

DANIEL BURRUS'

TECHNO TRENDS

THE BIG IDEAS THAT ARE
CHANGING EVERYTHING

In This Issue

The Extinction of
Passwords

Personal Spectrometer

Enhanced Stroke
Treatment

Pancake Printer

Solar Sponge

“Smarter” Car

Remote Control
Contraceptive

Energy Efficient Freezers

Automatic Calorie Counter



www.burrus.com



The Extinction of Passwords

By Daniel Burrus, CEO of Burrus Research

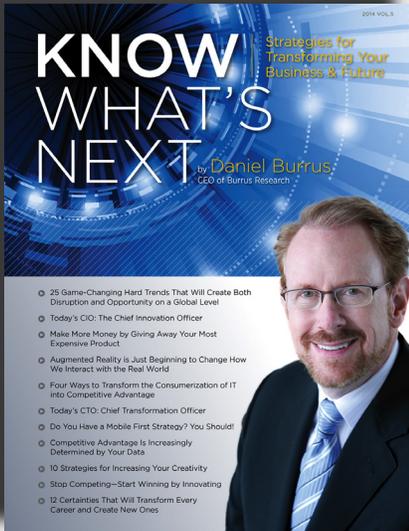
Currently, passwords are total chaos. In fact, most people have terrible passwords that are easy for hackers to guess. Even worse, many people use the same password for all their accounts, and they haven't changed their password for years. So all a hacker has to do is guess the password once and they'll have access to the user's entire life. And while we were all advised to change our passwords after the Heartbleed attack, very few of us actually did.

Since we're not really managing our passwords appropriately, it's time to get rid of the hassle of passwords and use something with more data points and that is unique to each individual. This is where advanced biometrics comes into the picture. Thanks to advanced biometrics, we are getting close to making passwords go away ... and I say, "Good riddance!" Here are a few of the biometrics coming to your smart phone, tablet, or laptop soon.

Facial Recognition: Today's facial recognition is extremely advanced and can separate you from millions of other individuals very quickly. In fact, several years ago I developed an app for the military to use during emergency response situations. Using the app and cameras installed around the base, the military personnel can identify every person on the premises and know exactly where each individual is—all using facial recognition. In everyday use, you already have a high-quality camera in your smart phone that could interface with a facial recognition app. And since facial recognition for identification will be 3D rather than 2D, someone can't hold up a picture of you to bypass the security. So this is certainly a great biometric that is much more secure than a password.

continued on page 7

Know What's Next Magazine



NEW FOR 2014

In today's world of technology-driven change, it has never been more important to **Know What's Next!**

Technology is transforming how we sell, market, communicate, collaborate, innovate and educate.

Also available on:



www.burrus.com

TECHNOLOGY NEWS HIGHLIGHTS

Personal Spectrometer

A new gadget called SCiO gives users the ability to ascertain the chemical makeup of foods, drugs, and just about anything else you come into contact with, in a matter of seconds. About the size of a thumb drive, it uses near infra-red spectrometry to analyze the unique molecular vibrations that are given off when a substance is exposed to light.



Simply point the device at an object and it reads the chemical structure. It then sends the information wirelessly to your smartphone (iOS or Android), where it's uploaded to a server to be analyzed. Advanced signal processing algorithms compare the data to an ever-growing "database of matter" to determine the molecular fingerprint and display the information on the downloadable app.

The device is currently limited to a few key applications that touch our everyday lives - food, pharmaceuticals and horticulture. For example, it can analyze the sugar, fat and calorie content of a smoothie, or authenticate the chemical composition of medications. It can even tell you how healthy your plants are and whether they need water. Users can also help expand the database (and therefore the future capabilities of SCiO) by uploading and tagging the spectra of other materials.

Kickstarter campaign backers are scheduled to begin receiving scanner shipments as early as December 2014.

For information: *Consumer Physics Inc., Tel Aviv, Israel; Web site: www.consumerphysics.com or www.kickstarter.com (search :SCiO)*

Enhanced Stroke Treatment

A new method for delivering thrombolytic therapy to blocked blood vessels could enhance the action of clot-busting drugs. Preliminary tests on mice indicate that the effectiveness of recombinant tissue plasminogen activator (t-PA) – the only approved drug for treatment of acute stroke – is almost doubled when used in conjunction with magnetic nanorods.



The tiny magnetized particles measure about 300 nanometers in diameter, and were injected into the bloodstream along with the t-PA. Using two revolving magnets, the nanorods rotate, propelling the drug to the site of the blockage and breaking up the clot more efficiently. The goal is to reduce the amount of t-PA needed to effectively dissolve a clot, as the drug prevents proper clot formation throughout the body, making patients more vulnerable to serious, uncontrolled bleeding problems.

Strokes are the second leading cause of death worldwide, and it has been estimated that in the U.S. alone, a person dies from stroke every four minutes. A treatment method such as this would also be applicable to other conditions caused by blood clots including pulmonary embolisms and heart attacks.

For information: Leidong Mao, University of Georgia, College of Engineering, Riverbend Research Laboratory South, 220 Riverbend Road, Room 166, Athens, GA 30602; phone: 706-542-1871; fax: 706-542-3804; email: mao@uga.edu; Web site: www.uga.edu or www.micronano.engr.uga.edu

Pancake Printer

Alaska Air has been making headlines with their pancake printers, available in select Alaska Airlines Board Room locations throughout the U.S. It turns out, there are more than 7,000 Popcake machines in college, hospital and casino cafeterias around the world, churning out (reportedly) delicious, fresh flapjacks on demand.



Recently, another printer known as PancakeBot was introduced that takes pancake-making one step further. Although it's not technically a 3-D printer, the concept is similar, allowing you to draw and design pancakes in any shape you desire. The first prototype was built using a Lego® Mindstorms® robotics kit, and a YouTube video of the creative machine went viral. The developer has since designed a second generation version that utilizes an Arduino open-source platform and a couple of Adafruit motors.

Although the main goal of Project PancakeBot has been to inspire children's interest in engineering and robotics, who knows? Could this become the next big thing in breakfast fare?

For information: Marek Szymanski, Popcake North America; phone: 888-767-8871 ext. 201; Web site: www.popcake-na.com Miguel Valenzuela; Web site: www.pancakebot.com

Solar Sponge



Using sunlight to generate steam that can, in turn, be converted into electricity isn't a new concept. But it's also not very efficient, so existing systems employ a variety of mechanisms designed to concentrate the solar energy. Movable mirrors (or heliostats) that track the sun's movement are capable of multiplying the collected energy up to 1000 times. Parabolic troughs increase the intensity by 60 to 80 times. And additives, like gold nanoparticles, increase efficiency, but still cannot boost performance above about 25%, and require intensely concentrated light.

Recently, researchers developed a material that would enable steam production with efficiencies up to 85 percent, using sunlight that is magnified by a factor of ten (and possibly less). This eliminates much of the cost, as lower magnification can be accomplished with inexpensive lenses rather than costly mirrors.

The idea is based on the same principle that turns a thin layer of water on a road into steam when exposed to sunlight. The material consists of a thin layer of graphite flakes on top of porous carbon foam, shaped like a disk and floating on the surface of a container filled with water. As the graphite absorbs heat from the sun, it creates a pressure gradient that pulls water up through the sponge. When it reaches the surface of the disk, the water readily turns into steam.

Inexpensive and efficient solar steam power could bring a wide range of essential and even life-saving

technologies (such as desalination, refrigeration, sterilization and waste treatment) to areas of the world where sunlight is the only energy source.

For information: Gang Chen, Massachusetts Institute of Technology, Department of Mechanical Engineering, 77 Massachusetts Avenue, Cambridge, MA 02139; phone: 617-253-3523; fax: 617-253-0006; email: gchen2@mit.edu; Web site: www.mit.edu/nanoengineering

“Smarter” Car

Designers at Jaguar Land Rover are using the latest developments in machine learning and artificial intelligence to create a self-learning vehicle that personalizes the driving experience and enhances driving pleasure.



First, it recognizes who's driving by their smartphone or other device. Then, it automatically adjusts the seats, steering wheel, mirrors and cabin temperature according to what it has learned about that person's past driving preferences. It can review their schedule, predict their destination and program navigation based on traffic and road conditions (it will know whether it's raining, snowing or sunny). And of course, it can make phone calls, send emails and offer passengers infotainment options based on each person's favorites.

But it's more than a convenience feature. According to the company, the ultimate goal is to reduce the risk

of accidents by minimizing distractions and presenting information to the driver when they need it. By taking over some of the more mundane driving chores, drivers can spend more time focusing on the road.

For information: Jaguar Land Rover, Abbey Road, Whitley, Coventry CV3 4LF, United Kingdom; web site: www.jaguarlandrover.com/gl/en

Remote Control Contraceptive



A new contraceptive implant that may be turned on and off using a remote control is scheduled to begin pre-clinical testing sometime next year. In addition to being more convenient, the new device is designed to last for up to 16 years – which for most women is nearly half their reproductive life.

Measuring about 20mm x 20mm x 7mm, the device can be implanted under the skin on the upper arm, abdomen or buttocks. Sixteen years-worth of levonorgestrel – a contraceptive hormone already in use – is stored on a microchip in tiny reservoirs that are covered with a membrane made of titanium and platinum. When activated, an internal battery passes an electric current through the membrane, causing it to melt temporarily and allowing a small dose of the hormone to diffuse into the tissue. When a woman is ready to conceive, she simply turns off the implant with the

remote control. It can be switched back on again just as easily, and a doctor can adjust dosages remotely if needed.

The company plans to begin marketing the new implant sometime in 2018, pending the outcome of clinical trials.

For information: microChips, 128 Spring Street, Suite 310, Lexington, MA 02421; phone: 781-778-7320; Web site: www.mchips.com

Energy Efficient Freezers

The key to reducing the amount of energy consumed by freezers may be found in the carnivorous pitcher plant, which forms a surface so slippery, even ants



can't cling to it. In the context of refrigeration, superhydrophobic materials such as the ones found in nature can stop ice from forming on surfaces, thereby reducing the need for defrosting. But existing versions can be fragile and scratch easily, which causes them to lose their slipperiness.

A new material recently developed by Harvard researchers uses a nanostructured surface that's designed to adhere to specific lubricants. The lubricants form a very thin liquid layer that's smoother than any solid surface could ever be. And if scratched, the lubricant flows over the area to maintain its slick properties.

Testing indicates that in freezer applications, the new surface could reduce the energy used during a typical defrost cycle (which represents about

one-quarter of the total energy consumption) by 40 percent or more. It could also be used on airplanes and wind turbines to reduce icing.

For information: Joanna Aizenberg, Harvard University, School of Engineering and Applied Science, 229 Pierce Hall, 29 Oxford Street, Cambridge, MA 02138; phone: 617-496-8381; email: jaiz@seas.harvard.edu; Web site: www.seas.harvard.edu

Automatic Calorie Counter



Counting the calories you consume is about to get a whole lot easier! A prototype device has been developed that directly measures the calories in food. Although it currently works only on homogeneous (blended) mixtures, a version is also in the works that will determine the caloric content of a typical plate of food.

A review of the nutritional data on thousands of foods indicates that calories can be estimated within 5 to 10 percent using only three parameters – fat content, water content, and total weight. The new technology is based on the fact that fat and water each have a characteristic effect on microwaves, so by passing low-energy microwaves through a sample and measuring how they are changed, a reasonable estimation of

calories can be calculated.

In order to perform similar measurements on non-homogeneous samples, the engineers are looking at developing microwave antennas with more uniform distribution and algorithms that can average readings from multiple points on the plate. The method could someday be incorporated into a microwave appliance that would heat your food and provide a read out of the calories without measuring and without the need to consult endless nutritional charts.

For information: Matt Webster, GE Research; Web site: www.ge.com or www.gereports.com

The Extinction of Passwords

continued from page 1

Fingerprint Recognition: Apple already has fingerprint readers on their latest iPhone, and other manufacturers are following. Of course, we've been using fingerprint plug-ins for laptops at the enterprise level for many years. One of the more advanced fingerprint techniques emerging is to read the blood vessel pattern underneath your skin. Now that Apple has starting using this on their smart phones, this represents the beginning of a more widespread use of biometrics.

Eye Recognition: Eye scans for identification have been around for a long time. Early versions used a laser to read the blood vessel pattern of your retina. Today, you don't have to use a laser. All it takes to identify you is a simple scan of your eye with a light you will not even notice.

Voice Recognition: Everyone's voice is unique. So by just talking to your smart phone or into your

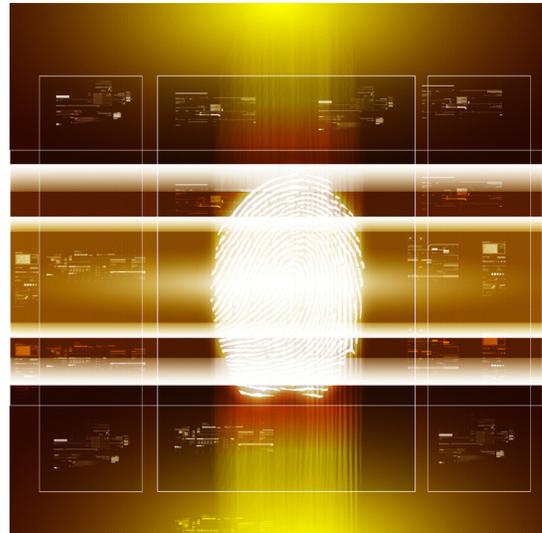
computer's microphone, you'll be able to verify that you really are you. While voice recognition has not been covered much in the press, it's coming on strong.

Heart Rate Recognition: Just like the other biometrics, everyone's heartbeat is unique. Soon your devices will be able to get your pulse from your thumb, just like a fingerprint reader, and use that to identify you.

Behavioral Profile Recognition: This refers to how you behave when using your device. For example, how you type is unique to you, including your speed and cadence when typing. Another example is how you hold your phone when using it. Since our devices have so many different sensors embedded, it's easy to determine whether you are really the one using the device.



The point of all these biometrics is to ensure you're you when using your device and accessing your many online accounts. After all, if your credit card information is stolen or your phone or other device gets into the wrong hands, you want to make sure someone else can't use it, especially



with so much sensitive financial and personal data people store these days.

As I see it, we'll soon use one biometric for simple password replacement for things that are not vital, but we will use multiple biometrics for things that need more security.

For example, if I'm accessing my social media, I might use one biometric. If I'm using a credit card online, I might use two biometrics. If I'm logging into my bank account or doing a securities trade, I might use three or four biometrics to make it even harder for someone to get in and hack my account. And best of all, you won't have to remember all those passwords. All you'll have to do is use your own body's biometrics.

So it's time to say good-bye to passwords and hello to biometrics ... and hello to a more secure online experience.

