

DANIEL BURRUS'

TECHNO TRENDS

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THE BIG IDEAS THAT ARE
CHANGING EVERYTHING

In This Issue

Mastering the Art of Your Career

Nanoscale Thermometer

Smartphone Pregnancy Test

New Materials from Tiny Explosions

3D-Printed Office Building

Internet via Space

Anti-Bacterial Grocery Conveyor

Goosebump Detector

Industry 4.0



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Mastering the Art of Your Career

By Daniel Burrus, CEO of Burrus Research

It doesn't matter what you do for a living — whether you work in medicine or retail, law or construction, whether you're a software engineer or a writer — there's an art and science to just about every career imaginable. Every profession has its scientific aspects, those more mechanical facets and rules and methods you absolutely must know to excel within your industry. However, these professions, no matter how dry, straightforward, or technical, also have their creative or artistic qualities.

This dichotomy is what makes every industry so diverse. It's the reason no two professionals within the same industry are ever identical. These people might have been working at their careers for the same amount of time; maybe they went to similar schools and took similar classes; maybe they even work for the same company and have the same position. However, they'll differentiate themselves in the ways they've applied creativity and intuitive insights to their jobs.

This idea is evident in our everyday lives and impacts us, as well. Think of doctors with the same specialty. If, say, all dentists or surgeons were the same by virtue of having identical skill sets and nothing more, it wouldn't matter whom you visited to get that root canal or have that cancerous mole removed. But it does matter, and you've got a preferred set of professionals you visit time and again to prove it.

A classic example of this idea, speaking of doctors, happened to one of my brothers. Some years back, he was having pain in his legs,

continued on page 7

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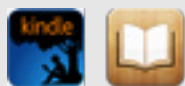


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TECHNOLOGY NEWS HIGHLIGHTS

Nanoscale Thermometer

In a recently published study, physicists reported that they have developed a thermometer that is so small it can measure temperature changes at the quantum level. By combining thermodynamic tools with quantum metrology, the



researchers were able to characterize both the accuracy of the probes and the margin of error that goes along with any temperature measurement, to fully characterize their performance. For example, by sacrificing some precision, the tiny thermometers can maintain constant sensitivity over a wider range of temperatures. And in situations where the time available for measurement may be limited due to the transient nature of a specific reaction, the researchers were able to study the maximum accuracy that could be achieved using such devices.

Accurate quantum thermometers can detect small temperature fluctuations in microscopic environments, such as within a biological cell. They represent a giant leap in technology for a wide array of applications including bioscience, chemistry and physics. Eventually, these nano-scale devices could also be useful in the diagnosis and treatment of diseases.

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Smartphone Pregnancy Test

A self-contained fiber-optic sensor for smartphones has been developed that could enable users to conduct a wide variety of biomolecular tests, including pregnancy testing or diabetes monitoring. It uses the principle of surface plasmon resonance (SPR) to detect the presence of biomolecules and/or trace gases in basically the same way that a bulky laboratory analyzer functions. However, the



new device is a small and robust lab-on-a-chip that is attached to a smartphone and can be designed to monitor a variety of body fluids or gases, such as blood, urine, saliva, sweat and exhaled air.

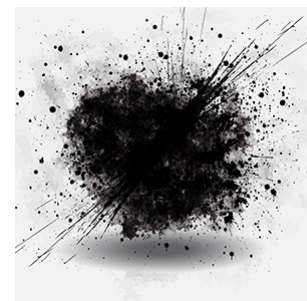
The u-shaped device is comprised of an optical fiber with a diameter of about 400-micrometers, the ends of which are polished to a 45-degree angle. A portion of the glass fiber is coated with silver, and a small well holds the solution to be analyzed. When attached to the phone case, light from the phone's LED passes through the sample and is separated into an emission spectrum by means of a diffraction grating. The camera records the spectrum and an onboard app analyzes it to provide real-time results.

In experiments using varying concentrations of glycerol, the sensitivity of the new device was demonstrated to be comparable to current laboratory equipment. In addition to being only a fraction of the size and cost, the ability to provide direct feedback could be lifesaving. For example, if sensor readings indicate a possible emergency, the app could be programmed to automatically interrogate the smartphone's GPS locator, guide the user to a nearby hospital or drug store, or even send for an ambulance.

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New Materials from Tiny Explosions

Australian scientists recently announced the discovery of at least two (and possibly up to six) new materials that were created by blasting tiny cavities in solid silicon using a laser. The new method could allow for large-scale manufacturing of exotic silicon derivatives that previously required the use of techniques that are more expensive and less industrially-friendly.



Creating new materials using high pressure is not a novel concept, however, current methods require the use of tiny diamonds to poke or squeeze the materials. On the other hand, the new method uses ultra-short lasers to generate much higher pressures than diamonds can produce, and can modify thousands of zones in a matter of seconds.

The explosions create entirely new crystal arrangements (or phases) within the silicon. Although such phases are often unstable under normal conditions, the small size of the structures created using the laser method allows them to cool more quickly, solidifying before they can decay. Some of the new crystals have lasted for over a year.

Guided by a thorough understanding of how the lasers will interact with the materials, the team has discovered crystal structures that repeat at different intervals, including every 12, 16 or 32 atoms. The ability to manipulate the complexity of silicon atoms opens up the possibility for new, unusual and unexpected properties to emerge. In a multi-billion dollar industry, the impact could be huge.

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3D-Printed Office Building



When it comes to unique architecture, the city of Dubai in the United Arab Emirates is second to none. In addition to the world's tallest building (the Burj Khalifa at 2,717 feet),

it is home to what has been billed as the world's only "7-star" hotel (the Burj Al Arab), as well as a number of man-made islands in unusual shapes including two that are shaped like palm trees and one that appears from the air to depict a map of the world. So it comes as no surprise that the world's first 3-D printed office building will soon be added to Dubai's collection of extraordinary structures.

The new project will be more than a chance to showcase unique design, however. As a global hub for innovation, Dubai hopes to be on the ground floor of cutting-edge technologies that have the potential to reshape construction by drastically reducing time, cost and waste. The 2,000 square foot building (including the furniture inside) will be constructed using a mixture of reinforced concrete, gypsum and plastic that is "printed" layer by layer with a 20-foot tall, 3-D printer. According to officials, it will be the most advanced 3-D printed structure to date, and the first to actually be put into use. The building will act as a temporary headquarters for Dubai's "Museum of the Future" which is slated to open in 2017.

For information: Web site: <http://www.thenational.ae/uae/technology/dubai-to-host-worlds-first-3-d-printed-office>

Internet via Space



In its mission to provide an affordable global gateway for Internet access, the consortium known as OneWeb recently came one step closer to solidifying its plans with the recent announcement that Airbus will be building the 900 satellites needed for the project. Initial deployment calls for 648 of them to be placed in a constellation circling the earth, and logically interlocking with each other to cover the entire planet with high-speed access. The remainder will be kept in reserve to be used as replacements as necessary.

Many of the most important aspects of our lives depend on communication, including education, the creative flow of ideas, and emergency or disaster relief. Yet half the world still has no way to connect. The objective of OneWeb is to change that by bridging the gaps in existing infrastructure. Whether the need is to broaden rural coverage or to restore connectivity that has been interrupted by weather, natural disasters, or other sudden crises, OneWeb's architecture will be compatible with any provider to extend their network utilizing a priority spectrum allocated by the United Nations International Telecommunications Union (ITU).

But accessibility is only half the story. The OneWeb initiative has also ushered in a new approach to satellite production that utilizes fewer components, so they're easier to build and

cheaper to launch. With on-board propulsion and GPS sensors, OneWeb satellites can steer clear of obstacles and always know their position within meters. And at the end of their service life, they will automatically leave orbit to minimize debris and maximize existing space assets. The first satellites are due to launch in 2018.

For information: www.oneweb.world/

Anti-Bacterial Grocery Conveyor

Checkout lanes are about the busiest areas in any grocery store. Because they're in constant contact with remnants of food and dirt, they can also be magnets for mold, mildew, fungus and bacteria. But a new product called MessageWrap™ enhances cleanliness while transforming checkout conveyor belts into dynamic advertising billboards.



MessageWrap utilizes mPale antimicrobial technology – a colorless, odorless polymer which can be bonded to the surface of a flexible substrate. The polymer is electrically charged so that any micro-organism which comes into contact with it is killed. With periodic cleaning to remove any build-up of dirt or dead microbes, the antimicrobial properties

remain active for long periods of time.

The substrate can also be digitally printed with a customized message to engage and connect with customers. For example, Roundy's, a leading Midwest grocer, is planning to roll out the new conveyor belts featuring their latest "Wisconsin Proud" branding campaign throughout the Milwaukee area this year.

For information: MessageWrap, 1514 Wealthy Street, SE #210, Grand Rapids, MI 49506; phone: 616-805-4816; Web site: <http://messagewrap.com/>

Roundy's, Inc., 875 E. Wisconsin Avenue, Milwaukee, WI 53202; phone: 414-231-5000; Web site: www.roundys.com

Goosebump Detector



Goosebumps (also known as piloerection) occur when the skin cells around hairs shrink, making the hairs stand on end. In animals, they develop when the animal feels fear or anger, and the effect makes them look larger or stronger as the hairs stand up. Humans also develop them when they feel a sudden surge of emotion, which makes goosebumps a good candidate for quantitative measurement of human emotional response.

Recently, a thin, flexible patch was developed that can detect goosebump responses by monitoring

capacitance. The work is centered on calibrating the measurements based on predefined personal emotional profiles and emotion sensitivity, while exposing subjects to different types and levels of emotion stimulus. The technology could someday offer new insights into the research on individuals with conduct issues and explosive or underdeveloped emotional traits to help them gain better control of their emotional responses.

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Industry 4.0



The next big thing in manufacturing is likely to be a move away from traditional assembly lines to customized products and manufacturing processes that respond to consumer demand in real-time. At least that's what Korean researchers are banking on with the development of a system that will merge manufacturing industries with information and communication technology (ICT) to create a cyber-physical system (CPS) capable of producing individualized products through automated and intelligent control.

A joint research project with Europe's largest

application-oriented research facility is aimed at developing a standardization framework and reference model to automate every aspect of manufacturing – including products, processes and production – enabling a new era of custom-made products to emerge. The system could have applications in virtually any industry from national defense to next-generation cars to customized cosmetics. It will take about three years to complete the base technology, after which they plan to develop modeling and simulation platforms that will enable products and factories to be created virtually.

For information: Jong Hyun Park, Electronics and Telecommunications Research Institute (ETRI), IT Convergence Technology Research Laboratory; 218 Gajeong-ro, Yuseong-gu, Daejeon, 305-700, South Korea; phone: +82-042-860-6400; fax: +82-042-860-1648; email: jhp@etri.re.kr; Web site: <https://www.etri.re.kr/eng/main/main.etri>

Mastering the Art of Your Career

continued from page 1

so he went to an orthopedic surgeon. The doctor examined my brother and told him he needed surgery. That didn't sound too pleasant, so I advised him to get a second opinion. We went to another orthopedic surgeon, same credentials, just as well known; she recommended exploratory surgery, which didn't sound great, either. So I asked him to get one more opinion so he went to a third orthopedic surgeon, who took one look at him and asked if he always wore his belt around his hips in the same place. My brother replied yes. Then the doctor asked if it was always a leather belt? Again the answer was yes. So the doctor recommended my brother switch belts, replacing his leather one with a softer stretchy material. His pain vanished within a week.

Now, all the doctors had the same impressive credentials. They all knew the science of their specialties, but this third doctor was much better at

creative problem solving.

When you're training or going to school for a career — and it doesn't matter if it's high school, vocational school, college, or a doctoral program — you're essentially being trained in the “science” of that field. That is, you're getting a hard, factual, standardized education, based on data and a proven methodology. If you're going to school for accounting, you're getting the “science” of accounting. If you're in med school, you're being instructed in a set of hard skills, from diagnostics to the proper way to set a broken bone. If you've just started a job in the food industry, you're being trained in the knowledge of the establishment and its menu, as well as the serving or preparation aspects of the job. In all these jobs and careers, you're also being schooled in the best practices of your industry.

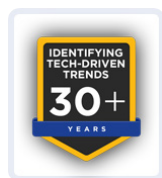
Even if you're in a creative field, you still have to learn both the science and the art of your craft before you can become adept at it. Writers need to learn grammatical and syntactical convention but they also have to learn how to write something you feel everyone must read. Musicians need to learn scales and notation and instrumental technique, but they also need to learn how to touch the heart and soul of listeners if they want to be considered great.

So where does the “art” come into these fields? The artistic aspects of a career are picked up by professionals through years of experience and another, more flexible, less standardized type of “education,” one of induction. The first method of becoming more creative within your career, that of learning creativity through personal and professional experience, is somewhat obvious — the longer you

do something, the more intrinsic, less immediately noticeable traits of this pursuit will become apparent to you; you'll become better at problem solving and thinking “outside the box.”

The second method, the nonstandard educational method of developing intuitive insights coupled with creativity, involves gleaning the best-kept secrets and most well honed, time honored methods, the knowledge and wisdom of your profession from other professionals. These should be people who've already distinguished themselves through their own creativity, people esteemed in your industry and admired by you and your peers. You might seek these people out, like a musician choosing to take lessons from one of his favorite players, or an entrepreneur asking the advice of someone who's already established herself as a success in business. Or you might stumble into these people during the course of your life, like having a captivating, inspirational professor or being trained by a capable manager who knows the secrets to making your job fun and interesting.

You can learn the science of your job from books, manuals, and classroom lessons and know that you will be good at what you do — but you need to learn the art from the artists of your field if you're going to become exceptional. This knowledge and wisdom transfer is key to a rewarding successful career. Not only does it provide professionals an essential balance of skills, it's what keeps industries thriving and innovative. It's what pushes us to compete with others by bettering ourselves and in doing so, to push our very professions forward.



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