

TECHNOLOGY ROUNDUP

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**SOLUTION
MOBILITY**



Forthcoming Tech Events

- International Conference on Innovative Engineering Technologies
- National Conference on Water and Environment
- International Conference on Arts, Education and Social Science
- International Conference on Science, Engineering & Technology
- International Conference on Recent Innovations in Engineering and Technology
- International Conference on Researches in Science and Technology
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Performance Analysis of Fiber Wireless Solution in Passive Optical/Copper Restrained Areas

With the rapid rise of optical fiber access technologies, a new networking form is emerging called fiber-wireless (Fi-Wi). Wireless part is used where laying-out of fiber is not feasible economically and its operation and maintenance is problematic. Fi-Wi offers high quality and reliability, better coverage, high signal-to-noise ratio, low maintenance and less time required for deployment.

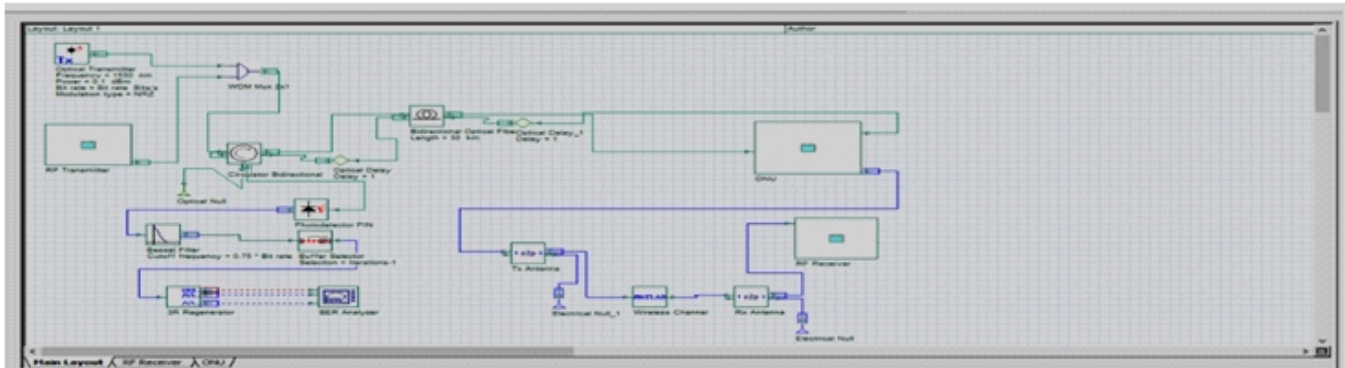


Figure1: Fi-Wi simulation set up

Fi-Wi set up was simulated and analyzed QoS parameters offered by the solution. The results were compared with access network with fiber only (PON). The proposed Fi-Wi system was simulated with data rates of 1 to 5 Gbps modulated by RF signal, for frequency range of 71-76 GHz, over varying fiber lengths. The simulation was evaluated using variable data rates, diverse fiber lengths and varying optical launch powers and their impact on bit error rate (BER) and Q-factor. Simulation results show that this type of network can provide high data rate services to customers with minimum BER and high SNR values. The signals were successfully transmitted from 1 Gbps to 3.5 Gbps at the customer premises with acceptable levels of signal quality, eye opening, Q factor and BER. Simulation results demonstrated that F-Wi networks can be used to provide multimedia and other high data rate demanding services in the areas where optical fiber cannot be extended. Moreover, Fi-Wi system gives comparable results in the last mile section against access network based on PON or Copper.

Source:

Muhammad Naeem* Abdul Latif, Imran Ali Qureshi, Telecommunication Engineering Dept. Mehran University of Engineering & Technology Jamshoro Pakistan, Erum Saba Information Technology Dept. Sindh Agriculture University Tando Jam Pakistan. International Journal of Electrical Engineering & Emerging Technology, 2019 Vol. 02(1) 28-34.

Assessment of Sustainable Groundwater Extraction Rate for Quetta City Using Modflow

Quetta is the largest population center in Baluchistan province. Its population entirely depends upon the groundwater. The increasing population of the city and unplanned use have depleted water table in the recent decades

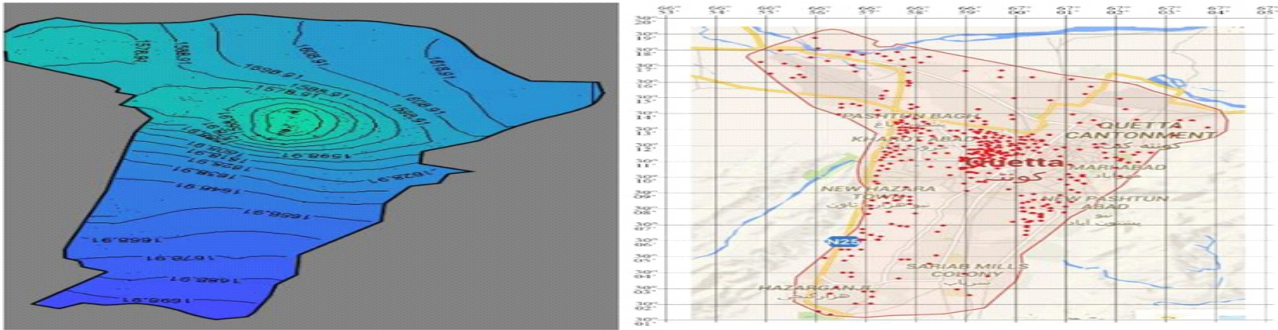


Figure 2: Water Table Profile (m) in the year of 2014

USGS groundwater flow model MODFLOW (MODFLOW Pro) was applied for the Quetta city to simulate the behavior of aquifer under stresses. The model solves partial differential groundwater flow governing equation by finite difference method. The data regarding groundwater levels, tube wells, pumping rates and aquifer parameters etc. were collected from Water and Power Development Authority (WAPDA). The data showed that the abstraction rate for the city has increased from 32.25 MGD to 57.76 MGD over 20 years. The model was calibrated and validated for the available data. Data from year 1995 to 1999 was used for calibration and from 2000 to 2005 for validation. The water balance showed that 20% of the total precipitation was ultimately going to the groundwater as recharge. It was observed from the model results that the water table under Quetta city has declined at the average rate of 0.91 m/year since 1995 to 2014. The Vermont Storm Water Management (VSWM) method of volume recharge was used to calculate the fraction of recharge that is retained by the imperviousness caused by the urbanization of the city. This fraction comes out to be 0.6 MGD to 2.9 MGD per year, depending upon the amount of precipitation and the amount of imperviousness for the same year.

The water budget calculated by the model showed that the average recharge per year in the study period was 37.04 MGD and the average abstraction from the aquifer was 84.20 MGD, so there was annual deficit of 47.11 MGD. The inflow through the boundaries was increasing with the passage of time due to fall of head inside the model area, whereas the outflow through the boundaries was almost zero during the study period because of higher heads outside the model boundary.

The model was then used to predict different future scenarios by giving the same average recharge rates and varying abstraction rates, in order to predict the future behavior of the aquifer.

In order to cope with the water scarcity issue, following recommendations are proposed by the authors:

- All wells data should be recorded at fixed intervals.

- All possible measures should be taken to reduce the rate of abstraction.

- As the only source of groundwater recharge is precipitation so delay actions dams should be constructed to increase the recharge

- Care should be taken in urban planning to design depressions for rain water to infiltrate

- Agricultural use of groundwater should be reduced in the valley

- Provision of infiltration galleries

- Studies should be conducted to see opportunities of importing water from external source outside the valley i.e. Ziarat, Zarghoon Mountains or Bolan etc.

Source: Abdul Ghani, Zulfiqar Ali Chaudary, Habib-Ur-Rehman, Aftab H. Azhar, Muhammad Masood. Assessment of Sustainable Groundwater Extraction Rate for Quetta City using Modflow. Pakistan Journal of Engineering and Applied Sciences. 2019 Vol. 24(1) 1-10

Innovative Technique uses Sensory Nanoparticles to Detect Disease

Like dipping a donut hole in powdered sugar, nanoparticles collect a unique coating of proteins from the blood. In a new study, researchers present a nanoparticle sensor array that they are developing as an early detection test for cancer and other diseases.

It has been shown that biomolecules in the blood of healthy individuals and patients form various corona profiles around nanoparticles. Like dipping a donut hole in powdered sugar, nanoparticles collect a unique coating of proteins from the blood. The Scientists further provide an evidence that these coronas are personalized and precise, with different compositions or patterns in people with cancers. They have developed a sensor array that has been tested on blood samples, both from people diagnosed with five different types of cancer as well as purportedly healthy people who went on to have a cancer diagnosis several years later. The goal is to develop an early detection test that could be used in the clinic to identify those at risk of cancer and other diseases.

Source:

www.sciencedaily.com/releases/2019/06/190617071716.html

Producing Electricity at Estuaries using Light and Osmosis

Researchers are working on a technology to exploit osmotic energy -- a source of power that's naturally available at estuaries, where fresh water comes into contact with seawater. In a laboratory experiment, the team reproduced the real-world conditions that occur where rivers meet the sea (pH and salt concentration) and showed that, by shining light on a system comprising salt, water and a membrane three atoms thick, it was possible to optimize electricity production.



Example of an estuary, in Maine (stock image). Credit: © mandritoiu / Adobe Stock

Most renewable power technologies are weather dependent. Wind farms can only operate when there's a breeze, and solar power plants rely on sunlight.

Osmosis is a natural process whereby molecules migrate from a concentrated to a more dilute solution across a semi-permeable membrane in order to balance the concentrations. At river estuaries, electrically charged salt ions move from the salty seawater to the fresh river water. The idea is to harness this phenomenon to generate power. Under the effect of light, the system produces twice as much power as it does in the dark.

The addition of light means the technology has moved one step closer to real-world application. The system involves two liquid-filled compartments, at markedly different salt concentrations, separated by a molybdenum disulfide (MoS₂) membrane. In the middle of the membrane is a nanopore -- a tiny hole between three and ten nanometers (one millionth of a millimeter) in diameter.

Every time a salt ion passes through the hole from the high- to the low-concentration solution, an electron is transferred to an electrode, which generates an electric current.

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The system's power generation potential depends on a number of factors -- not least the membrane itself, which needs to be thin in order to generate maximum current. The nanopore also has to be selective to create a potential difference (a voltage) between the two liquids, just like in a conventional battery. The nanopore allows positively charged ions to pass through, while pushing away most of the negatively charged ones.

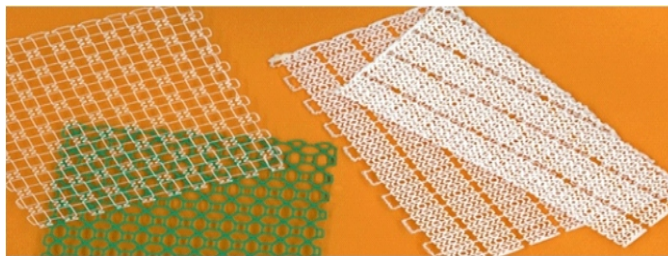
The system is finely balanced. The nanopore and the membrane have to be highly charged, and multiple identically sized nanopores are needed, which is a technically challenging process. The challenge remains to scale up production of the membrane, addressing a range of challenges such as optimal pore density.

Source:

www.sciencedaily.com/releases/2019/05/190523111359.html

Researchers 3D Print Wearable Mesh that can function as Flexible Medical Braces

3D printing has enabled the production of medical devices tailored to a patient's needs but, often, they are made using solid and inflexible materials. As a result, these devices restrict movement; using them can be inconvenient and uncomfortable. Moreover, they are not ideal to support the recovery of joints and muscles, which are more complex and nonlinear. Recently, engineers from MIT demonstrated 3D-printed mesh materials that offer support for softer tissues.



3-D-print stretchy mesh, with customized patterns designed to be flexible yet strong, for use in ankle and knee braces. Image credit: Felice Frankel

The flexible meshes were inspired by fabrics and collagen, the protein in the body that make up connective tissues. The materials were designed keeping in view the molecular structure of collagen. The wavy patterns were created and 3D-printed using thermoplastic polyurethane. A mesh configuration was fabricated having stretchy, tough, and pliable like fabric.

To test, long strips of mesh were printed and attached them on the outside of the ankle of several healthy volunteers. An ankle stiffness measurement robot was used, which is aptly named Anklebot, to examine how the mesh affected movement in different directions. It was observed that the material increased the ankle's stiffness during inversion, a common cause of injury, but had no effect to movement in other directions.

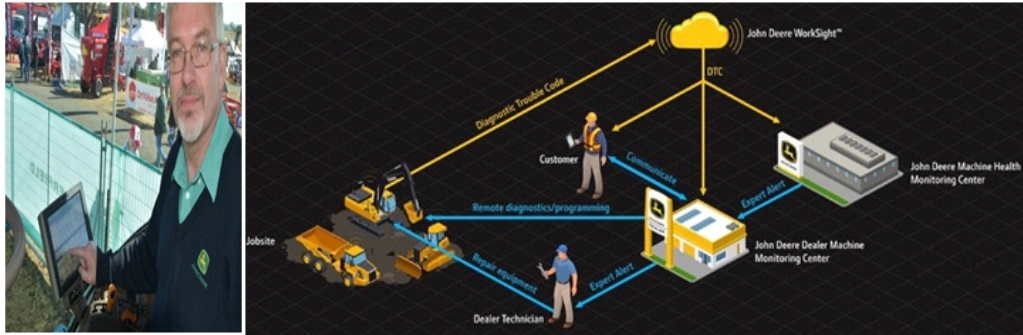
The researchers also fabricated a knee brace design that conforms to a patient's knee even as it bends and a glove that conforms to the wearer's knuckles to prevent involuntary clenching following a stroke. The researchers also discussed the potential of the 3D-printed flexible mesh as an implantable device to support hernia. These 3D-printed mesh can be used in a variety of ways to make all kind of devices that interface the human body..

Source:

www.technologynetworks.com/cell-science/news/flexible-mesh-3d-printed-for-ankle-and-knee-braces-320920

Predictive Machinery Monitoring Nips problems in the Bud

NEW machinery monitoring technology that provides real-time data on a tractor or harvester's 'health' is helping farmers and their service providers identify emerging problems and nip them in the bud before they become full-blown issues.



Vanderfield technical support and training specialist, Richard Harris, operates the Connected Support system on a new John Deere tractor at CRT FarmFest 2019. (Photo: Jim Booth)

Drawing on algorithms that combine the machine's history and current performance indicators, John Deere's Connected Support remote-monitoring system keeps tabs on the equipment's 'vital signs' as the machines operate in the field, and provides early warning of impending problems. The Connected Support featured a portfolio of different programs that allowed the company to remotely monitor customer machines.

“We have a team in the support office who monitor the machines. As the machines are going through the fields, potentially there could be issues with them such as over-heating or low oil pressure that are being reported back to our central database. “We have access to that and can monitor it. As a team, we can see if there is a machine that is starting to look like it is having a problem.” The service department can then contact the owner of the machine to alert them to the problem and be ready to make a repair before its actually needed. Rather than waiting for the problem to stop the machine, the technology in effect can predict the problem arising and stop it escalating.

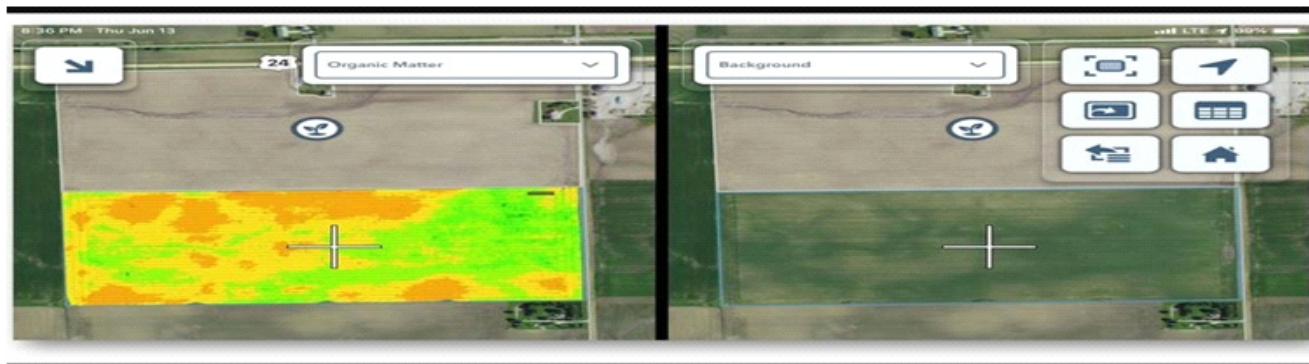
Another element of the Connected Support system is Service Advisor Remote which allows dealers to diagnosis and repair a problem from a remote location. The dealer is able to analyse machine conditions in real time, or set a trigger point to record intermittent conditions. Farmers have access to high levels of network connectivity. The data can be obtained from the machine back to the customer's home-base computer and to service providers. The system has the ability to send the information back to the central location automatically.

Source:

www.graincentral.com/machinery/predictive-machinery-monitoring-nips-problems-in-the-bud/

Bringing Tech and Agronomy Together

Agco's purchase of Precision Planting is just one tech area where the company continues to evolve; creation of a new telemetry product enhances machine fleet management.



AGCO-Organic matter-SIZE-Smart firmer vs Satellite Image. The organic matter map on this page shows the Smart Firmer information on the left and a satellite map on the right darker areas denote more organic matter.

The world of precision ag technology is evolving well past those colorful maps you often see post-harvest. Producers, consultants, startup companies and established firms are changing the way they think about cropping and bringing tools for in-season action that can boost yields. The challenge is having the right tech at work throughout the season. Agco became the final purchaser of Precision Planting from Bayer (formerly Monsanto) after that company had first been promised to John Deere. Today, Precision Planting continues its innovative work, and the parent company is putting those tools into new equipment. They're also marketing those products to competitors.

The validation of tillage practices in field trials and start building a database of information is the prime objective of this innovation. The Smart Firmer Precision Planting innovation can map factors at a level not possible in the past. The organic matter map on this page shows the Smart Firmer information on the left and a satellite map on the right darker areas denote more organic matter. Having that level of information as a data layer for evaluating crop performance could be very important

Source:

www.farmprogress.com/equipment/bringing-tech-and-agronomy-together

Scientists Develop new, rapid test to Diagnose Bacterial Lower Respiratory tract Infections

Scientists at the Quadram Institute and the University of East Anglia (UEA) have developed a new, rapid way of diagnosing bacterial lower respiratory tract infections in hours rather than days, that could improve patient care and slow the spread of antimicrobial resistance.



Lower respiratory infections, such as pneumonia, account for around 3 million deaths worldwide each year. Current diagnostic methods rely on growing bacteria from patient samples, but this takes two to three days and may still not identify the cause. During this time, patients are given broad-spectrum antibiotics, which may not work if the infection is caused by a resistant pathogen and could trigger side-effects. Over utilization of broad-spectrum antibiotics is also a known driver for the development of antimicrobial resistance.

A clinical metagenomics test (genomic analysis of multiple organisms obtained from a single sample) has been successfully developed to precisely identify the bacterial causes of lower respiratory infections within 6 hours. It can also determine if the pathogens are resistant to any of the antibiotics used to treat these infections.

This allows rapid treatment with targeted antibiotics, resulting in improved patient outcomes whilst reducing the use of broad-spectrum antibiotics and helping in the fight against antimicrobial resistance.

The protocol is now being assessed in a larger multi-site clinical trial to evaluate its performance for the diagnosis of hospital-acquired pneumonia.

Source:

www.news-medical.net/news/20190624/Scientists-develop-new-rapid-test-to-diagnose-bacterial-lower-respiratory-tract-infections.aspx

Forthcoming Tech Events

Pakistan

International Conference on Innovative Engineering Technologies

28-29 July, 2019

Rawalpindi

www.theires.org/Conference2019/Pakistan/1/ICIET/

National Conference on Water and Environment

22-23 August, 2019

US-Pakistan Center Jamshoro

www.ncwe.water.muet.edu.pk

International Conference on Arts, Education and Social Science

28-29 September, 2019

Rawalpindi

www.allconferencealert.net

International Conference on Science, Engineering & Technology

28-29 October, 2019

Rawalpindi

www.allconferencealert.net

International

International Conference on Recent Innovations in Engineering and Technology

1-2 September, 2019

United Arab Emirates

www.theiier.org/Conference2019/UAE/6/ICRIET/

International Conference on Researches in Science and Technology

4th October, 2019

Berlin, Germany

www.allconferencealert.net

International Conference on Engineering & Technology

5th November, 2019

Washington DC, USA

www.allconferencealert.net

International Conference on Science, Technology & Management

7th December, 2019

Port Moresby, Papua New Guinea

www.allconferencealert.net

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