Bluetooth Beacon Technology Is Changing Food Manufacturing for Good

Beacons are channeling the power of the Internet so it can be applied to food processing, opening-up opportunities to improve food safety, reducing risks, optimizing efficiency and cutting costs.

Analysis by
Stephen Statler
Principal
SCL - Statler Consulting LLC
www.statlerconsulting.com

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Bluetooth beacons are low cost devices, as small as a guitar pick, that can be attached to staff, pallets, tools and machinery. They allow the location of all the things to which they are attached to be monitored in real time in what is called an RTLS, a Real-Time Location System.

Bluetooth Spreads from Phones to Factories

Back in 2013 Apple lit the touch paper leading to this technology explosion by defining a standard called iBeacon. Billions of Bluetooth chips pour out of the semiconductor foundries every year for use in everything from headsets to heart monitors.   The massive production volume of these chips has brought down their price.
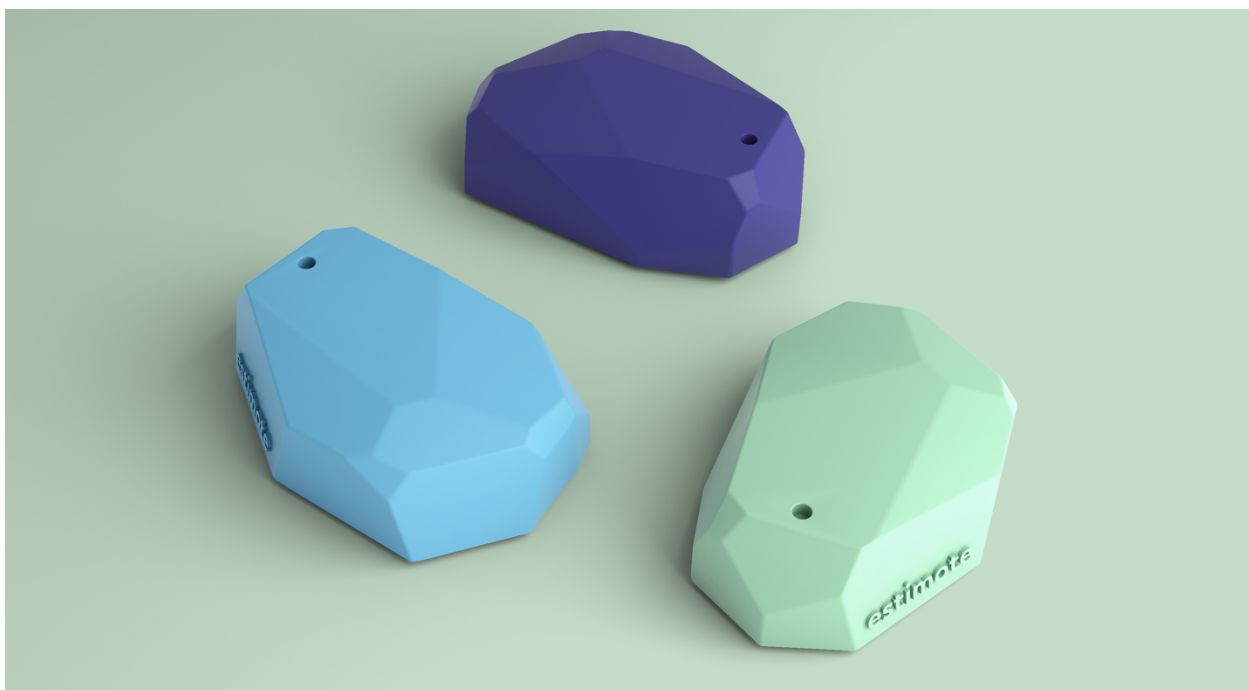
With iBeacon, Apple added software to the iPhone to allow a new Bluetooth Low Energy (BLE) version of the standard to be used to compute the proximity of Bluetooth beacons to smartphones. This allowed the location of customers to be monitored indoors

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where traditional GPS location stops functioning.   Apple used this in their own stores to trigger
welcome messages in their app as customers cross the threshold. Where Apple goes, other retailers follow and now millions of

beacons have been deployed in stores from Target to Rite Aid.

A related application has been popularized by companies such as Tile. The Bluetooth beacon, rather than being a stationary fixture at the threshold of a store is mobile, attached to key chains, wallets and TV remote controls. The people who have lost these things can then find them using their phones to sniff out the missing "asset" thanks to the beacon attached to it.

RTLS systems in manufacturing work in a similar way. Rather than using smartphones to listen for the Bluetooth signal from

beacons, dedicated beacon receivers, anchored to the walls, can be substituted. These receivers report back to servers that use triangulation to calculate the X/Y coordinate of each asset against a floor plan. A dashboard can show the location of all the assets and the resulting location data can feed other software central to manufacturing operations. Supply chain management and enterprise resource planning systems are starting to become beacon enabled.

Bluetooth beacons can cost as little as $5 and as much as $50, so it may not be practical to attach a beacon to every product. This is where other technologies can be used together with beacons. Barcodes and their electronic cousin, the RFID tag, cost pennies and can be used to quickly associate products with pallets. Waving an RFID reader over a stack of cardboard boxes or cartons on a pallet, can associate the cartons with a pallet in seconds. If we know that a carton with a serial number 123456 is on pallet A, and pallet A has a beacon on it, we can be sure where the carton is no matter where the pallet is moved to. The RFID scan that associates a carton with a pallet can be performed automatically by readers fixed to the fork lift trucks that move the pallets around.

Applications

So now our systems can go from having approximate, out of date snapshots of where assets are, to being omniscient, and having an all-seeing view. What could we do with this awesome power?

1. **Loss Prevention** – Remember the last time you were late and couldn't find your car keys? Not a good feeling. Searching for your car keys when the pressure is on is a waste of time and can generate frustration amongst the

people depending on you. While your customer in this case may be your kids or spouse, if we translate the scenario to the warehouse or shop floor, the ability to find people, equipment, raw materials and finished goods faster, can help maintain a paying customer's satisfaction, as the production process runs to schedule and less time is wasted finding those materials and products.

The other implication of this is that the tighter the rein you have on where assets are, the less often they go permanently missing. With automated audit trails being generated, shrinkage tends to drop significantly. One retailer that implemented electronic asset tracking found their shrinkage reduced by 55%.

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2. **Workforce Optimization** – With beacons now coming in the form of Employee ID cards, clocking-in no longer requires a punch card or even taping an RFID tag on a fixed reader. Staff can be checked into the building or a zone within a building simply by walking around. Relieving the employee of the need to "punch the clock" improves the accuracy of time keeping. It also allows a more objective view of how much of their day is spent in break rooms, or transitioning from one area within the facility to another. Foot path analysis can provide reliable data on workers' movements all day and every day. Floor layouts can be adjusted, or workflows optimized without any need for third party observation or manual record keeping.

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3. **Safety and Training** – For manufacturers using hazardous chemicals, it can be useful to have a clear audit of where staff are within a facility to make sure that only those staff trained and authorized to be in more hazardous areas are spending time there. Less risk of injuries is good for safety goals and ultimately reduces cost and the liability associated with accidents.

4. **Contamination Avoidance / Material Separation** – If areas of a facility are designated as being reserved for organic products, or are separated to avoid contamination of substances that could cause allergies, a breach of this separation can be costly.

   RTLS systems can make sure that tools, products or people are confined to the zones they should be in and don't contaminate those other areas where they are not supposed to be present.

5. **FDA Traceability Standards** - Industry insiders estimate that 90% of food processors are not in compliance with the FDA's traceability requirements. This opens up risk and liability that could cripple companies that are unable to meet their obligations in the event of contamination within the supply chain.

   On the plus side, the supplier who can demonstrate mastery of traceability has a competitive advantage. They have an edge when selling to retailers who may favor companies which can demonstrate systems operating at a standard significantly in advance of the norm.

A system that incorporates beacons can automatically generate

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an audit trail that traces the path of material through the process, with a guaranteed log of the staff and tools that came into contact with each batch. Not only is the audit going to be more accurate, it should also be less time-consuming to administer.   Tie the investment in RTLS technology to an increase in market share and your return on investment calculation should look compelling.

Next Steps

It's still early days in the application of RTLS to manufacturing. Some of the earliest projects were done in automobile manufacturing, where the cost of delays in a production line making BMWs justified investment in the generation of RTLS systems that predated the Bluetooth beacon. The technology that predated the availability of Bluetooth beacons was much more expensive. Now beacons and the alternative tools they compete with are in a race to reduce the cost of innovation.

In the area of food manufacturing, the innovators and early adopters have been moving forward. Typically these are larger or more progressive firms.

Venture Capital has flooded the Bluetooth beacon market and there are now hundreds of Bluetooth beacon suppliers. While a lot of the products look similar, there are significant differences in performance and in the strategic merits of alternative suppliers. It's worthwhile having a third-party consultant experienced in this domain to guide you through the process of selecting suppliers and integrating the beacons with your existing systems.

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Conclusion

Beacons allow us to link the physical world to the virtual world. We now have the opportunity to manage the physical factory floor the way we manage the virtual world of web sites. In the same way that Amazon was an early adopter of the web and became an industry leader applying cloud technologies to the challenge of brick and mortar retailing, early adopters of RTLS and Bluetooth beacons will be able to apply the full power of cloud services to the manufacturing process. Today no large retailer can afford to ignore the web. It will be interesting to see which companies strive to become the Amazon of manufacturing.

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Stephen Statler is the CEO of SCL, providing consulting and systems integration services for companies using the power of location and proximity to engage their customers and optimize their business. He writes and provides advice on the application of Bluetooth beacon technology to entrepreneurs, investors and venue owners. Stephen is an Advisory Board Member of a number of companies pioneering in the application of proximity technology including: Beaconix, Rover Labs and PassJoy.

Details of Steve's book, "Beacon Technologies: The Hitchhiker's Guide to the Beacosystem", and a series of interviews with leaders of the "Beacosystem" can be found at www.hhgb.us