Eco-Friendly Energy – Part 2

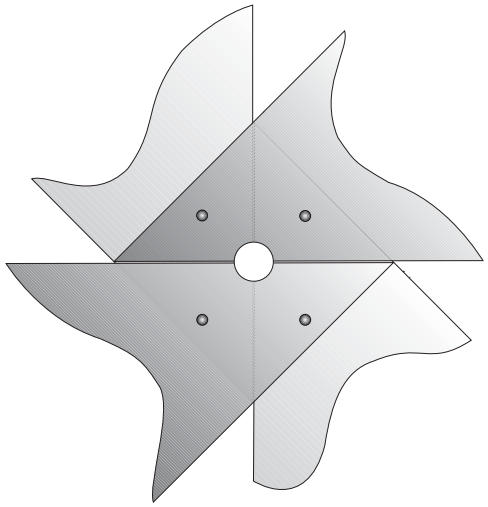
by Smart Arts

Well, following my first article in which I proposed several configurations of wind turbine and the ways that they might work, I decided to go ahead and build a turbine as proposed at the end of the piece. This was based on a child's windmill. In the process I succeeded in disproving my own theory that was that this sort of design should work as a vertical axis machine. It doesn't!

I chose this design because it is easy to make and as far as I am aware, no one else has used it before for this purpose. Ease of construction was an important factor since I have no workshop facilities so the whole project had to be built on the kitchen table and in the back yard, using nothing more technical than a Black & Decker power drill and Workmate. It is also more exciting to be working on a design that's not previously been tried and tested.

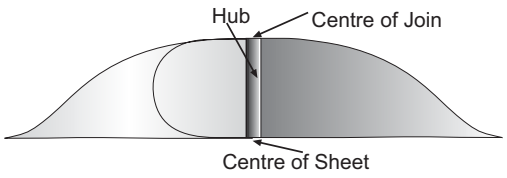
For basic testing I would need a couple of windmills which could be fixed at one end of a spindle and supported in a rudimentary bearing. So I started with a visit to the local B & Q warehouse where I purchased a 50cm x 100cm sheet of aluminium, a metre length of 12mm threaded steel studding, a similar length of steel tube with a bore of approximately 12mm and some 12mm nuts & washers.

The aluminium sheet was cut into two equal squares using a pair of tin snips, each square then being cut according to the template shown at the end of my first article. Each pointed corner was brought to the centre, forming a cylindrical blade around a baked bean tin which was lined up along the diagonal. Two opposite blades were formed first, bring the points past the centre overlapping laterally by an inch or two. The same was then done with the other two corners, bringing them over the first pair so they could be pop-riveted to this pair. (If you don't have a rivet gun then they can be screwed together using nuts and bolts.)



OVERLAPPING CENTRE JOIN

In the original design as used in the child's toy version, the points are brought to the centre of the sheet, in the same plane. I realised at this stage that I could make a small modification by separating the centres with a hub. It became clear that a stronger construction would result if the new centre formed at the joining of the points was located at one end of a hub, the other end of which would be at the centre of the sheet. The two centres, whilst on the same axis were in different planes, separated few inches apart. A 12mm clearance hole was cut in the two centres and a length of steel tube cut to form the hub.



WINDMILL SIDE ELEVATION

I now had all the bits needed for the clockwise windmill. A similar anti-clockwise windmill was fabricated from the second square of aluminium by first turning this sheet over before forming the blades. Finally, a nut and washer was fed onto the studding, leaving sufficient amount of stud extending so that the two windmills with their hubs could be mounted back to back and secured with another washer and nut at the end of the stud. The free end of the studding was pushed into the remaining length of steel tube to form a simple bearing. All was now ready for the preliminary tests.

December had been a quiet month in my 'neck of the woods' regarding wind. However, I had arranged to spend the Christmas/New Year period on Anglesey in North Wales where the winds are generally more meaty than in my home town. On the Thursday after Christmas the conditions were ideal apart from being b***dy cold. A gale force wind blew across the island for twenty-four hours. Braving the freezing wind, I stepped outside and clutching the bearing tube, held the assembly aloft and nothing! The blades barely turned. However, I rotated the assembly through ninety degrees, turned to face the blades into wind and the turbine went into overdrive.

It was obvious that this design would not work as a vertical axis machine but did show considerable potential as a horizontal axis generator. I believe the reason it didn't work in the vertical mode was that an equal area of blade was presented to the approaching block of air either on side of the vertical axis. That is to say the cross section of a blade facing the wind has an equal area to its opposite number, the one with its' back to the wind. Thus the pressure on either side of the axis is equalised. Hence no turning moment.

I believe that to make this design work in the vertical axis mode it would be necessary to direct individual jets of air at the blades in the way steam is directed at steam turbine blades. Since this is not a common occurrence in nature it wasn't a practical solution.

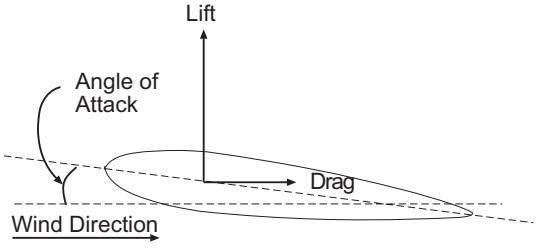
However, there are possibly two modes in which it could work in water:

1/ As a water wheel.
With the axis horizontal and at right angles to the flow. Lower blades submerged.

2/ As a water turbine.
With the axis horizontal and in line with the flow. Totally submerged. (Conversely, it would probably work as a marine propeller in this mode too.) So any interested experimenter with a suitable stream nearby might like to give it a try.

Following my early experiments I spent some time on the internet, researching what others had done before. Here are some facts that might be of interest to 'would be' developers:

Wind Turbine Facts



LIFT & DRAG FOR AEROFOIL SECTION

There are **two** modes of operation for wind turbines.

1/ Drag
Turbines that use drag cannot exceed the wind speed. My own design uses the drag mode of operation.

2/ Lift
Turbines that use lift can exceed wind speed.

Drag mode turbines will normally be quieter than lift mode turbines.

There are **two** methods of construction.

1/ Horizontal Axis Windmill (HAW)
These need to face into wind.

2/ Vertical Axis Windmill (VAW)
These will work whatever the direction wind.

There are **two** types of wind:

1/ Prevailing Wind
These are relatively slow speed winds.

2/ Gusting Winds
These are high speed winds that contain more energy than prevailing winds. Gusting winds blow at an angle to prevailing winds.

Wind tunnel tests have shown that the commercial HAWs which use the Lift mode of operation are the most efficient. However, in practice they have a serious disadvantage. Most of the time they are extracting energy from the prevailing low energy winds. When they are hit by a higher energy gust they have to turn to face it in order to take advantage. When the gust has passed they have to return to face the prevailing wind again. All this takes time and whilst they are turning they are not extracting the maximum energy from either wind. However, since a VAW will extract energy from winds from any direction, they don't suffer this problem. So despite wind tunnel results, a VAW might be more efficient in gusting winds. VAWs usually consist of vertical aerofoils arranged around a vertical spindle. They can consist of 2,3,4,5 or more aerofoils. These too have a disadvantage in that usually they don't self start. At the risk of reducing efficiency, this might be overcome by adding a small Drag type turbine at its' top. Larger installations are started with electric motors activated by wind detecting switches.

Having completed my preliminary tests I decided to bite the bullet and build a machine using the windmills already constructed but driving a horizontal axis. I've completed the mechanical part of this exercise and have a machine that will spin a car alternator via a 1:2 ratio, belt driven pulley when facing a stiff wind. The assembly is pivoted near the front and is designed to weathercock into wind. The anti-clockwise windmill was re-formed as another clockwise rotor. The completed assembly has one rotor at the front and one at the back, both facing forwards. It is hoped that the rear one will drag the assembly to face into wind since it is mounted well behind the pivot point. I just have the 'electrics' to sort out now to discover whether or not it will spin the alternator fast enough to produce electricity.

Editorial

I have had a sad e-mail from Janet Endersby via John Christie, as follows.

From: Tony Endersby [mailto:tony@endersby.com]
Sent: Monday 20 February 2006 10:52

To: j.christie@virgin.net
Subject: Re: NATGUG Weekend
Hi John,
Sorry to have to tell you that Tony passed away on Nov. 23rd. aged 78. I knew there would be someone I'd forget to tell. John Bodsworth came to the funeral, but Peter Hall wasn't able to come up from Brighton.
Please wish everyone of our old friends at NATGUG all the best, we did have some happy times in Swindon and I do miss the shopping!!!
Tony's email address is still Ok but if you wish you can put Janet at the front instead of Tony I don't mind.
Hope you have a lovely weekend
Sincerely
Janet

I was sad to learn that Tony had died, Tony and Janet for several years never missed a meeting, (mostly I think for Janet to tour the Swindon Shopping Centre) I can remember several of the last meetings that Tony was able to attend, demonstrating the way to verbal and visual communications using the net, he will be missed by several of the long standing members of Natgug.

The subject of alternative energy continues to generate interest especially since the news that British Gas are to hike the price of Gas & Electricity by a massive 22%, I have to say of all the things I have tried the most effective alternative energy has been not to use so much therefore saving not by generating my own power but not wasting any, Firstly I changed the gas boiler some 15 years ago to a condensing boiler, this boiler sparked my interest in more efficient use of power, my gas bill was reduced by over 35%.

I then changed almost all the lighting in the house to the low energy bulbs, Next was to cut losses through the roof, the house was built in 1976 so the roof was not insulated as it should have been, the problem was I had put a floor down and could not easily increase the insulation in the normal way, also I wanted the extra storage space to be dry and not have the extremes of temperature that the attic would normally experience, The only way to increase the insulation was to insulate the space between the rafters, by purchasing the blocks of Fiberglas that builders use to put between the outer brick wall and the inner block wall thereby filling the cavity between the walls, I used this by cutting the blocks slightly longer than the space and forcing it in between the rafters, this would not stay without some support, I then had a bit of luck, some re development of office space meant a suspended ceiling was to be taken down the sheets I loaded into the car and several trips later had enough to line the roof space with this material thus increasing the insulation properties and retaining the rockwool in place, this increased the low winter temperature in the attic from below freezing to a warm 9.5 c, the other insulation I had was the cavity wall insulation, the local council had offered a special price to fill the cavity with wool, all together this has saved me money and power, so save it first but what next? Well the obvious is to find some way of producing heat both to cook and keep the house warm and electricity for lighting and all the other things that need electricity to work (TV Video/DVD Recorders Computers etc.), My solar panels are not generating much in our winter sun when it decides to shine the power is way down on that produced in our summer.

That’s all for now folks, Bob.

Battle of the Browsers
IE May Lose

by Ira Wilsker

[Reprinted from the 2004 April issue of "SYDTRUG News", newsletter of SYDTRUG Inc., PO Box 75, PANANIA NSW 2213, AUSTRALIA, where it was reprinted from the 2003 January to March issue of "Reports", a publication of the Association of Personal Computer Users Groups Inc., 3150 Payne Avenue #12, Cleveland Ohio 44114-4504, U S of A]

First, in 1993, there was Mosaic as the dominant browser; it was clean, small, fast efficient, and free for personal use. Then one of the creators of Mosaic struck out on his own, and opened a tiny company called Netscape, where he intended to create an even better browser which he could hopefully sell for a profit. In the mid 90s Netscape was the dominant browser, easily pushing Mosaic aside, and approaching monopoly status. Netscape was having some small financial success until Bill Gates stated that Microsoft would become the Internet powerhouse, and released Internet Explorer, which to this day is still based on Mosaic. Mass distribution of Internet Explorer started in 1995. Internet Explorer was integral with Windows 98, and subsequent operating systems, and included with virtually every Microsoft product since. While Netscape was dependent upon sales to survive, Microsoft gave away millions of copies of Internet Explorer for free. Netscape entered a death spiral, with only 13% of the browser market in 1997, when as a slap at Microsoft for starting MSN as a competitor, AOL purchased Netscape, promising greatness again for the once-premier browser. The series of ubiquitous antitrust lawsuits against Microsoft followed, one of which cited Microsoft for "allegedly" trying to crush Netscape.

A series of bloated and unstable versions of Netscape appeared, along with generally dour reviews, and Netscape continued its plunge in market share. AOL slashed the Netscape budget, and laid off most of the Netscape staff, and Netscape was doomed. AOL generously released the source code, and helped to create a foundation to promote the "open source" code. With this freedom, Mozilla.org was officially born on February 23, 1998. Imagine a feature rich free browser, with well written code, an excellent e-mail companion, address book, newsreader, comprehensive web page creator, free support, and a variety of other benefits, including an integral pop-up blocker. Imagine a browser that is compatible with virtually all web pages and formats, freely available for Windows, Mac, Linux, and other operating systems, and available in over 50 languages "from Afrikaans to Zulu". You no longer have to imagine such a browser, because Mozilla 1.5 is here now, and version 1.6, currently in beta testing, is about to be released.

I recently downloaded Mozilla 1.5 from www.mozilla.org (also available on almost all other major download sites), installed it and was very pleasantly surprised. Instead of the slow performance of AOL's Netscape 6 (which I had previously uninstalled), I was greeted with a clean interface reminiscent of the pre-AOL Netscape 4, and also easily recognisable to Internet Explorer users. About the only difference I can see is that some web pages look slightly different than they do on IE, but this is to be expected. Mozilla is compliant with international W3 standards, a recognised standard that virtually all Internet utilities, except IE, comply with.

There was a "zero" learning curve with Mozilla, because it automatically imported my IE "favourites" or bookmarks into its bookmark list.

Not to stand on its laurels, which many computer publications have justly recognised, Mozilla is in a state of constant change. In the wings approaching final stages of development, is Firebird, a small but much faster new browser. Along with browsers, Mozilla is developing Thunderbird, described as "An e-mail and newsgroup client with powerful, new junk mail controls". Mozilla, Thunderbird and Firebird are multi-platform software functional on Macs, Windows and Linux machines. Mac users may also like Camino, Mozilla's specialty browser for Mac OS X, described by Mozilla as "a web browser optimised for Mac OS X with a Cocoa user interface, and powerful Gecko layout engine. It's the simple, secure, and fast browser for Mac OS X."

I tried the Mozilla e-mail client, and it was fast and intuitive. It looks familiar as it is organised similarly to Outlook, but seemed faster. The e-mail client includes an intelligent "junk mail control" function, which learns what is spam, and what is not. Safety and security was obviously important to the e-mail client developers, because Mozilla e-mail will not allow executable code to run in an e-mail, it prevents e-mail from setting cookies, and it has other security benefits. At present, the Mozilla address book cannot be hijacked by the contemporary worms and viruses, thus not having the critical vulnerability plaguing Outlook users. Another feature of the Mozilla e-mail client is the ability to access and manage the thousands of newsgroups available.

For users of Outlook, Outlook Express, and Eudora, migrating to Mozilla is easy, as it can import e-mail and address books nondestuctively from those programs, and be in full operation in an instant. AOL users can use a third party utility to migrate to Mozilla e-mail.

Creating web pages with Mozilla is very easy and intuitive, as the integral Composer looks like, and works as a common word processor, but creates html code much cleaner than Microsoft's.

If you are tired of slow internet performance, bloated browsers, insecure e-mail clients, pop-up ads, and other annoyances, give Mozilla a try, www.mozilla.org. Microsoft, take note: your near monopoly of the browser market is again being threatened by a group of free-spirited geeks and nerds. The Mozilla dragon is about to take a bite of you market share.

Blessed Are the Pessimists for They Hath Made Backups

by Tom Coleman

[Reprinted from the 2004 April issue of "SYDTRUG News", newsletter of SYDTRUG Inc., PO Box 75, PANANIA NSW 2213, AUSTRALIA, where it was reprinted from the 2004 January issue of "The Voice of FCUG", newsletter of the Fairfield County Computer Users Group Inc., 280 Main Street, Westport CT 06880-2408, U S of A, where it was reprinted from the 2003 June issue of the "PC Update", newsletter of the Melbourne PC User Group, Australia]

Our inimitable Tom Coleman reviews old methods and problems and introduces us to some new concepts in the field of Data Integrity

Let me state right at the start that this is not instructions on how to make a backup. This is a discussion on the current state of the art and consideration of some of the options.

Once upon a time you needed almost sixty floppy disks (that's 360K DSDD 5.25 inch floppies) to back up your 20MB hard disk. Well of course things changed and the floppies became 1.2 MB and there was rejoicing in the ranks because now they could feel less guilty because it now only required about 17 floppies. And then the advent of the high density 3.5 inch floppy reduced it to 14 floppies.

Let' Take a Side Track

Information on all drives is stored on sectors. A sector is a short (string) clump of magnetic impulses that holds 512 bytes of information. (Regular readers will know how I love to lie to them. There are in fact a few more bytes at each end of the sector for housekeeping but they do not contribute to storage capacity). Now the mathematically astute will know that 512 bytes is half a kilobyte. For the mathematically numb a kilobyte is 1024 bytes (or, if you like, two sectors).

Well that is true in the real world, but such truths are to be tweaked and fiddled with in the LaLa land of computer salesmen. Let me give you an example.

The standard 3.5 inch floppy disk has 18 sectors per track, a track being a circle of sectors on the disk. There are 80 tracks on each side of the disk. So this means that there are 2 times 80 times 18 sectors on each floppy. Come on now, out with the calculator and check me.

That's 1440 Kilobytes or if you like 1.44 thousands of Kilobytes. Because there are 1024KB in 1MB (one Megabyte), this means that the disk holds 1.4MB, (Oh all right 1.40625MB). What a pathetic way to make a disk seem bigger. Why did they not decimalise the kilobyte too ? That way they would have had a 1.47456MB floppy. It sounds bigger. The most likely reason is that computer salesmen don't know much about computers. It gets worse.

Your "Mine is bigger than yours" hard disk sales force advertises hard disks in millions or billions of bytes. So the 40GB hard drive you just bought comes up as a 37.25290298GB drive when it is installed in your computer.

Have you been robbed of two and three-quarter gigabytes ? No you haven't but they hate people like me pointing out the difference between a decimal gigabyte and a binary gigabyte. It makes them look petty and silly.

Time To Get Back on Track Again

So it turns out that you could fit all of your 20 (decimal) MB hard disk on just fourteen 3.5 inch floppies. Such a small task to save your bacon and your files and your soul from eternal damnation and the tut-tutting head shaking that goes on at hard disk wakes.

Guess what ? Hardly anyone backed up. It was so easy, but none but the paranoid did it. "Blessed are the Pessimists ...."

So where does this put us now ? A 20GB hard drive is a thousand times bigger than a 20MB drive. That cuts out floppies for two reasons: first, 14,000 floppies is just ridiculous; and

second, at 25 cents each for bulk buying it would cost $3,500 and take just short of ten days, non-stop, allowing a minute each. Longer if you have a slow floppy drive.

Of course the tape drive people have come a long way and tape speeds are now much faster than they used to be, but there are problems. They still take hours. It is frequently difficult to recover a single file.

Not just tapes but all forms of backup fail when they fail to restore. You may not know that you have a crook backup until the restore bombs. Typically that's when it's too late to fix. This applies to floppy backups too. But the reason most backups fail is that people don't do them.

It's the same now as it was when 14 floppies were enough and it took fifteen minutes, or half an hour if you had a slow drive.

George Skarbeck made me famous by saying "Backups are done tomorrow. Hard disks go down today".

Nothing has changed. To get a good backup system we need to remove the operator. The fact that people were involved and they had options such as "later ..." meant it was just never going to get done. That is the fundamental problem with all backup systems. Someone has to do it.

God moves in mysterious ways. The truth has been around for many years. It may have been expensive at one time, but is now coming and is affordable.

RAID is a series of protocols covering things to do with multiple hard disk arrays. The various functions are called RAID 0 or RAID 1 and so on.

Go off and read up on RAID arrays if you want to know more. We are interested in RAID 1. This covers disk mirroring. Once it is installed with two drives the second drive continuously makes itself as a copy, a duplicate, of the first. A permanent backup. The protocol provides for impeccable copy verification.

If RAID 1 is fully implemented, should the first drive fail then the second just takes over, seamlessly. If the second drive was a removable drive and you were a bit slow about putting it back at the day's start, you needn't worry as it will update itself in the background once you get around to installing it.

So how do you install RAID 1 ? It is a hardware/software installation. These days you can buy motherboards with RAID 0 and 1 built in. Sometimes maybe 3 and 5 as well. There are a couple of sockets on the motherboard, like IDE fittings, and you attach your drive cables to them. You will need to purchase a second hard drive. It does not need to be identical but needs to have adequate speed and capacity.

If you are not buying a motherboard then you need to buy a RAID card. It is a PCI fitting and benefits from faster PCI and FSB (Front Side BUS). Once you have installed the card and the hard drive(s) there is a simple software installation and you are up and running. Take a copy of your hard drive home with you at the end of the day if you like.

You do not have to do anything. It works with or without you. It works in spite of you.

Operator resistant backup. It is the future. You read it first in "PC Update

Computer Memory

by Brian K. Lewis
Sarasota Personal Computer Users Group, Inc.

Occasionally the question arises as to how much memory can be put in a computer. The answer is "it depends". It depends on just what you mean by memory (RAM or hard disk), what operating system you are using and the capabilities of your computer's motherboard and its chipset. When I talk about memory I am not referring to the permanent storage of programs and data on the hard disk. Rather, I refer to the random-access memory or RAM. This is the memory provided by memory chips seated in slots on the motherboard of today's computers. Anything stored in RAM disappears when the power is turned off, so it is referred to as volatile, or temporary, memory.

If you want to upgrade the memory in your computer you have to be able to determine the memory type as well as the size, pins and speed, the number of slots available on your motherboard and the maximum amount of memory that your system can address. In general, this varies with the age of your computer. So let's look at these components in a little more detail. (Please note that although my remarks refer to Intel's Pentium series central processors, they also generally apply to the equivalent AMD processors.)

Early Pentium based computers had a CPU bus speed of 66 MHz (megahertz) and a PCI I/O bus speed of 33 MHz. These values relate to the speed of data movement within the central processor and transmission to and from peripherals such as the memory bank. In some cases transfer to and from memory was at 50 MHz. Pentium computers generally had four slots which were arranged as two banks. This meant that memory had to be installed in units of two. The memory chips were 72 pin DRAM (dynamic RAM) or SIMM (single in-line memory modules) modules. Many of these computers could support four DRAM modules of 32 MB (megabytes) for a maximum of 128 MB of RAM. There were some motherboards built for Pentium 5 systems that had 2 or 3-168 bit DIMM slots in addition to the 72 pin slots. However, you could not use both the 72 pin and 168 pin slots, only one or the other. These systems would support either 128 or 256 MB of memory. However, at the time, many Pentium/Pentium II computers were sold with only 16 MB of RAM and Windows 95. Later, with Windows 98 the basic memory was 32 MB. In both cases, this is a less than optimum amount of memory for these operating systems. The first Pentium computers had a 32 bit address space which was theoretically capable of addressing 4 GB (gigabytes) of memory. However, none of the motherboards manufactured for these computers carried any such memory capacity.

The next generation of computers carried faster CPUs and chipsets along with faster bus speeds. For example the Intel 440 series chipsets were capable of working with CPUs with

speed of 233 - 333 MHz at a bus speed of 66 MHz or with 350-450 MHz processors at a bus speed of 100 MHz. These motherboards generally had 3-168 pin slots and would support a maximum of 384 MB of RAM. As the address space of the CPU was increased to 36 bit, the maximum addressable memory was 64 GB. However, in practice some computers running Win98 would not recognise more than 256 or 384 MB of RAM. This problem has been ascribed to the chipset design and problem with the L-2 cache. So some caution is recommended if you intend to upgrade the memory in a Pentium II or older system. With some of the Pentium III class computers there was an additional increment in bus speed to 133 MHz. The motherboards had 2 to 4 168-pin memory slots. The maximum usable memory of such systems ranges from 512 MB to 1 GB. These motherboards for this CPU class are generally able to use 100 - 133 MHz DIMMs. The 133 MHz DIMMS are capable of working at the 100 MHz speed. The Pentium 4 motherboards came with a whole new array of chipsets and memory chip types and speeds. The maximum memory now ranges up to 4 GB. Intel's initial Pentium 4 motherboards required the use of RDRAM or Rambus DRAM memory chips. RDRAM is a serial memory technology that arrived in three speeds, PC600, PC700, and PC800. RDRAM designs with multiple channels, such as those in Pentium 4 motherboards, are currently the fastest in memory throughput, especially when paired with the newer PC1066 RDRAM memory. A Rambus channel is 2-bytes wide, so we get a maximum 1.6GB/s transfer rate for a single RDRAM channel using PC800 RDRAM or 2.1GB/s for PC1066. The other form of memory chip is the double data rate DRAM. Intel and other manufacturers now have motherboards and chipsets that can utilise these memory modules. They are less expensive than the RDRAM. DDR memory modules are named after their peak bandwidth - the maximum amount of data they can deliver per second - rather than their clock rates. This is calculated by multiplying the amount of data a module can send at once (called the data path or bandwidth) by the speed of the front side bus (FSB). The bandwidth is measured in bits, and the FSB in MHz. Note that the RDRAM bandwidth is in bytes. One byte is equal to 8 bits.

A PC1600 DDR memory module can deliver bandwidth of 1600Mbps. PC2100 (the DDR version of PC133 SDRAM) has a bandwidth of 2100Mbps. PC2700 modules use DDR333 chips to deliver 2700Mbps of bandwidth and PC3200 - the fastest widely used form in late 2003 uses DDR400 chips to deliver 3200Mbps (3.2 Gbps) of bandwidth. You may see the term "dual channel" applied to memory. When properly used, the term refers to a DDR motherboard's chipset that's designed with two memory channels instead of one. The two channels handle memory-processing more efficiently by utilising the theoretical bandwidth of the two modules, thus reducing system latencies, the timing delays that inherently occur with one memory module. For example, one controller reads and writes data while the second controller prepares for the next access, hence, eliminating the reset and setup delays that occur before one memory module can begin the read/write process all over again.

Consider a model in which data is filled into a container (memory), which then directs the data to the CPU. Singlechannel memory would feed the

data to the processor via a single pathway at a maximum rate of 64 bits at a time. Dualchannel memory, on the other hand, utilises two pathways, thereby having the capability to deliver data twice as fast or up to 128 bits at a time. The process works the same way when data is transferred from the processor by reversing the flow of data. A "memory controller" chip is responsible for handling all data transfers involving the memory modules and the processor. This controls the flow of data through the pathways, preventing them from being over-filled with data. Now that you are totally confused by all this memory type and speed terminology, let's look at the next question.

How much memory should you have in your computer ? The answer is: probably as much as your motherboard and chipset can handle. For the newest motherboards, that may be excessive unless you are involved in digital video editing or graphic design. For most home users running WinXP or Win2K I would recommend 512MB up to 1GB. So why those figures ? I have found that WinXP uses over 200 MB of RAM for its own files, if that much is available. So on a 256 MB system that leaves very little for other applications and data. The net result is a lot of swapping with the virtual memory space on the hard drive. That slows everything down. In WinXP the Windows Task Manager (bring up by pressing CTRL-ALT-DEL) shows your current performance and the amount of memory available in real time. With 512 MB and several programs running, I have over 300 MB of real RAM available. That greatly increases the responsiveness (speed) of the system as moving data to and from RAM is many times faster than using a hard disk.

The Page File window shows you the virtual memory swapping your system is doing. At the moment, mine is zero.

You can do similar analyses on Win98/WinMe systems. The System Monitor application that comes with Windows can supply this information.

However, you may need to modify it to get the memory info you want. Go to Start-Programs-Accessories-System Tools and select System Monitor. If this selection is not available on your menu, then you need to install the program from your original Windows disk or from \WindowsOptions\Cabs file. You do that from the Control Panel (Add/ Remove Software) and Windows Setup. Once you have the system monitor you can ADD memory information by clicking on Edit, then add item. Select Memory Manager. The individual items that will be the most helpful are: allocated memory, unused physical memory, page files in/ out, swapfile in use or swappable memory. The kernel reading tells you how much of your CPU capacity is being used. Generally, Win98/WinME will do very well with 256 MB - 384 MB of RAM. You just have to be certain that your motherboard and chipset can support this much RAM. Most of the home computers I have worked on really don't have enough RAM for the most efficient operation. Does yours ?

Dr. Lewis is a former university and medical school professor. He has been working with personal computers for more than thirty years. He can be reached via e-mail at bwsail@yahoo.com or voice mail at 941/925-3047.

The New Professional Criminals

by Matthew Skala

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["Voice of FCUG" Editor's Note: Surfing the Net in search of material for the "Voice", I came across this article on a Canadian club site. It is a little dated now, but raises an important point, which you can work out for yourself ....]

I recently finished writing my Master's thesis in theoretical computer science, describing the research I've been doing for the past year and a half. In the Spring I travelled to the U.S.A. to present a talk about my research. Mathematical research may sound like a quiet, unassuming way to spend my time; my work on graph embeddings might even seem boring to someone outside the field. But I'd like to tell you about one of my colleagues, who found a whole lot of excitement in much the same activity.

Dmitry Sklyarov is a 26-year-old PhD student at Moscow State Technical University. Like me, he's doing academic research in computer science. He's interested in computer security systems, as I am. I'm sure we'd have plenty of things to talk about if we ever met. Not long ago he travelled from Russia, where he lives with his wife and two young children, to the U.S.A., to present a talk about his research at a technical conference; just like my talk earlier this year.

As I write this on June 21, 2001, Dmitry Sklyarov is being held without bail in a U.S. Federal detention centre, facing if convicted a US$500,000 fine and five years in prison. What did he do, kill someone ? No, he was arrested in connection with the talk he gave about his thesis research. Welcome to the Digital Millenium, where computer scientists like Dmitry and I find our profession classed as a form of criminal activity. I hope you've all buckled your seatbelts, because the next thousand years are going to be one heck of a ride.

We'll leave Dmitry in his jail cell while I tell you about another of my colleagues, Dr Edward Felten of Princeton. You may remember Dr. Felten; he was an expert witness in the Microsoft antitrust case. His research team analysed some security technologies used by the music business, in response to a contest called the "SDMI" Challenge", where a group of companies invited researchers to test the security of their schemes for controlling distribution of digital recordings.

Dr. Felten and his team, which included graduate students very much like myself, were successful in finding and manipulating the secret data hidden in the contest files. But when they proposed to give a talk at an academic conference, describing the results of their research, they were threatened with legal action. They were forced to withdraw from the conference.

If you're not part of the academic community yourself, you may not realise just what a big deal that event represents. If some professor can't give a talk, why should you care ?

The reason you should care is that you're a member of an industrialised society that depends on the work done by scientists like Sklyarov, Felten, and myself. If we can't do our jobs, everybody suffers. The most powerful things in our world are not physical objects, not even such apparently-powerful objects as hydrogen bombs; the most powerful things in our world are ideas. A hydrogen bomb can level one city; but an idea can destroy the entire world, or save it.

We have a system for handling ideas safely, to make sure that ideas serve us instead of destroying us. Scientists and scientific publication are important parts of that system. Strange as it may sound, we know from hundreds of years of trial and error that the only way to make sure ideas won't become destructive is to give them all away to everyone who wants them, as freely as possible.

Science doesn't work without open publication. The bottom line is that researchers have to be able to talk about whatever they want to talk about. That's why we have things like academic tenure -- so that researchers can be free to do their work without worrying about whether people will like it. As professional scientists, the job of my colleagues and me is to tell you the truth; not to tell you what you want to hear. That's important work.

They jailed Dmitry Sklyarov for doing research. They threatened Dr. Edward Felten for doing research. Is Matthew Skala's research next ? Could I be sued for publishing my own work ? I know the answer is "Yes", because it has already happened.

In March 2000 I was one of the defendants in a lawsuit triggered by a document I co-wrote. Just like Felten and Sklyarov, we didn't kill anyone, steal anyone's physical property, nor even distribute slander or hate literature: Eddy Jansson and I got in trouble just for doing mathematics and telling the truth, which is our job.

American copyright law is the common thread through all of these cases. Dmitry Sklyarov's talk about the vulnerabilities in the encryption used by Adobe eBook files. Dr. Edward Felten and his team wrote a paper about the insecurity of schemes for controlling the use of digital audio files. Eddy Jansson and I publicised some of the design goofs in an Internet content filtering program. All were prosecuted or threatened under copyright law.

When you think of copyright law, you probably break "copyright" into its component words -- the "right" to "copy". I would characterise it as the privilege to restrict copying. Either way, we imagine copyright as being all about copying things. If I write a book, and you print and sell copies of it without my permission, that's a violation of copyright. But under the Digital Millennium Copyright Act (DMCA), passed in 1998 in the U.S.A., copyright covers much more. With digital content (such as ebooks, audio recordings, or computer software), copyright holders are allowed to boobytrap the data to restrict it in ways that ordinary copyright would not allow.

For instance, when I buy a paper book I am allowed to read it until it wears out; but with an electronic book, the publisher could say, "No, you're only allowed to read it three times, and then you have to buy a new one".

The DMCA and related laws not only allow publishers to make those restrictions, but give such limits the force of law. If I read the book more than three times then I am actually breaking the law; and not only that, if I talk too much about how a person could read the book more than three times, that's "trafficking in a circumvention device" and it's a crime. That's the crime for which a graduate student of computer science a lot like me is at this moment held without bail in a U.S. Federal detention centre thousands of miles from home.

The Canadian government is soliciting public comments on whether it would be a good idea for us to introduce a DMCA-style law here. I am preparing a submission for them explaining my views; if you would like to express your own opinion, there is a government information site at http://strategis.ic.gc.ca/SSG/rp01100e.html. Space and politeness don't allow me to write all my thoughts about copyright law here, but I hope I've whetted your appetite. Whether you are in Canada, the U.S.A., or somewhere else, I'd encourage you to write to your elected representatives and let them know what you think about copyright in the Digital Millennium.

For the past year and a half, Matthew Skala has been a graduate student in Computer Science at the University of Victoria. He will be leaving Victoria in September to pursue his studies as a PhD student in computer science at the University of Waterloo in Ontario.

He is the winner of a prestigious Natural Sciences and Engineering Research Council of Canada Scholarship.

He was also the Systems Director of Big Blue and Cousins. Please see his article on CyberPatrol and other articles published in the BB&C newsletter.

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Index

Eco-Friendly Energy Part 2	Page 3
Editorial	Page 5
Battle of the Browsers IE May Lose	Page 7
Blessed Are The Pessimists For They Hath Made Backups	Page 8
Computer Memory	Page 11
The New Professional Criminals	Page 14