

TECHNOLOGY ROUNDUP

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Tech News Headlines

- **Variable K-Anonymity: An Approach for Minimizing Data Loss and Maintaining Usefulness of Data**
- **Prediction of an Optimum Biodiesel-Diesel Blended Fuel for Compression Ignition Engine Using GT-Power**
- **Toward a New Way to keep Electronics from Overheating**
- **Using Sand to Improve Battery Performance**
- **Microbes Engineered for Direct Conversion of Biomass to Fuel**
- **Rotten Egg Gas holds key to Healthcare Therapies**
- **Link between Antibiotics, Bacterial Biofilms and Chronic Infections Found**
- **Solar Cells: Powered by Nanoholes**
- **Chemists Develop Novel Catalyst With Two Functions**

Tech & Trade Offers



Forthcoming Tech Events

- **3rd International Conference on Forensic Research Technology**
- **31st IASP World Conference of the International Association of Science**
- **IEEE 6th International Conference on Adaptive Science & Technology**
- **International Conference on Nanoscience and Nanotechnology**
- **International Conference on Local Representation of Power in South Asia**
- **National Software Engineering Conference (NSEC 2014)**
- **International Conference on Management Research (ICMR) 2014**
- **International Conference on Energy Systems and Policies (ICESP-2014)**

Indigenous Technology

Variable K-Anonymity: An approach for Minimizing data Loss and Maintining Usefulness of Data

A team of researchers from Department of Computer Sciences, University of Peshawar, Pakistan have proposed Variable K-Anonymity: An approach for Minimizing data Loss and Maintining Usefulness of Data.

Many hospitals and organizations publish patients data that contain useful information for research purpose. Preserving privacy and security of this data is of paramount value. This data should be published in such a form, that the privacy of individuals should not be compromised and at the same time information in the data should be useful. The data which is published in the raw form is called micro-data. Many methods and techniques have been suggested for the preservation of privacy of individuals in the micro data.

This sensitive information can be leaked out indirectly by different types of malicious activities, such as linking and inference attacks. K-anonymity model has been proposed in the existing literature to secure the confidentiality of individuals from such types of attacks. It uses generalization and suppression techniques for providing security to the data. But as the generalization increases, the data becomes less meaningful. A new approach has been proposed in the presented study which is termed as variable K-anonymity technique. In this approach, the data is generalized in such a way so as to keep the data loss minimal while maintaining the privacy of data. In the proposed variable K-anonymity technique, the nature of data is taken into account, on the basis of which the value of K is decided. Therefore, the value of K is not fixed and varies depending on the nature of data. Left-over records, which are usually left for the next release or the attributes that are suppressed, are also adjusted in a more efficient manner in the variable K-anonymity technique. The proposed technique is a natural way of maintaining the anonymity of the data. An algorithm is proposed, which decides the best value of K for the given data with minimum generalization and suppression. The algorithm is applicable on large and growing data sets..

Courtesy:

NED University Journal of Research-Applied Sciences 2014, 11(2): 27-36
Fatima Liaqat, Azhar Rauf Shah Khusro, Saeed Mahfooz,
(Department of Computer Sciences, University of Peshawar, Pakistan)

Indigenous Technology

Prediction of an Optimum Biodiesel-Diesel Blended Fuel for Compression Ignition Engine Using GT-Power

A team of researchers from Department of Mechanical Engineering, University of Engineering and Technology, Lahore and BZU College of Engineering and Technology, Multan have investigated Optimum Biodiesel-Diesel Blended Fuel for Compression Ignition Engine Using GT-Power

Biodiesel, consisting of alkyl monoester of fatty acids from vegetable oils or animal fats, is gaining considerable attentions as an alternative fuel for CI engine on account of its better physicochemical properties and flexibility to be used either in neat or in blended form. It has the potential to alleviate the pollutants such as total hydrocarbons (THC), carbon monoxide (CO), particulate matter (PM) and smoke. NO_x emissions, however, are increased when CI engine is fueled with neat biodiesel owing to improved combustion efficiency caused by higher MCP and temperature.

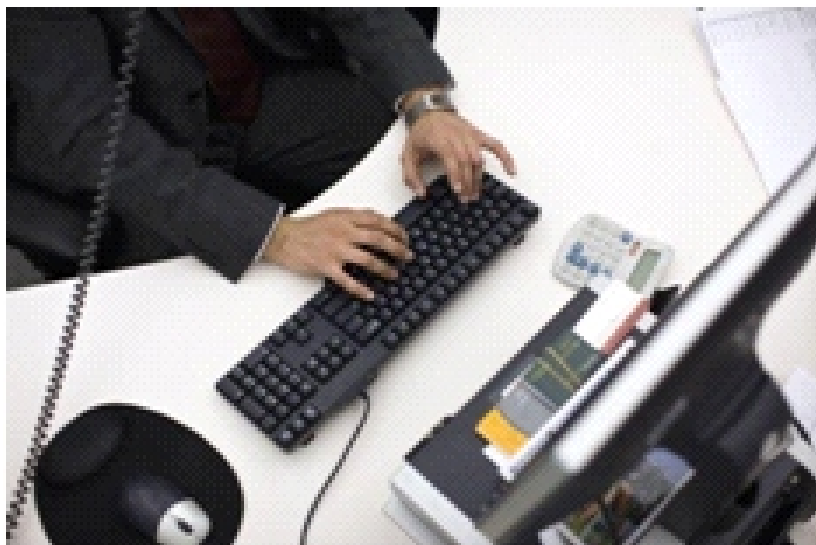
This study describes the development of a turbocharged direct-injection compression ignition (CI) engine model using fluid-dynamic engine simulation codes through a simulating tool known as GT Power. The model was first fueled with diesel, and then with various blends of biodiesel and diesel by allotting suitable parameters to predict an optimum blended fuel. During the optimization, main focus was on the engine performance, combustion, and one of the major regulated gaseous pollutants known as oxides of nitrogen (NO_x). The combustion parameters such as Premix Duration (DP), Main Duration (DM), Premix Fraction (FP), Main Exponent (ME) and ignition delay (ID) affect the start of injection (SOI) angle, and thus played significant role in the prediction of optimum blended fuel. The SOI angle ranging from 5.2 to 5.7 degree crank angle (DCA) measured before top dead center (TDC) revealed an optimum biodiesel-diesel blend known as B20 (20% biodiesel and 80% diesel by volume). B20 exhibited the minimum possible NO_x emissions, better combustion and acceptable engine performance. Moreover, experiments were performed to validate the simulated results by fueling the engine with B20 fuel and operating it on AC electrical dynamometer. Both the experimental and simulated results were in good agreement revealing maximum deviations of only 3%, 3.4%, 4.2%, and 5.1% for NO_x, maximum combustion pressure (MCP), engine brake power (BP), and brake specific fuel consumption (BSFC), respectively. Meanwhile, a positive correlation was found between MCP and NO_x showing that both the parameters are higher at lower speeds, relative to higher engine speeds.

Courtesy:

Pak.J.Engg & Appl. Sci. 2014, 14(1): 102-114

Asad Naeem Shah, Fiaz H. Shah, Ejaz M. Shahid (Department of Mechanical Engineering, University of Engineering and Technology, Lahore 54000, Pakistan) Syed Asad Gardazi. (Department of Mechanical Engineering, BZU College of Engineering and Technology, Multan Pakistan)

Toward a New Way to keep Electronics from Overheating



Computer technology has transformed the way we live, but as consumers expect ever more from their devices at faster speeds, personal computers as well as larger electronic systems can overheat. This can cause them to slow down, or worse, completely shut down. New research shows that liquids containing nanoparticles could help devices stay cool and keep them running

Researchers from Department of Mechanical Engineering, Faculty of Engineering, University of Malaya point out that consumers demand a lot out of their gadgets. But that puts a huge strain on the tiny parts that whirl away inside desktops and mainframe computers, which do the major data crunching for them. The result is overheating. Recent research has shown that substances called nanofluids have the potential to help keep electronics cool. They are made of metallic

nanoparticles that have been added to a liquid, such as water. But there are many different kinds, and past research on their coolant abilities has been limited. To help sort through them, The researchers set out to determine which ones might work best. Using something called a microchannel heat sink to simulate the warm environment of working electronic systems.

They analyzed three nanofluids for the traits that are important in an effective coolant. These include how well they transfer heat, how much energy they lose, the friction they cause and their pumping power. All three performed better than water as coolants with the nanofluid mixture of copper oxide and water topping them all.

www.pubs.acs.org/

Using Sand to improve Battery Performance

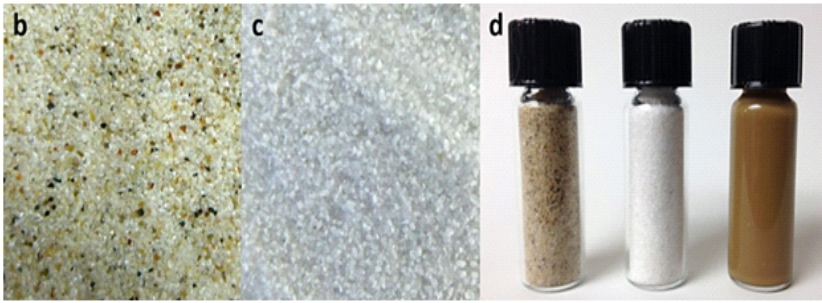
Researchers at the University of California, Riverside's Bourns College of Engineering have created a lithium ion battery that outperforms the current industry standard by three times. The key material is sand.

A low cost, non-toxic, environment friendly way to produce high performance lithium ion battery anodes. The idea came to the researcher six months ago. He was relaxing on the beach after surfing in San Clemente, Calif. when he picked up some sand, took a close look at it and saw it was made up primarily of quartz, or silicon dioxide. His research is centered on building better lithium ion batteries, primarily for personal electronics and electric vehicles. He is focused on the anode, or negative side of the battery. Graphite is the current standard material for the anode, but as electronics have become more powerful graphite's ability to be improved has been virtually tapped out.

Researchers are already focused on using silicon at the nanoscale, or billionths of a meter, level as a replacement for graphite. The problem with nanoscale silicon is that it degrades quickly and is hard to produce in large quantities. This team set out to solve both these problems. They milled down the sand into the nanometer scale, followed by a series of purification steps changing its color from brown to bright white, similar in color and texture to powdered sugar.

After that, they ground salt and magnesium, both very common elements found dissolved in sea water into the purified quartz. The resulting powder was then heated. With the salt acting as a heat absorber, the magnesium worked to remove the

oxygen from the quartz, resulting in pure silicon. The team was pleased with how the process went. They also encountered an added positive surprise. The pure nano-silicon formed in a very porous 3-D silicon sponge like consistency. That porosity has proved to be the key to improving the performance of the batteries built with the nano-silicon.



The improved performance could mean expanding the expected lifespan of silicon-based electric vehicle batteries up to 3 times or more, which would be significant for consumers, considering replacement batteries cost thousands

of dollars. For cell phones or tablets, it could mean having to recharge every three days, instead of every day. The findings were just published in the journal Nature Scientific Reports.

www.sciencedaily.com

Microbes Engineered for direct Conversion of Biomass to Fuel

The researchers from the University of Georgia has discovered direct conversion of switchgrass to fuel. The study documents the direct conversion of biomass to biofuel without pre-treatment, using the engineered bacterium *Caldicellulosiruptor bescii*.

Pre-treatment of the biomass feedstock, non-food crops such as switchgrass and miscanthus is the step of breaking down plant cell walls before fermentation into ethanol. This pre-treatment step has long been the economic bottleneck hindering fuel production from lignocellulosic biomass feedstocks.



The Team succeeded in genetically engineering the organism *C. bescii* to deconstruct un-pretreated plant biomass. The researcher who spent two and a half years developing genetic methods for manipulating the *C. bescii* bacterium to make the current work possible explained that Giving a choice between teaching an organism how to deconstruct biomass or teaching it how to make ethanol, the more difficult part is deconstructing biomass. The research group engineered a synthetic pathway into the organism, introducing genes from other anaerobic bacterium that produce ethanol, and constructed a pathway in the

organism to produce ethanol directly.

Now, without any pretreatment, they can simply take switchgrass, grind it up, add a low-cost, minimal salts medium and get ethanol out the other end, This is the first step toward an industrial process that is economically feasible. The recalcitrance of plant biomass for the production of fuels, a resistance to microbial degradation evolved in plants over millions of years, results from their rigid cell walls that have been the key to their survival and the major impediment to biofuel production. To take a virtually unknown and uncharacterized organism and engineer it to produce a biofuel of choice within the space of a few years is a towering scientific achievement of the team. *Caldicellulosiruptor* bacteria have been isolated around the world-from a hot spring in Russia to Yellowstone National Park. The researchers described that systems biology allows for the engineering of artificial pathways into organisms that allow them to do things they cannot do otherwise. Ethanol is but one of the products the bacterium can be taught to produce. Others include butanol and isobutanol (transportation fuels

comparable to ethanol), as well as other fuels and chemicals—using biomass as an alternative to petroleum. "This is really the beginning of a platform for manipulating organisms to make many products that are truly sustainable.

Rotten Egg Gas Holds key to Healthcare Therapies

It may smell of flatulence and have a reputation for being highly toxic, but when used in the right tiny dosage, hydrogen sulfide is now being found to offer potential health benefits in a range of issues, from diabetes to stroke, heart attacks and dementia. A new compound (AP39) could hold the key to future therapies, by targeting delivery of very small amounts of the substance to the right (or key) places inside cells.

Scientists in Exeter (UK) have already found that the compound protects mitochondria—the "powerhouse" of cells, which drive energy production in blood vessel cells. Preventing or reversing mitochondrial damage is a key strategy for treatments of a variety of conditions such as stroke, heart failure, diabetes and arthritis, dementia and aging. Mitochondria determine whether cells live or die and they regulate inflammation. In the clinic, dysfunctional mitochondria are strongly linked to disease severity.



"When cells become stressed by disease, they draw in enzymes to generate minute quantities of hydrogen sulfide. This keeps the mitochondria ticking over and allows cells to live. If this doesn't happen, the cells die and lose the ability to regulate survival and control inflammation.

The researchers have exploited this natural process by making a compound, called AP39, which slowly delivers very small amounts of this gas specifically to the mitochondria. The results indicate that if stressed cells are treated with AP39, mitochondria are protected and cells stay alive."

Although hydrogen sulfide is well known as a pungent, foul-smelling gas in rotten eggs and flatulence, it is

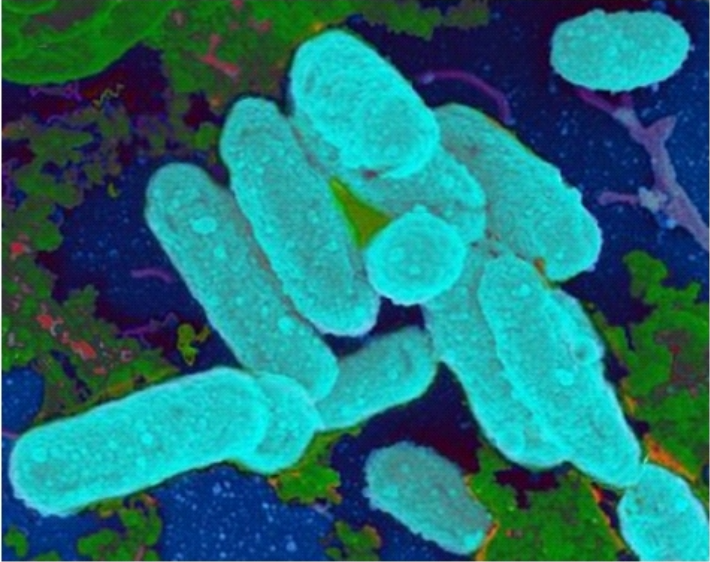
naturally produced in the body and could in fact be a healthcare hero with have significant implications for future therapies for a variety of diseases."

This research is being conducted in several models of disease, and pre-clinical results are promising. For example, in models of cardiovascular disease, research shows that more than 80 per cent of the powerhouse mitochondria cells survive under otherwise highly destructive conditions, if the AP39 is administered. Professors Whiteman and Wood are now working towards advancing the research to a stage where it can be tested in humans.

www.thehindu.com/sci-tech

Link Between Antibiotics, Bacterial Biofilms and Chronic Infections found

Researchers from the University of Southern California and the Oak Crest Institute of Science have discovered the link between antibiotics and bacterial biofilm formation leading to chronic lung, sinus and ear infections.



This research addresses the long standing issues surrounding chronic ear infections and why some children experience repeated ear infections even after antibiotic treatment. Once the biofilm forms, it becomes stronger with each treatment of antibiotics. During the study, non-typeable *Haemophilus influenzae* (NTHi) bacteria a common pathogen of humans was exposed to non-lethal doses of ampicillin, a class of antibiotics commonly used to treat respiratory, sinus and ear infections, or other beta-lactam antibiotics. The dose of the antibiotic was not enough to kill the bacteria which allowed the bacteria to react to the antibiotic by producing glycogen, a complex sugar often used by bacteria as a food source, to produce stronger biofilms when grown in the laboratory.

Biofilms are highly structured communities of microorganisms that attach to one another and to surfaces.

The microorganisms group together and form a slimy, polysaccharide cover. This layer is highly protective for the organisms within it, and when new bacteria are produced they stay within the slimy layer. With the introduction of antibiotic-produced glycogen, the biofilms have an almost endless food source that can be used once antibiotic exposure has ended.

There are currently no approved treatments for biofilm-related infections. Therefore, bacteria forced into forming stronger biofilms will become more difficult to treat and will cause more severe chronic infections. Adults will suffer protracted lung infections as the bacteria hunker down into their protective slime, and children will have repeated ear infections. What may appear to be antibiotic resistance when an infection does not clear up may actually be biofilms at work.

The researchers believe that modern medicine needs to find ways of detecting and treating biofilm infections before the bacteria are able to form these protective structures. The difficulties of treating biofilm infections, which can be up to 1,000 times more resistant to antibiotics, have prompted some physicians to propose a gradual move away from traditional antibiotic treatments and toward non-antibiotic therapies.

www.biomedox.com/

Solar Cells: Powered by Nanoholes

A simple and inexpensive fabrication procedure boosts the light-capturing capabilities of tiny holes carved into silicon wafers. Increasing the cost-effectiveness of photovoltaic devices is critical to making these renewable energy sources competitive with traditional fossil fuels. One possibility is to use hybrid solar cells that combine silicon nanowires with low-cost, photoresponsive polymers. The high surface area and confined nature of nanowires allows them to trap significant amounts of light for solar cell operations. Unfortunately, these thin, needle-like structures are very fragile and tend to stick together when the wires become too long.

The findings of research team from the A*STAR Singapore Institute of Manufacturing Technology and Nanyang

Technological University could turn the tables on silicon nanowires by improving the manufacturing of silicon 'nanoholes', narrow cavities carved into silicon wafers that have enhanced mechanical and light-harvesting capabilities.

Nanoholes are particularly effective at capturing light because photons can ricochet many times inside these openings until absorption occurs. Yet a practical understanding of how to fabricate these tiny structures is still lacking. One significant problem is the control of the initial stages of nanohole formation, a crucial period that can often induce defects into the solar cell. Instead of traditional time-consuming lithography, the researchers identified a rapid, 'maskless' approach to producing nanoholes using silver nanoparticles. First, they deposited a nanometre-thin layer of silver onto a silicon wafer which they toughened by annealing it using a rapid-burst ultraviolet laser. Careful optimization of this procedure yielded regular arrays of silver nanospheres on top of the silicon surface, with sphere size and distribution controlled by the laser annealing conditions.

Next, the nanosphere-silicon complex was immersed into a solution of hydrogen peroxide and hydrofluoric acid, a mixture that eats away at silicon atoms directly underneath the catalytic silver nanospheres. Subsequent removal of the silver particles with acid produced the final, nanohole-infused silicon surface. The team analyzed the solar cell activity of their nanohole interfaces by coating them with a semiconducting polymer and metal electrodes. Their experiments revealed a remarkable dependence on nanohole depth: cavities deeper than one micrometer showed sharp drops in power conversion efficiency from a maximum of 8.3 per cent due to light scattering off of rougher surfaces and higher series resistance effects.

Their simple process for making hybrid silicon nanohole devices can successfully reduce the fabrication costs which impede the solar cell industry. In addition, this approach can be easily transferred to silicon thin films to develop thin-film silicon-polymer hybrid solar cells with even higher efficiency."

www.sciencedaily.com

Chemists Develop Novel Catalyst With Two Functions

Chemists at the Ruhr-University Bochum have made a decisive step towards more cost-efficient regenerative fuel cells and rechargeable metal-air batteries. They developed a new type of catalyst on the basis of carbon, which can facilitate two opposite reactions: electrolysis of water and combustion of hydrogen with oxygen. A catalyst of this kind might make the storage of wind and solar energy and the manufacture of cost-efficient batteries, for example for electric cars, possible.

When energy is supplied, the so-called bi-functional catalysts can split water into hydrogen and oxygen- referred to as electrolysis. They can then store the energy in the chemical bonds of the thus formed hydrogen. The same catalysts can also have their polarity reversed to become fuel cells; they combust hydrogen with oxygen to water, generating electricity at the same time. So far, researchers have been using noble-metal catalysts for this purpose. However, these catalysts have the disadvantage of being either good for electrolysis or good for combustion, but not for both.

The novel catalysts from Bochum are made from manganese-oxide or cobalt-oxide nano particles which are embedded in specially modified carbon, into which the researchers have integrated nitrogen atoms in specific positions. The team analysed the catalysts using a number of spectroscopic and electrochemical methods. They have thus determined which properties are essential for bi-functionality.

Www.sciencedaily.com

Forthcoming Tech Events

National Events

International Conference on Local Representation of Power in South Asia

15-17 October, 2014
Lahore, Pakistan
www.gcu.edu.pk

National Software Engineering Conference (NSEC 2014)

11 - 12 November, 2014
Rawalpindi, Pakistan
www.nsec.mcs.edu.pk

CLT14 - 5th Conference on Language and Technology 2014

05-07 November, 2014
Karachi, Pakistan
www.cs.dsu.edu.pk

International Conference on Management Research (ICMR) 2014

20 - 21 November, 2014
Lahore, Pakistan
www.superior.edu.pk

International Events

International Conference on Nanoscience and Nanotechnology, Colombo (ICNSNT 2014)",

12-13 August, 2014
Colombo, Sri Lanka,
www.nanoconference.co

3rd International Conference on Forensic Research and Technology

6-8 October, 2014
San Antonio, USA
www.forensicrosearch2014.conferenceseries.net

ICSTI 2014 General Assembly and Annual Conference

18-21 October, 2014
Tokyo, Japan
www.icsti.org

31st IASP World Conf. of the Int. Association of Science

19-22 October, 2014
Doha, Qatar
www.medspring.eu

Tech & Trade Offers

SUBARU New RGN Series Robbin Generator

Optional Equipment

Electric Starter & Battery Frame

✎ Hour Meter

✎ 4-Weel Kit

✎ Life Hook



Fuel Tank Capacity

(i) 15.5 Litters

(ii) 23.5 Litters

(Make sure to fill below the “LEVEL” position for safety.)

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Email: robin_mosak@yahoo.com

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