Resumen de las Actividades de la División de Ecoenergía
Septiembre - Diciembre 2017

Continuando con su tradición innovadora, SETISA ya se encuentra trabajando en el Internet de las Cosas (IOT por sus siglas en Inglés). Un grupo de jóvenes ingenieros de su personal ha implementado varias aplicaciones que nos permitirán ofrecer a nuestros Clientes Industriales y del Sector Energía las ventajas de esta nueva tecnología. Como sabemos, el IOT consiste básicamente en relacionar armónicamente vía internet dedicado todo dispositivo que contenga un chip y manejarlo a través de la nube, el cual es un servidor o lugar electrónico de almacenamiento, con espacio ilimitado. A fines de Noviembre pasado nuestro presidente asistió a la Convención de IOT realizada en Santa Clara, California, estaban presentes profesionales y las empresas electrónicas más conocidas de todo el mundo pues el IOT marcará la pauta de muchas aplicaciones en industrias, plantas eléctricas, sistemas de transporte, edificios y ciudades inteligentes para lograr más eficiencia, y por ende reducción de costos.

Tal como lo mencionamos en nuestro anterior Boletín, entre el 16 y el 20 de Octubre, en conjunto con la empresa ETAP-OTI realizamos en la UCA y en el ITCA un Workshop titulado "Diseño Análisis y Operación de Sistemas de Potencia" y el Seminario Técnico "Análisis de Sistemas de Potencia", a ambos asistieron estudiantes, profesores e ingenieros de varias empresas industriales y de energía. En el transcurso de los eventos ETAP-OTI donó a ambas instituciones educativas 25 licencias de software con un valor comercial de $800,000.00. En el presente año esperamos hacer lo mismo en otras universidades.

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"Agilidad - Excelencia Técnica - Innovación"

Seminario, Workshop y Donación de Licencias ETAP a la UCA

El 16 de Octubre pasado, en conjunto con ETAP-OTI realizamos en la Universidad Centroamericana (UCA) un Seminario Técnico gratuito titulado: "Diseño, Análisis y Operación de Sistemas de Potencia"; del 17 al 19, siempre en las aulas de la UCA, se desarrolló el Workshop: "Análisis Especializado de Sistemas de Potencia". A ambos eventos asistieron alumnos y profesores de la UCA e ingenieros de empresas industriales y del sector eléctrico. Como corolario de dichas actividades ETAP-OTI hizo la donación de 25 licencias de Software para Estudios Eléctricos, con un valor comercial de $800,000.00, sobre lo cual la UCA comunicó lo siguiente:

Noticias UCA

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Donación de *software* para manejo de sistemas eléctricos

Margarita Moreno
25/10/2017

Vota ★ ★ ★ ★ ★ 7 Votos

Academia | Desarrollo institucional

El 16 de octubre, la UCA recibió un donativo de 25 licencias educativas del Programa de Análisis y Transiciones Eléctricas (ETAP, por sus siglas en inglés), uno de los *software* más utilizados a nivel mundial para simulación, monitoreo, control, optimización y automatización de sistemas eléctricos.

El donativo fue entregado por representantes de ETAP México y Setisa (la empresa representante de ETAP en El Salvador) al Departamento de Ciencias Energéticas y Fluídicas de la Universidad.

En el acto de entrega del donativo, Carlos Flores, catedrático del Departamento, aseguró que el *software* beneficiará a 150 estudiantes de Ingeniería Eléctrica, quienes, con la plataforma, fortalecerán su formación en máquinas eléctricas, sistemas de instrucción, sistemas de potencias, plantas y subestaciones, e instalaciones eléctricas.

En la práctica, como complemento a la teoría impartida en clase, el *software* les permitirá a los alumnos moldear sistemas, estudiar flujos de carga, trabajar en la protección de sistemas, realizar análisis en tiempo real, probar prototipos y simular el funcionamiento de sistemas eléctricos, entre otros.

De acuerdo al P. Andreu Oliva, rector, las alianzas con organizaciones de prestigio a nivel internacional, como ETAP, "permiten a la Universidad actualizarse e ir aumentado la vinculación con el mercado y el mundo empresarial". Una dinámica en la que todas las partes involucradas se ven fortalecidas, sobre todo los estudiantes, quienes se forman con herramientas tecnológicas de punta.

Con la donación de las 25 licencias educativas de ETAP, valorada en más 800 mil dólares, la UCA podrá utilizar el *software* por tres años, con opción de prórroga (Foto: Dirección de Comunicaciones, 16/10/2017).

Notas relacionadas

Conia 2017: talento ingenieril aplicado para la mejora de El Salvador
Loyda Salazar

Primer lugar en competencia de automatización
Margarita Moreno

Cinco nuevas herramientas para los laboratorios de química
Mateo Flores

Deje su comentario

ITCA

(Instituto Tecnológico Centroamericano)

Workshop “Diseño Análisis y Operación de Sistemas de Potencia”

El pasado 20 de octubre realizamos en el ITCA el Workshop “Diseño Análisis y Operación de Sistemas de Potencia” al que asistieron estudiantes y profesores de dicha institución.

La empresa ETAP-OTI hizo la donación de 25 licencias del software con un valor comercial de $800,000.

En la pagina oficial del ITCA-FEPADE se publico lo siguiente:

ITCA-FEPADE (Sitio Oficial) agregó 11 fotos nuevas.
20 de octubre de 2017 ·

INAUGURACIÓN DEL POWER LAW CON SOFTWARE ETAP

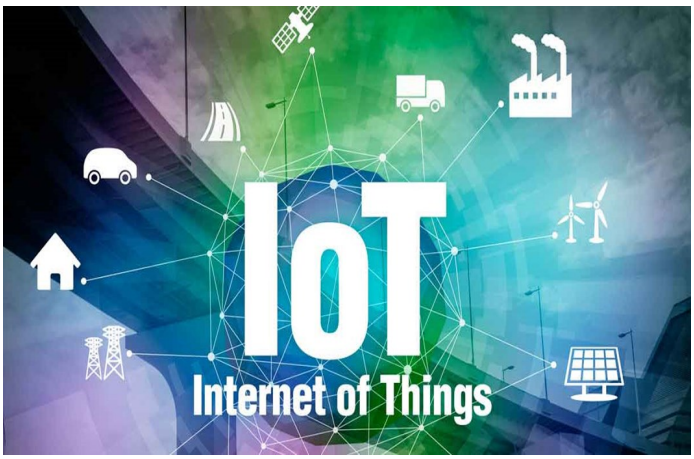
Esta mañana fue inaugurado en el campus de ITCA Sede Central, el Power Law con Software ETAP, gracias a la donación de su distribuidor y la empresa SETISA.
ETAP es reconocido mundialmente por su avanzada tecnología y su gran aporte a la educación consiste en 25 licencias del Software ETAP para uso en red LAN y 3 años de mantenimiento.
Los beneficiados directos en este ciclo serán un total de 636 estudiantes de la carrera de Técnico en Ingeniería Eléctrica. Siendo 246 del campus Santa Tecla, 198 de la Regional de Santa Ana y 192 de San Miguel. Esperamos al final de los 3 años haber capacitado a un aproximado de más de 3,800 estudiantes.
Los jóvenes, a través del software ETAP, podrán analizar y modelar sistemas eléctricos en aplicaciones relacionadas con arco eléctrico, flujo de carga, corto circuito, coordinación de protecciones eléctricas, dimensionamiento de cables eléctricos, estabilidad transitoria, optimización de taps de transformadores de distribución, análisis de armónicos, diseño de redes de tierra, entre otras aplicaciones y la predicción y simulaciones en tiempo real.

El Internet de las Cosas (IOT)

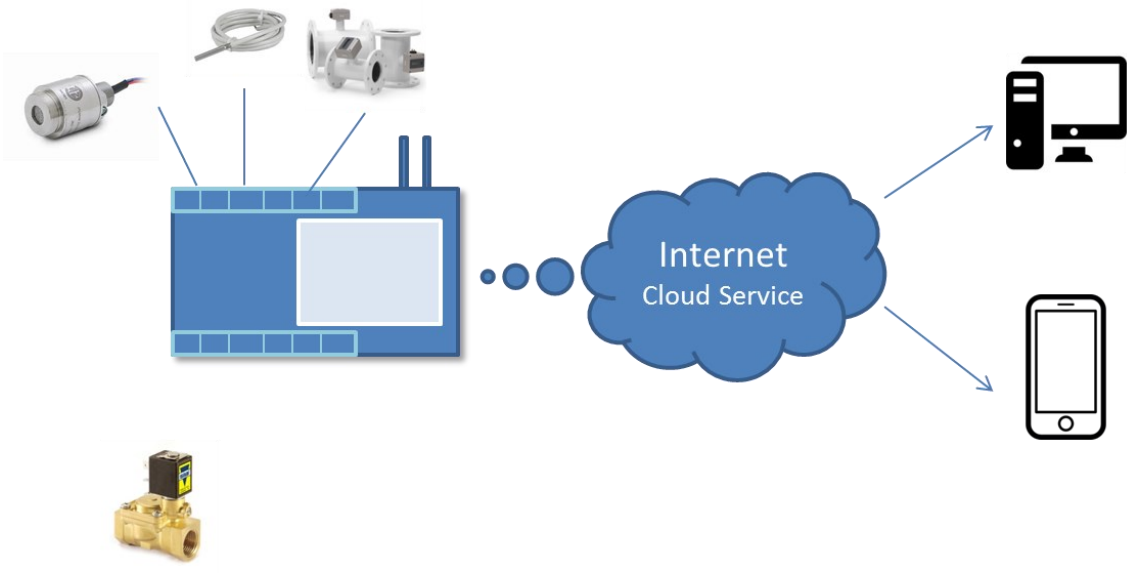
A fines de Noviembre nuestro Presidente asistió a la Convención del Internet de las Cosas (IOT) por sus siglas en inglés) realizado en Santa Clara, California, corazón del conocido Valle del Silicio. Estaban presentes profesionales y las empresas electrónicas más conocidas de todo el mundo pues el IOT marcará la pauta de muchas aplicaciones en industrias, plantas eléctricas, sistemas de transporte, y edificios y ciudades inteligentes para lograr más eficiencia, rapidez y por ende reducción de costos.

Básicamente consiste en relacionar armónicamente vía internet dedicado todo dispositivo que contenga un chip y manejarlo a través de la nube, el cual es un servidor o lugar electrónico de almacenamiento, con espacio ilimitado. Ya tenemos un grupo de jóvenes integrantes de nuestra empresa que están trabajando con gran entusiasmo, en la introducción del IOT en proyectos prácticos y pronto se verán resultados.

Áreas de aplicación del IOT



- Mantenimiento predictivo realizado a distancia
- Redes y Mediciones Inteligentes
- Edificios y Ciudades Inteligentes
- Sistemas de Seguridad Industriales
- Eficiencia de Energía y Optimización
- Ventilación, Aire Acondicionado y Calefacción Industrial.
- Monitoreo de Temperatura y Gas en aplicaciones industriales



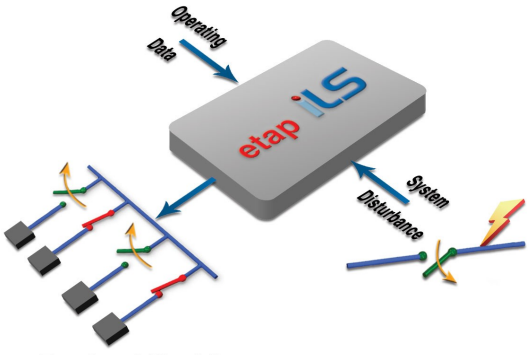
Sistema Inteligente de Desconexión de Cargas En HOLCIM, El Salvador

Holcim

Durante este periodo hemos actualizado el funcionamiento del Sistema de Desconexión Inteligente de Cargas (ILS), que opera satisfactoriamente desde el 2011; en las plantas de energía y producción de Holcim, este produce desconexiones instantáneas y selectivas de cargas ante perturbaciones externas y pérdidas de generación. El software ILS calcula la potencia mínima requerida que debe ser desconectada en cada sub-sistema según el tipo y ubicación de la perturbación, generación disponible, reserva rodante, carga, configuración, distribución de carga, y prioridades. Posteriormente ILS selecciona la mejor combinación de cargas que satisfagan estas necesidades, ejecutando las acciones en menos de 100 mseg después de perturbaciones en la red del Sistema Nacional, eliminando paros innecesarios de su carga crítica. Contribuye a su alta velocidad la utilización de PLC's y Circuitos de Fibra Óptica.

Características del Sistema ILS:

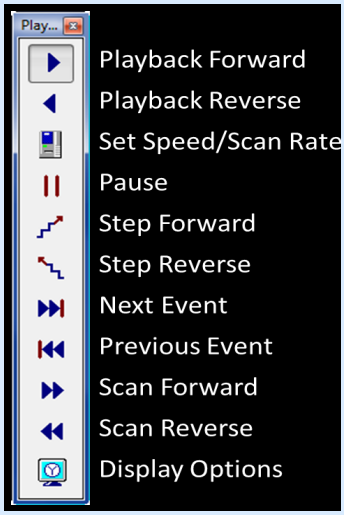
La respuesta dinámica o en estado estacionario del sistema puede ser verificada y analizada utilizando las capacidades de simulación de ETAP para Flujo de Carga y Estabilidad Transitoria. El simulador del ILS puede utilizar tanto los datos de diseño como los leídos en tiempo real del sistema. Este simulador es la herramienta perfecta para predecir la respuesta del sistema y las acciones de desconexiones de cargas en los escenarios de "¿Qué pasaría sí?" y ver que sucede al hacer modificaciones al Sistema, incluir nuevas cargas o hacer modificaciones de los enclavamientos. Luego de que la lógica del ILS es verificada y se establecen los niveles de acceso adecuados, el operador del sistema puede actualizar el servidor de una manera muy fácil sin sacar el sistema de línea y sin interrumpir la operación del servidor. ***Este tipo de Sistemas se puede implementar en Plantas Industriales, Generadoras, de Distribución Eléctrica ya que también se puede incluir el modulo de despacho económico.***



Fast Load Shedding
Optimal Load Preservation
Overload Curtailment

Una característica clave del Sistema ILS es su capacidad de actualizarse y reconfigurar la lógica del rechazo de carga sin realizar la reprogramación de los PLC's. El cambio de prioridades de las cargas, añadir, remover cargas del sistema y optimizar la lógica son

Playback



• **HOLCIM EL SALVADOR** ♦ **4 Plantas de Concreto**	Análisis de Material Particulado PTS, PM_{10} y $PM_{2.5}$ Ruido Ambiental Análisis de Ruido en Fuentes Móviles Dosimetría de Ruido Mapas de Ruido
• **YKK EL SALVADOR**	Medición de Compuestos Orgánicos Volátiles (CVO´s)
• **AVX**	Análisis de Material Particulado $PM_{2.5}$ Análisis de Emisiones de Gases Estudio de Iluminación
• **HANES BRANS INC.**	Análisis de Material Particulado PM_{10} y $PM_{2.5}$ Ruido ocupacional Iluminación Estrés Térmico Medición de Compuestos Orgánicos Volátiles (CVO´s)
• **SOCIEDAD ENERG. S.A. de C.V.**	Análisis de Material Particulado PTS, PM_{10} y $PM_{2.5}$ Ruido Ambiental Análisis de Emisiones de Gases
• **PLYCEM EL SALVADOR**	Análisis de Material Particulado PTS, PM_{10} y $PM_{2.5}$ Ruido Ambiental y Ocupacional Dosimetría de Ruido Estrés Térmico Iluminación Análisis de Emisiones de Gases
• **PODMIN**	Análisis de Material Particulado PTS
• **LABORATORIOS LÓPEZ / GRUPO PROCAPS**	Análisis de Material Particulado PM_{10}
• **CORPORACIÓN BONIMA**	Análisis de Emisiones de Gases Ruido Ambiental
• **PANESAL**	Análisis de Emisiones de Gases
• **MOLINOS MODERNOS**	Análisis de Material Particulado PM_{10} y $PM_{2.5}$

Servicios Ambientales y Seguridad e Higiene Ocupacional

• **APPLE TREE /TEXTILES SAN MARCOS** ♦ **5 plantas**	Análisis de Material Particulado $PM_{2.5}$
• **TEXTUFIL**	Análisis de Material Particulado PTS, PM_{10} Análisis de Emisiones de Gases
• **PLANTA DE TRATAMIENTO Y DISPOSICIÓN FINAL DE DESECHOS HOSPITALARIOS SAN MIGUEL**	Análisis de Material Particulado PM_{10} Ruido Ambiental Análisis de Emisiones de Gases
• **ALBACROME**	Ruido Ocupacional Análisis de Emisiones de Gases Etrés Térmico
• **PLANTA GENERADORA NEJAPA POWER**	Ruido Ambiental
• **SALTEX**	Análisis de Material Particulado PTS, PM_{10} Ruido Ambiental Análisis de Inmisiones Atmosféricas
• **MIDES**	Análisis de Material Particulado PTS, PM_{10} y $PM_{2.5}$
• **ASFALCA**	Análisis de Emisiones de Gases

Servicios del Área de Energía

• **OPP FILM EL SALVADOR**	Análisis de Vibraciones Análisis de Termografía
• **MOLSA**	Análisis de Vibraciones Balanceo Dinámico Mantenimiento y Análisis de Subestaciones Eléctricas
• **PLYCEM**	Análisis de Vibraciones
• **IMERLET**	Análisis por medio de Termografía
• **LA CABAÑA**	Análisis de aceites a transformadores por Cromatografía y Físico Químicos
• **ALDECA**	Análisis de aceites a transformadores por Cromatografía y Físico Químicos

SETISA tiene Registro Legal como Empresa Prestadora de Servicios Ambientales por el MARN además de poseer una Certificación como Empresa Asesora en

Ministerio de Medio Ambiente y Recursos Naturales
GOBIERNO DE EL SALVADOR
UNIR, CRECER, INCLUIR

Código de Registro:

MINISTERIO DE TRABAJO Y PREVISIÓN SOCIAL
EL SALVADOR
UNÁMONOS PARA CRECER

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Numero de Acreditación:

Entre nuestros clientes tenemos:

HOLCIM EL SALVADOR, SHERWIN WILLIAMS, INTRADESA S.A. DE C.V., CORPORACIÓN BONIMA, LABORATORIOS LÓPEZ, INDUSTRIAS LA CONSTANCIA, EL DIARIO DE HOY, AVX EL SALVADOR , YKK, OPPFILM, APPLE TREE, PLYCEM, HARISA, HANES BRANDS EL SALVADOR SEW, TEXTILES LA PAZ, MIDES, ALDECA, R&M S.A DE C.V, PRODEPT, BAYER, REASA S.A. DE C.V., POLYBAG S.A. DE C.,V., HANES BRANDS SOCK, SUNCHEMICAL,TEXTUFIL, entre otros.

Servicios de Mediciones, Análisis de Seguridad e Higiene Ocupacional (SHO)

SETISA

SETISA es pionera en realizar servicios de consultorías de Seguridad e Higiene Ocupacional (SHO) en las Industrias Salvadoreñas. Se presentan a continuación los servicios de mediciones y análisis ambientales que ofrecemos:

- **Análisis de material Particulado PM_{10} ,PM_5, $PM_{2.5}$ y PTS Ocupacional**

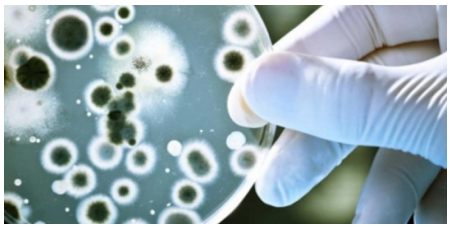
- **Medición de Compuestos Orgánicos Volátiles (CVO´S)**

- **Estudios de Iluminación y Estrés Térmico**

- **Análisis de Ruido en Fuentes Móviles, Ruido Ocupacional y Ambiental, Dosimetrías de Ruido y Mapas de Ruido Ocupacional**

- **Estudio de Atmosferas explosivas (ATEX)**

- **Riesgos Biológicos**



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Código de Registro:

Numero de Registro:

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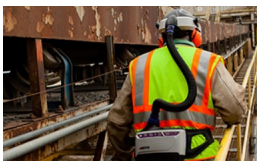
Servicios de Mediciones y Análisis Ambientales

SETISA es pionera en realizar servicios de consultorías de Seguridad e Higiene Ocupacional (SHO) en las Industrias Salvadoreñas. Se presentan a continuación los servicios de mediciones y análisis ambientales que ofrecemos:

- **Análisis de material Particulado Ambiental PM_{10} ,PM_5, $PM_{2.5}$ y PTS**



- **Análisis de Gases de Combustión en Calderas (AG)**

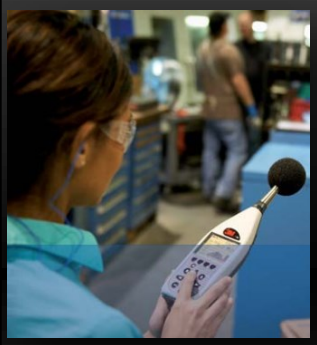


- **Análisis de Dispersión de Contaminantes Atmosféricos mediante AERMOD**

- **Medición de Compuestos Volátiles Orgánicos (VOC)**

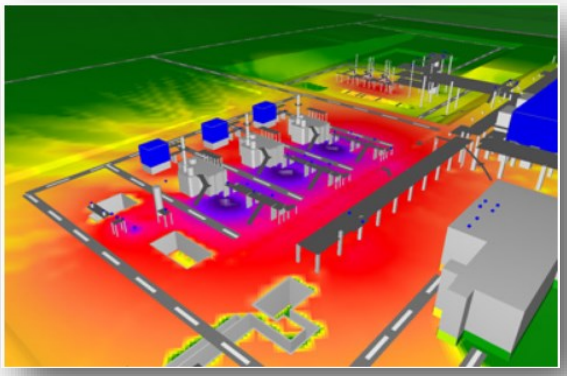

Mapas de Ruido Ocupacional

Mediante un mapa de ruido se identifican los niveles de presión sonara de las diversas áreas de una industria o planta de generación con el fin de tomar medidas de prevención tanto para el personal como para equipos de producción.



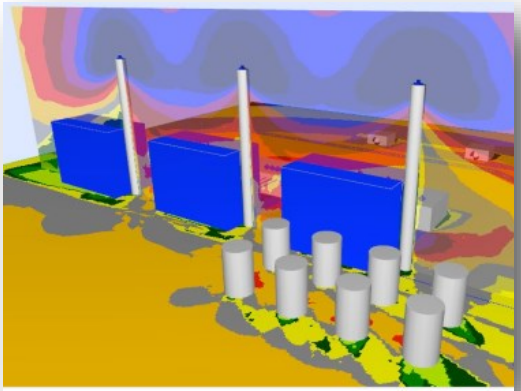
SETISA es pionera en elaboración de Mapas de Ruido en industrias y plantas de energía. Las ventajas de contar con un mapa de ruido son:

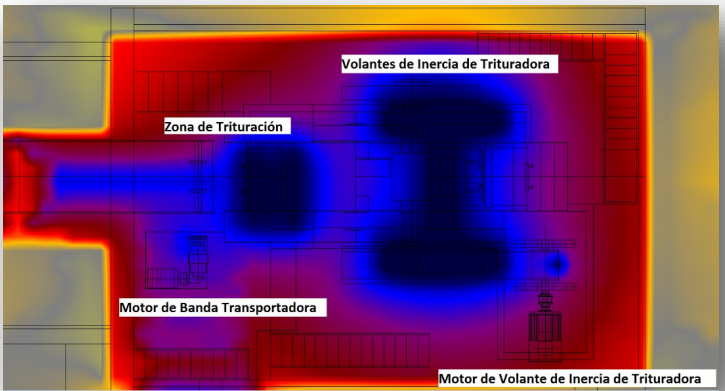
- **Identificar sitios de riesgo de exposición a niveles de ruido que puedan alterar la salud del personal.**
- **Se identifican niveles de ruido de equipos de producción, a fin de tomar medidas de reducción de vibraciones mecánicas, a través de mantenimientos programados o balanceos dinámicos.**



Cadna A®
State-of-the-art
noise prediction software

- **Identificar equipos con mayor emisión de energía acústica para la instalación de pantallas de aislamiento.**

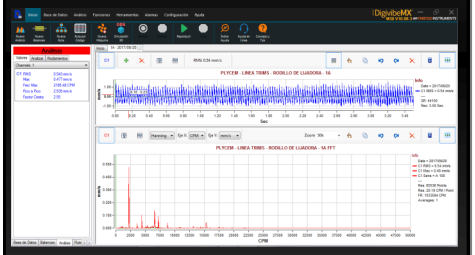




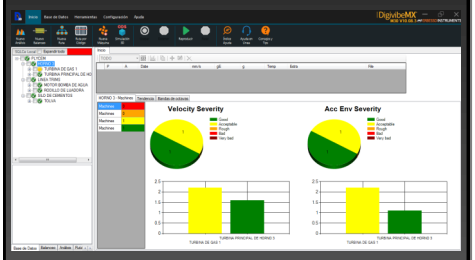
Análisis de Vibraciones y Balanceo Dinámico

*La Familia **DigivebeMX** ofrece los mejores Sistemas para **Balanceo Dinámico, Análisis de Vibraciones y Recolección de Datos.***

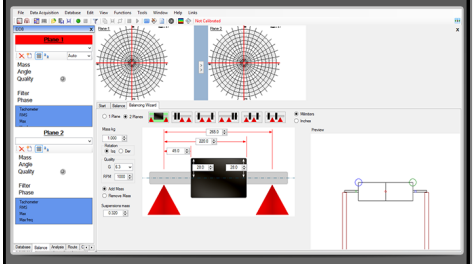
La interfaz es fácil de usar e incorpora funciones avanzadas para entender y analizar las Vibraciones y actuar rápidamente para implementar ajustes



Espectros de Vibración



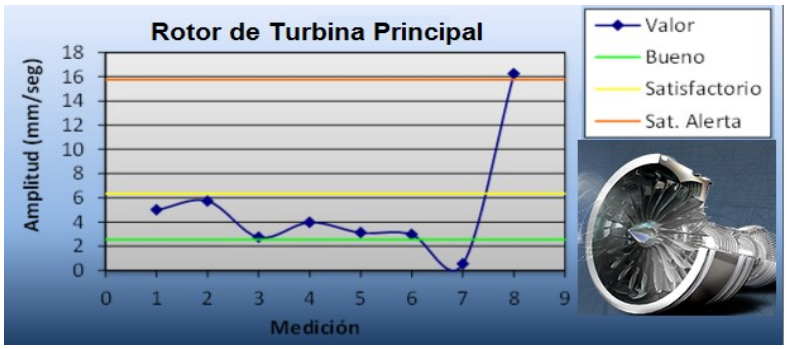
Análisis de Equipo



Balanceo Dinámico

SETISA es pionera en aplicar la disciplina de Análisis de Vibraciones y Ruido. Las ventajas de un Programa de Mantenimiento Predictivo (PMP), en Análisis de Vibraciones mecánicas son:

- **Reducción al mínimo de costos de mantenimiento y de reparaciones en maquinas criticas que podrían provocar paros de producción.**
- **Reducción del consumo de energía eléctrica de equipos.**
- **Se evitan los efectos negativos de vibraciones hacia el personal.**

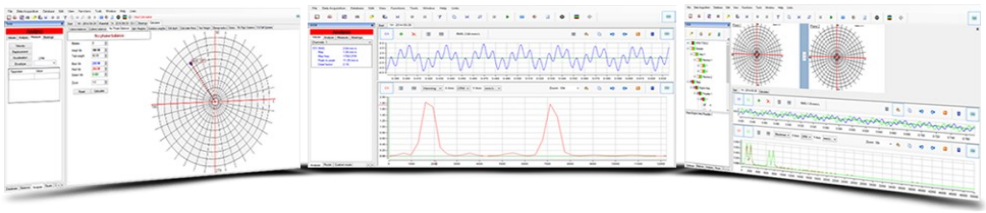


SETISA recibió recientemente un equipo

- **Protección y sistemas (equipos a equipos sensibles de laboratorio, sistemas de comunicación, etc.).**

ERBESSD RELIABILITY™
BALANCING-VIBRATION-ONLINE MONITORING-LASER ALIGNMENT - MASTERS OF MACHINE HEALTH ANALYTICS

- **Se generan Curvas de Comportamiento para programar reparaciones.**

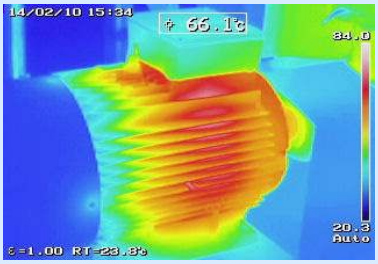


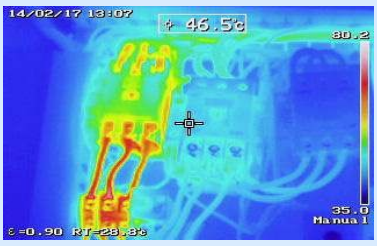
CTC
CONNECTION TECHNOLOGY CENTER, INC.

Keysight Technologies Cámara Termográfica

SETISA es distribuidor exclusivo de KEYSIGHT Technologies para El Salvador, Guatemala, Costa Rica y Honduras.

Mantenimiento Predictivo en Sistemas Eléctricos y Mecánicos.

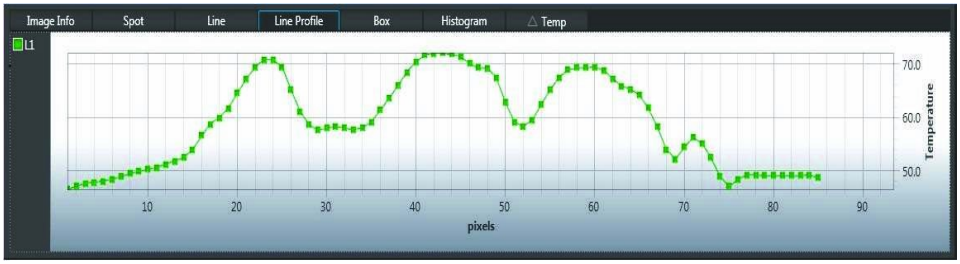


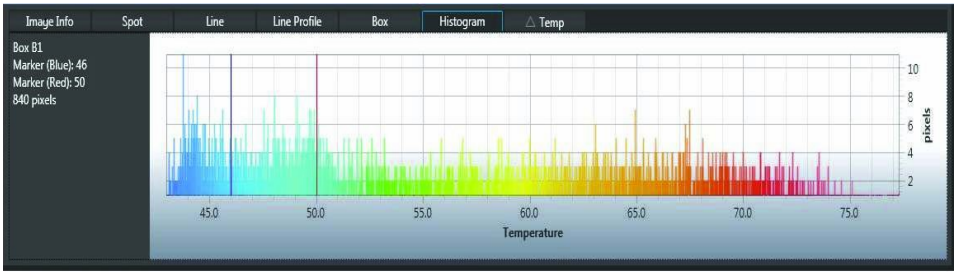


Este equipo puede utilizarse efectivamente en Programas de Mantenimiento Predictivo ya que recoge imagenes termográficas de puntos calientes en motores, bombas, tableros, interruptores y otros puntos de interés para anticipar y corregir problemas potenciales.

También es de mucha utilidad para identificar puntos anormalmente calientes en tarjetas electrónicas.

La Cámara Termográfica puede programarse para obtener curvas de tendencia de temperaturas.





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* Función V_{sense}—detección de voltaje sin contacto (Serie U1190)

SETISA cuenta con la representación de estos equipos especializados para análisis de “Calidad de Energía”

NOTAS ESPECIALES

Pittsburgh Steels Up for Microgrid Leadership

Pittsburgh aspires to be a global leader in envisioning and deploying a cutting edge grid of microgrids.

Dr. Gregory Reed, Dr. Katrina Kelly | **Energy Times-Jan 03, 2018**

Beginning in 2015, the University of Pittsburgh's Energy GRID Institute took the lead on defining the concept, and anchoring the research and development, for the city of Pittsburgh's "District Energy Initiative: The Grid of Microgrids." The early work related to this concept has thus far centered on collaborating with the city, the U.S. Department of Energy, industry participants, and community partners to better understand how energy is produced, delivered, and consumed within the city and the broader region. At the same time, Pitt's technical research in electric power systems and technologies have focused on better understanding the operational, financial, and technical impacts of new energy systems designs – including microgrids – through applied demonstrations with community partners, while also analyzing the environmental, social, and economic aspects of these new demonstrations.

The concept for a Grid of Microgrids brings together the strong value propositions of both independent energy eco-systems in harmony with a larger integrated energy network. To-date, there are four major projects underway in which the GRID Institute is participating. They include an analysis for an energy baseline report as part of Pittsburgh's Climate Action Plan 3.0, along with a broad energy planning analysis and strategy development for the broader Commonwealth of Pennsylvania; the development and successful implementation of a world-class test bed for Pitt's direct current infrastructure research with the Pitt-Ohio Express trucking company at their Harmar distribution facility, through the country's first all-DC-based renewable solar and wind) and storage integration; partnering with the local electric utility, Duquesne Light Company, on their Wood's Run Complex microgrid project; and efforts on Pitt's own campus through the support of the facilities management group on a long term energy and conservation plan. Many other projects and demonstrations are in the concept and planning stages throughout the city and the region, including developments for local communities and neighborhoods, hospital networks, industrial and commercial facilities and parks, greenfield developments, and retrofits of existing infrastructure.

All of these efforts are leading to an unprecedented sustainable energy transition in Pittsburgh, and have ensured that the diverse and innovative contributions of technical researchers is being translated into deployable projects across the city, while also understanding and identifying how project developers, technology providers, and broader utilities can better cooperate and demonstrate the creation of more sustainable, reliable, affordable, secure, and resilient energy infrastructures. In 2018, the efforts will focus on putting more of these plans into action. With the expected completion in early 2018 of the GRID Institute's new utility-scale Electric Power Technologies Lab at the Pittsburgh Energy Innovation Center, more opportunities will be available to accelerate research and development of applicable technologies and designs for continuing the advancement of these important energy system demonstrations, with an even greater emphasis on industry participation and community engagement. By 2019 and beyond, it is envisioned that a truly integrated and intelligent energy network will begin to emerge that embraces more sustainable solutions with adva
nced technology architectures.

Developing a Motor Strategy to Maximize Energy Savings

Take a comprehensive look at your facility to identify potential ways to reduce energy consumption.

Mark Lamendola | Dec 20, 2017- EC & M

Motors constitute a large share of the load at a typical industrial facility. They drive mixers, blowers, conveyors, grinders, and other kinds of equipment. In most facilities, huge amounts of energy savings in motor systems go unrealized. Most of the measures that reduce energy waste also extend motor life and tend to improve uptime and reliability as well. Doing one or two things to improve energy efficiency helps, but a comprehensive assessment and improvement strategy will maximize the savings. Have you considered all of the following?

• **Upgrade to an energy-efficient motor**. This (nearly always) makes sense, even if the existing motor is working fine. If you keep track of the cash flows and calculate the Internal Rate of Return, the savings are compelling. Also note that better components and better construction are the main ways a motor gets an "energy efficient" designation. That means increased reliability.

• **Match the motor to the conditions and load**. Design type, temperature rating, and other considerations can make a big difference in both how much energy a motor uses and how long it lasts in a given application.

• **Use VFDs, not gearboxes, for speed reduction (where appropriate)**. Unless you need torque multiplication, avoid pairing motors with gearboxes. When selecting a VFD, choose one that is power factor corrected and harmonics corrected if it's available for the application.

• **Be fanatical about the supply power**. Low power factor, excess harmonics, and voltage imbalance all make a motor draw more power to do the same work. Where possible, put single-phase loads on their own transformers; this will reduce voltage imbalance.

• **Minimize voltage drop**. Voltage drop means more current draw, which means more heat in the motor. Through a combination of larger conductors and locating transformers closer to their loads, you can reduce voltage drop dramatically.

• **Cool it.** Simple changes in air flow around motors can reduce their operating temperature, thus making them more efficient. Consider solutions that involve ducting or forced air.

• **Align and monitor.** When a motor isn't aligned properly, we typically see the effect in the form of excess vibration. What is vibration, actually? It's the use of supply energy to move the motor rather than the load. You want to get a perfect alignment, so use the proper tools (e.g., laser alignment system). And then monitor motor vibration, or at least add manual measurement to your PM system.

• **Correct load-related issues.** If a motor drives a gearbox that has lubrication deficiencies, more energy is required. Lubrication typically falls under the mechanical arm of the maintenance department, rather than the electrical arm. The problem is that the task is normally not performed properly (if at all). Generally, the gearbox should be slightly warmer than the ambient temperature. If your spot temperature gun or your thermographic camera shows more than a few degrees of difference, the plant engineer needs to know that the lubrication program probably is due for an overhaul. Else, the energy-wasting gearboxes will need overhauls when they eventually fail.

NY Governor Signs Bill Directing Storage Deployment Goal

New York's Clean Energy Standard, enacted by the Public Service Commission in the summer of 2016, requires that 50% of the state's energy come from renewable sources by 2030

Peter Manos | Dec 13, 2017- Energy Times

The American Public Power Association (APPA) recently reported that New York Governor Andrew Cuomo would direct the PSC to undertake a process to determine the appropriate suite of policies that will help drive New York toward a long-term energy storage deployment goal. Kate Muller, director of corporate communications and marketing at the New York State Energy Research and Development Authority, said that the process will be informed by the forthcoming energy storage "roadmap," which New York State's R&D organization, NYSERDA has been developing with an eye toward enabling mechanisms for market participants "that will maximize the benefits of energy storage for New Yorkers consistent with the principles" of REV.

The bill signed by Cuomo also calls for the creation of an energy storage deployment program that would be administered by NYSERDA and the Long Island Power Authority. Cuomo's decision to sign the bill won plaudits from the New York Battery and Energy Storage Technology Consortium, a trade group. "Energy storage has an important role to play in modernizing New York's electric grid, providing real benefits for ratepayers and producing environmental and economic benefits for the state," said William Acker, the group's executive director.

Energy storage, he noted, provides flexible, reliable power that produces no greenhouse gas or harmful air emissions.A recent NYSERDA report found the number of jobs in New York's energy storage industry grew by 1,000 between 2012 and 2015, a 30% increase.

Floating Solar Rig Produces Hydrogen Fuel

By Charles Q. Choi- IEEE Spectrum

Posted 18 Dec 2017 | 21:00 GMT

A floating "solar fuels rig" could one day use solar energy to split apart seawater and generate hydrogen fuel. A team of scientists recently described the design for the new rig in the *International Journal of Hydrogen Energy*. A scaled-up version of their prototype could someday float out on the open sea, they say, producing renewable fuel from sunlight and seawater. Scientists have long sought ways to harness sunlight to produce storable fuels that could be put to work when the sun doesn't shine. One strategy aims to use solar-generated electricity to drive the electrolysis of water—the splitting of water (H_2O) into hydrogen (H_2) and oxygen (O_2). Hydrogen is a clean fuel, the burning of which generates only water as its byproduct. When commercial electrolyzers split water, they rely on membranes to separate the resulting hydrogen and oxygen gases, since mixtures of these gases are potentially explosive. But these membranes are expensive, and prone to degradation and failure. Moreover, solar-powered hydrogen fuel production would ideally make use of cheap, abundant seawater. But commercial electrolyzers require very pure water, because seawater contains impurities and microbes that can easily destroy their membranes.

Previously, scientists had tried to develop electrolyzers that did not require membranes. However, these electrolyzers used flowing electrolyte fluids to separate hydrogen and oxygen, which required pumps and added a layer of mechanical complexity to these devices. Now researchers have developed what they suggest "is the first demonstration of a practical, floating photovoltaic-driven electrolysis device that is membrane-free and pump-free," says Daniel Esposito, a chemical engineer at Columbia University in New York who helped build the rig.

Esposito and his colleagues envision platforms of their solar-powered electrolyzers floating on the sea to make use of abundant sunlight and water to generate hydrogen fuel. These "solar fuel rigs" are reminiscent in some respects to deep sea rigs used to harvest fossil fuels today, they say. "About 71 percent of the Earth's surface is covered by water—why not use some of that space to harvest energy?" Esposito says.

The new electrolyzer uses electrodes made of sheets of titanium mesh that are suspended in water. A platinum catalyst coats just one side of each sheet. "These mesh electrodes are similar in nature to the metal window screens that allow desirable exchange of air between indoors and the outdoors while keeping bugs out," Esposito says.

"About 71 percent of the Earth's surface is covered by water—why not use some of that space to harvest energy?"—*Daniel Esposito, Columbia University*

When a mesh electrode is negatively charged, hydrogen bubbles develop on the side coated with the catalyst. When a mesh electrode is positively charged, oxygen bubbles develop on the catalyst-coated side instead.

The mesh electrodes are each placed at diagonal angles in the water. When the bubbles of gas on them grow large enough, the bubbles' buoyancy makes them detach from the mesh and float upward unimpeded. Depending on the arrangement of these electrodes, hydrogen bubbles can float into one set of chambers while oxygen bubbles can float into a separate array that vents the oxygen out into the atmosphere. The simplicity of the device suggests that relatively few parts are required, which lowers the materials and assembly costs, Esposito says. In experiments, the floating electrolyzer the researchers developed could produce hydrogen gas with a purity as high as 99 percent. "By using these electrodes, we can achieve efficient electrolysis with high product purity without a membrane and without a pump," Esposito says.

Future work can refine this design for more efficient operation in real seawater. For example, the researchers suggest developing catalysts that do not generate toxic chlorine gas from chloride ions dissolved in seawater. The researchers also plan to develop modular versions of their device that are suitable for implementation in large-scale rigs.

Changes You Can Make at Your Office to Reduce Your Carbon Footprint

Even minor changes to energy use, consumption, and travel can make a big difference

By JENNIFER BOSAVAGE October 2017-IEEE Spectrum

8

Making the office a bit greener requires us to be more responsible stewards of the Earth. Accomplishing that task pays off with a handsome reward: a better place to live and more efficient operations. According to U.S. National Grid, energy costs represent roughly 19 percent of total expenditures for a typical office building. Conserving energy is therefore not only good for the planet, but it results in a healthier profit margin. Here are three changes you can usher in at your office to reduce your carbon footprint.

#1 Measure Energy Usage

It can be difficult to determine what the goal for energy consumption should be at a particular office without knowing what your company is doing right and what it is not. You can't manage what you don't measure. Change the office mindset from "monitoring" to "measuring." Only then can realistic goals be set. The first step toward creating a conservation program is to conduct a carbon footprint analysis based on the Greenhouse Gas Protocol. That standard includes the accounting and reporting of seven greenhouse gases covered by the Kyoto Protocol: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, and nitrogen trifluoride. The Greenhouse Gas Protocol website offers reporting tools to help companies calculate emissions.

#2 Implement Daylighting Systems

Daylighting systems place windows, skylights, wall fixtures, and other devices in order to transmit daylight into a room in order to save on electricity costs. Some also reflect the daylight up onto the ceiling, which indirectly illuminates a room. Such daylight harvesting helps lower lighting energy consumption by using natural light to offset electric light in perimeter workspaces. In addition, worker productivity increases with better light quality—workers who are exposed to more natural light perform better than those who are not.

#3 Manage Employee Travel

Promoting ride sharing and using public transportation can reduce air pollution and can deliver employees to their workplaces efficiently and quickly. Often, however, staff members have their own automobiles and therefore have little motivation to change their modes of transportation. Subsidizing employee use of carpooling, energy-efficient vehicles, car -sharing programs, mass transit, bikes, and other transportation efficiency measures can reduce the energy consumed by employee commuting. Flex schedules that start earlier or later than rush hour can also cut back on energy use. In addition, compressed work weeks and regular telecommuting also help eliminate or reduce employee commute time. Finally, don't forget the benefits of teleconferencing. By adopting guidelines on the use of web, telephone, and video-conferencing, you'll avoid unnecessary travel and associated carbon emissions.

Measuring energy use, reducing consumption, and managing travel are three ways to make a major impact toward reducing the carbon footprint at your company. Those should go hand-in-hand with everyday measures, such as paper recycling, turning off unused lights and keeping the thermostat at 25 °C in the summer and 20 °C in the winter when the building is in use. (In fact, Energy.gov reports that adjusting the thermostat appropriately by 10 to 15 degrees for eight hours a day can reduce energy usage by 5 to 15 percent annually.)

In addition, alternative energy sources such as solar power are practical in some parts of the United States. By using energy efficiently, companies can help ensure better air quality, prevent against brownouts or power shortages, and boost their own bottom lines.

Smartphone Cameras Peek Around Corners by Analyzing Patterns of Light

By Jeremy Hsu

Posted 9 Oct 2017 | 17:00 GMT- IEEE Spectrum

Researchers can track moving objects hidden around corners by analyzing video from ordinary smartphone cameras.

Magically seeing around corners to spot moving people or objects may not rank first in most people's superhero daydreams. But MIT researchers have shown how they could someday bestow that superpower upon anyone with a smartphone. Their secret to peeking around corners is detecting slight differences in light patterns reflected from moving objects or people. Those reflected light patterns form subtle variations in the shadowy area near the base of each corner. MIT's Computer Science and Artificial Intelligence Lab (CSAIL) created simple software that can detect fuzzy pattern variations in the pixels of a 2-D video—taken by a basic consumer camera or even a smartphone camera—and reconstruct the speed and trajectory of moving objects by stitching together multiple, distinct 1-D images.

"Each point on the ground is reflecting light from a partial view of the hidden scene," says Katie Bouman, an electrical engineer who worked on the new study as part of her Ph.D. at MIT CSAIL in Cambridge. "Because different slices of the hidden scene are being reflected from the ground, you can recover and interpret how light is changing in the hidden scene over time."

MIT's "CornerCameras" system can reveal the number of moving people or objects as individual lines on a graph that tracks angular velocity over time. Thicker lines mean objects are closer, while thinner lines mean the objects are farther away. If researchers can observe the reflected light patterns at the base of two adjacent corners—as in the case of a doorway—their software algorithm can even triangulate the approximate location of the moving objects in the hidden scene.

Such technology could potentially allow self-driving cars to spot a child running out from a corner or behind another vehicle. The U.S. military also has a keen interest in such technology, and the MIT project received funding through the REVEAL program of the U.S. Defense Advanced Research Projects Agency (DARPA).

Other researchers previously developed a system that pinpoints the location of hidden objects by firing millions of laser pulses at the ground and measuring the reflected light. That active laser system can detect even stationary objects with fairly high precision, whereas the new MIT CornerCameras system can only detect moving objects.

But such laser systems work best with no ambient light, rain, or dust to confuse the system. By comparison, the passive MIT system can make use of environmental lighting conditions as long as it's not completely dark. It also seemed to work on a variety of surfaces such as concrete, carpet, brick, and linoleum.

"Even though there are a lot of good ideas for looking around corners, they often require complex algorithms, specialized hardware, or are computationally expensive and impractical to use in real-time scenarios," Bouman says.

Outdoor tests suggest that the MIT system may also function well in the rain. "When we first got it to work on outdoor scenes, that was a really pleasant surprise," says William Freeman, professor of electrical engineering and computer science at MIT. The MIT CornerCameras system is fairly simple and needs nothing more than a basic webcam or iPhone 5s smartphone camera, along with a laptop to run the software algorithm. That's a big advantage in someday making the system work for a wide range of commercial applications. The active laser system relies on a more extensive set of high-quality electronics to perform its laser-based tracking.

Despite the relative simplicity of MIT's approach, getting this far was no cakewalk. The team began by experimenting with people wearing bright white clothing and walking just out of sight around the corner of a wall or doorway, Freeman explained. Over time, they started to push the system's capability to detect people wearing different-colored clothing at greater distances. A next big step for the MIT team will be to see if the CornerCameras system works on a moving platform—a necessary feature if it's to ever become part of future collision-avoidance systems in cars. Vickie Ye, a computer vision researcher at MIT and coauthor on the paper, has been working with CSAIL robotics graduate student Felix Nase to test the system's stability while it's being wheeled around in wheelchairs. It's a prelude to trying the system out on a moving vehicle.

The team also hopes to begin using machine learning algorithms to automatically interpret patterns behind the number of moving objects and what they're doing, Freeman says. The early MIT testing still required the human researchers to eyeball the 1-D videos and interpret what was going on with the moving lines. It's unlikely that we will all be using our smartphones to peek around corners within the next few years. But in a world filled with uncertainty and surprises, a refined version of the MIT approach could eventually help both cars and humans get a glimpse of what's coming up just ahead.

Infrared Light Promises Ultrafast Wireless Communications

By Neil Savage

Posted 2 Oct 2017 | 15:30 GMT-IEE Spectrum

Using public Wi-Fi requires a lot of patience. Different devices have to share the bandwidth from a router, and that can slow downloads to a crawl. Now, a research group in the Netherlands is proposing to increase wireless capacity by orders of magnitude by using infrared light instead of radio waves. *The proposed system uses infrared antennas to steer light beams toward connected devices*, and reaches a bitrate of 112 gigabits per second (Gb/s). Standard Wi-Fi routers, by contrast, provide only tens or hundreds of megabits per second, roughly a thousand times smaller. And while multiple devices have to share a Wi-Fi router's bandwidth, every device using the infrared system gets its own dedicated 112-Gb/s connection.

"Wi-Fi's getting congested everywhere," says Ton Koonen, a professor of electrical engineering and chair of the Telecommunications and Broadband Networks group at Eindhoven University of Technology. He presented his work at the European Conference on Optical Communications in Gothenburg, Sweden, last week.

In his setup, data is carried on a beam from an infrared laser—the same sort used in telecommunications networks—to an array of optical fibers. Just as in telecommunications, the initial beam can be split into multiple channels, each at a slightly different wavelength. The fibers shine their beams, which have wavelengths between 1529.10 and 1569.80 nanometers, onto a pair of arrayed waveguide gratings. The gratings act like a filter, directing each beam in a particular direction based on its wavelength. A lens focuses the beams, coming out of a router on the ceiling of the room, into individual spots.

Where those spots land is where the tablet or smartphone ought to be. Those devices would be equipped with an infrared receiver, consisting of a wide-aperture lens with a wide viewing angle, and photodiodes to convert the optical signal to an electrical one. If the person using the tablet is walking around the room and wanders out of view of one antenna, the system switches to another antenna. The location of the device can be tracked using its Wi-Fi radio.

In theory, Koonen says, data from the device could be sent back optically as well, but that's a trickier system to design, so at first uploads would be sent via Wi-Fi. That shouldn't be a problem, he explains, because uploads generally use less data than downloads. Plus, with a lot of the traffic shifted to the infrared system, the Wi-Fi spectrum should be a lot less crowded. Other groups are working on replacing Wi-Fi with light-based communications. A consortium of groups led by the University of Strathclyde, in Glasgow, developed a system based on the light from LEDs used in room lighting, dubbed Li-Fi. Researchers on the project said their system could reach 10 Gb/s, although using lasers instead would boost it to 100 Gb/s.

But unlike his system, Koonen says, devices using Li-Fi would have to share the total bandwidth. "A major point in that system is you use illuminating LEDs, which are used for lighting, not for communications purposes," he says. That means they're being put to a use they're not designed and optimized for. His system, by contrast, using existing telecom components. If industry wants to spend money to engineer his system, Koonen says, it might be commercially available within five years.

Conversation With a Maker of a Battery-Free Cellphone

IEEE Member Vamsi Talla helped design the device
By MEGAN JOSEPH 13 Septiembre 2017-IEEE Spectrum

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Is the future for smartphones battery-free? That's one question *The Institute* asked IEEE Member Vamsi Talla, who recently finished building the first battery-free cellphone with fellow researchers at the University of Washington, in Seattle. The project is supported by a Google Faculty Research award in addition to three U.S. National Science Foundation grants—which totaled more than US $2 million.

The team began working on the phone last year while Talla was earning his Ph.D. in electrical engineering, which he completed this year. He is now the CTO of Jeeva Wireless, a Wi-Fi technology company in Seattle.Right now the phone only can make voice calls and dial an emergency operator. Talla says the phone could be especially useful for people living in developing countries who don't have a way to charge a phone. In this interview, Talla shares why his team is building the battery-free phone and what the future is for the technology.

How does the battery-free phone work?

The phone receives power from sunlight or RF waves sent from a nearby base station, a fixed point of communication for customer cellular phones on a carrier network. With a technique called *backscattering*, the phone can make a voice call by modifying and reflecting the same waves back to the base station.

We also were able to make Skype voice calls, proving that the prototype—made of commercial, off-the-shelf components—can communicate with a base station and applications like Skype. The phone consumes only 3 microwatts of power—which is about 10,000 times less than what a current smartphone consumes.

What are the benefits to the phone being battery-free?

For one, users can dial the number for the emergency operator without any battery power. In fact, you can call anyone with zero power. This technology is especially useful in developing countries, where there aren't many reliable sources to charge a device. We created our phone with a simplistic design and made it significantly cheaper than current smartphones on the market—which means it could be accessible to more people. What we're working on next is enabling wireless and text communication in current smartphone when their battery dies.

Is the future for smartphones battery-free?

We believe so. Cellular towers wouldn't require any hardware changes. Networks would have to rely on different protocols and update their back-end software—which they do regularly anyhow.

The phone would also require a chip to provide the functionality of sending communications without battery power. The chip would be a special-purpose IC placed on a piece of silicon. Then any phone manufacturer that wants to include a "battery-free cellphone mode" could buy and integrate that chip into its design.

How much would the phone cost?

The current prototype isn't being mass-produced, so we don't have a fair indication of the cost. However, when we produce them in large volumes, it has the potential to be extremely affordable, maybe even less than $1 to manufacture. It is very hard to forecast at this early stage.

Have there been any setbacks while building the phone?

Something we found challenging was implementing our own base station using an extensive software-defined radio called *Gnu*. It cost about $3,500. Software-defined networks decouple hardware from software and execute such software, not necessarily in the equipment but either in the cloud or in clusters of distributed IT servers. It's not the easiest software to work with. I would say that was the biggest roadblock. Implementing the base station required most of our time. We struggled because we're essentially taking the smart technology away from the phone and simplifying it—which puts all of the complexity on the base station.

What enhancements do you plan to add?

We want to improve the operating range and audio quality. Additionally, it's only capable of making voice calls—which we'd like to change. We're working on adding a camera and an E Ink display—a high-visibility and high-contrast display technology with low-power requirements. These technologies would allow the phone to have smartphone capabilities.

Researcher Comes Back to BU to Work on the Science of Memory

Steve Ramirez continues groundbreaking efforts at Kilachand Center-*Steve Ramirez (CAS'10) aims to "learn how memory works and then how to hijack it."*

09.26.2017By **Joel Brown** Photos by **Cydney Scott**share it!+

Because Steve Ramirez frequently attends neuroscience conferences around the world, he recently joined the Global Entry Program, which fast-tracks frequent flyers returning to the United States "I was telling my dad that when I come back to the United States now, I don't have to go through customs," says Ramirez (CAS'10), the son of Salvadoran immigrants. "And he's like, 'Wait a minute! I had to sneak into this country twice, and you can just *waltz* in?"

He laughs, but lots of doors are opening for him these days. His research into the nature and mechanisms of memory have made him a hot hand in neuroscience. His TED talk with research partner Xu Liu garnered over a million views. He just signed a deal for a book combining neuroscience and memoir, to be published by Penguin's Riverhead Books in fall 2019. And this summer, the 29-year-old returned to BU, joining the College of Arts & Sciences psychological and brain sciences department as an assistant professor and settling into a lab at the new Rajen Kilachand Center for Integrated Life Sciences & Engineering.

"He has just rocketed to the forefront," says David Somers, (GRS'93), a CAS professor and chair of psychological and brain sciences. "I think the sky's the limit for him."

But it's the whole Steve Ramirez Experience—full of family, humor, and a deeply felt idealism about science—that makes you root for him.

His parents, Pedro Ramirez and Delmy Moreno, came to the United States illegally with their older son and daughter to escape a murderous, decades-long civil war. The family settled in hardscrabble Everett, Mass., and their younger son was born in a Brighton hospital in 1988. He says he was a middling student in Everett High School's class of 2006, bright enough to earn As, Bs, and Cs, but lousy at standardized tests. "I learned to work hard. That's my parents, that's me channeling them," he says. "Because you see your dad working 100-hour weeks and you're like, maybe I should do my homework."

His father started in this country with jobs like waiting tables at a Howard Johnson's, then he took a janitorial position at a Harvard lab, eventually advancing to lab manager of the university's Concord Field Station in Bedford. His mother now works there too. Ramirez's interest in the brain began as a teenager, when a cousin went into a coma after being anesthetized for a Caesarian section—a temporary lack of oxygen was apparently to blame—and has never fully recovered. At BU, he found his way to the lab of Howard Eichenbaum, an internationally recognized figure in the study of memory, who passed away unexpectedly in July, at age 69. Eichenbaum was a William Fairfield Warren Distinguished Professor, a CAS professor of psychological and brain sciences, and director of BU's Center for Memory and Brain and the Laboratory of Cognitive Neurobiology. After two years in Eichenbaum's lab, Ramirez earned a BA in neuroscience.

"We did a lot of good science," Ramirez says. "We were working on really exciting projects, and he taught me how to think scientifically. So when I applied to grad school, I think MIT was like, 'Maybe the kid isn't as big a risk as we thought he'd be; who cares that he's from Everett or what his parents' background is.'"

Ramirez skipped a master's degree and became a PhD candidate at MIT's Picower Institute for Learning and Memory, where he and colleague Xu Liu first conducted newsmaking experiments changing the memories of mice.

"It's been a long-standing psychological question: what is a memory? What does that look like in the brain? How is it represented?" Somers says. "And we've had some ideas, but until you could actually demonstrate that you could activate one specific memory or change one specific memory, you have a theory that's not really tested."

Ramirez and Xu Liu did that with a variety of high-tech tools, including optogenetics: they inserted viruses into the brain cells of mice to make the cells respond to light. They identified cells in the hippocampus of the mouse that were associated with a specific memory, in this case a memory of receiving a mild electric shock on the foot while exploring a particular box. They then reactivated those memory cells with a laser while the mouse was in a different box, and it froze in fear. "What he's done is to tag a specific memory in an awake, behaving animal and actually manipulate that memory and either make it stronger or make it weaker, to change it," Somers says. "It's really amazing technically."

In 2015, Ramirez earned a PhD in brain and cognitive sciences from MIT, and the same year he was named one of the *Forbes* "30 Under 30" innovators in science. He also won a coveted Director's Early Independence Award grant from the National Institutes of Health—$1.25 million over five years. He entered the fellows' program at Harvard, but left early to accept the BU faculty post after Eichenbaum told him about the opening and encouraged him to apply.

Coming back to BU was a no-brainer, Ramirez says. He'd always planned to stay in Boston. Work-life balance is a challenge he is determined to ace. A fan of good beer and Boston sports teams, especially the Red Sox and Patriots, he shares a Mass Ave apartment with two guys who have been friends since seventh grade. He talks to his parents frequently on the phone and makes time for Sunday meals with the whole family. He'll do his best work where he's happiest, he says, and that will trickle down to his whole team

He hopes to apply his techniques reactivating positive memories in mice to minimize negative feelings. He imagines that the techniques might someday be used to help people overcome anxiety, depression, post-traumatic stress disorder—even the memory loss associated with Alzheimer's disease.

Somers references Harry Potter to explain Ramirez's work: "Harry was very good at casting a Patronus Charm to ward off Dementors, which are really just sort of an embodiment of depression. To cast a Patronus Charm, one needs to recall a very positive memory. And one avenue of Steve's research is making this a real thing, using positive memories to ward off anxiety and depression. That has tremendous clinical potential."

"It's viewing memories not just as a mechanism in the brain," Ramirez says, "but—and put this in humongous quotes—viewing memory as a kind of drug, as a potential therapeutic."

Of course, for many people the idea of scientists meddling with memories has Orwellian implications. Somers says that's inevitable. "I think you can say that with any sort of fundamental breakthrough, like understanding how DNA works," he says. "We've got this new CRISPR technology, a gene-editing approach to be used for good, but you can imagine somebody else finding a way to use it for nefarious purposes."

Ramirez understands the issues well; he's prone to referencing the movie *Inception* when the moral aspect comes up. "Memory manipulation is something that's drenched in ethical dilemmas," he says, "and our job is also to start the conversation with everyone about what does it mean and start it yesterday. By having that conversation and setting that conceptual scaffold, we do our job."

His dedication to transparency is spelled out in detail on the Ramirez Group website, and he is more open than most scientists in posting results before they are formally published. His commitment was strengthened, he says, by the deaths of Xu Liu, who passed away suddenly in 2015, and Eichenbaum. "Life is too short," he says. "I don't have the time to BS my way to the top."

"People say, 'You're young and naïve and you're posting all your data, and to get tenure you have to do this and that,'" Ramirez says. "But you got here because you want to fundamentally change culture to what it can be at its best. It doesn't have to be *The Hunger Games*. Tenure is the last thing I'm worried about. We're going to do good science and everything else will happen along the way.

"This is what I love about research—you have to bust your ass, it doesn't matter if you're a genius or not," he says. "Whether you're a man or woman, gay or straight, from El Salvador or Canada, it doesn't matter. If you work hard in research, you're going to push forward, you're going to make discoveries."

Steve Ramirez will discuss his work on memory manipulation live on the University's research-focused Facebook page on Wednesday, September 27, at noon. Viewers will be able to ask questions in real time and to hear from him about the current state of his research and his hopes for BU's new Kilachand Center.

Tesla Drives Solar Roof Production

Tesla has started production of solar shingles at its $750 million Buffalo factory.

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Bloomberg -- Tesla has kicked off production of its long-awaited electricity-producing shingles that Elon Musk says will transform the rooftop solar industry.

Manufacturing of the photovoltaic glass tiles began last month at a factory in Buffalo built with backing from New York State, the company said in an email Tuesday. It comes more than a year after Tesla unveiled the shingles to a mix of fanfare and skepticism.

The appeal: a sleek, clean solar product, especially for homeowners seeking to replace aging roofs. The tiles -- from most angles -- look like ordinary shingles. They allow light to pass from above and onto a standard flat solar cell.

Tesla, the biggest U.S. installer of rooftop-solar systems, piloted the product on the homes of several employees. The company expects to begin installing roofs for customers within the next few months.

Solar shingles will cost more than a conventional roof along with photovoltaic panels -- but not "wickedly so," said Hugh Bromley, a New York-based Bloomberg New Energy Finance analyst. He estimates a Tesla roof would cost about $57,000 for a 2,000-square-foot house, compared to about $41,000 for terracotta tiles along with a 5-kilowatt solar-panel system. A plain-old asphalt roof with panels would run about $22,000, Bromley said.

"It may actually do well in overseas markets where solar-photovoltaic is cheap and homeowners are used to paying a premium for building materials and cars -- such as Australia," Bromley said in an email.

Tesla started production of solar cells and panels about four months ago at its Gigafactory 2 in Buffalo. New York committed $750 million to help build the 1.2 million-square-foot factory, which currently employees about 500 people. The plant will eventually create nearly 3,000 jobs in Western New York and nearly 5,000 statewide, Governor Andrew Cuomo said.