SupplyChainDigest™
Your First Stop for Supply Chain Information

Is GE's New RFID-Based Sensor Technology a "Game Changer?"

Battery-Free Sensors Potentially Open Up a Wide Range of New Applications, but won't be Commercially Available for at Least Two Years

SCDigest Editorial Staff

GE Global Research, an R&D arm of corporate giant GE, announced last week an intriguing new system that combines RFID and sensor technology that could have far reaching supply chain implications.

The new technology, which GE refers to as a "platform," uses chemically-coated RFID tags, powered by a reader. That means the sensors themselves do not require a battery, and thus can be made much less expensively and in smaller or novel form factors than traditional sensors. That could open up a potentially huge range of applications.

In GE's approach, passive RFID tags can be selectively coated with a chemical film. Those chemicals in turn are capable of sensing or reporting environmental conditions that result from chemical or biological changes. The breakthrough is that film will be engineered to react in such a way that creates differences in the impedance signal on the tag to indicate the presence and concentration of specific substances. That change in signal can then be picked up by a reader.

For example, such a sensor on a carton of milk might be able to detect that it has gone sour, or that an egg in a carton of eggs has broken. In a press release, GE also sites the following types of potential applications:

- New security sensors that more effectively can detect dangerous chemical and biological threats,
- In-the-field water purification monitoring, checking for water impurities,
- Food and beverage safety monitoring, measuring the freshness of goods in transport or in the home,
- Portable vaccine manufacturing, ensuring the purity of a vaccine manufactured on-site during an emergency response to a flu outbreak or other potential pandemic,
- Emissions monitoring at power plants

The breakthrough is that film will be engineered to react in such a way that creates differences in the impedance signal on the tag to indicate the presence and concentration of specific substances. That change in signal can then be picked up by a reader.

There are two keys to this approach. The first is the ability to produce the battery-free sensor at low cost and in small or flexible form factors. So, such a sensor theoretically could be attached to the inside of a milk carton. To identify spoiled product, workers could poll the cartons on the store shelf, readers could be placed at the checkout lines, or consumers could ultimately even have readers at the home level; in any of these cases, the tags are activated during the read process.

The real promised breakthrough is the development of readers that can interpolate these minor changes in tag impedance. For example, a stronger signal in one area might indicate more of a dangerous substance than a weaker signal from another tag. This means the sensor should be able to both detect ***and*** quantify various environmental

Is GE's New RFID-Based Sensor Technology a "Game Changer?" (Con't)

conditions.

GE says the sensor/reader combination will be able to detect multiple substances, such as ethanol and methanol, that today might require use of multiple sensors. GE also says the sensor can be highly sensitive, already operating in the parts per billion detection range.

"One of the most important parameters of sensor's performance is its selectivity," said **Radislav Potyrailo,** principal scientist at GE Global Research who led the development team. "There are many applications where sensors should be very selective because the quality of its signal is critical for further decision-making. Highly selective sensors are needed to detect pathogenic bacteria in water, the presence of many harmless species, to detect very low concentrations of toxic fumes in indoor and outdoor air in presence of many other odors, and to detect food spoilage or contamination. For these and many other reasons, existing sensors need a significant improvement in their selectivity."

While this development seems exciting, a lot could happen between now and then – Potyrailo says the technology is at least two years away from commercialization.