

TECHNOLOGY ROUNDUP

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- 15th International Conference & Exhibition on Engineering Fields
- Food Technology Asia, 2015
- 2nd International Conference on Power Generation Systems and Renewable Energy Technologies
- International Innovation and Technology Exhibition (INOTEX)
- CTBT: Science and Technology 2015, Conference
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- 3rd International Scientific Conference on Engineering & Applied Sciences
- 2nd International Conference and Exhibition on Biotechnology

Indigenous Technology

Optimal Sizing of Low Head Hydropower Plant- A Case Study of Hydropower Project at Head of UCC (Lower) at Bambanwala

Researchers from Department of Civil Engineering, University of Engineering & Technology, Lahore have studied Optimal Sizing of Low Head Hydropower Plant- A Case Study of Hydropower Project at Head of UCC (Lower) at Bambanwala

The hydropower is a renewable source that significantly depends on the natural water cycle. Power generation using a hydropower scheme is the most promising power technology. The significant advantage of hydropower schemes is the flexibility in their designs that can work in various situations depending upon the hydrological conditions.

Pakistan is facing serious shortfall of electricity for few decades. Small hydropower projects can alleviate the worsening situation. The sizing of a low head hydropower plant plays a vital role in establishing the feasibility of the project. The plant needs to be optimized for energy produced, efficiencies of the plant components, number of units and its financial/economic parameters. This paper presents a review on the methodologies by which low head hydropower plants are being optimized to get maximum energy output with minimal cost. The study of various researchers is being presented regarding optimal sizing and selection of small hydropower plant components. A brief summary of low head hydropower schemes in Punjab, Pakistan is also presented herein, which are presently under construction. Moreover based upon literature review and methodology adopted for the hydropower schemes in construction stage, using graphical optimization technique, optimal sizing for power site at Upper Chenab Canal Lower (UCCL) at Bambanwala is also presented. In this study a new parameter; inverse incremental energy is employed for selecting optimum flow. Two turbines (Kaplan, pit type) with combined capacity of 3.58MW are found to be optimal for the case study site.

Courtesy:

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Indigenous Technology

Brine Purification for Chlor-Alkalis Production Based on Membrane Technology

Researchers from Department of Chemical Engineering, University of Engineering and Technology, Lahore have developed Brine Purification for Chlor-Alkalis Production Based on Membrane Technology

Brine is the life blood for Chlor-alkali industries. A passable supply of high quality brine on a continuous basis is invaluable for plants operation. The caustic soda (a Chlor-alkali) industry has vital importance because its per capita consumption is normally considered as an indicator of normal growth of a country, especially in the sector of derived chemicals, textiles, thermoplastics, polymeric products etc. Its need has been increasing substantially worldwide in last decades and will continue to increase in the coming times.

The experimental work is concerned to process and schematic methodology to reduce the percentage of sulfates and also to minimize the concentration of other impurities such as Calcium and Chlorate. The technology used in this study is a unique combination of primary and secondary treatment of raw brine to prepare a feed for the production of chlor-alkalis. A series of experimentation was conducted for the determination of major constituents and other trace metals in the brine using ICP spectrophotometer. The major elements determined were sodium, calcium, magnesium, potassium, strontium, sulfur and chloride. The trace metals determined were iron, barium, silicon, nickel, manganese, chromium, copper and boron. The influence of different parameters like concentration, temperature, pressure, impurity, pH, resin capacity was studied experimentally. On the basis of data collected and their analysis it can be concluded that best results are obtained when the treating chemicals Na_2CO_3 , NaOH and Flocculating agent (Anionic) may be added to brine as a separate addition point.

Courtesy:

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www.uet.edu.pk/research/researchinfo

Thumbnail Track Pad

Researchers at the MIT Media Laboratory are developing a new wearable device that turns the user's thumbnail into a miniature wireless track pad, Massachusetta USA.



They envision that the technology could let users control wireless devices when their hands are full answering the phone while cooking, for instance. It could also augment other interfaces, allowing someone texting on a cell phone, say, to google between symbol sets without interrupting his or her typing. Finally, it could enable subtle communication in circumstances that require it, such as sending a quick text to a child while attending an important meeting.

The researchers describe a prototype of the device, called NailO. According to the researchers, the device was inspired by the colorful stickers that some women apply to their nails. "It's

a cosmetic product, popular in Asian countries. Indeed, the researchers envision that a commercial version of their device would have a detachable membrane on its surface, so that users could coordinate surface patterns with their outfits. To that end, they used capacitive sensing the same kind of sensing the iPhone's touch screen relies on to register touch, since it can tolerate a thin, nonactive layer between the user's finger and the underlying sensors. As the site for a wearable input device, however, the thumbnail has other advantages. It's a hard surface with no nerve endings, so a device affixed to it wouldn't impair movement or cause discomfort. And it's easily accessed by the other fingers even when the user is holding something in his/her hand.

To build their prototype, the researchers needed to find a way to pack capacitive sensors, a battery, and three separate chips a microcontroller, a Bluetooth radio chip, and a capacitive-sensing chip into a space no larger than a thumbnail. The hardest part was probably the antenna design so you have to put the antenna far enough away from the chips so that it doesn't interfere with them. For their initial prototype, the researchers built their sensors by printing copper electrodes on sheets of flexible polyester, which allowed them to experiment with a range of different electrode layouts. But in ongoing experiments, they're using off-the-shelf sheets of electrodes like those found in some track pads.

The researchers also been in discussion with battery manufacturers traveling to China to meet with several of them and have identified a technology that they think could yield a battery that fits in the space of a thumbnail, but is only half a millimeter thick. A special-purpose chip that combines the functions of the microcontroller, radio, and capacitive sensor would further save space. At such small scales, however, energy efficiency is at a premium, so the device would have to be deactivated when not actually in use. In the new paper, the researchers also report the results of a usability study that compared different techniques for turning it off and on. They found that requiring surface contact with the operator's finger for just two or three seconds was enough to guard against inadvertent activation and deactivation.

Diet Swap has Dramatic Effects on Colon Cancer

Scientists have found dramatic effects on risk factors for colon cancer when American and African volunteers swapped diets for just two weeks. Western diets, high in protein and fat but low in fibre, are thought to raise colon cancer risk compared with African diets high in fibre and low in fat and protein. The new study,

published in *Nature Communications*, confirms that a high fiber diet can substantially reduce risk, and shows that bacteria living in the gut play an important role in this effect. Colon cancer is the fourth commonest cause of death from cancer worldwide, accounting for over 600,000 deaths per year.



To investigate the possible roles of diet An international team of scientists from the University of Pittsburgh and Imperial College London carried out a study with a group of 20 African American volunteers and another group of 20 participants from rural South Africa. The two groups swapped diets under tightly controlled conditions for two weeks.

The volunteers had colonoscopy examinations before and after the diet

swap. The researchers also measured biological markers that indicate colon cancer risk and studied samples of bacteria taken from the colon. At the start, when the groups had been eating their normal diets, almost half of the American subjects had polyps -- abnormal growths in the bowel lining that may be harmless but can progress to cancer. None of the Africans had these abnormalities. After two weeks on the African diet, the American group had significantly less inflammation in the colon and reduced biomarkers of cancer risk. In the African group, measurements indicating cancer risk dramatically increased after two weeks on the western diet.

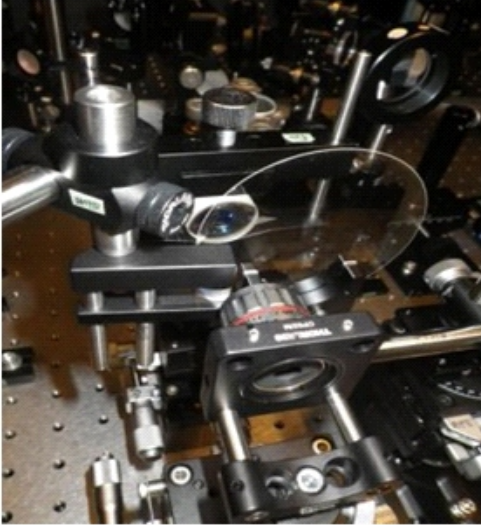
The findings suggest that people can substantially lower their risk of colon cancer by eating more fibre. This is not new in itself but what is really surprising is how quickly and dramatically the risk markers can switch in both groups following diet change. These findings also raise serious concerns that the progressive westernization of African communities may lead to the emergence of colon cancer as a major health issue."

The researchers say that it takes one generation of westernization to change their low incidence of colon cancer to the high rates observed in native Hawaiians. Their study suggests that westernization of the diet induces changes in biomarkers of colon cancer risk in the colonic mucosa within two weeks. This research shows that gut bacteria are critically important for mediating the link between diet and colon cancer risk. This means we can look to develop therapies targeting gut bacteria as a way to prevent and treat cancer. The study was funded by the National Institutes of Health in the US and the National Institute for Health Research Imperial Biomedical Research Centre in the UK.

www.acs.org

The Trillion-Frame-Per-Second Camera

Researchers from University of Tokyo Japan have developed a new high-speed camera technology, called STAMP, that can record events at a rate of more than 1-trillion-frames-per-second. The prototype camera is shown here in the lab. The speed is more than one thousand times faster than conventional high-speed cameras. Called STAMP, for Sequentially Timed All-optical Mapping Photography, the new camera technology "holds great promise for studying a diverse range of previously unexplored complex ultrafast phenomena. Conventional high-speed cameras are limited by the processing speed of their mechanical and electrical components. STAMP overcomes these limitations by using only fast, optical components.



STAMP relies on a property of light called dispersion that can be observed in the way a misty sky splits sunshine into a rainbow of colors. Similarly, STAMP splits an ultrashort pulse of light into a barrage of different colored flashes that hit the imaged object in rapid-fire succession. Each separate color flash can then be analyzed to string together a moving picture of what the object looked like over the time it took the dispersed light pulse to travel through the device. Even given STAMP's limitations, the technology has enormous potential; the team

has already used it with image electronic motion and lattice vibrations in a crystal of lithium niobate and to observe how a laser focused onto a glass plate creates a hot, rapidly expanding plume of plasma. They also notes that the camera could be used to explore a wide range of ultrafast phenomena for the first time, including the laser ignition of fusion, the phase transition of materials, and the dynamics of a Coulomb explosion, an event in which intense electromagnetic fields (for example from a narrow laser beam) can force a small amount of solid material to explode into a hot plasma of ionized atomic particles.

www.phys.org/news

Electrical Power Converter allows Grid to Easily Accept Power from Renewable Energy



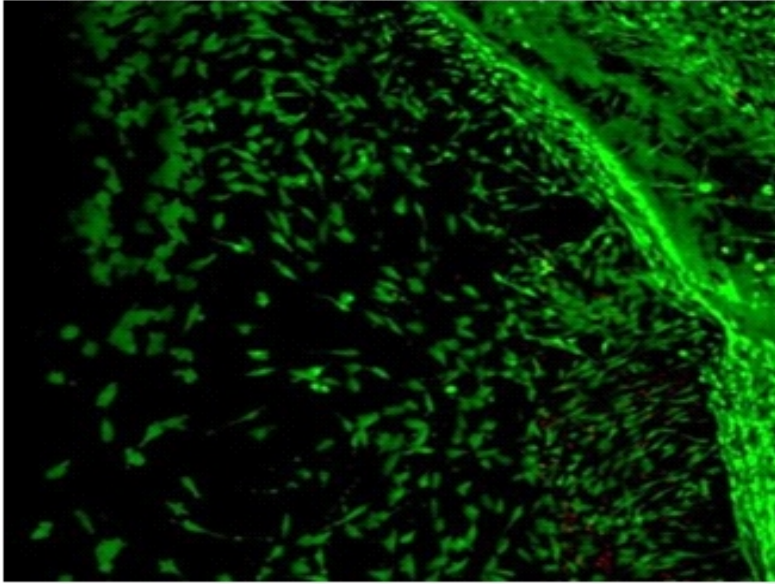
Engineering researchers at the University of Arkansas have invented a novel electrical power converter system that simultaneously accepts power from a variety of energy sources and converts it for use in the electrical grid system.

The availability and use of renewable energy sources, such as solar, geothermal and wind, and their associated harvesting systems increase the need for new power converters that can efficiently convert diverse energy sources to work across modern electrical grid systems. Current renewable energy conversion systems are bulky, inefficient and struggle to accept multiple inputs from diverse sources. The researchers' high-frequency matrix converter addresses these shortcomings. Its

simplified control system uses power converters to allow connection of a variety of power sources to a small, high-frequency transformer. Thes using a high-frequency matrix converter, it produces stable electricity ready to be supplied to the electrical grid system.

Bioactive Gel to Treat Knee Injuries being Developed

Knee injuries are the bane of athletes everywhere, from professionals and college stars to weekend warriors. Current surgical options for repairing damaged cartilage caused by knee injuries are costly, can have complications, and often are not very effective in the long run. Even after surgery, cartilage degeneration can progress leading to painful arthritis.



The University of Iowa orthopedics research team is working on a solution with hopes that it will result in a minimally invasive, practical, and inexpensive approach for repairing cartilage and preventing osteoarthritis. They are creating an injectable, bioactive hydrogel that can repair cartilage damage, regenerate stronger cartilage, and hopefully delay or eliminate the development of osteoarthritis and eliminate the need for total knee replacement. This team had previously identified precursor cells within normal cartilage that can mature into new cartilage tissue. This was a surprising discovery because of the long-held assumption that cartilage is one of the few tissues in the body that cannot repair itself.

The team also identified molecular signaling factors that attract these precursor cells, known as chondrogenic progenitor cells (CPC), out of the

surrounding healthy tissue into the damaged area and cause them to develop into new, normal cartilage. One of the signals, called stromal cell-derived factor 1 (SDF1), acts like a homing beacon for the precursor cells. The researchers loaded the custom-made hydrogel with SDF1 and injected it into holes punched into the model cartilage. The precursor cells migrated toward the SDF1 signal and filled in the injury site. Subsequent application of a growth factor caused the cells to mature into normal cartilage that repaired the injury. This process gives a great result. The new cartilage integrates seamlessly with the undamaged tissue, it has normal concentrations of proteoglycans, good structural properties, and looks like normal cartilage. The new tissue is not as mechanically strong as normal cartilage, but researchers think that mechanical loading, the type of stress that is exerted during physical therapy and exercise might improve the mechanical properties.

There's really no cure for osteoarthritis except for total joint replacement, which is not particularly suitable for younger patients because the artificial joints wear out and need to be replaced multiple times. This approach aims to leverage the body's own capacity for repair, and what they've shown is that cartilage does have regenerative potential; you just have to manipulate it just right. To translate this approach into a therapy that can be used in people, the team now needs to include the growth factor in the gel in such a way that there is a stepwise release of the attractant SDF1 followed by the growth factor.

The team will tap on microfabrication techniques for creating novel drug and gene delivery devices, to test two technologies- nano-size plasmids carrying genetic instructions for the growth factor or microspheres loaded with the substance -- to incorporate the growth factor into gel.

www.downthebackstretch.blogspot.com

Forthcoming Tech Events

National/International Events

Food Technology Asia, 2015

9-11 June, 2015

Karachi

www.foodtechnologyasia.com

2nd International Conference on Power Generation Systems and Renewable Energy Technologies

10-11 June, 2015

Islamabad, Pakistan

Www.iiui.edu.pk.com

15th International Conference & Exhibition on Engineering Fields

1 - 5 June 2015

Leuven, Belgium

Www.euspen.eu

International Innovation and Technology Exhibition (INOTEX 2015)

9-12 June 2015

Tehran

Www.bitcongress.com

CTBT: Science and Technology 2015, Conference

22-26 June, 2015

Austria

www.ctbto.org

2nd International Conference on Engineering and Natural Science

22-24 July, 2015

Tokyo Japan

Www.lanyrd.com

3rd International Scientific Conference on Engineering & Applied Sciences

29-31 July, 2015

Okinawa Japan

Www.lanyrd.com

2nd International Conference and Exhibition on Biotechnology

3-4 August, 2015

Hyderabad, India

www.brightice.co.in

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