TECHNO TRENDS

THE BIG IDEAS THAT ARE CHANGING EVERYTHING

THE PC TURNS 25

BY DANIEL BURRUS, CEO OF BURRUS RESEARCH

Twenty-five years ago, IBM launched the first personal computer. Corporate America noticed and started to use it, but it took companies like Radio Shack and Apple to begin bringing PCs to the masses by selling low-powered versions to hobbyists. For example, Radio Shack's early entry cost around $800; you had to learn Basic programming language to use it, and you had to store your data on a cassette tape.

A few years later, in 1984, Apple introduced the Macintosh with innovations such as a mouse, a graphic user interface, a screen that looked like a piece of paper (white with black type), and the option of many different types of fonts. It was marketed as the PC for the rest of us, and it helped open the door of using a PC to many who might have otherwise never given it a try.

With all that said, the first Mac, like its PC counterparts, only had a floppy drive; users would have to wait for the hard disk drive.

Speaking of disk drives, there is another technology birthday to celebrate – the disk drive – which just turned 50. Yes, 50! So why did it take so long to get into the PC? To answer that, you have to look at the dimensions of the first disk drive. It was called the RAMAC, and was designed by IMB. *Continued on page 2*

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It could only store five megabytes of data, but to do that it needed 50 spinning iron-oxide-coated disks that were the size of a 24-inch pizza. Its total size was that of two modern refrigerators and it required a separate air compressor to protect the two moving heads that were used to read and write the data, and it weighted a ton! If you wanted to lease one, it would cost you $250,000 in today's dollars. And with all that size and cost, it would only hold the equivalent of two short MP3 songs. At the time, the real innovation it represented was its ability to access data randomly. Before that, you had to wind a tape from one end to the other looking for the data you needed.

TODAY AND TOMORROW'S PC

Ten years ago, many felt that the PC era was coming to a close, as people would instead use a device that had no storage capabilities, or on-board software. Instead they would access software and store data remotely. This is happening, but the PC is in no way dead. Today, the PC is alive and well and only just beginning to change our lives. The very definition of a PC continues to morph, as our cameras, phones, and MP3 players, to name just a few, become connected versions of a PC with increasingly more power.

TECHNOLOGY NEWS HIGHLIGHTS

AUTOMATED WEB SITE MONITOR

A new system is scheduled for release this fall that will greatly simplify the task of detecting when "hackers" have tampered with your Web site. It works by periodically downloading the source file and comparing it to a previous version to detect differences. In order to distinguish potentially malicious alterations from routine updates, the system analyzes the source code for key words or suspicious code that may indicate unauthorized changes, then automatically alerts the Webmaster via email. The system has been shown to be 97 percent accurate at distinguishing malicious activity from intentional revisions.

For information: KDDI R&D Laboratories, Inc., Guardian Air Tower, 10-10 Iidabashi 3-chome, Chiyoda-ku, Tokyo 102-8460, Japan; Web site: www.kddi.com

FUEL-EFFICIENT TIRES

In recent years, tire designers have shifted their focus from boosting performance to reducing fuel consumption. Now, Japanese researchers have discovered a way to reduce a tire's rolling resistance, and boost fuel economy without compromising grip and other performance characteristics. The key ingredient – silica – does not readily mix with rubber, so engineers have devised a way to bind the material with carbon before adding it to the rubber mixture. The result is an eco-friendly tire that absorbs 10 percent less energy than traditional tires, translating into a 2 percent savings on fuel. Every little bit helps!

For information: Yokohama Rubber Company, Ltd. 36-11, Shimbashi 5-chome, Minato-ku, Tokyo 105-8685, Japan; Web site: www.yrc.co.jp

GLOW-IN-THE-DARK MOTORBIKES

Motorbikes, or small motorcycles, have long been a popular form of transportation in developing nations due to their low purchase price and cost of ownership. Because of the high cost of gas, their popularity is rapidly increasing in the United States and other industrialized nations. Driving a motorbike on the road at night can be dangerous due to its small size and lack of visibility to other drivers, but Yamaha has come up with a way to make these vulnerable vehicles somewhat safer. A new vacuum pressure process makes it possible to apply a thin layer of phosphorescent plastic to irregularly shaped surfaces, such as fenders and engine covers. Excited by UV light during the day, these coatings slowly emit light over the course of several hours, making the motorbikes easier to spot in the dark. The first vehicles to receive the new technology are Yamaha's EC-02 scooters.

For information: Yamaha Motor Company, 2500 Shingai, Iwata, Shizuoka, Japan; phone: +81-538-32-1115; fax: +81-538-32-1634; Web site: www.yamaha-motor.co.jp

PLASTICS FROM SUGAR

As global oil supplies continue to dwindle, scientists are seeking renewable replacements for many petroleum-based products and chemicals. One such alternative is the use of fructose to produce sugar-based polyesters, and researchers at the University of Wisconsin may have found the key to synthesizing these compounds efficiently and cost-effectively. When fructose along with an acidic catalyst was combined with water and an organic solvent called methylisobutylketone, the mixture separated into two layers. One of the layers contained hydrosymethyl-furfural (HMF), a chemical that could be used to fabricate any number of different products. Through careful adjustment of the process, the team was able to improve yields to the point where 80 percent of the fructose was converted into HMF and the compound was easily isolated from the mixture by evaporating the solvent. Processes such as this may form the basis for bio-refineries of the future, where sugar and other renewable resources are converted into chemicals and other useful products.

For information: James A. Dumesic, University of Wisconsin, Chemical and Biological Engineering, 3014 Engineering Hall, 1415 Engineering Drive, Madison, WI 53706; phone: 608-262-1095; fax: 608-262-0327; email: dumesic@engr.wisc.edu; Web site: www.wisc.edu

HAND-HELD GENE DETECTOR

Current methods for genetic identification involve the use of DNA chips containing light-emitting markers that are analyzed by large systems to detect the presence of specific genes. But recent advancements in field-effect transistor (FET) technology may soon enable researchers to build a portable test system that's small enough to fit in the palm of your hand. In a manner similar to the way DNA microarrays are arranged, synthetic DNA probe molecules are attached to the surface of a diamond FET. When exposed to a sample containing the target DNA, the probe molecules bind with the target molecules, doubling the negative charge on the FET. The target gene can then be detected simply by measuring the change in current. In comparison to silicon-based FET devices, which are also being developed as gene testers, the diamond devices are 30 times more sensitive, and are actually less costly to manufacture.

For information: Waseda University, 1-104 Totsukamachi, Shinjuku-ku, Tokyo 169-8050, Japan; phone: +81-3-3203-4141; fax: +81-3-3202-8638; Web site: www.waseda.jp

PARENTS, DO YOU KNOW WHERE YOUR CHILDREN ARE?

A new battery-operated smart tag system will soon make it easier for parents to check on the whereabouts of their children. Radio frequency (RF) receivers, installed on utility poles throughout a school district, pick up signals from the smart tags. By logging onto a special Web site, parents or guardians can quickly determine the location of their child. The system can even alert them by email when a student leaves school. The system is currently being tested in two elementary schools, and the developer plans to begin marketing the product in Japan this fall.

For information: NextComKK, Hitotsubashi SI Building, 3-26 Kanda-Nishikicho, Chiyoda-ku, Tokyo 101-0054, Japan; Web site: www.nextcom.co.jp

BOOSTING THE STRENGTH OF BIODEGRADABLE FIBERS

Although biodegradable materials have yet to match petroleum-based fibers in terms of strength, researchers are making headway. When strands of polyactic acid fiber (made from corn) are mixed with tiny, one-nanometer-diameter spheres of a similar organic substance, the connections between the fiber molecules are enhanced, doubling the amount of force that the threads can withstand. The developers hope to commercialize the new process within two years for use in products such as transparent films that can protect crops from insects and then naturally decompose.

For information: KRI, Inc., Kyoto Research Park, 134, Chudoji Minami-machi, Shimogyo-ku, Kyoto 600-8813, Japan; phone: +81-75-322-6830; fax: +81-75-322-6820; Web site: www.kri-inc.jp

BALANCING ACT

Japanese scientists are developing a new kind of bicycle that automatically keeps its balance. A built-in sensor and microcontroller continuously monitor the level of tilt, while an actuator in the handlebars steers to compensate and keep the bicycle upright.

For information: Osaka Prefecture University, 1-1 Gakuen-cho, Nakaku, Sakai, Osaka 599-8531, Japan; phone: +81-72-252-1161; Web site: www.osakafu-u.ac.jp

HIGH RESOLUTION TOUCH SENSOR

Researchers at the University of Nebraska have developed a device that is as sensitive to touch as the human finger. Unlike mechanical sensors, which are complex, expensive to build, and too fragile for practical use, the new technology makes use of a property called electroluminescence to determine the texture and contour of an object with a high degree of resolution. Alternating layers of gold and cadmium sulfide nanoparticles, separated by polymer layers to act as dielectric barriers, were used to develop the sensor. A voltage was then applied across the thickness of the sheet. When the sheet is pressed against an object, the layers compress, triggering a current flow that causes the cadmium sulfide particles to release light. The light is then projected onto a "strain map" to produce an image of the object's surface. Because the nanoparticles can move independently of one another, the device is capable of mapping a high level of detail. In surgical applications, for example, it would allow a surgeon to "feel" masses, such as gallstones, using an endoscope, or detect precisely where a tumor ends and healthy tissue begins.

For information: Ravi Saraf, University of Nebraska-Lincoln, Chemical and Biomolecular Engineering, 212 OTHM UNL 68588-0643; phone: 402-472-8284; email: rsaraf2@unl.edu; Web site: www.unl.edu

REMOTE NETWORK ACCESS USING A VIRTUAL PC

A new software package was recently released that may make virtual private networks (VPNs) a thing of the past. Called vThere, this new approach to providing network access for remote users eliminates the need for presentation or application servers and enhances security by installing a virtual PC – complete with operating system and antivirus software – directly to a remote computer. Authorized users connected to the network are subject to the same policies and updates as any office computer, but because vThere runs in a totally separate operating environment, viruses or other threats that may infiltrate a family PC do not affect the network. The software can be downloaded online or installed from disks.

For information: Sentillion, Inc., 40 Shattuck Road, Suite 200, Andover, MA 01810; phone: 978-689-9095; fax: 978-688-2313; Web site: www.sentillion.com or www.vthere.net

REMOVABLE TATTOOS

According to a recently published study, nearly one-quarter of Americans between the ages of 18 and 50 sport a tattoo. But that number may increase with the introduction of a new range of dyes that will be easier and safer to remove. The new tattoo is applied by injecting pigments that are encapsulated in microscopic beads into the skin. In the event the recipient decides to have it removed, a few pulses with a laser will break open the capsules. The dyes are then released into the body where they are safely absorbed. Unlike traditional tattoo pigments, which can contain heavy metals and other toxic chemicals, the new dyes are safe and gentle on the body, and have been approved by the US Food and Drug Administration. The new pigments are due to be released in 2007.

For information: Richard Rox Anderson, Massachusetts General Hospital, Dermatology Department, Wellman Lab BHX630, 55 Fruit Street, Boston, MA 02114; phone: 617-726-6168; fax: 617-726-6121; email: rranderson@partners.org; Web site: www.mgh.harvard.edu

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