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June 2008

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digit SEVENTH ANNIVERSARY

7 WONDERS OF THE TECHNOLOGY WORLD

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7 WORKSHOPS
36 LAPTOPS TESTED
10 WIRELESS ROUTERS TESTED
7 GEEKY INDULGENCES
64-BIT COMPUTING DEMYSTIFIED
ASSASSIN'S CREED REVIEWED

Humble Beginnings

IT IS FASCINATING how computers, and the digital devices that they power, have evolved. I fondly remember my first stint with computers. It was in the late 80s when I saw my first IBM Mainframe at my father's office in London. I was completely amazed with the machine. I was told that this "server" ran applications for the company's computers located all across the globe, but yet all I could see was a box that whirred and clicked. Still, I was fascinated, and remain addicted to such "boxes" even today.

Now, most of what I know of the early age computer and electricity is all bookish learning. I remember the last 25 years of personal computing somewhat clearly. It started with the launch of IBM's 5100 and 5150, which were sold for about $1500, and ran 4.77 MHz processors, with 64 KB of RAM.

The first computing machine I ever touched and worked (or played) on was the good old Commodore 64, back in 1987. I also owned a Sinclair ZX Spectrum around the same time. After spending months trying to figure out those machines, I finally taught myself how to play games and use small applications.

A few years after that, my dad bought my first PC—the IBM XT 286, with an Intel 80286, 6 MHz processor, 640 KB of RAM and a 20 MB Hard Drive. I was in heaven.

Later, I got a 486, and became the school whiz-kid, because I was the first to learn of an application called Stacker that could double hard drive capacities by compressing the contents. Thanks to me, the few others in school with computers were able to store 40 MB of data on our 20 MB drives.

While I was using computers, writing programs and playing *Paratrooper*, the age of viruses hit us. We, the geeky ones at school, were petrified of viruses like Stone, Michael Angelo, Jerusalem, Raindrop and Joshi.

Those were the days of CUI. Then the doors closed and world of Windows opened. I spent months playing around with Windows 3.11, an tamed that too. As time passed, the PC evolved at breakneck speeds, and I soon found myself using Open Source software, and even wrote my first code to get on the development tree of a version of the Linux kernel. I grew up a geek, long before it was cool to be one.

Sujay Nair Editorial Director

"...we've helped students become the teachers—teaching their parents, peers, and even their teachers, about technology."

Today, computers are ubiquitous, and not something that's restricted to the geeky amongst us. However, even today, kids are learning to do things with computers that their peers marvel at. *Digit* gets scores of emails every month, telling us how, over the past 7 years, we've helped students become the teachers—teaching their parents, peers, and even their teachers, about technology. This month we're celebrating 7 years of being India's number one technology magazine, and are showcasing the *7 Wonders Of The Technology World*. To me, the most important Wonder is the 7th in our list, and you'll understand what I'm saying better after you've read the cover story.

editor@thinkdigit.com

digit SEVENTH ANNIVERSARY

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COVER STORY 24

Seven Wonders of Technology

Presenting our Seven Wonders of the Technology World—seven things that have changed the way we look at transistors, at computers, at the world, at each other...

JUMBO FAST TRACKS

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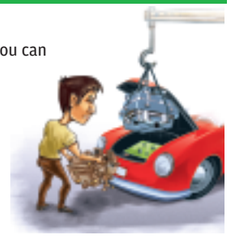
Features



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Solutions

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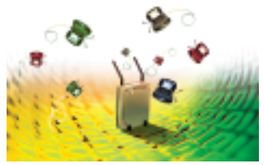
Test Centre



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Digital World

Over 250 of the Best Freeware Applications Ever Made

50 Free Games

- 8 Kingdoms
- A Tale of Two Kingdoms
- ACWABATIACS
- BallDroppings
- Battleships Forever
- Ben Jordan: Paranormal Investigator
- Bloodmasters
- Bollen
- Cactus Arcade
- Captain Binary
- CRUSH!
- Dark Oberon
- De Blob
- Desert Hawk
- Dr. Lutz and the Time Travel Machine
- Empyreal Nocturne
- Galaxy Scraper
- GameBiz 2
- Harmotion
- Hot Potato
- JonnyRPG
- Jumper: Redux
- Loveless
- Madhouse
- Mondo Agency
- Mu-cade
- MultiHero
- Open Mortal
- P.H.L.O.P.
- Pluto Strikes Back
- Poesysteme
- Polarity
- Purgatorio
- Ray-Hound
- Rorschach
- Rückblende
- RUNMAN'S MONSTER FRACAS
- Shapes on a Plane
- Shark Attack: Deep Sea Adventure
- Simutrans
- Star Rage
- Star Wars
- Synaesthete
- Teh Forum Game
- The Desolate Room
- Torus Trooper
- TrackMania Nations Forever
- Transcendence
- Universal Combat
- Vivid Conceptions

Entertainment

7 Free Movies

- Borg War
- Faith Hope and Charity
- Infest Wisely
- Nobody Needs To Know
- Star Wreck: In The Pirkinning
- The Stranger
- War of the Servers

Gaming

Demos

- LEGO Indiana Jones: The Original Adventures
- Race Driver: Grid

7 Free Movies

- #!/bin/bash by Gerador Zero
- Debut by Chaos
- For The Stilling Of Volcanoes by pharmacopia
- Life is Music by Steven Host
- Our Future Begins Here (EP) by b-Shake
- Time to Think by The Home Phonema
- WhiteRoom by WhiteRoom

Archive!

PDFs of all Digit Issues and Fast Tracks Ever Published

(Over 15,000 pages of Content in a single DVD)

Microsoft's Imagine Cup - The winners

It's Official! The Indian leg of the competition that has been the focus of attention for the past few months has finally yielded its champions. Young and innovative students from across the country proved their mettle by coming up with innovative ideas. The finale of the Imagine Cup that was held in Bangalore on May 09, 2008, gripped the audience from beginning to end and revealed the forerunners who would go ahead and represent India in the Imagine Cup World Finals in early July.

The participants who created solutions in accordance to this year's theme - Imagine a world where technology enables a sustainable environment - and that made it to the finalist list were:

Team blAnkSpace, Team Eco Warriors, Team EcoPals, Team GRAS, Team Green Waves, Team Gurus, Team Novices@Work and Team SKAN.

Ravi Venkatesan gave away the prizes to the deserving students.

Eminent dignitaries from industry and academia, like Paul Murphy, Director of Innovation, Microsoft; Kiran Karnik, Past President, NASSCOM; Prof S Sadagopan, Founder-Director, IIIT (International Institute of Information Technology) ; Ravi Venkatesan, Chairman, Microsoft India; Tarun Gulati, COO Microsoft India; Rajdeep Sehrawat, Vice President, NASSCOM; Dr Gopichand Katragadda, GM, Operations, GE Global Research Banglore, R K Misra, Winner-Lead India and Prof. Sameer Barua, Director, IIMA, graced the event.

Sound Bytes

Speaking on the occasion, Paul Murphy discussed the pressing need for India-specific innovations rather than force fitting global innovations. "The most important aspect of Innovation is that they are of two kinds. One is necessity based and the other convenience based. If you look at the US and Western Europe, most of the innovations have been convenience based, but the true need of the hour in India is necessity based innovations".

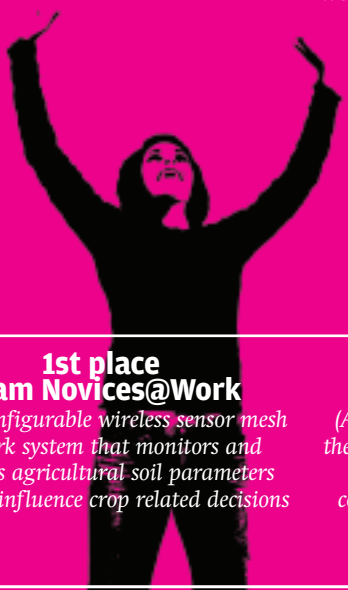
Platforms like Imagine Cup will be instrumental in fulfilling such a need. Also, it gives tremendous opportunity for the young talent to use their knowledge and new thinking into creating solutions that will benefit the world. This gets better as such a stage helps students to make a business case of their solution and enter the corporate world.

According to Prof. S Sadgopan, when it comes to innovation, deep research doesn't necessarily bring results. In the past, small innovations have made a phenomenal difference to the life of the common man. And such innovations have not been done by noble prize winning geniuses, but by regular people. This should inspire students and the young talent in India to push themselves to think broadly and keep their eyes and ears open as we need a whole spectrum of ideas to progress as a nation.

"Change is the only constant. And that is what we are trying to do - we are trying to change India. Post Lead India we have started this initiative wherein we are trying to change the way we - Indians think, behave and conduct ourselves. We are trying to bring about a difference, and the majority of people in the campaign are our youngsters as I believe youngsters have the capacity to think differently and be real change agents and I honestly have a lot of faith in young India ", shared R K Misra. According to Tarun Gulati, "We believe in investing for the future. If the Indian IT system is enabled and if students in India have the capability and skills to realise their potential, not only Microsoft, but every company will benefit from such initiatives."

Dr R K Pachauri, Director General, TERI (The Energy and Research Institute) who was unable to attend the event due to previous engagements, sent a very inspiring message to the students. He said that environmental issues are a grave concern today and if we do not wake up to the peril, not only future generation, but also this generation will face serious consequences. Today, we need a solution which can be implemented through collective action and only youngsters can be the catalyst to push the society in the right direction. He went on to say that Imagine Cup is the right platform for such a radical movement.

In the end, a very excited Saili Dharia - member of Team Novices @Work - took the stage. "I am feeling exhilarated and I want to profusely thank all those who played a part in our success. This solution will truly benefit rural India and I want to make a sincere appeal that this should be taken up and put into practical use, as seeing it succeed will be our true reward", she signed off.



Winners

1st place
Team Novices@Work
(A self-configurable wireless sensor mesh network system that monitors and analyses agricultural soil parameters that can influence crop related decisions

2nd place
Team SKAN
(A power consumption solution where the management can monitor the entire computer network and switch idle computers into the power save mode)

3rd place
Team Green Waves
(A solution where citizens can take photographs of environmental issues they come across in their day-to-day lives and send them to a centralised agency, which can then disseminate the information to concerned NGOs)

Fast Track Love

I have been reading *Digit* for a year, and am eagerly waiting for your seventh anniversary issue. You are the best among all the other tech magazines, and I love your CD / DVD, Fast Tracks, and magazine. I will soon be subscribing to *Digit* for three years, and I thought I should write to you and tell you that last month's *Digit* was amazing. *The Fast Track to Google Sketchup* was very useful for an architect like me, and has made me fall in love with *Digit*. Please keep rocking India, and keep up the good work.

Saurabh Kumar

We received a lot of positive feedback about the *Fast Track to Google Sketchup*, both from budding architects, as well as those with a passion for design and engineering drawing. We will try our best to find more such topics. Suggestions are always welcome.

Team Digit

Ridiculous!

I have been reading your fantastic magazine for the past 3 years, but this is the first time I am writing to you. I started reading your magazine in May 2005, when I was in the 9th grade. I bought your first issue from Nainital, where I was holidaying at the time (I actually live in Mumbai). There's been no turning back, and I would like to thank you and give you full credit for all that I know about computers. I have earned the reputation of "computer geek" amongst my friends, thanks to you, and I am sought after about computers. I can help my friends and give them detailed replies thanks to *Digit*.

The magnitude of gratefulness that I feel towards you is something I can't express in words; thanks a lot! All your issues and fast tracks have been the best ever, and no amount of competition can ever defeat the fact that you are the best. It's all thanks to you that I have been able to assemble my dream AMD gaming rig, with an AMD Phenom 9550 processor and a 780G chipset-based board. I have also assembled and sold a computer, all thanks to you! I loved the article about the technology used to send probes to Mars, as well as the Fast Tracks to Tech Jargon, Wireless Networking and The Web. Congrats on being India's No 1 tech magazine, and the World's best magazine for me.

It's not all praise though, and I must state that I feel that you are biased towards Intel processors. I feel that AMD has much better products than Intel, and is far superior in terms of price and performance. I feel that Intel and ATi have disappeared from the *Digit* world.

In your Zero1 awards, you stated that "there has not been much action from the AMD Phenom processors", but I feel it's because of all the Intel-sponsored reviews on the Net, which pitted the Intel Quads against the Phenoms on NVIDIAs 590 SLIs. Had the reviews been done on an AMD 7xxx chipset, which are specially designed for the AMD Phenoms, it would be a different story. It's a known fact that the Phenoms provide unto 30 per cent better performance on an AMD 7 series chipset.

The Phenom gives me beautiful performance, excellent on even high-end games like Portal and Far cry at FULL detail, right out of the box—any time greater then an Intel Core 2 Quad on a G35 chipset. Sometimes I feel that you are being paid a good amount by Intel to advertise their inferior products, because one of your competitors reviewed and rated the Athlon 64 X2s much greater than most Core 2 duos, and those ratings seemed genuine. I surely hope that I am wrong, but I am telling you how I feel.

Please continue your good work, and keep on giving us wonderful magazines.

Abheek Gulati
Mumbai

This is the first time anyone has ever accused us of being biased in our tests! The idea that we'd take a little money to make one product win over another is so ludicrous that we're still finding it hard to believe.

To begin with, we're not quite sure what sites you have been reading up on, but we can tell you that you should un-bookmark them. It's no secret to the world that the Core 2 series from Intel has done to AMD exactly what AMDs Athlon64 series did to Intel's Pentium 4 series. If you go back and look at older *Digit* issues, you will see that we are completely unbiased, and as long as Athlons ruled the roost, it was all that we ever recommended to people. Part of the fun of working for *Digit* is to know that we're not some fly-by-night little Web site that is looking to make money or scandals, but a company that for the past decade has been known to have the most fair and unbiased Test Centre in India. We have even lost advertisers based on the fact that we have attacked sub-standard products from companies that are considered tech giants, and it's still not phased us one bit.

As for the Phenom, yes it is a nice processor, and does quite well against the Core 2 Quads of similar pricing. It still loses most benchmarks, even on the AMD 7xxx platform. Add to this the fact that the Penryn and newer Core 2s are based on a 45-nm fab, which means lower power, less heat and still higher clock speeds, and you can see why we recommend Core 2s for performance junkies. As for those on a budget, we do recommend AMD's offerings, because the fight between Intel and AMD means that you get a nice big discount on some very nice AMD processors. A couple of years ago, the roles were reversed, and it was Pentium 4s that were the budget offerings.

As for *Portal* and *Far Cry*, they're not even close to as CPU intensive as say, *Crysis* is, and they stress the graphics sub-system more than a CPU. Any current generation dual-core CPU should allow you to play both of these without any framing at "FULL detail", providing you have a good graphics card! I suggest that you do a little more research online about how to benchmark CPUs, and then try a comparison of your own, with all the strict testing guidelines that any good reviewer adheres to.

In our 7 years as *Digit*, and even before that, we have received tonnes of both positive and negative feedback, and we have to admit that yours is, by far, the most insulting and heartbreaking letter of all time! The only thing that would seem more preposterous now is if someone wrote in and accused us of accepting bribes from Microsoft to promote Linux and Open Source!

Team Digit

Break It Up

I have only been buying *Digit* for the last six months, but I'm in the process of reading the 30 older issues that my elder brother has collected. Although, I also have a lot of other tech magazines, *Digit* fulfils all my needs. I'm not a geek, but I am a technology freak, and am addicted to it. So while I'm busy filling up my hard drive (my mind) with technology knowledge about hardware and software from *Digit*, I thought I should thank you with this letter. Please show my letter to all the *Digit* staff as my thanks for their great effort towards distributing tech knowledge and making India a better and more intelligent place to live in.

I have only one complaint, which is about the design of the magazine. I think your articles should be divided much better visually, with breaks so as not to look like long essays. The only other thing I can think of is the poor quality of the DVDs, which has gone down regularly—the quality of the discs, not the content. Apart from this, you're all doing a perfect job.

Apoorva Rai
Varanasi

Write to the Editor

E-mail: **editor@thinkdigit.com**

Snail Mail: **The Editor, Digit, KPT House, Plot 41/13, Sector 30, Vashi, Navi Mumbai 400 703**

Digit will publish the best letters on these pages. Letters may be edited for clarity. **Please include your complete address in all communication.**

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The staff thanks you for appreciating our work. We do have both short and long stories, depending on what the subject demands. It's important that some subjects be covered comprehensively, and that's why you feel that some stories are too long. We will do our best to make them feel shorter, visually at least. As for the DVD contents, it would help a lot if you told us what you don't like, or at least what sort of content you do like.

Note: We request our readers to be more specific in their feedback so that we can pinpoint what you like and what you don't!

Team Digit

Yeh Dil Maange More

Hello fellow tech-holics, who live for the best thing on this planet—technology. I have been reading *Digit* for over 4 years now, and I have only one word for it—AWESOME! Your unattractive subscription offers, however, have stopped me from subscribing. Although not perfect, *Digit* is still the best tech magazine in India. From your 7th anniversary onwards I hope you will get rid of some issues that have nagged us:

Paper and print quality, timely availability in smaller cities like Ranchi, better software in the DVD, newer movies, better music, less Linux, more on education, more mobile content, mention game minimum system requirements on the DVD, and a *Fast Track to Programming*.

Arighna Mitra
Ranchi

Now that's the way to suggest improvements! Just rattle them out without wasting any words. You have our assurance that we will try and meet most of your demands in a couple of months. As for the newer movies, which seems to be a common request, we think you guys are getting the wrong idea. Although we do provide a blockbuster, latest movie in some special issues, we're *not* trying to get you to believe that the regular vintage movies we provide are a substitute for that.

We're quite well aware that the movies we provide are from the 1920s to 1950s, and we're providing them for nostalgic reasons. It's important to know your history, and these are the history of the entertainment industry. We we're the first to offer you movies, and we were also the first to take a step back in time and reminisce. Just as Motzart and Beethoven are classical musicians, we're hoping you will learn to appreciate these classic movies. Besides, they hardly waste any DVD space...

Team Digit

Whatever Happened To?

On Page 59, the last tip ("Archive archive archive") ends abruptly. I expect such things from others, but not from *Digit*. You also held an opinion poll about the Fast Track being made colour, with better paper quality—whatever happened to that? Please make the *Q&A* section bigger, or at least publish all reader queries online. Also, more articles to educate people about the risks they put themselves in while pirating would be good.

Sridhar Rao

Whoops! Apologies. We'll certainly try not to let such idiotic errors happen again. As for the *Fast Track*, we're working on something that we feel all our readers will like. And we're trying to make sure we can do it without raising the price of the magazine. You'll find out soon enough.

Team Digit

Nobody's Perfect

I appreciate the effort Team Digit puts into every issue to satisfy our tech hunger. I've been a reader for the past 5 months, and I am greatly impressed with *Digit*. However, I already have a few complaints.

Please start international subscriptions at low rates for countries around India. I am from Nepal, and I have to spend NPR 200 (One Indian Rupee is 1.6 Nepalese Rupees) which is too much for a student like me. Please also make sure that the *Take A Crack* section is included in every issue. Give us more Fast Track books to programming and Linux. Please improve the paper quality, because *Digit* goes through a lot of weathering and transportation to reach us in Nepal.

Of course, nobody's perfect, and these feel like minor issues when compared to the information you offer, but please consider them and keep up the good work.

Pravesh Koirala
Janakpur, Nepal

At a conversion rate of 1:1.6, Indian Rs 125 works out to NPR 200 exactly. You're paying exactly what our Indian readers are paying, and we think it would be unfair to price a magazine that's made in India at a cheaper rate in another country. We will try and look into a subscription scheme to allow you to save some money though. Stay tuned.

Team Digit

LETTER OF THE MONTH

Phat-Being!

Hello Uncle Chandiramani! I am 14 years old and recently started reading *Digit*. The articles you wrote were very interesting, and really had a lot of information about the latest gadgets. When I get *Digit*, I always read your articles first. The contents of the DVD and CD that you make are also amazing. They have helped me personalise Windows, and tune my system. I'm the first amongst my friends to be introduced to DTP, Web, Programming, etc.

The only thing I dislike is gaming, because it takes away our creativity, and there is nothing obtained except fun. I started making HTML pages last year, and recently completed Visual Basic on my own. I request you to give us more programming stuff (for VB, HTML, C++, etc) like source codes, tools, etc. I also secretly request you to provide software such as ResHacker and hex editors so that I can hack into EXE and DLL files, and I also want links for free software Web-sites. Thank you my dear Uncle!

Raavi Munaf Bhatkar
Ratnagiri

Dear Raavi,
Team Digit would like to thank you for finally giving us something to rag good old "Uncle Chandiramani" about. You have no idea how hard it is to find flaws with Nimish, or "Fatbeing", as he calls himself. He's one of our best writers, toasts an excellent DVD, and makes fun of his one weakness—food—himself! Thanks to your letter, many of us have finally got a chance to give him some of his own. He's a good sport though, and will definitely heed your suggestions for the DVD. We're just hoping that you're asking for sites to download "freeware" from, and not the other kind of *free* software!

Team Digit

Corrigendum

In last month's issue, on page 87 in the LCD test tables, the Editor's Pick award (LG L246WP) erroneously read "April 2008" and should have read May 2008.

In the Hard Drive test of the same month, on page 93, the Seagate Barracuda 7200.11 750 GB was awarded the Editor's Pick award, but here too, the month was wrongly displayed as April 2008 instead of May 2008. Our apologies for any confusion this might have caused.

User Generated Content

Opportunities And Challenges

Shailesh Rao

Our world would be a very boring place, if we all agreed all the time. We also know that letting people express their views freely, has real practical benefits. Allowing individuals to voice unpopular, inconvenient or controversial opinions is also important. Not only might they be right (think Galileo), but debating difficult issues in the open often helps people come to better decisions.

India, the world's largest democracy, faces challenges unlike any other nation on earth. I'm often asked if online companies are helping or complicating the collective conversation, that is democracy in India. I would, absolutely, say it's helping. But no one should deceive themselves—it's complicated, as well.

While most people acknowledge the right to free expression, the challenge, however, is putting theory to practice. And that certainly holds true on the Web—to speak and be heard as never before.

We are witnessing an explosion of content online. With increasing numbers getting faster Internet connections (though still not enough in India), cheaper digital storage and lower production costs for music, videos and Web sites—the rules for social communications have fundamentally changed.

The result is the democratisation of access information and the ability to communicate. Individuals can create and find information, communicating directly with one another, without having to pass through the bottlenecks of traditional institutional controls.

At Google, we have a bias in favour of people's right to free expression in everything we do. But we also recognise that freedom of expression can't be—and shouldn't be—without some limits. The difficulty is in deciding where these boundaries are drawn. For a company like ours, with services in more than 100 countries with differing laws and cultural norms, it's a challenge we face often.

In a few cases, it's straightforward. While child pornography is illegal in virtually every country, for political extremism it's not as simple. Some countries' histories make commentary or criticism on certain topics that are especially sensitive. Other countries believe that the best way to discredit extremists is to allow their arguments to be publicly exposed.

People have different views about what should appear on our sites. How and where to draw the boundaries is the subject of lively debate, even within Google. We think that's healthy. And partly because of this—we realise that creating a flawless set of policies on which everyone can agree is an impossible task.

The most challenging areas are where we host other people's content. On the one hand, we're not generating the content and we aim to offer a platform for free expression. On the other hand, we host the content on our servers and want to be socially responsible. So we have terms that we ask our users to follow. See Blogger and Orkut for example.

How do we enforce these terms? We, at Google, don't believe in being the gatekeeper, and can't check content before it goes live, in the same way that your phone company wouldn't screen the content of your phone calls or your ISP wouldn't edit your e-mails. We also have millions of active users who are vocal when it comes to alerting us on content that they find unacceptable or believe, may breach our policies. When they do, we review it and remove it appropriately. These are always subjective judgments and some people will inevitably disagree. But that's because what's acceptable to one person may be offensive to another.

We also face the added complication that laws governing online content apply differently in the different parts of the world we operate in. These legal differences create real technical challenges. In extreme cases, we face questions about whether a country's laws and lack of democratic processes are so antithetical to our principles that we simply can't comply or operate there in a way that benefits users.

Dealing with controversial content is one of the biggest challenges we face as a company. We do try hard to think things through from first principles, to be as transparent as possible about how we make decisions, and to keep reviewing and debating our policies. After all, the right to disagree is a sign of a healthy society.

The author is the Managing Director of Google India

The views expressed in this article are those of the author, and are not intended to represent the views of Digit.

From A Hacker's Diary

No MP3 Business Please!

Aasis Vinayak

I was reading 'Digital Certificates' by Jalal Feghhi, when Sam, a friend of mine and a free software enthusiast, called me on my mobile. He wanted to fix some bugs associated with OGA files. He was trying to experiment with those Ogg files on his Samsung P520 mobile. He wanted to free his musical tracks too!

Ogg can multiplex a number of independent, free, and open source codecs for audio, video, text (say for subtitles) and meta data. I've been told that the word Ogg comes from the name of the character Nanny Ogg appearing in Terry Pratchett's Discworld novels! There is another version too. It says that Ogg comes from "ogging", jargon from the computer game Netrek, which is used to refer to an activity that is done forcefully (without even considering about the future resources).

Ogg is a free, open standard container format (that too a professional-grade media format) and its source is maintained by the Xiph Foundation. The source code (called libvorbis) is available on the download page of the foundation's site at **http://xiph.org/downloads/**. You can also use aoTuV, an upgraded version of the latest release of libvorbis (1.2.0), for obtaining better audio quality, especially at low bit rates. In a standard frame, Theora will offer a video layer, while the Vorbis codec basically acts as the audio layer.

MP3 files are generally restricted by patents. But that is not the case with Ogg Vorbis. It respects one's freedom. I remember when Microsoft was asked to pay some $1.5 billion for using MP3 without getting a license. Now they too are safe if they come to the free software world for getting resources for their products! Even larger players in the market like RealPlayer have started using Ogg implementations.

It was way back in 1998, when the development work of Vorbis (**http://www.vorbis.com/**) had started, when Fraunhofer-Gesellschaft announced the decision to charge licensing fees for the MP3 format. Then Christopher "Monty" Montgomery, a multimedia programmer and an open source advocate, pioneered the works and founded Xiph. And finally they succeeded in bringing out the stable version (1.0) in the second half of 2002. Vorbis is now commonly used along with the standard Ogg container, and is therefore called as Ogg Vorbis.

Ogg is, in fact, the general format. We use OGA for audio, OGV for video (including Theora) and OGX for applications. Now using libogg, a BSD-licensed library, every one like Sam can encode and decode their data.

Sam's issue was basically with the driver. But I have seen some even wondering how to access Ogg Vorbis (that encodes audio) and Ogg Theora (that encodes video) files. If they had tried using any free software players (media players), their doubts would have been answered. I recommended VLC Media Player (the player that I like the most) to all those who wrote to me regarding this.

You might think that patent lawsuits concerned with these will never affect you. However, you are partially wrong. You have limited your skills and creativity. He has chained his skills and creativeness. For example, players like Windows Media Player and RealPlayer require people to use non-free software and they are controlled solely by the respective companies. The ultimate result is that he cannot develop multimedia software without thinking about the legal complications arising out their deployment.

Recently, one of my friends launched a project to create an interactive modular soft-synth. He says that 'the Psychosynth project (**www.psychosynth.com**) allows newbies, developers and professionals explore new ways of making music'. The advantage is all that concerning the Freedom—as it does not require the use of proprietary software. This is also directed towards the same goal.

This 'freedom' has led to the use of Ogg's various codecs in various other free and proprietary media players. The list appeared to be interesting to me, as it included both commercial and non-commercial media players, portable media players and even GPS receivers from various companies.

The prime reason for this endorsement, even from those proprietary giants, is that the quality of the files is not lost when Ogg Vorbis is used. Further, it is able to compress audio down to a size smaller than MP3 and is freely re-implementable in the respective software. The only thing that matters to me is to break away from limitations. Absolute freedom is not far away for me.

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Viruses in the army

Apart from grappling with local insurgents, the US army in Iraq is fighting a steadily losing war with computer viruses. Bootleg porn CDs, purchased locally, which are widely popular in the army are infected with viruses and worms. Military commanders are worried that the infected computers could pose a security threat

Friend Connect

Google has unveiled a new service called Friend Connect, which allows any site to add social networking features for free without any programming. These features can be added in the form of widgets developed by Google as well as third-party developers

HEARTLESS HACKERS

A New Low For Hackers

Hackers are always up to things. They steal data like credit card information, break into servers and bring Websites down and make life hell for network admins. Rarely, however do they cause direct physical harm to their victims.

However, hackers reached a new low when they broke into Epilepsy Foundation's Website (**www.epilepsyfoundation.org**). As its name indicates, this foundation acts as a support group to epileptic patients, who form the bulk of visitors. Many of them are susceptible to seizures on exposure to brightly coloured lights and images. Such patients were affected by the malicious stunt of the hackers who flooded the site's user forums with links to pages full of brightly flashing images. According to media reports, many people suffered splitting headaches and near seizures.

This attack seems to be more like one of those show-off stunts that are made just to prove a point. However, authorities are taking this attack seriously and the FBI is investigating this incident. Forum users of the foundation are no longer allowed to post animated images. Meanwhile in a world where computers are pervading even the most personal of spaces, such direct attacks can cause significantly more havoc than the botnets of today.

CAMPUS VIDEO

Promotion 2.0

Colleges and universities in the US are becoming smarter in promoting their brand name. No more are they content in only sending out recruiters to high schools or designing glossy promotional material. The latest playground is the Internet—specifically sites like YouTube. These colleges have started YouTube channels to showcase what they have to offer to prospective students.

Students among the segments on YouTube and most of the content they create have some sort of relationship with where they study. There are possibly hundreds of thousands of videos of folks doing backflips, peeing from dorm windows and chilling out. While these videos don't say anything for the facilities that the particular school offers, there are often some videos like those of hazing rituals, leaky classrooms and racist fights that might harm the reputation of universities. Keeping this fact in mind, the colleges have started uploading positive videos to drown out the negative ones.

Colleges are also holding video competitions among students where the best gets to be the official promotional video for that institution. This approach is more effective because prospective students would more likely watch videos made by people from the same age group and the colleges also save on expenses incurred by hiring an ad agency.

Apart from YouTube, academic institutions have been hawking their wares in places like iTunesU and Facebook. These videos have won both brickbats and bouquets from the student community. On a side note, using such videos for promoting educational institutions is already catching on in India, especially among private institutions. A few years ago, Manipal University came out with its own promotional video based on the *Summer of 69* track, which has had thousands of views on YouTube as well as being watched in college LANs across India.

SUPERPOD

Chips And Supercomputers

Did you ever expect your humble iPod to be used for services to science? If everything goes according to plan a supercomputer five years down the

■ Intel and Cray team up for supercomputer development ■ YouTube rejects a Senator's demand to remove Islamist videos ■

line might be built out of chips that drive today's consumer electronics equipments like iPods and mobile phones.

Researchers at the Lawrence Berkeley National Laboratory, a US Department of Energy lab have, in a research paper proposed the building of a poor man's supercomputer using the embedded chips. Meant to be used for running cloud simulations, these systems are used in weather forecasting and rain predictions. Currently, the fastest supercomputers can do this. However, the accuracy level and leaves much to be desired which leads the Met department's weather forecasts to be taken with a healthy pinch of salt. With this new "iPod supercomputer", however, scientists hope that predicting the vagaries of the weather would be a lot easier.

In the midst of all this, the interesting fact is the saving in money as a result of all this design. A conventional supercomputer built with the existing design would cost around $1 Billion and consume around 200 MW of electricity, which is enough to power a city of around 100,000 people. This supercomputer would also need to be more that 1,000 times more powerful than the current models. The new design would use 20 million chips, of the kind that is found in iPods. In addition, it would also cost a relatively less $75million. Electric power consumption would also considerably be less at 4 MW, and performance figures would be 200 petaflops (IBM's Blue Gene, one of the current fastest runs at 2 petaflops).

The only hurdle appears to be the interconnection between individual processors—the paths through which data flows. If there are any bottlenecks, then the whole scheme would come crashing down. We guess researchers would surely find one solution or another.

PREACHING VIA SMS

Teh V471c4n, And Teh Pope?

The Vatican seems to be finally waking up to the axiom that when you can't take a horse to the river, bring the river to the horse. Hit by falling rates of attendance at churches and the general disdain of the younger generation towards God and institutional religion, the Vatican is hoping that technology can help them reach out to the young.

In the run up to World Youth Day in July, Pope Benedict XVI will text prayers and blessings to thousands of Catholic youth. To be held at Sydney, and spread over six days, the World Youth Day is an event promoted by the Roman Catholic church, which basically tries to "catch 'em young"! Thousands of young men and women from across the world gather together every two or three years to meet each other and talk about spirituality and religion. This audience, accustomed to mobile phones and the Internet are believed to be better reached, if the traditional sermons were replaced with something more techie. Besides using text messages, the church also plans to promote a social networking site akin to Orkut or Facebook to knit the community, especially the youth together. Digital prayer walls would also be erected across the sprawling racecourse in Sydney, where the main events are planned, so that participants can see the prayers instead of straining to hear from the nearest loudspeaker.

The telecom company in charge of these arrangements estimates that it will connect 8,000 volunteers, 2,000 members of the clergy, 3,000 media personnel and about 225,000 pilgrims across 700 locations in Sydney. The faithful who can't make it to Sydney will

Femtocells

What are Femtocells?
Femtocells, officially known as Access Point Base Stations are small devices that boost cellular networks around areas in the interior of buildings that might have low signal strength. A femtocell is no different from a wireless router and are about the size of a paperback.

How do they work?
Femto cells route the signals from up to 5 mobile phones through a broadband connection and pass them to the service provider thereby bypassing the conventional phone to tower path. GSM, CDMA and UMTS connections are currently supported by femtocells.

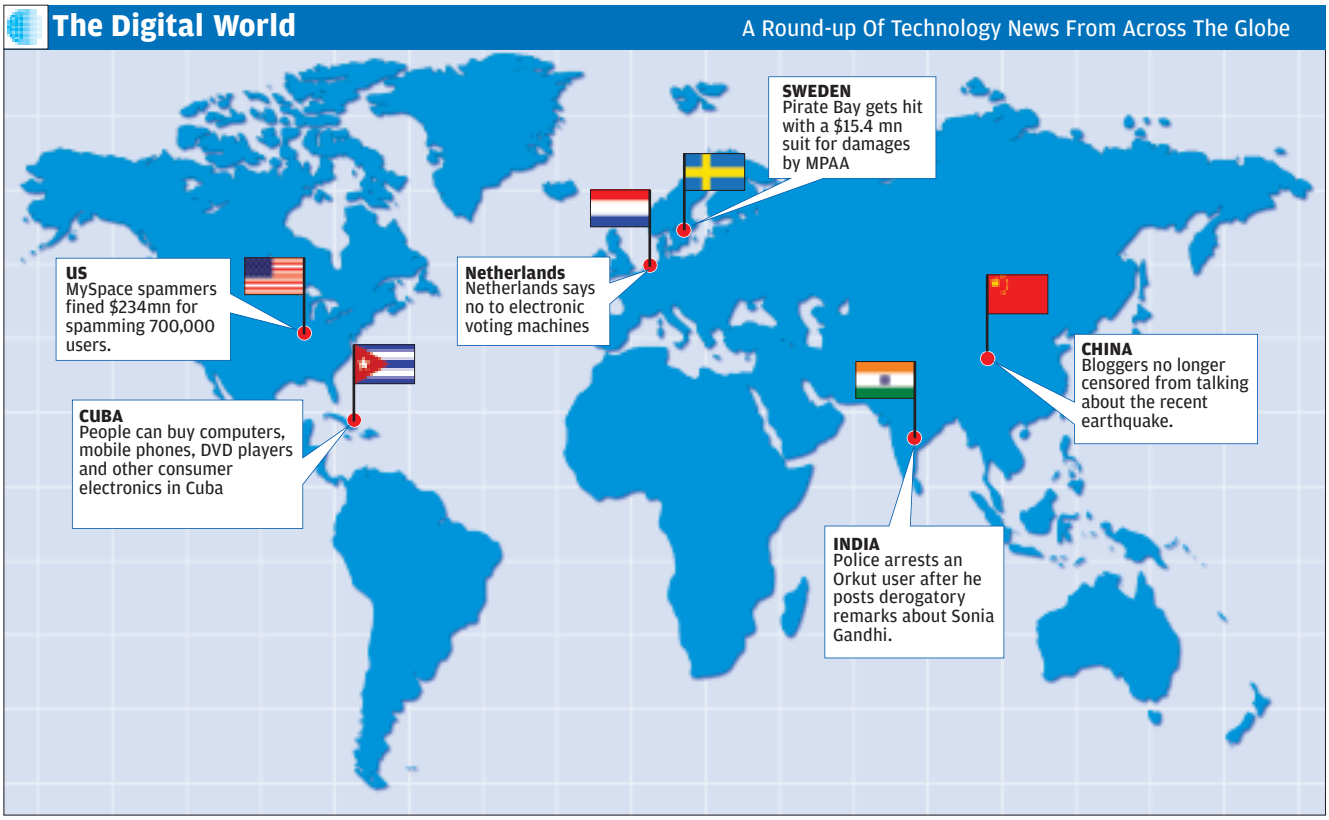
Who will benefit?
Femtocells benefit both customers and operators. Customers benefit by improved coverage, lower costs per call, longer battery life and usage of multiple phones and lines on the same connection. Operators get more customers by minimal infrastructure investment and reduced congestion in the wireless network. Therefore its a win-win scenario for everyone involved.

Why the emphasis on Femtocells?
With the phasing out of 2G networks, phones using 3G networks and technologies like HSDPA becoming mainstream, extending a network by conventional means—installing more towers—would be expensive. Also since people are used to terms like Internet and broadband, customer education would not be necessary and adaptation to the new technology would be hassle-free. The technological advances in embedded design have also lowered the price of base stations to affordable levels.

When will this technology debut?
Femtocells are already used on a limited basis across some cities in the West.

Which companies are working on this?
Major players like Motorola, Netgear and Google have their fingers in the femtocell pie.

■ Microsoft to pay Live Search users to search and buy products ■ RIM allows Indian government to monitor BlackBerry network ■



be able to log in to the official Website of the event, and watch videos while the entire convention area will be covered with WiFi. In addition music downloads and pictures are also available from the Website.

With the above figures, there hardly seems to be any difference from your typical Macworld or CeBIT. Who says religion and science are on the opposite sides of the fence!

P2P—PIRATE TO POLITICIAN

Warez Of Crime

Politics is the final destination of the scoundrel. Indians are quite familiar with this, and have seen history sheeters and locked up dons become MLAs and MPs. The Americans, however, are surprised when they hear of a similar case in Fan Diego.

The San Diego branch of the Grand Old Party was a respectable gentleman named Tony Krvaric. An immigrant from Sweden, he seemed to espouse all the values of the mostly right wing, conservative party. However, he also had a less than chequered past. Investigations by intrepid journos have revealed that a young Krvaric was the cofounder of a warez group called Fairlight. For those not quite aware, warez sites peddle movies, games and other copyrighted materials. However, downloading from these sites can pose a significant security risk in terms of spyware and malware that are shipped along with the movie or song. Besides, distributing malicious software, these sites break the law by indulging in piracy. The FBI had Fairlight under investigations in a nationwide operation against copyright offenders and several members of the group were also arrested. Officially though, Kravic had left the scene and he didn't face any charges due to lack of proof.

With this latest scandal threatening his political ambitions, Krvaric had assured his party officials that the only misdemeanours he committed were in the 4th standard and they were quite embarrassing (we think he means the time he peed on the school lawns). However, he is simply lying—the email address which he had registered with the Registrar of Votes is on a Fairlight domain. This proves that our budding mayor and / or governor did a lot more than peeing or raising hell among school girls. Wonder how the citizens of San Diego feel about one of their politicians being revealed as a pirate?

F FOR...ERR... FREEDOM?

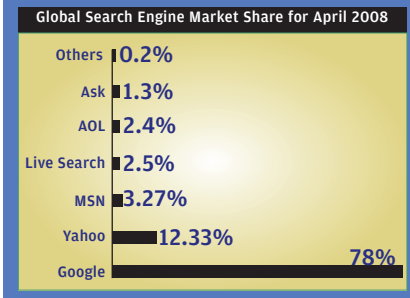
Rewards For Net Neutrality

If you are male, have lived in, or are travelling to Belgium shortly, you might be interested in this. A maverick Belgian political activist, Tanya Devereaux, ran a campaign for a

■ A new design of the OLPC laptop costing $75 to be released in 2010 displayed ■ Wii sales make Nintendo CEO richest man in Japan

STAT ATTACK

It's all in the numbers



48.9% of **Indian mobile users** access **social networking sites** from their **phones**

About 50% of airlines **Airlines** worldwide will allow **in-flight calls** by the end of **2008**

ITU says number of **global mobile phone users** is **3.3 billion**, or **49%** of the **world's population**

20% of the **US population** has **NEVER sent** an **e-mail**

seat in the Belgian parliament, by promising sexual favours to around 40,000 people. In fact she goes on to say that she will have sex with any virgin who supports Net neutrality.

Basically, Net neutrality—a hot topic in the West these days—means you are allowed to download torrents as much as you can, without your ISP threatening to take your connection down. So if you have a written documentation of your support towards this cause (forum or blog posting) and are okay with giving your e-mail address and name on a Web site, then you might just have a chance of Tania engaging in you-know-what with you.

Before you do something, there are some points to ponder over. Considering that Net neutrality would probably have thousands of supporters, there are some terms and conditions to be met. Firstly the participant should be above 18 years of age and should be a virgin. She will make her own travel arrangements, and she is open to suggestions on going about with the act. She is also game to "performing" before an audience and also being videotaped, though for non-commercial purposes. Since presumably she would have a lot of virgins to service, the upper limit per person is exactly 30 minutes—not a second more. Also, another important caveat—she has the absolute right to refuse anyone for hygienic reasons. Also, in case the lady finds out that the person is not a virgin, she does not guarantee against any accidental injury to the groin area. Ouch!

We, at Digit, have always stood by principles and ethics—from avoiding piracy to refusing sleazy material to promote sales. What is glittery in the beginning fades away with time, or so they say! Problem is, Ms Devereaux has a history of pulling stunts like these to grab attention. Her "personal sexual favour" pitch has been projected as an art project, as is her widely read blog where she apparently chronicled the days before her "suicide" took place. For all we know, this might be a sneaky way to gather e-mail addresses for spamming. However, in the unlikely case that it's true, we wonder how many years it will take her to completely discharge her obligations. So all you excited readers, chill! Nothing comes for free. It is substance that sustains.■

Splashtop

Buzzword of the MONTH

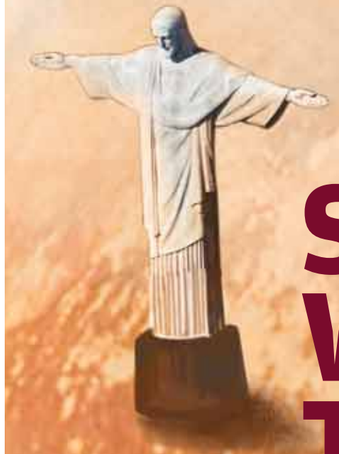
Have you ever thought how cool it would be if your computer starts and shuts down instantly like a television? If you get a computer with any Asus motherboard in the near future, you will be able to power up and run basic applications like Web surfing and Internet telephony, without loading the operating system.

This has been made possible by embedding a version of Linux called Splashtop in the motherboard. Available on high-end Asus motherboards like P5E3 Deluxe, since October last year and marketed as Express Gate, it will be pushed by the company across the board. This instant start version of Linux has received great feedback from customers.

In computers that come with Splashtop, it takes not more than 5 seconds after switching on, to get full Net access. Given that many people use computers most of the time to browse online it's no wonder that the system was a hit. No more waiting for the sluggish OS to load. Similarly, there are no delays waiting for the PC to shut down. Given that many people leave their systems on for days, Splashtop will help conserve electricity and extend the life of the hardware.

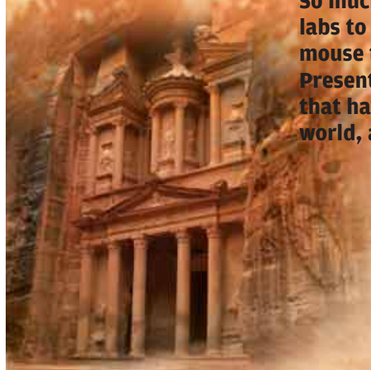
■ UK plans to monitor and record every phone call, e-mail and browsing history of its citizens for security purposes ■

Shrikrishna Patkar



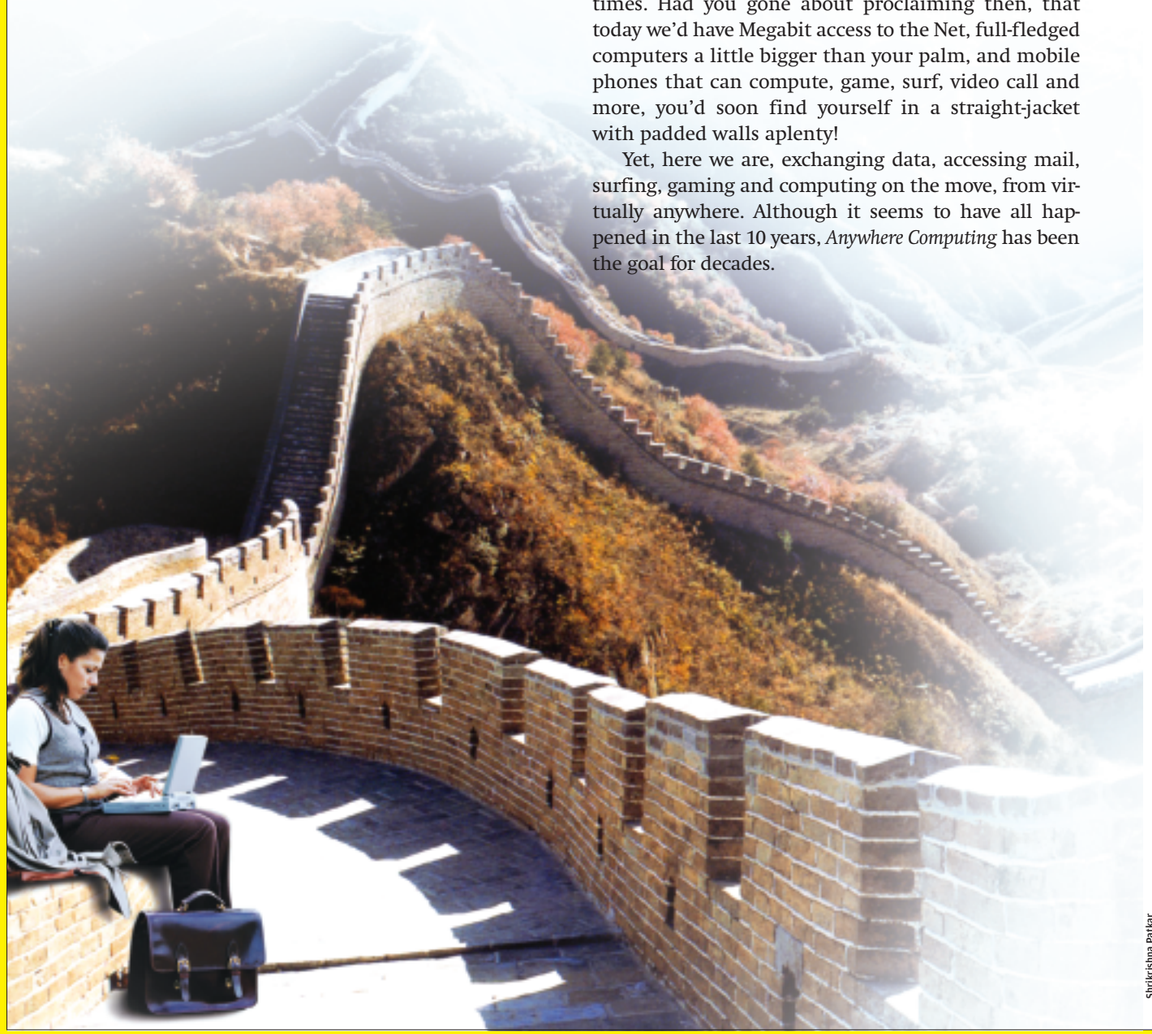
Seven Wonders of Technology

So much has changed. From the first computers in the first computer labs to powerful computers in your pocket. From the keyboard to the mouse to touch to *think*. From white-on-black to 24-bit high definition. Presenting our Seven Wonders of the Technology World—seven things that have changed the way we look at transistors, at computers, at the world, at each other...



No Boundaries

Computing is not something you do at a desk anymore, or just at work. All of us are computing on the move, and the future has more in store...



Shrikrishna Patkar

Robert Sovereign-Smith

Rewind a decade or two, to the *dark ages* when we were growing up (well, when I was growing up anyway), and today's world feels so alien at times. Had you gone about proclaiming then, that today we'd have Megabit access to the Net, full-fledged computers a little bigger than your palm, and mobile phones that can compute, game, surf, video call and more, you'd soon find yourself in a straight-jacket with padded walls aplenty!

Yet, here we are, exchanging data, accessing mail, surfing, gaming and computing on the move, from virtually anywhere. Although it seems to have all happened in the last 10 years, *Anywhere Computing* has been the goal for decades.

Laptops

The first mobile computer was probably the Grid Compass, designed in 1979 by William Moggridge from Britain. It was later used by NASA in their 80s space shuttle programme, because it was a fraction of the weight of any other computer of comparable computing power. It boasted of 340 KB of memory with a foldable display!

Soon after the Grid Compass, the Osborne 1 was released by Osborne Computer in 1981, and this is what most historians consider to be the first fully-functional laptop computer. It weighed about 12 kilos, had a 5-inch screen, a battery, two 5.25-inch floppy drives, a modem port and quite a few software applications. All that goodness came at a price though, about $1800 (a lot of money in 1981), and perhaps that explains why the company never successfully marketed the Osborne 1.

Today, we still pay premium for laptop computers, but it's not too much more than a desktop of a similar configuration. Most of us don't mind coughing up the extra dough for the convenience of being able to carry a PC wherever we go, and the market trends are proof of this... Over the last couple of years, the growth in sales of Laptops had risen exponentially, while the desktop market growth isn't what it used to be.

In this issue itself, we've tested laptops from various vendors, and you will find that all of them offer models that can sit on a single palm. Perhaps we might have to stop calling them notebook computers soon, and start calling them pocketbooks! As you will read in the test, small screens and tiny form factors don't mean special OSes and reduced processing power, instead, these little beasts are quite capable of handling anything you would normally do on a laptop.

PDAs

Going back to 1984 again, while most companies were still trying to figure out how to build cheaper and better PCs, with the occasional company attempting to build laptops, British-based Psion released the Psion Organiser I—a pocket computer. The Organiser I had 4 KB of ROM and 2 KB of RAM, with a single-row, monochrome, text display. It did not have an OS, and told time (and date), could calculate, and used a simplistic database—something like a shopping list that you type out in notepad; one item per line!

In 1986, the Psion Organiser II was released, and this was what we like to think of as the first real PDA.

The Psion Organiser II: perhaps the first true PDA

Intel's Personal Server / Agere BluOnyx

While everyone and their uncles are trying to make or envision flashy devices that promise to do your bidding at the click of a button, Intel took a step back and tried to solve one age old problem. Yes, it's true, you, me, your friends, other *Digit* readers, the world at large, we all have one common problem, "How do I carry all my data about with me?"

Let's use me as an example: My problem is, I have to leave all my music behind when I leave my house, or carry it all around with me on my external hard drive. For me, it's music, for you, it might be movies, videos, presentations, documents, whatever floats your boat. At the end of it all, we'll still find ourselves on a camping trip, or stuck in a cab, with all the data you require in an external hard drive and no way to get at it—at least not right now, when you need it the most.

The Idea behind Intel's Personal Server was that you needed a smart storage solution that powers itself and can interface with almost anything that you are near, with the right security measures, of course. Now instead of worrying about how to make a mini display, power it, make an interface, add features, and basically make another flashy device, Intel decided to leave that to those who do it best, and focus on making an extremely low power computer, that could store GBs, serve it all up over Bluetooth or Wi-Fi, and interface with any device that had a screen, a browser and a wireless connection—which is pretty much every desktop, notebook, cell phone and PDA today.

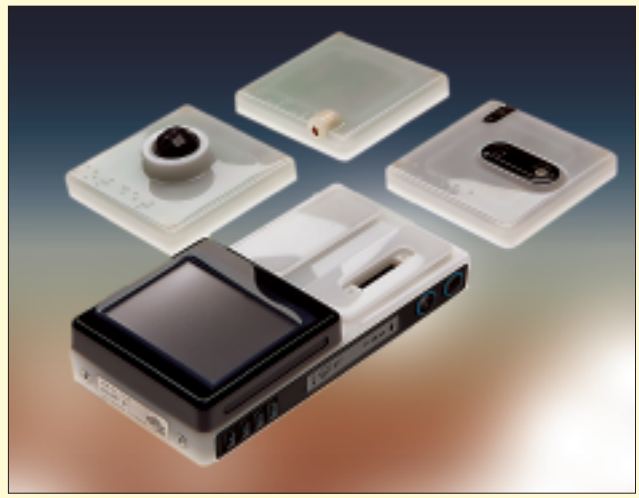
The idea was to carry the Personal Server in a bag, or your pocket, go wherever you wanted, and if you felt the need to get at your data, you could just whip out a cell phone, or borrow the phone of the guy in front of you in the queue to buy IPL tickets, use a browser to get at your files, edit them, mail them, or do whatever you normally would, had you been sitting at your home PC. The device, sadly, never made it out of Intel's labs, but chip maker Agere took the idea and released a prototype called BluOnyx, which is based on the same principle. Currently, BluOnyx is being sold as the world's first Personal Media Server, and you will find more details at **www.bluonyx.com**.

Bug Labs Platform

Didn't you love playing with Lego blocks as a kid? The freedom to build what you fancied, with creative new designs for buildings and cars that were uniquely designed by yourself. Ahh... those were the days. Today, you have to make do with gadgets that millions of other also own. You can either become an iPerson, like the rest of the world, or you can be bitten by the creativity bug.

The Bug Labs Platform, which is open source incidentally, allows you to build yourself a gadget, like you did when playing with Lego. You can develop your own modules, or just be lazy and buy the ones you want, and then attach it all to the microprocessor base, and have your very own gadget. You can even write your own programs, or be lazy again, and download those written by the community, which are easily available (don't you love Open Source?), to get the functionality you want, nothing more, nothing less.

Of course, this is still in a nascent stage, but we can imagine Bug Labs, or another project like it, catering to the whims and fancies of every individual. Want to own a mobile phone that has no keypad (because you hardly ever call people), but has a large screen for videos, a large storage capacity, and none of the Bluetooth, MMS and Smart Phone nonsense? Just build it yourself!



It had 8 or 16 KB of RAM, a two-line display, a single-tasking OS, diary and alarm features (basic reminders), and was even user programmable! Of course, only really advanced users could customise their Organiser IIs, because you had to either use the Organiser Programming Language or machine code to get it to do your bidding. They were tough cookies too, and rumour has it that you could run an Organiser II over with a bus and still be able to extract your data. Ah, they don't make them like that anymore!

Time warp back to today, however, and the reality of it all hits you smack in the face. Today, it's no secret that PDAs are a dying breed! Most people are just getting themselves laptops and enjoying the power of full-fledged computers at their beck and call, rather than buy a PDA that has a special OS, tiny screen, and very often, no QWERTY keyboard! The fact that sizes of tablet PCs are shrinking, and bringing tiny touch-based computers within every senior executive's reach has not helped the PDA cause either. As it stands, the convergence of PDAs and cell phones (what we like to call Smart Phones), seems to be the only avenue for PDA manufacturers.

Cell Phones

The history of mobile phones is rather muddled. It depends solely on what we could consider to be a "mobile" phone. If it's just wireless voice connectivity between two specified points, then sometime in the 1940s Motorola first popularised its Walkie-Talkie backpack system. The race for mobile communication technologies was contested by Motorola and Bell labs (AT&T), with Bell engineers proposing the first electronic designs and plans. However, the first mobile phone (wireless, but able to connect to the wired telephone network) was the Motorola DynaTAC (Dynamic Adaptive Total Area Coverage), which Dr Martin Cooper first showed off in 1973. He was also the first person to talk on a cell phone, and his first ever call was to his rival—Joel Engel, then Head of Research, Bell labs. Perhaps you can understand the rivalry better when you picture Dr Cooper standing below a rather tall

building, surrounded by reporters and passers-by, pressing a button and making a call, much to the bewilderment of the onlookers and to Joel Engel's chagrin...

What bewildered people in 1973, has absolutely no effect on us now though. These days you would actually turn more heads if you proclaimed, "No, I don't own a cell phone."

All of us seem more interested in buzzwords like 3G, 4G, CDMA, HSCSD, GSM, MMS, Tri-band, GPRS and Bluetooth, because it's what we see mentioned on the feature lists of the phone models we aspire to buy. However, the biggest buzzword of the twenty first century is "convergence", and the most common form of technology has turned out to be the humble cell phone. It doesn't take a genius to figure out why so much innovation has happened in the mobile handset and services markets.

What used to be a device to make and receive calls has now become a manifestation of all the technologies and services we desire. Think about it. When phone calls to foreign countries were prohibitively costly, e-mail and chat rescued the day. However, e-mail is free, but the humble SMS is still the most popular way of greetings and information flow. Every Diwali, Eid or Christmas, we receive more SMSes than e-mails from friends and acquaintances, because it's cheap and instantaneous. It's not as intrusive as a phone call, yet intrusive enough to be delivered instantly—whether you're in the loo, asleep or rock-climbing. Even if your phone is off, you get your messages as soon as it's turned on, which has a much higher probability of occurring than, say, you sitting down at a PC and checking mail. The limitations of SMS (in terms of characters) is now being offset by push-mail services, thanks to our digital data capable networks. So now executives with a BlackBerry are informed of e-mail the way most of the world is informed about a received SMS.

It's not just about messaging systems though, and increases in processing power, advancements in mobile OSes and better batteries mean that you can now buy phones that are, for all practical purposes, mini computers, or PDAs at the least. With the sheer amount of software developers focussing on the mobile segment, and thanks to software platforms like Java, almost every phone can do almost anything. You can view your documents, store your files, click and store pictures, upload those pictures to your site, check mail, surf, chat over IM, watch videos, listen to music or FM, and even play games. What more could you want? Plenty more!

The Future

With 4G promised to all of us soon, we can start seeing PC like bandwidth on mobile phones, which means streaming video content, in the form of subscription services or even dedicated mobile TV channels! The focus here is entertainment, obviously, so gaming, chatting, streaming radio and TV are what get all the headlines. However, with 4G we're talking about being connected to cell networks at near-LAN speeds (100 Mbps to 1 Gbps). This also brings along with it video conferencing capabilities, true MMS capabilities and mobile peer-to-peer networks.

So will the lines between mobile phones and laptops begin to blur next? Probably, but it might take a decade or two. With the kind of research being done, although notebook computers will get smaller, so will cell phones. Perhaps we might soon see the cell phone that fits into your ear, or one that's embedded in your skin, powered by your heart! The cell phone and notebook computers are different enough to survive un-converged, but we're betting that the differences will not stop manufacturers from trying to converge the two anyway.

Security Concerns

Miniaturisation and mass adoption bring with them security concerns aplenty. Just as PC users have to worry about viruses, Trojans and spyware, the "smart" phone of the future will need to have anti-virus software running on them to keep them safe from hackers. With Wi-Fi access already available at most popular haunts (coffee hops, airports, train stations, etc.) and WiMAX promising to extend networks across entire cities, we're headed towards a time when we will always be connected to data networks, and the Net. The problem is, whatever device you use, public networks are usually teeming with malware, and the odd hacker looking for a chance to get at your personal information.

With miniaturisation we end up with a human problem, where the voyeur hidden amongst us surfaces. Already because of camera phones we're in the age of MMS, mobile video and still photography scandals. Can you imagine what would happen if we had tiny mobiles or cameras built into, say, a pair of sun glasses, and made them cheaply available at every local electronic shop?

The Last Word

The technology trends we've seen, all around us, point specifically to Anywhere Computing. Whether it's just about being connected all the time, or about making smarter devices to allow your fridge to order more milk via your cell phone when you're running low, it's all heading in the same direction. In this magazine itself you have read about grid computing, ubiquitous computing and now anywhere computing, and it all boils down to many more smarter devices, all communicating, all pervasive, and all of them offering you the opportunity to surround yourself in sweet silicon goodness, and call yourself a geek. It's now just a matter of time... the geek really will inherit the Earth! ■

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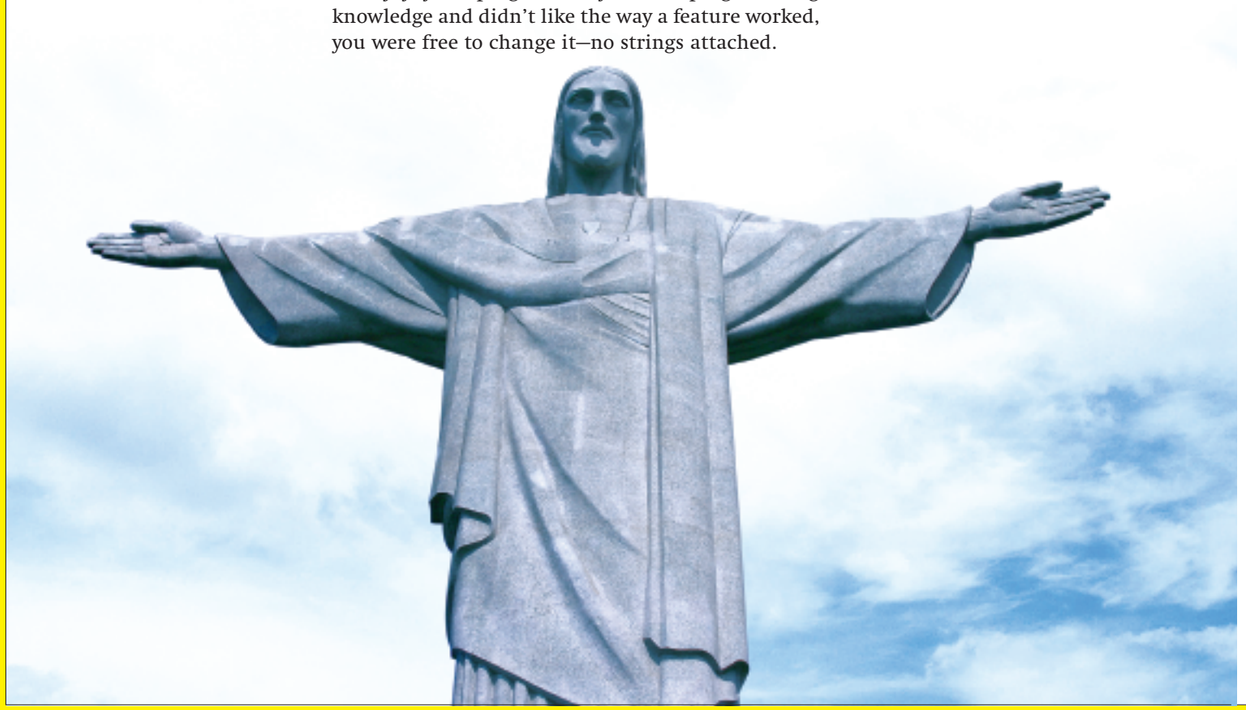
Seven Wonders | **Open Source**

Everything For Everyone

A small rag-tag bunch of programmers with a will to Change The World become technology's rock stars, and even if you don't fully understand it, it's hard not to have a soft spot for the philosophy of Open Source

Nimish Chandiramani

In the 1980s, if you owned an Apple II series computer, you could buy yourself a copy of *Nibble* magazine and leaf through its pages to find the BASIC source code for a small utility or game—complete with an explanation of what each block of code does. If you were just a user, you could just type out that code into your command line and proceed to enjoy your program. If you had programming knowledge and didn't like the way a feature worked, you were free to change it—no strings attached.



(Mis)Understanding Freedom

There's been a lot of controversy around the terms "free" and "open source". Richard Stallman's definition of free software is quite clear—freely available software that gives the user freedom to create, modify and redistribute. Unfortunately, this clashes with the other definition of free software—as in free of cost. The loose definition of open source software—software whose source code is freely available—addresses this somewhat, but as mentioned, it's a *loose* definition based on the definition of free software. In his words: "Open source is a development methodology; free software is a social movement. For the free software movement, free software is an ethical imperative, because only free software respects the users' freedom. By contrast, the philosophy of open source considers issues in terms of how to make software "better"—in a practical sense only."

So why is Open Source our wonder and not Free Software? Open source culture has reached a point where it's a healthy compromise between Stallman's freedom and the need for software developers to make money. Moreover, the definition of free software can't be extended beyond—free and open source beer, for example, would lead to a rather large number of inebriated college students. With open movies and music, there are grades to freedom—some are available as Public Domain ("do what you want"), others can let you enjoy and modify, but not distribute that modified version.

None of this can be called bad or "oppressive"—it's just part of our changing world. Free is our Xanadu, Open is the reality we live in.

For most of us, open source software's biggest selling point is that it's free of cost. In the early days of the movement, however, the objective was much more serious.

Why

In the 70s, all software was free and open source—primarily because if you weren't in a university lab, you had no need to be using software. If you were in a lab, you probably got the program's source code from a fellow academic who wanted to share it with you. You could then tweak the code to work with your computer (architectures varied, and you didn't live in the standard x86 world you do now), and fix any bugs you might find in the code. You could also add to the program's capabilities and hand the new source code back to your colleague, simply because this is how academics and researchers work—in collaboration with each other.

But then, someone made seventy duplicates of a pre-release copy of Altair BASIC at a hobbyists meeting, urging those seventy to "go forth and share". This invited the ire of the developer, who had planned to sell the program—he'd anticipated that computers would soon move beyond the lab and into the real world, and selling software would be a good way to make money off that move. In an open letter to the group, this developer—a pimply-faced lad named Gates—condemned this activity, and called the hobbyists thieves. It's an interesting read, and you can find it here: **http://www.digibarn.com/collections/newsletters/homebrew/V2_01/homebrew_V2_01_p2.jpg**.

There were responses to this, of course—including one which gently advised him not to call his target audience "thieves", but the damage had been done. Others got the idea—AT&T began charging for Unix, and the era of "proprietary" software began. Naturally, there had to be a rebellion, and by the early 80s, that rebellion was called the Free Software Foundation.

But was it really so unthinkable to pay for software?

Tools > Preferences

We've come to take the customisability of our software—even the paid tools—for granted. You can tweak a bunch of settings to get the program working the way you want to (within limits, of course). In the beginning, however, you had to take what the programmer gave you. At a time when proprietary software was mostly compilers and interpreters, there was no difference between users and developers—the people who used these programs were often fully qualified to modify it and fix its bugs. Imagine their frustration to know that they could fix a program, but can't. Clearly the alternative was to fight the fight for free software—software that can be shared and modified without restriction.

Today, however, less than 10 per cent of the people who use open source software actually contribute to the development of a project—for the rest, reasons vary from "It's free!" to "I don't want to be oppressed by proprietary software". But if the free software movement is such a great cause, why are its evangelists the underdogs?

Perhaps it's something to do with the roots of open source software, and the fact that traditionally, open source software has been more developer-friendly than user friendly. That, thankfully, has changed a lot.

Linux And You

Clearly the most important open source project in recent times has been the Linux operating system. It

gave programmers an operating system that wasn't paid like Unix, but was compatible with Unix commands, included a text editor, a compiler and an interpreter. More importantly, it came on to the scene before Richard Stallman's GNU (GNU is Not Unix) operating system—the original proposed Saviour.

For so many years, Linux was an operating system for programmers only, after which it expanded its audience to geeks who didn't mind poking and probing the system to figure out even the simplest tasks. Look at Linux today, and the journey's been well worth it—that this writer's 57 year old uncle uses Xubuntu with fewer requests for tech support than for Windows, is testament to how easy Linux has become to use—at least for the basic "I need office-Internet-IM-e-mail" home user.

With distributions like Ubuntu (which you can find on this month's *Freeware* DVD), Linux has finally come into its own. The applications have always been there, but no distribution brought them together as wonderfully as Ubuntu did. The interface is ridiculously easy to use, and even installing it is a breeze—the fact that it's a live CD means that you can actually enjoy a couple of rounds of Solitaire (or any other game, for that matter) while the OS installs in the background!

Even installing applications—formerly a nightmare involving RPMs, dependencies and code compilations—has become a smooth process across all distributions. Just fire up the distribution's *package manager*, search for the software you want (you can even search by description), and mark it for installation. The software will come to you from an online repository—complete with dependencies and application menu entries. It's an enviable selling point for a platform to have, and you can even see Windows users yearning for something like this.

The bottom line is clear: unless you're a gamer, or don't have a mature Linux alternative to the software you're already using, there's no reason for you not to be using Linux. At the very least, give the Ubuntu Live CD a whirl—it won't alter your PC, but you might soon want it to.

Open Is Cool

With the open source movement getting more popular, everybody wants to get some love from enthusiasts. In stark contrast to Gates' letter to hobbyists, you can now visit **http://www.microsoft.com/opensource/** to find out what Microsoft's doing to promote the open source philosophy. In fact, if you're a developer on Microsoft's .net platform, they'll let you study the code of the Common Language Runtime (CLR)—the core component of the platform—to enable you to optimise your applications for better performance. You can't modify the code, though—just study it. It's not free as Stallman would have it, but it's something.

And it's not just software that benefits from this burgeoning free culture. The philosophy of "if you like it, share it" comes to the aid of budding movie makers and artists as well, thanks to Creative Commons (CC). Release your work under a CC license, and you're giving users the right to share it with their friends if they like it—which is another tenet of the free software movement. Of course, while all CC-licensed work is free of cost, they may not all be free to modify and / or used for commercial purposes—there are many variations. By throwing yourself open to the community in general, you're actually widening your audience—people have nothing to lose by listening to a free album or watching a free movie—you'll get your feedback, and if people like your work, you'll get donations. Recently, Nine Inch Nails opened up to the world by releasing their new album *The Slip* as a free, CC-licensed download. Get it here: **http://theslip.nin.com/**—it's even available in the raw WAV format.

Software, music, movies—what next?

Beyond Bits

It may sound like just another fad caused by online communities, but openness now transcends content—software, music or movies. Even hardware is going open—notably, Sun started the OpenSPARC project to create an "open source processor". The design of the UltraSPARC processor is freely available to study and modify, and the aim is for everyone to contribute to creating the best design—which Sun will then manufacture (you could too, if you have a fabrication plant lying about). It'll also help developers build better applications optimised for the processor.

The Neo 1973 is the manifestation of OpenMoko's initiative. Right now, it's only for developers, and you can get your hands on the CAD files if you want to change the design

Imagine being able to design a cell phone just the way you want it—get rid of an interface annoyance, change the location of a port, whatever you want. Enter OpenMoko, the open source cell phone project. Not only is the phone's operating system based on Linux, you can redesign the phone any way you want. If you're a developer, you can order yourself a unit of the Neo 1973—the current prototype—and hack away to your heart's content.

Is this what the open source car will look like? This is one of the many proposed designs—a three-wheeled approach seems to be rather popular, too

Then there's the marketing gimmick that became more popular than the product it was marketing. When a firm called Opencola wanted to promote their collaborative search software, they decided to create an open source cola (yes, as in Coca-) to promote open source. The recipe for the cola is available for study, experimentation and modification, and the popularity of the cola has surpassed the popularity of the software it was supposed to promote. Around the same time, students in Denmark's IT-University in Copenhagen were brewing (literally) an open source beer with the same intentions.

Could it get any weirder? How about an open source car? It's rather self-explanatory—the design for the car is released to the community at large, and anyone who chooses to modify it, can. Any resulting cars, though, will likely not be available free of cost.

Full Circle

We've gone from sharing software we liked to being called thieves for it to doing it anyway, to being called heroes for it. Soon, it'll stop being such a big deal, and this open, share-what-you-like culture will be taken for granted once again—at least, that's what we hope. It doesn't even matter that only a small percentage of users will actually contribute to further development—just the knowledge that they can is enough.■

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Stuck
behind the keyboard

Years of keyboarding and mousing later, it finally looks like we'll be breaking our shackles and poking at computers in new and wonderful ways. Famous last words?

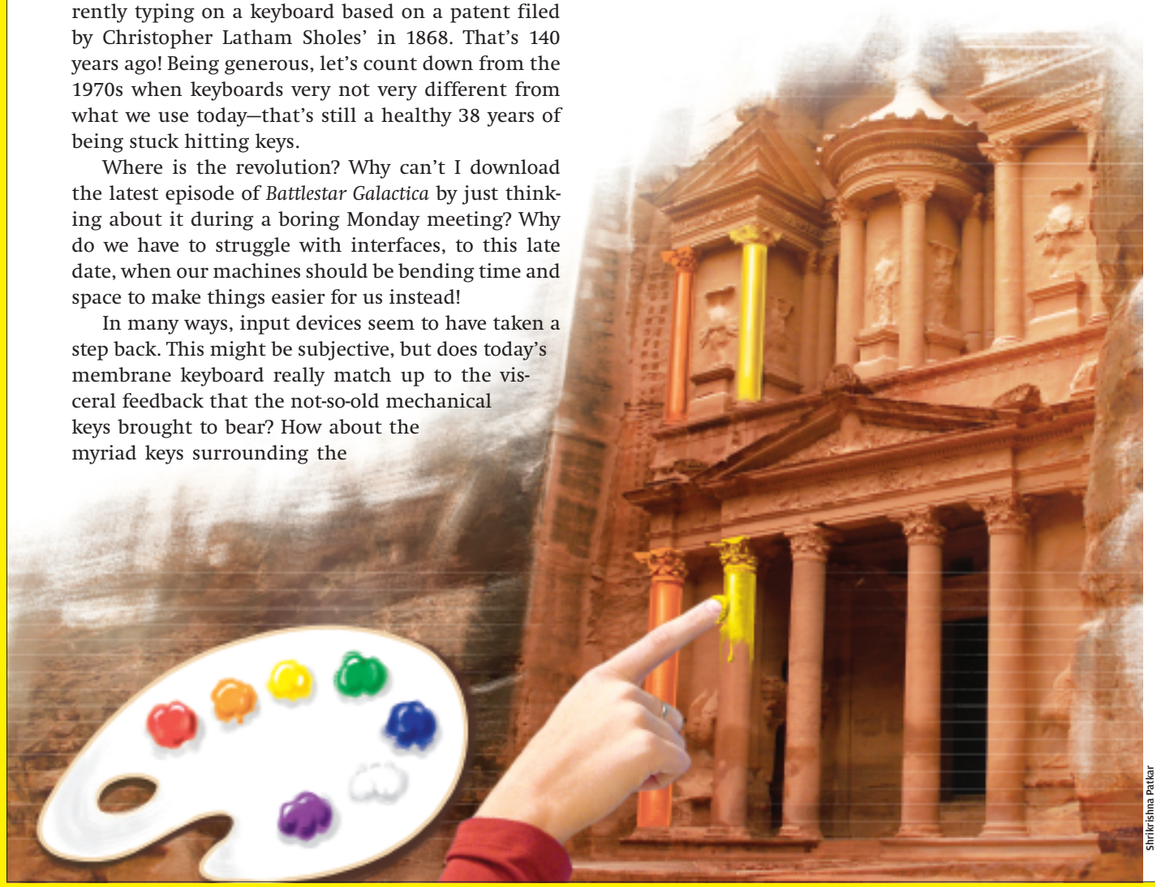
Ahmed Shaikh

We shake our tiny fists in outrage at the fact that we are still using the mouse and keyboard to interact with our silly computing machines. Join us in our demand for a revolution that is way overdue.

So here we are, mid-way through 2008. I'm currently typing on a keyboard based on a patent filed by Christopher Latham Sholes' in 1868. That's 140 years ago! Being generous, let's count down from the 1970s when keyboards very not very different from what we use today—that's still a healthy 38 years of being stuck hitting keys.

Where is the revolution? Why can't I download the latest episode of *Battlestar Galactica* by just thinking about it during a boring Monday meeting? Why do we have to struggle with interfaces, to this late date, when our machines should be bending time and space to make things easier for us instead!

In many ways, input devices seem to have taken a step back. This might be subjective, but does today's membrane keyboard really match up to the visceral feedback that the not-so-old mechanical keys brought to bear? How about the myriad keys surrounding the QWERTY layout, threatening to throw themselves at your fingertips to inadvertently launch a calculator application, or start an instant messenger, or much worse—put your computer to sleep! Who asked for those anyway? In 38 years, all we have been offered is a wireless setup, more keys to mistakenly hit, and LCD panels that tell us whether it's hot outside, or if you have unread mail.



Shrikrishna Patkar

It's all pretty glum, if you ask us. The mouse does not fare any better. Where we are today, is safely stuck with the status quo. No one seems to have either the courage to introduce a new interface, or the vision to dream up a newer manner to communicate with our machine brethren. Or so it would seem.

Fact is that our being stuck with the same interface for decades is not entirely a matter of manufacturer laziness or consumer ennui. Human-machine interface is an actively researched field. New means of interaction with the computer are constantly being looked into, and either pursued or discarded as being impractical. Consumers too, are very open to exploring options other than the keyboard and mouse. The acceptance of the Apple iPhone, the Nintendo DS and the Wii console stands evidence to this.

So, where is the revolution?

The iPhone has changed the way we interact with our devices by bringing us gesture-based commands

Touch The Future

When the Nintendo DS was introduced, it made mainstream what was until then for a few PDA-philes—the touch screen. In 1971, the first step in touch-screen technology was taken by Dr Sam Hurst, while he was an instructor at the University of Kentucky. Three years later, around 1974, he created a sensor called the Elograph, which was later developed into a transparent surface, similar to what we use today. Fast forward to 1993 and Apple introduces the Newton—a touch-screen driven, monochromatic device dubbed the Personal Digital Assistant. But success only came to touch-screens with the 1996 arrival of the Palm Pilot. The touch-screens used by these devices were built to take in a single point of input. Touch-screens are generally based on resistive technologies, wherein the pressure from a stylus or your finger causes conductive and resistive layers of circuitry to touch each other, changing the circuit's resistance. These screens would only take in one input at a time—generally the first point of contact was considered and if you so happened to touch the screen with two fingers, the second point of contact would be ignored completely.

That changed with the introduction of the iPhone in 2007—multi-touch is the new buzzword, and has enough traction to trickle into devices other than the iPhone and iPod Touch. Apple's implementation of multi-touch is based on capacitive circuitry beneath the screen. Due to this, the touch screen can only be driven by fingers and not the stylus. What makes multi-touch impressive, is the interfaces it provides—touch to start a program, use gestures to interact—pinching zooms out of a screen, swipe your finger to move images, and so on. It's immediately intuitive—the hallmark of a good interface.

The success of this interface setup has spawned many me-too products ranging from the poorly implemented (the HTC Touch), to more recent implementations which seem to do better such as the touch screen used in the HTC Diamond, or the scroll pad used in the Eee PC 900 laptop.

While multi-touch screens and surfaces have, thus far, seen commercial use in smaller devices, there are larger plans ahead.

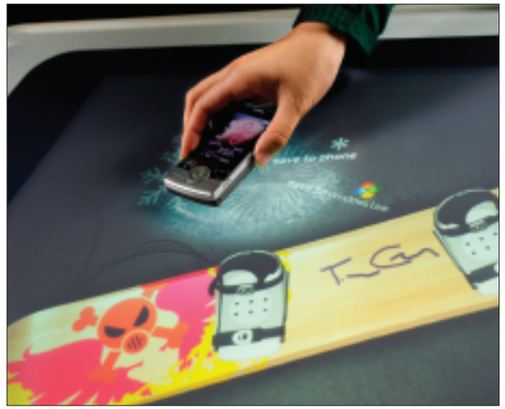
Microsoft Surface, for example, was showcased not too long ago. It successfully captured the imagination of all of us bored by the humdrum and tedious keyboard and mouse interface. The Surface was announced on May 29, 2007. The particular example shown was that of a large table, the 'surface' of which, was covered by a multi-touch interface. It is a hardware and software soup that allows one or more users to manipulate digital content using multi-touch interactions—natural motions, hand gestures, and even physical objects to share and exchange data intuitively. Beneath the surface is a Microsoft Vista PC, running a 30-inch reflective screen. A projector beneath the screen throws the interface elements visible on the Surface, while five cameras track and record reflections of infrared light from a person's fingertips. Electronic devices can also be tagged and used directly on the Surface. The cameras recognise these tagged devices and allow meaningful interactions. For example, placing a cell phone on the Surface would 'spill' all the photographs inside the camera onto the Surface. The user could then interact with these photographs—write on them, resize them using hand gestures, delete or rotate them, and even move them to other devices by flipping through them with a finger.

The technology beneath the Surface makes it inherently costly for wide-spread use. For now, Microsoft will ship the Surface to commercial clients such as AT&T and T-Mobile, since each Surface is estimated around $5,000 to $15,000! However, Microsoft expects prices to fall to consumer levels by the year 2010.

While Surface seems a few years outside our grasp, another technology, again from Microsoft, promises an early entry into our lives.

Dubbed the TouchWall, this implementation actually consists of two pieces—the hardware itself

(TouchWall) and the Vista-based software called Plex. TouchWall has some superficial similarities with Surface, in that both systems permit multi-touch interaction with the interface. What differentiates the TouchWall from the Surface, though, is that it is a much simpler solution. It consists of three infrared light sources, which scan the entire surface. The surface in this case, consists of a 4x6 foot plexiglass sheet. When something hinders the infrared beams, a camera notes the position and feeds the information to the software heart—Plex.



Surface features a 30-inch tabletop display which allows several people to work independently or simultaneously, without using a mouse or a keyboard

TouchWall was recently demonstrated by Microsoft Office Labs General Manager Chris Pratley and Director of Envisioning (nice title) Ian Sands. Prately envisioned that hopefully in the near future, computing would be less monitor / keyboard / mouse and more like an architect's desk, with direct interactions via voice commands and touch surfaces.

Sands demonstrated a number of activities to that effect—interacting with media with his hands, zooming in and out of Web pages, and using drawing tools to turn the entire screen into a whiteboard.

The relatively simple hardware used for TouchWall—one camera, three infrared laser emitters and a plexiglass surface should make the product more pocket-friendly than the Surface initiative. Microsoft suggested a price in the range of a 'few hundred dollars'.

More exciting than the multi-touch, tactile interactions offered by these products is the user interface evolution that this change in hardware is destined to trigger. The iPhone, for example, has re-imagined the way we interact with a phone or even a PDA. Gone are ugly menus so common with Windows Mobile devices, or pad-driven interfaces which are the hallmark of almost every cell phone. The iPhone brought along a rich, high-resolution, icon-driven interface. Viewing photographs no longer meant a long list of thumbnails to scroll through, but full-screen images that you can flip through, much like you would a photo-album. On the other hand, the Microsoft Surface has pioneered multiple device interactions. Downloading videos and photographs from a camera to a personal computer is done by simply placing the camera on the Surface. One probable use of the Surface in the hotel industry explores the possibility of placing a tagged wineglass on the surface, only to trigger the Surface to fan out all the wine offerings of the hotel, around the bottom of the glass. Another possible use explored by T-Mobile, is to display specifications of a cell phone around it when placed on the Surface—making comparisons between cell phone models a breeze. The TouchWall, too, brings along a unique interface—resembling an infinite work table. Electronic documents can be stacked, much like your office desk. Browsing through your presentations is then as simple as touching this stack to zoom in and then making page flipping gestures to move between pages. The central thrust of the TouchWall concept is to organise and view content spatially. Zoom out to a stack of your videos, touch to zoom in, and tap to play the video, zoom out again to a Web page, zoom in to check your mail, zoom out to a document you wish to mail, and so on. The status quo of trudging through file managers, sub-sub-sub folders, menu structures and icons is done away with, through such an interface.

Of Screaming At Windows And Winking At Hyperlinks

What else can we expect down the years, as either an evolution or a revolution of the man-machine interface? The difficulty lies in the prediction. The usual suspects have been circling the aging mouse-keyboard duo for ages now, to no avail.

Voice-Activated Interfaces: The staple of science fiction—talking directly to a machine to carry out your whims and fancies. Not science fiction anymore though. Dictation software that jot down spoken words to your favourite word processor have been around for quite sometime. Current operating systems such as Windows Vista even come with rudimentary voice command interfaces. But these are baby-steps. Software is not so smart that we can carry a natural conversation with a machine such that it understands our vocal idiosyncrasies to even take down notes, let alone carry our complicated tasks. Then there is the hurdle of language itself—there are so many ways we humans speak. One day (as Bill Gates loves to remind us almost every year), voice-recognition and voice-command will indeed become a viable means of communicating with our computing machines.

Brain-Machine Interfaces: This idea is still fantastical, although it has already hatched and taken its first primordial steps in laboratories the world over—the human brain interfaced directly to machines. Perhaps the ultimate interface—think and the mail is typed and sent, blink and you are at your favourite online shopping portal, sneeze and your computer gets a virus... maybe not the last bit, or so we hope. Brains have been tested to drive machines for decades now—from rats to humans. The biggest human success stories and research are done to ease paraplegics who are 'locked' in their bodies. These stories range from research to ease the disabled move a wheelchair with just their thoughts, or to communicate via a computer by blinking, and so on. Such mind-machine links are generally done in one of two ways—electrodes are either linked to the surface of the cortex, in a direct machine-brain connection, or are placed on the surface of the head, and run on the same brain firings that an EEG machine detects and analyses. Both these methods have met limited success. People have been able to do little more than move boxes around a computer screen, or a mouse cursor. A more practical implementation of an EEG-running interface was released in the form of a baseball cap. A team of researchers from Taiwan designed a brain monitoring system inside a baseball cap. The wireless and portable system, can process data and provide feedback in real time. It is currently being tested as an early-warning system to warn drivers that they are falling asleep on the wheel. In future, similar technology could very well be used to allow you to control home appliances such as TVs, computers, and air conditioners, all by just thinking about them! As you can imagine though, such interfaces are still a long way from bearing fruit.

A tetraplegic patient attempts left or right hand movements and tries to move the circle from the middle of the screen to the target

Eye-Tracking Software: A few months back, a small video on YouTube created a lot of buzz in the tech circles. Created by Johnny Chung Lee, from Carnegie Mellon, it showed him using the Nintendo Wii's controller to navigate around a 3D space. What was so special about that? The navigation was done by Chung Lee simply moving his head around, while the IR sensor in the Wii Remote tracked him. The tech behind the seeming magic is based on IR. Lee wore glasses with small IR transmitters tacked on the sides. The Wii Remote controller tracked these IR points through its IR window and some clever software did the rest.

A similar experiment was performed by a Stanford researcher, Manu Kumar. In March 2007, Kumar successfully demonstrated an alternative to the mouse. His eye-tracking interface allows you to remote control a computer interface using movements of the eye. The interface allowed the person to click hyperlinks, highlight text, and scroll simply by looking at the screen and tapping a key on the keyboard. Manu Kumar's eye-tracking software had some common elements with Johnny Lee's—a high-definition camera to do the actual tracking and infrared light served as the tracking points.

Eye-tracking and head-tracking software seems feasible, especially given the fact that monitors today come armed with cameras embedded anyway. However, the resolution for cameras would have to be much higher to successfully track a reference point. Perhaps some day soon, we will be able to close a window just by staring at it in anger...

Where Do We Go From Here?

Multi-touch has made decent inroads into our interactions with computing devices. Considering that the technology went public only a year ago, it is a good show. But what else can we look forward to? Will the Microsoft Surface make it to our living room anytime soon? Or will the TouchWall make an appearance in our office meeting rooms? Would our laptops allow us to interact with our operating systems by just blinking at them, or by moving our heads? Only one thing is certain, and that's uncertainty. Predictions prove futile in this fast-moving tech world of ours. It will only take one successful product, launched by a visionary company to completely change the way we interact with data. Whether this would-be product is based on touch sensitive surfaces, brain-machine interfaces, or on voice-commands, no one can tell for sure. It might as well run on technology not accounted for in this article... What is certain is that we could do a lot better than what we have today. The days of the tacky keyboard and mouse, and the menu and icon based user-interface that they have spawned, must surely be numbered. ■

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57 Channels (And Nothin' Much On)

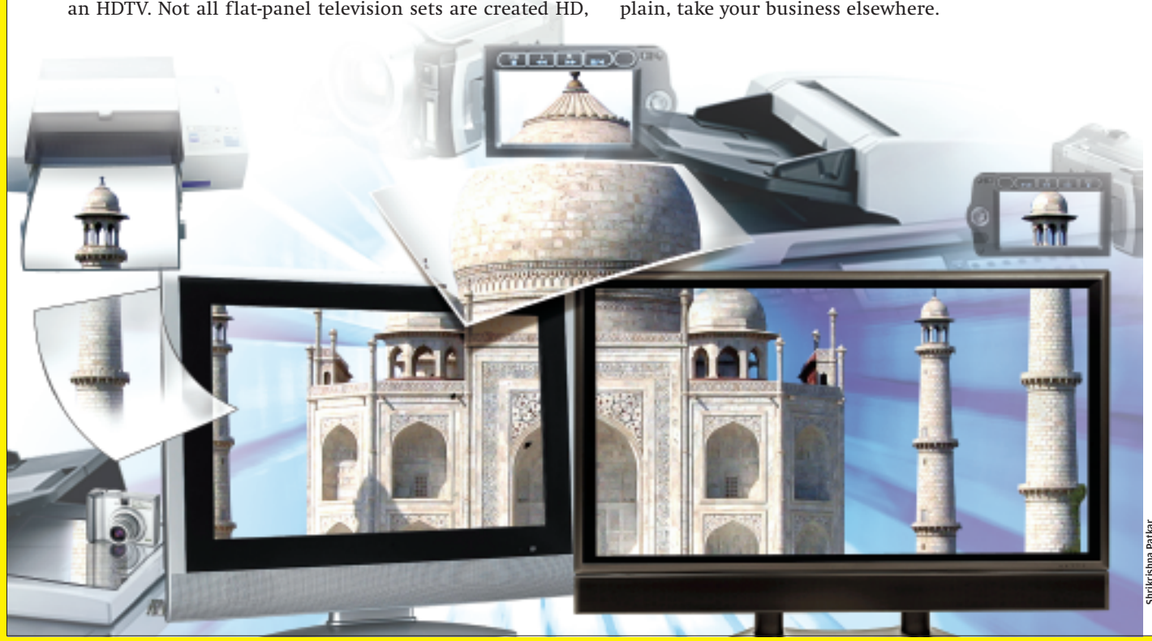
Like Bruce Springsteen did so many years ago, we find ourselves coming home to our HDTV only to find little to no HD content. At least we get more than 57 channels of nothing...

Ahmed Shaikh

Some time ago, Digit investigated the state of HDTVs in India. Back then, things were nebulous—it wasn't clear which HD technology to invest in. The TVs themselves were sparingly spotted in the retail wilderness—local HD content was a pipe-dream, and the prices were exorbitant to say the least.

Here we are and much has changed, and yet, little has changed. HDTVs are pretty much in every retail store—being pushed as eagerly as an air-conditioner or a washing machine would be to the mothers and the fathers of the world. The market has largely settled to backing the LCD technology, with Plasma tech playing second-fiddle, but nevertheless making its retail presence felt. Things are simpler thus. And cheaper, somewhat—you can pick up a fairly good quality and screen-size HDTV for about Rs 25,000. Cheaper still, if you know anyone in the Middle East. It is not exactly an impulse buy yet, but the various loans and offers on hand do make the jump that much more tempting.

There is still a little bit of caveat emptor, in picking up an HDTV. Not all flat-panel television sets are created HD, and you still need to be very careful that you pick up a TV, that at least supports the 720p resolution. Anything lower and you are essentially getting duped—if you can't afford a model that does 720p, wait for the prices to drop as they invariably will. Do not settle for the 1080i-only TV sets, yes there are a small percentage of these out there as well. If you have the cash, go for the 1080p, but not with a screen size less than 50-inch—the higher resolution makes little difference for smaller screens. Here's something else you need to keep in mind while investing in a 1080p set—true HD-content, the 1080p kind, is hard to find. Mostly, your television will be upscaling content to fit the 1080p resolution. Upscaling is like taking a small photo, say of 320x240 pixels taken by your camera phone and then increasing its resolution to say 1024x768 using your computer. Mostly, the result looks bad, but this entirely depends on the quality of the TV's scaler—the piece of hardware that does the upscaling. The best thing to do is to test the TV with the kind of content you would be watching most frequently, right there in the retail store, before you pick it up. You are going to be spending upwards of Rs 50,000 for a set—so don't worry about inconveniencing the store—if they complain, take your business elsewhere.



Shrikrishna Patkar

All this brings to focus a sore point about the HD scene in India—the content, or rather, the lack of HD content. Here too, the scenario has improved, but not too much. We do have set-top boxes which are sometimes given away with HDTVs—these boast "DVD" resolutions or "MPEG4" quality, as if a video format or a video compression technique is any indication of the actual visual fidelity. Generally, these sets bring terrestrial TV shows in slightly better-than-normal-TV quality. Hardly any of the content here is widescreen, which means a less-than-ideal picture quality with stretched scenes and squat profiles. DVDs are widely available, and are more often, than not, a better means of enjoying that big screen you just bought. But where is the *real* HD content?

The good news here is that the HD-DVD format is dead and buried and there is only one clear format to back for HD content, that being Blu-Ray. So far, so good! But the bad news is that India is stuck with China, Mongolia and some other South Asian countries in the Blu-Ray region shuffle. It sucks because we are not in the regions that really matter and where all the HD-action happens—either with the USA and Japan region, or with the European region. It sucks more so, because for whatever reason, India has been stuck with a pitiful collection of Blu-Ray titles. Pitiful! It's best to not visit the Blu-Ray section of any major retail store, lest you want to tear your hair out at the frustratingly anaemic collection.

Stuck as we are with Region C in the Blu-Ray scheme of things, we cannot even import titles from online retailers such as Amazon.com, or Play-asia.com. Finally, where are the Blu-Ray players!?! We have the PlayStation 3 and... the PlayStation 3. Sure the PS3 is a great device but a little competition here would be good. This is an international issue, not one just unique to India—the PS3, by-and-large is the best Blu-Ray player in terms of both affordability and quality of playback. So, if you are really serious about HD, consider importing a PS3 from the US, or Hong Kong.

So the point here is that unless you own an Xbox 360 or the PS3 and actively play games on these consoles, you could still skip on the HDTV. Unless, of course you are perfectly OK with watching regular television, the odd-DVD movie, or even the few Blu-Ray movies we have been blessed with. The rest of us should be patient, like we need to be with every technology, living in India.

The Sony PlayStation 3 is still the best Blu-Ray player out there. Now if we could only find some good Blu-Ray titles in India, we would be 30 per cent less sulky

The good news is that there is cooler tech than LCD and Plasma on the horizon! So let's dabble in a little bit of technological window-shopping and take a look at where the TV is headed.

The Challengers

LCD is the current king, with Plasma playing *Birbal*. If you want cheap and good, go for an LCD—their black level reproductions have markedly improved, ditto their viewing angles, and their popularity makes them cheaper than Plasma, on the whole. Plasmas though, are still the tech to pick if you want the absolute best visual quality—Pioneer's Kuro series is the best-of-the-best, with a Panasonic screen, not too far behind. But there are challengers to these current rulers.

FED: Straddling The CRT And The LCD

Field Emission Display is a self-luminescent display like CRT. Being self-lit, it offers superior brightness, contrast, and viewing angle compared to an LCD. Thus, FED displays feature the picture quality of a CRT and the flat profile of an LCD or a Plasma display.

Likeliness to take over the HD kingdom: Medium

LCoS: Bringing The Chips To Play

Liquid Crystal on Silicon was a tech quickly favoured and just as quickly abandoned by Intel. It uses a silicon chip at its heart, which is why Intel was interested in the technology. Using standard chip-making processes, an LCoS embeds LCD pixel units directly on the surface of a chip. The chip itself has all the circuitry needed to operate these LCD units. The big advantage with LCoS is that the technology improves as chip fabrication improves: with a smaller chip, you can add more LCD pixels, giving better resolution.

Likeliness to take over the HD kingdom: Low

Laser: A Potential LCD Killer

A Laser TV will essentially replace the traditional light-sources in rear-projection HD sets with, you guessed it, Laser light. As such, it is not a new technology, but an evolution of a current standard. It could potentially improve the quality of LCD and DLP sets. Laser sets promise to be thinner, consumer less power, improve refresh rates, and extend a TV's life. They also promise to offer a wider range of colours—where the LCD reproduces about 50 per cent of the colour gamut visible to the human eye, a laser unit could go higher than 90 per cent colour gamut reproduction. This will make colours more 'life-like'.

OLED displays and Laser backlit displays threaten to take the crown of Plasma HDTVs when it comes to image quality and black level reproductions

Likeliness to take over HD kingdom: High

The Future Of TV

While the challengers are a small step forward in display tech, there is a whole range of displays being researched out there: some obvious, a few bizarre, while others are almost fictional.

Let's take a look at what the future might be, in the years to come. Expect some technologies which are offshoots of current display tech, or are built over current displays but offer a unique interface with which to interact with video content. Yet others are a completely new way to experience video.

The 2-way LCD

In 2007, Samsung showcased the first LCD panel which could operate two independent images on each side of its surface. The LCD product made use of Samsung's new double-gate, thin-film transistor (TFT) architecture. A TFT gate controls the liquid crystal alignment needed to reproduce on-screen images. Samsung's implementation had two gates that operate on each pixel instead of just one. Thus the screen on the front can display different images than the one on the back. Moreover, one of the screens was transmissive, allowing light to pass through, while the other was reflective in nature, throwing back light—this allowed the entire display to operate on just one backlight source. A 2-way LCD such as this could find its way onto the cell phones of tomorrow.

Something similar, yet completely different was showcased by Sharp towards the end of 2007. Sharp Corporation developed and showcased an LCD TV screen which can simultaneously display two independent images at the same time. Similar to the Samsung's but different in the detail that both the images are displayed on the same surface! The implantation is such that one particular image is seen visible when the LCD is viewed from a particular angle, while a completely different image is seen from a different viewing angle. Sharp employed a parallax barrier superimposed on an ordinary TFT LCD, to do the trick: the LCD sends the light from the backlight into right and left directions, making it possible to show different information and visual content on the same screen at the same time depending on the viewing angle. Such an LCD could find its way next to the driver's seat—offering one set of information to the driver, like a GPS map; and a completely different visual to the passenger, such as a movie.

Flexible displays

TVs built with Organic Light Emitting Diodes (OLED) don't seem far away. As suggested, OLED screens employ an organic material as the light-emitting substrate. This make an OLED screen self-lit, requiring no back light. This then goes a long way to endow an OLED with several benefits such as—better viewing angles, high picture contrast, better colour reproduction, deeper black levels, lower power consumption, thinner display profiles, and the ability to 'print' out displays. An OLED display can be rolled, or drawn into an elliptical or circular shape—imagine the entire ceiling covered with an OLED light source, or the surface of a table covered in one, or a wall showcasing an OLED-powered, wallpaper-thin television set—this is the future promised by OLED.

Different images seen from different viewing angles

The drawback is that the lifetime of OLEDs is far shorter compared to LCD or PDP technologies. But OLED is an actively researched area and if the manufacturers were not monetarily occupied with churning out LCD panels, its drawbacks would have already been solved. The solutions can't be far though, and already HD sets built using OLED have been showcased by the likes of Samsung, Sony and LG. OLEDs currently find themselves on smaller devices such as cell phones, wristwatches, and music players. This technology has a good chance to make it as a replacement to LCD and PDP displays.

Another form of flexible display is the E-ink display. E-ink is already the technology of choice for e-book manufacturers—Amazon's Kindle, Sony's Book Reader, the iLiad, all employ e-ink as their displays. E-ink is amazing in that it does not require any power to keep it running, only to make screen refreshes, making it ideal for reading books. E-ink displays are constantly evolving—they are now bendable, roll-able, and while currently monochromatic, colour is not too far away; even videos have been showcased running on E-ink displays.

Interactive Displays

We will take a more thorough look at this class of displays a little later in this cover story. An interactive display such as the Microsoft's Surface or TouchWall is likely to make its presence felt to us mere mortals in the coming years. These displays allow you to directly interact with what's on screen—generally via a touch screen or a multi-touch interface. Apart from the aforementioned solutions, you also have the Mitsubishi DiamondTouch which takes a unique approach: it is a tabular screen which consists of a series of sensors on its surface. But that's not the whole of it. It also consists of sensors placed near a user's body, such as a chair. Now when the user touches such a display, her body acts as a channel and connects the two sensors together. This allows the display to determine exact information on several fronts: which user touched it, which hand was used, and how many fingers.

The Phillips Entertaible is another table-display interface, but more aimed at gaming. It comprises a 32-inch horizontal LCD, which is enabled by touch screen-based multi-object position detection. The Entertaible offers electronic games which combine the features of computer gaming, such as dynamic playing fields and gaming levels, with the social interaction and tangible playing pieces, such as pawns and dies, of traditional board games.

Another unique interface is offered by the so-called

Touchless Touch screen. It consists of an LCD TV screen which is laden with sensors that detect hand movements. By merely waving the hands in front of the screen, you can interact with what is being displayed. For example, you could flip through pages by making a page-flipping motion, or gesture left or right to move through objects. Interactive displays such as these are likely to find use as advertisement kiosks, and might one day make it to our living rooms and meeting rooms.

3D TV

3D technologies promise to take television into the three-dimensions that we are accustomed to in the real-world! There are two possible implementations here—both actively researched, one more likely to visit our sets sooner rather than later. Let's take a look at the more fantastical possibility.

Brewing in the research labs of Mitsubishi Electric is an actual 3D TV, a "complete end-to-end 3D TV system that performs real-time acquisition, transmission, and 3D display of dynamic scenes." What the 3D TV system consists of is an array of cameras which is synchronized and together captures different views of a scene. To deal with the high processing and bandwidth requirements, the system uses a fully distributed architecture with clusters of PCs. This forms the 'acquisition' side of the 3D TV. To output the captured video, the system uses a multi-projector display with horizontal parallax. Since we are talking actual 3D here, the researchers also had to implement anti-aliasing techniques to improve the rendering of images on the 3D display. But the result is astounding in its promise—a true 3D scene on our television screens, hopefully, not too far from now!

Slightly less exciting, but cool still, is a 3D-like display; not actual 3D but good enough! The prominent technology here is Philips' so-called WOWvx—implemented and showcased by television manufacturers such as LG. WOWvx fools our eyes into true stereoscopic vision and depth perception—two important ways in which our eyes perceive a 3D environment. The tech consists of a series of tiny cylindrical lenses which split light from a TV into multiple parts and scatter them to multiple directions. This helps our brain perceive the image as three-dimensional. The technology also adds a "depth" map to the visual output to give our brains the sense of depth in the image. Some prototypes based on WOWvx technology can switch between 2D and 3D on the fly.

WOWvx brings depth perception to our flat television screens

Volumetric Displays

Holographic projectors: R2-D2 showing Obi-Wan a message from Princess Leia, could that be in our future? Volumetric displays are an attempt to break out of the 2-dimensional confines of the television frame. The most successful of volumetric displays is perhaps the Heliodisplay, which although isn't really from this category, but is close enough for us to consider here. The Heliodisplay actually works on a projection screen; in its case the screen is made up of a thin film of water—mist, literally. The water is sprayed into the general atmosphere and then images and video are projected on to this film. Some variations of this commercial product come with touch support, allowing you to manipulate objects that hang in mid air.

Then we have the displays which rely on persistence of vision to create a volumetric object in space. With these kinds of "swept-surface" displays, an object to be viewed is generally cut into cross-sectional slices which are then projected one after another, and quickly to form the entire object. For example, one implementation sees fast-moving LEDs create a 360-degree surface in air. Another implementation might see a pulsing laser—each pulse lasting about a nanosecond—creating globes of plasma in air. These superheated plasma spheres are then combined to form an object.

While there might be little content for our HDTVs, things are certainly looking up from last year. Prices are falling and will only go down, terrestrial TV is moving towards HD, slowly, and more excitingly, there is a bevy of cool tech just on the horizon to keep us wondering and eagerly looking forward to the coming years. ■

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US versus Them

Calling all fanboys: it's about the games, stupid!

Run for the hills! The consoles have been unleashed and the PC is running scared, tail between its legs. Or so they say.

Ahmed Shaikh

It has never been easy being a PC gamer—right after you con your parents into buying you a PC to 'study', even as you make clandestine arrangements to hoard the latest and the greatest games—the rest of your relationship with the computer is a constant catch-up to the fastest specs, to play the latest games, to post the fastest frames. Or so they say.

Shrikrishna Patkar

Myth: You need the latest to run the latest.

If you could peel yourself away from the online forums for a while and stop breathing in the hyperbole, "LOL YOU NEEDZ $5000 PC TO RUNZ CRYSIS!!! CONSOLES FTW!" you would come to the realisation that game developers are smart enough to cater to an audience that does not have the latest hardware. Games do run on low-end machines. Yes, you might need to lower settings to get to a decent frame rate but having a low-specced computer does not make you a gaming pariah. The trick with PC gaming is to catch the tech / cost curve at just the right moment. Since hardware refreshes are almost an annual ritual, with major changes every two years, you just need to be a little patient before jumping in headlong and picking up a $500 graphic card and a $300 processor. A smarter approach is to invest in previous generation hardware, after the latest has been unleashed. This generally implies going for something cheaper (sometimes half as cheap!), which performs almost as well as the latest. Currently, for example—the 8800GT graphics card is a great pick, and so is say, the E7200 processor from Intel. But just wait a bit longer, when NVIDIA and AMD release their next batch come June, and you can enjoy even lower prices on the graphics card.

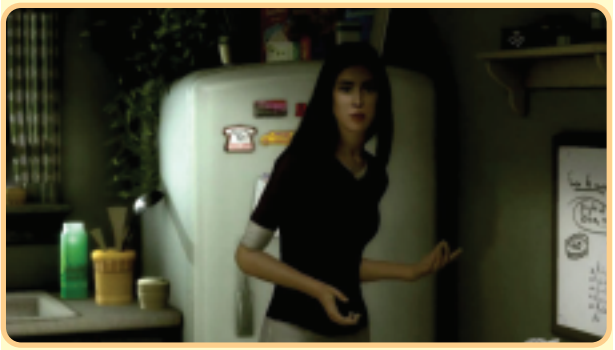
So, how about the $5000 PC to run the best games myth? *Crysis* runs just fine on a "$600 machine"; let's flesh it out a bit. $150 for an Intel Core 2 Duo E7200 processor + $180 for an XFX GeForce 8800GT + about a $100 for a Gigabyte Motherboard that supports the two, add some RAM and you get a pretty good build for about $600. The reason for being so specific about the hardware necessary to run *Crysis*, is to clear away the myth that you need to invest a lot of money to play PC games. Another point to note here is that *Crysis* is the best-of-breed—no game, not even an HD console game—can touch its visual fidelity so far. This implies that if your PC can run *Crysis* at even a decent frame rate, it can blaze through the hundreds of other titles on the computer that are available out there.

Myth: The HD Console Games Look Great And The PC Will Never Catch Up

This is such a ridiculous position to take. In fact, even to address it lends some credence to idiocy. Fact: The greatest games on these consoles do not even run at HD resolutions. *Halo 3* runs at 640p, and not 720p. Besides, it's upscaled. *Call of Duty 4* runs at 600p, not 720p and is upscaled. *Haze* runs at 576p, not 720p and is upscaled. The point here is not to belittle these great titles—the resolution does not matter, these are fun, great games. The point is that the consoles are not powerful enough to run games at the resolutions that their manufacturers shouted from the rooftops. The amount of bandwidth offered and the amount of memory available to the graphic chips of these consoles is simply not enough to create games, which are impossible to make on the personal computer. The reality is that a developer on the PC can create games that will not be possible on the consoles until next-generation ones arrive. The reason being the graphic chips that power these consoles—they are "last-gen", at best. Just to drive in this reality, consider *Lost Planet: Extreme Conditions*. This game was released in January 2007 for the Xbox 360, running at 720p and hailed as a great-looking shooter. The same game made its PC debut in June sporting even better graphics, with full-screen anti-aliasing and

Alan Wake

Realistic cloud formations and skies, day / night time cycles, ambient occlusion, and more! *Alan Wake* promises a visual feast upon release



Heavy Rain

You looking at me? 'Heavy Rain' has been showcased showing a 'realistic' character who cries but manages to freak one out thanks to the Uncanny Valley.

Heavy Rain

Look at me! The same game a few months later shows a much improved character and a much reduced impact of the Valley

Metal Gear Solid 4: Guns of the Patriots

MGS 4 **might not look very impressive in screenshots but you have to watch this baby in motion to truly appreciate the superior animations, the filters used and the smoke and fire effects**

Killzone 2

Killzone **uses a Deferred Rendering engine that integrates multisample anti-aliasing and uses the PlayStation 3's cell process to process geometry and indirect lighting in parallel. Result? Yummy!**

Resistance 2

Resistance 2 **is all kinds of awesome: not only does it look gorgeous but it also features a co-operative campaign which supports up to 8 players online or 2 players split-screen, with classes including a medic class, a heavy weapons class, and a special ops class. Its online multiplayer will support up to 60 players!**

anisotropic filtering and running at higher resolutions. Let's see *Crysis* running on a console.

Reality: Piracy Is Rampant On The PC, Retail Sales Are Dwindling For The PC Market

This is why we see the game developers flocking to the consoles, the reason why quality PC releases are few and far between. So, if there is anyone to blame for the sorry state of PC releases, it's us. If you like games, buy them.

Another angle to consider here, is that of online distribution. Developers on the PC are increasingly taking to an online model—such as Steam—to distribute their content. This has benefits of cheaper software, a better control over piracy, and the ability to distribute to far reaches of the world, without the need for a physical distribution chain. Online distribution also accounts for some drop in sales. Nevertheless, the fact remains that piracy on the PC is hurting the PC game developer, and he's looking to the consoles to see better returns. This exodus could mean more delayed releases on the PC, while the consoles get a game first, or worse, developers dropping off the PC bandwagon altogether. The latter though, is unlikely to happen, or so we hope.

Reality: It's About The Games

PC or console, this generation is all about the games, and what a glorious generation this promises to be! We have already seen some great titles on the consoles—*Gears of War*, *Halo 3*, *Uncharted*, *Ratchet and Clank: Tools of Destruction*, *Gran Turismo 5: Prologue*, *Grand Theft Auto 4*, *Crysis*, *Age of Conan: Hyborian Adventures*, *Mario Galaxy*, with many more to come—*LittleBigPlanet*, *Alan Wake*, *FarCry 2*, *Resistance 2*, *Killzone 2*, *Fable 2*, *StarCraft 2*, *Duke Nukem Forever* (we hope!), *Diablo III* (oh please, Mr. Blizzard!) and many many more. There has never been a better time to be a gamer. So here's our suggestion for the year ahead—enjoy!

The Road To Realism

Between *Gears of War*, *Crysis* and the upcoming *Metal Gear Solid 4*, this generation of games have been a visual feast. Recall the screenshots comparing in-game scenes of *Crysis* to real-world locales—could you really tell the difference? Did your jaw not drop when you saw the cars in *Gran Turismo 5*? We are inching ever so close to the holy grail of computer graphics resembling the real world. There are still some huge hurdles to clear. The biggest is psychological—the so called Uncanny Valley hypothesis, that "when computer-rendered humans look and act almost, but not entirely, like actual humans, it causes a response of revulsion among human observers." As we get closer to human-like, and life-like, we being to notice the tiny flaws—the unnatural gait, the lip movement, the eye flutter, the way the bush reacts to our passing, our in-game shadows, and so on. Another hurdle is that of texture quality—a game looks as good as the textures it can display. High-quality textures take up both disc space and graphics card bandwidth and memory—all are in limited supply, finite, even though Blu-Ray discs

slightly alleviate one of the problems. One possible solution is the *MegaTexture* approach taken by id Software, recently demonstrated by John Carmack as part of id's upcoming Tech 5 game engine: the scene demonstrated had 20 GB of texture data, using textures with up to 128000 x 128000 pixel resolution, and a completely dynamically changeable world.

MegaTexture employs an extremely large terrain texture, instead of repeating multiple smaller textures, which adds to the visual fidelity of a scene and makes the artist's work much easier to boot. The single large texture is stored on removable media and streamed as needed, allowing large amounts of detail and variation over a large area.

The tech also alleviates the uncanny valley associated with shadows as the Tech 5 renderer includes a penumbra in the shadowing, by using shadow maps. The engine will also support multiple processors by multi-threading many of its tasks such as rendering, some gameplay logic, AI, physics and sound processing.

Multi-processing is also been appropriately utilised by the upcoming *Alan Wake*. This psychological action thriller will showcase some great effects due to its leveraging of multiple processors—including a complete modelling of atmospheric scattering—giving us realistic cloud formations and skies, day / night time cycles, ambient occlusion, normal mapping, high dynamic rendering, fully volumetric shadows that are projected through the entire world, full weather modelling, bloom, depth of field and a draw distance of around 2 kilometres! The game is being designed with five threads—the rendering thread will prepare vertices to be sent to the GPU, an audio thread and a streaming thread, which will be used to stream data off of the DVD or hard disk as well as decompress the data on the fly and allowing seamless traversal of environments without loading screens, a thread for physics calculations, which are being simulated using the Havoc engine, and one for terrain tessellation. Moreover, an entire core processor can be dedicated to physical calculations alone.

Crysis

With over one million copies sold worldwide, *Crysis* for the PC redefined what a game could offer as visuals

Far Cry 2

Far Cry 2 **will take place in a sprawling African region—covering everything from small towns to the savannah. The game features destructible environments and foliage, vehicles, and a dynamic weather system which changes from sunny skies to storms depending on how well the player is doing in the game!**

LittleBigPlanet

LittleBigPlanet **proves that you don't need guns to look good. This PS3 game innovates with both its look and its gameplay: players shape and develop the game on-the-fly to build custom levels either individually, collaboratively, or competitively. The game's core focus in on co-operative, and physics-based platforming**

Gran Turismo 5

Gran Turismo 5: Prologue **for the PlayStation 3 brings the most realistically detailed cars to a racing game, till date.**

Games are only going to improve in visual quality as we progress, the next few years should bring us eye candy unlike any we could imagine. If you took a look at what's around you now, you'd get an idea of the awesomeness that is to follow... ■

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Out of Time

The year 2005 saw the clock run out on clockspeed. With *faster* leading to *hotter*, speed was no longer the rallying call for processors. Here, we explore the nature of the wall the processors hit, and the solutions which promise to bring that wall down

Ahmed Shaikh

R.I.P. Moore's Law
Faithful servant to a multi-billion dollar industry
1965–2005

Ok, so the above is a bit of an exaggeration. Yeah, fine, slightly more than an overstatement. But everyone is allowed a bit of hyperbole every now and then, and the events of the past few years have seen the computer processor industry do such a stark turning-on-a-dime, that only hyperbole can help juxtapose where we are today, in relation to where we were supposed to be!

10-GHz processors were supposed to be the destination, not too long ago. The number is so mind-numbingly huge that when Intel revealed its plans for going faster and faster, everyone listened and cheered them on. 10 GHz was supposed to be the legacy of the Netburst architecture—the foundation of the now-doomed Pentium 4 project. Everything went fine-ish up to the 3 GHz mark and then Netburst fell flat. The Prescott, Netburst's final hurrah, made it to the 3.8-GHz mark, wheezing and numerous revisions later. 3.8 GHz was a power nightmare though—remember those videos of frying eggs on the processor—the processor lost as much as 115 watt of power! Something was terribly wrong with where we were heading.

Nature Of The Beast

The microprocessor is a complex beast. Nothing is as charming and straightforward inside the belly of this beast as Moore's Law would have you believe: "The complexity for minimum component costs has increased at a rate of roughly a factor of two per year..." which leads to *the number of transistors on a chip will double about every two years*. Of course, Gordon Moore never proposed it as a simple mantra to drive the semiconductor industry forward. Moore's law was perhaps a simple roadmap for the industry itself, and an ideal PR line—clever and simple enough to keep the media happy and intrigued. Hidden behind the popular headlines of "faster every year!" though, were a plethora of engineering hurdles barely cleared, or threatening to rear their ugly heads. And much like the mythical Hydra—these nanometre beasts would sprout another head, as soon as you chopped down one problem.

Sooner or later the difficulties in going faster would catch up with the industry, and with Netburst, they did. So what were these issues?

The biggest problem, briefly hinted by the example of Prescott above—is power dissipation. Fast chips get hot, but the problem is not that simple. There are two main elements that constitute a microprocessor—capacitors and transistors, connected together through myriad wires. We are once again oversimplifying things here, but for our understanding of the issues, this simplification serves us well.

The power dissipated by a processor increases linearly with the effective capacitance, the frequency at which the processor is running and also on how much load it is carrying. The more 'processor-intensive' a program you run, the hotter the processor will get, pretty logical, right? While the last factor is pretty self-explanatory, the processor's relationship with its constituent transistors, wires and capacitors is slightly more complex.

A processor's power dissipation also increases quadruple with the core voltage of the processor. The relation can be put forth as follows:

```
Power ~ [Capacitance] [Voltage]² [Load] [Frequency]
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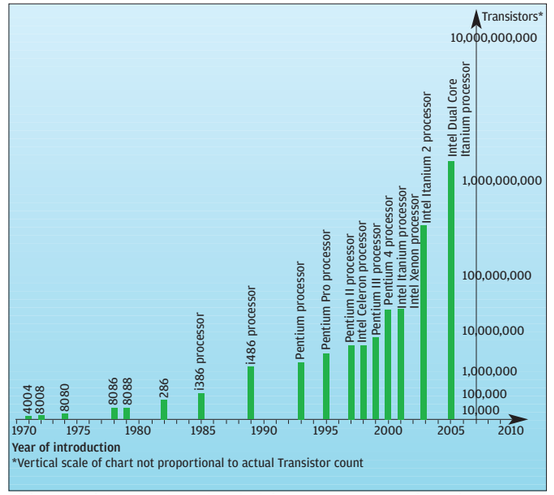
As technology progresses, processors shrink in size—this is termed a die shrink, the die being the physical medium on which the processor's constituent elements reside and run. Shrinking dies have an interesting effect on the power dissipation of a processor. As processors get smaller and smaller, you need less voltage to run the parts. But with this shrinking die, a processor also adds features, their capabilities increase—this is progress after all. This leads to an increase in the number of transistors that are packed into the shrinking die. The increase in the transistors (capacitance), more often than not, offsets any power-reduction that a decrease in core voltage brings to the table.

One of the techniques used by engineers is called clock gating. To alleviate the power problems caused by an increase in transistors, engineers design the system such that parts of the processor are only activated when the system requires work off them. Otherwise, they hang



Rising transistor counts and underlying processor manufacturing problems put the brakes on faster processors

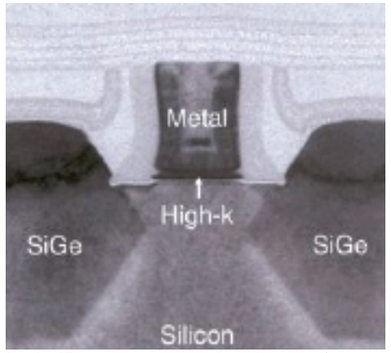
idle, thus reducing the power draw. Techniques like these are used to somewhat reign in the runaway power draw. Generally speaking, power drawn is made to increase linearly, while the number of transistors used increases exponentially.

Power drawn is thus a controllable beast. Plus, it is actually used to do real work by the processor. The real issue lies with power leakage. While power drawn is linear and controllable, as the die shrinks, the leakage component increases quickly and exponentially, threatening to overwhelm and destroy the circuitry if not reigned in. As the core voltage increases and the size of the processor die reduces, the bigger the problem of leakage gets. Power leaks away as current. As the current leaks, the system has to draw more power to compensate, which only exacerbates the problem and may very well lead to an overheated processor—and a system shutdown.

There are two types of leakage currents—gate oxide tunnelling current and sub-threshold leakage. As the die shrinks, the transistors get smaller alongside, and the insulation on these transistors also needs to get thinner. The thinning insulation results in leakage in the form of gate oxide tunnelling current. Sub-threshold leakage is the leakage current flowing through a transistor when it is supposed to be turned off.

The way a transistor works, is similar to a gate. It stops the flow of current from one side of the gate to the other side. The gate is closed until the voltage across the transistor is less than a certain 'threshold'. As the voltage crosses this threshold, the gate opens up and lets the current through. Thus, the transistor is either ON or OFF depending upon this threshold voltage. As long as the threshold is not reached, the transistor should remain OFF, and no current should flow through the transistor.

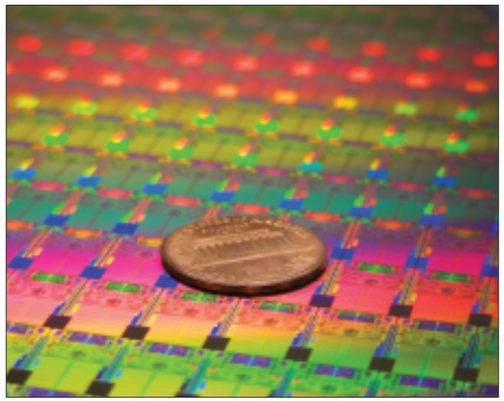
The incredible shrinking though, throws a wrench into the ideal. As transistors shrink, the wires connecting them shrink and the insulation that prevents the current to flow until the threshold is reached, gets worse. This can be likened to a leaking dam—the walls of which have grown holes letting the water through, when the dam shouldn't. As the pressure increases on the dam, the holes get larger, getting more water through. Thus, even when the dam should stop water (transistor OFF), it lets water through (leakage).



Intel's 45-nm processors are based on transistors with Hafnium-based high-k metal gate silicon technology

Shekhar Borkar, Intel Fellow and Director of Circuit Research puts it eloquently, "In a perfect switch, such as your light switch, when it is turned off, there is no current flowing through it, and the light bulb does not glow. If the switch is bad, then even though it is turned off there could be some residual current flowing through it, which may be so small that the light bulb does not seem to glow, but its there. Modern transistors are analogous to these bad light switches, they leak when they are turned off. And to make it worse, Moore's Law allows you to double these bad switches every two years, exponentially increasing the leakage every two years, and now it is becoming noticeable." A graph alongside this chilling declaration shows that at 45 nm (consumer processors have just reached this die size), the sub-threshold leakage current causes a power draw of 100 watts!

Thus far, you have seen die shrinks negatively effect the way the transistors work. The wires that connect these nanomachines inside the processor together are not spared either. As the processor shrinks, the wires that connect the parts should shrink as well. The shrinking increases the resistance of these interconnects, which slows down the rate of current flow through them. So the interconnects get slower to transmit currents, but here's the catch—the transistors themselves are actually getting faster as they shrink. So you have one part of the processor—the brains really, running away, while the part that connects these speed demons is caught lagging behind! This phenomenon is known as 'wire delay' and it is yet another reason why processor speeds can't just increase without solving some basic plumbing problems.


Processors on an Intel 45-nm Hafnium-based High-k Metal Gate "Penryn" wafer photographed with a penny. These processors incorporate 410 million transistors for each dual-core chip, and 820 million for each quad-core chip.

Taming The Beast

Taming first calls for plugging the plugs, or at least as many plugs as current technology can fix. The biggest hindrance to increasing clock speeds is leakage current. As we saw earlier, leakage without solutions could cause a processor to consume as much as 100 watts at 45 nm, and about 250 watts in total. One part of the solution is an implementation of a technology called Silicon on insulator (SOI), pioneered by IBM. Processors are generally built on a substrate of silicon. With SOI, the silicon substrate is replaced by a sandwich of silicon-insulator-silicon. The silicon junction is above an electrical insulator, typically silicon dioxide or sapphire. The insulating layer and topmost silicon layer also vary widely with application. SOI improves the insulation of the transistor gate and thus reduces leakage currents.

Another piece of the solution is use of so-called 'high-k' materials in building transistors. The 'k' here refers to the dielectric constant of a material. The dielectric constant tells you how effective a material is to storage of electrical charge, or the amount of electrical charge. For a transistor, k is a vital stat. The solution is replacing silicon dioxide, which has been used as a gate oxide material with a high-k material, such as Hafnium. As we learned earlier—with shrinking transistors, we get to a point where leakage currents due to tunnelling increase drastically, leading to increased power consumption and reduced device reliability. Replacing the silicon dioxide gate dielectric with a high-k material allows increased gate capacitance without the leakage effects.

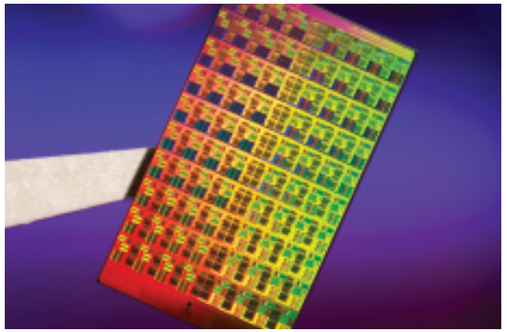
Wire delay is reduced by using materials of low-resistance for the chip interconnects—generally copper, instead of aluminium. Another trick is to use more metal layers in the sandwich of the processor. Increasing the metal layers helps pack the wires tighter together, which help keeps their length down, which in turn lowers their resistance and thus the delay. Further, the capacitance of the wires is also being reduced, this time by using low-k materials.

Engineers are also investigating the use of optical fibres instead of metal wires to carry information inside the chip. IBM, very recently, revealed a silicon photonic switch based on cascaded micro-ring resonators. This device can switch between nine channels with a bandwidth of about 40 Gbps per channel—allowing it to route data at speeds of 1 Tbps. It is capable of processing data with a switching speed of less than 2 ns. Fast enough to keep up with runaway processors? "It's certainly a big step in the right direction," said Yurii Vlasov, head of IBM's research into silicon nanophotonics. According to him, "It looks like our vision for on-chip optical interconnects is becoming more and more realistic." Sun Microsystems is also in the optical game, having recently won a contract from DARPA to use optical interconnect technology to stitch an upcoming supercomputer together. Sun's CTO and head of R&D, Greg Papadopoulos is optimistic "Optical communications could be a truly game-changing technology—an elegant way to continue impressive performance gains while completely changing the economics of large-scale silicon production." Optical interconnects are not just a solution to wire delay, but also a potential answer to the other problems arising from densely packing electrical and capacitive materials together, resulting in problems such as cross-talk, EMI and signal distortion.

The take-away from this discussion is that there isn't a single problem to tackle when it comes to engineering at nano scales. Similarly, there is no silver bullet to solve the myriad issues—it takes a mix of solutions to reduce the scale of issues faced, such that technology can keep trudging forward. But clearly, we are at a point where solutions need to catch up to the problems a bit more before we can hit that 10-GHz mark. Meanwhile, we need to redefine the playing field a bit.

Our Very Own Hydra

Since processor speeds have reached something of a plateau, the path to progress lies in multiple cores. The idea is to combine several slower processors (slow in the relative sense here, they are still fast enough) to build a macro-processor. The trick then, is to split up work loads between these multiple constituent processors, such that, the total work done by the macro-processor is comparable to what could be done by a single super-fast processor. So goes the theory. And much like the 10 GHz number was thrown by Intel in the time of the Netburst architecture, the multi-core era sees the concept of an *80-core* chip, part of the so-called Tera-scale project inside the Intel labs. The theoretical applications of such many-core processor can be quite intriguing. One possibility, for example, is that of a data centre that is located entirely on a single microprocessor chip consisting of these 80-cores—each core connected via optical


The Teraflops Research Chip is Intel's first silicon tera-scale research prototype. This research project focuses on exploring new, energy-efficient designs for future multi-core chips, as well as approaches to interconnect and core-to-core communications.

fibre links and talking with each other using TCP/IP protocols.

Many-cores are a research project currently, much like the 10 GHz processor existed on paper not so long ago. We do have some multi-core solutions in the market though—ranging between dual-cores, quad-cores and looking forward to octa-cores. You could also use two dual-core processors on a single motherboard, for a pseudo-quad-core solution, or indeed two quad-cores for an eight-way powerhouse of data. The last example can be picked from Intel today—the Intel Desktop Board D5400XS, part of its "Extreme" range of motherboards, can house dual CPUs, providing up to eight core processing.

You also have more esoteric solutions in the making. Intel's looking to enter the discrete graphics processor market with its Larabee initiative (we spoke about this in the May 2008 issue of Digit). Larabee leverages multi-core capabilities to churn out graphic-intensive tasks. From the other side, AMD and NVIDIA are turning the GPU into a GP-GPU—a more General Purpose processor which can offload some tasks off the main processing unit(s).

Today, almost everyone has a multi-core chip powering his or her desktop. So why doesn't processing feel faster than it did when speeds reigned supreme? The main reason is that there is a lag between hardware that has gone multi-core, and software that is still largely stuck in the past.

Past Tense

Multi-core processors rely on the existence of software code that does things in parallel, using so-called 'multi-threaded' applications. Give one chunk of this task to this processor here, the other to that one, now quick, both of you run at 2.4 GHz and give me the result in half time—effectively making the multi-core 4.8GHz fast. Yes, that was a bit of oversimplification, but that is the gist of the idea. The average software code, however, does not allow the CPU to process a lot of instructions in parallel. Part of the reason is the way in which these instructions are inherently designed. Instructions invariably need data which is being churned out by other instructions. This dependency is an inherent hurdle to parallelising data.

Then there are complexities—huge complexities, if we are to believe software developers—in the debugging of parallel code. Tim Sweeney, of Epic Games has been quoted as saying that "Implementing a multi-threaded system requires two to three times the development and testing effort of implementing a comparable non-multithreaded system..." Tim is mostly referring to the difficulty in producing clean and parallel code. Debugging such a multi-headed beast is a monstrous task. The solution is to multi-thread manageable code—It's especially important to focus multithreading efforts on the self-contained and performance-critical subsystems that offer the most potential performance gain. You definitely don't want to execute your 150,000 lines of object-oriented gameplay logic across multiple threads—the combinatorial complexity of all of the interactions is beyond what a team can economically manage... it's vital that developers focus on self-contained systems that offer the highest effort-to-reward ratio. This effort-to-reward ratio as implemented by the latest Unreal Engine 3 is simple. As Sweeney puts it, "For multithreading optimisations, we're focusing on physics, animation updates, sound updates and content streaming. We are not attempting to multi-thread systems that are highly sequential and object-oriented, such as the gameplay".

Unreal Engine's multi-threaded Gemini engine powers games such as Gears of War

So while the actual gameplay engine might not be multi-threaded, you do see the game making use of the parallel-ability of multi-cores to offload tasks such as AI and physics calculations.

For some mundane tasks, multi-cores is the clear way ahead. Database applications, for example, scale linearly in performance with core additions and some database vendors out there are clearly pleased with the way things are heading.

But What About The Rest Of Us?

For most applications, there is currently only one thread that really needs all the power. Thus parallelisation does not bring much to the table. Some claim multi-tasking to be a much improved experience with multi-cores, and that might be so—especially, since operating systems are more multi-core aware and shuffle tasks across cores to balance things. But even multi-tasking is hostage to inherent and systemic bottlenecks. Hard drive speeds, being the biggest culprit—most applications thrash the hard-drive and there is only so much a processor can do to keep the system running smooth and fast, before it hits that particular bottleneck. Games will probably be the biggest winners due to multi-cores, with better AI, sound, physics simulations, animations and so on.

We are thus at a crossroad. The processor manufacturers want to go the multi-core route, since the other way is clearly impractical to traverse at this point. The software people though are stuck between a rock and a hard place and seem a little wary of going full-steam on the multi-lanes. Will things improve as the hardware hits its groove and compilers and other programming tools offer better solutions to the software people?

Only time will tell. ■

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You!

The only thing that makes or breaks a technology product is You—the consumer. However, you're not the silent window shopper any more, you have become the most influential force in technology, and perhaps the greatest wonder of the technology world!

Robert Sovereign Smith

In the last 5 years, the faceless masses that were confined to adopting products and spending money, have started standing up to be counted. As you have already read, we've listed Open Source as one of our technology wonders, and it's you that makes Open Source what it is.

Linux has now grown into the Free Software Foundation and Open Source. In fact, now it's not just Linux, but millions of little projects that have ended up making some of the best software there is, and it was all possible because of the Internet. As the number of people online grew, we started forming little online communities, much like the way we do in real life—the chess club, computer club, bikers club and other popular cliques you see in every college are examples.

Shrikrishna Parkar

Networking

After the wonderment of the Internet faded, it became just another tool that we used to find information and interact with other people from around the globe. The next step was obviously to start creating content and sharing information, and as a result, most of us ended up with a little space on the Net to call our own. Those of us who could afford it, ended up buying domains and hosting to set up our own Web sites, others settled for free alternatives such as Yahoo! Geocities. But how long could this continue? We are social animals after all, and before you knew it, we found ourselves gravitating to form communities.

Chat applications such as ICQ and search features enabled us to make new friends, and search for long lost buddies, or even strangers with the same interests. It was natural that most people were looking for friends of the opposite sex, because everyone, it seemed, was desperate to get a date. In the early Internet days, there were plenty of dating services at the time anyway, and there were different communities and forums for like minded individuals. However, if you were an IRC trivia junkie, who could code, loved motorcycles and dipping chocolate chip cookies into your strawberry milkshakes, you'd probably have to go on IRC to play trivia, then visit a forum to find the latest news from your motorcycle buddies and hope that you'd find a girl on a dating site who didn't mind sipping on a strawberry milkshake that had a few choco-chip crumbs in it...

Then came social networking sites. SixDegrees.com was probably the first, and was launched in 1997. It died soon though, and many online experts feel it was way ahead of its time. The first popular social networking site was Friendster (2002), probably because it didn't just focus on dating or any one aspect of socialising. MySpace followed in 2003, Orkut and Facebook later, and by now social networking was a rage. It's not all just fun though, and although mainly the evils of social networking make the news headlines, it has enabled many to make business contacts, outsource work and get exposure to otherwise inaccessible avenues.

Blogging

Blogging took the concept of a private diary and made it public. You could consider any online space where personal views are expressed to be a blog, and this dates back to the BBS and Usenet days. Even Yahoo! Geocities, launched many a blogger. However, this meant that people needed to design their own sites and know HTML coding. With the launch of Open Diary and Live Journal around 1998-99, people had access to easy-to-use tools to create their own blogs. Blogger then came along and joined the party, and is here to stay.

Blogging was so popular, that it prompted Google to buy Blogger in 2003. It's not just opinions anymore—photo-blogging, video-blogging, audio-blogging, micro-blogging and mobile-blogging are all ways in which to express oneself.

What blogging has done, is unearth the talents that most of us never knew we had. So if you're a network admin who loves to cook, you could have a blog dedicated to cooking, and teach the world the magic behind your *Paneer Makhanwala*—something you'd never have the chance of talking about at work with colleagues or even at home with friends. The major reason why blogging is taken seriously by everyone, is that apart from un-earthing subject-matter experts that you never knew existed, it's also a very viable source of income. After Google, YouTube, Yahoo!, Wikipedia and the like, some of the most popular information resources are blogs, and millions of hits translate into quite a few dollars for bloggers who take their work seriously.

Wikipedia

Wikipedia is a completely community-driven initiative that met unquestionable success. Ever since its launch in 2001, Wikipedia has grown in popularity to now become one of the top 10 global sites. The concept was brilliant, an encyclopaedia created and managed by a community, in a Wiki format (editable by anyone). Wikipedia gets its fair share of criticism, based on the fact that anyone can edit any page, and that popular opinion, rather than the 'right' information, always prevails. When Time magazine made You the person of the year, 2006, they cited Wikipedia as one of your greatest achievements.

YouTube

In early 2005, when everyone wanted to network or blog, YouTube was a refreshing change. There are an estimated 85 million videos on YouTube, and with all that streaming video content, it's estimated that the bandwidth cost for YouTube is Rs 4 crore a *day*. The best way to describe YouTube would be to call it community TV, where you can find content from almost every topic you can think of. So popular was this Internet video phenomenon that Google just had to own it. In November 2006, Google coughed up $1.65 billion in stock to acquire YouTube. That's Rs 6,600 crore, plus the Rs 4 crore a day in bandwidth costs!

The Web

If you've noticed, we've not used the term Web 2.0 thus far. We don't like that term. If we changed that number every time something revolutionary happened online we'd probably be at Web 66.6 right now. What's remain unchanged is the fact that the Net, as always, connects us to one another. It's just the way we use it that changes, if at all. For example, we've always been able to express opinions, through the BBS, our own sites and forums. It's merely the platform that's changing, with everyone trying to bring in the numbers, offering new ways to do old things. Even YouTube is much younger than, say, those "Worlds Most Amazing Videos" shows, or those based on videos you took of your baby or pets. What's changed is that instead of you sitting in front of an idiot box, watching what's shown to you, you can now make your own videos and upload them, or just sit back and watch what you want to online, and post your opinion or a video response to something.

The evolution of the Web to "Web 2.0" can probably be attributed to the increasing popularity of the Net. With more and more of you getting online, isn't it natural for an evolution of sorts to take place? Just as the majority prefers TV to radio or newspapers, video sites seem to be leaving text and audio based sites coughing up dust. Just as we like to express our opinions when we're with friends, we're blogging and informing the world of what we feel. Call it what you want, Web 2.0 or not, the virtual world is just becoming more like you are in the real world, and everyone loves it.

Weeding Out

If you look at blogs, for instance, you will find that most of them do not actually appeal to you, or to most others for that matter. It's actually hard to hear a nightingale over the cacophony of the Web, but thankfully, society seems to have taken care of all the "bad content" as well. The best part about the Web is that it is decentralised and anonymous (to a certain extent). This means that a 40-kilo weakling can visit a professional wrestler's blog and call him a moron openly—if that's what he feels like saying. What would be considered anti-social in our world of laws, is actually the only policing force online, and it's helping weed out the bad content and keeping the good.

Much like Wikipedia, where a few vandals are soon overcome by a lot of well wishers, we too play our part in policing the Web. Let's face it, unless you're the one who's created the content, you're not going to subject yourself to bad content. Even if you're not brutally honest, and don't leave scathing comments, others probably will, but you will do your part by forgetting about the content in question. If the majority agree with you, and forget about the content as well, pretty soon Google (if it listed the content to begin with) will forget about it, and it will be doomed to a dark alley of the Web forever. So basically, even just by surfing you're rating content, and as a result, making the Web a more enjoyable place for others!

Prosumers

We're talking about the Professional Consumer. The idea is simple, if you don't like something, instead of bitching about it, improve it. Let's take the example of *Second Life* (*SL*), where you live your life in a virtual world. You're free to buy things and pay real money, and also work and make some money. Hundreds and thousands of developers logged in to *SL* and started creating models, houses and more.

Even the Open Source movement is based on Prosumers, where developers who were not happy with the software that was available, just started making their own, or modifying existing OSS to add in features and suit their needs.

Microsoft offers the XNA Framework to aid gamers who might want to try their hand at game development for the Xbox 360 or Windows platform. Instead of making developers write boring base code from scratch for every game, developers can now use the provided libraries and save a lot of time and effort. It also makes the game development process a lot easier, as is the process of porting games between XNA-based platforms—Windows and Xbox. Microsoft does not stop there either, and even offers to sell any game that you develop on its Live platform—which means that you now have potential to earn money off any game you develop.

It's not like Microsoft is doing this out of the goodness of their hearts, because what this means is that most of the gaming community is coding for Microsoft platforms, which is a big blow to its competitors. It is still a win-win situation for both us and Microsoft, and they deserve credit for such an innovation. In the near future, we should see more such projects that leverage the skills of consumers to benefit both companies and consumers. Truly, the age of the prosumer!

Crowd-sourcing

Actually, when you think about it, the entire Web is nothing but one big crowd-sourcing initiative. You, and a billion others, spend money to buy bandwidth and a PC and get online, and companies make money off you. From the subtle Google ads you see almost everywhere, to big flashy banner ads that you try and ignore, to signing up for Gmail and visiting your favourite news site, *everything* you do online is making money for some company, somewhere in the world. You are an integral part of the Web economy.

However, even if you never realised that before, we're not interested in the obvious. What's brilliant is the way in which a lot of companies use the masses to complete tasks and improve services. Google, for example, has an image tagging program that uses its audience to tag images better, which in turn makes its searches more relevant. Sure, it means that as a person who uses Google to search, you get better results, but it also means that Google is cementing its 'numero uno' slot thanks to you. Wikipedia is another example of crowdsourcing, as is YouTube, and most popular online businesses. Even offline businesses, such as Tesla Motors (**www.teslamotors.com**) are turning to crowdsourcing to develop a better electric car, by maintaining a rather honest and open blog.

Of course, we don't mean to sound used or abused here, because no one is forcing anyone to do anything, and all successful crowdsourcing is completely optional—Wikipedia is a prime example here again. However, it is significant that companies are using your spare time and brain power, much like the BOINC and folding@home projects, use your idle CPU power, to complete tasks that result in better products and services for you to use.

Crowdsourcing is the culmination of social networking, prosumer-grade users and a passion to contribute, and it's a trend that's here to stay. It's another feather in your cap, and another reason why you are the most important wonder of the technology-laden decades to come. Each one of you reading this article need to pat yourselves on the back, because thousands of companies across the globe (us included) are thanking you for using, making and changing technology in a way that benefits all of mankind. ■

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I R G33K!

Proud of your geek status? If you're not causing frustration in humans around you, however, you shouldn't be. Here are seven random, pointless things that only true geeks would dare do. Why? Because they can

Nimish Chandiramani

Shrikrishna Patkar, Ashwini Baviskar

Get Efficient...ish

Did you know that the QWERTY keyboard layout was designed to *slow typists down*? Think about that the next time you think you're hot stuff at 60 words per minute—you could actually be so much faster! The Dvorak keyboard layout is a much more sensible design. A little old lady named Barbara Blackburn set the record for the world's fastest typing speed on a Dvorak keyboard—a peak of 212 words per minute!

Using the Dvorak layout is a security system, too. Try picturing that annoying friend or colleague who treats your PC like his own—now picture him trying to type even the simplest word with a keyboard that isn't QWERTY. From our experiments, we've discovered miscreants who've run away crying like babies.

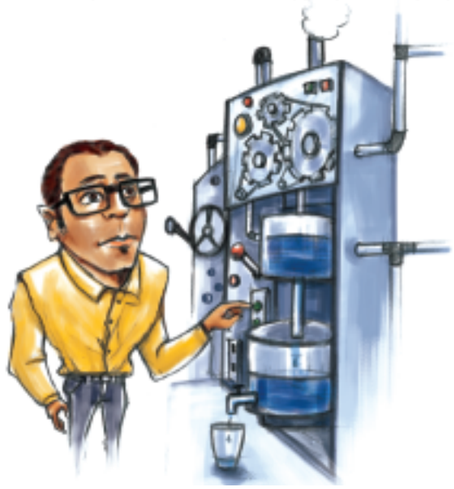
Sadly, you must also deal with being nearly useless on a QWERTY keyboard and field questions like "Are you *sure* you're a writer?"

Down With Word

Do you really think geeks need features like AutoCorrect and spell check? Do real geeks need anything beyond system fonts? Fancy text editors are for the weak—you, however, must choose between the two text editors to end it all—Vi (or Vim) and EMACS.

The two editors have been around since the glorious days of Unix, and continue to live in our favourite Linux distributions today. Both are keyboard warriors' best friends, and both have fanatical user communities. More importantly, both have that "retro" goodness that only 30-year old programs can have. They are both each other's mortal enemies, and by liking one, you automatically reject the other.

If you're not the Linux type, you can get your hands on the Windows versions as well.



Doing It The Hard Way

Popular applications are for...well...the general population. Who *really* needs all those features anyway? You must transcend bells and whistles, and use programs that are more focused on their primary functions.

In the IM department, shun everything for Miranda—it's a no-nonsense multi-messenger, devoid of unnecessary fluff (emoticons, for instance). It lets you satisfy your prodding instincts with the multitude of settings, guaranteeing hours of tweaking joy.

Replace your current media player with Foobar. True to its name, it is rather effed up beyond all recognition—the default interface doesn't even have a volume slider—you're supposed to know how to change the volume using The Force (or alternatively, a keyboard shortcut). Another tweaker's pet, Foobar ensures that the second you think you're done configuring it, you'll think of a new thing you can do with it.

DIY

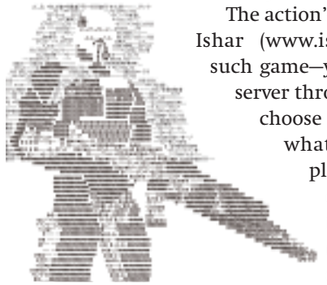
Is your current MP3 player too "assembly line"? Instead of settling for gadgets that the rest of the world's using, build your own! If you're comfortable (or are willing to get comfortable) with C and/or Assembly language programming and can use a soldering iron without burning holes in things—especially yourself—you can get your hands on a number of kits that give you all the components you need to build the gadget of your choice.

This'll usually consist of a microcontroller, a PCB, resistors, capacitors, buttons and so on. Sometimes, you'll even get the code that you need to program the microcontroller with—it's not the same as doing it yourself, but you can take pride in the fact that your MP3 player (or whatever) is the geekiest—even if it doesn't have a display, or a "shuffle" function, or...well, much more than a Play button.

Oblivion? Bah!

Think you're being retro with *Minesweeper* and *Jezzball*? What you *really* need is a good dose of text-based RPG-ing. After all, what gaming engine can match your imagination?

And what, you might ask, is a text RPG? Think of it as any other role-playing game—choose from races like elf, human and so on, build your skills, wreak havoc if you can, try not to get killed, and so on—but instead of roaming the world in a shiny new 3D gaming engine, you do it in a command-line interface. To look around, type "look", to kill someone, type "kill" and so on. The action is all in your mind's eye.



The action's even gone MMO—Ishar (www.ishar.com) is one such game—you connect to the server through your browser, choose a name, race, and whatnot, and you're plonked into a city called Mareldja, from whence the madness must commence.

Get Back To Your Roots

Warning: while there is a smidgen of value to be obtained from the rest of these activities, this particular one baffles even the best of us. Throw yourself back to the days of Windows 3.1—at the time, wouldn't you have yearned to see it fly on a Pentium III with 512 MB of RAM?

Well, here's your chance. The 8 MB (!) OS is available for download at a couple of abandonware sites (we can't give you their URLs). You'll even find applications for it on those sites, so you could theoretically have all you need to use this every day.

Get On The Mobile (?) Web

What do you do when you want to surf the Internet on your non-WiFi phone? GPRS is too slow, and depending on your provider, can get a bit expensive. You've probably got a perfectly good connection hooked up to your PC—how about using that? Forget, for the moment, that you'll be giving up a perfectly good computer with a large monitor and a full keyboard to squint at your phone's screen—it's the coolness of using the Internet on your phone that matters more.

Just hook up your phone via USB or Bluetooth (assuming you have a Bluetooth adaptor), configure the connection and you can surf the Internet. In bed. Well, if you have Bluetooth. If you're using USB, you can access the Internet from as far as your USB cord will let you go.

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Twice As Nice?

Nimish Chandiramani

If you were to read the lay (and, unfortunately, very popular) definition of 64-bit computing—"A 64-bit computer can process twice as much information as a 32-bit computer"—you'd be expecting programs to run twice as fast and games to look twice as good. And yet, not much has changed in the past few years—well, aside from all the hype dying down a bit.

So what do we expect from 64-bit computing when it does "arrive"?

The Bits That Matter

why do we speak of computers (processors, to be precise), in terms of bits? What do the 64 bits in a 64-bit processor actually *do*? On the processor, this means that the *registers* on the processor—which act as temporary storage areas—can store 64 bits of data at a time. It also means that the Arithmetic and Logic Unit (ALU) of the processor can work with 64-bit numbers—which is how the generalised definition comes about. The truth, however, is not as glamourous or exhilarating.

To understand, let's consider a system we understand better—decimal numbers. If the Powers That Be told you that you're allowed only to use one digit, you'd only be able to represent the first ten integers—0 to 9. Now, if you were given another digit, think of the possibilities—you can represent a hundred numbers now, all the way from 0 to 99. Let's take another look at the definition now—*twice* as much information.

A random number like 43 isn't twice as much information as, say, the number 6, is it? It's just different information—the extra digit has only multiplied the number of possibilities: one digit gave you ten (10^1) numbers, two give you a hundred (10^2), three will give you a thousand (10^3) and so on.

It's the same with binary digits, only it's a factor of two we're talking about—one bit gives you two numbers (2^1), two gives you four (2^2), three, eight (2^3), and onwards. With 32 bits, you can represent around 4.3 billion (2^{32}) numbers, and with 64 bits, you multiply that by another 4.3 billion. So, you see, 64-bit computers don't process twice as much information, but they can represent 4.3 billion times as many numbers as 32-bit computers.

But what does it do with all those numbers?

Remember This?

Since you've likely been subjected to a lot of pro-64 propaganda, you'll no longer recall the most popular problem with 32-bit computers—they can only use 4 GB of memory. With each memory location a byte long, that gives us 4 GB of memory. With 64-bit memory addresses, that becomes a theoretical 18 million terabytes—16 exabytes—of addressable memory!

Even six months ago, it seemed unlikely that you'd invest in 4 GB of RAM—even if you could afford more—but that's changed now. Try to run the 32-bit version of Windows XP (which is what you'll most likely have anyway) with that, and you'll see that it only shows you 3.5-odd GB available. Moreover, no application will ever be allocated more than 2 GB of RAM—it's just the way Windows is built.

To be able to use more than 4 GB of RAM—and that could be sooner than you think—you obviously need a 64-bit computer, and an operating system that supports 64-bit computing.

And what do you do with all that memory? Well, if you're a regular PC user—using the Internet, an office suite, IM and a bit of casual gaming—nothing. You'll have bragging rights, but anything more than 2 GB (even if you're running Vista) is wasted on you. If, however, you use 3D design and / or audio editing applications, raising your ceiling above 4 GB lets you load larger textures and more sound samples into the system memory, making your programs rely less on virtual memory, and thus much more responsive. Ditto if you're running a database or Web server.

But more memory isn't the only good thing about 64-bit computing.

Doing The Math

A 32-bit computer is pretty much similar to a 10-digit calculator. When you exceed the maximum number that can be represented with these 32 bits, the processor gives you an inaccurate result and tells you that there's been an *overflow*. So have we been restricting ourselves to 32-bit numbers all this time?

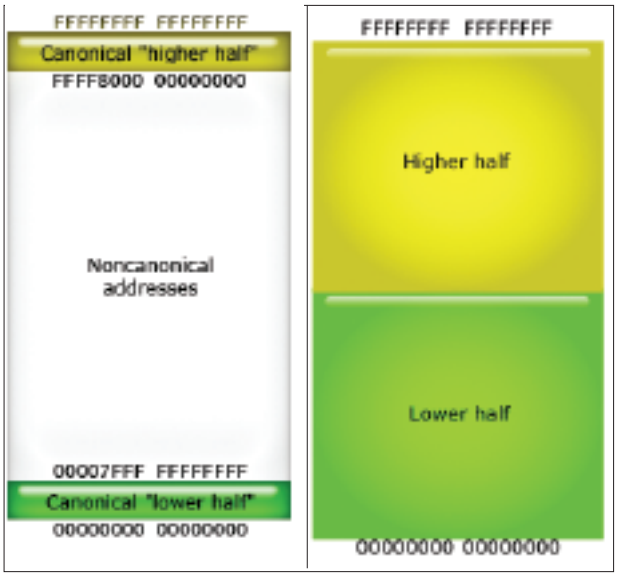
Unfortunately, to develop applications that need to deal with large numbers, programmers couldn't afford to wait for more range, so they devised a way that'll let processors deal with 64-bit numbers, 32 bits at a time. To store a 64-bit number, a 32-bit processor would take two clock cycles—64-bit processors do it in one. It's the same with any operation—load, add, subtract, multiply—and when you must deal with many 64-bit numbers, the disadvantages of 32-bit computing become more obvious.

A Peek Into x86_64

If 64-bit computing has been around since the 1960s (it started with the IBM Stretch Supercomputer in 1961), what took it so long to get to our desktops? One word: compatibility. By the time 64-bit computing was considered for computers less glamorous than the world's fastest supercomputers, a sizeable chunk of the computing world had already chosen to go the way of the Intel 8086 and its successors—the x86 series. Programs were written in its native 'instruction set', which could only be understood by these processors and no other. To ask the world to move to 64-bit processors and leave all their precious x86 applications behind would be a laughable idea—almost as silly as asking all software vendors to rewrite their programs to use the instruction set of a new processor.

So in 1999, AMD published a way out—they took the existing x86 processor architecture and modified it to support 64-bit instructions, while still retaining the ability to run old, 32-bit x86 instructions—the "x86-64" concept materialised with the first Athlon 64 in 2003. It meant that we could now enjoy the goodness of 64-bit programs, but didn't have to sacrifice our old 32-bit applications to be able to do so.

The new processors' ALU works with 64-bit numbers; existing registers are now 64 bits wide, and more registers have been added to hold temporary data. This is a good thing—the data in registers can be accessed the fastest, and to have more registers is to have more data close to the processor. This, in turn, means that the processor can spend more time processing, and less time waiting for data to be brought to it from the system's memory. It also means that data that needs to be immediately available need not be sent even to the cache—another boost to performance.



The x86-64 design uses 48 bits to address memory. The section at the top is used by the operating system and devices, and the section at the bottom is called "user memory"—for your programs. The possible locations in between won't be used for now. The second image shows an estimate of what 64-bit addressing would be like under Windows. Windows NT uses the top half of all memory addresses for itself and devices, and the bottom half can be given to programs. This is why Windows XP will only give 2 GB of memory to programs even if you've got 4 GB of RAM

The x86-64 architecture, however, doesn't use all 64 bits for memory addresses—it uses 48, making the total addressable memory 256 terabytes. Before you start yelling that you've been cheated of the remaining millions of terabytes, consider that 256 terabytes is a *lot* of memory, and ought to be enough for anybody—for now, at least. Translating a 64-bit integer into a physical memory address is work on the part of the processor, and it's simply not worth it—it'll be a really long while before 18 million terabytes of memory becomes a realistic figure, so why waste the processor's time translating 64-bit addresses? As for the day when it does become a realistic number, there'll be a processor that'll use all the 64 bits—x86-64's future-proof design makes room for that.

All said and done, what do *you* get out of all this? And do you need more than 4 GB to "enjoy" 64-bits of computing goodness?

The Real Advantage (?)

You have no choice but to buy a 64-bit processor today, but must you use Windows XP x64 Edition (or 64-bit Linux) as your new OS? Without 4 GB of RAM, you obviously can't take advantage of the ability to load plenty of data into your system's memory. You can, however, take advantage of faster calculations—applications like audio and video editors will run a bit faster, but not too much, unless you give them more memory to play with. Adobe Photoshop, while not available in a 64-bit version, will use system memory over the 4 GB mark as a scratch disk if it's running on a 64-bit processor with a 64-bit OS. If you're not a professional in any of these fields, however, this will matter little.

Must You Care?

Did you care that when you ditched Windows 98 for XP, you had finally left 16-bit computing behind and ascended into the world of true 32-bit computing? We thought not. Software has traditionally taken a long while to come to terms with hardware, and the day when all code is 64-bit is still a good way off.

For those of us who aren't audio, video, math or imaging professionals, the transition to 64-bitness will be as smooth as it was from 16- to 32-bit. And as long as our applications still work when we get there, it'll be painless. ■

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Almost Human

They come in all shapes and sizes and are growing more intelligent by the day. Meet the robots of today and delve into the exciting field of robotics

Samir Makwana

Pick up any newspaper today and you'll find news about a humanoid waitress at a restaurant, a dancing robot, a dog-like robot, war-bots, etc. In today's world there exists a huge scope for a career in robotics given the various applications that the field lends itself to—medical, nanotechnology and even modern warfare. Ergo, there has been a gradual rise in demand for technical experts and research specialists in robotics. No longer does robotics involve the manufacture of small automated machines, which are merely used to pick up things and perform other such simple tasks.

The Home Front

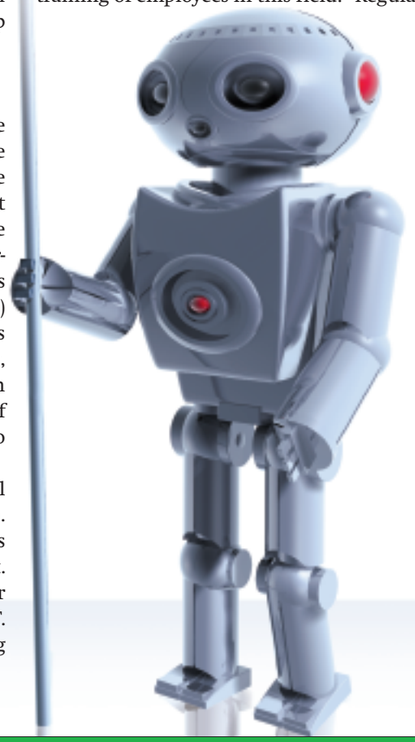
At the inauguration of a new building of the Defence Research and Development Organisation in 2006, the Prime Minister announced that India would pursue technologies for the development of a robot army. Post that, the development of war-bots is already in the pipeline for critical combat activities and espionage purposes. In January this year, the first Robo Expo 2008 was organised by the Confederation of Indian Industry (CII) after realisation that the robotics industry in India was on the path of growth. According to industry estimates, the world market for industrial robots will reach 139,300 units by 2010 with a yearly growth average of 4.2 per cent. The Indian robotics industry is expected to grow at 2-2.5 times the global average.

"The Indian robotics industry has huge potential for growth as well as employment generation. Development of low cost robots for Indian industry is one of the focus areas we are working on at present. Application development is going to be a major employment generator in this area," says Dr. T. Asokan, Assistant Professor, Dept. of Engineering Design, IIT-Madras.

Under the initiatives of DST (Department of Science and Technology) a consortium has been formed with two IITs (Madras and Bombay) and the private sector for the design and development of low-cost robots.

There are many manufacturers who utilise robotics and automation, but very few who actually manufacture robots and automation products or services "Very few industries manufacture robots in India. One has to convince labour of the necessity—more so in existing units. New units may be able to implement robotics in their plants. The people who have experience are mostly in academics or national labs," says Prof. C. Amarnath, professor at Mechanical Engineering Department, IIT Bombay.

With just a few organisations specialising in robotics, interaction with academia has become a must for training of employees in this field. "Regular interaction



3D: Shrikrishna Patkar

of companies who use or manufacture robots with the educational institutes engaged in robotic teaching or research (is a must). Institutes can do short term courses for the companies whereas the live projects can be provided to the students of academic institutes. This will keep the dialogues on," says Dr. Subir Kumar Saha, a professor at IIT-Delhi.

Enter Intelligence

Robots can be defined as machines with human-injected intelligence that are automatically controlled, can be reprogrammed, could be immobile or otherwise, and serve as multipurpose machinery. Robotics is all about designing robots, developing applications to control them, manufacture them, maintain them and conducting further research for better performance. This field overlaps with different areas like electronics, computer science, artificial intelligence, mechatronics, nanotechnology and bioengineering.

"Advancements in technology in terms of memory, speed, accuracy of computers and robots and telecommunications have provided the basis for significant expansion of the field of applied robotics."

Dr. Kaustubh Chokshi
Founder and CEO
Intelligent Business Systems

Regarding the robotics field, Asokan says, "Robotics being an interdisciplinary field requires a good amount of exposure to different areas such as mechanical design, electronics, sensors and actuators, programming, and integration of electromechanical systems. Those who plan to pursue a career in robotics need to focus on these areas and must try to develop an overall idea of integration of many systems."

According to VS Mahalingam, Director, Centre for Artificial Intelligence and Robotics (CAIR), Defence Research and Development Organisation (DRDO), "Opportunities in robotics lie in three broad areas—hardware, software and control. In hardware such as embedded systems, a single board circuit is designed and made to perform functions like other computer circuit boards (the motherboard). Next, software meant to execute complex functions involves working on the real-time issues through usage of particular Real Time Linux OS to co-ordinate with the special hardware. Critical algorithms are designed and fine tuned for the accurate performance of the software and RTOS in sync with the hardware. Finally, control of the robots is basically managing the integration of the hardware and software of the robot for achieving specified tasks."

The major areas to specialise under this field are:

Design: For designing the structure of the robotics application, specialisation in engineering design is essential. It's the initial stage of building robots wherein development engineers and even R&D engineers play a vital role in a robot's concept and design. Also the designing of hardware and embedded chips used in robots can draw influences from electrical and electronics engineering.

Implementation and Control: Software applications along with RTOS, mostly RT Linux, are used for developing critical algorithms and defining the functions to be executed by the robot through the applications of expertise from computer science and information technology. Various operational or functional issues are solved in real-time with help of application programming. The control portion includes certain aspects of electrical engineering. Also the maximum application of mechatronics takes place in this area, directly. Integration of hardware and software takes place to build a robot in this area.

Operation and Maintenance: The area involves knowledge and expertise from different engineering branches for using robots and automated machinery for achieving specified goals. The maintenance part deals with repair and servicing.

Research and Development: This area requires the application of complex skills and expertise on research and further development to exploit robots functioning in particular areas of robotics such as underwater robotics, robots for medical purposes, GPS navigation or warfare robots and robots for industrial applications. This involves research on deriving better algorithms, software application development, interface driver development and RTOS customisation in parallel with hardware used.

Taking up academics is also a paying option, which involves working on different research projects (sponsored and non-sponsored) at university labs. Also, the scope for robotics engineers is brighter abroad since India is yet to match the pace of technological advancement.

Institutes offering courses on Robotics and Automation

- All Indian Institutes of Technology
- NIT-Calicut, Warangal, Surat, Bhopal, Rourkela, Tiruchirapalli, Durgapur
- IIIT-Hyderabad, Bangalore, Bhubaneshwar, Allahabad, Calcutta
- National Institute of Technology, the University of Hyderabad
- Kalinga Institute of Information Technology
- IISc, Bangalore
- International Institute of Technology, Pune
- Birla Institute of Technology and Science, Pilani
- Veermata Jijabai Technological Institute, Mumbai
- Jadavpur University, Kolkata
- M.S. University, Baroda
- NIRMA Institute of Technology
- Jaypee Institute of Information Technology, Noida
- Delhi College of Engineering, Delhi
- College of Engineering, Guindy, Anna University

**Indicative list. Check regional technical institutes for Robotics and A.I. as electives in final year of graduation.*

Tools Of The Trade

Due to incubation of robotics at the school levels, many elite schools from different corners of the country have participated in the World Robot Olympiad at the international level. At the elementary level, interest and proficiency in physics and mathematics prove to be beneficial in this domain.

"Organisations looking to recruit freshers prefer graduates like B.E. or B. Tech.," says Saha. For development and research jobs, Masters and Ph.D. level students from the engineering domain as well as physics and mathematics are employed. Masters degree holders like M.E. or M. Tech also have a chance to apply and get through internship/training at the national labs or national level agencies which come out with such openings from time to time.

"Since a lot of automation activities are taking place in India to reduce defects and increase tolerances, there is a lot of scope for a career in robotics."

Dr. Subir Kumar Saha
Professor
Dept. of Mechanical Engineering
IIT Delhi

The chief educational streams to go through and the subjects to master are:

- Mechanical Engineering—kinematics, dynamics, design, simulation
- Electrical Engineering—electronics, controls
- Computer Engineering—control hardware, vision, embedded systems, artificial intelligence
- Information Technology—Programming for simulation and control

Top technical institutes provide different courses in robotics engineering or specialisation in subjects directly dealing with robotics. Scoring well in your engineering stream of interest by mastering the subjects mentioned will bring you a few steps closer to an exciting job. Taking part in technical festivals can also serve as an exclusive platform for display of skills and learning about new techniques applied in robotics.

Application And Training

The recruitment process involves the conventional procedure where more weightage is given to projects pursued by the applicants. Making robots from ready-made or semi-made kits is passé—students are expected to address more complex issues.

Soft skills are also a must since candidates need to perform on an individual basis and also in a team. In addiction to soft skills, freshers are required to have good cognitive skills, excellent analytical and problem solving abilities and reasoning abilities.

Various institutes offer very basic training along with the education while the students broaden their horizons by working on projects and taking part in tech-fests. Also quite a number of national labs/agencies and many private organisations like ABB Ltd., KUKA, FANUC, The Robotics Institute India, DiFACTO, etc. offer training services, courses and also workshops for professionals as well as enthusiasts.

Levels of hierarchy

The roles and responsibilities are well-defined in any lab or organisation working on robotics. Here the individuals do not have specific time schedule of working and most of the time end up working late.

- Service Engineers: Servicing and maintenance of existing robots
- Development Engineers: Developing new designs/methods etc. in specific areas for robotics in terms of hardware and software.
- System Engineers: Overall system integration, working closely with development teams
- R&D Engineers: Development of new technologies, application development.

Hierarchical structure for these different avenues remains the same. From trainee engineer or assistant engineer you can rise to become the director or vice president for that particular function or project. Freshers start as robot technicians and within two years advance to the next level in the relevant field of designing, development or controlling the robot. There are also robot controllers/operators who instruct robots.

Since majority of the work is project-based, the structure of an organisation dealing in robotics is similar to that of other engineering occupations.

Payday

Designation	Salary Per Annum (INR)	Experience (Years)
Higher Technical & Administrative Positions	12 lakh and above	10 to 15
Project Manager / Engineering	8 to 12 lakh	5 to 10 or more
Senior Technician / Software Developer / Control Engineer	6.5 to 8 lakh	2 to 5 or more
Assts. Engineers / Technicians / Research Assistants	4 to 6 lakh	0 to 2

Artificial Intelligence

"Robotics as a career has definitely a bright future in India. Development of robots for various critical purposes like GPS, navigation and also the human-like behaviour such as hearing, speech, and touch is also taking place at specialised scale," says Mahalingam, "Even high schools are getting active with projects and expos for young and enthusiastic students."

Forget all those sci-fi movies. Robotics has arrived.

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Comfort Zone

With tremendous laptop adoption rates, setting up a wireless home network is the need of the hour—after all, what's the point of having a laptop if you can't use it from the comfort of your bed. With that in mind, we took a look at the best WiFi technology, to help you not only browse the Internet, but also stream music, movies and work.

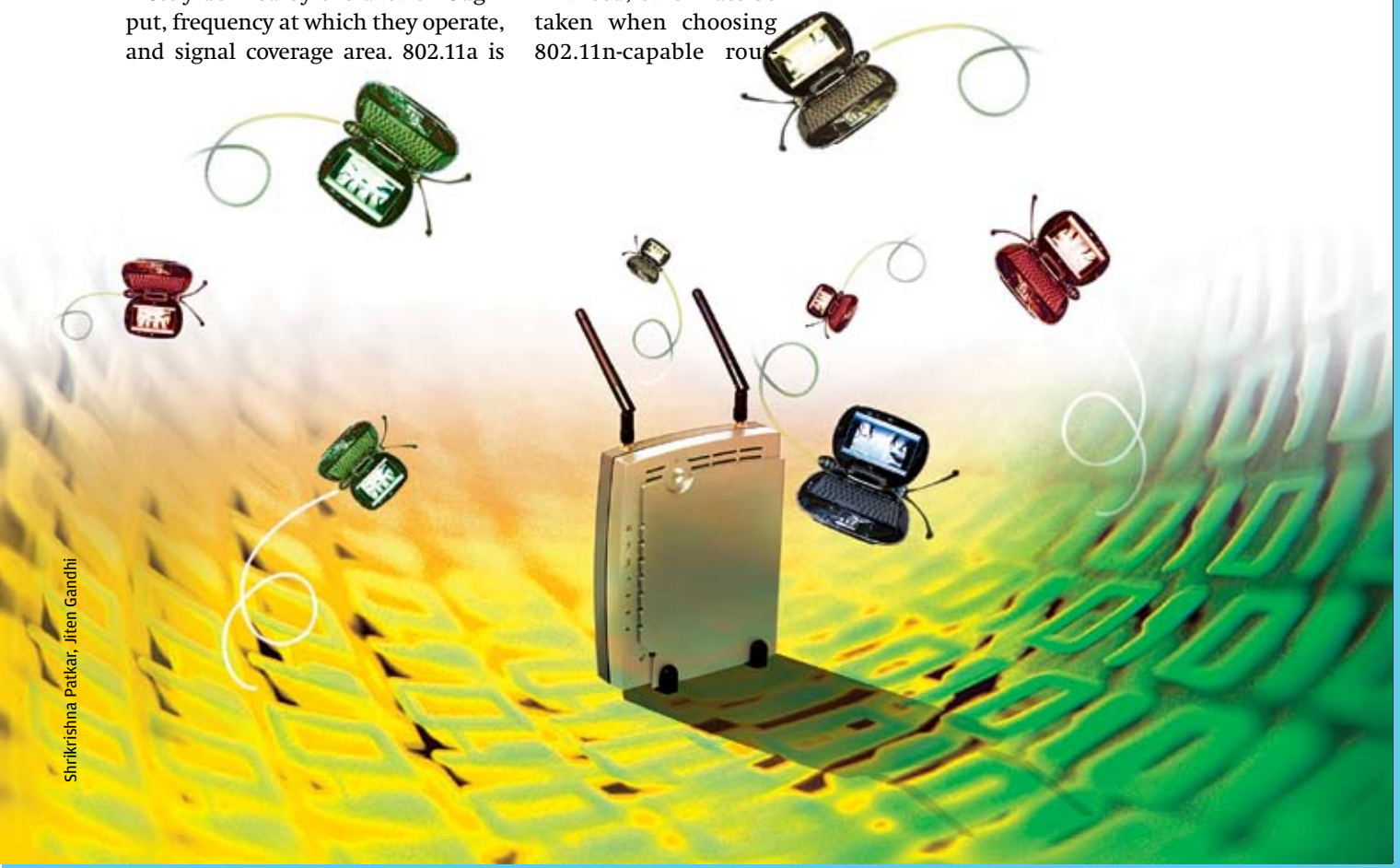
Sanket Naik

We are no aliens to wireless communication. Cell phones with Bluetooth and IR, cordless phones, remote controls, etc are few wireless technologies we use on a daily basis. However, these short distance wireless technologies have limited scope, and today we see yet another development—WiFi.

WiFi is the commercial name for a group of standards designated by the IEEE as 802.11a, 802.11b, 802.11g and now 802.11 n. Each of these standards have their own characteristics, mostly defined by the data throughput, frequency at which they operate, and signal coverage area. 802.11a is the oldest of the lot. Laptops are generally equipped with 802.11g, while 802.11n is a relatively newer version that differs in many ways.

Although the 802.11a standard was the first to be released, it was 802.11b and g, which saw rapid acceptance because of Intel's Centrino platform, which came integrated in all laptops. As of today, most laptops come with an 802.11g module, but newer laptops based on the latest Centrino platform are seeing 802.11n-based parts. With the 802.11n standard being new and currently in the draft stage, that is, the standard is yet to be completely finalised, care must be taken when choosing 802.11n-capable rout-ers—compatibility issues abound. So whether 802.11n is ready for acceptance is the one big question on everyone's mind, and we will try to answer it in this test.

WiMAX is yet another technology often talked about. Will it replace WiFi, in the longer run? No! WiFi was developed for LAN (local area network) applications, whereas WiMAX is developed for MAN (metropolitan area network). Simply put, WiMAX extends the WiFi experience over a large geographical area, and hence the two will co-exist. This situation is quite similar to using Bluetooth and WiFi—Bluetooth for small range and



Shrikrishna Patkar, Jiten Gandhi

WiFi over larger areas. Technically speaking, WiFi will often be used for local (home) networks, whereas WiMAX will be used for last mile connectivity (between your home and ISP)—thankfully no more dug up roads!

In this comparison, we have ten routers—five based on 802.11g and five on 802.11n, respectively. Those based on 802.11n are backward compatible with 802.11g, but not the other way round. Though 802.11n-based routers provide faster data speeds, they are plagued with compatibility issues and may not deliver the performance they should when used with laptops or devices using 802.11g wireless cards. From here on, 802.11g-based devices will be referred to as the 'g' group, while 802.11n-based ones will be called the 'n' group.

Features

Aesthetics

If you plan to install a WiFi router in your living room, you surely don't want something that is finished in grey plastic, looks chunky and has many antennas staring in your face.

In the 'g' group, Netgear's WGR615 has a pearl-white finish and looks appealing. This is followed by ASUS, which also employs a similar finish. D-link has come a long way from the grey plastic boxes they used to offer. The newer routers look better in the black-silver outfit. Linksys' WRT54G wouldn't qualify in our best looking router though. Compex NP25G still reminds us of the 33 Kbps Modem days.

In the 'n' group the Linksys WRT310N simply blew us away. It doesn't look like a router from any angle. We reckon this is how routers should be designed! Netgear's WNR834B rectangular looks didn't impress us much. The D-link trio were nearly identical, except for the top-end DIR-655, which was finished in white.

Connectivity

Routers come with loads of connectivity options, Ethernet ports, USB ports and wireless of course! Getting the right kind of device as per your need is also the key. In the 'g' group, the ASUS WL-520GU was the only router to come with USB port, and offers print server capability. D-link's 635 and 655 in the 'n' group were equipped with USB ports. These routers currently don't support a print server, but it is expected in D-link's new firmware due to be released in a few months. For now, you can just use them to exchange wireless settings using Windows Connect Now (WCN).

Depending on the radio configuration, the number of antennas varies from product to product. Some vendors offer routers with no external antennas. However, they do have them concealed to improve aesthetics. Linksys' WRT310N is one such device, and without the external antenna, it performed well in our tests. D-link's DIR-655 on the other hand, had three of them and returned good results. However, there wasn't significant difference between the two. All g-based routers had just one antenna and they performed well.

Device Features

D-link's DIR-655 has a blue backlight with icons on a silver panel, which affects legibility from a distance. In our opinion, wall mounting is an important feature, because mounting a router higher up ensures that signals are not attenuated (weakened) by furniture, doors, metal objects and so on. Netgear's WGR615 was the only router to skip this feature. All routers came with good bundle featuring, one Ethernet cable, power adapter, a quick install guide and one CD featuring the installation wizard.

How We Tested

Test Setup

Each WiFi device was setup in an identical, elevated position and was kept away from metal objects, thick wooden walls to minimise interference.

The testing was done in two zones. Distances aren't important for benchmarking any sort of WiFi network, it's the obstructions between the access point (AP) and the signal recipient that ultimately plays the lead role. With this in mind, we designed each of these zones to actually take these wireless devices to their performance limits.

Zone 1: The laptop was placed within 20 feet of the AP. There was a wooden partition between AP and client through they were essentially in the same room. There was no shortage of signal attenuating obstructions.

Zone 2: We placed the laptop within 35 feet of the router. This time we ensured a decent load of signal-obstructing objects. There was a concrete wall (with cupboards) between both the WiFi devices to scramble the reception. There were also a couple of wooden partitions to help.

Test Process

File Transfer

We took two 400 MB files, one a single RAR file and the other a folder full of MP3s and video clips. The files were stored on a PC hard drive, which was connected to the Ethernet ports of the router. These files where then copied on a laptop at the two zones, and the time taken was noted down. Before beginning the transfer, we noted the signal reception strength in each zone.

Movie Streaming

Next, we streamed an HD video file encoded at 1280x720 (720p). This clip was present on our test PC's hard disk, and streamed to the laptop. In case any jerking of frames was really noticeable, points were deducted accordingly.

Test Laptop

We used Sony's VGN-FZ35GN notebook for this test—it comes with Intel's 4965AGN—compatible with both 2.4 and 5 GHz frequencies.

D-link's DIR-655

Linksys WRT310N

Installation

For a lay person, configuring routers can be a daunting task—you to know at least some networking basics. However, these days most routers are bundled with wizards that make installing them a breeze.

Linksys, ASUS, Netgear, D-link and Compex, each have their version of wizards to help you out. You need to run the accompanying CD before connecting the router to the PC. After a few rounds of questions, the device is set. For geeks, these routers are a treasure trove—days of fun tinkering around with the settings. During our testing none of the routers needed any special attention while installing.

Web Server Interface

This provides the interface to micromanage the router's functionality. All settings are done via the Web server. A lot depends on how this interface is designed—grouping of key menus, granularity of settings, etc.

Linksys devices are really simple to use. D-link has done away with their old, quirky interface and has come up with a new, superb looking and easy-to-use interface. Netgear's interface has an excellent menu structure, but needs some polishing. One thing that sets Netgear apart is the ready availability of help. There is brief explanation of each setting and what they do. Great for someone lacking technical expertise. The Compex interface is bland and will probably confuse the newbie.

Security

Having the best possible protection is a must when it comes to wireless networks. Almost all the routers that we reviewed, support WPA2-PSK with AES or TKIP encryption. They also have basic integrated SPI (stateful packet inspection) firewalls to safe guard the network. Though all routers had these features, some such as Linksys offer predefined rule sets, which can be applied with a single click. In others, one has to work a little harder to make it happen.

Network Features

DHCP was up and running on all routers by default, and all of them give options to limit the number of client connections. Advanced features such as NAT and port forwarding for specific applications are also available. Blocking certain URLs, services and applications is also possible. In Linksys, D-link and Netgear, these settings are easy to work with, simply because of the intuitive interface. Each router allows only specific number of rules to be set—not more than 15 in all cases.

Device Management

Basic device management such as changing passwords, rebooting the router, running diagnostic tools and upgrading the firmware can be done on all routers we reviewed. Router set-

Test Centre | **WiFi Devices**

WiFi Devices

Brand Model No	ASUS WL-520GU	Compex NP-54G	D-link DIR-300	Linksys WRT54G	Netgear WGR615	D-link DIR-615	D-link DIR-635	D-link DIR-655	Linksys WRT310N	Netgear WNR834B
										
Price Rs.	Rs 3,750	Rs 3,000	Rs 2,500	Rs 3,775	Rs 2,705	Rs 6,750	Rs 8,900	Rs 13,500	Rs 7,999	Rs 5,200
Pros (+)	Good signal Coverage,	Small foot print	Excellent Web server interface	Good Signal coverage	Appealing looks	Good design	Feature rich	Excellent signal coverage	Great looker, feature rich	Superb signal coverage
Cons (-)	Web server utility could be better	Slow transfer speeds	Relatively slow	Unappealing looks	Can't be wall mounted	Relatively slow	None	Expensive	None	Bulky design
Features (Out of 50)	33.38	29.80	31.58	31.95	31.05	31.68	34.63	35.23	32.85	31.20
Performance (Out of 50)	25.84	21.49	23.97	24.59	24.97	34.74	36.01	38.11	35.56	35.21
Grand Total (Out of 100)	59.22	51.29	55.54	56.54	56.02	66.42	70.64	73.34	68.41	66.41
FEATURES										
Type Of Device (AP / Router / ADSL Router)	Router	Router	Router	Router	Router	Router	Router	Router	Gigabit Router	Router
Protocols Supported (802.11 a/b/g/pre-n)	802.11g	802.11g	802.11g	802.11g	802.11g	802.11n	802.11n	802.11n	802.11n	802.11n
ADSL modem inbuilt (Y / N)	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Type Of WAN Port (Ethernet / ADSL / USB)	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet
No. Of Antenna(s)	1	1	1	2	1	2	3	3	3	3
No Of RJ45 (LAN) Ports	4	4	4	4	4	4	4	4 (Gigabit)	4 (Gigabit)	4
No Of USB Ports	1	✗	✗	✗	✗	✗	1	1	✗	✗
Device Features:										
Power Indicator (Y / N)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Internet connectivity LED (Y / N)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Individual LAN port LED (Y / N)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Activity Indication i.e. Blinking (Y / N)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Factory-Defaults Reset Button	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Wall Mountable (Y / N)	✔	✔	✔	✔	✗	✔	✔	✔	✔	✔
Security:										
Firewall (Types Supported)	SPI	Packet based	SPI	SPI	SPI	SPI	SPI	SPI	SPI	SPI
LAN I/P Based Site Blocking (Y / N)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Application blocking	✔	✗	✔	✔	✔	✔	✔	✔	✔	✔
Encryption (Y / N)	TKIP, AES	TKIP, AES	TKIP, AES	TKIP, AES	TKIP, AES	TKIP, AES	TKIP, AES	TKIP, AES	TKIP , AES	TKIP, AES
Port Mapping (Forwarding)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Firmware Interface Features:										
Basic Setup Wizard	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Firmware Upgrade	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Settings Backup To HDD	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Load settings From HDD	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Ease of Installation/Use										
Installation ease (So10)	6.5	5.5	7.5	8	7	7.5	7.5	7.5	8	7
Bundle (So10)	7	6.5	7	7	7	7	7	7	7	7
Software Interface (So10)	7	7	8	8.5	7	8	8	8	8.5	7
Device Settings (So10)	8	8.5	9	9	8	9	9	9	9.5	8
PERFORMANCE										
Max Strength (%)	92	90	93	93	92	95	95	98	95	95
Zone 1 (400 MB File)										
Signal Strength (%)	65	64	65	65	60	56	71	72	65	61
Single File (sec)	165	185	170	170	174	73	86	74	86	89
Multiple Files (Sec)	162	181	168	167	173	69	78	75	72	70
Zone 2 (400 MB File)										
Signal Strength (%)	40	40	30	36	39	35	55	60	40	46
Single File (sec)	170	190	175	173	173	83	75	73	77	79
Multiple Files (Sec)	165	195	176	170	174	87	78	76	80	81
Video Streaming HD 720p WMV (Out of 10)	7.5	5	6.5	7	7	7	7	7.5	7.5	7

Primer on 802.11n

802.11n, an amendment of the 802.11 standard, promises significantly improved throughput and range as compared to the existing 802.11 standards. Most devices tested in this comparison are based on a stable draft version called as the 802.11n draft 2.0. Earlier versions are called 'Pre-n' and they were plagued with interoperability issues.

	802.11a	802.11b	802.11g	802.11n (Draft 2.0)
Maximum throughput	54 Mbps	11 Mbps	54 Mbps	300 Mbps
Operating frequency	5 GHz	2.4 GHz	2.4 GHz	2.4 and 5 GHz
Non-overlapping channels	23	3	3	3 at 2.4 GHz, 23 at 5 GHz
Standard Approved	Yes	Yes	Yes	Expected by 2009
WiFi certified	Yes	Yes	Yes	Yes (Draft 2.0 devices)
Interference Sources	Cordless phones using 5 GHz channels	Bluetooth, microwave ovens etc	Bluetooth, microwave ovens etc	Same as 802.11a at 5 GHz and same as 802.11 bg at 2.4 GHz

802.11n includes many new features that improve the throughput, range and reliability of wireless networks. The adjoining table gives an overview of the core technical difference between the various 802.11 standards.

From the above table, as is clearly evident, 802.11n devices can work on both 2.4- as well as 5-GHz frequency bands, and hence, anyone using them has an option of using it on either frequency range. When used at 5 GHz, the network is less susceptible to interference because very few electronic devices transmit in that frequency range. Also, the 5-GHz band offers 23 channels as compared to 3 channels offered by the 2.4-GHz band. Hence, it is easy to find an interference-free channel. Moreover, the 5-GHz band can support eleven 40-MHz channels, thus boosting the aggregate bandwidth available to the device. The same device, when used in the 2.4-GHz band, can only support one 40-MHz channel. A point worth noting is that the WiFi alliance doesn't certify the use of 40 MHz in the 2.4-GHz band.

Other important features that 802.11n offers is Frame aggregation, MIMO and channel bonding.

Frame Aggregation: 802.11n improves MAC layer performance by allowing devices to aggregate several packets into one single packet using two different techniques. The wasted overhead between frames is thus avoided due to this aggregation. Hence, 802.11n devices require less air time as compared to devices based on 802.11 a / b / g standards.

MIMO: Stands for Multiple Input, Multiple output, and is a technology where multiple antennas are used at both the transmitter as well as the receiving end. It has the advantage of radio frequency signal property called 'Multipath', that is, RF signals often reflects off objects in their path, thus creating multiple streams of the same signal, but separated by time in the spatial domain. MIMO uses a technique called Spatial multiplexing, where the signal is transmitted in separate data streams at the same frequency, but over different spatial channels. Hence, 802.11n devices perform excellently in an environment that causes lot of multipath reflection.

Channel Bonding: Existing standards such as 802.11a and 802.11g use a single 20 MHz channel, whereas 802.11n can bond two such 20 MHz channels to form a single, wide band 40 MHz channel, thus improving effective bandwidth and boosting the maximum throughput.

Operational Modes

Since 802.11n is backward compatible with the existing standards, supporting devices can be made to run in three different modes,

Mixed Mode: This mode enables 802.11n devices to co-exist and interoperate with legacy 802.11 a / b / g devices on the same wireless network. This may not be important to a home user, but in a small office, which already has legacy WiFi hardware (802.11 a / b / g) devices this mode ensures interoperability.

Legacy Mode: Here the 802.11n-based router / access point will operate in 802.11 a / g mode, but with some improved performance due to the enhancement done at the physical layer as defined in the 802.11n Draft 2.0. This mode is important if you buy a new 802.11n router, but have laptops with legacy 802.11 a / b / g wireless cards and don't want to enable 802.11n in your router.

802.11n Mode: Here, the 802.11n router will work as a pure 802.11n device and won't accept connections from 802.11 a / g devices. This kind of operation can be used for best throughput for laptops based on 802.11n wireless cards.

Agent001's tips for 802.11n WiFi network:

1. Before buying any router / Access point, ensure it has minimum two radios—dual radio or 2x2 matrix, 3x3 matrix is still better.
2. To ensure good flexibility, buy dual-band devices, that is, devices which support for both, the 2.4- as well as 5-GHz frequency band.
3. Whenever possible, configure the 802.11n device to use the 5-GHz band. This will improve the maximum throughput, albeit with decreased signal coverage as compared to 802.11n at 2.4 GHz. Channel bonding will help and hence select the 40 MHz settings when configuring the device.
4. Avoid keeping the router near known interference devices (Cordless phones, microwave ovens, etc) working at same frequency band.
5. If you already have too many laptops with 802.11 a / g hardware, configure your new 802.11n router to run in mixed mode for better compatibility.

tings can be saved as profiles and can be loaded from the hard drives—a feature now available with all routers.

Performance

Zone 1

In zone one, a wooden partition was the only barrier between the laptop and WiFi router. As shown by PassMark WirelessMon, the signal strength on all routers hovered in the range of 65-70 per cent, with only the D-link DIR-615 falling slightly below 60 per cent.

In the 'g' group, almost all routers took nearly 3 minutes to transfer a single 400 MB file, and that's barely acceptable performance. On the brighter side, streaming a single movie posed no problems. However, multiple streams led to framing. In the multiple file copy tests too, the time taken for copy didn't deviate too much. Again, most routers completed it in 3 minutes. The Compex NP25G lagged behind other 802.11g routers by nearly 20 seconds.

In the 'n' group, the routers were able to complete the file transfer in almost a minute. In both, the single file and multiple file transfer, the time hovered around 70 seconds, which is certainly not bad. Linksys' WRT310N was behind other routers, but not by large margins. We had absolutely no problems streaming a high definition 720p movie over n routers.

Zone 2

Zone two performances are more critical than zone one, because it truly reflects the real world scenario. Between the router and the client, we had two concrete walls and wooden cabinets. Also, they were in two different rooms, but on the same floor.

In the 'g' group, the signal reception immediately fell below 40 per cent and kept varying between 35-40 per cent. Despite the signal attenuation, there wasn't a significant difference in the performance during file transfers. In fact, most routers took just 5-7 seconds more to complete the test. However, the same can't be said about movie streaming. Almost all routers played the movie, but we could notice frames dropping. Compex's NP54G was the only router where the viewing experience was hampered.

In the 'n' group, the signal reception dropped too. However, the likes of D-link DIR-655 managed to stay at around 60 per cent—good. In the file transfer test, the 802.11n-based routers were able to deliver the throughput despite lower signal strength. Movie streaming was smooth, and all of them coped well with multiple streams as well.

From the results, it is quite clear that the n-based routers do have an edge. However, there are some compatibility issues to consider. When we used a laptop with an 802.11g wireless card, the performance wasn't quite up to the mark, and the figures were too low.

The Winners

D-link's DIR-655 returned the best performance figures. Although based on 802.11n, it performed well with both 802.11n as well as 802.11g-based wireless cards. Also, it was the only router to have all the connectivity options that one can ask for. For its excellent performance, D-link's DIR-655 bags our best performance award.

If you are looking out for an 802.11n-based router that has a good combination of looks, features and performance, then the Linksys WRT310N is the one to choose. This router has all the traditional features offered by Linksys and is one of the routers with an easy-to-use interface. As a package, it offers a lot. A few might miss the USB option though. The Linksys WRT310N bags our *Best Buy* award.

Both Netgear products are attractively priced and hence make good buy if you are looking out for an easy to use WiFi router.

During the test we did encounter some compatibility issues, especially, when using the laptops legacy hardware with 802.11n-based devices. However, by setting the configuration correctly, we were able to derive better performance and range. The 802.11n standard definitely has a lot of potential and the current crop of draft 2.0 devices does offer some performance increment over the older standards. 802.11n should definitely be considered if you are planning a home WiFi network, especially with multimedia applications in mind. ■

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Jargon Buster

SSID—SSID or Service Set Identifier (Network Name) is the name (alphanumeric) given to a Wireless Local Area network (WLAN). To communicate with any device on a wireless network, all wireless devices must use the same SSID. The SSID can be kept private, in which case, a user who doesn't know the SSID cannot gain access to that network.

WEP—Wired Equivalent Privacy. As the name suggests, this was the earliest 802.11 standard, providing 64- and 128-bit keys (hexadecimal coded), to protect wireless devices from unwanted intrusion.

WPA/WPA2—WPA is an acronym for Wireless Protected Access, which is a slightly more secure method of protecting data transmission than WEP. WPA 2 is a newer protocol. It's also known as 802.11i.

DHCP—Acronym for Dynamic Host Configuration Protocol. It's a communications protocol that automatically assigns IP addresses to clients logging on to a TCP/IP network.

Deep Packet Inspection—Deep Packet Inspection (DPI) is a form of packet filtering that inspects the actual data contained in data packets as opposed to just checking the header information. DPI is basically an evolved form of SPI (Stateful Packet Inspection).

Computing On The Go

The notebook is no longer a rare commodity, and buying one has never been easier. To simplify your choice, we looked at some of the best solutions out there...

Michael Browne

For many, a laptop is something to show off—flash an expensive one at an airport or at the odd boardroom discussion and you're bound to get attention.

Such people belong to a soon-to-be extinct species. Most people who own a laptop today will be the first to tell you that it was functionality, utility and convenience that made them go for a notebook, rather than style, panache or even sex appeal.

The most obvious class of people to benefit from notebooks are, of course, the business class. As an owner of a company, you *have* to be constantly informed of changes both within and outside your organisation.

What about the average BE or MBA student, who attends lectures during the day, studies during the night, and works on projects in between? You'll need something to take down quick notes, quick access to the Internet to verify facts and do some research. You'll also probably want to unwind to a movie, or listen to some music while you work on your project. Then you may need to work on a report, during lunch hour.

For all of the above, a notebook would be a necessity. Like caffeine, something that is needed to jump start one's day, or at the least see them through it. So a luxury no more, a notebook has even gone so far as replacing a desktop in some homes, simply because, the family would rather be more flexible, and nobody has accused desktops of being that...

Traditionally, notebooks have lacked just two things—usability, which is important to everyone—and performance, which is important to most people. These comparisons are made with respect to a desktop PC, which in general, is more powerful, more general purpose, more comfortable and ergonomic to use, and can perform a few tasks beyond most laptops. While this chasm of shortcomings between notebooks and desktops still exists, (and may always exist), laptops today are more powerful processing machines than their predecessors that are just a year old.

We've tested 36 notebooks across all spheres of usage, and from all possible manufacturers. No matter what your need, if you're shopping for a laptop solution you are going to find one in the following pages.

DESKTOP REPLACEMENTS
Stable Beings

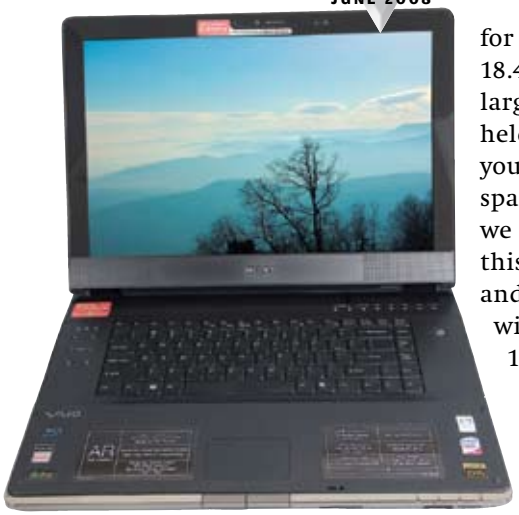
Sony Vaio VGN-AR69GU

This 17-inch behemoth is definitely not meant to keep on your lap, unless you have a very large lap indeed, or need to keep it warm! What this is, however, is a desktop replacement and a powerful and good looking one at that. While the build, fit and finish are excellent, the AR-69GU feels solid to hold, you get the feeling that a device so large defeats the purpose of being a notebook. The screen is gorgeous and crisp, and the keypad wonderfully spaced out—a pity though, that the multimedia buttons are very clicky and tacky. The touchpad is also sensitive and imparts just the right amount of feedback. With 3 GB of system memory and a 256 MB GeForce 8600GT under the hood, you can expect this giant to be no slouch.

There's a fully functional Windows MCE remote bundled with this thing, and Sony also provides S-Video and TV antenna jacks, in addition to an HDMI port. Incidentally, the 17-inch screen does 1920x1200 pixels, so native 1080p should be a wonderful experience. This notebook's entertainment genes are wonderfully evident even before switching it on. You'll find the shortcut keys very utilitarian—our only gripe being the typically soft Vaio keypads, which lack key feedback—they're too soft. With two 250 GB hard drives on board and a DVD Writer-cum-Blu-ray drive, this notebook has a configuration that should stand the test of time...at least for another couple of years.

We really enjoyed this notebook as far as home entertainment is concerned. It's not for the discerning gamer, but it does most tasks with ease, while retaining functionality as a fully remote-controllable desktop replacement. At Rs 1,69,900, the largest Vaio in this test is very expensive. But that's in keeping

Jiten Gandhi, Ashwini Bavliskar



Sony Vaio VGN-AR69GU

with its premium specifications, premium performance, premium features, and its premium heritage. It's for those looking for an HTPC-cum-PC-cum-powerful notebook that is connectable to a large screen TV as well, but crave the mobile flexibility of a notebook and do not want to waste space on a desktop.

Acer Aspire 8920G

If you thought 17-inch notebooks were nicknamed "lap busters", we wonder what name would be apt for this humongous freak. At 18.4 inches, the 8920G is the largest notebook we've seen, or held. If you're looking to lug your notebook in anything less spacious than a limousine, then we suggest you forget owning this. With a piano black finish, and a rounded, curvy posterior with a bright screen that does 1920 x 1080 pixels, this laptop isn't unattractive at all.

With 3 GB of RAM, a snappy 2.2-GHz dual-core processor and a spanking new GeForce 9500GS graphics solution, the 8920G seems to be a strong contender to replace your ageing desktop (actually, it would give any desktop a good run for its buck). For those looking for something to use as a home entertainment system, or a laptop for the entire family, you get 320 GB of HDD space, and an HDMI port to connect to your large screen TV. We'd have liked a Blu-ray optical drive, but all we got was a 20x DVD burner.

With a quirky keypad, and touch buttons that look better than they work, the 8920G is still a formidable desktop replacement solution, and it'll offer some portability to those who are muscular enough to heft its bulk around. If it loses out to the Vaio AR69GU in terms of features like a built in TV Tuner, S-Video connect and Blu-ray drive, it also wins big time in terms of price. At Rs 79,999, it's half the price of the less bulky Sony VGN-AR69GU. Although it's not as well built, and doesn't sport the same designer tag, we reckon it's a saner choice, unless you really want your notebook to grab all the attention.

Acer Aspire 8920G

How We Tested

We divided our notebooks into the following categories:

1. Notebooks up to Rs 40,000
2. Notebooks above Rs 40,000
3. Business Notebooks
4. Ultra Compact Notebooks
5. Lifestyle / Home Entertainment Notebooks

While categories 1 and 2 are crystal clear, in category 3, we included all notebooks that have a strong business orientation. Notebooks have extremely compact dimensions, up to a screen size of 13.3 inches included in the Ultra-compact category. Lifestyle notebooks are those that are powerful, with many features, but don't really cater to a particular audience.

For features, we looked at the bundle and the specifications of each laptop. We also looked at the connectivity options like the number of USB ports, FireWire, memory card readers and HDMI. We also looked for LAN, Bluetooth and WLAN connectivity.

We gave scores ranging on a scale of 10 for usability, intuitiveness, convenience as well as ergonomics. Such non-tangible factors are often what make the difference to most users, like build quality, or the feel of a keypad, or even the placement and use of shortcut keys.

We used a clean install of Windows Vista Home Premium 32-bit, and only the drivers and necessary benchmark software were installed. For those notebooks that did not come with Windows Vista or any other Microsoft OS we used Windows XP Professional SP 2. Our tests consisted of a gamut of benchmark suites and real world tests.

To check the performance of key components like CPU, RAM, storage and video subsystems, we used two general benchmarks: PC Mark 05, and SiSoft Sandra 2007 Professional. For specifically stressing the graphics subsystem, we used 3D Mark 05. For testing the quality of the display provided, we used Display Mate's colour suite. Finally, we used WirelessMon 2.0 to check the strength of the WLAN solution embedded on each notebook.

For real world tests, we checked the overall effectiveness of each of the test subjects at viewing HD content and gaming, music, video encoding, and file transfers. The former tests stress out the video solution, CPU and memory while the file transfer test specifically targets the storage subsystem.

Acer Aspire 6920

The smaller brother to the Aspire 8920G (by 2.4 screen inches, to be exact) looks identical to its larger, faster and costlier sibling. The quirky touch-type multimedia keys remain unchanged from its older brother. However, it's a lot more portable, although these aren't the type of notebooks anyone would want to cart around. It's as well built as its sibling but makes do without any without any discrete graphics powering its video subsystem. Once again 3 GB of system memory makes the 6920 snappy. Both Acers have a CPU in common.

Acer Aspire 6920

In our collective opinion such a large, powerful notebook simply requires a graphics card and an X3100 video solution just doesn't cut it for viewing HD content, or any kind of serious multimedia usage. And that's the kind of user who will buy such a laptop—a person who wants a powerful notebook to replace his main desktop solution.

At Rs 49,999, the 6920 is a sturdy, large notebook meant to be plonked on to a desk and for the most part, kept there. We really wish for a discrete graphics solution on this one but if wishes were Acers, this one would be an unavoidable recommendation. As it stands, if you're looking for a powerful desktop replacement notebook and you're on a budget, it doesn't get stingier than this.

WORKHORSES UP TO RS 40,000
Plough Nags

HCL G28 CP

At Rs 22,490, the G28 CP is positioned as an entry level solution, and for this price we wouldn't expect much. However, it's got a solid, robust, (if bulky), feel. Thanks to a total lack of design attention, it also feels very clunky. The good thing about it is that if you're ever going to get caught in an alley by a mugger, then this is the notebook you would probably wish you had.

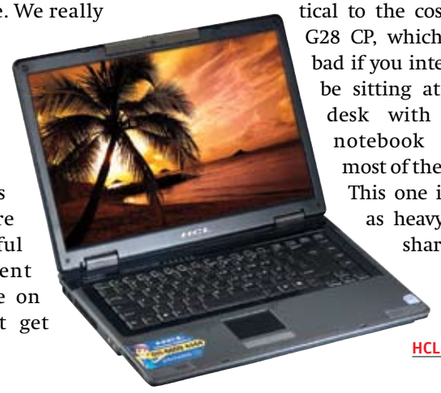
The keypad isn't too bad, and the keys, although lacking any kind of comfort contouring, are rather well laid out, with acceptable levels of feedback.

An entry-level Core 2 Duo does duty here (T2310). In fact, these processors are little more than dual core Celerons, so don't expect much performance from this notebook. The 1 GB of RAM is decent enough for the target audience who will mostly be using this at office or home for very basic tasks.

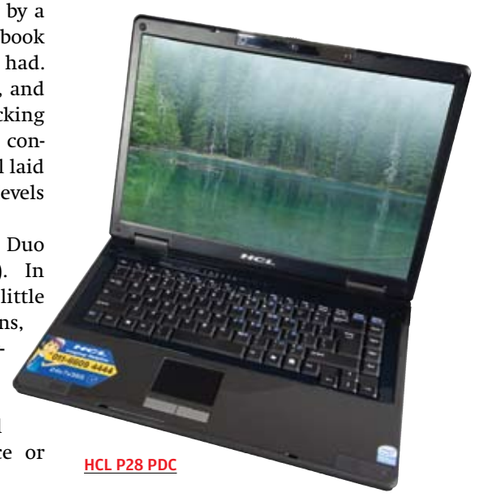
If you're even remotely interested in multimedia or a fancy notebook, or even a powerful desktop replacement, then you'd do well to steer clear of this. For someone looking for an entry level notebook, however, this one may be worth considering.

HCL P28 PDC

HCL next offering and basically identical to the cosh-like G28 CP, which isn't bad if you intend to be sitting at your desk with your notebook for most of the time. This one is just as heavy, and shares the same keys and feedback. We didn't like the very hard-to-press shortcut buttons on the front bezel. Other convenience issues were the lack of any type of buttons for activating and deactivating WLAN connectivity. Incidentally, Bluetooth is lacking (also on the G28 CP).


HCL G28 CP

Powered by a Core 2 Duo T2330, and 2 GB of RAM, along with a 160 GB hard drive, this has a marginally better configuration, though battery life is down at an abysmal 81


HCL P28 PDC

minutes. For Rs 28,990, this notebook will have takers only from the lot who want a notebook and are graduating there from a desktop. Portability freaks, performance users and aficionados will give this a miss.

HCL B30 C2D

Sporting an identical look to both the earlier HCLs in this category, the B30 C2D offers nothing different to the earlier two expect in terms of configuration. This notebook comes with FreeDOS, so do remember that genuine copies of Windows will add to your purchase price. Also no software is bundled, except for an HCL backup-restore suite.

The 2 GB of RAM and Core 2 Duo T5550 do make the B30 C2D a little faster, and this notebook will handle some multimedia content, (remember we said *some*). The 80 GB HDD is a backward step and considering the


HCL B30 C2D

minimal difference in price of 80 and 160 GB notebook HDDs this is a travesty. For Rs 32,990, the B30 C2D is a decent solution for price conscious buyers, though to be honest, if all you need is access to the Internet and basic office use, both the G28 and the P28 from HCL's own stables would do the trick. You save pretty penny too!

HCL Z24 C2D

This is HCL's first good notebook solution that we reviewed. A 14.1-inch laptop is so much better than a 15.4 inch, especially, when you need to heft it around, and when HCL designs their notebooks to be heavy duty.

At Rs 38,490, the Z24 C2D is good value for money. It's reasonably powerful, reasonably compact,

HCL Z24 C2D

and reasonably functional. For the value conscious home user who wants some mobility, this is a good option.

Intex M722S

A 12.1-inch notebook that wasn't as compact as we'd like and therefore finds itself in this category. It's a little thick, and rather heavy for a 12.1 inch notebook, and aimed squarely at value buyers, which is no excuse for such a mediocre build. Also, one needs to take care when opening the notebook and extending the lid too far back, as the hinge is rather flimsy.

It's got a very basic configuration, but if you are looking for something extremely portable for office use and something that can be lugged home


Intex M722S

with minimal fuss or energy consumption, then the Core 2 Duo T2450 (2.0 GHz), with 1 GB of RAM will suffice.

The clincher for Intex is the price—at Rs 30,900, the M722S is one of the cheapest compacts that money can buy, and makes sense for someone looking for frugal mobility.

Acer Aspire 5290

Acer reminisces with the Lego toys of yesteryear with a return to plastic with their Aspire 5290. The finish although cheap looking, and off white in colour, (the worst colour for dirt prone touch pads), does seem to


Acer Aspire 5290

be of good quality, especially, after a week of regular use.

It's the larger twin of the Aspire 2920, and for a 15.4-inch notebook, its heavy too (3 kg). The configuration is a Core 2 Duo T5550 (1.83 GHz) coupled with 2 GB of RAM is good enough for office work and the Internet on Windows Vista. A shame then, that Acer chose to bundle Linux with this notebook, although frankly we were interested to see the difference this made in the pricing. At Rs 39,139 the Aspire 5290 aspires to be something it is not. Do not aspire to own this, you will find better options among the other contenders.

LG XNote R405

LG's value offering, something for the person who wants quality and a good price sans hassles. All XNote's are very well built, and the R405 looks like one of those notebooks that will outlast your desire to hold on to it. The colour combination on the lid is attractive, white flecks on a smooth black background. The inside is finished in matte antiseptic white that looks well...a little too clean. It's a rather thick notebook however, and not at all compact as you'd expect a 14.1-inch notebook to be. The keypad is well laid out with good spacing between keys, and although not bevelled in any way, it has a very responsive feedback. LG has done a decent job of shortcut keys, no complaints with either the WLAN switch or any of the multimedia keys.

LG XNote R405

The configuration is a (common) Core 2 Duo T5550 (1.83 GHz), which is coupled with 1 GB of RAM, and a Radeon Xpress 1250 solution. For Rs 40,000, the R405 is well built, and rugged, and offers a solid portable computing experience sans some of the performance. It's not a high-end configuration or even a fast configuration so demanding mobile warriors will give this a miss.

WORKHORSES ABOVE RS 40,000: Thoroughbreds

HP DV2701TX

Touted as a "special edition", one look at the beautiful design in subtle gold, silver and brown on the cover and inner body will tell you why. With a smooth finish that weathers beautifully, HP's DV2701TX is a very attractive notebook, with a profile which when viewed from the side tapers from slim to slimmer as one's vision moves from the top of the keyboard towards the palm rest. The silk-like finish exudes quality and so does the soft touch, bevelled keypad. The soft-blue backlit multimedia controls are touch activated and both look and work beautifully.

14.1 inches and a superb form factor, gives you the best of both worlds—functionality and flexibility on one hand, and portability on the other. It's not bulky to cart around as a 15.4-inch notebook, and not as diminutive as a 12.1-inch screen. Incidentally, the screen is beautiful and crisp. As far as a multimedia notebook goes this one has a good graphics solution, a GeForce 8400GS and features an HDMI connect. While HP, could have used a faster processor, we'd really like to see more memory, 1 GB is a little skimpy.

With an excellent screen, good graphics, a great keypad, and some mighty funky (yet functional) touch controls the HP DV2701TX is a winner in many ways, including price. At Rs 46,990, it's a must buy.

HP DV2701TX

Lenovo Y510

The 'Y' series introduces Lenovo to the entertainment hemisphere, a realm where looks, performance, and functionality are of utmost importance, although—not in that order. The Y510 is a well-built notebook. The hinge system looks neat and when open reveals five LEDs, which are battery indicators. The piano black finish is well done, but at no point comes across as loud. If anything we'd complain about, would be an entertainment / multimedia geared notebook being so boxy. The backlit, touch multimedia controls work well, and we like the tasteful orange lighting, which goes well with the black and grey body colour scheme. The screen, while crisp and bright, is a glossy panel, and reflections will cause havoc with multimedia content in particular.

What we would like to see, is more memory for one thing (1 GB is so slow with Windows Vista), and a decent graphics solution (X3100 is strictly for non-multimedia work). Lenovo provides heaps of software on their notebooks and the Y510 was no exception. With MS Office 2007, Adobe Elements, Norton Antivirus, and a host of other multimedia and utilitarian software, the Y510 is a fully loaded solution (if only on the software side). Another nifty utility is the face recognition software that allows you to login on the basis of your face. While not as fast as a fingerprint reader, any kind of biometrics device on a notebook is just cool.

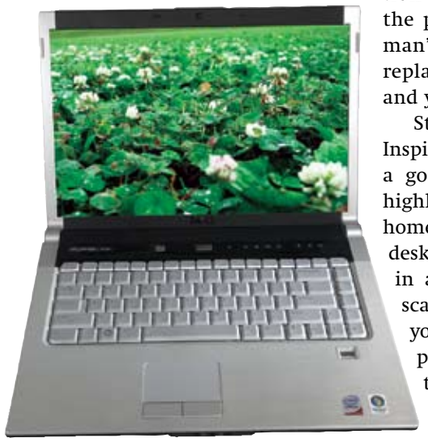
In terms of performance, the T5450 on the Y510 is no slouch, but gets left behind by the T7xxx series and latest T8xxx series. In multimedia tests, the lack of dedicated graphics also pinches, and you will face problems viewing HD content on this one, and don't even dream about the odd game. At Rs 48,490, the Y510 is reasonably priced for a notebook and is a solid solution for office users, but we'd like to see better hardware under the hood next time.

Lenovo Y510

Dell XPS 1530

The newer XPS 1530 is Dell's answer to the high-end desktop replacement notebooks in the 14 to 15.4-inch size category. With the same tapered body as the M1330 (although it's not as slim), the M1530 packs even more horsepower under its larger hood. Like up to a T9500 (2.6 GHz) processor, 4 GB of RAM, and an option of a GeForce 8600GT. The same ergonomic keypad makes its way into this one. The wide palm rest (slightly bigger than the already generous M1330) will really (ahem) rest your palms. With features like HDMI, this could also be a substitute for an HTPC.

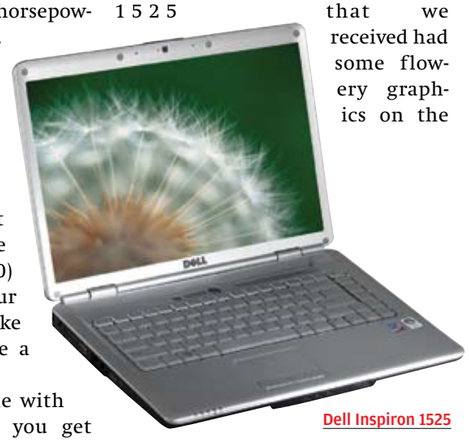
The M1530 is available with a 15.4-inch screen, but you get to choose the resolution. Choose from 1280x800 pixels, 1440x900 pixels, or a whopping 1680x1050 pixels. If you want something a little more powerful than the XPS M1330, then the 1530 will do the trick. It'll also give you more real estate on-screen. If you crave mobility, go with the smaller sibling. Prices start at Rs 49,900, and it's a superb deal overall. The stuck-on panels are a pain, though.



Dell XPS 1530

Dell Inspiron 1525

Dell's notebook for the masses, the Inspiron series are their mainstream offerings, a cut below the fancy looking, higher configuration bearing XPS notebooks. With a regular 15.4-inch screen, the Inspiron 1525 that we received had some flowery graphics on the lid—one of many designs available when you configure it online. But it's got a capable configuration that can bare its teeth when required. It's also not as compact as the same screen size bearing XPS 1530, which users who want a higher configuration would prefer. The Inspiron is the proverbial 'rock'. The working man's solution, the home desktop replacement, the jack of all trades and yet master of none stereotype.



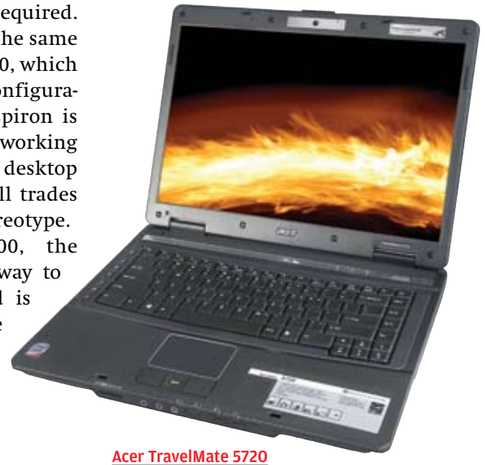
Dell Inspiron 1525

Starting at Rs 42,900, the Inspiron 1525 is a cheap way to a good configuration, and is highly recommended to the home user, who wants a desktop replacement. Add in a graphics card for a scant Rs 3,000 more, and you've got yourself a plain-looking but effective powerhouse.

Acer TravelMate 5720

The TravelMate 5720 looks like a business companion at first, with its charcoal grey metal lid, and black body. Bundled with Linux, this is not the typical business laptop, and so it finds itself in this category—not exactly a bad place to be. One grouse is the size, it's not very wide or long for a 15.4-inch notebook, but it is thick. Thanks to the bullet proofing on the cover, it's also heavy, and feels bulky to lug around.

The innards consist of a fast T7500 (2.2 GHz) and 1 GB of RAM. Needless to say, it's no slouch, but we weren't really impressed. The 120 GB HDD was also a little on the smaller side. What we did like, was the number of USB ports—four of them, and Acer even managed to sneak in a mini FireWire port! In terms of connectivity options, everything possible has been included. So there you go...a complete solution that's not a standout in any way, but neither does it have any serious flaws. For Rs 44,999, the TravelMate 5720 is a little expensive for the configuration. Actually, all they need to do is to make the body slightly slimmer. And add another gigabyte of RAM. Then we'd swallow the deal.



Acer TravelMate 5720

ASUS F5SL

The first thing that struck us when we looked at the laptop while it was closed was "compact 17-inch". Then, we opened her up and saw the bulky bezel and a 15.4-inch screen (sheep in wolf's clothing?). It's built well, and the F5SL is a good looking laptop that has a beautiful charcoal grey colour. The nicely bevelled keys are well spaced-out, great for typing and feedback is pretty decent. We also loved the touchpad's responsiveness.

ASUS F5SL

ASUS does cheat a bit on the configuration though. A fast, shiny new GPU, paired with an older, slower processor. Although this keeps the price down, it also keeps the F5SL from becoming a serious multimedia enthusiast's solution. Its slightly bulky form means that it's larger than your average 15.4-inch notebook, and will easily replace most desktop PCs. The fact that ASUS supplies a USB mouse with a tilt wheel, just goes to show their level of commitment to try and replace your desktop.

At Rs 44,990, and with good hardware, the F5SL is a solution that's well worth the price. The amount of software bundled, the build quality and the usability of this notebook will be the answer to nearly all home user's prayers.

Sony Vaio VGN-FZ35GN

This 15.4 inch laptop is a beauty to behold, with a slim design well complemented by quality materials and a silver base colour with the palm rest trimmed in dark grey. Although it feels a little heavy, this notebook is built like a tank, and sculpted like a sports car. The keypad is well laid out, although (strangely) not as well laid out as its tiny 11.1-inch sibling. Sony has dropped in an amazing screen, its bright, brilliant colours, and text is very, very easy to read. After working with mediocre displays, this is a much needed respite.

A killer configuration—Core 2 Duo T8100 (2.1 GHz), 2 GB of RAM, 200 GB 7200 rpm HDD, and a GeForce 8400GT mean that this Vaio is ready to tackle nearly any obstacle thrown in its path. It's the epitome of what 15.4 inch notebooks are all about—power, performance, looks, build quality, with just a tantalising hint of portability.

The only place Sony slipped up in our opinion, was with the rather lifeless and clicky multimedia keys.

Sony Vaio VGN-FZ35GN

These exude no feedback whatsoever, and they feel tacky as well (although we're sure they aren't). With HDMI and S-Video connectivity the VGN-FZ35GN can substitute as a decent HTPC solution for those who have large screen TVs and wish to hook them up to a computer.

At Rs 59,900, the Vaio VGN-FZ35GN offers a superb configuration and a colossal software bundle as well, making this Vaio really worth its price for those looking for a superbly refined 15.4-inch notebook that can double as a desktop for most tasks.

Fujitsu S7211

Fujitsu's S7211 is a spin-off from their business series. It's ruggedly built, but doesn't share the same class leading weight reduction tactics that Fujitsu employs in their higher "P" series. It's also not as compact as the other Fujitsu 14.1-inch offerings. There's a nifty little LCD display on the top of the notebook, and to the left of the keyboard displays essential parameters like the battery life and status, power saving mode selected and WiFi status. Then there's the keypad, which doesn't feel as ruggedly built or impart the same sort of feedback, though to be perfectly honest feedback wasn't as bad as some of the other notebooks in this category. Only the display is as crisp as the costlier siblings. There are four large configurable shortcut keys atop the front facia, above the keypad, and to the right, which are useful and easily accessible.

A powerful CPU (T7500, 2.2 GHz) is let down by a 'mere' 1 GB of RAM. Windows Vista Basic is the OS included, as is a full set of software to get you started. Fujitsu scores in the pricing department—at Rs 41,000 the S7211 is very well priced for such a well built, and feature rich notebook. Although some will lament the lack of more memory, we feel the overall package and the notebook itself is worth the premium you pay.

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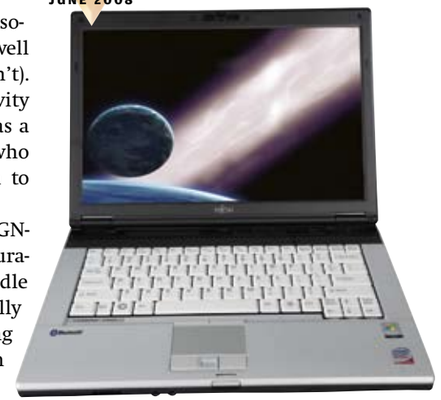


Fujitsu S7211

Acer Aspire 2920

One look at the Aspire 2920 had us thinking cheap, tacky and plasticy. However, once you use the notebook, you realise the simple plastic beige bezel is misleading—it's clearly a cost cutting move rather than a cheap tactic to rake in bigger profit percentages on sales. The notebook has this tacky looking cover, and a cheap looking (but not so) inner bezel. What annoyed us is the large footprint (for a 12.1-inch notebook) courtesy a larger, rounded body. It's heavier than your average 12.1-inch too, at 2.04 kg. It's for this reason that the Aspire 2920 finds itself in this category rather than the 'ultra compact' category, which is more suited to notebooks bearing similar screen sizes. The keypad is surprisingly good, and very usable.


Acer Aspire 2920

The configuration is fine for a regular notebook for the home or office—a 1.83 GHz Core 2 Duo, 2 GB of RAM, and a 160 GB HDD. Linux is the OS of choice, another cost cutting move. With such capers being cut, we expected the price to be really superb. At Rs 41,199, the Aspire 2920 isn't exorbitant, but it's much costlier than the Fujitsu S7211, which is a better notebook (albeit with 1 GB less memory). For this reason, as well as the quality of materials and finish on this product, we suggest you stay away from this.

Notebooks? Pocket Books? Whatever...

Fujitsu U1010

Born out of a desire to be petite, the U1010 is a tiny-but-not-pocket-compatible notebook. A laptop this is not, especially, with a screen size of 5.6 inches. It's 3.5G ready and supports HSDPA1, (acronym for High Speed Downlink Packet Access 1, a fast 3G mobile communications protocol), ready. While this may sound good to most people, it's mostly useless in India, and is strictly advertising jargon as of now. Build quality is sadly mediocre, and the swivel has a lot of play, the keypad besides being (obviously) cramped, doesn't impart too intuitive a feel. The buttons and little interface objects (shortcut keys, biometric login, WiFi switch, etc) are also weirdly placed and it'll take time to get used to using this.

With Windows Vista Home Premium, a touch screen, and a fully functional (albeit horribly cramped keypad), this tiny notebook could be easily mistaken for a large PDA. With an Intel A110, (codenamed Stealey), 800 MHz CPU, and 1 GB of RAM, this little notebook is all set to ride in your cargo pockets.

And herein lies one of its biggest advantages and drawbacks. People craving performance with mobility will look for an 11.1-inch form factor, with a usable keyboard, or at the most a compact 12.1-inch solution. But the U1010 straddles a chasm best left unabridged for the route is rife with problems. If you want something nearly pocket-able, then this may be for you. If you want a 'portable' notebook, look somewhere else. At Rs 72,000, its very niche, and if you're looking for something like this, the price shouldn't deter you.

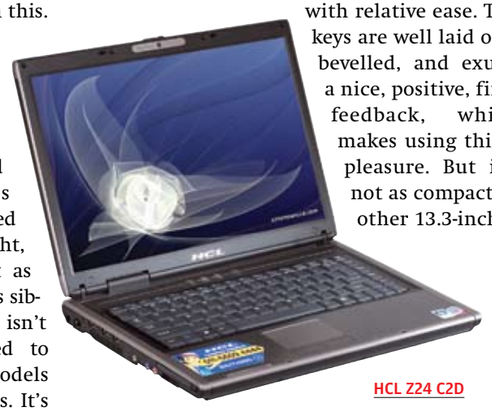
HCL MiLeap MV02

The name not withstanding, the MiLeap MV02 is a very large PDA or a compact notebook, depending solely on how you look at it. It's for those who want something small, with touch screen functionality, but cannot afford the price, size, or both, of a tablet PC. This is built sturdier than the Fujitsu U1010, but we wonder about the piano black finish, which imparts the look of a designer handbag, rather than a notebook / giant PDA. The chrome buttons add some much unwanted garishness to an already non-acoustically loud device.

It's got an Intel A110 CPU running at a nominal 800 MHz, and 1 GB of RAM, coupled with 80 GB of storage. The fact that it's significantly larger than the U1010 means that its keypad is more usable too. Keypad feedback is not good however, and for the most (unless typing out a letter or something similar) you'll pretty much want to stick to the touch screen / stylus duo. For someone who's really looking for the additional functionality of a touch screen and the portability of a tiny notebook the MiLeap MV02 is a decent solution, with a killer price tag—Rs 34,990.

HCL Z24 C2D

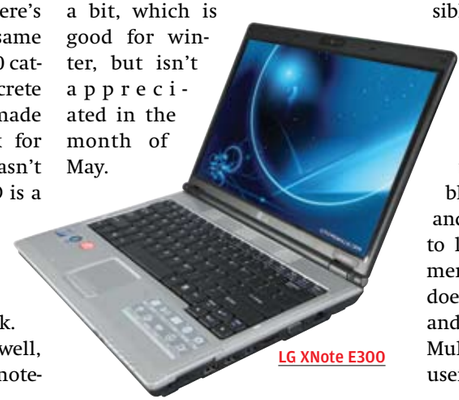
After the other boxy HCL notebooks we had our fingers crossed when this one's carton was popped open. To our delight, the Z24 C2D isn't as bulky as most of its siblings, although it isn't compact compared to the 14.1-inch models from other vendors. It's a 14.1-inch notebook, and the matte-finished metal lid exudes quality. At 2.31 kg, it's heavy for a 14.1-inch notebook, but the dimensions seem good. The key pad has been reworked from other HCL models, now imparting crisper feedback, and a nice springy feel from the keys. The screen is quite good. We weren't expecting such a sharp display from HCL.


HCL Z24 C2D

A good configuration under the hood (Core 2 Duo T7250, 2 GHz), a whopping 3 GB of RAM, and a colossal 320 GB HDD make the costlier avatar of the Z24 C2D (there's a cheaper version with the same model number in our sub-40,000 category) a killer. Although a discrete graphics solution would have made this an even better notebook for multimedia aficionados, this wasn't to be. At Rs 57,740, the Z24 C2D is a powerful solution. But if you compare specifications, the Dell XPS 1530 and the Sony Vaio VGN-FZ35GN knock it into orbit in nearly every benchmark. And they're priced very close as well, which makes the Z24 C2D, a notebook which due to no fault of its own, we cannot recommend.

LG XNote E300

LG's answer for the discerning masses, the E300 is a good looking notebook with a charcoal-grey finish. It's solidly built, and the body and finish feels durable enough to last through a couple of years of abuse with relative ease. The keys are well laid out, bevelled, and exude a nice, positive, firm feedback, which makes using this a pleasure. But it's not as compact as other 13.3-inches in the market, which is why it isn't doing a one-on-one with the XPS M1330 which features in our "ultra compact" category. At 2.04 kg, it's not the lightest of the 13.3-inch notebooks. On a different note, this notebook's left palm rest gets quite hot, presumably, because of the fact that LG uses the body of their notebooks as heatsinks. Still, the heat dissipation should be restricted to the undercarriage of the notebook, and working on this for around an hour warmed up our palms quite a bit, which is good for winter, but isn't appreciated in the month of May.


LG XNote E300

A decent configuration— T7300, 2.0 GHz, 2 GB of RAM, a Radeon Xpress 1250, and a screen size of 13.3 inches—mean the XNote is a good notebook for road warriors and desktop oriented users alike. Although the Radeon chipset won't do gaming or even serious HD playback (at least not without the inevitable skip), the E300 features an HDMI out.

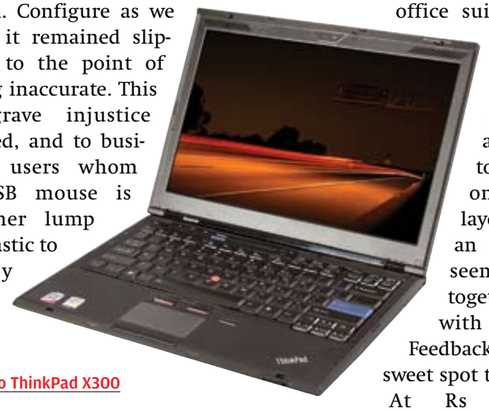
At Rs 52,000, the E300 is an attractive looking solution that finds itself in the wrong category and at the wrong end of a performance war. In this category, the cheaper Dell XPS 1530 easily wins all accolades over this, while in the compact category the Dell XPS M1330 easily won. So it's caught between a rock and a potentially hard place. Which is why we aren't recommending the E300 to anyone.

BUSINESS NOTEBOOKS: Corporate Champions

Lenovo ThinkPad X300

The new ThinkPad combines the flexibility of a 15.4 inch display in a slim and lightweight shell. The lid mounted keyboard light, superb functionality, button-type joy pad and industrial grade rugged design and finish will ensure nostalgia (read IBM). Under the hood, we were surprised to find a new super power saving U7100 Core 2 Duo processor. Remarkably, this CPU is thermally efficient, which is what makes the X300 so remarkably slim and possibly lightweight (read bulky heatsink-free). Then Lenovo has another trick—a 60 GB solid state hard drive. This feature is a standout and the titanium reinforced body in tow means that the X300 is remarkably durable too. Bonuses like power savings and performance are also goodies to look for. With the business segment as its target audience, the X300 doesn't need a graphics solution, and guess what—it doesn't have one. Multimedia aficionados and home users—don't even '*hink* ThinkPad.

While the feel of the keyboard is typical of the ThinkPad and gives good feedback, we found the trackpad to be a bit of a let-down. Configure as we may, it remained slippery to the point of being inaccurate. This is grave injustice indeed, and to business users whom a USB mouse is another lump of plastic to carry around, we figure Lenovo should take a look at this issue. Biometric logins are a pleasure, courtesy the easy-to-use fingerprint reader.

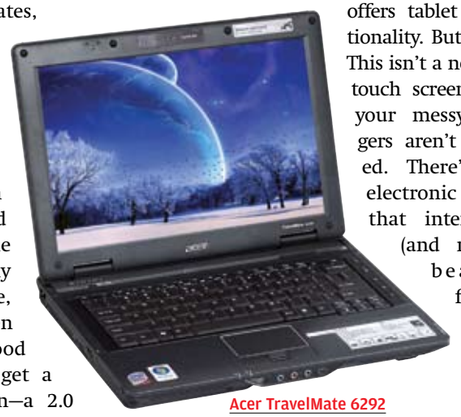


Lenovo ThinkPad X300

Such a well crafted, ruggedly built notebook was never expected to be cheap, and with solid state storage to boot, the price tag of Rs 1,45,000 is hardly budget-friendly, but it's still worth it. It's got one quirk, and that aside total peace of mind. We figure those who really understand what ThinkPads are all about will take the plunge and shell out.

Acer TravelMate 6292

Acer's answer to the corporate executive's prayers, the TravelMate series are typically business notebooks, and a single glance at them and their stable mates, the Aspire series, will tell you why. Industrial grade finishes, and a magnesium / aluminium alloy on the lid that is both lightweight and durable, makes the TravelMate worthy of its name. Inside, the 12.1-inch screen is crisp with good colours. You also get a good configuration—a 2.0 GHz Core 2 Duo T7300 processor and 2 GB of RAM. Acer is admittedly shy on the software bundle side of things, but all the essentials, like an office suite and firewall program have been provided. The keypad is nicely sculpted and feels good to use. However, once again the layout is a bit of an issue with keys seeming too close together for people with larger fingers. Feedback is right on the sweet spot though.



Acer TravelMate 6292

At Rs 52,999, the TravelMate 6292 is a good break from all the costlier Business class notebooks. It's small footprint (12.1 inches) is only let down by a slightly bulky body. Although it's built well, it lacks that attractive feel that makes people go "ooh" when they see one.

HP Compaq 2710P

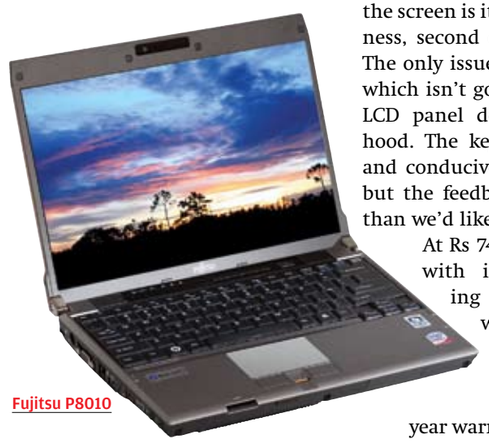
For those corporate users who want a little more than what the ThinkPad offers, the 2710P may be just up your alley. It's built mostly out of some kind of lightweight alloy and feels remarkably sturdy. It's got an even faster processor than the X300—the 2.0 GHz U7600, does its duty under the hood. A sleek laptop and one that offers tablet functionality. But wait! This isn't a normal touch screen and your messy fingers aren't invited. There's an electronic pen that interfaces (and rather beautifully) with the crisp, and bright screen. Handwriting recognition is a delight to use, and isn't just a gimmick—it's very functional as well. You'll find yourself scribbling notes, writing out e-mails and doing just about every task that requires typing with the pen instead. While still on the topic of ergonomics, brilliance comes at a severe price. There's no touchpad, just a ThinkPad-like mouse button that takes a lot of getting used to. There's an inbuilt WiFi antenna that can be extruded to increase signal strength and a biometrics fingerprint reader too.

HP Compaq 2710P

On the hardware front, we have no complaints aside from the measly 1 GB of RAM. The target audience is unlikely to need extra storage space or a video solution, so the 2710P passes scrutiny in this regard. At Rs 110,000, we figure that most business users who go for this, will either look to save Rs 35,000 (the difference between this and the Lenovo X300) or desire the show of a touch screen. Whatever the reason, at this price, this is a good—albeit slightly overpriced—solution for the target audience.

Fujitsu P8010

An attractive notebook with a glossy lid, that's strangely—and not unattractively—liveried in dull orange. It's extremely light, even for a compact 12.1-inch notebook. The screen is crisp. Fujitsu does have this tradition of soft keys, and frankly this is a trend we hope discontinues. Why? Not enough tactile feedback.



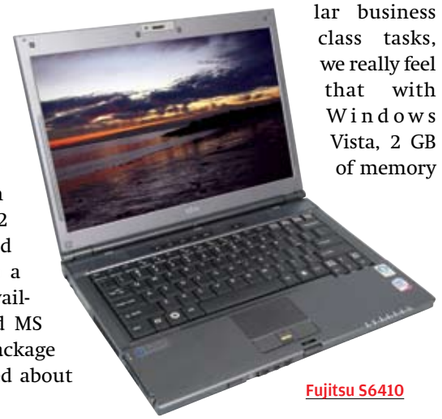
Fujitsu P8010

It's aimed at business users, and the P8010 is all business. With a battery backup time of more than two hours with video playback, the P8010 will satisfy the corporate exec on the go. 2 GB of RAM makes Vista snappy, if not blazingly fast, and this will be enough for most corporate users.

At Rs 1,05,100, however, the P8010 doesn't do anything radically different to justify such a price tag. We figure at this price you would be better served by the HP Compaq 2710P, which adds a utilitarian touchscreen to the package.

Fujitsu S6410

Built around slim lines, the S6410 is an ultra portable 13.3-inch laptop oriented towards the discerning businessman who travels a lot. It's very light at 1.7 kg, and built well enough to cart around. The industrial-grade charcoal grey finish is attractive, but in a suave, non-intrusive sort of way. It's got a strong configuration that will pull it through most situations—like a 2.2 GHz Core 2 Duo T7500 and 2 GB of RAM. There's also a host of software options available for business users and MS Office 2007 is part of the package as well. What we really liked about the screen is its crispness and brightness, second only to Sony displays. The only issue is the viewing angle, which isn't good. It seems like a TN LCD panel doing duty under the hood. The keypad is well laid out and conducive to some fast typing, but the feedback is a little soggier than we'd like.



Fujitsu S6410

At Rs 74,000, the S6410 brings with it a solid computing experience, and a well built, compact machine capable of most business oriented tasks. The three-year warranty that Fujitsu provides, makes this a very attractive laptop for those who don't want to splurge on the costlier P8010.

Fujitsu Esprimo U9200

Fujitsu's U series of notebooks are meant to denote 'ultra' portability and they're aimed squarely at the business class, which is why this notebook finds itself in this category and not in the ultra portable category. It's simpler than both its similar looking siblings—the S6510 and S6410. Unfortunately, for an ultra-portable, it's a little too thick. Compare it to Sony's ultra-sleek Vaio VGN-TZ37GN/R and you'll get the feeling of a water buffalo standing next to a panther.

The looks notwithstanding, the U9200 has a powerful processor (T7500, 2.2 GHz) but only 1 GB of RAM. Although it'll be snappy enough for most regular business class tasks, we really feel that with Windows Vista, 2 GB of memory should be made an industry standard for vendors.

The standout here is the superb price. At Rs 43,500, the U9200 slugs other business laptops where it hurts and as a frugal tycoon, you know it's worth every paise of its price. A three-year warranty included for the price makes this a great deal. We'd say the only possible detractions are the very plain looks, and the thickness which is unwarranted for a compact 12.1-inch notebook.

BEST BUY digit JUNE 2008

Fujitsu Esprimo U9200

Fujitsu S6510

The bigger brother to the S6510 (14.1 inches), it's heavier as well, but by a mere 200 grams. Looks wise, they're both identical, except of course, for the slightly larger footprint. Once again the build quality of hinges and such is good. The S6510 should stand the rigours of travel quite well. We found the keypad spacing even better on this model. However, the soft soggy feedback isn't as much fun. Another great software bundle, image editing software, antivirus suite, and MS Office 2007, along with some nifty Fujitsu utilities that save battery, optimise performance, etc make the S6510 a fully loaded solution.

It's got the same configuration as its little brother, which isn't a bad thing at all. For Rs 80,000, how-

ever, it's a touch costly, since its more compact brother is lighter and smaller. If you're looking for a business solution, you may want to check out the S6410 instead.

Fujitsu S6510

ULTRA COMPACTS
True Blue Mobility

Dell XPS M1330

The successor to Dell's ultra compact XPS M1210 gets a slightly larger screen and more horsepower under the bonnet. As with the other Dells, the XPS M1330 is configurable. This one came with a T7500 processor, which while not the latest, is quite fast. Configured with 2 GB of RAM, and a GeForce 8400GS solution, you realise that size doesn't compromise on processing oomph. Then you realise other subtleties—like the slim white-LED display, the nicely bevelled keypad and the slick working touchpad. While 12.1 inches seemed small for some, 13.3 inches seems like the best possible compromise between size and functionality. In fact, to be honest with the M1330 there's no compromise at all. What you do get is a lot of performance in a form factor that is both great to use, and easy to carry around. With a host of configurable options the M1330 proudly carries the XPS badge to greater heights. HDMI connectivity will be of interest to those looking to connect this to large screen TVs.

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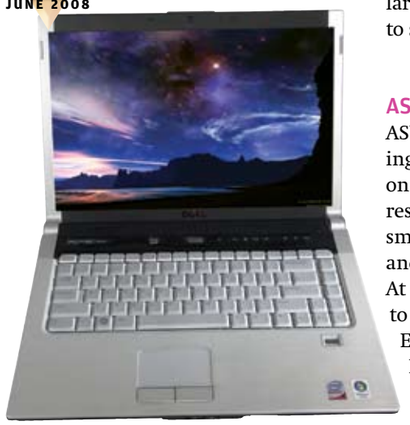


Dell XPS M1330

It's not niggle-free though. The body panels are of the snap-on variety (which is how Dell offers you colour options). Unfortunately, these snap-ons aren't as firm as you'd like, and you can easily detach one. While not affecting the functions, it's alarming to see the lower bezel of the monitor flap loose with couple of tugs.

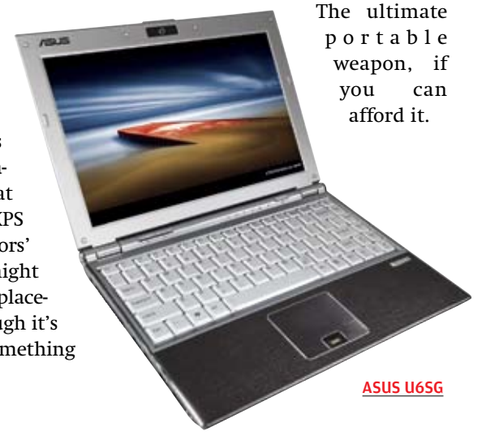
At a starting price of Rs 51,000, with the configuration we received priced at around Rs 8,000 more, the XPS M1330 is a true mobile warriors' weapon of choice. You might even buy it as a desktop replacement—it's that good. Although it's larger sibling may have something to say about that.

ASUS U6SG

ASUS' answer to the compact offerings around, and all said—a brilliant one. It's got a glossy black lid that resists all but the most determined smudges and the off-white keypad and silver-grey body just exudes class. At 12.1 inches, it's compact enough to lug around just about anywhere. Ergonomics are top class, and the keypad and touchpad alike exude marvellous feedback. The laptop uses an ultra thin white-LED display, which besides being brilliant and crisp is very slim. This in conjunction with a slim body makes for an unbelievably slim solution. In fact, there was only one solution that was slimmer!

Compact it may be, but this little bruiser has muscle as well. How does a Core 2 Duo T8300 (2.4 GHz) sound? There's 2 GB of memory, and a latest 9 series GPU from NVIDIA (GeForce 9300) with 256 MB of discrete video RAM. Storage is huge too at 250 GB. We'd expect such a configuration from much larger 15.4 inch notebooks, and none of those came with such specifications.

With class-leading ergonomics and design, and such high-end components powering it, we expected the price to be astronomical. At Rs 94,900, the little U6SG is pricey, but it delivers a punch unlike any ultra-compact can, and even leaves many of its larger competitors chewing trail dust. The ultimate portable weapon, if you can afford it.



ASUS U6SG

Sony Vaio VGN-TZ37GN/R

The long, confusing name not withstanding, this notebook struck us as a work of art! It's simply stunning—the kind that only international supermodels can aspire to be. The dark copper-red, (coffee coloured if you will), lid, glossy black and charcoal grey body, and the fact that at a mere 11.1 inches of screen size, we've never seen anything lighter, or slimmer for that matter. Build quality is exemplary, and everything has that distinct upmarket feel, and you're suddenly aware of its pedigree. Like a Ford owner who suddenly beholds a Bentley, we were stunned and spent a lot of time just flocking around it.

Design wise, Sony is flawless here—its lid is barely half a centimetre thick! The display quality doesn't suffer for this—crisp, clear, and with amazing colours. The keys are surprisingly well spaced out, and amazingly usable for its tiny size, and the configuration is punchy (don't expect discrete graphics though). A biometrics device for recognising your fingerprints hasn't been left out, and with 2 GB of RAM this little feline can bare rather large claws.

At Rs 1,14,900, the Vaio VGN-TZ37GN/R isn't for everybody. But it wasn't meant to be. Like the Rolex's and Rolls Royce's of our era, it was meant to be pursued by only those who can appreciate its pedigree.

Sony Vaio VGN-TZ37GN/R

HCL Z29 C2D

This is HCL's compact offering, and while it doesn't even claim to be in the same league as the ones before it, the Z29 C2D is a Core 2 Duo T5550 (1.83 GHz) based 12.1 notebook. We couldn't figure out why HCL added the diamond cut patterns on the lid—this brings back unpleasant memories of Nokia's Prism.

This notebook is well built, and except for its lid, which seems flimsy and doesn't tilt back, we couldn't find much to complain about. Oh!–Wait a minute, there was the issue with the keypad where the 'function' key is placed to the extreme left where the [Ctrl] key should be. This causes a lot of inconvenience when using the [Ctrl] key for any purpose, especially shortcuts. And did we mention that it's a little too thick for a 12.1 inch. In fact, any thicker and we wouldn't have put it into this category.

HCL Z29 C2D

LG XNote R200

The XNote 200 is a compact laptop with a 12.1 inch screen and is a good looker. The matte white finish on the inside is eye catching if not attractive. The R200 feels very well built with excellent fit and finish, and the slightly thicker screen holds another small LCD display built into the outer lid. This little LCD has a menu of its own, and you are informed of new mails, and get important updates on it without even opening the lid.

We really like the feel of LG's keyboard; the keys exude a solid feeling of feedback, and a key press feels like your finger is working against a stiff little rubber spring behind each key. The keypad is well laid out too. LG drops in a surprisingly good configuration—a Core 2 Duo T7300 (2.0 GHz), 2 GB of RAM and a Radeon HD2400 graphics solution with 128 MB of dedicated video memory. The R200 should be good as a desktop replacement except that it's got a small screen and will serve portability nuts well.

LG XNote R200

At Rs 62,000 the XNote R200 is a well-priced notebook for its configuration and compact size. It's not as compact as the slimmer Dell XPS M1330, which also manages a better configuration. The M1330 also kills it in the pricing department. If you don't mind the stubby profile, and like the extra screen as much as to shell out Rs 10,000 more for it, then buy this by all means.

Sahara ImageBook 8WS

Sahara's ImageBook is a really compact notebook with a huge monitor bezel for some inexplicable reason, making it bulky for just an eight inch screen. The first issue is with the build quality which isn't very appealing, neither is the finish, a plain steel grey. The second major issue was with the battery retention which leaves some room for play, so your battery will move around slightly. While battery contact isn't affected, it isn't comforting to have a loose battery.

The screen is not very clear and accounting for the lack of display size this is a double whammy. Sahara could easily have provided an 11-inch screen with such a body size. This was the only notebook to feature an AMD processor, the new power-saving Geode LX clocked at 800 MHz. What we also couldn't figure out was the lack of memory—the ImageBook comes with a paltry 256 MB. You can forget about running anything more than Windows XP on this notebook—and that too at a snail's pace.

The price is a bit of a life saver though—at Rs 14,999 the ImageBook 8WS is very, very

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Laptops	Workhorses Up to Rs 40,000							Workhorses above Rs 40,000				
Brand Model	**HCL G28 CP**	**HCL P28 PDC**	**Intex M722S**	**HCL B30 C2D**	**HCL Z24 C2D**	**Acer Aspire 5920**		**LG Xnote R405**	**Fujitsu S7211**	**Acer Aspire 2920**	**Dell Inspiron 1525**	**ASUS F5SL**
Price	Rs 22,490	Rs 28,990	Rs 30,900	Rs 32,990	Rs 38,490	Rs 39,139		Rs 40,000	Rs 41,000	Rs 41,199	Rs 42,900	Rs 44,990
Plus (+)	Inexpensive	Inexpensive	Compact	Solid Build	Solid Build	Cute		Well built	Slim, well built	Plasticy	Well built	Good specs
Minus (-)	Clunky	Clunky	Build quality	Clunky	None in particular	Plasticy		Bulky	None in particular	Bulky	Plain looking	Bulky
Grand Total (Out of 100)	47.19	51.71	58.75	61.50	61.00	64.12		60.22	67.41	60.13	69.06	70.95
Features (Out of 55)	26.22	30.62	39.25	38.60	37.50	40.89		34.17	40.12	37.66	42.38	40.63
Performance (Out of 45)	20.97	21.09	19.50	22.90	23.50	23.75		26.05	27.28	22.47	26.68	30.32
Features												
Component Specifications												
Processor / Clock Speed	T2310 / 1.73 GHz	T2330 / 1.6 GHz	T2450 / 2.0 GHz	T5550 / 1.83 GHz	T5550 / 1.83 GHz	T5550 / 1.83 GHz		T5550 / 1.83 GHz	T7500 / 2.2 GHz	T5550 / 1.83 GHz	T7250 / 2.0 GHz	T5550 /1.83 GHz
RAM / Type / Clock Speed	1024 MB / DDR2 / 667 MHz	2048 MB / DDR2 / 667 MHz	1024 MB / DDR2 / 667 MHz	2048 MB / DDR2 / 667 MHz	2048 MB / DDR2 / 667 MHz	2048 MB / DDR2 / 667 MHz		1024 MB / DDR2 / 667 MHz	1024 MB / DDR2 / 667 MHz	2048 MB / DDR2 / 667 MHz	2048 MB / DDR2 / 667 MHz	2048 MB / DDR2 / 667 MHz
Chipset	P4M 900	P4M 900	SiS 671	SiS 671	GM965	GM965		Radeon Xpress 1100	GM965	GM965	GM965	SiS 671FX
Graphics Solution / Onboard Memory (MB)	Via Chrome 9 / Shared	Via Chrome 9 / Shared	SiS Mirage / Shared	SiS Mirage 3 / 128 MB	X3100 / Shared	X3100 / Shared		Radeon Xpress 1250 / 128 MB	X3100 / Shared	X3100 / Shared	X3100 / Shared	Radeon HD3470 / 256 MB
HDD Size (GB)	80 GB	160 GB	160 GB	80 GB	160 GB	160 GB		160 GB	160 GB	160 GB	160 GB	160 GB
Bundled OS	Free DOS	Free DOS	NA	Free DOS	Vista Home Premium	Linux		Vista Basic	Vista Basic	Linux	Vista Home Premium	Vista Home Premium
Characteristics												
Screen Size (Inches)	15.4 inches	15.4 inches	12.1 inches	15.4 inches	14.1 inches	15.4 inches		14.1 inches	14.1 inches	12.1 inches	15.4 inches	15.4 inches
Screen Resolution (Native)	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels		1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels
Weight (kg)	3 kgs	2.92 kgs	2.2 kgs	3.05 kgs	2.3 kgs	3.0 kgs		2.3 kgs	2.2 kgs	2.04 kgs	2.6 kgs	2.6 kgs
No of Ports (USB / FireWire)	4 / 0	4 / 0	3 / 1	4 / 1	4 / 0	4 / 1		3 / 0	3 / 0	3 / 0	4 / 1	4 / 0
Connectivity (LAN / Bluetooth / WiFi)	✔ / ✖ / ✔	✔ / ✖ / ✔	✔ / ✔ / ✔	✔ / ✖ / ✔	✔ / ✖ / ✔	✔ / ✔/ ✔		✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔
Memory Card Reader (Y / N)	✖	✖	✔	✔	✔	✔		✔	✔	✔	✔	✔
Inbuilt Webcam (Y / N)	✖	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔
Media Centre Remote (Y / N)	✖	✖	✖	✔	✖	✖		✖	✖	✖	✖	✖
Build (So 10)												
Build Quality (Body / Keypad / Lid, movables)	7.25 / 7 / 7	7.25 / 7 / 7	6.5 / 6.5 / 6.5	7.25 / 7 / 7	7.25 / 7 / 7	5.25 / 5.5 / 5.5		7.25 / 7 / 7	7.5 / 7.25 / 7	5.25 / 5.5 / 5.5	6.5 / 6.75 / 6.5	6.5 / 7 / 7
Ergonomics												
Keypad Tactility / Layout / Shortcuts (So 10)	6.75 / 5 / 4.5	6.75 / 5 / 4.5	7 / 6.5 / 6	6.75 / 5 / 5.5	6.75 / 5.5 / 4.5	5.75 / 6.75 / 6.25		7.25 / 6.75 / 6	7 / 7.25 / 6.75	5.75 / 6.75 / 6.5	6.75 / 7 / 6	7.25 / 6.25 / 7
Biometrics Login / WiFi / Bluetooth / Touchpad switches	✖ / ✖ / ✖ / ✖	✖ / ✖ / ✖ / ✖	✖ / ✔ / ✔ / ✖	✖ / ✔ / ✖ / ✖	✖ / ✔ / ✖ / ✖	✖ / ✔ / ✔ / ✖		✖ / ✖ / ✖ / ✖	✖ / ✔ / ✔ / ✖	✖ / ✔ / ✔ / ✖	✖ / ✔ / ✔ / ✖	✖ / ✔ / ✔ / ✖
Performance												
Synthetic Scores												
PC Mark 2005												
CPU / Memory Score	3937 / 3414	3872 / 2778	3310 / 2620	4123 / 3409	4190 / 3402	4632 / 3628		4606 / 3504	5353 / 4192	4663 / 3604	4628 / 3975	4721 / 3621
Graphics / HDD Score	1562 / 3841	574 / 4166	501 / 3636	1562 / 3626	1660 / 3693	1562 / 3563		1753 / 3979	1536 / 4146	1319 / 3643	1611 / 3373	2834 / 3823
Overall	3562	2537	2215	3526	3626	3728		3939	4102	3712	4088	4120
SiSoft Sandra X1 SP1												
CPU Arithmetic (Integer / Floating)	9438 / 5630	14245 / 10992	9203 / 5632	15623 / 10273	15282 / 10830	16474 / 11033		16976 / 11734	19283 / 14373	16937 / 11874	18234 / 15102	16985 / 11848
CPU Multimedia (Integer / Floating)	45393 / 24234	93283 / 42818	48282 / 25372	101383 / 48923	102202 / 49292	102537 / 54839		101112 / 54965	120393 / 65373	101038 / 53984	110239 / 57394	102395 / 54982
HDD Index	33	38	34	35	34	37		42	38	38	38	37
Memory bandwidth (Integer / Floating)	3142 / 3132	3523 / 3544	3425 / 3426	3173 / 3176	3192 / 3216	3498 / 3547		3337 / 3462	2034 / 2029	3292 / 3527	3627 / 3651	3273 / 3424
3D Mark 2005												
CPU / Overall Score	3722 / 472	3075 / 340	3527 / 340	4083 / 536	4102 / 561	3873 / 710		6591 / 1190	6012 / 694	3892 / 672	5162 / 620	4523 / 6423
Display Mate Tests												
DisplayMate Colour Accuracy Test (Avg, So 10)	5.75	5.75	5.75	5.75	6	5.5		5	6.75	5.5	6.5	6.25
Battery Life Test (Min)	91 min	81 min	97 min	87 min	98 min	102 min		93 min	101 min	98 min	103 min	129 min
WiFi Signal Strength Test	35%	32%	35%	38%	34%	41%		35%	37%	39%	34%	37%
Real World Tests												
Audio Test Speakers (So 10)	5	4.5	5.5	5	4.5	4.25		5	5	4	5.5	6.25
HD Movie Viewing (So 10)	4.5	5	4.5	6.25	5.5	5.5		5.5	6	4.25	6.5	6.25
Video Encoding (100 MB file) (Sec)	173.23	151.4	171.24	152.23	154.23	151.23		123.45	101.23	154.34	108.22	108.4
File transfer Test (1 GB assorted test file) (in MBps)	20.24 MBps	21.4 MBps	23.34 MBps	22.6 MBps	22.1 MBps	21.4 MBps		29.24 MBps	27.2 MBps	21.4 MBps	27.23 MBps	24.7 MBps
DOOM 3 (fps) (640x480, medium detail)	8.2	7.4	6.2	9.1	5.6	7.2		23.3	14.2	7.1	10.7	58.8
Far Cry (fps) (640x480, low detail)	23.27	27.33	17.24	21.5	15.42	26.23		31.3	36.34	22.34	37.26	92.52
Warranty (Years)	1 year	1 year	1 year	1 year	1 year	1 year		1 year	3 years	1 year	1 year	2 years

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Sahara Imagebook 8WS

cheap, shockingly so for a notebook. If you must have a notebook for an unbelievably low price, this has got to be it.

Conclusion

Notebooks should ideally be oriented towards portability and performance / functionality in somewhat equal proportions. Bridging this set of requirements can be tricky, though not impossible. Dell manages this with their XPS M1330 rather well. ASUS does an excellent job with their U6SG—these notebooks well and truly bridge the divide. Just how bulky or powerful a notebook you want, or how important compactness is to you depends on your usage, and ultimately which parameter you're willing to compromise on more. After all, you just can't get a fast processor, 4 GB of RAM, 320 GB hard drive, and a 256 MB graphics solution on a small screen, not yet anyways. Technology has shrunk enough, however, that tiny marvels like the Vaio VGN-TZ37GN/R exist, and thrive. However at 11.1 inches, it may be a bit too compact for most, even those on the go.

A 15.4-inch form factor is too large a footprint for a portable machine. A screen size of 13.3 inches is more like what is acceptable, but we're not giving up an ounce of processing power, or functionality. For those who desire something even more mobile we recommend a 12.1 inch notebook. With new 'green' hard drives that run cooler, faster and more efficient CPUs from Intel and AMD, and very watt-skimpy graphics solutions from ATI and NVIDIA, the whole shrink in screen size is a revolution that has arrived now...and not a distant vista we can drool over. ■

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Test Centre | **Laptops**

Laptops	Workhorses above Rs 40,000								Business			
Brand Model	**Acer TravelMate 5720**	**HP DV 2701TX**	**Lenovo IdeaPad Y510**	**Dell XPS 1530**	**LG X-Note E300**	**HCL Z24 C2D**	**Sony Vaio VGN-FZ35GN**		**Acer TravelMate 6292**	**Fujitsu P8010**	**Fujitsu S6410**	**Fujitsu S6510**
Price	Rs 44999	Rs 46990	Rs 48490	Rs 49900	Rs 52000	Rs 57740	Rs 59990		Rs 52999	Rs 105100	Rs 74000	Rs 80000
Plus (+)	Well Built	Stunning looks	Sturdy, good looks	Sturdy, powerful	Good looking	Good specs	Fast, Well built		Well built	Light, compact	Light, compact	Light, compact
Minus (-)	Heavy	None in particular	No integrated graphics	Heavy	Pricey	None in particular	Bulky		Mediocre keypad	Very expensive	Soft keypad	Soft keypad
Grand Totals (Out of 100)	70.36	72.14	64.83	81.30	60.80	62.52	78.89		66.88	76.51	77.81	79.10
Features (Out of 55)	44.54	42.85	39.34	44.98	32.02	36.29	42.80		34.99	47.44	47.40	47.40
Performance (Out of 45)	25.82	29.29	25.49	36.33	28.77	26.23	36.09		31.88	29.07	30.41	31.71
Features												
Component Specifications												
Processor Model No / Clock Speed	T7500/2.2 GHz	T5450/1.6 GHz	T5450/1.66 GHz	T7500/2.2 GHz	T7300/2.0 GHz	T7250/2.0 GHz	T8100/2.1 GHz		T7300/2.0 GHz	L7100/1.2 GHz	T7500/2.2 GHz	T7500/2.2 GHz
RAM / Type / Clock Speed	1024 MB/DDR2/ 667 MHz	1024 MB/DDR2/ 667 MHz	1024 MB/DDR2/ 667 MHz	2048 MB/DDR2/ 667 MHz	2048 MB/DDR2/ 667 MHz	3072 MB/DDR2/ 667 MHz	2048 MB/DDR2/ 667 MHz		2048 MB/DDR2/ 667 MHz	2048 MB/DDR2/ 667 MHz	2048 MB/DDR2/ 667 MHz	2048 MB/DDR2/ 667 MHz
Chipset	GM965	PM965	GM965	PM965	ATI Radeon Xpress 1100	GM965	PM965		GM965	GM965	GM965	GM965
Graphics Solution / Onboard Memory (MB)	X3100/Shared	GeForce 8400 GS/128 MB	X3100/Shared	GeForce 8600GT/256 MB	Radeon Xpress 1250/Shared	X3100/Shared	GeForce 8400GT/128 MB		X3100/Shared	X3100/Shared	X3100/Shared	X3100/Shared
HDD Size (GB)	120 GB	160 GB	160 GB	250 GB	160 GB	320 GB	200 GB		160 GB	160 GB	160 GB	160 GB
Bundled OS	Linux	Vista Home Premium	Vista Home Premium	Vista Home Premium	Vista Home Premium	Vista Home Premium	Vista Home Premium		Vista Business	Vista Business	Vista Business	Vista Business
Characteristics												
Screen Size (Inches)	15.4 inches	14.1 inches	15.4 inches	15.4 inches	13.3 inches	14.1 inches	15.4 inches		12.1 inches	12.1 inches	13.3 inches	14.1 inches
Screen Resolution (Native)	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1680 x 1050 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels		1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels
Weight (kg)	2.88 kgs	2.1 kgs	2.71 kgs	2.6 kgs	2.04 kgs	2.31 kgs	2.4 kgs		1.9 kgs	1.3 kgs	1.9 kgs	1.7 kgs
No of Ports (USB/FireWire)	4, 1	2, 1	3, 1	3, 1	3 , 0	4, 0	3, 1		3, 1	3, 1	3, 1	3, 1
Connectivity (LAN/Bluetooth/WiFi)	✔ / ✔ / ✔	✔ / ✔/ ✔	✔ / ✖ / ✔	✔ / ✔ / ✔	✔ / ✖ / ✔	✔ / ✖ / ✔	✔ / ✔ / ✔		✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔
Memory Card Reader (Y/N)	✔	✔	✔	✔	✔	✔	✔		✖	✔	✔	✔
Inbuilt Webcam (Y/N)	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔
Media Centre Remote (Y/N)	✖	✖	✖	✔	✖	✖	✖		✖	✖	✖	✖
Build (So 10)												
Build Quality (Body / Keypad / Lid, movables)	7.25 / 6.5 / 6.5	8.25 / 7.75 / 8.25	7.75 / 7.5 / 7.5	6.75 / 7.25 / 6.75	6.75 / 6.75 / 6.75	7.25 / 7 / 7	8.25 / 6.75 / 8		7 / 6.5 / 5.5	7 / 7 / 6.5	6.75 / 6.75 / 6.75	6.75 / 6.75 / 6.75
Ergonomics												
Keypad Tactility / Layout / Shortcuts (So 10)	5.75 / 6.75 / 6.5	7.25 / 7.25 / 7	7.75 / 7.75 / 6	6 / 7 / 7	7 / 6.75 / 6.5	6.75 / 5.5 / 4.5	6.5 / 7.25 / 7		6 / 6.5 / 5.75	7 / 7.25 / 7	7 / 7.25 / 7	7 / 7.25 / 7
Biometrics Login/WiFi/Bluetooth/Touchpad switches	✔ / ✔ / ✔ / ✖	✔ / ✔ / ✔ / ✖	✔ / ✔ / ✖ / ✖	✔ / ✔ / ✔ / ✖	✖ / ✖ / ✖ / ✖	✖ / ✔ / ✖ / ✖	✖ / ✔ / ✔ / ✖		✔ / ✖ / ✔ / ✖	✔ / ✔ / ✔ / ✖	✔ / ✔ / ✔ / ✖	✔ / ✔ / ✔ / ✖
Performance												
Synthetic Scores												
PC Mark 2005												
CPU / Memory Score	5244 / 4192	4160 / 3422	4163 / 3460	5715 / 4625	5029 / 4004	4215 / 4259	3051 / 2537		4726 / 3892	3226 / 3273	5271 / 4492	5644 / 4427
Graphics / HDD Score	1538 / 4198	2966 / 4054	1461 / 4298	4314 / 4024	2179 / 4122	1801 / 4263	691 / 2745		1737 / 4253	1225 / 5052	1791 / 3699	1625 / 4338
Overall	4139	4069	3690	4671	4354	4191	2394		4278	2934	3969	4198
SiSoft Sandra X1 SP1												
CPU Arithmetic (Integer / Floating)	19224 / 14237	15051 / 10669	15261 / 10295	20168 / 14474	18167 / 12189	18283 / 14998	12125 / 8526		18922 / 14172	11039 / 7679	7317 / 4864	20017 / 14105
CPU Multimedia (Integer / Floating)	120320 / 65349	91813 / 41817	91799 / 49233	121530 / 65995	110387 / 59936	111001 / 56838	73421 / 39857		118290 / 63622	66010 / 35836	43934 / 23801	121357 / 65837
HDD Index	38	38	45	38	47	38	45		40	43	39	40
Memory bandwidth (Integer / Floating)	2045 / 2034	3585 / 3585	3499 / 3512	4283 / 4285	4162 / 4181	3728 / 3744	2206 / 2226		3293 / 3282	3584 / 3569	2036 / 2048	2054 / 2058
3D Mark 2005												
CPU / Overall Score	6023 / 673	5167 / 3982	5559 / 693	11173 / 7995	7434 / 1623	5172 / 622	2860 / 321		5739 / 612	4722 / 667	6034 / 734	6119 / 740
Display Mate Tests												
DisplayMate Colour Accuracy Test (Avg, So 10)	6	6.75	6.75	6.5	5.25	6	7.5		6.25	6.75	6.5	6.5
Battery Life Test (Min)	105 min	95 min	101 min	94 min	96 min	87 min	126 min		94 min	132 min	98 min	95 min
WiFi Signal Strength Test	35%	35%	37%	35%	34%	35%	44%		35%	38%	34%	33%
Real World Tests												
Audio Test Speakers (So 10)	4	6.25	5.75	5.25	5.5	4.75	6.25		5	4	4.5	4.5
HD Movie Viewing (So 10)	5.5	6	4.75	6.75	6.25	6	6.5		6	6	6	6
Video Encoding (100 MB file) (Sec)	109.25	126.51	125.44	101.24	103.25	109.23	101.12		109.23	155.4	134.34	132.32
File transfer Test (1 GB assorted test file) (in MBps)	24.3 MBps	27.23 MBps	28.24 MBps	28.65 MBps	27.83 MBps	27.9 MBps	31.24 MBps		21.2 MBps	23.34 MBps	22.74 MBps	25.1 MBps
DOOM 3 (fps) (640x480, medium detail)	12.3	97.3	9.7	151.2	44.5	12.2	109.2		11.1	8.3	9.8	9.1
Far Cry (fps) (640x480, low detail)	34.32	92.68	19.25	178.17	61.92	31.2	168.74		32.3	30.31	35.45	35.43
Warranty (Years)	1 year	1 year	1 year	1 year	1 year	1 year	1 year		1 year	3 years	3 years	3 years

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BEST PERFORMER digit JUNE 2008

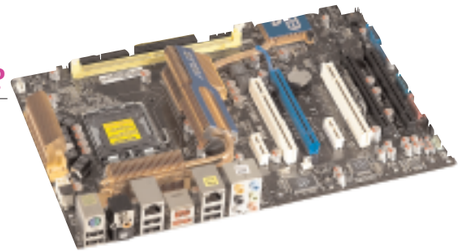
Laptops	Business			Ultra Portables					Desktop Replacements				
Brand Model	**Fujitsu Esprimo U9200**	**HP Compaq 2710P**	**Lenovo ThinkPad X300**	**ASUS U6SG**	**Dell XPS M1330**	**HCL Z29 C2D**	**LG Xnote R200**		**Sahara ImageBook 8WS**	**Sony Vaio VGN-TZ37GN/R**	**Acer Aspire 6920**	**Acer Aspire 8920G**	**Sony Vaio VGN-AR69GU**
Price	Rs 43500	Rs 110000	Rs 1,45,000	Rs 94900	Rs 51900	Rs 45990	Rs 62000		Rs 14999	Rs 114900	Rs 49999	Rs 79999	Rs 169900
Plus (+)	Compact, light	Touchscreen	Slim, very light	Powerful	Compact, powerful	Compact	Compact, powerful		Small footprint	Very compact	Brilliant screen	Powerful	Feature-rich
Minus (-)	Soft keypad	Lack of touchpad troublesome	Expensive	Tiny WiFi switch	Elcheapo body strips	Weird design on lid	Silghtly thick		Lacks build quality	Expensive	Bulky	Very Bulky	Bulky
Grand Totals (Out of 100)	76.46	76.56	70.79	82.40	75.48	60.96	58.47		43.34	71.11	67.41	75.42	84.15
Features (Out of 55)	46.08	47.77	38.79	44.58	41.59	37.92	28.71		27.86	42.98	40.41	40.41	44.91
Performance (Out of 45)	30.38	28.79	32.00	37.82	33.89	23.04	29.76		15.48	28.13	27.00	35.00	39.24
Features													
Component Specifications													
Processor Model No / Clock Speed	T7500/2.2 GHz	U7600/2.0 GHz	U7100/1.2 GHz	T8300/2.4 GHz	T7500/2.2 GHz	T5550/1.66 GHz	T7300/2.0 GHz		Geode LX/800 MHz	U7700/1.33 GHz	T7300/2.0 GHz	T7500/2.2 GHz	T8300/2.4 GHz
RAM / Type / Clock Speed	1024 MB/ DDR2/667 MHz	1024 MB/ DDR2/667 MHz	2048 MB/ DDR2/667 MHz	2048 MB/ DDR2/667 MHz	2048 MB/ DDR2/667 MHz	2048 MB/ DDR2/667 MHz	1024 MB/ DDR2/667 MHz		256 MB/DDR2/667 MHz	2048 MB/DDR2/667 MHz	3072 MB/ DDR2/667 MHz	3072 MB/ DDR2/667 MHz	3072 MB/ DDR2/667 MHz
Chipset	GM965	GM965	GM965	PM965	PM965	GM965	PM965		NA	i945GMS	PM965	PM965	PM965
Graphics Solution / Onboard Memory (MB)	X3100/Shared	X3100/Shared	Intel X3100/Shared	GeForce 9300/256 MB	GeForce 8400 GS/128 MB	X3100/Shared	Radeon HD2400/128 MB		CPU shared/Shared	GMA 950/Shared	X3100/Shared	GeForce 9500GS/512 MB	GeForce 8600GT/256 MB
HDD Size (GB)	160 GB	100 GB	60 GB solid state	250 GB	250 GB	160 GB	160 GB		60 GB	120 GB	320 GB	320 GB	500 GB
Bundled OS	Vista Business	Vista Business	Vista Business	Vista Home Premium	Vista Home Premium	Vista Home Premium	Vista Home Premium		Vista Business OEM	Vista Home Premium	Vista Home Premium	Vista Home Premium	Vista Home Premium
Characteristics													
Screen Size (Inches)	12.1 inches	12.1 inches	15.4 inches	12.1 inches	13.3 inches	12.1inches	12.1 inches		8 inches	11.1 inches	16 inches	18.4 inches	17 inches
Screen Resolution (Native)	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels	1280 x 800 pixels		800 x 600 pixels	1280 x 800 pixels	1366 x 768 pixels	1920 x 1080 pixels	1920 x 1200 pixels
Weight (kg)	1.9 kgs	2.0 kgs	1.6 kgs	1.3 kgs	1.94 kgs	2.1 kgs	1.94 kgs		1.4 kgs	0.95 kgs	3.3 kgs	4.17 kgs	3.3 kgs
No of Ports (USB/FireWire)	3, 0	2, 1	3, 0	4, 0	2, 1	3, 1	3, 1		2, 0	2, 1	4, 0	4, 0	3, 1
Connectivity (LAN/Bluetooth/WiFi)	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✘ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✘ / ✔	✔ / ✘ / ✔		✔ / ✘ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔	✔ / ✔ / ✔
Memory Card Reader (Y/N)	✔	✔	✘	✔	✔	✔	✔		✔	✔	✔	✔	✔
Inbuilt Webcam (Y/N)	✔	✔	✔	✔	✔	✔	✘		✘	✔	✔	✔	✔
Media Centre Remote (Y/N)	✘	✘	✘	✘	✔	✘	✘		✘	✘	✘	✘	✔
Build (So 10)													
Build Quality (Body / Keypad / Lid, movables)	6.75 / 6.75 / 6.75	7.75 / 7 / 7.25	8.5 / 8 / 8	8 / 8.25 / 8	6.5 / 7.25 / 6.75	6.5 / 6.75 / 6.25	7 / 6.75 / 6.75		6.5 / 6.5 / 6	8 / 8 / 7.5	7.25 / 6.5 / 7	7.25 / 6.5 / 7	8 / 7.5 / 7.5
Ergonomics													
Keypad Tactility / Layout / Shortcuts (So 10)	7 / 7.25 / 7	7.25 / 6.5 / 6.75	7 / 7 / 6.25	7.5 / 7.25 / 7.25	6 / 7 / 7	6.75 / 6.5 / 6	7 / 7 / 6.25		6 / 5.5 / 4	6.75 / 7.25 / 7.25	6.25 / 6.5 / 6.5	6.25 / 6.5 / 6.5	6.5 / 7.25 / 7
Biometrics Login/WiFi/Bluetooth /Touchpad switches	✔ / ✔ / ✔ / ✘	✔ / ✔ / ✔ / ✘	✔ / ✔ / ✘ / ✔	✔ / ✔ / ✔ / ✘	✘ / ✔ / ✔ / ✘	✔ / ✔ / ✘ / ✘	✘ / ✘ / ✘ / ✘		✘ / ✔ / ✘ / ✘	✔ / ✔ / ✔ / ✘	✘ / ✔ / ✔ / ✘	✘ / ✔ / ✔ / ✘	✘ / ✔ / ✔ / ✘
Performance													
Synthetic Scores													
PC Mark 2005													
CPU / Memory Score	5423 / 4256	3872 / 3043	3151 / 3136	6072 / 4702	5712 / 4604	4162 / 3426	5345 / 4102		1928 / 2839	5440 / 4457	4781 / 4803	5524 / 4377	5895 / 4740
Graphics / HDD Score	1534 / 4145	1326 / 3627	1283 / 15362	3237 / 4788	3184 / 4762	1526 / 3579	2462 / 4048		312 / 3102	3321 / 4065	1732 / 4667	5122 / 4628	5751 / 4767
Overall	3957	3738	3830	5342	4782	3572	4611		2382	5022	4085	5212	5767
SiSoft Sandra X1 SP1													
CPU Arithmetic (Integer / Floating)	20035 / 14056	12120 / 7836	10959 / 7675	22029 / 17738	19914 / 14071	15277 / 10287	18130 / 12148		7829 / 4829	19349 / 15422	18426 / 12841	19674 / 14103	22006 / 17564
CPU Multimedia (Integer / Floating)	121546 / 65647	71828 / 37282	65975 / 35806	131068 / 71434	121316 / 65873	100238 / 47939	110373 / 59950		31920 / 17120	115893 / 63139	110534 / 58105	121346 / 65580	132049 / 71950
HDD Index	39	41	86	44	45	34	39		29	30	48	49	87
Memory bandwidth (Integer / Floating)	2034 / 2043	3536 / 3522	3529 / 3553	4525 / 4490	4259 / 4267	3722 / 3626	3857 / 3846		2882 / 2838	4609 / 4602	4662 / 4512	4857 / 4783	4492 / 4497
3D Mark 2005													
CPU / Overall Score	6120 / 724	6292 / 743	4486 / 645	11980 / 3203	8660 / 3162	4122 / 624	5433 / 3271		1923 / 221	10943 / 3335	6989 / 812	10922 / 6358	11851 / 7650
Display Mate Tests													
DisplayMate Colour Accuracy Test (Avg, So 10)	6.5	6.5	6.75	7.25	7	5.75	6.5		4.5	6.75	6	6	6.75
Battery Life Test (Min)	89 min	129 min	135 min	139 min	122 min	84 min	81 min		85 min	191 min	113 min	108 min	136 min
WiFi Signal Strength Test	34%	36%	37%	45%	41%	36%	32%		31%	46%	40%	41%	45%
Real World Tests													
Audio Test Speakers (So 10)	4.5	5.5	4.5	6.5	5	4.5	5		3.5	6.5	7	7	7.75
HD Movie Viewing (So 10)	6	5.25	5.25	6.25	6	6	6		3	5.75	7.75	8.25	7.5
Video Encoding (100 MB file) (Sec)	135.73	137.24	140.83	99.25	109.34	152.23	101.11		228.26	151.24	99.7	96.1	95.36
File transfer Test (1 GB assorted test file) (in MBps)	21.53 MBps	21.7 MBps	39.15 MBps	34.3 MBps	31.2 MBps	32.24 MBps	29.57 MBps		21.5 MBps	31 MBps	34.6 MBps	35.3 MBps	46 MBps
DOOM 3 (fps) (640x480, medium detail)	9.6	7.4	8.8	112.6	102	9.2	72.8		crashed	4.7	11.8	120.6	157
Far Cry (fps) (640x480, low detail)	29.32	15.35	14.61	178.59	160.68	23.26	81.5		9.25	9.6	40.86	184.7	189.46
Warranty (Years)	3 years	3 years	3 years	2 years	1 year	1 year	1 year		1 year	1 year	1 year	1 year	1 year

Bazaar

We test the latest hardware and software products available in the market

ASUS P5Q Deluxe

P45 Arrives But Is It Same Story As The X48?



The *Digit* Test Centre received ASUS' latest offering—the P5Q Deluxe motherboard based on Intel's all new P45 chipset. The boards run on the P45 chip coupled with the new ICH10R, which is a step up from the ICH9R from the P35. One of the changes is that the P45 has a 1600 MHz bus speed as compared to 1333 MHz on the P35.

The motherboard has a really clean layout and there is the usual profusion of heatsinks and copper heat pipes running across the board. Overclocking features as usual are built in well like the other ASUS boards we've seen. BIOS settings can be saved and loaded as you wish.

We ran the same barrage of tests and observed small jumps in performance in benchmarks such as PC Mark 2005 where it scored 2 to 3 per cent more than the P35's from our motherboard comparison test. 3DMark 2005 scores were also marginally higher than the P35. Small changes were noted in *Doom 3* running at low resolutions too.

Although performance doesn't seem to be the new P45's forte, ASUS has added some unique features to their board. One of them is called Express Gate—an operating system built into the motherboard that works without the need of an attached hard drive. The environment has Skype, Pidgin—an instant messenger—and a modified version of Firefox running on a customised Linux distribution called Splashtop. Should you lose your operating system in a data crash, Express Gate will give you complete access to the Internet. There are features for copying data from hard drives as well as USB drives.

The new P45 chipset doesn't really do a whole lot more for performance. There is a marginal jump, but nothing substantial that would convince anyone to move from a P35 based board to a P45 one, for example. People who want to buy an enthusiast level board should consider the P45, but those who are already on P35 and X38s will just have to wait.

Specifications:

LGA775 socket, System bus: 800 / 1066 / 1333 / 1600 MHz, Maximum RAM supported: 16 GB DDR2, ATI CrossFireX support, ATX form factor.

Contact: ASUS Technology Pvt. Ltd.
Phone: 1-800-2090365
E-mail: media_india@asus.com
Web site: www.asus.in
Price: Rs 12,100

RATINGS	
Performance	★★★★☆
Features	★★★★☆
Build Quality	★★★★☆
Value for Money	★★★☆☆
Overall	★★★★☆

BenQ X2200W

Perfect For A Gaming Console!

The 22-inch BenQ X2200W is a LCD monitor targeted at gamers and movie enthusiasts—the styling on this screen is clearly indicative of that. The screen and the body both have a matte finish.

The screen has a medium-sized bezel all through but it is fatter on the sides, thin on the top and thick at the bottom. There are no buttons at the bottom of the screen but there is a metallic looking dotted pattern which gives the screen a fine look. When the monitor is in idle mode, a blue light is emitted from the gap below which adds to its style. All these cosmetics make the screen look really chunky and huge.

The contrast ratio is good and the darks appear a little darker than most screens. The viewing angles are good too, as long as you are as the same level as the screen. When you move up and down, things go horribly wrong—the display quality is pretty bad when you look at the monitor from the top or the bottom.

One of the biggest plus points is HDMI connectivity, which is very rare in 22-inch screens—or any other screen for that matter. HDMI means that this monitor can be used as a display for your gaming consoles or HD players. There is a headphone jack for audio output as well.

There is no doubt that this is better than most of the screens in the market today, but those screens are priced very competitively. The X2200W isn't available right now, and is expected in the next few months at a price of Rs 16,500, which is asking for quite a bit. At this price, one enters the entry level 24-inch LCD price bracket. If you want a cheap LCD screen for the computer that doubles as your display for your consoles, then this might just be the one for you.

Specifications

Resolution: 1680x1050, Contrast Ratio 1000:1, Maximum power consumption: 45 W, Response time: 5 ms.

Contact: Neoteric
Phone: 1-800-22-0808
E-mail: sales.enquiryin@BenQ.com
Web site: www.benq.com
Price: Rs 16,500

RATINGS	
Performance	★★★★☆
Features	★★★★☆
Build Quality	★★★½☆
Value for Money	★★★☆☆
Overall	★★★½☆

Nikon D60

An Inch Up

The Nikon D60 is a compact 10.2 MP D-SLR, but also much larger than the typical point-and-shoot cameras. Unlike some of the higher-end D-SLRs, it isn't heavy at all. The kit comes with an 18–55 mm VR zoom lens, which is more or less the equivalent of a 3x optical zoom lens on a point-and-shoot camera. The camera performs flawlessly—switching between menus is quick and prompt. Firing the trigger immediately clicks a photo—hardly any delay as compared to point-and-shoot cameras. Information and help is available at every step in the menu. Set the D60 to Auto and just about anyone can use it.

The image quality is great—photos turn out crisp and colour reproduction is also pretty good. There is hardly any visible grain with the ISO level set at 100 and 200. The various modes—aperture priority, shutter speed priority and program mode work well. In addition to JPEG, the camera also shoots in RAW, so quality is maintained. Even though the D60 uses a CCD instead of a CMOS sensor, there is still a significant difference in the quality between a D60 and a P&S.

The D60, like most D-SLRs, is filled to the brim with features. The D60 gives you control over each and every component of the camera. There are also the typical presets for different lighting scenarios to keep things simpler. The interface has been designed to be as simple as on a point-and-shoot. For example, the shutter speed and aperture size are displayed in real life-like illustrations that update in real time when you point it at an object.

The camera runs on SD and SDHC memory cards and it is powered by a Li-ion battery. The flash is fairly powerful. Being a D-SLR, a horse-shoe is available, so you can mount additional flashes to it.

D-SLRs maybe great to learn photography and take professional shots but it isn't something practical for everyday use. Set everything to Auto and you are down to a camera that behaves like any other P&S. If you want to get into serious photography after having used a P&S for a while, then a beginner D-SLR like a D60 is definitely worth considering. The menus and icons in the camera make it very easy to use, but it will take a while before those used to point-and-shoots are familiar with all of its features.

The D60 kit is priced around Rs 35,950, making it too expensive for a beginner. In terms of specs and performance, there is hardly any difference between a D60 and a D40X—or even a D40, for that matter. We expected something closer to the D80, but it just isn't. In the past few months, the D40X was even selling as low as Rs 27,000. Prices seem to have inflated a bit since then. Still, D-SLRs selling at reasonable prices are a good sign and there is definitely a slowly growing market for budding photography enthusiasts.

Specifications

10.2 MP CCD Sensor Size: 23.6 x 15.8 mm, Maximum Resolution: 3872x2592, Lens: 18 -55 mm, 2.5-inch 230,000 pixel LCD screen
Dimensions: 126 x 94 x 64 mm, Weight 495 g

Contact: Nikon India Pvt Ltd
Phone: +91-124-4688500
E-mail: nindsupport@nikonoa.net
Web site: www.nikon.com
Price: Rs 35,950

RATINGS	
Performance	★★★★☆
Features	★★★★☆
Build Quality	★★★★☆
Value for Money	★★★☆☆
Overall	★★★★☆

Billion BiGuard S20

Fitting Gatekeeper For Your Office Network

The Billion BiGuard S20 is a network switch with a lot of focus on security and virtual networking. The hardware has 8 ports for the LAN and 2 ports for WAN. There is even a Gigabit Ethernet port for high speed backbone links to other switches or networks.

A Web interface is used to control and monitor the various features. The interface is plain and easy to use. The WAN ports can be set up to dial using PPPoE to ISPs and there are features for load balancing between the connections in the device. Features for bandwidth monitoring and throttling are also present. All the features have logs that can be viewed and e-mail alerts can be sent automatically. Other than the standard features, there is a lot of emphasis on security, SSL and virtual private networks.

The router generates almost no heat, and the Web interface doesn't slow down under load. Overall, the BiGuard S20 is very good as a switch. It has features perfect for offices, but at Rs 30,000, it is an expensive piece of equipment to consider. It might be worth it if you really need the plethora of security and features it offers.

Specifications

Four 10/100 Mbps ports, Two WAN ports, One Gigabit port, RS232 Console connector

Contact: One Network (India) Pvt. Ltd.
Phone: +91-9821014253
E-mail: deepak@onenetwork.co.in
Web site: www.billion.com
Price: Rs 30,000

RATINGS	
Performance	4
Features	4
Build Quality	4
Value for Money	2.5
Overall	3.5

Microsoft Sidewinder Mouse

Stretching Ergonomics To The Extreme

Microsoft's Siderwinder mouse has seen a lot of hype over of its design. Another mouse to create such a racket about its shape was the Logitech G9, which we tested a while back.

The size of the Sidewinder mouse is monstrous. It is one of the largest mice we've come across. Users with huge hands will find this comfortable, but those with smaller palms will find it hard to hold on to. The sides of your finger won't come close to touching the surface. The scroll doesn't have a prominent gritty ride to it. The wheel is heavy duty. The buttons are quite soft and feel somewhere between Logitech and the Razer mice.

The mouse performs flawlessly. There is no skipping but playing with a mouse that large can take a while to get used to. There are three buttons to change the resolution of the sensor and a small display which shows the current DPI setting. The three levels can be set using the driver.

The mouse itself is pretty heavy but it also feels very hollow. Additional weights for the mouse are supplied in a nice little case that can be placed into a tray that slides out from the side of the mouse. The case has something else which you don't find in your everyday mice—mouse feet. There are 2 additional sets which you can replace by snapping at the back of the mouse.

The market price for the Sidewinder is Rs 3,050. It's not as over-the-top expensive as the Razer Lachesis or the other high-end gaming mice, but it isn't that stacked with performance figures either. For the price of the Sidewinder, one would expect features like a tilt scroll wheel. It might not be something every gamer would spend on willingly, but surely people with an inclination towards large mice will love this.

Specifications

Sensor Resolution: 2000 dpi, USB Refresh rate: 500 Hz

Contact: Microsoft India
Phone: +91-80-66586575
E-mail: geethakb@microsoft.com
Web site: www.microsoft.com
Price: Rs 3,050

RATINGS	
Performance	4
Features	4
Build Quality	3.5
Value for Money	3.5
Overall	4

Tagan TG1300-BZ

Even More...Power!!

Mounting power requirements for performance systems don't seem to slow down. With single graphics card consumption close to 200—300 W each, SLI and quad-SLI setups are very demanding. As its name suggests it's a 1300 W power supply.

Like with some other Tagan power supplies, the TG1300-BZ too has the round connectors with a nut screw to tighten. The sockets are lit up and the cables are of good quality—long and also well sheathed. A perfectly fitting rubber gasket acts as a buffer to absorb vibration and keep noise low. It is provided separately and fits between the power supply and the cabinet. A 135 mm fan is used for cooling the power supply. Gold plated connectors have been used for all the cables.

For the test, we plugged in 3 hard drives, an optical drive and two 9800 GTXs in SLI. The system ran flawlessly .

The package by itself gives an idea that this is a costly and premium product. The power supply comes in a fancy carry bag with an additional pouch for cables. There are anti-static gloves supplied as well. Even the crocodile leather-styled manual is extremely detailed and explains every thing of setting up the power supply in detail. Other extras include a small screw driver.

No matter how much of a premium product the Tagan TG1300-BZ might be, it is by no means cheap especially with a price tag of Rs 16,700. The demand for this colossal amount of power is usually not required even with the most powerful of systems.

Specifications

Maximum power: 1300W, ATX standard, Weight: 3.4 kgs

Contact: NanoPoint Technology Ltd.
Phone: +91-33-22251192
E-mail: mail@tirupati.net
Web site: www.tagan.com
Price: Rs 16,700

RATINGS	
Performance	4
Features	4
Build Quality	4
Value for Money	2.5
Overall	3.5

Brother MFC-685CW

Awesome Value For Money

Brother's MFC-685CW is an all-round multifunction device. Among its few flaws is that the USB or network cable has to be guided through a small crevice along one side of the MFD to the centre.

Like any other MFD, it performs the typical scan, print and copy functions. It also has a memory card reader which can read from a variety of memory cards, and support for USB flash drives. That's not all—it has both wireless and wired network connectivity, which means it acts as a network printer as well.

The quality of photo prints is good, but colours —red especially—turned out a little pink. In the other text and image prints, there is a little difference in the density of the colours between the normal and fine quality prints. It is close to twice as fast in the normal mode than the fine mode.

At Rs 13,630, this is an awesome bargain. There are just way too many features in this MFD to go on about. It does pretty much everything you'd possibly want an MFD to do.

Specifications

Maximum printing resolution: 6000x1200 dpi, Scanner resolution: 600x2400 dpi, Interfaces: USB, Ethernet, WiFi 802.11 b/g, 32 MB Memory

Contact: Brother International (India) Pvt. Ltd.
Phone: +91-22-40988900
E-mail: info@brother.in
Web site: www.brother.in
Price: Rs 13,630

RATINGS	
Performance	3.5
Features	4.5
Build Quality	3.5
Value for Money	4.5
Overall	4

Canon VIXIA HG10

Ridiculously Priced

The Canon HG10 is a one of the few high-definition camcorders to run on a hard drive—40 GB, to be precise. The design is attractive and it looks a lot like most tape- and optical disc-based camcorders. Although slightly heavy, the HG10 is quite comfortable to hold and use for long periods.

The HG10 records videos at a maximum resolution of 1440 x 1080. When it comes to performance, it does a decent job. It has a good zoom lens that goes up to 10x. There is little grain in bright areas and very fine grain in the dark areas. The frame rate is stable all throughout the video recording and the exposure meter works rather well. It is easy to go from low light to dark areas without a sudden jolt in exposures. There is also a powerful light that can be used in total darkness.

The user interface is colourful and most of the controls for it are on the LCD screen. Movies and files can be copied and moved about freely without the need of bulky software. The camera uses a kind of AVC standard—AVCHD to record movies, so any media player capable of playing H.264 content can play them—VLC or Media Player Classic with ffdshow.

At Rs 89,995, it is a very costly camcorder for a home user to buy or even consider.

Specifications

1/2.7-inch CMOS Sensor, 10x optical zoom, still photo resolution: 2048x1536 (3.1 MP), 40 GB hard drive.

Contact: Canon India Pvt Ltd
Phone: 1-800-3453366
E-mail: info@canon.co.in
Web site: www.canon.co.in
Price: Rs 89,995

RATINGS	
Performance	4.5
Features	4.5
Build Quality	4.5
Value for Money	2
Overall	3.5

3DPaintBrush

The Ultimate Utility For Architects

3DPaintBrush 1.0 is one of the latest products to come from the Indian software house—Geometric. The software is aimed at architects and those who want to demo models in a scene without having to set up lights in a 3D scene.

Unlike professional 3D modelling software, there is no renderer to render a high quality frame and most of the rendering is done using DirectX as well.

Basic modelling tools and texturing features are available too, and you can animate the camera as well. Shaders can be set to objects and different lighting schemes can be used.

One of the most unique features of 3DPaintBrush is 3DSnip. 3DSnip allows you to capture pretty much any model from any 3D software into the program with a couple of clicks.

Other features include importing models through the program from Google 3D Warehouse. There is also support for popular formats for programs such as 3D Studio Max and the widely used OBJ format.

Without any models loaded, 3DPaintBrush hardly consumes 13 MB of RAM. There aren't any unnecessary features as such in the application.

At $99 (Rs 4,150), it's amazingly well priced.

Specifications

Requirements: 1.2 GHz Processor, 512 MB Memory, 100 MB space DirectX 9.0c card, Windows XP and Vista supported

Contact: Geometric Ltd.
Phone: +91-22-67056880
E-mail: sales@3dpaintbrush.com
Web site: www.3dpaintbrush.com
Price: $99 (Approx Rs 4,150)

RATINGS	
Performance	4.5
Features	3.5
Ease of Use	5
Value for Money	4.5
Overall	4.5

Creative MuVo T200

Simple, But A Tad Expensive

The Creative MuVo T200 is a compact little 2 GB MP3 player shaped like a USB Flash drive. It is aimed at users who want a compact and easy to use PMP for cheap.

It comes with a tiny colour screen, which looks decent. There are colour themes that you can switch to as well. The styling is average and the player comes with a smooth finish. The buttons aren't printed and are just moulded into the body.

The interface is a little confusing at first, but one gets used to in a few minutes. There is voice recording and the player can tune in to radio as well. FM stations are auto scanned and can be stored as presets.

Performance issues are noticed when you fast forward and rewind tracks—it loses track of the position of the song and displays the wrong position.

The earplugs supplied with the player are of poor quality—the sound from them is very flat with highs over-emphasised.

With a price of Rs 3,399, it is definitely a bit expensive for a 2 GB MP3 player. PMPs with additional features and a better build are priced competitively.

Specifications

Dimensions: 25 x 77.7 x 11 mm, Weight: 20.6 gm, Memory: 2 GB, Formats supported: Built-in rechargeable Li-ion battery, USB 2.0 connectivity, FM radio

Contact: Creative Technology
Phone: +91-9821455590
E-mail: irfan@ctl.creative.com
Web site: http://in.creative.com
Price: Rs 3,399

RATINGS	
Performance	3.5
Features	3.5
Build Quality	3.5
Value for Money	3
Overall	3.5

LG KF600

Style Statement For Smaller Pockets

The KF600 is a brand new model from LG and seems to be influenced by the recently reviewed LG Viewty.

The KF600 has a small touch screen at the bottom that's called an InteractPad. Above that is the slightly larger screen as the main display.

Interacting with the KF600 gets a little irritating. Usually, a touch screen allows you to press the feature or button on the screen. The KF600 needs you to use directional buttons on a touch screen to navigate. It might seem like fun in the beginning but it gets annoying fast. The keypad has slightly clunky buttons, but the slide mechanism is smooth.

The phone's camera is decent and there are a lot of features available in the photo shooting application. The image stabilisation works pretty well too. The software interface of the KF600 is similar to that of the Viewty. There are themes available which are very similar to each other just with different colors. There are a few decent games and a few applications as well.

Reception on the phone is good and so is the voice tone is very rounded. There are no harsh bits in the voice. The earphones supplied are average and not vibrant.

The KF600 is quite similar to the Viewty. At Rs 14,990, it is pretty expensive for a phone of this kind. Other than the price, using the phone can get pretty annoying and the additional small touch screen robs the phone of a larger screen.

Specifications

Dimensions: 101.2 mm x 50.7 mm x 14.1 mm, Weight: 107 gms, MicroSD expansion slot, 800 mAH Li-ion battery

Contact: LG Electronics India Pvt. Ltd.
Phone: +91-120-2560900
E-mail: viveksingh@lgindia.com
Web site: www.lgindia.com
Price: Rs. 14,990

RATINGS	
Performance	3
Features	3
Build Quality	4
Value for Money	3
Overall	3

Freecom MusicPal

Satellite Radios Look Out!

Many activities that normally revolve around the computer are now are now moving out to dedicated devices. The Freecom MusicPal—a dedicated Internet radio is a perfect example of this. It connects to the Internet wirelessly as well are through a wired Ethernet connection.

The device is shaped to act as a stand for itself. The front has two big knobs that feel like anti-bacterial material. The feel of the dials is squishy and also a little wobbly. They are the two most important controls used for the player. Two other buttons—menu and favourites—are available. It has a black and white screen as its main display.

The player connects to Internet stations from an online database and also those from Shoutcast. Streaming works fine as long as you have enough bandwidth. The variety of music streams is vast and well-categorised.

The player can also be controlled and customised through a Web interface. The same can be done through the player, but using only the dials to cycle through characters is both slow and painful.

The player has many more features other than the ability to stream music over the Internet. It also sports an RSS feed reader and an alarm clock. There is a Web browser that can also be controlled through the minimal controls on the device. The browsing feature does not work too well. Sites with a mobile version work fine, but even those show up some compatibility issues. These extra features are automatically enabled when the player goes into idle mode which can be set through the Web interface.

A price of Rs 6,695 is a tad more than expected. Even then, it makes a very good gadget to sit in your living room. It could be a little more stylish though, but even then it is bound to give satellite radios a run for their money. For this low one-time fee, you get a device that does so much and gives you free instant access to the humongous library of Internet radio stations.

RATINGS	
Performance	★★★½
Features	★★★★
Build Quality	★★★½
Value for Money	★★★½
Overall	★★★½

Contact: Rashi Peripherals Pvt.Ltd
Phone: 022-67090909
E-mail: freecom@rptechindia.com
Web site: www.freecom.com
Price: Rs 6,695

HP LaserJet P1505n

Just Another Printer

The P1505n is a brand new network printer from HP which can also be used as a local printer using USB. It looks like any other laser printer—compact with a simple design and bland colour scheme.

The printer feels very light and has lots of plastic all over it. The trays seem wobbly and weak, so the printer might not be ideal for rough use. The paper feeding mechanism works well even with few sheets of paper in the feeding tray.

In terms of print quality, it isn't too bad. There is an economical mode you can choose from for both the 600 dpi and 1200 dpi modes. There's a big degradation in quality but there isn't much difference in the speed anyway. The eco mode shows up big jagged edges in the curved text characters. The shades of black become a lot lighter. Most prints take between 7 to 9 s from the time the print command is given on the program to the paper being dropped out. There is a little difference in print quality between the 600 dpi and 1200 dpi print modes.

This printer serves as a network printer as well. Installation is simple and just requires plugging in the CAT5 cable. Firing up a test print gives you all the necessary information. There is a Web interface that can be accessed through a Web browser. Network connection and quality settings for the printer can be viewed and changed. IPv6 support has been integrated into the printer.

The price for the HP P1505n is Rs 14,999 which is costly and would make no obvious sense for a home user. For office use, it's a comparatively cheap investment. For prints with images along with text, the quality is average, but for just plain text printouts it does a rather good job. If you already own a monochrome laser printer, then there's no real reason to move to this. For a SoHo environment, or even larger offices for that matter, this printer should make good sense as it removes a dedicated print server from the equation.

RATINGS	
Performance	★★★
Features	★★★★
Build Quality	★★★½
Value for Money	★★★
Overall	★★★½

Specifications

Resolution: 600 x 600 dpi, Memory: 8MB, 1 toner cartridge, Dimensions: 14.9 x 15.9 x 8.9 inches, Weight: 5.8 kg.

Contact: Hewlett Packard
Phone: +91-124-2566 111
E-mail: samir-s_shah@hp.com
Web site: www.hp.com/in
Price: Rs. 14,999

Zebronics Mupic Arcade

Does A Lot But Not Too Well

The Music Arcade is a PMP that also works as a handheld gaming console. It comes with 2 GB of inbuilt memory and a Mini-SD card slot for expansion.

The quality of the buttons is poor. The buttons for the volume control and playback controls are placed on the outside.

Playing games is difficult as holding down the small keys more than a single key at a time is close to impossible. For the games, there is a NES emulator built into it. Additional games can be downloaded and put on the PMP.

The Mupic Arcade can play audio and video other than playing games and viewing text files. The screen is pretty good for images and movie playback but there is some stuttering while playing some of the videos. There are also other applications such as a calculator and a notepad. The PMP shows up as a USB drive on the operating system. Media files can be dumped into the respective folders through it.

An additional feature is the in-built camera. The camera can take still shots of resolutions up to 1600 x 1200. The maximum resolution for the videos is 320 x 240 and these are stored in the 3GP format. There are earplugs supplied with it—the audio is loud and they don't sound too shabby.

Overall, the player feels very cheap and has quite a few bugs and design flaws. It has quite a few features which you most likely won't use anyway.

Rs 5,400 is what you pay for the Mupic Arcade and that makes it really bad value for money when you compare it to the competition. For around Rs 2,000 to 3,000 more, you can get your hands on a Playstation Portable that comes with a much larger screen, is much more powerful, and has WiFi along with many other features. It also looks much better and feels a lot more solidly built than the Mupic Arcade.

RATINGS	
Performance	★★★
Features	★★★
Build Quality	★★★
Value for Money	★★½
Overall	★★★

Specifications

Screen resolution: 320x240, 2 GB internal memory, Mini-SD expansion cards support, MP3 / WMA Audio format support

Contact: Zebronics (TopNotch Infotronix)
Phone: +91-44-26616201
E-mail: enquiry@zebronics.info
Web site: www.zebronics.com
Price: Rs 5,400

Kiran Bhosle

Enjoying Movies On Your PC

Agent goes around the market place foraging for his new HTPC

After the hectic schedule last month, most of us were relaxing late one evening in our office and dreaming on how to splurge with the extra moolah from our annual increment. While one had planned a week off to Goa, another planned a long drive to visit family in Bangalore. I'd been hankering after an HTPC and with some extra money at hand, this finally seemed to be closer to reality. I managed to rope in another test centre buddy who was interested in something similar.

You can build / assemble a superb HTPC on your own, without any hassles. An HTPC is just like any other ordinary PC—multipurpose, except that it is aimed at realising a more realistic movie experience over a desktop. There are no special components that make up an HTPC—all you need is a reasonably fast processor with at least 1 GB RAM, an entry level graphics card or even a good onboard solution, a large widescreen monitor or TV (22 inches being a decent start) and a reasonable set of surround speakers (preferably 5.1). This relatively high configuration allows you to enjoy HD videos, which are encoded at resolutions of 1280x720 (720p) and 1080p (1920x1080) with progressive scanning. With Blu-ray media slated to become common by 2009, this investment could very well be rewarding in the long run. Similarly, rich multimedia content weighs heavily on system resources, though the presence of a GPU does alleviate the stress.

Look for a good LCD panel—a 22-inch TN will suffice—although something in the range of 24 inches would be better. If you can afford premium panels such as MVA and PVA, that would be the icing on the cake. Also, if you have a large LCD or Plasma TV, you could use the same. If any of you happen to have a decent gaming PC, or even a powerful multimedia PC with a good monitor, then you already have the essentials for a good HTPC. The only other aspect is the noise levels—HTPCs should be silent. Choose the cabinet and power supply carefully (if you are building from scratch). While efficient cooling is must, excessive noise is a strict no-no.

With the many options available to both of us, we had a tough time deciding what to buy. We visited Lamington Road, here in Mumbai a couple of times during the weekend. All the vendors we visited suggested the Intel platform. According to them, an integrated graphics processor (IGP) is the way to go. For an Intel-based PC, the G35 chipset makes a lot of sense. Based on the GMA x3500 GPU core, the G35 incorporates DirectX 10 graphics, HDMI support and digital audio outputs. The G33 is based around the less powerful x3100 GPU (2 less shader units than the G35). The 780G chipset (AMD-only platform) from ATI is a stronger contender for an HTPC, especially, if you're not buying a discrete graphics card. The 780G adds a powerful DX10-ready GPU in the form of the Radeon HD3200. NVIDIA's latest GeForce 8200 series of chipsets offer support for both platforms (Intel and AMD), and offers similar features such as H.264 and AVC hardware decoding, not found in the G35/G33m, significantly freeing up your CPU. This also enables seamless Blu-ray playback. The only issue is this chipset's (GeForce 8200) lack of availability in our markets at the time of writing this. Besides, the vendors we asked couldn't give us any concrete quotes or time frames. My colleague wanted an Intel solution, while I remained fixated on an AMD-based HTPC configuration.

After looking at four or five options, I decided on Gigabyte's GA-MA78GM-S2H (AMD 780G). It's well built, feature-rich, (Optical outs, HDMI, 2 PCI slots, 5 SATA ports), and has solid-state capacitors for durability. For the processor, after pouring over some features and specifications, I went for AMD's spanking new 65-nm "green" CPUs. At 2.1 GHz, the BE-2350 processor gives me all the horsepower I needed for any kind of HD or Blu-ray content, with power consumption of a mere 45 watts. I managed to get a combined price for the CPU and motherboard. I decided on a little extra memory and invested in 2 GB of DDR2 800 MHz memory from Transcend (integrated solutions utilise system memory, remember?). I already had a 250 GB hard drive, my 24-inch monitor and 5.1 speakers (Logitech). So, my only remaining purchases included a compact cabinet and matching power supply. I came across two cabinets that caught my attention—Antec's NSK1300 (with a cube-like form factor) and CoolerMaster's CM Media 260. The former is a very compact cube-like cabinet, and is very well-built. The CM 260 is a little higher, but a lot slimmer, and can fit an ATX-sized motherboard (the NSK1300 can manage Micro-ATX only). This cabinet also comes with a media centre unit (remote and receiver with necessary software).

My colleague wanted to connect his HTPC to his LCD TV directly, and was shopping for an HDMI-to-DVI converter. While I argued that his motherboard already had an HDMI port and that he was wasting his time searching for a graphics card, he argued that he wanted to game a bit as well. For a motherboard, we finally picked up a Gigabyte GA-G33M-S2H (G33). ASUS' P5E-VM HDMI (G35-based Intel solution), looked good, but at Rs 9,500 (board only) was too expensive. For the processor, he was looking at something basic, and was torn between an E2180 (Pentium Dual Core) and an E4300 (Core 2 Duo). Since he was going for a graphics card, I recommended the cheaper CPU—the E2180. I suggest a GeForce 8400GS for the video card. I wanted a fan-less solution (for less noise). The ASUS GeForce 8400GS Silent was our pick at Rs 3,200. He'd already bought a mini ATX form factor cabinet and 400-watt power supply from VIP earlier, so his build was complete, since he had 5.1 speakers.

We couldn't find branded stuff in Lamington Road, and eventually ended up buying a regular unbranded six feet long HDMI-to-DVI cable for Rs 1,900. HDMI cables were even cheaper—Rs 900. Although many people swear by costly brands, I feel that the difference (if any) is minimal, and definitely not worth the premium you pay for upmarket stuff.

We also tried looking for Media Centre remote and receiver kits that work with Windows XP MCE and Vista. Unfortunately, we came across many Chinese remote units with no receivers! It seems most people looking for a media centre PC remote unit usually end up buying a wireless keyboard and mouse kit...and with the paltry options available to us, I can't blame them. I guess I was lucky to get such an option along with my cabinet.

Although the HTPCs we built weren't exactly cheap, a much cheaper PC could be built by saving on costly LCD panels, expensive speakers etc. The fact that we already had half the components with us was the reason we stayed with them, else a decent 22-inch monitor would cost no more than 13,000 bucks. That's the beauty of an HTPC—spend more, get more! I've banged out this write-up on the same PC, and while I watch a quick movie, I leave you to pore over the detailed specifications below. ◙

agent001@thinkdigit.com

HTPC BUILDS	BUILD 1		BUILD 2	
	Components	**Price**	**Components**	**Price**
Processor	AMD Athlon BE-2350	Rs 8,300 (combo offer)	Intel Pentium Dual Core E2180	Rs 3,250
Motherboard	Gigabyte GA-MA78GM-S2H		Gigabyte GA-G33M-S2H	Rs 6,100
RAM	Transcend 2x1 GB DDR2 667	Rs 2,000	Kingston 1 GB DDR2 667	Rs 950
Discrete Graphics solution (if any)	NA	NA	ASUS GeForce 8400GS Silent	Rs 3,200
Hard Drive	Seagate 7200.10 250 GB	Rs 2,100	Western Digital WD3200KS	Rs 3,000
Monitor / Display	Dell E248WFP	Rs 18,500	Samsung 32-inch Bordeaux LA32 R81	Rs 42,000
Cabinet / Power Supply	CM Media 260 + Antec 350W	Rs 8,500	VIP Micro ATX case / 400 W PSU	Rs 4,200
Keyboard / Mouse / remote	Logitech wireless desktop basic	Rs 1,800	Logitech wireless desktop basic	Rs 1,800
Speakers	Logitech Z5300E	Rs 11,000	Altec Lansing VS3251	Rs 3,700
Total		**Rs 52,200**		**Rs 68,200**

Ask Agent 001

Tweak That Config!

Q I want to buy a PC with the following configuration:-
Intel Core 2 Duo E6550 2.33 GHz; ASUS P5N-E-SLI; 2x1 GB Kingston DDR2-667 MHz; Seagate Barracuda 7200.10-320 GB SATA; XFX GeForce 8800GT Alpha Dog Ed.-512 MB; 2 LG DVD Writers; 19-inch LG CRT monitor; Logitech G-15 gaming keyboard; CABINET–I-Ball gamer with 400 watts supply and a sound system within Rs 2,000. Is the PSU included with the i-Ball Gamer, sufficient for my configuration? If not, please suggest me a PSU and a good looking cabinet of mid-range.

Utsav Biswas

Opt for the new Penryn processors—the E8200, which at 2.66 GHz will be much better than the E6550, which I doubt is available as of now. Expect to pay around Rs 7,500 for this processor. The P5N E-SLI is a good motherboard, but why not go in for a hassle-free Intel P35 chipset? The Abit IP-35-E is a good board at just Rs 5,500 and will much more than satisfactory. I recommend the Corsair VX450 power supply for Rs 3,700. Your current 400-watt SMPS will be inadequate. For a sound system within 2,000 bucks, I suggest Artis 111R, which should cost around Rs 1,350.

Better Sound?

Q I recently purchased Logitech X-540, upgrading from JBL platinum series' mere 2 speakers. Reviews everywhere say it's the best under Rs 6,000. I have an onboard Realtek ALC885/889a, as revealed by Everest Ultimate. I wish to know whether upgrading to a discrete sound card will have a huge difference on the sound, or will it be worth the money spent? I am not exactly an audiophile, but will definitely appreciate better sound. Will the Soundblaster Audigy or X-Fi edition be the right choice? Please guide me and suggest an appropriate sound card. My budget is upto Rs 5,000, but I am expecting good value for it, otherwise I would rather stick with the onboard sound. Please suggest a value product, because I don't believe in paying a premium for negligible improvement in quality.

For your speakers, I don't think an add-on soundcard will help at all—at the most maybe a five per cent increment in quality, which won't really be noticeable. The difference in a good soundcard is noticeable on really good sound equipment. Unfortunately those speakers don't really qualify. So stick with the integrated sound solution.

Visual Appeal

Q I am looking for a monitor and I have zeroed in on the Dell SP2208WFP 22-inch. I want to use it as a standalone TV, so I would need an external TV tuner. I would like to know if there are any other monitors offering better functionalities and performance than this Dell and priced comparatively.

Gowtham Nayak

The SP 2208 WFP is a good monitor indeed, with a good contrast ratio and good colours for a TN panel. Expect to pay around 15,000 bucks for it. As far as an external TV Tuner that offers connectivity to a monitor goes, there are hardly any options available in the market, when I last checked. You will need a PC, and take a look at LeadTek as a good brand for TV Tuners. Do remember that the Dell SP2208 WFP is a glossy panel and will reflect pretty much anything easily, so if you're watching it from a distance (as you would a TV) then the experience may not be as good as you'd expect.

Gamer In Progress

Q After a year of saving, I am finally setting up my own gaming PC, the details are: Intel Core 2 Duo E6750, 2 GB DDR 2 Transcend RAM, GeForce 8600 GT based XDX graphics card, MSI P35 platinum desktop board, Samsung SH-S203 optical drive, ordinary multimedia keyboard, Logitech MX518 mouse. Please suggest a widescreen monitor and comment on the configuration.

Bijesh Amatya

First of all, if you're looking for a gaming solution, concentrate harder on your card and go for an 8800GT solution instead of the slower 8600GT—you'll see thrice the performance. Personally, I prefer Sony or LG optical drives. For a monitor, I recommend the Dell SP 2208 WFP for around Rs 15,000. Lastly, a processor upgrade to an E8400 would also be quite beneficial to your gaming experience, though it's only recommended if you are willing to spend more for a relatively small performance boost.

No Dell, Please

Q I want to buy a laptop for programming, graphics and multimedia. The GPU should have at least 256 MB of video memory, CPU at least 2 GHz. I need at least 160 GB of hard drive space. I would like to know, which will be better–AMD- or Intel-based ? Can I use an external optical drive with the laptop? Is there any powerful, feature-rich model are available in the market? Please note that I don't prefer Dell laptops. The screen size should also not be greater than 15.4 inches. My budget is around Rs 65,000.

Abhinab Gogoi

I'm surprised you don't care for Dell—their laptops represent some of the best value for money. If you'd not have been biased I'd have immediately pointed you towards Dell's XPS 1530, which is an excellent performance laptop with a fast processor and a GeForce 8600GT 256 MB graphics solution. For an HP notebook I recommend a look at the DV6700 Thrive Edition. It has amazing looks, and has a 256 MB GeForce 8400GS, along with 3 GB of system memory. It also has a 250 GB hard drive, and a 1.83 GHz Core 2 Duo processor.

Ad-hoc Networking

Most of us have heard of the term ad-hoc networking, but have never quite dwelt on understanding its potential in making our lives much easier

Nash David

Literally meaning "for this purpose", this is a network intended for closed functioning. A typical ad-hoc network involves interconnecting devices. It fits into the typical scenario—a desktop, the home PC, along with a couple of laptops—all connected together sharing resources such as storage area effectively, and most importantly, a common Internet connection.

Connecting Your Home Without A Router

Connecting your home with the standard configuration is quite simple. There are three basic steps involved in this. First you need to ensure that all the systems are WiFi compatible (buy a WLAN card for your desktop, if you need to). After you have cleared this hurdle, you need to configure it as a computer-to-computer (ad-hoc) network. Lastly, comes the Internet Connection Sharing (ICS) part.

Getting your computer WiFi-enabled is really simple. You need to plugin a Wireless network card, which is available in two forms—one a USB kind which you just plug and play, and the other which you need to fix into your PCI slot on your motherboard. Most laptops are WiFi enabled, so no work needed there.

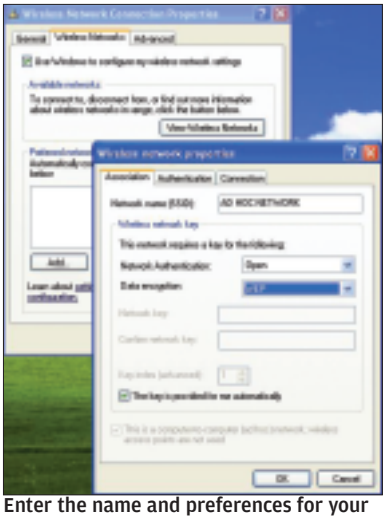
In order to proceed with setting up the network, you need to configure one computer as the host and others as the client. We will start with the host computer. Click on the icon in your system tray to view available wireless connections. You may see some wireless networks from your neighbourhood, in the list. Do not select any yet.

Go to `Start > Control Panel > Network Connections`. Right-click on your wireless network adapter and click on `Properties`. Select the `Wireless Network` Tab.

Click on `Advanced` on the bottom right. Select the option for `Computer-to-computer (ad-hoc) networks only`.

Our next step is to christen our ad-hoc network so that all users can log on to it. To do this, click on `Add` in the same dialog box. You need to enter a name for your ad-hoc network—called a Service Set Identifier (SSID) which is nothing but a name for your network.

To prevent abuse of your ad-hoc network, it is always wise to use the network authentication and data encryption features. Nevertheless, in this scenario, you are still safe even of you leave `Network Authentication` as `Open`—this setting has more relevance if you're setting up a more permanent network.



Enter the name and preferences for your ad-hoc network

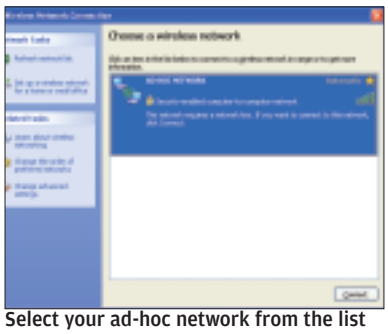
Once you enter in these details, click `OK` and you are done with the host computer.

Configuring The Client

The way to configure the client is in not too different from the way you configured the host. Follow the same procedure, enter the same SSID, and remember to select the option for `Computer-to-computer ad-hoc networks only`.

Once you are done with these steps, you are ready to connect. Now click on the icon for wireless networks. Refresh the network list on the laptops / computers that will act as clients on the ad-hoc network (`AD-HOC NETWORK` in our case).

You will see your ad hoc network appearing in the list of available networks. Select this network and click on `Connect`. It is worth noting that the systems that are part of the ad hoc network should be connected simultaneously to the network in order to make it a more convenient procedure.



Select your ad-hoc network from the list

Once your connection is established, Windows will will indicate the signal strength and quality. Now all you have to do is start sharing! ■

nash.david@thinkdigit.com

AutoHotkey Basics

Work at the speed of... err... your PC config. AutoHotkey makes life easier

Samir Makwana

You know that you can save time by using shortcuts, but each task has a different shortcut to remember. If you perform many predefined tasks, you should use a little program called AutoHotkey. Get it from **www.autohotkey.com**, and we promise you will never want to live without it again.

Basic Scripting Rules

You can command your PC better if you learn some of the simple scripting that AutoHotkey expects. You will need a text editor.

To create a script, just right-click on the desktop, or on any folder and choose `New > AutoHotkey Script` from the context menu. Next, open the script you created in Notepad by right-clicking on it and selecting Edit.

Before you begin scripting, you will need to know how common keys are added to this script: for example, the Windows key is denoted by `[#]`, while `[+]` is `[Shift]`, [!] is `[Alt]` and `[^]` is [Ctrl]. Visit **http://tinyurl.com/2coxu3** for a list of hotkeys.

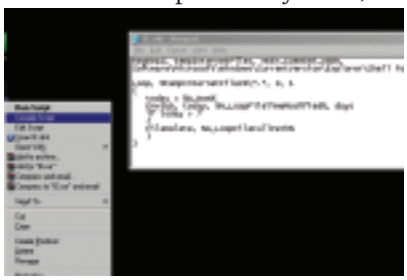
App Launcher

If you need multiple programs to be launched simultaneously, then you can save time by scripting hotkeys.

In a new AutoHotkey script window, type the following in,

```
#o::
Run, %A_Program
Files%\Opera\Opera.exe
Run Winword.exe
Run Notepad.exe
Return
```

Save this script with any name, for example, 'Start', with an .ahk extension. Double-click on it to run and an AutoHotkey (Letter H) icon will show up in the system tray. You can add as many programs to the script, but certain programs like Photoshop take time to load.



Compile scripts and run them on Windows-based PCs.

This script runs Opera, MS Word and Notepad by pressing the Windows Key and `[O]`. Right-click on the script and choose `Compile Script` to create an executable that can run on any Windows-based machine.

Run with Hot Strings

Repetitive typing of the same text, especially in chat or e-mail replies at times can get time-consuming and also boring. AutoHotkey allows writing scripts for auto-completion of text modules. For example,

```
::sig::With kind
regards{Enter}{Enter}Yours
sincerely{Enter}{Enter}Samir
Makwana{Enter}Writer-
DIGIT{Enter}9.9
Interactive{Enter}Mumbai
{Enter}
```

Save and run this script. Now whenever you type "sig", you'll find your signature pasted automatically. Make sure that the trigger ("sig" in our case) is unique, or you'll find yourself inserting signatures where they shouldn't be. It's better to use special characters, such as `@@` to avoid any confusion.

Another example:

```
:*:s@@::samir.makwana@thinkdi
git.com
```

This hotkey will add the text above as soon as you have typed `@@`.

Delete Temporary Internet Files

Note: Backup your registry before using this hotkey script, since it alters the registry.

Instead of manually deleting your browser cache, you can just use AutoHotkey to do it for you.

```
RegRead, tempInternetFiles,
HKEY_CURRENT_USER,
Software\Microsoft\Windows\C
urrentVersion\Explorer\Shell
Folders, Cache
Loop,
%tempInternetFiles%\*.*, 0,
1
{
    today = %A_Now%
    EnvSub, today,
%A_LoopFileTimeModified%,
days
    if today > 7
    {
    FileDelete,
%A_LoopFileFullPath%
    }
}
```

Save this script and then compile it to create an executable. Just double-click it to delete all temporary files!

Folder Content Copy

Want to know what songs you have in your miscellaneous folder, or what .files are taking up space in your My Documents folder? Let AutoHotkey find out for you. Use the following simple script to catalogue disc contents and then compile it to make it an executable:

```
SetWorkingDir, %1%
Loop, *.doc, 1, 1
{
    All =
%All%%A_LoopFileFullPath%`r`
n
}
Clipboard = %All%
```

Now, if `C:\misc\DVD2` is the folder in question, just drag and drop the DVD2 folder on to the executable you created. Based on the script, all the returned data will be saved to the clipboard. All you have to do now is to fire up notepad and paste it and then save or print it as you please.

The above script will look not only in the DVD2 folder but also all the sub-directories under it. If you want all the files in a particular directory to be listed, you have to replace the "`*.doc`" part of the script with "`*.*`".

To learn more, visit **www.autohotkey.com** and master this simple program that's worth its weight in gold. ■

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Flying Without Wings

Limnor lets you write the programs you always wanted to... without the hassle of coding!

Nimish Chandiramani

Limnor—a new "visual programming tool", lets you create programs without having to write any code, and unlike Scratch (**http://scratch.mit.edu**), it's not for kids' games and animation, either.

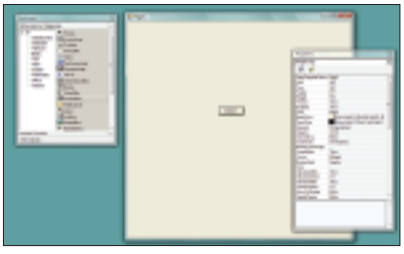
The key here is *event-based programming*—basically, your application is in an idle state till something (like a mouse click or the press of a key) happens. Here, we'll create a simple program that opens a dialog that says "Hello" (or anything you prefer, for that matter).

The Very Basics

On start up, Limnor asks you to create a new application and decide whether it'll be a Desktop Application or a Kiosk Application (one that fills the screen and is the only application to run at any time). Later, you can also change the nature of the program from within Limnor.

The main toolbar is on the left, and to access the main menu, you must click on the Menu button. To minimise Limnor, click on the button at the very top. The rest of the screen is taken up by an empty window for you to build on—a 'page' in Limnor-speak.

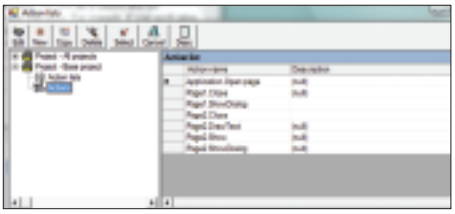
We'll be following the event-action approach here. We'll first create an action, and then find an event to associate it with. For example, let's create an Exit button for our application. Right-click on Page 1 and choose `Make Action > Close`. Let the name of the action remain the default. Now to create a button.



Start by creating a button

Items like buttons, text boxes and so on are called 'performers' in Limnor. Click on the `Performers` button on the toolbar to access the toolbox. Under `Performers by Categories > Basic`, you'll find `Button`. Drag a button on to your page and position it where required.

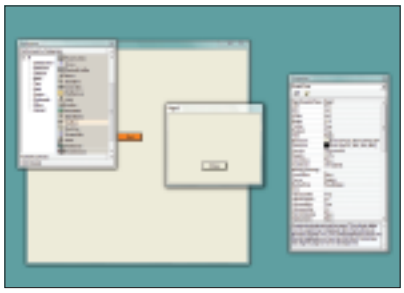
To change the text on the button, right-click on it and choose `Properties`. Once you're done having your fun here, it's time to attach the Close action to the button's Click event. Right-click on the button and choose `Assign Actions > Click`. Select the row with `Page1.Close` and hit the `Select` button. Click on `Run` at the bottom of the toolbar. When you click the button, your application should close and you should return to Limnor.



Add an action to your button

Another Page

Right-click anywhere and choose `Add / Open Page > Add New Page Template`. Page 2 will now be created, and you can manipulate this any way you please. Here, too, create an action called `Page2.Close`, and associate that with a `Close` button like before. To give this page a more dialog-like look, right-click on the page and choose Properties. In the `Properties` dialog, change Control Box to `False` and `BorderStyle` to `FixedDialog`.



Page 2, after some work

For the text, right-click on Page 2 and choose `Make Action > DrawText`. An Action Data dialog will come up, where you can enter the text you want to draw (under Text around the bottom left). To make sure this text is drawn when Page 2 appears, right-click on the page and choose `Assign Actions > AfterShow`. Choose `Page2.DrawText` in the Actions dialog and hit the Select button—just like before.

To have Page 2 as a dialog box, we need to create the ShowDialog action—right-click on Page 2 and choose `Make Action > ShowDialog`. We want Page 2 to show up when a button on Page 1 is clicked, so now go back to Page 1. Change the text of the button you had created, to "Press Me!" (or something as tempting). Right-click on it and choose `Assign Actions > Click`. In the Actions dialog, choose `Page2.ShowDialog` and hit the `Select` button.

On running the program, you'll see that Page 2 opens when you click on the button in Page 1. Also, you can't do anything in Page 1 without closing Page 2.

With something as easy as this at your disposal, just go ahead and start programming. Send us your programs, and if they're good, we'll feature them on the DVD! ■

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Tomboy

Note keeping made easy in Linux

Rossi Fernandes

Tomboy is a note-keeping application, which is similar to Microsoft's OneNote that comes with the Office suite. Remember those rush hour situations of opening a text editor to type in bits of information such as phone numbers or things to do? Tomboy is an improvement over such text editors. Even though it is a small software, there are loads of features and we will be looking at how these can be used.

Tomboy comes preinstalled with Ubuntu. Later versions can also be downloaded from **www.gnome.org/projects/tomboy**. Once you have it up and running, creating notes is simple. Click on the Tomboy icon in the tray and choose `Create New Note`. Type in the information you want and close the window to save it.

Creating New Notebooks

Notes are easy to track, and Tomboy makes it even simpler by allowing you to create separate notebooks as a way of grouping them. For example, you can have a separate notebook for each day, or for a different topic. To create a new notebook, left click on the Tomboy icon and then on `Notebooks > New Notebook`. You can open notebooks previously created by clicking on the names in the same menu.

It is possible to move notes among notebooks. You can open a note and press the Notebook button on the top right and choose the notebook where you want to move it. The other way is to go to the Search notes window and drag and drop notes to the notebooks.

Searching Notes

Once you have started using Tomboy, you will need to access these notes easily. The search feature can be accessed by left-clicking on the Tomboy icon in the system tray and clicking on `Search All Notes`. Type the search keywords and press Enter to search. You can also click on a notebook in the left pane to search only that notebook.

Creating Links To Other Notes

Links allow you to switch from one note to another. To create a link, highlight some text using the left-click and then right-click on it. Select `Link to New Note`. Enter the information into this note and close it. Clicking on the link will now take you to the new note.

Another way to create links between notes is to use the formatting methods used in Wiki. Type a keyword which you want to create a link with in this manner—`ThinkDigit`, for example. Each word should begin with an upper case and should not have any space between them. Press `Enter` and you will notice the change in formatting. Click that word to open a new note.

Exporting Notes

If you want to export notes to another computer or application, first open the note you want to export. Choose `Tools > Export to HTML`. You can also synchronise your Tomboy notes with another folder or an online service. To synchronise to a folder, right-click on the Tomboy icon and choose `Preferences > Synchronization` tab. Use the dropdown menu and select `Local Folder`. Single notes can be synchronised by choosing `Tools > Synchronize Notes`.

For WebDAV synchronisation, you first need to find a service. Once you have your login information, go to the `Synchronization` tab in the `Preferences` window again. Choose `WebDAV` from the dropdown and enter the login information.

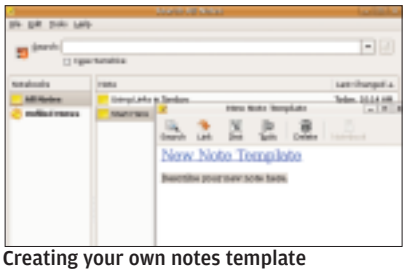
Adding And Disabling Plugins

Tomboy supports third party plugins, which can be used to add new features to the program. One can install Tomboy plugins by copying the uncompressed files to `/home/Your_userID/.tomboy/addins` folder. A list of plugins for Tomboy can be found at **http://live.gnome.org/Tomboy/PluginList**.

To access the list of plugins that come installed with Tomboy, go to the Preferences window and click on Add-ins. You may not require certain features like WebDAV. You can disable such add-ins by selecting them first and then clicking on Disable.

Customising Tomboy

Tomboy is customisable to some extent. The fonts are one such component which look good enough, but might not suite everybody. Fonts for the notes can be changed by right-clicking on the Tomboy system tray and then on Preferences. Click the `Use custom font` checkbox and select the font you want to use.



Creating your own notes template

Tomboy also has shortcut keys that can be used to quickly add or search for notes. These shortcut keys can be changed to easier ones. Under Preferences, click the Hotkeys tab and change them. ■

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Wireshark

Monitor your network with greater ease...

Rossi Fernandes

Wireshark is a free and open source network packet analysing software, which was known as Ethereal till 2006. If you're a developer, you can monitor network connections made by your applications. If you have a network or if your Internet connection is constantly getting congested, then you can use Wireshark to examine the cause. There are chances that you might find a virus or worm to be cause of the congestion. It also makes a very good educational tool for networking and security enthusiasts.

Selecting The Interface And Capturing

Wireshark can be used to capture data from all kinds of network adapters. If you have more than one network adapter, you need to first select it. Go to `Capture > Options`. Choose the one you want to capture from the dropdown menu and make changes to the settings if you need to. Click on `Start` to capture data. After you finish capturing data, click on the `Stop` button on the toolbar, or from the Capture menu.

Wireshark can also load data captured using other network analysing tools. Go to `File > Open` and select the file to be imported. You can also set filters during the import process. Captured data can be saved using `File > Save As`.

Understanding The Interface

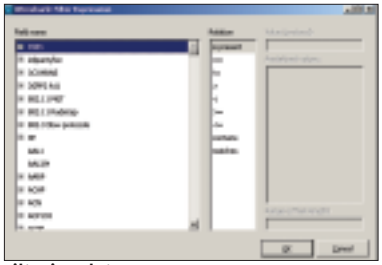
Working with Wireshark can be a very harrowing experience when you first use it. The three most important panes that you see from top to bottom are the packet info, packet details and packet bytes panes. The topmost pane displays the different packets passing through the network and the packet details shows important statistics and information on the selected packet. The last packet bytes pane displays the data in the packet itself. Clicking on a pane in the packet info pane shows the necessary information for that packet in the other two panes.

If you do not like the layout of the interface, you can change it by selecting `Edit > Preferences`. Click on `Layout` under the `User Interface` section on the left. Now click on one of the layouts and click `OK` to enable that layout.

Filtering In Wireshark

There is way too much data that Wireshark churns up when you set it to capture data. It is close to impossible to use all of that data. The filter feature is one of the most important things to understand in Wireshark, as it will make going through connections and packets much simpler than if you were to do it one packet at a time.

The simplest way to filter data is to use the Filter toolbar. Use keywords like tcp or udp to filter out data. More advanced parameters can be found by clicking on `Expression`. Scroll down to the category you want to filter. Expand the item and choose the parameter. Select a relation and enter a value. Click `OK` and the filter will be entered. A history of filters is stored in the same dropdown menu, so you can access the most used filters from time to time.



Filtering data

Colouring rules

To make tracking of packets and connections easier, Wireshark displays important events in unique colours. These colours can be changed and new ones added by clicking on `View > Coloring Rules`. You can create your own custom colouring rule by clicking on the `New` button. Give a name to the rule and enter a filter. Choose a background and foreground colour by clicking on the buttons below. Click `OK`. These rules can be saved and loaded back again using the Export and Import buttons.

For colouring of certain connections, select `View > Colorize Conversation`. You can also use the shortcuts `[Ctrl] + [1]` to `[0]` to set colours. The sequence of packets and transactions will be highlighted in that colour making it easy to find and understand.

Refresh Rate

Depending on the size of the network and the amount of data passing through it, Wireshark can significantly slow down your computer. All the packets are being updated on the interface in real time. Click on `Edit > Preferences > Capture`. Uncheck the box for and updated list of the packets in real time. Click OK. All the packets will now be captured in the background. When the command for stopping the data capture is given, you can see all captured data on the screen.

You can see the captured data in real-time by scrolling it on the window. If you find this annoying, you can disable it by unchecking the `Auto Scroll in Live Capture` item under `View`. ■

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Basket Note Pads

Linux users can now store your tidbits in a "basket" of their own

Rossi Fernandes

Basket Note Pads (**http://basket.kde.org**) is another note-taking software just like Tomboy. It can be installed on Gnome-based distributions as well, but requires additional KDE libraries in order to work. Compared to Tomboy, Basket Note Pads is a monster with many more features for security and also seamless integration with other applications.

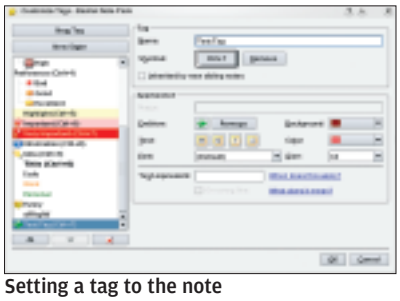
Creating Baskets

Notes are kept in baskets—a fancy name for container—that help in sorting and categorising events and tasks. You can create baskets by clicking on the Basket menu and then on `New > New Basket`. You can choose the layout template for this new basket.

You can make even more changes in the basket by right-clicking on a basket and choosing `Properties`. Tasks are created by clicking in a basket. Enter the notes and then click elsewhere.

Setting A Tag To The Note

Basket Note Pads is a complete note taking software and doubles as a planner at the same time. Every single note created can be changed to be a different kind of item. Say you create a new note. You can set that note to be an item in a To-Do list or you can use the note as a progress bar to monitor status of a particular job.



Setting a tag to the note

To change the note to any other kind item, click on the down arrow marker on the note and choose the type of tag you want to set. You can choose to set multiple tags to a note. There are also shortcut keys displayed alongside the tags.

You can also create your own tag or even customise an existing one. In the `Tags` menu, select `Assign New Tag`. Give the tag a name and choose a shortcut for it. Modify it further by setting different fonts, colours and icons for it.

You can prioritise tasks in the same manner. Select a task and use the dropdown menu for the task and select the priority level.

Add Elements To A Note

The speciality of Basket Note Pads is that you can simply drag elements into a note or basket. To drag images for example, open a file browser and drag and drop the image from the browser to the basket. Click on `Copy here` to confirm the move. To move the image in place, click on the left holder and drag it into place. Images can be locked to other text notes by dragging it below another note. To resize the image, hold the right holder and drag it.

There might be pages and sites with multiple little components that cannot be imported into Basket Note Pads. For this, there is even a screen capture feature which allows you to take a snapshot of the page and save it in the application. To do this, right-click in the basket and click on `Grab Screen Zone`. Drag a box around the area of interest, to capture the screen and to add it as an image in the basket.

Adding Links

It isn't just images and text that can be added to your notes. You can create links to sites and even start programs by clicking on a link. To add a link to a program, select `Insert > Launcher`. Enter a command name for the application or press the .... button to select a program. Give a name to the application and choose an icon. Click `OK`. Entering site links is simpler. Simply type the URL for the page in the note, and the link will be generated automatically.

Setting A Password

The notes in your basket may contain sensitive information. Right-click on a basket and select `Password`. Click on `Protect basket with a password`. Click `OK` and then enter a passphrase. You might have to repeat it a couple of times before it is registered. The next time you access this notebook, you will need to enter the password.

Filtering Notes

Searching notes in Basket Note Pads is of no worry either. You can search through the notes using the filter toolbar above the notebook workspace. Click on the Tag dropdown and then enter a keyword in the Filter text field. Even with no keyword entered, you can use the Tag dropdown menu to sort out a particular kind of note - for example, To Do lists or jobs of a particular priority level.

Importing And Backing Up Data

All notes need to be periodically-backed up, to prevent data loss while migrating to another computer or account. Go to `Basket > Backup & Restore`. `Move to Another Folder` changes the location of your data files as per your choice. Backups can be made by clicking the Backup... button and the Restore & Backup can be used to restore backed up data. ■

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There's A Monkey In Your PC

MediaMonkey is your saviour if you have tonnes of unsorted music. Just sit back and let the Monkey do all the work

Samir Makwana

Sound Check

Codecs are important for good quality playback, so download the Vista Codec Package from **http://tinyurl. com/6qfkmb** for all Vista 32-bit versions. Those on Vista 64-bit systems need to install Vista Codec x64 Components from **http://tinyurl.com/68o7tq**.

MediaMonkey is a music player, organiser, MP3 encoder and tagging software. You can get it from **www.mediamonkey.com**.

Add Files To The Library

When you launch MediaMonkey for first time, it asks you to add media files. You can just select the drive that contains your music, or just let it search your entire computer.

MediaMonkey will scan your hard drive for media files and add them all to its library

To automatically sort your music, click on the + sign before `Files to Edit` and from the list that's shown, choose one option. One you have selected a task, just press `[Ctrl] + [Shift] + [C]` to open the Convert Tracks dialog. You can level volumes, sort your tracks based on artist, album, year, genre, whatever!

To rips tracks from an audio CD, just go to `Tools > Rip Audio CD`, choose the resultant compression format, and click or any other format.

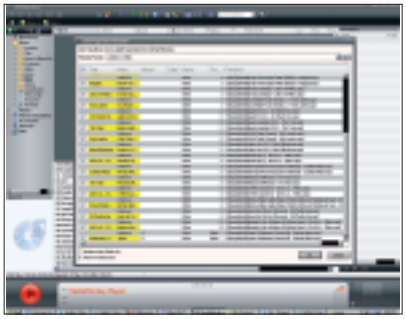
If you wish to check the statistics of your music collection then go to `File > Create Reports > Statistics` to generate a statistical report.

Organising Your Collection

Once you're done adding all your music to MediaMonkey's library, you now have to sort all that music. To do this, click on either Title, Artist, Album, Genre or Year, select all the tracks shown and then press `[Ctrl] + [R]` (or just go to `Tools > Auto-Organize Files`) to organise your music files. When the Auto-Organize window pops up, any duplicate files that are found will be listed in red. Click `Configure` if you want to specify a particular format—such as `<Artist> - <Title>`, or `<Artist>-<Album>-<Title>`, or whatever options you want. Press OK and your files will be auto-organised.

Editing Tags

You can edit tags directly from inside MediaMonkey by just clicking on the field you want to change in the main window. You can also let MediaMonkey auto-tag all you music. Just select all tracks and then go to `Tools > Auto-Tag from Filename/Web`. Album art can be changed from the Update Album art box on the left column below the music explorer tree.



Why tag your own music? Let the Monkey do all the dirty work

Syncing A Portable USB Device

As you connect your phone or portable device to your PC, MediaMonkey will recognise it. You can now sync Playlists with the portable device and make relevant changes as per your choice. To safely remove the device, just click on the drop down arrow next to the Portable / Audio Device icon, choose `Safely Remove Device`, and then you disconnect the device.

If you're on Windows Vista, and find that your USB mass storage devices and phones are unable to sync with Vista, you need to go to `C:\Windows\INF\` and find the file `INFCACHE.1` and delete it. You will need to have Administrator access to do this. Now, copy `USBSTOR.INF` and `USBSTOR.PNF` from `C:\WINDOWS\System32\DriverStore\FileRepository` to `C:\WINDOWS\INF` and restart your PC. If you continue to have problems with syncing phones, you may have corrupted drivers, so reinstall them.

Party All Night

You're hosting a party, and you can't afford a DJ. You don't need one; just let the Monkey DJ for you. Go to `Tools > Options` and then find `Player > Auto-DJ/Now Playing`. Just tick the "Enable Auto-DJ" check box, set the number of upcoming tracks and select the location of the music. By default the entire library is selected, but you can select a folder where you've stored all your party music instead. Now all you have to do is click the Play button in MediaMonkey! ■

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RACEDRIVER GRID

For some reason, the latest *Need for Speed: Pro Street* hasn't received the same warm welcome from gamers as the earlier *NFS* series starting from *NFS: Underground*. *NFS*s have the feeling of going through the streets at lightning speeds and braking from those speeds to a complete halt in 2 seconds, taking sharp 90 degree turns at such speeds with gravity working overtime to stop you from crashing into a building or someone's living room. On the other hand, for the console, there's the *Gran Turismo 5*, which has always given console gamers a mild sensation of racing simulation.

Seriously though, games like *GTR2*, *Live for Speed*, *rFactor* and *Richard Burns Rally* for the PC are more authentic and exhibit immersive simulations than the watered down arcade games.

Here's where Codemaster's all new arcade-sim racer *Race Driver: Grid* comes into the picture. The last release of *Colin McRae - Dirt* has been known for its graphics. It's the same engine that's used in *Grid*.

Each game mode has a distinct handling characteristics for the cars. If you thought you were good at *NFS* drifting, then you have to try *Grid*.

Multiplayer works considerably well. The netcode is great and cars don't hover or juggle around the roads like other racing games. The real opponents can be annoying as you'll find yourself being boxed into barriers, and straight into walls on some narrower tracks. The tracks are well detailed and there is a good variety of them. There're race circuits, as well as street tracks to industrial zones for drifting!

Finally! An arcade racer that respects some laws of physics...

The replay is just spectacular with realistic camera motion. *NFS* had done away with the cockpit views years ago, and is good to see it back in a racing title like *Grid*. There's a fair amount of detail in the car and it adds to the mood.

Dents, smashed corners, scraped patches of paint are quite normal. It's amazing how much more refined *Grid* is than *Dirt* was. The game absolutely gorgeous and is undoubtedly one of the best looking racers - maybe even better than *Dirt*.

Simply put, *Grid* is a fun arcade racer, garnished with bits of simulation characteristics—it's more challenging than NFS for sure, and it's a proper racing game with focus on diligent driving and worrying less about how flashy your car looks. Since its demo release a few weeks, there's been enthusiasm from simulation and arcade racing fans alike.

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Rating: **8/10**
Developer: **Ubisoft Montreal**
Publisher: **Ubisoft**
Platforms: **PC, Xbox 360 and Playstation 3**

Assassin's Creed

Lets play an assassin in a game within a game!

Assassin's Creed is set in the not too distant future. You're part of a scientific experiment, which involves a machine called the Animus. *Assassin's Creed* takes you back to your distant ancestral past... where you play the role of an assassin called Altair.

Your leader has lost trust in you and now to regain it back, you must go through missions. You're rewarded with new skills and weapons for clearing these. Every now and then, you are brought out by the doctor and his assistant, whose looks and voice has been done by the well known TV actress Kristen Bell.

The graphics are amazing, and surprisingly, it runs well on mid-ranged graphics cards like the GeForce 8800GT and the 9600GT, in spite of the multisampling rate set to high, and a resolution of 1680x1050. The textures used are decent and the lighting looks pretty realistic as well. The sound effects are great, as are all the moves and animations. The mood is set well with crowds in the market area and sparser populations in the narrower lanes.

Occasionally, you end up surrounded by several guards trying to poke you in the back. The AI does a good job of keeping you engaged. The guards chase you even over the roof tops, and those in the surroundings chase you if you seem fussy.

It isn't a very long game either, if you just go by the bare needed missions to get upgrades. One good example of some ridiculous stunts is the Leap of Faith, where you climb some of the tallest structures towering hundreds of feet in the air to survey the area for your next target. You then jump off it into an always suitably positioned small cart of hay, only to walk away without a scratch.

If you hurry to finish the game, it will probably last you 2 to 3 days. Overall, it's a good, fun game to play for an hour or so everyday. There has already been news of a sequel in the works.

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Rating: **8/10**
Developer: **Ubisoft Montreal**
Publisher: **Ubisoft**
Platforms: **PC, Xbox 360 and Playstation 3**

You Lose. The Dead Win.

Fright Nite (*FN*) is to the mobile what *The House of the Dead* (*HOD*) is to the computer—and no, that's not a good thing. You're in a usual save-the-world mission plot—I paraphrase from the in-game brief, "Zombies are back from the dead. Using the holy "portion", you must terminate the zombies." Even if you digest the error, there is *no* holy potion to use. You have a five-bullet pistol.

The crosshairs are moved using the joystick and/or 2, 4, 6, 8 keys. The joystick click shoots, and "5" reloads. This is frustrating—once you are shooting down zombies, 5 bullets are nothing, and moving your thumb between the joystick and 5 is not really ergonomic.

Now, the biggest blunder. The game belongs to the "augmented reality" genre—making use of real world around with the help of the phone's camera—zombies will be layered on top of the camera's display, making it look like there are zombies around the real world. And this feature doesn't work.

There are two game modes—Dark Fall and Survival. Survival is literally surviving by killing zombies till they kill you. Dark Fall mode starts with the easy level with a preset number of targets. Every time you kill the fixed number of targets you get promoted to a higher difficulty. This continues for Easy and Medium, and with Hard you complete the game. The world is saved, and so are you. This game surely is a hit—with two year olds, though.

Durgesh Kawale
Courtesy SKOAR!

Rating: **3 / 10**
Developer: **Mauj Games**
Price: **Rs 50**
To Download: **SMS GAME 1419 to 57007**

San Andreas Goes Mobile!

Ah, how I remember my first time playing *GTA 3*. I was slightly impressed by the sheer size of Liberty City, very impressed by the weapons and car handling (I must have been 15 at the time), and then *Vice City* won me over with bikes, helicopters, '80's cars and the *Scarface* theme. Now, I have taken GTA-clone gaming to the next level with *Gangstar: Crime City*. It's better than I thought...much better.

You take on the role of Sean Johnson, who has returned to Crime City, to find that all the local gangs are being wiped out by a mysterious man called the Kingpin. Sean, who owes the Kingpin half a million, is in trouble because his gang has been wiped out. The game follows Sean trying to rebuild his gang and eliminate the Kingpin. This story isn't much, just a spinoff of *San Andreas*: as far as stories go, I've seen better. I've seen worse too.

To rebuild his gang, Sean must hire Uzi-carrying "bodyguards" from gun shops for $10,000 per man. There are also various businesses around town like a music store and restaurant: you can buy them up to increase revenue, a la *Vice City*.

The graphics are well-done, and the car detailing is good: the cars look almost 3-D, leaving real tire burns after powersliding. The sound is also adequate: not annoying, but not exactly melodious either. At the end of the day, *Gangstar* is a great game. There are a few control issues, but those aside, this could very well be a good prequel or sequel to *GTA San Andreas*, but the characters are nothing to remember and the story is overshadowed by its free-roaming experience.

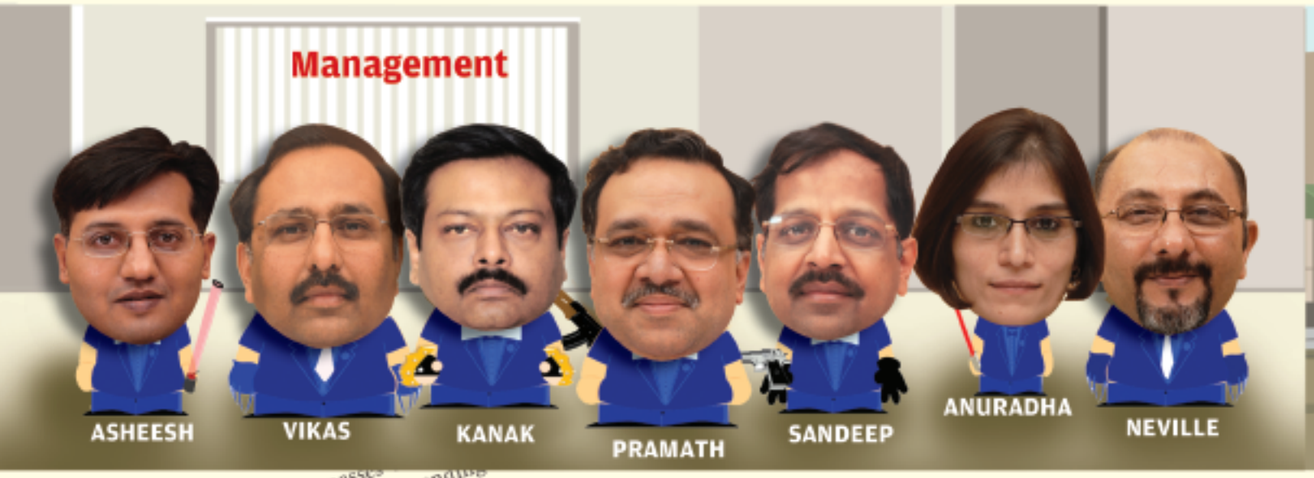
Pranab Pant
Courtesy SKOAR!

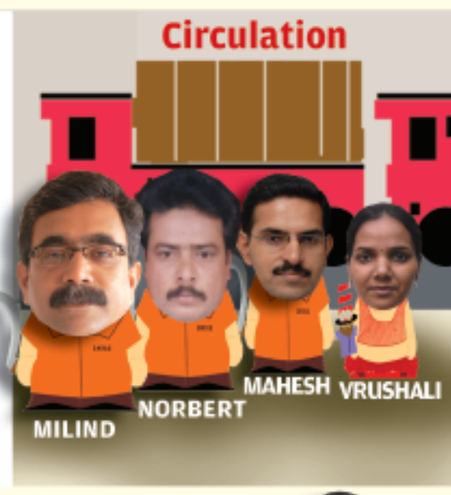
Rating: **8 / 10**
Developer: **Rockstar Games**
Publisher: **Gameloft**
Price: **$3 (Rs 126 approx—www.gameloft.com)**

digit SEVENTH ANNIVERSARY

47 Warriors

For 7 years, these 7 teams have fought off all challengers to remain India's only true Technology Navigator. We look forward to doing the same for years to come





The Eighth Wonder

May. You too have undoubtedly felt its wrath—especially in the sun-beating-down-on-hapless-soul department. This is also the month that we stock up on coffee (and all the accessories, of course—sugar, milk and all that) in preparation for overnighters, and bean bags (or any soft materials that can be used as a bed), should the coffee not perform as advertised. (It did not.)

Another anniversary issue put to bed, screaming, writhing and scratching like a toddler deprived of chocolate and cartoons. Bhaskar dislocated his shoulder, FatBeing went down with the flu, Vijay complained all throughout of an aching body, Sanket had to go visit his in-laws for a post-wedding ritual and everyone except Rossi and Nash complained about the 16-hour workdays. It always seems like a miracle, and it always gets done— don't ask us how. We just hope you enjoyed the results.

In other news, Samir (aka Shady, aka "You camping %^$@") has left our portals, leaving Michael a teary mess. We're always looking for new blood to spill (in *Quake III*, silly), so write in and apply for a job if you're interested. We will undoubtedly miss the entertainment and target practice Samir so generously provided to the whole team. From now on, we'll have to make do with fragging Michael to kingdom come. Hey, maybe that's why he's so teary-eyed to see Shady leave!

DIGIT DIARY

Vijay—miffed at the fact that he was recognised from a mile away due to the heaving swell of his belly—decided that it had gone on too long, and hit the gym. And the gym, as gyms can sometimes do, hit back. There was the strong temptation (on both sides) to part ways, but they stuck to it, and after many painful hours of negotiations, have reached a mutually beneficial arrangement. The swell has been demoted to protrusion, and Vijay's new theme song is "I feel good!" (Complete with screeches and sound effects). Nimish (FatBeing) was inspired, but only in a moment of weakness. "What use is a FatBeing," it dawned on him, "without Fat?"

Nash has started to show his ugly side—keep him awake long enough, and he spews the foulest of humour—the kind that even B-grade Bollywood comedies would reject. Once he makes it past that stage (miraculously, with limbs still attached), he oscillates between grammar-nerd humour (the kind with big words we bet even he doesn't understand) and religious propaganda. In his 25th waking hour, he finally comes up with a killer...and promptly falls asleep halfway through. We're still waiting for him to wake up, so maybe we'll share that with you next month.

Raaabo, as usual, is rueing the day he took over the magazine—not only does he have much more work to do, he has to spend innumerable hours with the Suits listening to management jabber like "strategise", "monetise", "add value" and other such Big Words. Someone pointed out that if he hadn't already gone bald, he would have by now. We're starting to wonder who he sees when he blows people up in *Quake III*. We have a medical team on standby. You never know...

FatBeing lost his status as "young-ish blood" (he's 25) towards the end of the month, when a young reader addressed him as "Dear Uncle Chandiramani". You've no doubt read the letter earlier in this issue. He has since been the victim of comments like "I *told* you to shave off that beard" and "When Uncle talks, you must listen", and many such crimes against humanity.

digit

iPod Touch Giveaway.

In celebration of *Digit's* **7th Anniversary**, we're giving away **7 iPod Touch PMPs** to **7 lucky readers**. All you have to do is wait till we announce the winning numbers—online at ThinkDigit.com and in our July issue. If the number printed alongside is one of the winning numbers, courier us this page with your contact details and we will send you your iPod Touch.

Please address your courier to:
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