Technological Marvels

Presented By:

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$\mathbf{Y}$our world is about to change, again. I present you the proof here in aggregate form as written by various authors, several snippets, a digest if you will, of fantastic capabilities - submitted for your erudition: a listing of technological marvels that may become part of your lives soon. I have not created a top ten list because I refuse to be wrong ever, maybe.

The Next Generation: Barium Titanate Batteries

EEStor is a very secretive company. When asked for information the company co-founder and chief executive Richard Weir said: "EEStor is not making public statements at present time." What they are doing in Austin with their Kleiner Perkins Caufield & Byers money is developing a "parallel plate capacitor with barium titanate as the dielectric" or hypercapacitor. Kleiner's John Doerr, who recently spoke at a California event where tech VCs gather to make their predictions for the year, referred to an investment in an energy storage company he declined to name, calling it Kleiner's "Highest-risk, highest-reward" investment." Here is some more hype:

 - The batteries fully charge in minutes as opposed to hours.

Whereas with lead acid batteries you might get lucky to have 500 to 700 recharge cycles, the EEStor technology has been tested up to a million cycles with no material degradation.

* EEStor's technology could be used in more than low-speed electric vehicles. The company envisions using it for full-speed pure electric vehicles, hybrid-electrics (including plug-ins), military applications, backup power and even large-scale utility storage for intermittent renewable power sources such as wind and solar.

* Because it's a solid state battery rather than a chemical battery, such being the case for lithium ion technology, there would be no overheating and thus safety concerns with using it in a vehicle.

* Finally, with volume manufacturing it's expected to be cost-competitive with lead-acid technology.

From his Star article:

Energy storage has long been the bottleneck for innovation, holding back new energy-sucking features in mobile devices and preventing everything from the electric car to renewable power systems from reaching their full potential. Build a radically better battery at lower cost, experts say, and the world we know will be forever transformed.

Among EEStor's claims is that its "electrical energy storage unit" could pack nearly 10 times the energy punch of a lead-acid battery of similar weight

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and, under mass production, would cost half as much.

It also says its technology more than doubles the energy density of lithium-ion.

Combine this technology with Shai Agassi's (ex-SAP) drive for low-cost electric cars (get it?) with battery-changing stations, charging stations and a cost of 8 cents per mile in 2010 and you have technology that will reduce our dependency on oil. Check it out:

http://www.ted.com/index.php/talks/shai_agassi_on_electric_cars.html

Force Fields, Anyone?

Ah, an application of technology well-known to Star Trek fans:

http://science.nasa.gov/headlines/y2005/24jun_electrostatics.htm

Ultra Wideband

Anything with Ultra in the title sounds cool already. Search 'n rescue teams as well as archaeologists use this radio-based technology to "peer" through solids. This same technology, called ultra wideband (UWB), will allow you to wirelessly beam high-definition TV signals from your PC or Mac in your bedroom to the TV in your family room. UWB would operate at speeds around 110 megabits per second which is enough bandwidth to carry compressed HDTV signals out to a Bluetooth-like range of about 30 feet through typical interior construction. When the range decreases, the speed increases: 3 feet – 2 gigabits per second. We will probably see 480Mps within a 10 foot range. Imagine in a year or two you could transfer a 1.4GB high-definition movie to your 6gen iPod in 13 seconds while it is still in your pocket.

Wireless High-definition Interface

UWB and another technology called Wireless High-definition Interface (WHDI) will probably coexist peacefully unlike Blu-ray vs. HD-DVD. The reason: UWB is a data-transfer technology that can also transmit video streams, while WHDI is designed to replace video cables altogether. This technology is a wireless alternative to high-definition multimedia interface (HDMI) which connects HD-capable devices together. WHDI may deliver a range and bandwidth three to four times greater than that of UWB. Future networking products may blur the lines between computer networking and high-definition networks. Imagine hanging out in an airport terminal

checking your email and watching the latest theatrical release on your laptop. WHDI uses some of the same technology as HDMI so the data stream can be encrypted which implies that video-content providers can control the flow of programming. We should see this technology within a few years.

OLED Displays

SOLEDs, PLEDS, and TOLEDS belong to the family of new display technologies based on organic light-emitting diodes, or OLEDs. OLEDs suffer from issues such as poor resistance to moisture and short display life (5,000 hours or a little more than a year at 12 hours of use per day.) The technology promise is in energy consumption – much less than LCDs - because there is no need for the display to be backlit. OLEDs offer better brightness, better viewing angles and purer color. Sony http://www.engadget.com/2007/01/08/sonys-1-000-000-1-contrast-ratio-27-inch-oled-hdtv/ has shown off their beautiful OLED TVs. We're talking 1024 x 600 pixels slathered across that wee (11 inch) 1,000,000:1 contrast panel capable of 8-bit RGB color and covering more than 100% of the NTSC color gamut. The display itself measures just 3-mm thick. If you can afford it you can buy one this year.

Wireless Power

Cords and cables contribute more chaos to my cubicle than anything else. While the wireless revolution has helped reduce the clutter the power cord remains the one thing you have to connect. A completely wireless electronic appliance, whether it is a television or computer, allows you to design your living or office space without any constraints. The technology that will free us is called electricity broadcast and it works using the physics phenomenon of resonance. Resonance is the tendency of a system to oscillate at maximum amplitude at a set of frequencies. Most people know about resonance as it applies to acoustics but it can also be electrical or mechanical in nature.

The first electricity broadcast will power an LED light stick. Brought to you by Powercast and Philips, the technology works by plugging in a transmitter the size of your laptop adapter into a power outlet which converts the electricity into radio frequency that's received by a dime-sized sensor built into the device. The receiver converts the radio waves into direct current which charges the battery. The range is about 3 feet from the power source and the charging capacity is at the mobile phone battery level. Imagine charging your iPod just by placing it on your desk.

Ultra High-Speed Internet

Consider this. In Paris there was a trial residential service consisting of the following: Internet access with the speeds of 2.5Gps down/1.25Gps up, digital television and unlimited phone calls all for $96 US per month. Contrast that with residential service in the United States: 5-15Mbs range (Verizon peaks at 50Mbps). But with IBM's new optical transceiver chip (1/15 the size of a dime), we can envision real speed on the order of 160Gps. The time frame is around five years but when this technology becomes available and you have fiber to your home you are looking at downloading an entire HD move in a second.

Where is the outrage?

Solar-in-a-Box

http://josh.com/Solar/

Solar energy should become a commodity. Here is an example of solar-in-a-box. The primary component of this system can be called the hub. You plug the hub into a normal wall outlet and then you connect a load (appliance, computer, lights) into the hub. Both connections use normal household 3-prong plugs. You also connect a solar panel into a special jack on the hub. When the sun is shining, the hub converts the DC energy coming from the solar panel into AC energy that your stuff can use. When the sun is not making enough power for your load (because it is cloudy or nighttime), the hub seamlessly supplies the extra power from your house mains so you always get continuous power. The hub displays the amount of power the load is using and the amount of power that is being supplied by the solar panels.

You will be able obtain power from 200 Watts to 2,000 Watts hubs. Bigger hubs have multiple energy source jacks, so you can buy extra panels and plug them in at anytime to expand the system. The hub will be in constant digital communication with the connected power sources. The communication link runs over the same wires that carry the power. Because the hub is able to read information from the connected solar panel, it can make adjustments based on what size and type of panel is attached and run at maximum efficiency. The fail-safe switch: if the communication link is ever broken because the wires are damaged or disconnected, the power source instantly stops sending power down the lines. The technology is here today; not sure why they are not at Wal-mart.

Oldies but Goodies: A New Old Computer Operating System

One of the most airtight, hacker-proof operating systems ever created is OpenBSD. Bolstered by advanced cryptography and data-traffic filtering, OpenBSD runs systems at Intel, Oracle and Adobe, secures a gas pipeline in Kurdistan and runs servers at the University of Minnesota. As good as it is, OpenBSD costs nothing; you can download a free copy from the Web and put it on a server or network gateway.

The main author, Theo De Raadt, is an almost-ready-for-prime-time cult hero in the open-source-software movement, a not-yet-famous Canadian version of Linus Torvalds, the creator of the open Linux system that helped spark the free-code revolution. Theo, as is his inclination, derides the Linux movement and says his software blows the doors off that inferior code. "Look at Linux closely and it's heading to be the next Microsoft," he avers. "It's low-quality software. Their stuff isn't any better."

Free and secure but not marketed or user-friendly; put it on your radar screen anyway.

Ultra Home Theater for Less

Nelson Chang and Niranjan Damera-Venkata have spent the past few years developing a technology that reinvents the notion of a home theater. It is called Pluribus and with it you can build a cineplex-quality image using a handful of ordinary, $1,000 PC projectors in the same time it takes you to build a home network. So for a mere $12,000, you could build a home theater that stands up to the $100,000 image at local movie houses. This humungus-display is good for more than just movies. It might be even better for 3D games.

In much the same way a cluster pools the resources of multiple PCs, duplicating the effect of a super-computer, Pluribus pools the resources of multiple projectors. Pluribus can seamlessly "tile" images from multiple projectors, fitting them together like pieces of a jigsaw puzzle. Or it can superimpose images from multiple projectors, putting one atop the other. This vastly improves resolution, sharpness, brightness, contrast, and more (no, popcorn popper not included.) The disruption with Pluribus is that it builds these über-images so quickly. You needn't spend hours adjusting the physical position of your projectors. You simply plop them down, plug them in, and point them in the general direction you'd like them to point. Pluribus does the rest, in minutes.

The system consists of an ordinary PC workstation, a camera, and some ingenious C code. The camera grabs a snapshot of the many images streaming from your projectors and feeds that snapshot back to the software. The

software then adjusts each image so they all fit together, using mathematical models that stretch the limits of modern computer science. "People didn't think it could be done," Damera-Venkata says.

A gaming PC with dueling graphics cards can line up 12 projectors in as little as 5 minutes, producing a 16-by-9 foot image with 4,096-by-2,304 resolution. But the system can scale up to even larger images. As you add more PCs, you could, in theory, add as many projectors as you like. A true home theater is closer than you think.

A Print-the-entire-width-of-the-page Printer

The first Memjet ink-based printer will deliver 60 pages per minute at a reasonable cost per page. Memjet combines the benefits of ink and laser technologies into radically new price/performance levels. The technology is based on page-width printheads, driver chips ink and software. Printheads are comprised of individual microchip segments, joined together into page-width printing systems. The driver chip is an integrated printing system that calculates 900 million drops per second and drives 70,400 nozzles in a standard A4/letter printer, delivering color page-width printing at 60 pages per minute. The Memjet software is highly portable and modular, allowing software developers to drive Memjet printers at rated speed and quality avoiding the details of printhead, nozzles or hardware. Didn't you always wonder why should the print head move across the page?

And there you are, no matter where you go (nevermind), some cool technologies that may become available to consumers in the next few years. Man your credit cards.