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Why the Retail Industry Needs More Accurate Indoor Location Technology

Ciaran Connell CEO DecaWave 1/16/2014

Indoor location technology is taking the retail industry by storm. Store and mall owners are dreaming of customers using their smartphones to get into more stores, buy more, be tempted by promotions, buy cross-sold items, and give the stores big data they can use to improve shopping efficiency. Retail industry IT providers see an opportunity to branch out of cash registers and back end systems and into the world of mobile. Retail advertisers see more chances to sell specifically-targeted mobile advertisements.

Of course, indoor location has been a hot topic across industries as well. Google is pushing Google Maps indoors, Apple is working on proximity sensing, indoor location start-up companies have been acquired by Apple and Aruba, and indoor apps are sprouting up in exhibitions, casinos, hospitals, and more.

When today's indoor location technology is deployed, however, it becomes clear that it's not yet as accurate as it needs to be. The technologies that are easiest to deploy, based on already-existing WiFi hotspots, tend to be accurate only to within seven to 10 meters. That means that an indoor navigation system won't necessarily know if a customer is aisle 7 or aisle 8, a cross-selling system won't be sure whether a customer is standing and staring for 60 seconds at spaghetti sauce or beer, a mall system may not know if the customer is in front of JC Penney or TGI Fridays, and a traffic analysis system may be wrong about which aisle it was that 95% of the entering customers traversed.

Of course, today's indoor location systems have the big advantage of working reasonably on today's smartphones, and requiring little infrastructure beyond already-existing WiFi access points. But what good is this ease-of-deployment if the resulting location tracking is not accurate enough to distinguish aisles and product areas?

Some companies are working hard to make WiFi-based systems more accurate. But the accuracy of most of these easy-to-deploy technologies has not gone below 3-4 meters. The reasons for this are very technical, and relate to how narrowband radio, including both WiFi and Bluetooth, encode information within radio waves. Narrowband radio systems transmit in a way that is very practical for wireless Internet or for wireless earphones, but which does not straightforwardly support accurate or reliable location tracking. This is why, out of 50 or more indoor location solutions on the market, only a handful can achieve sub-meter accuracy.

In addition to this, many approaches have accuracy that fluctuates a lot based on the physical layout of the place. Some technologies work very well when the things being tracked are within line-of-sight of some of the system's radio beacons, but are less accurate when the things being tracked are blocked by high shelves or are in different rooms, or when radio signals are blocked by certain materials. In retail settings, where some shelves will be stocked with metal cans or appliances while others have wide varieties of other materials, technology is needed that works reliably in all settings.

For example, we have introduced a chip and system that implements a new approach to wireless indoor location positioning, designed specifically to deliver much higher accuracy more reliably. The chip is implemented on radio technology called ultra-wideband (UWB). UWB transmits information in a manner that is more reliable, even in buildings with a lot of interference and in which line of sight is not always available; accuracy is generally maintained within 20cm, much better than the seven to 10 meters that today's indoor location technology delivers.

With technology this accurate, it will be easy to know not only which aisle a customer is on, but which product they're standing in front of, what they're about to pass by as they walk, and which side of the aisle they're on. Now it will be possible to know which store they're standing near in the mall and which check-out line they're standing in.

Soon, such technology might be found in smartphones. Then, the store-owner's dream of knowing whether customers are staring at Ruffles or Lays might just come true and the mall owner can succeed at sending a coupon for a free cup of coffee right as a customer is walking by Starbucks.

In the meantime, you're going to be reading a lot of articles about indoor location. Besides reading the dreams, read the small print, and pay attention to how accurate the systems being deployed truly are. If your application requires very good accuracy, you may want to wait for the technology to really deliver pinpoints instead of circles