

TECHNOLOGY ROUNDUP

A NEWS BULLETIN

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- World Congress on Pollution Control
- International Conference on Science, Engineering & Technology
- International Science, Technology and Engineering Conference
- International Conference On Science Technology And Management
- EU Sustainable Energy Week
- World Congress On Materials Science And Engineering

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Performance Improvement using Simulation Tool in a Tiles Production Facility

In recent times, the globalization of markets due to the improvement of utilization of resources has significant impact on the manufacturing systems. International competition forced companies to establish efficient and effective production facilities that provide best possible outcome in terms of profitability, throughput and lead time. In this background, every industrial facility is in competition to remain competitive in the market and be flexible for future changes. It is not easy to change the environment of any facility in order to check the results beforehand therefore simulation is a viable option. Simulation tools are used to help analyze performance measures for improvement.

This study was conducted at FORTE Ceramic Industries, Industrial State Peshawar, Pakistan to improve its production using simulation tool. Models for both improved and current systems are developed in the simulation tool. Data analyzed in the simulation tool shows better results that represent a significant improvement in productivity, cycle time and throughput time to optimize the system. It is also observed that by decreasing the inter arrival time there is increase in the throughput which improves the revenue.

The research process consists of several steps. First, a detailed study was conducted about the manufacturing processes of the proposed industry to know about the existing issues. It has been observed that the proposed company is using traditional manufacturing processes with no consideration of improving the tiles production. After detailed literature review and problem identification, data was collected about the production process of tiles. Then this data was used to develop a simulation model. This model was created and simulated in SIMIO software of the current production process at different cycle times to analyze the performance measures. The results were analyzed to find the respective processes. Finally, based on these results recommendations were made to the said industry for making necessary improvements.

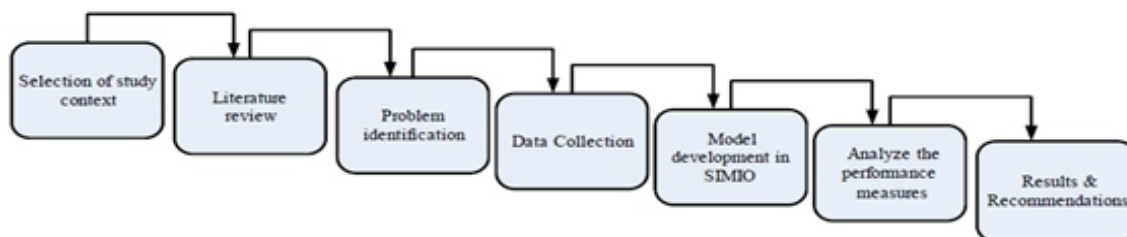


FIG. 1. RESEARCH METHODOLOGY

The process flow layout of FORTE ceramics starts from raw material and ends at tiles packing. Some of the processes are continuous and some are discrete. The green color boxes show continuous processes and blue color boxes represent discrete processes. The results represent a significant improvement of the production process in productivity, cycle time and throughput time to optimize the system. There is a substantial increase in production of each type of tile by changing the inter-arrival time from 7.15-6.25 seconds.

Source:

Uroosa Nadir, Tufail Habib, Sikandar Bilal Khattak, and Ishrat Noor. Performance Improvement using Simulation Tool in a Tiles Production Facility. *Mehran University Research Journal of Engineering and Technology*, 2020 Volume 39(1) Pages 117-132

Pashtu Numerals Recognition through Convolutional Neural Networks

The researchers have introduced a new Pashtu numerals dataset recognition model having handwritten scanned images. Pashtu language is used by more than fifty million people both for oral and written communication, but still no efforts are devoted to the Optical Character Recognition (OCR) system for Pashtu language. A main drawback of the deep learning-based method is the requirement of large training data. We collected data from different regions to bring diversity in writing style. We collected these images from faculty members, staff, and students of three universities, namely, the University of Azad Jammu and Kashmir, University of Malakand, and the University of Peshawar.

The make the dataset publically available for scientific and research use. A new method has been introduced for handwritten numerals recognition of Pashtu language through the deep learning based models. We use convolutional neural networks (CNNs) both for features extraction and classification tasks. The researchers assess the performance of the proposed CNNs based model and obtained recognition accuracy of 91.45%. A CNNs model has three main parts i.e., convolutional layers, pooling layers and fully connected layers. We represented the kernels as $N \times M \times C$. N and M are representing height a width of the filter and C channel. The pooling layers filters are represented by $P \times Q$, where P and Q represent height and width of the filter, respectively. The fully connected layer is the final layer which performs the task of classification (Fig. 2).

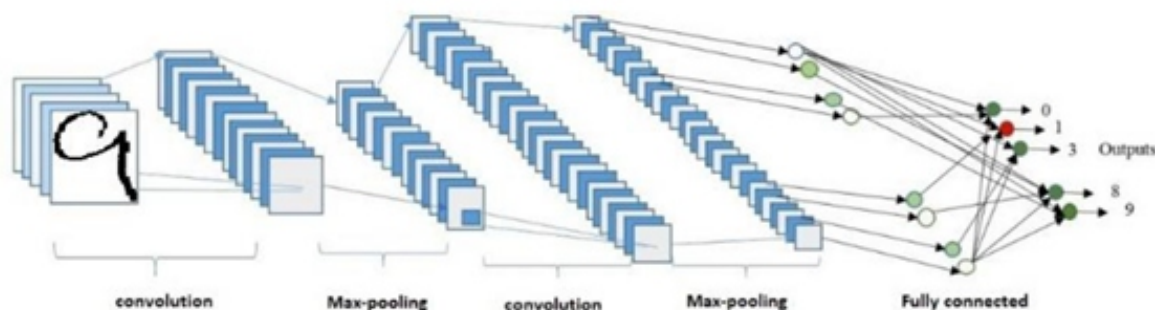


Figure 2. Proposed CNNs Architecture.

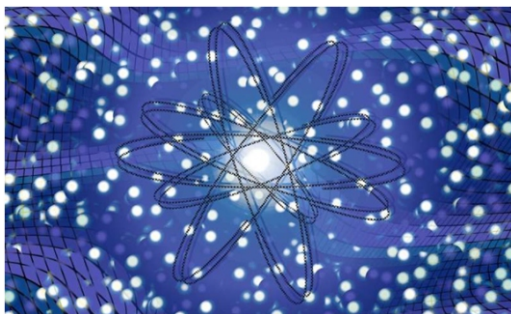
This study is part of long term research strategy regarding cursive script languages. The researchers aim to build a complete Pashtu database for ligatures in future. In the next step, complete OCR for the Pashtu language will be developed the researchers will explore the OCR system both for offline and online Pashtu text recognition. The researchers also have planning towards translation of Pashtu language text to other languages. The researchers further intend to apply this proposed deep learning-based method to other cursive script languages passing through the same un-developed phase, such as Sindhi, Punjabi, etc.

Source:

Khalil Khan, Bilawal Shah, Muhammad Waheed, Adeel Shams, Daniyal Munir Pashtu Numerals Recognition through Convolutional Neural Networks. Journal of Applied and Emerging Sciences, 2019, Volume 9 (2) 91-96

New Biochemical compound breaks down Environmental Pollutants

Enzymes with flavin cofactor play an important part in plants, fungi, bacteria and animals: as oxygenases they incorporate oxygen into organic compounds. For instance this allows people to excrete foreign substances more effectively. Until now scientists were agreed that such flavin-dependent oxygenases use flavin C₄a-peroxide as oxidizing agent. This is formed by the C₄a-atom of the flavin cofactor reacting with atmospheric oxygen (O₂), before one of the two oxygen atoms are transferred to the compound.



Courtesy: phys.org/news/2020-02-biochemical-compound-environmental-pollutants

The researchers from Institute of Biology II at the University of Freiburg, Germany have discovered that O₂ also reacts to flavin N₅-peroxide with the N5-atom of the flavin cofactor. The newly-discovered flavin N₅-peroxide has different reactive characteristics than the flavin C₄a-peroxide. Some bacteria use this to break down stable chemical compounds, including environmental pollutants such as dibenzothiophene, a component of crude oil, or hexachlorobenzene, a plant protection agent. Using X-ray structural analysis and mechanistic studies the scientists were able to clarify how the formation of this flavin N5-peroxide is controlled at an enzymatic level.

Scientists, now, are focussed to study biochemistry of this novel flavin in nature to improve understanding of the role, reactivity and functionality of the flavin N₅-peroxide. This endeavour will allow the prediction of flavin enzyme functionality or modification using biotechnology in future.

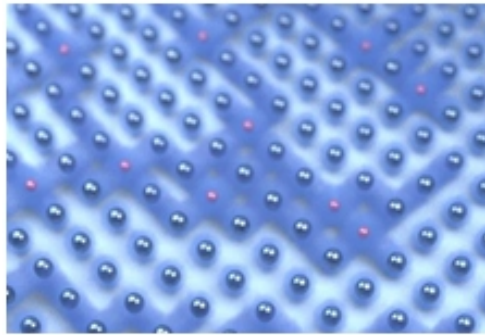
Source:

www.sciencedaily.com/releases/2020/02/200218124348.html

New Quantum Switch turns Metals into Insulators

Most modern electronic devices rely on tiny, finely-tuned electrical currents to process and store information. These currents dictate how fast our computers run, how regularly our pacemakers tick and how securely our money is stored in the bank. The researchers at the University of British Columbia, Canada have demonstrated an entirely new way to precisely control such electrical currents by leveraging the interaction between an electron's spin (which is the quantum magnetic field it inherently carries) and its orbital rotation around the nucleus. The results will help in developing understanding about working of electrical conduction as well as further exploration of known properties such as conductivity, magnetism and superconductivity, and discover new ones that could be important for quantum computing, data storage and energy applications."

Broadly, all materials can be categorized as metals or insulators, depending on the ability of electrons to move through the material and conduct electricity. However, not all insulators are created equally. In a Mott insulator, electrostatic repulsion prevents the electrons from getting too close to one another, which creates a traffic jam and limits the free flow of electrons. Until now, there were two known ways to free up the traffic jam: by reducing the strength of the repulsive interaction between electrons, or by changing the number of electrons.



Courtesy: phys.org/news/2020-02-quantum-metals-insulators

Using a technique called angle-resolved photoemission spectroscopy, Mott insulator Sr_2IrO_4 , monitoring the number of electrons, their electrostatic repulsion, and finally the interaction between the electron spin and its orbital rotation were monitored. The study found that coupling the spin to the orbital angular momentum slows the electrons down to such an extent that they become sensitive to one another's presence, solidifying the traffic jam. "Reducing spin-orbit coupling in turn eases the traffic jam and we were able to demonstrate a transition from an insulator to a metal for the first time using this strategy."

The findings expand the potential of modern electronics, if microscopic understanding these phases of quantum matter and their emergent electronic phenomena is explored, it would be landmark achievement to exploit them by engineering quantum materials atom-by-atom for new electronic, magnetic and sensing applications.

Source:

www.sciencedaily.com/releases/2020/02/200203141439.html

New World record for Conversion of Solar Energy to Electricity using Quantum Dots

Researchers, from the University of Queensland, Australia, have set a world record for the conversion of solar energy to electricity via the use of tiny nanoparticles called 'quantum dots', which pass electrons between one another and generate electrical current when exposed to solar energy in a solar cell device.

The technology has a huge range of potential applications, including the possibility to use it as a flexible, transparent skin to power cars, planes, homes and wearable technology.

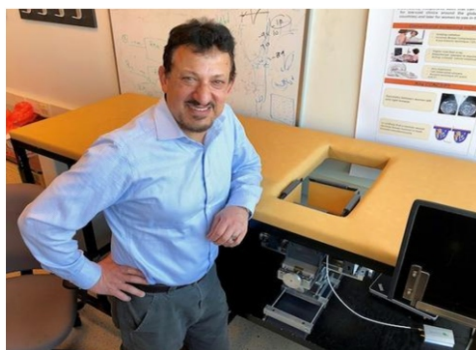
The development of next generation solar power technology, as a potential source of flexible 'skin' over hard surfaces, has moved a step closer. The development represents a significant step towards making the technology commercially-viable and supporting global renewable energy targets. This new generation of quantum dots is compatible with more affordable and large-scale printable technologies. The world needs to rapidly reduce carbon emissions and this requires us to invest much more in research to improve existing energy-generation technologies and develop entirely new ones.

Source:

www.sciencedaily.com/releases/2020/02/200218182208.html

New Tech takes Radiation out of Cancer screening

Researchers have developed a new, inexpensive technology that could save lives and money by routinely screening women for breast cancer without exposure to radiation. The system uses harmless microwaves and artificial intelligence (AI) software to detect even small, early-stage tumors within minutes. The system, developed by researchers at the University of Waterloo, Canada, uses harmless microwaves and artificial intelligence (AI) software to detect even small, early-stage tumors within minutes. This technology has fast detection and is inexpensive.



Courtesy: uwaterloo.ca/research/news/new-tech-takes-radiation-out-cancer-screening

A prototype device -- the culmination of 15 years of work on the use of microwaves for tumor detection, not imaging -- cost less than \$5,000 to build. It consists of a small sensor in an adjustable box about 15 centimetres square that is situated under an opening in a padded examination table. Patients lie face-down on the table so that one breast at a time is positioned in the box. The sensor emits microwaves that bounce back and are then processed by AI software on a laptop computer. By comparing the tissue composition of one breast with the other, the system is sensitive enough to detect anomalies less than one centimeter in diameter. The negative result could quickly rule out cancer, while a positive result would trigger referral for more expensive tests using mammography or magnetic resonance imaging (MRI).

In addition to reducing patient wait times and enabling earlier diagnosis, the device would eliminate radiation exposure, improve patient comfort and work on particularly dense breasts, a problem with mammograms. It would also save health-care systems enormous amounts of money and, because of its low cost and ease of use, dramatically increase access to screening in the developing world.

Researchers have applied for a patent and started a company, Wave Intelligence Inc. of Waterloo, to commercialize the system and hope to begin trials on patients within six months. Three rounds of preliminary testing included the use of artificial human torsos known as phantoms.

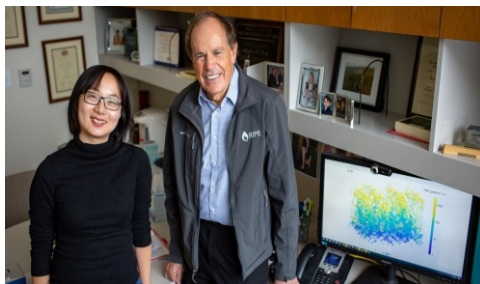
Source:

www.sciencedaily.com/releases/2020/02/200218182208.html

Boost Soybean Yields by adapting Photosynthesis to Fleeting Shadows, according to model

Scientists, from University of Illinois, USA report a new mathematical computer model that is used to understand how much yield is lost as soybean crops grapple with minute-by-minute light fluctuations on cloudy and sunny days. Komorebi is a Japanese word that describes how light filters through leaves -- creating shifting, dappled "sunflecks" that illustrate plants' ever-changing light environment. Crops harness light energy to fix carbon dioxide into food via photosynthesis. "Soybean is the fourth most important crop in terms of overall production, but it is the top source of vegetable protein globally.

The study found that soybean plants may lose as much as 13 percent of their productivity because they cannot adjust quickly enough to the changes in light intensity that are standard in any crop field. It may not sound like much, but in terms of the global yield -- this is massive." Realizing Increased Photosynthetic Efficiency (RIPE) is an international research project that aims to improve photosynthesis to equip farmers worldwide with higher-yielding crops needed to ensure everyone has enough food to lead a healthy, productive life. RIPE is sponsored by the Bill & Melinda Gates Foundation, the U.S. Foundation for Food and Agriculture Research (FFAR), and the U.K. Government's Department for International Development (DFID).



Courtesy: aces.illinois.edu/news/boost-soybean-yields-adapting-photosynthesis-fleeting-shadows-according-model

Past models have only examined hour-by-hour changes in light intensity. For this study, the team created a dynamic computational ray-tracing model that was able to predict light levels to the millimeter across every leaf for every minute of the day in a flowering soybean crop. The model also takes into account two critical factors: photoprotection and Rubisco activase. Photoprotection protects plants from sun damage. Triggered by high light levels, this process dissipates excess light energy safely as heat. But, when light levels drop, it can take minutes to hours for photoprotection to relax, or stop -- costing the plant potential yield. The team evaluated 41 varieties of soybean to find out the fastest, slowest, and average rate from induction to the relaxation of photoprotection. Less than 30 minutes is considered "short-term," and anything longer is "long-term" photoprotection.

Using this new model, the team simulated a sunny and cloudy day in Champaign, Illinois. On the sunny day, long-term photoprotection was the most significant limitation of photosynthesis. On the cloudy day, photosynthesis was the most limited by short-term photoprotection and Rubisco activase, which is a helper enzyme -- triggered by light -- that turns on Rubisco to fix carbon into sugar. The RIPE project has already begun to address photoprotection limitations in soybean and other crops, including cassava, cowpea, and rice to attain full potential of crops.

Source:

www.sciencedaily.com/releases/2020/02/200224130931.html

Skin-like Sensors bring a Human Touch to Wearable Tech

Researchers have developed a super-stretchy, transparent and self-powering sensor that records the complex sensations of human skin. Dubbed artificial ionic skin -- or AISkin for short -- the researchers believe the innovative properties of AISkin could lead to future advancements in wearable electronics, personal health care and robotics. University of Toronto Engineering researchers, Canada, have developed a super-stretchy, transparent and self-powering sensor that records the complex sensations of human skin.

Being hydrogel material, it's inexpensive and biocompatible -- you can put it on the skin without any toxic effects. It's also very adhesive, and it doesn't fall off, so there are so many avenues for this material. The adhesive AISkin is made of two oppositely charged sheets of stretchable substances known as hydrogels. By overlaying negative and positive ions, the researchers create what they call a "sensing junction" on the gel's surface. When the AISkin is subjected to strain, humidity or changes in temperature, it generates controlled ion movements across the sensing junction, which can be measured as electrical signals such as voltage or current.



Courtesy: startupheretoronto.com/partners/uoft/skin-like-sensors-bring-a-human-touch-to-wearable-tech

AISkin is also uniquely tough and stretchable. Our human skin can stretch about 50 per cent, but AISkin can stretch up to 400 per cent of its length without breaking. The new AISkin could open doors to skin-like Fitbits that measure multiple body parameters, or an adhesive touchpad you can stick onto the surface of your hand. It could work for athletes looking to measure the rigour of their training, or it could be a wearable touchpad to play games. It could also measure the progress of muscle rehabilitation.

Another application is in soft robotics -- flexible bots made completely out of polymers. An example is soft robotic grippers used in factories to handle delicate objects such as light bulbs or food. The researchers envision AISkin being integrated onto soft robots to measure data, whether it's the temperature of food or the pressure necessary to handle brittle objects.

The next goal is to shrink the size of AISkin sensors through microfabrication. Bio-sensing capabilities to the material will also be added, allowing it to measure biomolecules in body fluids such as sweat. This could also be helpful for developing smart bandage as wound healing requires breathability, moisture balance -- ionic skin feels like the natural.

Source:

www.sciencedaily.com/releases/2020/01/200108123149.html

Forthcoming Tech Events

Pakistan

Solar Pakistan Exhibition

19-21 March, 2020

Expo Centre, Lahore, Pakistan

www.10times.com/solar-pakistan-exhibition

Invention to Innovation Summit Islamabad

15-16 April, 2020

Quaid-i-Azam University, Islamabad

www.pastic.gov.pk

World Congress on Pollution Control

28-29 April, 2020

Hotel & Golf Course Gulshan-I-Maymar Road, Karachi

www.sciencenet.co/event/index.php?id=1181640

International Conference on Science, Engineering & Technology

28-29 July, 2020

Pearl Continental Hotel, Rawalpindi

www.10times.com/icset-pakistan

International

International Science, Technology and Engineering Conference

8-10 April, 2020

George Town, Malaysia

www.10times.com/istec-penang

International Conference On Science Technology And Management

13-14 May, 2020

Brussels, Belgium

<https://10times.com/icstm-b>

EU Sustainable Energy Week

23-25, June 2020

Belgium

www.https://10times.com/eusew

World Congress On Materials Science And Engineering

24-25 August, 2020

Czech Republic

Tech & Trade Offers

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Strong business ethics, excellence in business, productive work environment, continuous improvement through sound corporate governance and dynamic employee engagement have been at the foundation of the success of the company.

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