The Internet of Energy:

Sensor technology: A driving force in IoT

centrica
Business Solutions

Sensor technology is the future of Internet of Things

The Internet of Things: the network of physical objects that collect and exchange data, allowing objects to be sensed and controlled remotely and creating opportunities for improved efficiency and profitability.

Ten-year potential economic impact:

$11.1 trillion

per year overall

up to
$150 billion

in office security
and energy

$3.7 trillion

in operations and
equipment optimization
in factories

$1.2 trillion

in retail environments,
and much more

All this is made possible by small, non-invasive wireless sensors that connect devices and things, perform measurements and communicate data. Sensors are a key tenet of IoT and help drive the IoT by connecting people, processes, data and devices.

Internet of Things without sensors
We have had wireless phones and mobile computers for decades; we have tracked data electronically for years. But it is only now, as sensor technology matures, that we can harness the power of many technological advancements in a world of connected devices.

According to PwC Report (*Source: PwC 6th Annual Digital IQ, 2014) Sensing the Future of the Internet of Things, "While the IoT represents the convergence of advances in miniaturization, wireless connectivity, increased data storage capacity and batteries, the IoT wouldn't be possible without sensors. Sensors detect and measure changes in position, temperature, light, etc. and they are necessary to turn billions of objects into data-generating "things" that can report on their status, and in some cases, interact with their environment."

Whether we are exploring wearables or intelligent HVAC systems, it is the sensors that make our "things" smart. While without the infrastructure provided by the internet, our devices would not be able to communicate with each other; without sensors, they wouldn't have anything to communicate about.

Internet of Things sensors

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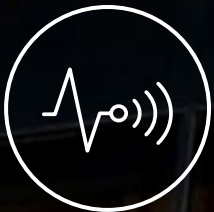
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PwC 6th Annual Digital IQ, 2014.

Our energy insight solutions: Panoramic Power

Our sensors make virtually any energy-consuming device a smart device.

Manufacturing equipment, HVAC components, lighting systems – our sensors can make them smart, optimized, efficient, and more importantly, connected.

Our self-powered, miniature, wireless current sensors track energy consumption at the individual circuit breaker level. At the circuit breaker, the sensors clamp on to the outgoing electrical wire that powers each device. The sensors harvest the magnetic field as their power source and begin monitoring and tracking the energy flowing to each energy-consuming asset. They send the data wirelessly to a cloud-based analytics system every 15 seconds.

The data that the sensors gather is analyzed on a business rules engine that performs calculations and analyses. Every device has an energy profile and the sensors are able to understand operational patterns, pinpoint inefficiencies and correct faulty systems. They can also report on and send real-time alerts on anomalies – thereby avoiding crises and failed machinery.

The IoT and the sensors that power it can report and send real-time alerts on anomalies.

This helps to avoid crises and failed machinery.

IoT energy sensors and your business

Using sensors technology to gather data and the Internet of Things to transmit that data to an analytics platform has benefits for various industries, types of operations, and kinds of facilities.

| Type of business	Benefits	Typical results
Industrial manufacturers	• Avoid equipment downtime by predicting failures • Maximize energy savings of every device and entire plants • Detect operational inefficiencies with benchmarking • Identify machine sequencing issues • Real-time failure detection diagnosis • Optimize overall equipment effectiveness • Increase production yields and calculate cost of production per equipment and per production line	Reducing maintenance costs by 60%, equipment downtime by 50%, and equipment capital investment by 3 to 5% by extending the useful life of machinery
Merchandise retailers	• Cut costs by reducing energy waste • Optimize equipment and maintenance • Enhance brand reputation through sustainability • Benchmark between sites and devices	Eliminate 30% excess energy consumption
Grocery and convenience stores	• Identify inefficiencies, improper usage, and opportunities for savings • Detect refrigeration failures before they occur • Improve operations and promote behavior change • Monitor the entire operation from one dashboard	A 10% reduction in energy costs (including HVAC and refrigeration) that boosts net profit margins by as much as 16%
Multi-site restaurant chains	• Detect equipment failures before they occur • Benchmark to maximize energy savings for each location • Improve operations and promote behavioral change	Reduce energy consumption by 10% and increase profit margins by 4%
Commercial buildings and small business campuses (i.e. healthcare facilities and higher education)	• Predict failures and operational anomalies through real-time alerts • Reduce energy waste and increase system reliability • Measure effectiveness of retrofits • Improve continuously to achieve higher operational effectiveness • Detect off-hour energy consumption across campuses and benchmark units to detect inefficiencies • Pinpoint real-time energy savings • Report on financial, energy, and operational metric improvements • Comply with energy disclosure laws	Cut equipment maintenance costs by 40%, along with extending equipment lifetimes

Operation optimization

Businesses in many industries are gaining
a granular view of their operations with device-level
energy consumption sensors and connected devices.

**Using sensors to monitor the health
of machinery, companies shift to a
condition-based maintenance model.**

They service equipment only when there
is an actual need, rather than relying on a
regular maintenance schedule, or repairing
equipment after it breaks down. This is
accomplished through predictive analytics.

**The Internet of Things is certainly
shaping our times**
The Internet of Things is certainly
shaping our times. Connected devices are
producing data that guide our businesses
through making decisions, saving money,
and optimizing processes. In virtually
every industry, equipping energy-
consuming assets with device level sensor
technology delivers unique visibility into
an organization's operation, creating
enormous opportunities for efficiencies
and optimizations.
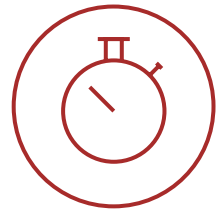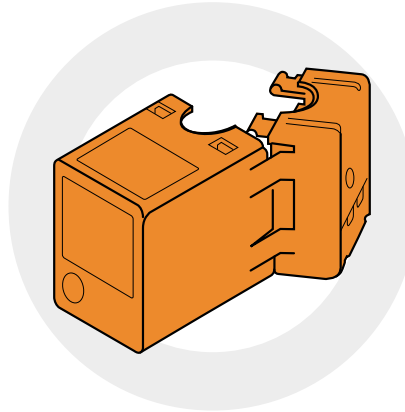
**Real-time high-frequency
current data**

**Snap and fit
implementation**

Wireless and self powered

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solutions and corporate sustainability,
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