

DANIEL BURRUS'

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THE BIG IDEAS THAT ARE
CHANGING EVERYTHING

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Today's Technology is Getting Smarter

By Daniel Burrus, CEO of Burrus Research

Most people agree that our technology is getting smarter, but most don't realize just how smart. Sure, they know their smart phones have GPS capability and their smart appliances are capable of improving efficiency, but that's just the tip of the iceberg. In reality, smart technology is around us every day. From surveillance cameras to clothing, today's smart technology is watching us, helping us, and getting smarter because of us.

Smart Video

As an example, let's look at in-store surveillance cameras. In the past, the video quality of those cameras was poor. Most of us can remember watching the nightly news and seeing blurry footage of a robbery and not being able to make anything out.

Today we have two things taking place that alleviate that scenario. 1) We have software that can clean up the video footage so we can see the detail. 2) We have inexpensive cameras that can replace those old, bigger cameras, and that can give us full 1080P HD video resolution at a low cost.

Now you might be thinking, "So, what? That just means the police will be able to better identify who was robbing a store."

Actually, it's a much bigger deal than that. With today's smart technology, companies are tapping into these video streams and, using high-speed computer analytics, are doing shopping analyses within the store, based on the security camera footage. In other words, security cameras are able to expose a wealth of sales and marketing data.

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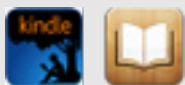
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TECHNOLOGY NEWS HIGHLIGHTS

A Car That Powers Your House

Nissan LEAF owners in Japan can now use their cars to power their homes using the recently released LEAF-to-Home power



station. About the size of a small air conditioning unit, the system draws DC power from the car's battery, converts it to AC power and delivers it to the home's electrical distribution panel. The lithium ion batteries can store up to 24 kilowatt-hours of electricity – enough to supply the average Japanese home for two days – with a peak power output of 6 kilowatts.

In addition to supplying backup power in the event of an outage, Nissan envisions the power station as a way to balance energy demand. By charging at night, during low demand hours, consumers can save money on their overall energy costs. The system can also be charged from solar panels.

For information: Nissan Motor Co., Ltd., 1-1, Takashima 1-chome, Nishi-ku, Yokohama-shi, Kanagawa 220-8686, Japan; phone: +81-(0)45-523-5523; Web site: www.nissan-global.com

Artificial Leaf

One of the major obstacles to commercializing fuel cell power is coming up with reliable and inexpensive ways to generate hydrogen. But recently, MIT researchers announced the development of a device that simulates photosynthesis by using sunlight to split water into hydrogen and oxygen ten times more efficiently than a real leaf.

Similar to a conventional solar cell, the artificial leaf consists of a thin sheet of silicon bound to a cobalt-based catalyst on one side, which



releases oxygen, and to a nickel-molybdenum-zinc alloy on the other side, which releases hydrogen. When placed into a container of water and exposed to sunlight, the device generates two streams of bubbles that can be collected and stored as fuel to generate power. And unlike existing electrolysis systems, the device will even work in dirty water.

The new technology represents a major step in harvesting solar energy not only to generate electricity, but to create chemical fuel that could supply areas of the world without access to reliable sources of power.

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other internal structures can also be added along the way, and an entire house could be erected in as little as 20 hours.

The method is ideal for emergency housing or low cost structures, but will undoubtedly also be used for custom luxury homes. Some even envision it as a way to construct facilities on the moon or Mars.

Benefits of this type of construction include very little waste (including less energy to transport goods), fewer injuries, more efficient buildings, and increased structural strength.

For information: Behrokh Khoshnevis, University of Southern California, Industrial and Systems Engineering, 3715 McClintock Avenue, GER 240, Los Angeles, CA 90089; phone: 213-740-4889; fax: 213-740-1120; email: khoshnevis@usa.edu; Web site: www.contourcrafting.org or www.usc.edu

3D Printer Prints House

Researchers are now looking at 3D printing to construct entire buildings using a new fabrication method called Contour Crafting. The concept is similar to other solid free form prototyping techniques only it utilizes a mobile gantry (taller than the building to be constructed) that sets down layer upon layer of concrete. Plumbing, electrical wiring, ductwork, and

Self Cooling Shirt

A new fabric has been developed that actually cools your body temperature – and the more you sweat, the better it works. Known as Omni-Freeze ZERO, the material is made from a wicking polyester base embedded with thousands of hydrophilic rings that look like tiny blue donuts. The rings are made from a special cooling polymer that swells when exposed to sweat or moisture.

As they expand, they pull heat from the surrounding area to create a cooling effect. In comparison tests, the Omni-Freeze shirt was up to 10 degrees cooler than those made from other wicking fabrics.



The new technology will be available to consumers in Spring of 2013 across Columbia's line of shirts, headwear and footwear.

For information: Columbia Sportswear Company, 14375 NW Science Park Drive, Portland, OR 97229; phone: 503-985-4000; Web site: www.columbia.com

Predictive Traffic App

Students in Germany have developed a Windows Phone app designed to get you to your destination in the shortest amount of time using predictive software.



Called Greenway, their goal is to not only advise users of traffic jams and hazards, but to prevent backups from occurring using predictive software tools to optimize multiple routes. Based on the length, number of lanes and speed limit, Greenway calculates the maximum capacity for a given street and directs users so that no road ever reaches its limit. By monitoring a user's speed, it can detect when backups occur and reroute drivers accordingly.

The app offers two routes to users – the shortest one and a traffic-optimized one – along with the amount of time and gas that will be required to get there. Although the app itself is free, the developers plan on charging a nominal fee for optimized navigation based on the amount of fuel that can be saved, with a maximum of about 30 cents per route. In simulations of up to 50,000 vehicles, the software cut driving times in half while consuming up to 20 percent less fuel.

Obviously, the more people that use Greenway, the more reliable it will get, which is why the developers are looking at partnering with cab companies to maximize usage. The app is currently being tested in Munich, Germany and recently won an environmental sustainability award at Microsoft's Imagine Cup technology competition.

For information: email: info@greenway2012.com; Web site: www.greenway2012.wordpress.com

Better Sound from Your Cell Phone

A new system that uses tissue conduction to carry sounds promises to make cell phones audible virtually anywhere. Smart Sonic Receiver technology uses a piezo-electric actuator to create vibrations across a smart phone's display screen. These vibrations are

transmitted to the skin, tissue – and ultimately the eardrum – resulting in clearer voice quality.



Current Bluetooth headsets that use bone conduction to supplement a phone's speaker tend to produce muffled sound because they bypass the eardrum. The new method works regardless of where the ear is placed on the screen, and also helps to block outside sounds by acting as a shield.

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temperature differential increases, different areas of the belt expand and contract to move the pulleys. This motion can be captured to drive a generator shaft and could create enough electricity to power the air conditioning system or radio, for example.

A mere 2-gram strand of the alloy will generate up to 2 watts of power. At current typical levels for a gasoline engine, that amounts to a nearly 20 percent increase in energy efficiency. But the technology is not limited to cars; diesel trucks and trains that run continuously for long periods are excellent candidates for waste-heat recovery systems.

For information: Jeffrey Browne, Dynalloy, Inc., 14762 Bentley Circle, Tustin, CA 92780; phone: 714-436-1206; fax: 714-436-0511; Web site: www.dynalloy.com

Fuel Efficiency Increases 20%

A new approach to harvesting the waste heat from a car's engine could improve fuel efficiency by more than 20 percent. The key component is a nickel-titanium alloy that expands and contracts with changes in temperature.

A thin belt of the alloy is looped around three pulleys, forming a triangle. One pulley is located close to the exhaust system, where it can pick up heat. Another is placed further away, where it's cooler. As the

Robots That Move Like Humans

New research into the way people move may someday make robot motion appear more human-like. The work is based on analyzing patterns of antagonist muscle pairs, which create movement by alternately contracting and relaxing (e.g. biceps and triceps).



Electromyograms (EMGs) of various human muscle motions are recorded and analyzed to extract patterns of muscle pair coordination. This information is then transferred to a musculo-skeletal model that uses low-pressure pneumatic actuators as “muscles.” So far, the researchers have been able to mimic the smooth walking and pedaling movements of humans. Future directions include creating a robot hand that would be capable of human-like dexterity.

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Technology is Getting Smarter

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We can see customer movements, what products they stop in front of, and how often they stop in front of them. We can see if that display at the end of the counter is working or not. At the end of each evening, we can get a report on all the traffic patterns in the store without having to watch all the video because it's all automated. The report can show where delays are taking place in the store, where the lines are building up, where people are spending most of the time in the store, where people are not going in the store, what products are the hottest, and which aisles are being browsed and for how long. And that's just information from inside the store! When you take the camera outside the store, its uses are even more amazing.

Smart Audio

Increasingly, we're using cameras outside to analyze traffic patterns and to look at high-crime areas. The nation that is most advanced in this practice is Great Britain. They have cameras all over their cities and towns capturing the video of 24/7 life and using high-speed analytics to analyze traffic flows, people movement, crime, etc. But it doesn't stop at video footage; they're also capturing the audio. That means after a video has been recorded, they can do an audio zoom and listen to the conversation that is happening at an intersection, for example.

You might think, “Who is going to listen to all of those conversations?” The answer: No one. Since it's digital audio, you can search the audio content for keywords and pull up the conversations that are specific to the phrases you're searching for. This is already happening in Great Britain. Now the question is, will it only be used there, or will other countries, including our own, start using this smart technology in the future? The answer is, of course we will be using it here and in other countries as well. So while seeing is believing, seeing and hearing something is undeniable.

Smart Technology You Can Wear

Realize that smart technology isn't always about something you hold in your hand or a device you intentionally manipulate. Now, even the clothes you wear can have a technological component. For example, there already is a product called “The Helmet Hero.” With it, you can take a helmet, such as a bicycle, ski, or motorcycle helmet, and mount a small high-definition camera on it that can record as HD video or capture still photography. Thanks to an SD card, you can record up to 20 hours on a single charge.

Additionally, since one of the hard trends of technology is the ability to make things smaller and smaller, you can create high-quality video or still camera pictures from a very small lens that's clipped to or embedded in your sunglasses, and then upload it directly to Facebook or other social media

platforms. So, for example, if you're walking on the beach or hiking a mountain, you can have that feed go directly to your video Facebook page.

While this might sound great, the newest wearable technology goes even beyond all this. For example, Adidas has created an "intelligent football boot" that can upload performance data, including your maximum speed, minimum speed, the number of sprints you took, the distance you took for each sprint, the distance you went at a high-intensity level, etc. In other words, they've created a true training device that keeps track of your entire training regimen. They started with football, but it will surely spread to other sports.

Going a little further, the US military has developed smart underwear. It looks just like normal underwear, but it has micro sensors that can monitor respiration, heart rate, body posture, and skin temperature. Now we can really see what's happening with troops in the field. And since all the data can be transmitted wirelessly, we can monitor the well-being of all of the people in real time. If someone has a problem or has been wounded, we already have body monitors on them in their underwear.

Now let's take that to the next level. If this technology works for the military, couldn't intelligent underwear work for professional sports too? Of course. It can track hydration levels, heart rate, and other things to help coaches determine when to pull someone from the field.

Going even further, smart underwear has a medical application too. People who are having a medical problem and who need to be monitored over time can wear the smart underwear and the data can be instantly streamed to the doctor's office for analysis. Currently you have to wear expensive monitors and report to the doctor's office to get the information from the monitor read. It's both costly and

time consuming. But with the smart underwear, it's quick and much less expensive.

The Next Generation of Smart

Here's the really exciting part of all this: You may remember the old Star Trek television series, where they wore a little piece of jewelry on their shirt that they would touch to communicate with people in other parts of the ship or those who beamed down to a foreboding planet. If you think about Apple's Siri, you'll see that we're actually beyond that piece of science fiction right now. With Siri, we have an ultra-intelligent electronic agent with us at all times. Currently, we need the smart phone to use Siri, but soon we won't.

Imagine wearing a piece of jewelry that you touch to activate. You might say, "Read my voicemails," and then respond to them. You can do that now with Siri, so why not just make it a piece of jewelry rather than phone? We don't need to have that whole big phone with a touch screen to do this. Imagine walking around hands-free and running your day: "What's my next appointment? Write an email. Read my messages. Where is the nearest Starbucks?" Yes, that's what we're going to see soon rather than needing a full smart phone. When you have no screen and use voice input only, you could, in reality, have a device small enough to be a Star Trek-like communicator, only better.

Smartness at Your Fingertips

As our processing power, bandwidth, and storage continue to expand, we will definitely see more and more smart technologies in our life. From cameras to clothes, the wealth of information that can be gleaned, stored, and transmitted will grow exponentially, giving us access to new and usable knowledge that can enhance both business and life. The key question for you is: How can you and your company work smarter with these and other types of smart technologies?



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