



IT
Information Society
Technology Perspectives

PANORAMA

MAY

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FOREWORD












Information Society Technology Perspectives

The "Information Society Technology Perspectives (IT3, according to the acronym of the Hungarian title) project intends to survey the trends in the development and application of information and communication technologies, filtered by their expected impact on the information society in Hungary within the next decade. The study has been performed in 12 key areas, subdividing each area into 6-8 subparts, concisely describing the main development trends of these subparts. Based on these overviews 20-25 topics have been selected for further detailed ("drill down") analysis. For each of these topics significant, non-trivial statements can be formulated with considerable impact on the Hungarian information society during the 2010s.

As a useful by-product, a bimonthly newsletter "IT3 Korkep" (IT3 Panorama) is being published containing actual news items relevant to the topics of the project. These news items came into our sight during collecting material to the description of the key areas and to the preparation of "drill down" analyses. We have tried to collect news items which support the ideas outlined in our study. Due to the abundance of available information, no attempt can be made to cover fully the key areas, we are trying to choose the most significant and most characteristic news items.

Key areas are denoted by pictograms and to each news item one or more pictograms are attached, the most significant key area is put on the first place.

Beside the news and the introductory analysis there is another short study, at the end of the IT3 Panorama. This study analyzes the social and economical impact of the appearance and usage of certain technology or group of technologies. This "Social Perspectives" study is the result of a cooperation between NHIT and ITHAKA.

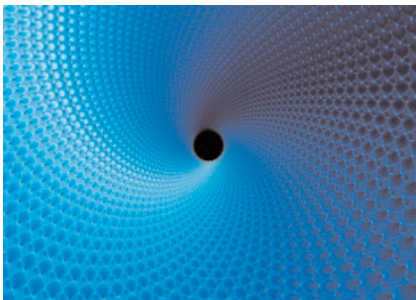
-  basic technologies
-  communications
-  peripherals
-  architecture
-  application frameworks
-  content management
-  system development
-  security
-  business
-  public service
-  private sphere
-  regulation

Futurology in a different way

IT forecasts (for example IT3) sometimes should go beyond their normal time horizon and take into consideration extreme prognoses dealing human and machine perception ("thinking") in absolutely subversive manner. In our short essay we try to analyze the most known of these prognoses.

The Technological Singularity

The complex phenomenon called technological singularity (or just Singularity) in the futurology and science-fiction in its original meaning concerned to a potential event or set of events in the future: the appearance of human-level artificial intelligence (AI) which would rapidly surpass human intellect. The fictitious growth curve will reach a certain point and beyond this point the future is completely unpredictable. The theory has been elaborated from computer scientific point of view, and according to its new meaning the technological progress will change the reality so drastically and quickly that Pre-Singularity human can't understand the new world. If they can not understand it, they can not make prognoses about it. (It's obvious that this kind of change might happen in other technological domains as well. If a brand



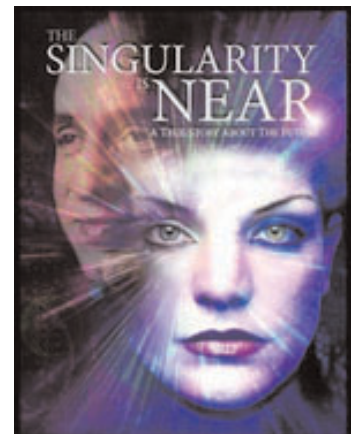
new energy source transformed the hydrocarbon and the climate change problems, we would consider it as a Singularity, too.)

The name is an analogy between the breakdown of modern physics near a gravitational singularity and the drastic change in society theorists argue would occur following an intelligence explosion. A gravitational singularity (sometimes spacetime singularity) is, approximately, a place where quantities which are used to measure the gravitational field become infinite. It means that our physical model is useless nearby black holes. If we replace black holes by artificial intelligence and our physical model by the future model, we'll have the technological singularity.

Singularity-interpretations

Statistician I. J. Good first wrote in 1965 of an "intelligence explosion", suggesting that if machines could even slightly surpass human intellect, they could improve their own designs in ways unforeseen by their designers, and thus recursively augment themselves into far greater intelligences. The first such improvements might be small, but as the machine became more intelligent it would become better at becoming more intelligent, which could lead to an exponential and quite sudden growth in intelligence.

Mathematician and sci-fi author Vernor Vinge later called this event "the Singularity." In the 1980s, Vinge popularized the singularity in lectures, essays, and science fiction, especially in his seminal 1993 essay (The Coming Technological Singularity) which contains the oft-quoted statement, "Within thirty years, we will have the technological means to create superhuman intelligence. Shortly thereafter, the human era will be ended." Vinge refines his estimate of the time scales involved, adding, "I'll be surprised if this event occurs before 2005 or after 2030." Approaching to the Singularity our future-models will become more and more uncertain. After the appearance of superhuman intelligence (cybernetically "perfected" human minds and artificial intelligences) growth will be dramatically faster.

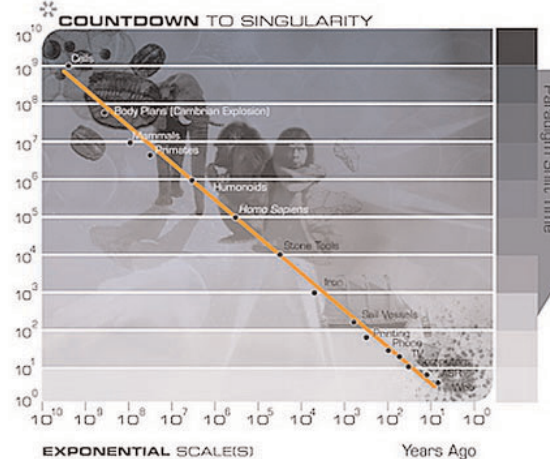


Singularity is one of science's and technology's hot topics: some scientists think it's totally crazy and unimaginable, some see it in the very distant future. Polyhistor inventor Ray Kurzweil generalizing the theory, but only concentrating on the "hardware", the quantitative growth, has discovered exponential patterns in human history: such an event is implied by a long-term pattern of accelerating change that generalizes Moore's Law to technologies predating the integrated circuit and which he argues will continue to other technologies not yet invented. Whenever technology approaches a barrier, Kurzweil writes, new technologies will cross it. He predicts paradigm shifts will become increasingly common, leading to technological change so rapid and profound it represents a rupture in the fabric of human history: "An analysis of the history of technology shows that technological change is exponential, contrary to the common-sense intuitive linear view. So we won't experience 100 years of progress in the 21st century - it will be more like 20,000 years of progress (at today's rate). The returns, such as chip speed and cost-effectiveness, also increase exponentially. There's even exponential growth in the rate of exponential growth. Within a few decades, machine intelligence will surpass human intelligence, leading to The Singularity - technological change so rapid and profound it represents a rupture in the fabric of human history."

Scenarios

Beside its "classic" robotics-based model, Singularity might occur at least five other ways, but in most cases as a result of different combinations of these scenarios:

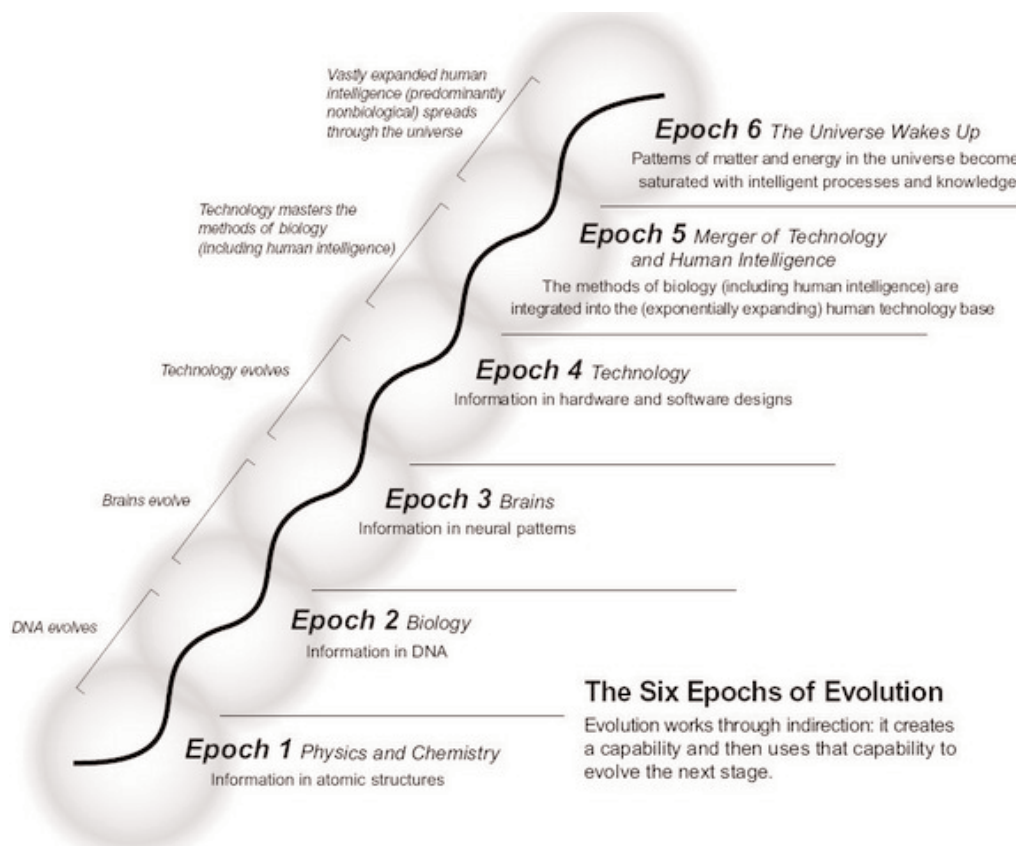
1. The growth of computing capacity influences human intelligence and other capacities in a direct way, cyborgs and other Homo sapiens-machine systems will come. (This path preparing the so-called "intelligence amplification" (IA) is characterized by Kevin Warwick's experiments.)
2. The fast evolution of technology and neuroscience might result in the emulation of human brain on hardware. Beings living in cyberspace will be organized into complex systems with special collective intelligence. (Hans Moravec, the Carnegie Mellon roboticist is the most famous advocate of this trend.)
3. The more and more complex and far-reaching Internet and the "network-user" humanity will become one superhuman system, a global brain. (A little bit in the same way as Arthur C. Clarke predicted it about telephon networks.)
4. The development of micro-electro mechanical systems (MEMS), embedded computing systems in our environments and fulleren-based machines will result in industrial nano assemblers. (This "Digital Gaia" solution is usually proposed by nanotechnology researchers.)
5. Instead of human-machine symbiosis, genetics, neuroscience and biotech will lead to the Singularity.



For and against

Opinions largely differ not only about the occurrence of the exceptional event but about its time too. Most pundits think it will happen in the 2020s, 2030s. Possibilities:

- Between 2010 and 2030, probably in 2014 (Vernor Vinge),
- 2016 (Peter Cochrane, British Telecom),
- not later than 2020 (Eliezer Yudkowsky, AI researcher),
- between 2019 and 2029 (not later than 2099),
- approximately in 2020 (Ralph Merkle, nanotechnologist),
- between 2020 and 2050 (Michio Kaku, theoretical physicist),
- at the end of the 2030s (Hans Moravec),
- etc.

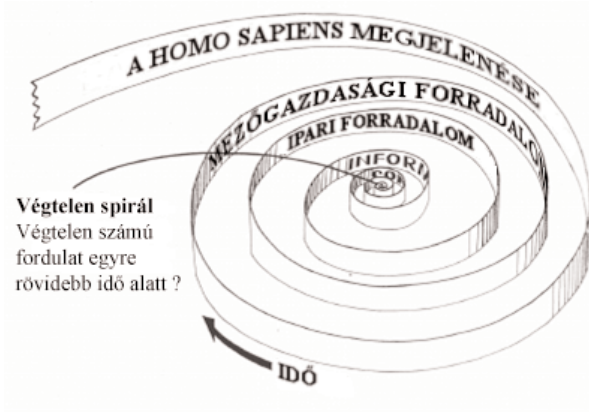


Yudkowsky thinks that human technology will evolve to the point where it will be capable to repair its basic hardware and software. Despite the fact that these researchers are coming from the four corners of the scientific world, all are close to transhumanism. More interesting is that some well-known transhumanist do not agree with the Singularity theory. For example Anders Sandberg and Max More imagine the human-posthuman transition without any singularity point or disruptions.

Others attack the theory from more realistic point-of-view. Computer scientist Jeff Hawkins think machine intelligence's exponential growth will never happen. Gordon Bell (Microsoft Research) has the same opinion: machines will never be conscious. The so often cited Gordon Moore gives the evolution as an example: Homo sapiens is more than the sum of her intellectual abilities, and "fine-tuning" is impossible even if we could copy and paste these abilities into machine systems. Cognitive psychologist Steven Pinker cites his childhood's science fiction dreams about the future: underwater cities, mile-high buildings, nuclear-powered automobiles have never happened.

Singularity or series of disruptions?

Dramatic changes especially the proliferation of agriculture then industry in the rate of economic growth have occurred in the past because of some technological advancement. These changes might be seemed as singularities. The parallel is logical, but - despite the "industrial revolution" - both agriculture and industry hadn't change the humanity in a given historical point but gradually, as results of long evolutionary processes. These changes hadn't happened because of one singular cataclysm-like event, but in consequence of less dramatic, but in their complexity all-changing disruptions.



Contemporary future foresight schools prefer this method and make "microcosm-scale" disruption-based predictions and scenarios. Disruptions always have their roots in the past or are logical consequences of contemporary trends.

The singularity theory shows some similarities with the concept of postindustrial society "invented" by sociologists and anthropologists (Alvin Toffler, Daniel Bell, John Naisbitt). Surprisingly, their imagined society and the after-singularity society have many common points.

Források

- <http://www.spectrum.ieee.org/singularity> (IEEE Spectrum, Special Report: The Singularity),
- <http://www.kurzweilai.net> (KurzweilAI.net),
- <http://www.singinst.org> (The Singularity Institute for Artificial Intelligence),
- <http://singularity.com> (The Singularity Is Near)
- <http://www-rohan.sdsu.edu/faculty/vinge/misc/singularity.html> (Vernor Vinge: The Coming Technological Singularity)



NEWS



Who will
be the next?



Biological processors



Biological processors are able to carry out complex computations much faster than their silicon based peers. A research group from North-Carolina has successfully proved recently this with the help of a bunch of genetically engineered bacteria. However computing speed is not everything: there is still tremendous possibility for the improvement of the data communication capabilities of biological processors.

Scientists have built the first living computer and tasked it with solving an important problem: flipping pancakes. Researchers genetically engineered the bacterium *E. coli* to coax its DNA into computing a classic mathematical puzzle known as the burned pancake problem. Molecules of DNA have the natural ability to store and process information, and scientists have been performing computations with bare DNA molecules in lab dishes since the mid-1990s. But the new research, reported online in the *Journal of Biological Engineering*, is the first to do DNA computation in living cells. "Imagine having the parallel processing power of a million computers all in the space of a drop of water," says Karmella Haynes, a biologist at Davidson College in North Carolina. "It's possible to do that because cells are so tiny and DNA is so tiny." While the potential computational power of programmed bacteria is immense, the DNA-computation system that Haynes and her colleagues designed can only solve problems by flipping and sorting data. It doesn't have the open-ended computing flexibility of a laptop computer or even a solar-powered calculator, so the bacteria can only handle a limited set of mathematical problems. "We're not going to have bacteria running iPods just yet," Haynes says. Other kinds of DNA computation are possible, though.

(053/2008)

www.sciencenews.org



IBM water cools 3D chips



While enormous virtualised computing centres are being built throughout the world in order that the services available in the internet be always equipped with adequate computing and storage capacities, the hardware development laboratories try to increase the computing and storage capacities of the servers used in these computing centres beyond the current limits by applying ever newer solutions. As part of this, researchers at IBM return regularly to technologies applied in earlier times (e.g. virtual machines), and put them under new shed of light and into modern environments.

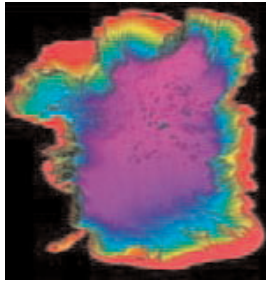
IBM's Zurich Research Laboratory demonstrated three-dimensional chip stacks that are cooled with water. The company expects to commercialize such stacks for its multicore servers as early as 2013. IBM plans to stack memory chips between processor cores to multiply interconnections by 100 times while reducing their feature size tenfold. To cool the stack at a rate of 180 watts per layer, water flows down 50-micron channels between the stacked chips. "Electrical interconnects are in a wiring crisis; the wiring does not scale the way transistors scale, because the width of wires is shrinking but their length is not," said IBM Zurich researcher Thomas Brunschweiler. "Our solution is to go to the third dimension to stack multicore dice and have the interconnections go in between them vertically, which can decrease their length by up to 1,000 times." IBM's paper on the approach, "Forced convective interlayer cooling in vertically integrated packages," received a Best Paper award at the IEEE ITherm conference, held in late May in Orlando, Fla. This marks the third consecutive year the IBM Zurich Lab's Advanced Thermal Packaging team has won such awards. The Zurich group claims to be fixated on water cooling because water is up to 4,000 times more effective than air at removing heat from electronics. Earlier this year, the same group described the water cooling method for IBM's Hydro-Cluster supercomputer. For the Hydro-Cluster Power 575, the Zurich group replaced heat sinks with water-filled copper plates above each core. The Zurich team predicts high-end IBM multicore computers will migrate from the copper-plate water-cooling-method to the 3-D chip-stack in five to 10 years. Threedimensional water-cooled chip stacks will interleave processor cores and memory chips so that the interconnects run vertically chip to chip through copper vias that are surrounded by silicon oxide. Thin-film soldering (using electroplating) enables the separate dice to be electrically bonded to the layers above and below them, with the insulating layers of silicon oxide separating the flowing water from the copper vias.

(054/2008)

www.eetimes.com



Optical network is key to next-generation research cyberinfrastructure



Today, the access to high performance computing capacities is a necessary part of research activities. However, the delay in accessing remote computing centres is a serious bottleneck, and may become a critical point when a university cannot (or can hardly) hook to the regional or global optical network. Fortunately, the light can now be recognised at the end of the fibre.

Larry Smarr, director of the California Institute for Telecommunications and Information Technology, announced at the TeraGrid '08 Conference that the use of remote high performance computers for scientific advancement is on the cusp of a revolution thanks to the establishment of state, regional, national, and global optical networks. He says the National Science Foundation-funded OptIPuter project can help remove the last obstruction to this revolution. "The ... project has been exploring for six years how user-controlled, wide-area, high-bandwidth lightpaths--termed lambdas--on fiber optics can provide direct uncongested access to global data repositories, scientific instruments and high performance computational resources from the researchers' Linux clusters in their campus laboratories," Smarr says. "This research is now being rapidly adopted because universities are beginning to acquire lambda access through state or regional optical networks interconnected with the National LambdaRail, the Internet2 Dynamic Circuit Network, and the Global Lambda Integrated Facility." The OptIPuter employs dedicated lightpaths to form end-to-end uncongested 1 Gbps or 10 Gbps Internet protocol (IP) networks, and its network infrastructure and supporting software boasts high bandwidth, security, lower cost per unit bandwidth, and controlled performance. The critical bottleneck is most campuses' failure to install the optical fiber paths needed to link from the regional optical network campus gateway to the end user. Smarr is a participant in Quartzite, an experiment at the University of California, San Diego to produce a switching complex capable of switching packets, wavelengths, or entire fiber paths to facilitate rapid configuration, under software control, of the different types of network layouts and capabilities needed by the end user. "Quartzite provides the 'golden spike' which allows completion of end-to-end 10 Gbps lightpaths running from TeraGrid sites to the remote user's lab," Smarr says.

(055/2008)

www.calit2.net



Putting WiMax on the fast track



Largest content provider via Internet and processor developer form alliance with cable TV operators in order to develop the WiMax technology. Firms forming an alliance are also interested in an open operating system. Giant may extend the business area through technology innovations and with partners from complementary businesses.

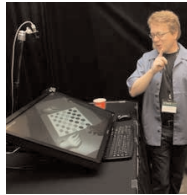
Tech giants Google and Intel will partner with Sprint Nextel and Clearwire to develop a \$14.5 billion ultra-fast mobile network. In a seismic shift that may alter the U.S. wireless landscape, a coalition of tech giants was announced on May 7 that they will join forces with Sprint Nextel and Clearwire to create a \$14.5 billion ultra-fast mobile network. Google, Intel, and the nation's biggest cable providers together will invest more than \$3 billion in a technology called WiMAX that aims to deliver high-speed Web connections more cheaply and efficiently those now offered by the top two cellular carriers, AT&T and Verizon Wireless. Under terms of the deal, Sprint, the owner of the largest swath of wireless airwaves capable of providing WiMAX, would spin out its Xohm mobile broadband business and combine it with a comparable service offered by Clearwire, which holds the next-largest block of necessary spectrum. The venture will use the cash infusion to fund an ambitious plan to blanket the nation's biggest cities by 2011. The deal comes after months of fractious negotiations and legal wrangling among participating executives over how the company would operate and what role each would play. Outside investments include \$1.05 billion from Comcast, \$1 billion from Intel, \$550 million from Time Warner Cable, \$500 million from Google, and \$100 million from smaller cable outfit Bright House Networks. Each of the investors is expected to get a seat on the independent board of the new company, gaining veto power over decision-making.

(056/2008)

www.businessweek.com



A Low-Cost Multitouch Screen



Laser touchscreen has been demonstrated at the Apple. It uses infrared signals to sense the touching. The new device is good for graphics and fotoprocessing, and it is rather cheap. The largest software maker firm also is involved, because it hopes some extension of its business area.

The multitouch screen is certainly having its day in the sun. Apple's iPhone and iPod and Microsoft's touch-screen table, called Surface, all illustrate the concept in slick ways. And at a recent conference, Bill Gates and Steve Ballmer showed off Windows 7, a forthcoming operating system that supports multitouch. But the capabilities of today's multitouch software are still somewhat limited, and researchers and engineers aren't yet sure how best to exploit large displays. Recently, however, Microsoft introduced a new multitouch platform, called LaserTouch, which includes hardware that's cheap enough to retrofit any display into a touch screen. The software giant believes that by providing inexpensive multitouch hardware, researchers will be more inclined to experiment with different form factors and develop interesting software. LaserTouch is a system built on the cheap: the hardware only costs a couple hundred dollars, excluding the display--which can be a plasma television or overhead projector, for instance--and the computer that runs the software. Unlike Surface, which uses a camera within the table to detect touch and a rear-projection system to create the images, LaserTouch uses a camera that's mounted on top of the display. Two infrared lasers, with beams spread wide, are affixed at the corners, essentially creating sheets of invisible light. When a person's finger touches the screen, it breaks the plane of light--an action that's detected by the camera above. One of the main differences between Surface and LaserTouch, says Andy Wilson, one of Surface's developers, is that you can use LaserTouch on high-resolution displays. These displays lend themselves nicely to graphics applications, such as photo and video editing. And since LaserTouch can be fitted to any type of display, Wilson adds, it could be used for office applications such as presentations.

(057/2008)

www.technologyreview.com



A baseball cap that reads your mind



It is well known that delicate state changes of our mind can be directly observed with the help of brain waves although our ideas articulated in structured sentences or our continuously emerging memory pictures not yet accessible. However, the fact that we do not have to go anymore into a medical investigation room full of equipments, and to put electrodes on our head with doctor's assistance, but it is enough to have a cap on, brings the everyday, practical use of certain simple forms of telepathy into tangible distance.

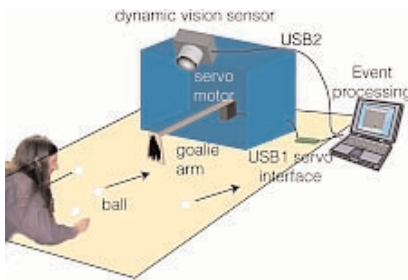
It looks like an ordinary baseball cap. But when you put it on, the cap detects and analyzes the electroencephalogram (EEG) signals from your brain. It can even tell you if you're getting too sleepy when driving based on your brain wave patterns. Similar technology could also allow you to control home electronics such as TVs, computers, and air conditioners, all by just thinking about them. A team of researchers from Taiwan has designed the new bio-signal monitoring system inside a baseball cap with the goal of making it convenient and easy to use in everyday life. Since the system is wireless and portable, and can process data and provide feedback in real time, it could be useful for a variety of indoor and outdoor applications. "This study details the design, development and testing of a non-invasive mobile and wireless EEG system for continuously monitoring high-temporal resolution brain dynamics without requiring conductive gels applied to the scalp," researcher Li-Wei Ko from National Chiao-Tung University in Taiwan told. "This system has online EEG signal acquisition and real-time signal processing." The system takes advantage of advances in sensor and information technology to achieve reduced power consumption and production costs. Currently, the system can operate continuously for about two days before the lithium-ion battery needs to be recharged, but the researchers hope to further increase the lifetime. The cap contains five embedded dry electrodes on the wearer's forehead, and one electrode behind the left ear, that acquire EEG signals. Then, the EEG signals are wirelessly transmitted to a data receiver, where they are processed in real-time by a dual-core processor. The BCI system includes Bluetooth transmission for distances of 10m or less (e.g., for driving applications), as well as RF transmission for distances up to 600m (e.g., for potential sports applications). Next, the processed signals are transmitted back to the cap, where the data can be stored, displayed in real-time on a screen, or be used to trigger an audio warning, if necessary.

(058/2008)

www.physorg.com



Vision sensors keep their eye on the ball at Euro 2008



Machine vision is one of IT's most developing research areas. It's latest results were shown during the football European Championship in June and July. These systems and their basic technologies capable of faster dataprocessing than its predecessors will be used in different applications: not only in security but also in robotics and traffic control.

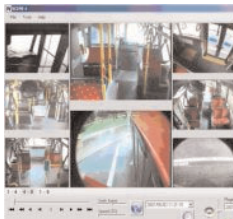
Traditional video surveillance is limited by relatively slow response times and heavy demands on computer time and memory. For over 40 years the technology has focussed on the concept of the frame. Processing every pixel in every frame, even pixels that register no change, takes its toll on computing and human time. But by focussing on the pixel and not the frame, researchers in the EU-funded Caviar project developed a frame-free vision system that uses so-called 'spike events', produced whenever there is movement in the scene. Spike events are also produced by human eyes and used in human brains. "Instead of using frames, each pixel decides when it wants to send information, and that is dependent on changes in brightness," says Tobi Delbruck, the project's spokesman from the Institute of Neuroinformatics at the Swiss Federal Institute of Technology in Zurich. "This is a nice property because if nothing changes there is no output." By outputting spike events, the silicon retina, or DVS as it is known, allows for processing of novel visual information at the moment it occurs, resulting in greatly reduced power consumption and response time. While traditional cameras operate at a rate of about 50 frames per second, the equivalent speed of the Caviar system is about 10,000 frames per second, says Delbruck, who was responsible in Caviar for the development of the silicon retina. "The speed is in the data processing," he says. "It comes down to the fact of immediately processing only the pixels that need to be processed. "The beautiful thing about the Caviar system is that it is capable of recognising an object and tracking it with 40,000 spiking elements or 'neurons' in the system without a single line of computer code. "This avoids the need for computing power as it is a pure hardware solution. We showed that it is possible to build hardware machines capable of recognition and high speed object tracking without writing code, but rather emulating a simplified brain-like neural architecture."

(059/2008)

cordis.europa.eu



Transforming buses into mobile sensing platforms



Modern buses are able to sense and transmit all information about the environment. Collected information are to be sent to various centers: to the driver, to the traffic inspection, to the environmental monitoring. Intelligent buses seem to be the first representatives of the coming intelligent ambient.

Modern buses could be used as mobile sensing platforms, sending out live information that can be used to control traffic and detect road hazards, according to European researchers. The research could help allowing traffic controllers, police and other services to access up-to-date information from any number of public buses already on the streets. In a test, the researchers equipped city buses with environmental sensors and cameras, allowing the vehicles to become transmitters of measurements, warnings and live or recorded videos to anyone allowed to access the data. Researchers with the MORVNE project perfected a raft of technologies for mobile sensing, data acquisition, analyses and telecommunications that could be placed in public buses as a part of a larger effort to improve road safety and traffic management. In tests, they embedded humidity and temperature sensors on buses. One pair of sensors checks the road surface while the other pair analyses the air. The sensors were selected and designed to resist to pollution. They were also designed to quickly acclimatise to the environment, as buses may have to go through tunnels, tiny dark roads, bridges and city parks over the course of a few minutes. The data gathered by the sensors is processed on the bus, using a small but very powerful computer. The computer can then warn the bus driver if for example foggy or icy conditions are imminent. The computer can also send alerts to a public transport control centre via a variety of wireless connections, including mobile radio systems, wifi or wimax networks, and UMTS (3G). The control centre can in turn warn nearby buses of dangerous conditions through the same wireless channels. The system can also be set up to warn city traffic-monitoring centres of road conditions, making these mobile environmental sensors another way to collect information on top of an existing network.

(060/2008)

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European Research Consortium turns focus on transactional memory

Although the problem of processor performance enhancement has been essentially pushed over to the software field, the problem itself has not disappeared just transformed. As a matter of fact, the multi-core processors require the application of efficient parallel programming techniques. The good news is that the number of these techniques is increasing. The bad news is that we are only at the very beginning of this journey.

A huge challenge facing the computing community today is how to make programming multi-cores easier. With this goal in mind, the VELOX project, titled "An Integrated Approach to Transactional Memory on Multi-Core Computers" and funded with €4 million at the beginning of this year by the European Commission, launched its activities with the objective of delivering seamless transactional memory (TM) systems that integrate well at all levels of the system stack. The adoption of multi-core chips as the architecture-of-choice for mainstream computing will undoubtedly bring about profound changes in the way software is developed. In this brave new era, programs will need to be rewritten in a parallel way for computers that have multiple processing cores. One of the fundamental issues in developing parallel programs is a coordinated and orderly way of accessing shared data. The use of previous techniques such as fine-grained locking as the multi-core programmer's coordination methodology is viewed by most experts as a dead end since locking is too complicated for the average programmer. The TM programming paradigm is a strong contender to become the approach of choice for replacing those coordination techniques and implementing atomic operations in concurrent programming. Combining sequences of concurrent operations into atomic transactions promises a great reduction in the complexity of both programming and verification, by making parts of the code appear to be sequential without the need to program fine-grained locks.

(061/2008)

www.hpcwire.com



'Saucy' software finds symmetries dramatically faster

A symmetry finding algorithm developed by Paul Darga in 2004 can be tested with a new software. The software is called Saucy and a copy can be freely acquired from the researchers of University of Michigan. With the help of the new algorithm it is possible to solve such mathematical problems within seconds, which previously required many years of computing capacity.

Computer scientists at the University of Michigan developed open-source software that cuts the time to find symmetries in complicated equations from days to seconds in some cases. Finding symmetries is a way to highlight shortcuts to answers that, for example, verify the safety of train schedules, identify bugs in software and hardware designs, or speed up common search tasks. The algorithm is an update to software called "saucy" that the researchers developed in 2004 and shared with colleagues. Paul Darga, a graduate student in the Department of Electrical Engineering and Computer Science, presented the algorithm on June 10 at the Design Automation Conference in Anaheim, Calif. Darga's co-authors are Igor Markov, associate professor in the Department of Electrical Engineering and Computer Science, and Karem Sakallah, a professor in the same department. The software's applications extend to artificial intelligence and logistics. It speeds up solutions to fundamental computer science problems and quickly solves what's called the graph automorphism problem. "Our new algorithm solves the graph automorphism problem so quickly in real-life applications that the problem is starting to look easy," Markov said. Symmetries are, in a sense, interchangeable options that lead to the same outcome. In complicated equations, symmetries point to repeated branches of the search for solutions that only need to be figured out once. Current programs that look for symmetries can take days to give results even when they find no instances, Darga said. The new method finishes in seconds even when there are millions of variables. To illustrate how finding symmetries can simplify equations, Markov pointed to the pigeonhole principle. This says you can't, for example, fit 10 birds in nine pigeonholes (unless they share.) The particular problem has a nine-fold symmetry because it doesn't matter which hole each bird occupies. One will always end up homeless. It also has a 10-fold symmetry because the birds are considered interchangeable.

(062/2008)

www.ns.umich.edu



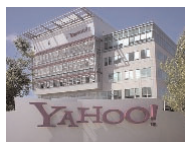
Software emulates the visual processing of the cat brain with 80% accuracy

The visual information processing mechanisms of cat brain were successfully modelled in the Smith-Kettlewell Eye Research Institute. The application simulated with an 80% accuracy the output of a nerve group, the lateral geniculate nucleus, which preprocesses the visual information provided by the optic nerve.

It may not be able to catch mice yet, but software developed in the US can perceive moving images in much the same way a cat's brain does. The researchers hope the work will one day lead to implants that make it possible for people to see without an optic nerve. Researchers at the Smith-Kettlewell Eye Research Institute, San Francisco, were motivated by the fact that, until now, models of the way brains respond to visual input used simple images like dots, bars and grids. They are typically unable to cope with the complex scenes a human would usually see. To try and develop a more sophisticated model, the team recorded the responses of 49 individual neurons in a part of a cat's brain called the lateral geniculate nucleus (LGN). The LGN receives and processes visual information from the retina, via the optic nerve, before sending it on to the cerebral cortex. Using a mixture of simple stimuli, like dots and bars, and building up to more complex moving artificial scenes, the team tried to work out the basics of the LGN's response to visual features. The data made it possible to build a software model of the LGN that can approximate how the neurons would respond to real scenes. The model was tested against scenes recorded from a "catcam" camera attached to a cat's head. The model's predictions proved to be 80% accurate when shown artificial scenes, but this figure fell to 60% with the natural scenes or the Tarzan movie. "For these people, a prosthesis in the eye doesn't help," Matteo Carandini explains. Only people who have recently become blind can benefit from such implants – currently being tested in humans – that stimulate the retina or optic nerve. Work on monkeys last year showed it is possible to stimulate the LGN using electrodes to alter their vision, something previously thought impossible. Software models like that developed by Carandini and colleagues would be vital for an implant to stimulate the right neurons to create a mental impression of vision.

(063/2008)

technology.newscientist.com



Suez Canal of IT applications

After Google Gears, Adobe Air and Mozilla Prism finally the Yahoo BrowserPlus has also arrived. It seems that the fight for the control of the platform between web and desktop applications is slowly becoming really heated.

There have been small bits of information trickling out about Yahoo's BrowserPlus, but recently we got some more information about what Yahoo's planning and it's a good development for RIAs. In their own words, Yahoo is building a platform, BrowserPlus for extending the Web: an end-user installs it and a developer uses its features through a small JavaScript library. Some of the features that exist in the platform today include: drag-and-drop from the desktop, client-side image manipulation (cropping, rotation & filters), desktop notifications. Clint Boulton makes the comparison between Gears and Adobe AIR, which is sort of correct. It really looks like it's more competition for Google Gears as it will run inside the browser and expand the capabilities of the browser. It also doesn't seem to be a one-plugin fro everything model. In the case of Yahoo BrowserPlus, users would download a plugin, and then websites could call different web services supported by BrowserPlus and BrowserPlus would load those into the browser when they're called. That means it's very easy for Yahoo to add functionality to the platform as they go instead of having to worry about distributing a new version of the plugin every time. Some of the new functionality parallels the new features and roadmap of Google Gears that was announced on the 28th of May 2008 and it's interesting to see two big web companies continue to try and expand on what the browser can do by offering their own functionality. If you look at Mozilla Prism, Adobe AIR, Google Gears, and BrowserPlus, there does seem to be a lot of interest in moving beyond the browser and there is plenty of choice for how each developer makes that happen.

(064/2008)

blogs.zdnet.com



TU Delft robot Flame walks like a human



The development of walking robots is not only a scientific-technological success - which is in itself remarkable - but give us the hope of more concrete, rehabilitational results as well. Modelling the walking process allows researchers to construct more naturally walking two-legged robots. More insight into the walking process can in turn help people with walking difficulties.

Researcher Daan Hobbelen of TU Delft has developed a new, highly-advanced walking robot: Flame. This type of research is important as it provides insight into how people walk. This can in turn help people with walking difficulties through improved diagnoses, training and rehabilitation equipment. If you try to teach a robot to walk, you will discover just how complex an activity it is. Walking robots have been around since the seventies. The applied strategies can roughly be divided into two types. The first derives from the world of industrial robots, in which everything is fixed in routines, as is the case with factory robots. This approach can, where sufficient time and money are invested, produce excellent results, but there are major restrictions with regard to cost, energy consumption and flexibility. TU Delft is a pioneer of the other method used for constructing walking robots, which examines the way humans walk. This is really very similar to falling forward in a controlled fashion. Adopting this method replaces the cautious, rigid way in which robots walk with the more fluid, energy-efficient movement used by humans. PhD student Daan Hobbelen has demonstrated for the first time that a robot can be both energy-efficient and highly stable. His breakthrough came in inventing a suitable method for measuring the stability of the way people walk for the first time. This is remarkable, as 'falling forward' is traditionally viewed as an unstable movement. Next he built a new robot with which he was able to demonstrate the improved performance: Flame. Flame contains seven motors, an organ of balance and various algorithms which ensure its high level of stability. For instance, the robot can apply the information provided by its organ of balance to place its feet slightly further apart in order to prevent a potential fall. According to Hobbelen, Flame is the most advanced walking robot in the world, at least in the category of robots which apply the human method of walking as a starting principle.

(065/2008)

www.tudelft.nl



Robot conducts the Detroit Symphony



Legendary robot ASIMO's capabilities are increasing: the fact that its brand new version can differentiate three human voices might result an important step foeward in human-machine interaction. But for the more authentic and useful human-machine interaction affection as much needed as other capabilities. This lack of empathy was poorly missed last time when ASIMO demonstrated its skills.

ASIMO is not your typical conductor. It's gender neutral, stands at a little over 4 feet tall and has no pulse. It's a humanoid robot that made its conducting debut in Detroit. It walked onto the stage to thunderous applause worthy of Leonard Bernstein. "Hello, everyone," it said. "Hello," the audience responded. Then, ASIMO gracefully walked to the center of the stage, bowed and began leading the orchestra in a performance of "The Impossible Dream" from the musical Man of La Mancha. ASIMO, which stands for Advanced Step in Innovative Mobility, is a robot designed and built by Honda. One of its main goals is to get kids interested in math and science. But ASIMO took a stab at conducting. David Everson, who plays the French horn, said that while ASIMO's timing was impeccable, like a metronome, something clearly was missing. "This thing doesn't have any eyes," Everson said. "You can't see its eyes. They can't convey any kind of emotions to you other than ... It's standing up there, it's not moving forward, it's not moving back. It's not making little small gestures or giving anybody any cues." Leonard Slatkin, the DSO's newly installed music director, echoed Everson's analysis. Slatkin said that a conductor must be able to improvise — a skill ASIMO has yet to master. "Sometimes you want to take a passage a little bit slower; sometimes it needs to have a darker color; sometimes it should be softer," Slatkin said. "These are all things that a conductor conveys to the orchestra on the spur of the moment." At intermission, people of all ages were heard talking about and mimicking ASIMO. "I thought he was going to be more boxy," but his head and fingers were humanlike, said Janey Degnan, who plays in a youth orchestra. ASIMO's presence in Detroit, while entertaining, was also meant to draw attention to the importance of music education.

(066/2008)

www.npr.org



Computer game's high score could earn the Nobel Prize in medicine



Computer games longtime have been more than entertainment: today they are used for example in education and scientific researsches. An American experiment shows that by them we can participate in important scientific reseaeches, too. Researchers analyzes the most important movements of the users and try to demonstrate how users solve the puzzle-like questions.

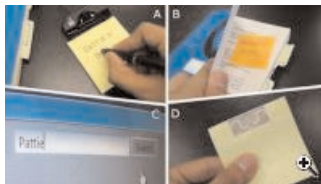
Gamers have devoted countless years of collective brainpower to rescuing princesses or protecting the planet against alien invasions. This week researchers at the University of Washington will try to harness those finely honed skills to make medical discoveries, perhaps even finding a cure for HIV. A new game, named Foldit, turns protein folding into a competitive sport. Introductory levels teach the rules, which are the same laws of physics by which protein strands curl and twist into three-dimensional shapes -- key for biological mysteries ranging from Alzheimer's to vaccines. After about 20 minutes of training, people feel like they're playing a video game but are actually mouse-clicking in the name of medical science. The game was developed by doctoral student Seth Cooper and postdoctoral researcher Adrien Treuille, both in computer science and engineering, working with Zoran Popović, a UW associate professor of computer science and engineering; David Baker, a UW professor of biochemistry and Howard Hughes Medical Institute investigator; and David Salesin, a UW professor of computer science and engineering. "We're hopefully going to change the way science is done, and who it's done by," said Popović, who presented the project today at the Games for Health meeting in Baltimore. "Our ultimate goal is to have ordinary people play the game and eventually be candidates for winning the Nobel Prize." The intuitive skills that make someone good at playing Foldit are not necessarily the ones that make a top biologist. Baker says his 13-year-old son is faster at folding proteins than he is. Others may be even faster. Eventually, the researchers hope to advance science by discovering protein-folding prodigies who have natural abilities to see proteins in 3-D. "Some people are just able to look at the game and in less than two minutes, get to the top score," said Popović. "They can't even explain what they're doing, but somehow they're able to do it."

(067/2008)

uwnews.washington.edu



Quickies: intelligent sticky notes



The electronic copy of the "small yellow stickies" has been done: the handwritten note is stored on RFID chips. In the practice it is important to put a reversible sign on the documents and other objects. The system accept handwriting also, and tries to understand the most common handling information.

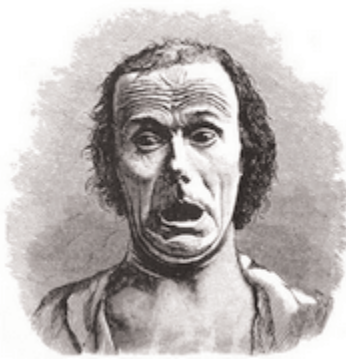
In an attempt to bring one of the most famous inventions of the 20th century into the digital age, scientists of the "Ambient Intelligence Group" at the Massachusetts Institute of Technology have developed the "intelligent stickies". These are essentially Post-its with a twist - the notes written on them can be managed by a PC that will be able to remind users of any information stored on the small paper notes at the appropriate time, via a variety of digital devices. In a project that combines artificial intelligence, RFID, and ink recognition technologies, the MIT team says they have managed to make the popular sticky notes much more useful. A newly-written Quickie is a simple Post-it note, which is scribed on a sensitive pad that allows the computer to capture and store the written information. This is done using commercially available digital-pen hardware, which translates the movement of the pen on the surface of the paper sticky note into digital information. The data can be viewed at any time through the Quickie software, which stores the sticky notes as images and converts the hand-written notes into computer-understandable text using available handwriting recognition algorithms. The Quickie application not only allows users to browse their notes, but also lets users search for specific information or keywords. Using a freely available commonsense knowledge engine and computational AI techniques, the software processes the written text and determines the relevant context of the notes, categorizing them appropriately. "The system uses its understanding of the user's intentions, content, and the context of the notes to provide the user with reminders, alerts, messages, and just-in-time information" – said the inventors. Additionally, each Quickie carries a unique RFID tag, so that it can be easily located around the house or office. Therefore, users can be sure never to lose a bookmarked book or any other object marked with a Quickie.

(068/2008)

www.ftot.info



Intelligent computers see your human traits



It is an important element of the improvement of man-machine interface that the machine should be „aware“ of the state of mind and feelings of the man. Although the brain waves transfer a lot of information related to this, their disadvantage is that they are only observable near the head. For the everyday use, the well-known audio-visual signs remain to be used, i.e. voice tones, facial expressions, gestures etc. What is, however, an easy task for man, is a complex, multimodal data analysis for the machine. But it is possible, and the results are not bad at all.

Today’s computers can do a lot as far as computation goes, but they tend to do it in an impersonal, stand-offish way, so to speak. However, computer engineers are busy changing that, as they try to give computers a bit of a personal touch to make human-computer interaction more natural and friendly. For instance, two studies from a recent issue of IEEE Transactions on Multimedia have investigated enabling computers to recognize users’ emotional states and ages. The researchers hope that tomorrow’s computers will be able to “look” at a human face and extract this type of information, much like humans do with each other. By combining audio and visual data, Yongjin Wang from the University of Toronto and Ling Guan from Ryerson University in Toronto have developed a system that recognizes six human emotional states: happiness, sadness, anger, fear, surprise, and disgust. Their system can recognize emotions in people from different cultures and who speak different languages with a success rate of 82%. “Human-centered computing focuses on understanding humans, including recognition of face, emotions, gestures, speech, body movements, etc.,” Wang told PhysOrg.com. “Emotion recognition systems help the computer to understand the affective state of the user, and hence the computer can respond accordingly based on that perception.” The researchers’ system extracted a large number of vocal characteristics, such as “prosodic features,” which include the rhythm, intensity, rate, and frequency of speech. Facial features were extracted holistically. Then, the researchers trained the system on several short video samples of individuals showing different emotions, from which it connected certain features with emotions. As Wang and Guan explained, emotional representation is very diverse: some vocal and facial features may play an important role in characterizing certain emotions, but a very minimal role in other emotions. As a general example, happiness is detected better using certain visual features (e.g. in smiling), while anger is detected better using audio features (e.g. in yelling).

(069/2008)

www.physorg.com



Profits for publishers in making books accessible to all



More and more books are published in different forms: Braille alphabet, audio and other formats. The problem is that even nowadays many users are unable to read these products. New editorial concepts, technologies and applications are needed for the better accessibility.

Many people have no access to most published books. European researchers are trying to remedy this by adapting new technologies to provide accessibility on demand for the visually impaired. The dream is to make all new publications simultaneously available in formats such as Braille, large print and audio. This will mean the blind, the partially sighted and those suffering from reading disabilities such as dyslexia have the same access rights to information as the rest of society. While the driving force behind the research is helping the ‘print impaired’, who make up between 6-8% of all Europeans, a substantial and hence profitable new mainstream market is also being created. The EUAIN project and its successors have brought together the publishing industry in Europe with accessibility organisations for the first time, and a whole new type of publishing is in the process of being created as a result. Project co-ordinator David Crombie says while there are plenty of accessibility projects for the Internet, this one is different in that it deals with allowing access to documents in any digital format. The researchers also viewed accessibility as a being part of a process rather than as a product. “At key points in the process of creating a digital document, you have to put in accessibility,” he says. “The sooner in the process you add accessibility the better and cheaper it is.”

(070/2008)

cordis.europa.eu



Next generation of business software could get more fun



Enterprises working in knowledge intensive economical sectors, generally acknowledge that a substantial part of the organisation's knowledge is created, enhanced and confirmed by informal man-man interactions. The efficient IT-driven business activities, however, eliminate the places where the employees can spontaneously meet each other, and share the information and knowledge among each other which is important for them at the very moment. Paradoxically, the thrive for productivity increase at all expenses, may decrease the productivity. What remain, are the virtual (i.e. web) spaces that we visit in the process of our work. At least, these spaces should be pleasant and suitable for spontaneous information exchange.

Once upon a time, people bonded with their co-workers on office softball teams and traded gossip at the watercooler. OK, so those days aren't gone yet. But as big companies parcel Information Age work to people in widely dispersed locations, it's getting harder for colleagues to develop the camaraderie that comes from being in the same place. Beyond making work less fun, feeling disconnected from comrades might be a drag on productivity. Now technology researchers are trying to replicate old-fashioned office interactions by transforming everyday business software for the new era of work. The historically dry-as-sawdust products are borrowing elements from video games and social-networking Web sites. You can tell just from looking at the Beehive program under development at IBM Corp. that something is different. Beehive's color scheme is bright yellow, not IBM's standard blue. The cheerfulness reflects the fact that Beehive is meant to encourage far-flung co-workers to like each other more.

(071/2008)

www.theglobeandmail.com



Ruby is on the rise

The Java programming language was quoted, when it was announced publicly, as the „genetic code” of the internet. And indeed: it is applied extremely widely, a lot of tools and programmers support and use. However, it is also being recognised that this is not the „ultimate coding scheme”, its wide acceptance does not mean the end of the history of programming languages. For example, in terms of expressive power and ease of use, it has found a challenger in Ruby. It is another question, however, that a Ruby-program is much slower than its Java-equivalent. But remember: Java has not been famous about its speed in the beginning, too.



With Java now a very mature language with millions of developers, the Ruby language is among the fastest growing programming languages, and the number of Ruby developers is expected to quadruple over the next five years. In a panel discussion at the Sun's CommunityOne day preview to JavaOne here on May 5, Mark Driver, an analyst at Gartner, said, "There are under one million professional Ruby developers now and we're projecting there will be four million plus by 2013." Driver later told eWEEK that Gartner's research shows "strong interest" in Ruby and that the percentage of developers that will be creating commercial systems versus those that are hobbyists will be even greater for Ruby than for other languages. "Ruby will be more interesting to commercial developers," he said. The panel discussion featured a variety of participants, including some core contributors to the JRuby project and a trio of Ruby developers. In addition, while broaching the issue of Ruby's growth, the session also at times compared Ruby to other languages such as PHP and Java itself. JRuby is an implementation of Ruby that runs on the JVM (Java Virtual Machine).

(072/2008)

www.eweek.com



MIT researchers: morphing Web sites could bring riches



Websites automatically customized to users may sell more products and services. About 5-10 clicks are needed to get to know the customer and customize the site. Clustering online the customers, may give new perspectives to e-commerce.

Web sites that automatically customize themselves for each visitor so they come across as more appealing or simply less annoying can boost sales for online businesses by close to 20%, MIT research says. These sites adapt to display information so everyone who visits sees a version best suited to their preferred style of absorbing information, say the four researchers. So the site might play an audio file and present graphics to one visitor, but present the same information as text to the next depending on each person's cognitive style. Morphing sites deduce that style from the decisions visitors make as they click through pages on the site. "You need five to 10 clicks before you can really get a pretty good idea of who they are," says John Hauser, the lead author of the paper and a professor at MIT's Sloan School of Management. He says over the past decade statistics have evolved to allow broader conclusions from less data. "You can infer a lot more from a lot less data by borrowing data from other respondents," he says. "When I first heard it I thought this couldn't possibly work." But it does. By using a sample set of users navigating a test Web site, individual businesses can set the baseline for what click choices on that site mean about the visitor. Over time with real potential customers visiting a live site, the morphing engine fine tunes itself to draw better conclusions about visitors' preferences and to serve up what pages most likely lead to a sale, Hauser says. The software is open source and available at MIT's Web site, but so far no one has created a commercial business to apply it to individual customers, he says. Such auto-customizing Web sites are less intrusive than the alternative - sites that visitors can manually customize, a time-consuming process that many visitors won't bother with, the researchers say. And they create the right Web site for maximum sales much quicker, Hauser says.

(073/2008)

www.networkworld.com



Boston University researchers developing sign language video dictionary

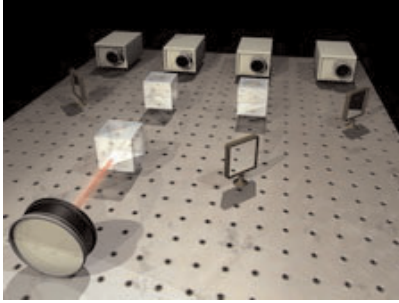


Expressions of the sign-language are riches, complex and fast changing such as the talking languages. There is new a engraving technique for sign-language expressions, made by the Boston Unoversity. The main goal is to build up a dctionary of sign-languages for multimedia purposes.

Even though Joan Nash has been using American Sign Language for most of her life and has made a career of teaching deaf and hearing-impaired children, she is sometimes stumped when she encounters a sign she has never seen. She can't just look it up in a dictionary. At least not yet. Nash, a doctoral student at Boston University, is part of a team working on an interactive video project that would allow someone to demonstrate a sign in front of a camera, and have a computer program interpret and explain its meaning. "Sometimes when I see a sign I don't know it can be frustrating as you run around asking people and trying to find out what it is," she said. American Sign Language has no written form, and even though there are print and video ASL dictionaries, one needs to know the meaning of the word to look up the sign. That's sort of like trying to figure out the meaning of a foreign word by looking it up under its English equivalent. "I know from my own experience that it's really hard if you see a sign that you don't know, either in a class, in a video you've been assigned to watch, or even if you see it on the street, to figure out what it means," said linguistics professor Carol Neidle, one of the project's lead researchers along with BU's Stan Sclaroff and Vassilis Athitsos at the University of Texas-Arlington. The goal is to develop a lexicon of more than 3,000 signs. The meaning of each sign is not just determined by the shape of the hands, but also the movements of the hands and arms, and even facial expressions. As Nash scrolls through hundreds of words alphabetically in English - sweep, sweetheart, swimming, symbol, system - Elizabeth Cassidy, a native ASL speaker, signs them for four cameras, three in front of her and one on her right. Two cameras shoot close-ups from different angles, and one takes a wider shot. The goal is to use the technology to develop a multimedia ASL dictionary to help parents better communicate with deaf children, and to help sign language students.

(074/2008)

canadianpress.google.com



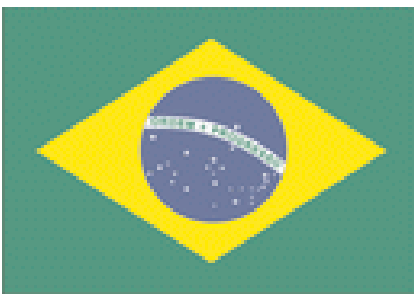
Linköping University researchers break "unbreakable" crypto

It was accepted so far that quantum cryptography is an absolutely secure solution for the protection of confidentiality of communications, because it is impossible to observe the data flow by a third party without being detected. However Jan-Ake Larsson at Linköping University managed to prove that an undetectable observation is theoretically possible.

Quantum cryptography has been regarded as 100-percent protection against attacks on sensitive data traffic. But now a research team at Linköping University in Sweden has found a hole in this advanced technology. The risk of illegal accessing of information, for example in money transactions, is necessitating more and more advanced cryptographic techniques. When you send an encrypted message via the computer network, one of the most difficult problems to solve is how the key should be transmitted. One way is to send it by courier. Another way is a "public key," which is used for online banking and security functions in Web browsers. A courier must of course be reliable, otherwise there is a risk that the key will be secretly copied on the way. A public key is regarded as secure, since enormous calculations are required to break the long strings of data bits - some 2,000 - that make up the key. But a new technology called quantum cryptography is supposed to be absolutely secure. Thus far, however, very few people have made use of it. It requires special hardware, for example with a type of laser that emits polarized light particles (photons) via optic fiber or through the air. Some companies and banks in Austria are testing the system, and trials are underway with satellite-TV transmission. The security is guaranteed by the laws of quantum mechanics. Quantum-mechanical objects have the peculiar property that they cannot be measured upon or manipulated without being disturbed. If somebody tries to copy a quantum-cryptographic key in transit, this will be noticeable as extra noise. An eavesdropper can cause problems, but not extract usable information. But Jan-Ake Larsson, associate professor of applied mathematics at Linköping University, working with his student Jörgen Cederlöf, has shown that not even quantum cryptography is 100-percent secure. There is a theoretical possibility that an unauthorized person can extract the key without being discovered, by simultaneously manipulating both the quantum-mechanical and the regular communication needed in quantum cryptography.

(075/2008)

www.liu.se



How the free software movement is winning the war in Brazil

The Brazilian open source software based governmental application development projects are wxtremely succesful. However some question the long term viability of this development model. This and other connected issues are discussed in a long interview with Marcos Mazoni who is the currently elected head of the Brazilian Technical Committee for the Implementation of Free Software.

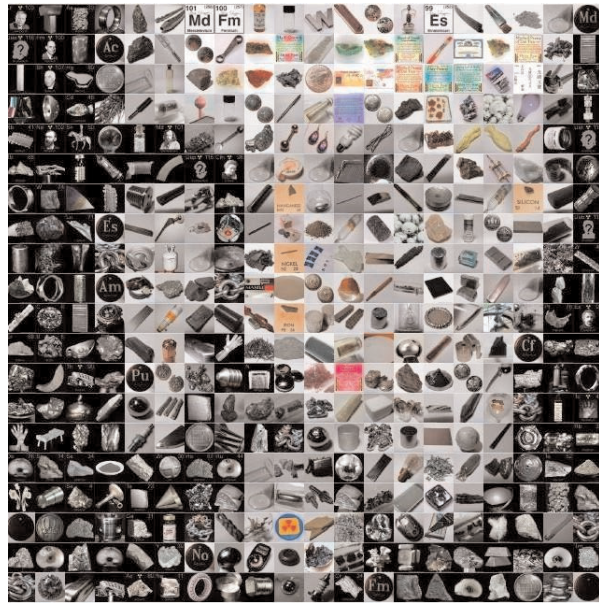
Brazil made an impression on the free software world during the past five years of President Luiz Inácio Lula da Silva's administration by promoting a policy of migration to open source software for the government and state-owned industry. Initial press coverage of this policy change away from proprietary software was celebrated in many mainstream media outlets. Since then, the mainstream media hasn't really given much time to the actual policy implementation and English-language bloggers have started to question whether there is anything for open source advocates to be excited about: "Interest in FOSS (Free and Open Source Software) still exists throughout Brazil, but signs of progress are hard to see in 2007," asserts an article at Linux.com and repeated in the open source blogosphere. This outlook is a significant departure from the reality on the ground. Brazil's commitment to free software is demonstrated in a number of impressive initiatives, any one of which would be unprecedented by themselves. Collectively, these programs comprise an enormous contribution to the open source community in the form of both code and real-life experience in deploying free software as a solution for large and complex organizations, if not society as a whole.

(076/2008)

www.brazil.com

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PERSPECTIVES



Will we see
the big picture?

Information, Information, and more Information

In the development of the network society, we have clearly gotten beyond the phase (if there in fact existed such a phase) which can be characterized as a glorification of the increase in the quantity of accessible data and information. By this, I refer to the exploitation of possibilities and the development of user modes which stem from connectivity, and which bear its characteristics.

Naturally, all of this refers to simultaneously fluctuating and intimately interrelated processes in the social, technological and economic sphere - and especially significant in our case, even at the smallest level of social existence - in the thinking, lifestyle and abilities of the individual.

It would be unnecessary to revisit the initial stages of the formation of the information society. Instead, let us rather concentrate on the phenomena of the most recent phase. Bearing the mark of the concept of web 2.0, collective internet usage brought along with it a new storehouse of possibilities and phenomena. On one side, we have user participation and browsing/information management based on collectivity. On the other hand, the appearance of new business models and structures cannot be disregarded either, most notably in the case of the long-tail model. The latter brought the concept of 'zero cost' or 'free' to the fore of our economic thinking. In the beginning, we encountered newer and newer services, which were accessible to users on the basis of advertising revenue. As the object was the attraction of the largest possible segment of the target audience, services, in spite of their complimentary nature, continuously developed in line with user demands, and today a complete line of sophisticated applications is at our disposal.

However, it is worth examining these phenomena from two different perspectives. One perspective is the possibility for the production, publication and merging of the largest possible quantity of information and data. We merely need to think of Google Maps' geographically based data sets, or the most recent projects, which pertain to the linking of scattered data and databases at various levels. The inherent advantages of these are unambiguous. However, yet another perspective is necessary to complete the picture, which pertains to the management of this vast quantity of data and information that has appeared as of late. The foregoing would achieve nothing in and of itself if its usage and systematization proved to be cumbersome. Relevant here are various visualization-based services, tags, as well as feed readers.

At the same time, the individual who feels at home in the information society encounters on a day to day basis countless letters arriving to their electronic mailbox, a portion of which go unread. Meanwhile, on various levels, they still cultivate their relationships with people from their community network - whose data they continuously monitor - with the interactive services present in this sphere. However, with the ever-increasing quantity of unread feeds, a person can feel that they are falling behind if they don't read all of these from top to bottom. In other words, their frustration reaches greater and greater heights.

Following the glorification alluded to in the beginning of this paper, information overload became an everyday, recurring concept, calling our attention to challenges which not only pertain to the question of technological development, but touch upon the most essential fundamentals of human development - be it lifestyle, or biology.

How much information?

In an attempt to merely get a sense of the dimensions at play, we call upon the assistance of research conducted by the University of California, Berkeley's School of Information Management and Systems, which in 2000 and 2003 conducted its research project entitled *How much information?*¹. Although it may seem outdated juxtaposed with the speed of today's changes - rightly postulating the accelerating tendencies - we can sense that the dimensions of the quantity of data falling under the umbrella of 'information' which they are attempting to grasp is virtually incomprehensible - at the same time, also realizing how much of this pertains to phenomena or "products" of the most recent phase.

The table displays the quantity of new and digitally stored information produced in 1999 and 2003, where the measurement unit is the terabyte - that is, 10¹² bytes. According to the researchers' survey, all in all 5 exabytes of new information was stored on the specified data carriers, which is half a million times as great as the volume of books stored in The Library of Congress.

This data, however, was prepared prior to the appearance of - from the perspective of information production - numerous determinant phenomena, to which the arrival of web 2.0 also belongs. Among the relevant data, it is at this time worth highlighting merely one of these - namely, number of blogs. Naturally, precise data is unknown. However, at the beginning of 2008, Technorati accounted for 112.8 million blogs (compared with 70 million the previous year) to which (merely to supplement this data) the 72.82 million blogs accounted for in the world of the Chinese internet can be added.² And naturally, this is merely the portion of the data which could be tracked down.

Why do we consume?

As I previously mentioned, this ever-increasing quantity of data and information is beginning to become a significant burden, weighing heavily on our everyday lives, and is testing the limits of human capabilities and cognition. But then what is the explanation for us still wanting to "play ball"? Why must we read so many blogs which provide us with disjointed information, instead of reading one, perhaps a few, but in any case a modest amount of carefully thought out books or articles? Why do we store digital music in such quantities that we can't even listen to all of them, instead of having a handful of carefully selected albums? Meanwhile, it is apparent that this issue, raised to a societal level, will signify a serious problem in the near future.

One possible answer is provided by the approach of behavioral economics, in which psychological motives also play a significant role.³ Although it is rather based on intuition, it is worthwhile carefully considering Rob Horning's analysis.⁴ Its initial basis is the following perennial economic question: On what basis do we decide upon the acquisition of certain goods? Borrowing Nicholas Carr's analogy, the choice is between hamburgers and hot dogs.⁵ The two products can be regarded as substitute products, but people like hamburgers a little bit more. However, if department store chains begin dispensing hot dogs for free, then that is what people will "buy". Such is the situation with filtered, not necessarily free information and the currently accessible, free, unfiltered quantity of information. If acquisition costs are seemingly reduced to nothing, then it is clear which way the scale will tip.

¹ *How much information? 2003* - <http://www2.sims.berkeley.edu/research/projects/how-much-info-2003/>

² *Helmond, Anne: How many blogs are there? Is someone still counting?* - <http://www.blogherald.com/2008/02/11/how-many-blogs-are-there-is-someone-still-counting/>

³ *Kolbert, Elizabeth: What was I thinking?* - http://www.newyorker.com/arts/critics/books/2008/02/25/080225crbo_books_kolbert

⁴ *Horning, Rob: The time cost of free goods* - http://www.popmatters.com/pm/blogs/marginalutility_post/59981/the-time-cost-of-free-goods

⁵ *Carr, Nicholas: Does my brain look fat?* - http://www.rougtype.com/archives/2008/06/does_my_brain_l.php

This economic 'verdict', however, has further implications. That is to say, other costs are associated with the aforementioned products (i.e. the various types of information). As tempting as it may be, I will now dispense with the subjective viewpoint of which values the various types of available information represent. The cost factor in question, in this case, is the time we spend on acquisition and consumption. "Zero cost" can create the illusion that the more information we acquire, the better off we are. Naturally, this effect is also reinforced by social influence, since, according to the new sets of rules (i.e. the attention economy⁶) we mustn't lag behind. Orientation towards quantities of data and information is one of the foundations of personal status. Consumption, however, takes place at the expense of time, the logical consequence of which is the attempt to increase efficiency - the improvement of effective time management. Abiding by the economic concepts, this, however, calls forth such phenomena as attention scarcity,⁷ or continuous partial attention,⁸ which is now replacing the concept of multitasking. That is, we have finally reached our cognitive limits. But what answers does technological development provide?

Technological answers

On the topic, researchers from the Institute for the Future have identified four areas as technological 'trackers' of our sensory transformation.⁹ However, before specifying what these are, it is worth mentioning that, although they can presently be regarded as external factors, the nature of the processes is moving in such a direction that they seem to be becoming internal. After all, we are dealing with sensory aids, which is a fundamentally cognitive process.

The four areas are the following:

- **Data visualization:** to be highlighted in this case, in addition to numerous developmental paths, is the solution to the cognitive challenge of making the interpretability of quantities of data that are becoming more complex more efficient and simpler, which can greatly promote the development of intelligent systems capable of being studied
- **Ambient displays:** in this case as well, the apparent path of development is greater adaptation to everyday life (e.g. removable tools analogous to clothing) - this could even include solutions that are in greater harmony with the biological functions of cognition (for example, if we concentrate on something, it becomes more in focus)
- **Social filtering:** here we can already encounter well-operating systems (e.g. del.icio.us) where functionality becoming real-time could be the next step, or rather, the presence of awareness with the introduction of structural principles and structural levels

⁶ Iskold, Alex: *The attention economy: An overview* - http://www.readriteweb.com/archives/attention_economy_overview.php

⁷ Goldman, Eric: *Attention scarcity* - <http://www.ericgoldman.org/Speeches/attention scarcity aug2004.htm>

⁸ Stone, Linda: *Continuous partial attention* - <http://continuouspartialattention.jot.com/WikiHome>

⁹ *Sensory Transformation: New Tools & Practises for Overcoming Cognitive Overload* - <http://www.iff.org/node/68>

- **Agents and interfaces:** here we must think of types of solutions which adapt in an intelligent manner, on one hand, to cognitive operation, and on the other hand, to requirements relating to lifestyle (e.g. an alarm-clock that lets you sleep if the train is running late; tools that react to one's level of concentration) - it is important here to mention measures being taken towards the formation of the semantic web, which also belongs to this area

In addition, the future internal transformation of the individual is also an important issue. One trend is life hack, which pertains to the optimization of one's daily activities and overcoming problems, situations or even frustrations resulting from information overload. These have fundamentally been linked to computer activity, but to an ever-increasing extent, the now popular blogs also offer tips for optimizing one's daily activities.

The other trend is brain hack, which refers to the alteration of biological faculties. One of the obvious forms this takes is the increase in the consumption of various concentration and endurance enhancing pharmaceuticals. Further, although not yet evident attempts pertaining to the actual transformation of the functioning of the brain in order to deal with altered environmental requirements are also under way.

Where do we go from here?

As is usually the case with the investigation of developmental trends, we have more questions than answers. What we may now judge as detrimental will be a given from the perspective of subsequent generations. It remains to be seen whether adaptation or the pursuit of solutions is a feasible path, or whether we should in reality command ourselves to stop, and more carefully examine whether we are heading in the right direction. Maybe the future belongs to the snails.¹⁰

Further readings:

<http://www.kk.org/thetechnium/archives/2008/04/zillionics.php>

<http://www.research.ibm.com/visual/publications.html>

<http://www.hyperorg.com/blogger/>

¹⁰ <http://www.carlhonore.com/?page=1>