

DANIEL BURRUS'

TECHNO TRENDS

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THE BIG IDEAS THAT ARE
CHANGING EVERYTHING

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How Technology Will Impact the Future of Travel

By Daniel Burrus, CEO of Burrus Research

In the next five to ten years, technology will give us many new ways to enjoy travel—from the planning phase to the actual trip. In fact, tomorrow's travel will look nothing like it does today, and the travel adventures anyone can go on will be limited only by our imagination. Here's a look at what you can expect:

- Semantic voice search technologies will revolutionize how people discover, discuss, and plan their travel. Semantic voice search is already working fairly well with Apple's Siri and Google's Voice search tools, and they will be much better in the near future thanks to the advances of the Three Digital Accelerators of processing power, digital storage, and digital bandwidth. Within the next five years most of our searching will be with voice to what I have called an ultra-intelligent electronic agent (an audio and/or visual version of Siri and the others).

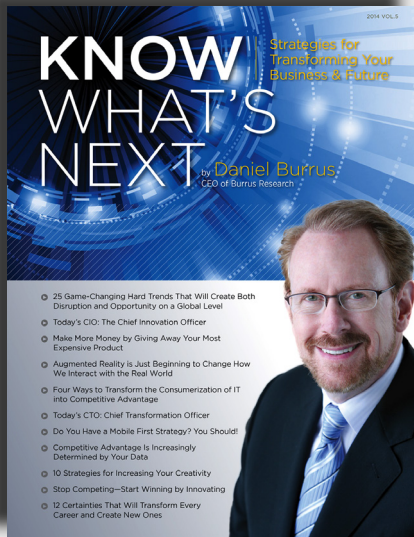
- Ultra-intelligent electronic agents will also be your travel buddy. Think of this electronic travel buddy as your virtual concierge, trouble shooter, and travel guide. If you don't have your own ultra-intelligent electronic agent, you will be able to rent one as part of your travel package via the travel agent or company you're booking with. These travel buddies will help you with everything from securing movie, show, or park tickets at your destination to making restaurant reservations to hailing taxis to helping you if you get lost. You'll never again travel alone.

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TECHNOLOGY NEWS HIGHLIGHTS

3D Holograms

Imagine seeing your friend projected in front of you in thin air while you chat on the phone, or being able to visualize how the lamp you found online will look sitting on top of your credenza.



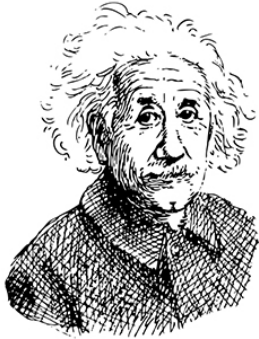
Thanks to new projector technology known as the Quantum Photonic Imager, this kind of virtual reality without headsets may be available to consumers within a couple of years.

The device combines an image processor with micro-LEDs and image rendering software to project images with a resolution of 5,000 dots per inch (dpi), all in a package that's less than 0.5 cubic centimeters in size (about the size of a TicTac). When six of them are arranged in an array, three-dimensional objects can be beamed in mid-air, projecting a nearly solid image that appears consistent from any viewing angle.

The company is working with smartphone manufacturers to incorporate two-dimensional versions of the technology into their products as early as summer of 2015 at a cost of about \$30 to the consumer. These devices will be capable of projecting up to 48-inch diagonal videos and images onto nearby surfaces. The second generation 3D versions will appear in smartphones shortly thereafter, followed by televisions, smart watches and perhaps even holographic tables.

For information: Ostendo Technologies Inc., 6185 Paseo del Norte, Suite 200, Carlsbad, CA 92011; phone: 760-710-3000; fax: 760-710-3017; Web site: <http://ostendo.com>

Quantum Computing



When it came to quantum mechanics, Albert Einstein was an unequivocal unbeliever, stating that “spooky actions” such as entanglement had no place in physics. But physicists recently came one step

closer to proving that entanglement, a key component of quantum mechanics, may, in fact, be a repeatable phenomenon. The ability to harness this power could lead to a whole new generation of quantum computing with unprecedented power and speed.

The principle of entanglement basically claims that two particles can instantaneously affect each other, even at a distance. In other words, the properties of one particle (or quantum system) get “tangled” with the other so that what’s reflected in one is simultaneously reflected in the other.

To demonstrate this, the researchers first created qubits – quantum units that are capable of holding multiple values – by trapping electrons in diamonds at extremely low temperatures so that their spin could be observed. With two qubits spaced about three meters apart, they were able to see that the spin of one electron was replicated in the other qubit instantly, and the results were 100 percent reproducible. The next step will be to increase the separation distance to a kilometer or more to better observe the consistency and speed at which the information can travel.

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Smart Toilets

The American bathroom may be the next frontier in the “smart home” revolution with at least one manufacturer planning to begin a major promotion aimed at installing smart toilets into more American homes over the next few years.



Among the features included in the new generation of commodes are automatic flushers, lids that open and close on demand, adjustable heated seats, and integral nightlights to illuminate the bowl. They can sync with smart phones via Bluetooth to play a user’s favorite music, and some models are equipped with bidet functions.

The Japanese have led the way in adopting the use of smart toilets. It’s been estimated that three-quarters of Japanese homes are currently equipped with smart toilets, and high-end models can even perform simple medical tests and send results to your smart phone, but the U.S. market is pretty much untapped. So plan to see more of these high-tech lavatories as manufacturers undertake campaigns to make them a regular fixture in American bathrooms as well.

For information: Yoshiaki Fujimori, CEO, Lixil Corporation, 36F, Kasumigaseki Building, 3-2-5 Kasumigaseki, Chiyoda-ku, 100-6036 Tokyo, Japan; Web site: <http://global.lixil.co.jp/>

This Robot Can Catch!

A bionic arm was recently developed that has the unique ability to catch moving objects of various shapes and sizes in less than five hundredths of a second. It's one of several projects underway at the Swiss Space Center, whose



goal is to develop technologies for recovering and disposing of the ever-increasing amount of space debris orbiting the earth. In addition to space applications, there will be many new commercial applications for this back on Earth including warehouse management automation, supply chain management and logistics to mention a few.

It may sound simple, but creating a machine that can predict the dynamics of a moving object and generate an appropriate reaction on the spot requires a complex set of commands. Unlike most robots, which are precisely programmed to perform specific functions, the robot arm needed to be "taught" in a way that allows it to adapt to a range of situations. So the researchers used time-tested human techniques of imitation, trial and error, and repetition.

In the first phase of learning, the robot used a series of cameras to generate equations that describe the trajectory, speed, and rotation of various objects – including a ball, a bottle, a hammer and a tennis racket. These equations enable it to quickly position

itself whenever an item is thrown in its direction, even when its movement involves several axes. As a result, the device is capable of high-precision capture with a response time of a few milliseconds.

For information: Aude Billard, Ecole Polytechnique Federale de Lausanne, Learning Algorithms and Systems Laboratory, ME A3 393 (Batiment ME), Station 9, CH 1015 Lausanne, Switzerland; phone: +41-21-693-5464; fax: +41-21-693-7850; email: aude.billard@epfl.ch; Web site: [www.epfl.ch](http://lasa.epfl.ch) or <http://lasa.epfl.ch>

Personal Electronic Nose



Industrial machines that can sniff out spoiled meat have been around for years, but a new gadget, due to be released at the end of the year, will enable consumers to determine whether their beef, pork, poultry or fish is really safe to eat.

Called Peres, the hand-held device contains sensors that measure humidity, temperature, ammonia levels and 100+ other organic volatile compounds that are commonly found in rotten meat. Readings are transmitted via Bluetooth to an Android or iOS smartphone or tablet where an app indicates whether or not the food is safe to eat, potentially risky, or downright spoiled. In lab tests, the device has been shown to be 80-95 percent accurate.

With more than 76 million cases of food borne illness and 5,000 associated deaths annually in the U.S. alone, the company is banking on the public's desire to be more certain about the safety of their food. They've raised funds to commercialize the technology (with an anticipated retail price of \$100) through an Indiegogo campaign, achieving more than 150 percent of their goal in less than two months.

For information: ARS LAB, Ltd., Vilnius 02300, Lithuania;
phone: +370-655-62313; email: info@getperes.com;
Web site: www.getperes.com

Mobile Cancer Detector



Smartphones are changing the face of medicine by giving doctors the ability to monitor everything from glucose levels to heart activity without the need for a patient visit. But recent advances can now turn a smartphone into a mobile colposcope, a breakthrough that will allow physicians to better diagnose and treat women in developing countries where cervical cancer is a leading cause of death.

The system uses a technique called Polarization Difference Spectral Measurement in which the tissue is illuminated with polarized light that is reflected back from multiple layers

and components both at the surface and deep below the surface. Analysis of the reflected light reveals information on different structural patterns as well as composition (including some biomarkers) of the tissue.

The \$400 device can transform virtually any smartphone into a cancer screening tool, and the company has plans to deploy pilot units in six developing countries where up to 85 percent of women have no access to cervical cancer screening, and over 250,000 women per year die from the disease, which, if detected within the first five years, can be treated effectively and inexpensively.

For information: MobileOCT, Tel Aviv, Israel; Web site: www.mobileoct.com

Chemical Detector Bracelet

A recent U.K. study reported that women are exposed to more than 500 chemical compounds daily through body care products, makeups, hair products and the like. Combine that with environmental toxins and the myriad of chemicals that are found in food and the importance of determining the effects on human health becomes clear. So, researchers have developed an easy way to measure these potentially dangerous compounds.



Silicone wristbands, similar to those that support any number of charitable causes, were soaked in solvents, making them capable of absorbing a variety of chemicals.

Thirty volunteers then wore the bracelets for a month, after which the chemicals were removed by shaking them in a mix of solvents and testing them in a lab. The results showed that the wearers were exposed to nearly 50 different compounds including pesticides, flame retardants, and chemicals from pet flea applications as well as remnants from caffeine, nicotine, fragrances and other personal care products. In a separate test on roofers, the wristbands revealed exposure to twelve hydrocarbons on the EPA priority list.

The wristbands are now being used in other studies to determine the risks of exposure to chemicals. One involves pregnant women in New York City in which the results are being compared to results from portable air sampling units. The goal is to learn about the connection between birth defects and environmental toxins. Another will soon be underway in West Africa where researchers are studying the risks of pesticides and other agricultural chemicals on farmers.

For information: Kim Anderson, Oregon State University, 1007 Agriculture and Life Sciences, Corvallis, OR 97339; phone: 541-737-8501; fax: 541-737-5001; email: kim.anderson@oregonstate.edu; Web site: www.oregonstate.edu

Amazon's Prime Phone

Amazon unveiled their new smartphone on stage this month in Seattle. The Fire Phone has one of the brightest screens available for better outdoor viewing and reading. It sports a 13-mixapixel camera with an f/2.0 five-element lens that has better low-light performance and optical image stabilization for sharper photos. It can shoot 1080p HD videos with unlimited



Cloud Drive storage (provided by Amazon) for all photos taken with the device.

Amazon is aiming for the Fire Phone to have a premium look and feel. They have equipped it with stereo speakers and Dolby Digital Sound, a 4,7" screen, and five front-facing camera lenses, four of which are infrared and in each corner of the screen to offer a dynamic 3D perspective.

The Fire Phone runs on Amazon's Fire OS, which is based on Android, but doesn't offer Google services. Instead, Amazon is offering Dynamic Perspective, Firefly Technology, Mayday and Prime to differentiate them from the competition. These services offer users a custom-designed sensor system that responds to how you hold, view and move your phone, the ability to instantly check the price of more than 70 million products and live tech support for no additional fee.

The phone will be available in a 32GB model for \$200 and a 64GB model for \$300 and is exclusive with AT&T as the service provider.

For information: www.Amazon.com

The Future of Travel

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- Virtual reality technologies will allow you to experience (see, hear, and even smell) your chosen destination months before you arrive. Within the next five years you will be using virtual reality technology to have 3D experiences of your favorite destinations as if you were there. But this won't reduce the need for travel; if anything, it'll make people want to experience the real thing. It will be a form of what is called "show-rooming" in retail outlets today—a way to find what you want and then plan a trip there knowing exactly what you will want to see and do.



- Airports will become an enjoyable part of the travel experience thanks to the use of biometrics, such as fingerprint reading and face recognition, to keep people moving and reduce the long lines. For example, you can already use your fingerprints as a pass to get through international security when you arrive back in the U.S., so in the future there is no reason why you could not do the same for boarding a plane once you're checked in. This will be an option that will save time and many will opt into this type of program.

- Social Travel with a social mobile media element will happen in a formal way within the next five

years. We currently have web sites that are like community marketplaces for people to list, discover, and book unique accommodations around the world. Technological advances will make this sort of peer-to-peer booking more seamless and user-friendly.

- Space tourism will take off ... literally. Currently, you can book a space flight for about \$250,000 USD, but you only get a few minutes in Low Earth Orbit space before you come back down. To go up and stay for a while and enjoy it will take some time—most likely closer to the ten year mark. But if you want to go there for a few minutes to see the Earth and experience weightlessness (and have bragging rights), that will happen on a mass scale very soon.

- Augmented adventure will become popular thanks to the use of Google Glass-style wearable technology to detect virtual reality and data apps embedded in the landscape, adding a new layer to a hike in the hills, and making getting lost a thing of the past.

- Finally, we'll see a future of man-made travel environments, from Qatar's Desert Park to conceptual architects such as Jean-Marie Massaud suggesting a new generation of slow travel luxury airships and dBox's zero-impact floating islands. Disneyland was the first to do this on a large-scale decades ago. We will see even more impressive examples happen around the world using many new and powerful tools.

Travel will certainly transform over the next few years. What changes are you already seeing? What are you most looking forward to?