

TECHNOLOGY ROUNDUP

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Tech News

Local Technology

Thermo Pad for Heat Therapy

Heat Therapy is an age old, but effective, and safe therapy in ailments like aching joints, muscular sprains, aching joints, or simply cold limbs. Electric heating pad, a modern improvement on the hot water bottle, a cheap and convenient alternative to short wave diathermy (SWD) and the IR lamp, is gaining popularity in the Pakistani market because of its overall superiority and utility compared to all the other devices. Heating pads from western and Asian countries are, as a result fast invading the market which could be roughly 300,000 pieces per year. With an estimated cost of Rs.2000 for a reasonable quality pad this translates to over Rs. 4.5 billion per annum, with the obvious drain of precious foreign exchange.



The indigenous electric thermo pads has been developed produced and marketed on small scale. Is used for warming of parts of the body in order to manage pain. Localized application of heat promotes blood flow.

The heating pad operates off mains. A flexible heater element of nichrome wire is specially wound on a core of glass fiber with controlled pitch and length to allow a power of approximately 60 watt. The length of the element is laid out in a serpentine manner to provide a uniform distribution of heat over the area of the pad. Locally made semiconductors are used as temperature sensors. Three identical sensors biased at low current are placed in series and dispersed uniformly along the longer dimension of the heated area. The combined output of the sensors is compared to a presettable reference voltage. The output of the comparator controls the heater through a semiconductor switch.



The heat localized in the element is diffused through a sheath of glass fibre sleeve, the retaining cotton shroud, layers of cotton material, a shroud of rubber coated cloth (For water resistance) and a removable and washable cotton cover etc so that the user feels a more or less uniform temperature over the surface. The same layers of diffusing materials provide as many layers of electrical insulation against shock. Other than the sensors, the control electronics is housed in a control box which also houses a

switch for selecting one of two reference voltages, a power on switch and two LEDs to indicate mains power and state of heater power. The cycling of this latter light also tends to reassure the user that the heat is being controlled.

The control box connects to the “pad” proper through a 4-conductor flat cable and to the mains through a two conductor mains cable. DC power for the control circuitry is obtained from the mains by reduction, rectification, and zener stabilization. The control includes special safety circuitry to sense presence of the sensor loop. In case the loop is broken power to the heater is disabled.

With one Face Hotter Than Other. Hi/Lo Toggle Switch Makes Four Heats Available. It is more Versatile than the Bottle,IR Lamp, or Shortwave. Wrap it or Lie on it. Use in Bed or in Office, or Clinic----Keep Working.

www.ftipak.com

Air-Conditioned Greenhouse uses Alternative Energy



Neiker-Tecnalia (The Basque Institute for Agricultural Research and Development, Spain)) has created an air-conditioned greenhouse using alternative energies that enable the reduction of energy costs, improvements in energy efficiency and an increase in crop yields. The novel system has a biomass boiler and thermodynamic solar panels, which reach an optimum temperature for the crop without using fuels derived from petroleum oil or gas.

A biomass boiler produces 400 kW power and is, now the largest using air-conditioning in greenhouses. With the boiler there are 40 thermodynamic panels, employed for the first time in intensive greenhouse cultivation. The combination of both energies act to heat the water which circulates in tubes located a few centimeters above the floor and below the substrate of the crop, the aim being to heat the roots.

The tubes, distributed throughout the whole surface of the greenhouse, transport water at an average temperature of 80 degrees centigrade. Thus optimum air-conditioning for greenhouses is achieved, with the result that the plants grow as in the natural production period. Achieving less expenditure in consumption and having seasonal crops all year.

The biomass boiler used by Neiker-Tecnalia works with organic waste, such as almond nut shells, olive oil stones, tree pruning cuttings, the waste obtained from clearing forests, granulated pellets of sawdust, sawdust itself, wood shavings or any other leftover from the timber industry. The expenditure in fuel for the biomass boiler is 55 cents for kilowatt consumed, well below the 92 cents of a euro needed for boilers fed by petroleum oil-derived fuels or by natural gas or propane.

Air-conditioning using alternative energies is complemented with a technique known as 'hydroponic soil', involving placing the plants on substrate at a height of some ten centimetres above the hard floor of the greenhouse. This method also enables the roots to be heated by pipes through which water circulates at an average temperature of 45 degrees centigrade. Directly heating the substrate where the roots are found enables reducing the ambient temperature of the greenhouse overall, thus involving less energy expenditure. This system involves a network of sensors (distributed throughout the greenhouse) that enables regulating the temperature of the market garden. The meters gather data in real time on the temperature and humidity of the crop zone. The data is sent to a computer which has software capable of programming different actions, such as increasing or reducing the temperature of the greenhouse or fixing the most appropriate hours for heating the plants.

www.basqueresearch.com

New Solar Cell Self-Repairs Like Natural Plant Systems

Researchers are creating a new type of solar cell designed to self-repair like natural photosynthetic systems in plants by using carbon nanotubes and DNA, an approach aimed at increasing service life and reducing cost.

Hyun Choi, an Assistant Professor of Mechanical Engineering at Purdue University told that this artificial photosystems is created by using optical nanomaterials to harvest solar energy that is converted to electrical power.



The design exploits the unusual electrical properties of structures called single-wall carbon nanotubes, using them as molecular wires in light harvesting cells.

Photoelectrochemical cells convert sunlight into electricity and use an electrolyte a liquid that conducts electricity to transport electrons and create the current. The cells contain light-absorbing dyes called chromophores, chlorophyll-like molecules that degrade due to exposure to sunlight.

The critical disadvantage of conventional photoelectrochemical cells is this degradation. The new technology overcomes this problem just as nature does: by continuously replacing the photo-damaged dyes with new ones. This sort of self-regeneration is done in plants every hour.

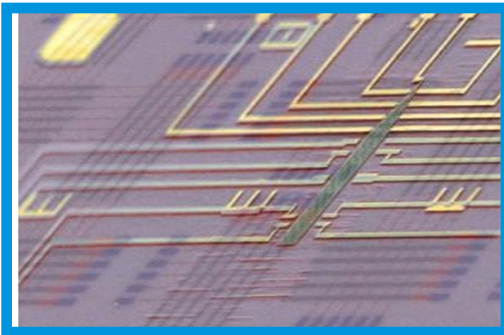
The new concept could make possible an innovative type of photoelectrochemical cell that continues operating at full capacity indefinitely, as long as new chromophores are added.

The carbon nanotubes work as a platform to anchor strands of DNA. The DNA is engineered to have specific sequences of building blocks called nucleotides, enabling them to recognize and attach to the chromophores. The DNA recognizes the dye molecules, and then the system spontaneously self-assembles. When the chromophores are ready to be replaced, they might be removed by using chemical processes or by adding new DNA strands with different nucleotide sequences, kicking off the damaged dye molecules. New chromophores would then be added.

Two elements are critical for the technology to mimic nature's self-repair mechanism: molecular recognition and thermodynamic metastability, or the ability of the system to continuously be dissolved and reassembled. This technology offers promise for industrialization.

www.purdue.edu

World's First Programmable Nanoprocessor



Engineers and scientists collaborating at Harvard University USA and the MITRE Corporation have developed and demonstrated the world's first programmable nanoprocessor.

The groundbreaking prototype computer system is a significant step forward in the complexity of computer circuits that can be assembled from synthesized nanometer-scale components. It also represents an advance because these ultra-tiny nanocircuits can be programmed electronically to perform a number of basic arithmetic and logical functions.

This work represents a quantum jump forward in the complexity and function of circuits built from the bottom up, and thus demonstrates that this bottom-up paradigm, which is distinct from the way commercial circuits are built today, can yield nanoprocessors and other integrated systems of the future. The work was enabled by advances in the design and synthesis of nanowire building blocks. These nanowire components now demonstrate the reproducibility needed to build functional electronic circuits, and also do so at a size and material complexity difficult to achieve by traditional top-down approaches.

Moreover, the tiled architecture is fully scalable, allowing the assembly of much larger and ever more functional nanoprocessors.

For the past 10 to 15 years, researchers working with nanowires, carbon nanotubes, and other nanostructures have struggled to build all but the most basic circuits, in large part due to variations in properties of individual nanostructures. An additional feature of the advance is that the circuits in the nanoprocessor operate using very little power, even allowing for their miniscule size, because their component nanowires contain transistor switches that are nonvolatile.

This means that unlike transistors in conventional microcomputer circuits, once the nanowire transistors are programmed, they do not require any additional expenditure of electrical power for maintaining memory.

"Because of their very small size and very low power requirements, these new nanoprocessor circuits are

building blocks that can control and enable an entirely new class of much smaller, lighter weight electronic sensors and consumer electronics. This new nanoprocessor represents a major milestone toward realizing the vision of a nanocomputer.

www.harvard.edu

Recovering Fingerprints on Fabrics Could Turn Clothes into Silent Witnesses



Forensic experts at the University of Abertay Dundee and the Scottish Police Services Authority (SPSA) are leading the way in the research of new ground-breaking forensic techniques within the field of fingerprints.

The new research seeks to recover fingerprint ridge detail and impressions from fabrics, a technique that has up until now proved difficult. A technique known as Vacuum Metal Deposition (VMD) that uses gold and zinc to recover the fingerprint mark is being investigated as part of the research project. VMD is a highly sensitive technique already used to detect fingerprint

marks on smooth surfaces such as carrier bags, plastics and glass.

The current research study by the University of Abertay Dundee and SPSA forensic experts is exploring its use in the examination of clothing and the potential value it could bring to a police investigation.

Joanna Fraser, a forensic sciences researcher told that "The research uses fine layers of metals to display fingerprints people may have left on fabrics, something which is far harder to do with soft surfaces. The technique has been around since the 1970s and is used on many surfaces but was never widely used on fabrics.

The fabric is placed in a vacuum chamber, and then heat up gold to evaporate it and spread a fine film over the fabric after that zinc is heated up, which attaches to the gold where there are no fingerprint residues. This helps reveal the fingerprint where contact has been made the original fabric is seen, where there was no contact only grey colour is left, it is like a photographic negative, where colours show up as their opposites. The fingerprint ridges show through as clear fabric, but where there are no ridges the distinctive grey colour of the metal is seen. Previously it had proved difficult to reveal a clear fingerprint on fabric, but this is now possible and the researchers have had great success in revealing the shape of a handprint on a number of fabric types.

Such an impression could help the police piece together a timeline of events and could be used to provide evidence in cases where someone was pushed, or grabbed, in a particular area of their clothing.

www.abertay.ac.uk

E-ink To Replace Books and Newspapers

Scientists at Sony have developed an electronic version of ink, currently used in the E-Reader, that enables thousands of books to be carried around in one portable, energy-efficient case. Sony Reader is a new electronic book device that uses a new display technology called electronic ink. Developed by E-Ink, a company based in Cambridge, Mass., the display provides a natural reading experience with no backlight, unlike reading standard computer screens. Other prospective uses for electronic ink include

displays on credit cards that would not break when they are bent; fresh food shelf labels where the price can change throughout the day; and watches and cell phone displays.

Sandwiched between layers of plastic film are millions of transparent, nearly microscopic liquid-filled spheres about the diameter of a human hair. Inside these "microcapsules" float even tinier black and white particles; the black particles are negatively charged while the white particles are positively charged. Depending on how the electrical charge is applied to the plastic film, either the black or white particles rise to the top of the spheres, forming patterns of black and white. For instance, when a negative electric field is applied, the white particles rise to the top, while the black particles are pulled to the bottom of the spheres. The surface will appear white at that spot. When a positive electric field is applied, the black particles rise to the top, and the white particles are pulled to the bottom, so the surface appears dark in that spot.

The E-Ink technology is reflective, so it uses almost no power; even large displays will use a minimum amount of electricity. So the Sony Reader need not be turned off; it can be set aside just as one would do with a printed book. The current page remains on the screen without draining any battery power. In fact, a single charge is good for 7,500 page turns. The screen is easily readable outdoors. And E-Ink can be used to coat almost any surface, so it is ideal for flexible display applications. Also, studies have shown that users reported increased readability and minimal eyestrain compared to other electronic book technology.

E-Ink scientists are now developing ways to revolutionize the newspaper industry. Consumers would hold a paper-like display but be able to download an infinite number of stories.

The Sony Reader can store and display documents like Adobe PDF files, blogs, RSS feeds, photos and e-books. Scientists are also working on ways to use E Ink in supermarket shelf labels and signs along the highway. Its low level power consumption is also making E-Ink popular in cell phones and watches.

www.aip.org/dbis

Forthcoming Tech Events

Symposia on Building Effective Coordination between R&D and Industry for Enhancing Innovations, Competitiveness and Productivity of Indigenous Technologies

10 March, 2011

Peshawar, Pakistan

Tel: +0092-51-9248111

www.pastic.gov.pk

International Food & Technology Exhibition (Food& Beverages)

5-7 April, 2011

Karachi, Pakistan

Tel: +92-21-111734266

Textile Asia Karachi (Fabrics & Textiles)

16-18-April, 2011
Karachi, Pakistan
Tel: +0092-21-111222444

International Conference on Shipping, Marine & Offshore Industry

18-19 April, 2011
Dubai, UAE
Tel: +91 484 406 66 66
www.shiptek2011.com

Africa Consortium on Climate Change

2-3 May, 2011
Pretoria, South Africa
www.environbusiness.com

MECOM 2011

(Science & Technology, Telecommunications)

16-18 May, 2011
Abu Dhabi, United Arab Emirates
www.tradechakra.com

Electronic Materials Conference 2011 (EMC 2011)

June 22-24, 2011
Santa Barbara, CA, USA
www.tms.org

Tech & Trade Offers

HEAT TRANSFER PRESS

Specification:

- MOD. 108
- mm (1150x750) Single press for transfer printing + bonding
- Versions: mm (1150x750)



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DIESEL GENERATING SETS

Diesel and gas generating sets can be used in a variety of applications, including domestic use right through to power modules with the ability to operate as complete power stations supplying electricity. The company's generating sets range from 12.5kVA to 2,500kVA

**Specification:**

- 26-200 JVA
- Power by Perkins 1100 Series engine EU Stage II Emissions compliant
- Side hinged doors removable at 45°
- Consistent component mounting
- Excellent service and maintenance access

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Fax: 0092-21-32851162, 32850086
www.smjaffer.com

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