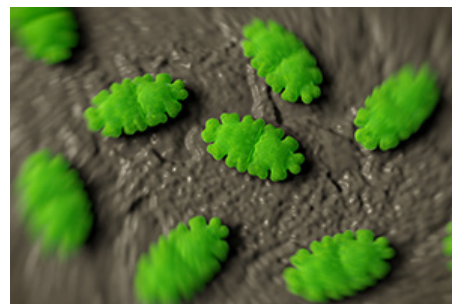
Powered by wind energy and drawing less than 1400 watts, a radial ventilation system draws polluted air into a chamber where particles smaller than 15 micrometers are positively charged. The particles then attach themselves to a counter electrode while the clean air is discharged through vents. Unlike other ionic air purifiers, the Smog Free Tower doesn't produce ozone as the system creates positive rather than negative ions.

While the technology has been used previously in areas such as hospital purification systems and parking garages, this is the first demonstration of its effectiveness on such a large scale. It was funded by a successful Kickstarter campaign in which contributors could purchase 8.4 cubic millimeter plastic cubes filled with compressed smog particles from 1,000 cubic meters of air as a tangible symbol of a cleaner future. The developers are currently working with officials in several cities (including Mumbai, Beijing, Paris, Tokyo and others) to bring the technology to public spaces around the globe.

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Curing Blindness with Algae

The FDA recently approved human clinical trials of a revolutionary new approach to curing blindness



caused by retinitis pigmentosa (RP) – a genetic disease in which the photoreceptor cells of the retina die off. The treatment will utilize a light sensitive protein called channelrhodopsin-2, which has been used by neuroscientists for over a decade to make neurons react to light. The protein comes from single-celled green algae that technically can't even see. Instead of an "eye" they have an "eyespot" to seek out the sunlight they need for photosynthesis. It's these same genes which enable algae to detect light that will be transplanted into the retinas of 15 subjects in hopes of restoring their vision.

The use of gene therapy in treating genetic eye disease is not new, however, past trials have used only proteins from humans or other animals. This is the first time a trial will be conducted using plant proteins. In addition, past approaches have relied on attempting to correct the genetic defects. But RP can be caused by more than 100 different genetic defects, and identifying the correct one is problematic. This study will instead focus on "installing" new photoreceptors, thereby restoring vision regardless of which gene is responsible for the loss of vision, and making the method applicable over a broader spectrum of patients.

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Making Autonomous Vehicles More Affordable

A new approach to LIDAR – the combination of “light” and “radar” that enables such inventions as self-driving cars – could



significantly reduce size, weight, power requirements and cost, making this technology practical for a broader range of applications.

Typical LIDARs work by shining a laser on an object and measuring the time it takes for the light to bounce back. Since the speed of light is constant, the system can then calculate the distance between the transmitter and the sensor. However, in order to differentiate incoming (reflected) light from outgoing (transmitted) light, the wavelength of the laser must be changed constantly using a mirror or series of mirrors to adjust the frequencies. It's these mirror mechanisms that make LIDARs bulky, slow, power-hungry and costly.

Recently, researchers created what's known as a self-sweeping laser in which the physical force of the light itself is used to move an ultra-thin, high contrast grating (HCG) mirror. Used in past experiments to create an artificial, chameleon-like skin, the HCG mirror consists of rows of tiny ridges which can move under an average force of only a few nano-newtons (about one-thousandth the weight of an ant), so that the energy exerted by the light alone is enough to cause it to vibrate. The mirror is mounted on mechanical springs which allow it to swing back and forth, sweeping across a wavelength range of 23 nanometers within the infrared spectrum, in cycles as short as a few hundred nanoseconds. The bottom line is that the new technique could be used to detect 3D surface profile features as small as 50 micrometers in size, at a distance of tens of

meters, and capture them in real-time video. The whole thing can be powered by a AA battery, and takes up only a few hundred square micrometers of space. In addition to making autonomous vehicles more affordable, the new LIDAR is faster, providing a more accurate picture of its surroundings. Its compact size and light weight make it suitable for smaller devices, such as smartphones or small drones. Other applications include optical coherence tomography for 3D medical imaging.

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Wind-Powered Trains

Netherlands Railway recently announced an ambitious energy goal for their 1,800-mile electric



train network. Within the next three years, they plan to have the entire system running on 100 percent wind power.

Wind generators currently supply about half of the energy for the network which carries 1.2 million passengers per day. The additional power will come from wind farms in the Netherlands as well as Belgium and Scandinavia.

Since 2000, installation of land-based wind generators worldwide has increased by about 24 percent annually. According to the International

Energy Council, current plans for the global expansion of wind power could ultimately result in 18 percent of global energy production being generated by wind farms.

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strength. However, with 123,000 patients awaiting a transplant, and too few donor hearts to go around, there's no question that the new device could fill an urgent need.

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Soft Artificial Heart

The artificial hearts that are currently approved by the FDA consist of rigid devices attached to external

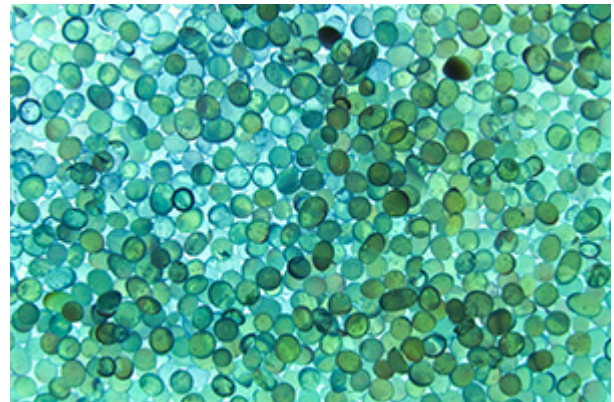


pumps, which push fluid through the body. But engineers at Cornell University have been working on a design that can interact more organically with internal tissues.

Inspired by the emerging field of soft robotics and artificial muscles, the new device is made of a porous foam covered by a flexible silicone coating. An external pump pushes air and fluids through the walls to simulate the beating of a typical human heart and move blood through the vessels in a more natural way.

There are several hurdles yet to be overcome prior to testing the device in vitro. For example, although the artificial heart is capable of pumping adequate volumes of fluid, the rate at which it does so is limited by the current pneumatic design. The foam is also susceptible to tearing if the heart overinflates, so further work needs to be done to improve wall

Rapid Self-Repairing Material



Several materials have been reported on in recent years that are capable of repairing themselves when damaged. Most consist of microcapsules filled with a glue-like material that mixes with a catalyst to solidify when the capsules are ruptured. But the fact that the curing process sometimes requires several hours limits their potential applications. For example, an aircraft or spacecraft that is punctured by debris will lose cabin pressure far too quickly for these materials to be of use.

This was particularly important to one team of chemical engineers interested in addressing the specific challenge of creating a self-repairing material suitable for use on a pressurized fuselage. They began by looking for compounds that solidify quickly when exposed to air. The key was to find a chemical which

would react readily with oxygen to form free radicals, which are instrumental in joining small molecules into larger ones to create plastics – a process known as polymerization. What they came up with was a resin made of organosulphuric compounds (called thiols) and hydrocarbons (called alkenes).

To test the new resin, they sandwiched a 1-millimeter thick layer between two pieces of plastic (also 1-millimeter thick) and shot it with a rifle at point blank range. High-speed video revealed that the material rapidly transformed into a solid polymer plug to seal up the hole in less than one second.

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World's First Hydrogen Bike

A French bicycle manufacture recently unveiled their Alpha Bike, the first commercial electrically-assisted bike to be powered by hydrogen. With

a range of 100 kilometers (62 miles) it boasts a longer battery life than traditional electric bikes, but the real benefit is in the time it takes to charge. The hydrogen cells can be recharged at special hydrogen stations in about five minutes, compared to three or four hours for other types of electric bike batteries. And Alpha Bike is virtually carbon neutral with the only emissions being pure water. Even the charging stations are run by solar and/or wind power.

Alpha Bikes will be officially released for sale to the public later this year, however the French postal service



has reportedly expressed an interest in ordering an entire fleet. The company plans to build 100 bikes in 2016 and will be ramping up production to 1,000 in 2017. The price will be comparable to currently available, high-end electric bikes at around €2,300 (\$2,500US).

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Humanizing Digital Communications

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hasn't yet been digitally disrupted, it will soon be; if it's been disrupted, expect wave after wave of new disruptions as well as opportunities.

Back to the realm of communication: While Skype offers companies the possibility of integrating their desk phones with the Skype network, this is merely a transitional service. In fact, Skype offers more opportunities than traditional methods of communication could — and savvy companies recognize this.

In an increasingly globalized work environment, it is not always possible to meet clients face to face... or at least, that was the case for the last several decades. Companies relied on telephones as a means of connecting with far-away clients if they didn't have access to a video conferencing system.

But now, with visual communications, we've come full circle. Ironically and pleasantly enough, digitization hasn't taken us to an even more abstract, conceptualized means of communication; it's actually given communications a human face.

I've talked before about what I call the Both/And

Principle. The new doesn't replace the old. In fact, recognizing the interplay between the new and old is an incredibly useful first step in developing an entrepreneurial mindset. With Skype, we see both online and in-person interactions mixing together.

But beyond this, Skype also offers a more flexible network than traditional communications could. Through Skype, you can be linked to both clients within your network and anyone within the wider Skype user community.



This reflects and incorporates the more dynamic interactions companies have in today's business environment. It allows for on-the-fly additions to conferences and opens up businesses to new interactions in a safer and secure space.

Audio and visual quality are now at a higher level, making online conferences more efficient. This, of course, is only one aspect, albeit a major one. There are still more possibilities to discover in the field of visual communications.

Developers are still testing the ways in which visual communications can be pushed further.

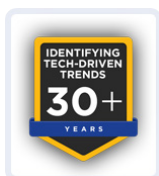
The recording of all communications over these platforms, their easy accessibility for analysis and troubleshooting are one area to continue tweaking.



Undoubtedly, digitization opens up visual communications to the benefits of big data. Digitization also provides businesses with easy access to support systems. Tech support can easily access a company's network to fix any issues. This streamlines a process that once involved sitting on hold for hours with an external customer service center.

One thing is certain, that the exponential advances in processing power, digital storage and bandwidth, what I have called the Three Digital Accelerators, will continue to provide new and powerful functionality to all forms of visual communications as this highly personal method of dialogue and discourse becomes an even more dominant, prevalent means of communication with businesses around the globe.

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