Star TECH

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**Java**

*Java refers to a number of computer software products and specifications from Sun Microsystems that together provide a system for developing and deploying cross-platform applications. Java is used in a wide variety of computing platforms spanning from embedded devices and cell phones on the low end to enterprise servers and super computers on the high end. Java is fairly ubiquitous in cell phones, Web servers and enterprise applications, and somewhat less common in desktop applications, though users may have come across Java applets when browsing the Web. For years, Sun Microsystems referred to Java as the "Java technology" but has used the word "Java" as an adjective about "technology."*

TECHFOCUS

## Thin-film solar cell

# Harnessing solar energy more efficiently

MIRZA ATIK AHMED MEHRAN

THERE is an immense shortage of electricity in our country and the world over as conventional power plants -- power turbines, wind turbines, hydroelectric plants and solar panels -- cannot meet the demand for it.

Power turbines -- the most used method -- use coal, oil, and gas for producing electricity. But these fossil fuels are becoming less available as days roll by, entailing a spike in their production cost. Installing a wind-powered turbine or hydroelectric plant, on the other hand, is also very high. All these methods are not environment-friendly either.

Many scientists have been working on developing alternative energy called "green energy". Green power is the solution to creating a cleaner, sustainable energy system. The sun, wind, plants and moving water are renewable energy sources and they hold the promise of meeting our energy needs and protecting the environment as well. Among these, solar energy is one of the greenest forms of all renewable energy.

But producing electricity from the sunlight has its drawbacks. The main setback for first-generation solar cells is that they are not cost-effective as the panels use single-layer p-n junction diode -- which occupies a large area -- using a silicon wafer. The production cost of these cells is also very high. That is why conventional solar cells have not gained much worldwide popularity. The efficiency of these cells, which have 86 percent market share, is about 7-13%.

Thin-film solar cell is the second-generation technology in producing power from the sunlight. Various thin-film technologies currently being developed reduce the amount (or mass) of light-absorbing material required in creating a solar cell. This may lead to reduced processing costs. They, however, also tend to reduce energy conversion efficiency, although many multi-layer thin films have more efficiency than that of bulk silicon wafers. The main reason why thin-film solar cells are held to be the solution to ever-growing electricity needs is their being cost-friendly.

The second-generation of photovoltaic materials is based on the use of thin-film deposits of semiconductors. These devices were initially designed to be high-efficiency multiple-junction photovoltaic cells. Later, the advantage of using a thin-film of material was noted, reducing the mass of material required for cell design. This led to the prediction of greatly reduced costs for thin film solar cells.

There are currently a number of technologies/semiconductor materials under development or in mass production. Examples include amorphous silicon, polycrystalline silicon, microcrystalline silicon, cadmium telluride, copper indium selenide /sulfide.

Typically, the efficiency of thin-film solar cells is lower compared with silicon (wafer-based) solar cells, but their manufacturing costs are also lower so a lower cost per watt can be achieved. Another advantage of the reduced mass is that less support is needed when placing panels on rooftops and it allows fitting panels on light materials or flexible materials, even on textiles.

Some of the thin-film materials and their efficacy are given below.

1) CdTe: Efficiencies of approximately 10 percent were achieved using both p-i-n and p-n structures.

2) CIGS: The best efficiency of a thin-film solar cell as of December 2005 was 19.5% with CIGS. Higher efficiency (around 30%) can be obtained by using optics to concentrate the incident light.

3) CIS: This film can achieve 13.5% efficiency.

4) Gallium arsenide (GaAs) multijunction: GaAs triple-junction cells reach efficiency above 28.3%. They are also some of the most expensive cells per unit area (up to US$40/cm²).

5) Light absorbing dyes: Typically a Ruthenium metal organic dye (Ru-centred) used as a monolayer of light-absorbing material.

6) Organic/polymer solar cells: Energy conversion efficiencies achieved to date using conductive polymers are low at 4-5% efficiency for the best cells to date.

7) Silicon: Silicon thin-films are mainly deposited by chemical vapour deposition (typically plasma enhanced (PE-CVD)) from silane gas and hydrogen gas. The best conversion efficiency of 15.12% (AM1.5G, 24.5/spl deg/C) has been achieved without the cell's surface texture.

The cells, called thin-film solar cells, are 100 times thinner and potentially lighter than today's silicon cells. Because they require less semiconductor material than other solar cells, lots of thin-film solar cells can be made for less money.

However, the new cells have a much more complex structure and are more difficult to make, limiting their production and commercialisation so far. "They have a more complicated structure and require more complicated processing," said Tim Anderson, chairman of chemical engineering department at the University of Florida (UF) and member of the research team. "Our role is to better understand and transfer the technology to industry."

The advantage of thin-film solar cells is their ability to produce electrical power without harmful emissions, according to the scientists. They can also generate power for a house or small business on site, reducing electrical demand on power plants and electrical grids. The thin-film cells can be created with pennies worth of material on flexible surfaces such as plastic. "The material cost is very minimal," said Sheng Li, a UF professor of electrical and computer engineering and part of a four-member UF faculty team at work on the process. "This is a very promising technology for solar cells."

Li expects CIS cells to be widely available in less than 10 years.

Times Square, the tallest skyscraper built in the 1990s in New York City, incorporates more energy-efficient building techniques than any other commercial skyscraper and also includes building-integrated photovoltaic (BIPV) panels on the 37th through 43rd floors on the south-and west-facing facades to produce part of the building's power. The building's most advanced feature is the photovoltaic skin, a system that uses thin-film PV panels to replace traditional glass cladding material.

This cell has a vast array ,of usages. It has the potential of being used almost anywhere. The high cost of crystalline silicon wafers (they make up 40-50% of the cost of a finished module) has led the industry and scientists to look at cheaper materials to make solar cells. And thin films are one of those materials.

In this era of ever increasing consumption of electricity, thin-film technology is a breath of fresh air. This technology-based cell's efficiency can reach up to 25-30%. With the use of thin film, solar cell price can decrease to 40-50 percent. The future of meeting the electricity need is tied to the expansion of thin-film cell technologies.

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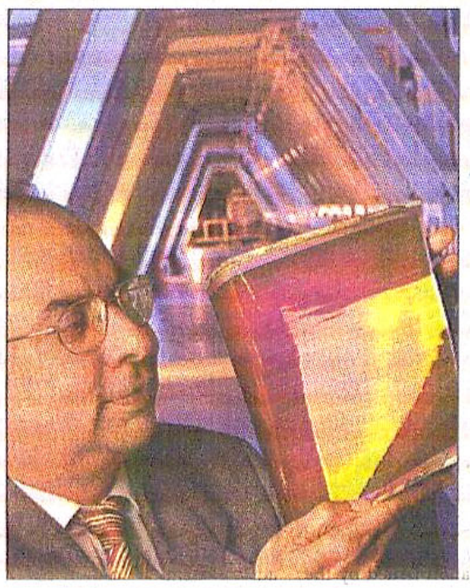

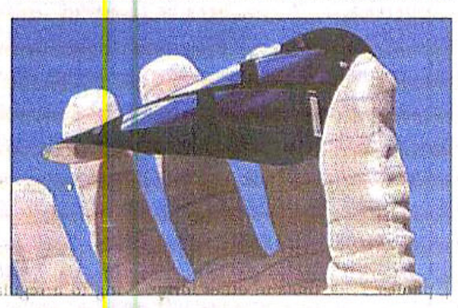

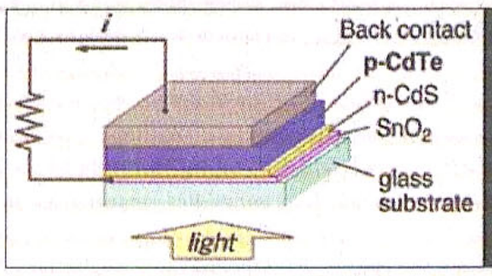


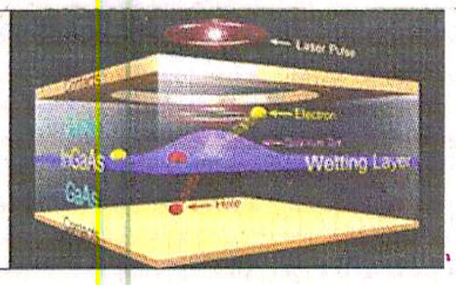


TECHVIEWS

# Teen 'unlocks' iPhone

AP, *New York*

George Hotz holds an iPhone that he has unlocked

ARMED with a soldering iron and a large supply of energy drinks, a slight, curly haired teenager has developed a way to make the iPhone, arguably the gadget of the year, available to a much wider audience.

George Hotz of Glen Rock, N.J., spent his last summer before college figuring out how to "unlock" the iPhone, freeing it from being restricted to a single carrier, AT&T Inc.

The procedure, which the 17-year-old posted on his blog Thursday, raises the possibility of a cottage industry springing up to buy iPhones, unlocking them and then selling them to people who don't want AT&T service or can't get it, particularly overseas.

The phone, which combines an innovative touch-screen interface with the media-playing abilities of the iPod, is currently sold only in the U.S.

An AP reporter was able to verify that an iPhone Hotz brought to the AP's headquarters on Friday was unlocked. Hotz placed the reporter's T-Mobile SIM card, a small chip that identifies a phone to the network, in the iPhone. It then connected to T-Mobile's network and placed calls using the reporter's account.

T-Mobile is the only major U.S. carrier apart from AT&T that is compatible with the iPhone's cellular technology, but smaller carriers also use the technology, known as GSM. In Europe and Asia, GSM is the dominant network technology.

The hack is complicated and requires skill with both soldering and software, and missteps may result in the iPhone becoming useless, so few people will be able to follow the instructions.

"But that's the simplest I could make them," Hotz said.

Technology blog Engadget on Friday reported successfully unlocking an iPhone using a different method that required no tinkering with the hardware. The software was supplied by an anonymous group of hackers that apparently plans to charge for it.

AT&T spokesman Mark Siegel and Apple spokeswoman Jennifer Bowcock said their companies had no comment on Hotz' exploit. Hotz said the companies had not been in touch with him.

The iPhone has already been made to work on overseas networks using another method, which involves copying information from the SIM chip, or Subscriber Identity Module.

The SIM-chip method does not involve any soldering, but does require special equipment, and it doesn't unlock the phone each new SIM chip has to be reprogrammed for use on a particular iPhone.

Both hacks leave intact the iPhone's many functions, including a built-in camera and the ability to access Wi-Fi networks. The only thing that won't work is the "visual voicemail" feature, which lists voice messages as if they were incoming e-mail.

Since the details of both hacks are public, Apple may be able to modify the iPhone production line to make new phones invulnerable.

Hotz collaborated online with a large number of people to develop the unlocking process. Of smaller core group, two were in Russia.

"Then there are two guys who I think are somewhere U.S.-side," Hotz said. He knows them only by their online handles.

Hotz himself spent about 500 hours on the project since the iPhone went on sale. On Thursday, he put the unlocked iPhone up for sale on eBay, where the high bid was at $12,600 late Friday. The model, with 4 gigabytes of memory, sells for $499 new.

"Some of my friends think I wasted my summer but I think it was worth it," he told The Record of Bergen County, which reported Hotz's hack Friday.

Hotz heads for college on Saturday. He plans to major in neuroscience or "hacking the brain" as he puts it at the Rochester Institute of Technology.

TECHNEWS

# bdjobs.com turns seven

EDWARD APURBA SINGHA

BDJOBS.COM, the pioneer of online-based career services in Bangladesh, has celebrated its seven years in operation. To mark this occasion, the company organised a press conference at Hotel Sonargaon on August 21 to talk about its successes down these years and future plan.

Fahim Mashroor, chief executive officer (CEO) of Bdjobs.com, in his welcome note acknowledged the contribution of the media to help Bdjobs.com familiarise online job search in the country.

"Bdjobs.com began its operation with limited resources and it is systematically upgrading itself by implementing innovative ideas. Outstanding support from corporate houses also plays a role in its onward march", Fahim said. "We transformed our portal into a new sensational one in order to minimise download time and make job search more interactive for the people", he added.

On any internship opportunity at the firm, Fahim told StarTech that Bdjobs.com is considering the issue and will incorporate more facilities to ease online job hunting in the near future. The firm has so far organised different seminars and training programs on regular basis with a view to helping people to choose the right career.

The company claimed that everyday 20,000 visitors on average hit its portal, adding its online CV bank contains more than 1.5 lakh resumé of different professionals and over 3,000 employers in the country use the portal to recruit-employees.

During the last seven years, over fifty thousand professionals have got employment through Bdjobs.com, including more than one thousand overseas jobs. The training division of the company has also trained more than 6,500 professionals.

BDjob.com's chairman Ahmad Islam Muqsit, directors Masumul Haq Shiblee and Mohammad Anis and marketing and sales manger Prokash Roy Chowdhury were present at the press conference.

PHOTOTECH

## PLAYING ALL THE TIME

Visitors of the Games Convention computer games fair sit on toilets as they try out games, on August 22 in Leipzig, eastern Germany. Organisers of Europe's largest show for interactive entertainment experienced 200,000 visitors during the event that continued till August 26.

PHOTO: AFP

# Tech Jargon V

TODAY, let's have some entertainment. We'll take a look at certain aspects of multimedia, you know, audio, video, etc.

Codec: Ever been in a situation where you've tried to play a movie on the computer and the darn video player kept saying " Unknown format. Cannot play video file"? Well, if you did, then it may not necessarily be a problem with the CD. It may be because your video was probably compressed using a codec (Compressor / Decompressor). A codec is a small program that compresses your video files so that they take less amount of disk space. They can also tell the computer how to decode the information in the file. An example of a codec is "The Playa", which codes and decodes video files in the "DivX" format. So if your video player won't play a particular format, you can easily download and install a codec from the internet where it is widely available.

AVI: Full form for this is *Audio-Video Interleaved*. It can contain both audio and video data and allows synchronous audio with video playback. Although widely used, AVI is considered by some to be an outdated format, increasing file size more than necessary. A good replacement for the AVI format is MPEG, which stands for "*Motion Picture Experts Group*". This format has a set of standards for compressing video and audio files, allowing for comparatively lesser use of disk space.

MP3: Stands for *MPEG-1 Audio Layer 3*. Ever wonder how come all these music shops fit so many music albums into one CD? A thing that was almost impossible before the introduction of mp3s, mainly because of the huge amount of disk space that a song can take. Today, the mp3 is a very popular standard for compressing

audio and particularly music files down to a very reasonable size with little or no perceptible loss of quality. The files created using MP3 compression are also called "MP3s".

But beware, both selling and buying of these many-in-one audio CDs is actually illegal and incurs a great loss to the music industry. In Bangladesh, however, these CDs are so widespread and easily available, one would think "Everyone's doing it! Then what's wrong if I do it?"

Burn: I particularly included this word as it sounds quite misleading to many. A friend of mine once asked me to show her how to create a CD by saving a few of her files onto a re-writable CD. I used the software that was provided with her CD writer and after completing all the formalities, when I was finally about to click on the "Burn CD" button, she just screamed out "Don't do that! That's a brand new CD! Why on earth would you want to burn it?" That's when I explained to her that he word "Burn", when it comes to creating CDs or DVDs actually means "To start saving the files on the CD, not to destroy it!". So readers, remember not to embarrass yourself by making a comment like this to anyone.

WAV: A wav file is a computer sound recording. Not a very suitable format to save your favourite songs in, since wav files tend to be very large in size and take up a lot of disk space. Therefore, sound recordings are often compressed into MP3s so that they can be played on the internet. Although quality may be slightly lower, the file in the MP3 format will be much smaller in size.

Nahid Akhter