<< Back to Article

Top Technology Breakthroughs of 2008

By Priya Ganapati 12.26.08

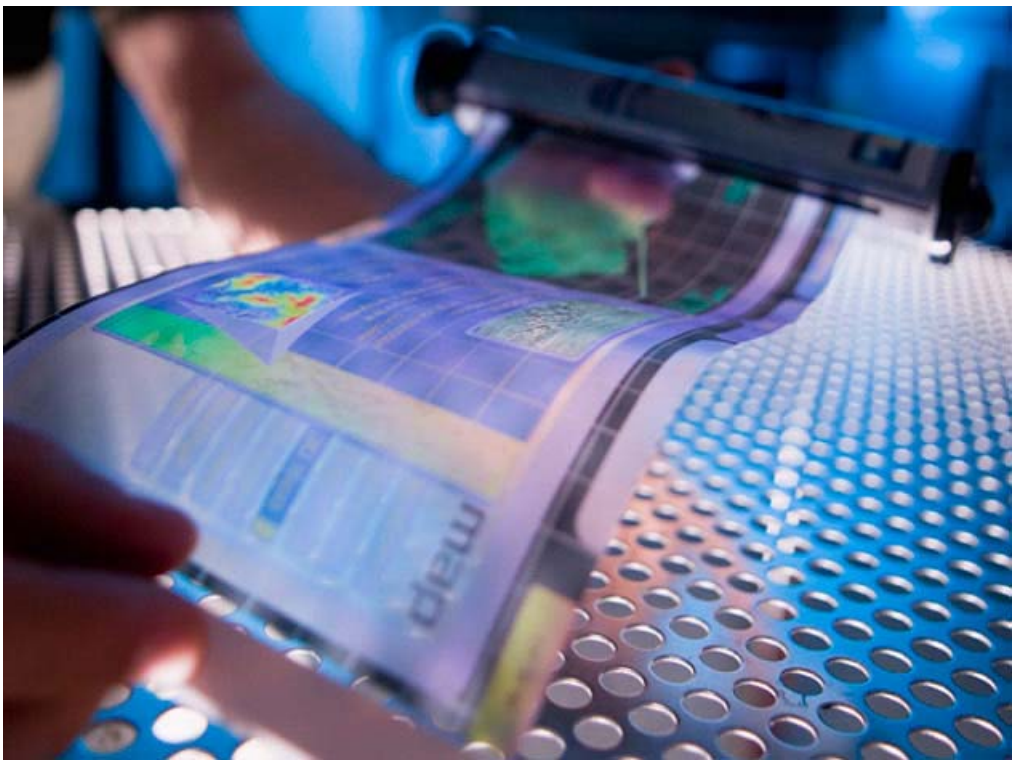
The economy may be tanking, but innovation is alive and well.

When it came to products, incremental improvements were the name of the game this year. Phones got faster (iPhone 3G anyone?), notebooks turned into netbooks and pocket cameras went from recording standard-definition video to HD.

But the world's corporate and academic R&D labs were busy laying the foundations of some amazing future technologies in 2008. They produced concepts such as silicon chips you can swallow for personalized medicine from the inside out and a fourth fundamental element in electronic circuitry. And engineers cranked out a few less groundbreaking — but no less important — inventions, like a space-age swimsuit to help Michael Phelps slice through the water faster than a river otter on a jet ski.

Here's our countdown of what rocked our world in 2008 — and what will change yours in 2009 and beyond.

10. Flexible Displays



Flexible displays are likely to be a reality by 2010 or 2011.
Courtesy Phillip Spears

A sliver of the future can soon be tucked into your back pocket. For years, researchers have worked on thin, paperlike displays that can be folded, rolled or sewn into the sleeve of your hoodie. Flexible displays could change the way we interact with the info-universe, creating new kinds of cellphones, portable computers, e-newspapers and electronic books.

This year, the research moved from the realm of science fiction to plausible reality. With help from the U.S. Army, Arizona State University's Flexible Display Center has created a prototype for soldiers, and hopes to have the devices in field trials in the next three years. Startups like Plastic

Logic and E-Ink have been developing similar technologies.

Meanwhile, Hewlett Packard announced a manufacturing breakthrough that allows the thin-film transistor arrays to be fabricated on flexible plastic materials, enabling manufacturers to "print" displays on big, newsprintlike rolls. Samsung showed off a mobile phone prototype with a flexible display that folds like a book.

Outlook: A *Minority Report*-style digital newspaper that you can roll up in your pocket isn't happening before 2010 at the earliest. But to quote science fiction novelist William Gibson: "The future is here. It's just not widely distributed yet."

9. Edible Chips

Grandma's pillbox with the days of the week neatly marked is set to go high tech. Tiny edible chips will replace the organizer, tracking when patients take their pills (or don't) and monitoring the effects of the drugs they're taking. Proteus, a Redwood City, California, company, has created tiny chips out of silicon grains
that, once swallowed, activate in the stomach. The chips send a signal to an external patch that monitors vital parameters such as heart rate, temperature, state of wakefulness or body angle.

The data is then sent to an online repository or a cellphone for the physician and the patient to track. Proteus says its chips can keep score of how patients are responding to the medication. That may be just the beginning, as the chips could improve drug delivery and even insert other kinds of health monitors inside the body. Now doctors may have a better answer to a common patient complaint — they will know exactly how it feels.

Outlook:
If proven in clinical trials, edible chips could let physicians look into a patient's system in a way that could change how medicine is prescribed and how we take the drugs.

8. Speedo LZR

Michael Phelps. 2008 Olympics. Enough said. Phelps and others were able to log faster times because of Speedo's LZR swimsuit. It blends new materials and a dose of NASA rocket science to boost the speeds of elite swimmers — legally.

Viscous drag on a swimmer can be as much as 25 percent of the total retarding force. But Speedo's suit, with its ultrasonically bonded seams instead of stitches, low-drag panels and a mix of polyurethane layers, can cut resistance and help swimmers move through the water faster. It also has a rigid, girdle-style structure that helps position the swimmer's body in an optimal position. Did it have anything to do with Michael Phelps' amazing eight Olympic gold medals? Probably not, as nearly every swimmer at the Games was wearing a Speedo suit.

Outlook:
We're hoping at least some of the technologies in the LZR will trickle down to the consumer level so we can slice through the water at the Y.

7. Flash Memory

When Apple blessed the iPod with flash memory, it gave new life to a technology that had long played second fiddle to hard disk drives. Now flash memory is a mainstay of most consumer electronics products, from ultralight notebooks to digital cameras and media players.

Next, the who's who of the tech industry — EMC, Sun Microsystems, Intel and Hitachi — are championing flash drives for larger business users.

The advantage? Solid-state flash drives offer faster response times than hard disk drives and they require much less power. The hitch is that they are almost eight times more expensive than hard disk drives. But with the star power behind flash storage, the prices have nowhere to go but down.

Outlook:
More data centers are likely to move to flash storage in 2009, which is likely to drive prices down

further. If this trend takes off, say goodbye to the hard disk drives in your house. It will be time to flash your drive.

6. GPS

The Global Positioning System is old, old, older than you think. The system has been operational since 1978 and available for commercial use since 1993, but for years its use was relegated to expensive personal navigation devices and the dashboards of high-end cars.

This year, suddenly GPS popped up everywhere else, from the iPhone 3G and the T-Mobile G1 to notebooks such as Fujitsu's LifeBook series.

And devices that couldn't or didn't include true GPS made do with cell-tower triangulation or geolocation based on Wi-Fi hotspots. Now getting lost is no longer an option.

Outlook:
With widespread GPS capabilities throughout the gadget world, services that make use of geographic data, like Loopt and Yahoo's Firebird, will be able to build critical mass.

5. The Memristor

It's not often that a fundamental tech breakthrough has the potential to change how we compute. Nearly 37 years after it was first described in a series of mathematical equations, researchers at HP Labs proved that the fourth fundamental element of electronic circuitry is for real. The "memristor," or memory transistor, now joins the three other widely known elements: the capacitor, the resistor and the inductor.

The discovery will make it possible to develop computer systems that remember what's stored in memory when they are turned off. That means computers that don't need to be booted up and systems that are far more energy efficient than the current crop. Researchers also hope the memristor can help develop a new kind of computer memory that can supplement or ultimately replace dynamic random access memory, or DRAM — the type of memory used in personal computers.

Outlook:
Memristors are still primarily confined to the lab, so don't expect commercial products based on this kind of circuitry for at least five years.

4. Video-Capable SLRs

Video-capable SLRs will meld high-def moving and still images.
Courtesy of Nikon

For years, high-end single-lens reflex cameras have been unable to do what even $100 pocket cams can do: Shoot video. That's because of the type of imaging chip used by SLRs.

This year, the camera industry overcame that limitation. Two new cameras, the Nikon D90 and the Canon 5D Mark II
capture top-notch still images, but let the photographer to shoot high-definition video. No longer do SLR users have to stand by, while friends mock them for their expensive camera's inability to shoot video.

Outlook:
Shooting high-def videos with an SLR is cheap compared to using professional video equipment — and it gives photographers access to a wide range of lenses. In 2009, we predict this will lead to an explosion in arty, high-def videos shot by professional still photographers.

3. USB 3.0

Fasten your seatbelts. The data-transfer freeway is set to turn into an autobahn. The Universal Serial Bus, or USB, a popular standard for transferring files to your PC or charging your iPhone, got its first major update in eight years. USB 3.0 will be 10 times faster than the current USB 2.0 standard, and will increase the amount of electrical current that can be delivered through a USB cable.

Users need the increased speed — 4.8 gigabits per second, to be precise. Digital cameras and pocket-size HD video recorders generate a torrent of bits, all of which need to be transferred quickly to computers, so they can be uploaded to YouTube, adding to the internet video that only a handful of people will ever watch.

And as consumers carry around more devices, charging them off a PC using a USB cable will be much easier than carrying multiple chargers. With the USB 3.0 specifications nailed down this year, the standard will bump up the power output to 900 milliamps from 100 milliamps, allowing more devices to be charged faster.

Outlook: We expect the earliest USB 3.0 products in mid-2009.

2. Android

Handset makers from Motorola to Sony Ericsson are rushing to add Android to their lineup.
Jon Snyder/Wired.com

There were many reasons to dislike the T-Mobile HTC G1 phone: its color, poor battery life and a touchscreen that isn't super-responsive. And the numbers reflect that. Only about 1.5 million units of the G1 have been sold since its October 2008 launch. Compare that to the 3 million iPhones that sold when it debuted.

But the G1 scores with its operating system. It runs Android, the free mobile operating system from Google. It's the first mobile OS to make its debut in years and the G1 is just the first of what will be many phones that use it. With its open source base, growing developer community and dozens of cellphone manufacturers pledging to make Android phones, Android has the potential to reshape the wireless industry in significant ways.

Outlook:
At least half a dozen manufacturers are likely to release Android phones in 2009, increasing the pressure on other smartphone operating systems. The iPhone is likely to remain the top-selling smartphone through the end of the year, however.

1. Apple's App Store

Until this year, mobile app developers lacked an easy way to get their software into the hands of consumers, forcing them to make deals with finicky and power-hungry carriers if they wanted to get any distribution at all. Apple's App Store changed all that. It made creating and distributing mobile applications for cellphone users easy — jumpstarting the mobile-app development market and creating clones such as the Android Market. It even forced Research in Motion to offer a BlackBerry Application Storefront. For thousands of programmers, the cellphone is the new PC.

Outlook:
App stores have changed forever the way we use our phones, turning them into personalized devices filled with utilities, handy tools and copies of *Tap Tap Revenge*.