INTERACTIVE SENSORS FOR FOOD QUALITY CONTROL
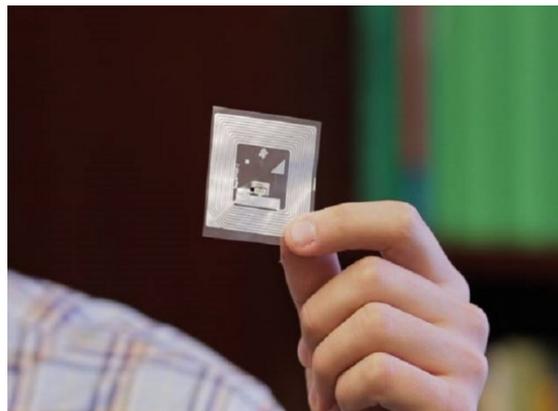
Smart Sensors Revolutionizing Food Safety

Sensors that measure data are not entirely new to the food industry. Take, for example, the thermometer. Originally using alcohol or air in a sealed glass tube to measure temperature changes in the surrounding environment or substance, the standard mercury thermometer has been around since the 17th century. And it has found perhaps its most important use in kitchens across the world – measuring the temperature of meat as it cooks, the coldness of a liquid, or the ambient air in a refrigerator. All of these applications are used to ensure that food is free of dangerous bacteria and is fit for human consumption.

But requirements for food safety in the 21st century and beyond, in order to attain the scale required in a world populated by six billion people, will require technology. People alone simply cannot track and manage the amount of food being shipped and consumed daily through manual methods. The technology to support the growth in monitoring food safety is here.

Labor Force Takeaway

TAN recommends that Smart Sensor technology be included in all food service industry strategic roadmaps. Technology is displacing manual stroke tally and checklist work needed for regulatory compliance with automated tracking and reporting of quality, status, and positioning. Reporting through companion software tools will allow management to make proactive decisions regarding shipment viability and control. The ability to generate, read, interpret, and act upon the results will be essential. Therefore, companies in the food services sector need *skilled* employees. It goes without saying that this data mining, interpretation, and management is a growing field.

The work of upskilling existing associates and redeploying workers to different functions brought about by the assimilation and interpretation of big data is crucial. Software certifications, data mining capabilities, reports building abilities and more, will be new skills savvy food service companies will need to ensure their associates are acquiring.

Device inventory, placement, monitoring and maintenance will be other roles that will need staffing. The tech nature of this work has the added benefit of being industry agnostic, enabling cross skilling between sectors.

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Quality Measures through Tech Miniaturization

With the advent of the Internet of Things (IoT) technology, and smart sensors, the use of micro devices in food service applications has broadened greatly. Thermometers, equipped with **bluetooth sensors**, are able to now not only check temperatures, but at predetermined intervals forward the data to servers and HACCP logs, thereby automating required and sensitive temperature tracking for regulatory purposes.

The use for this sensor technology does not stop at temperature, however. The **eTongue**, and eNose, which have been in development since **2010**, are currently playing numerous roles in Food Service.

The eTongue can be used in the recognition of both qualitative analysis and taste analysis of food. It works through pattern recognition, using PVC-Lipid membranes which, once in contact with food types, can match measurements of criteria (bitter, sour, sweet) against known substances, and render an output analysis. This is not only usable in evaluating taste, but in identifying components – ingredients – in the tested food.

Other applications of the eTongue and eNose, using different reference data, include Process Monitoring, Shelf Life Analysis, Freshness Evaluation, Authenticity Verification, Quality Control, Pressure and Position.

This technology has individual applications as well. It has been estimated that nutritional labels and ingredient lists are often off by up to 20%. As the consumer becomes more health conscious and diet conscious, the knowledge of food elements is becoming increasingly important. TELLSPEC offers a raman spectrometer that employs an algorithm that can identify a number of undesirable components of a food item – things like allergens, chemicals, nutrients, anything of which food might be composed. Another manufacturers product, SCIO, also uses spectrometry in a device that can measure the molecular footprint of any object. It then sends the derived nutritional information to a user's Smartphone or PDA for analysis and action. This can also be used on medicines, vitamins, and plants.

There are also **edible sensors** available. There are a few designs on Crowdfunder right now seeking investors for mass production. These are typically used to measure freshness. They are made from silk and gold – silk is dissolvable and organic, while gold can detect physical changes in food through its electromagnetic properties. The information is sent to a Smartphone/PDA for analysis and action. Ultimately, one will only need to pass their Smartphone over their food to know if it's safe to eat or not.

Finally, there are a number of gas-based spoiled food detectors. These use NFC's (Near Field Communication tags) together with carbon nanotubes to read the presence and volume of emitted gases, usually arising from spoilage. These tags draw on Smartphone power to detect this gas, and transmit readings for interpretation.

At the recent show in Louisville, Kentucky, the **Franchising and Food Innovation Conference 2018** featured as a keynote speaker Don Hawkins Jr., Group VP of the Middleby Corporation, who devoted his entire talk to the topic of " Automation and Robotics: The Past, Present, and Future of Your Kitchen". Given the amount of time and talent that is devoted to the topic of technology in food service, it is well worth the time to investigate newer technologies, and what they can do for you.

These mentioned are but a few of the latest technologies that should be considered.

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