Abstract

Beacon technology is an emerging technology that uses small "beacons" which emit a continuous Bluetooth Low Energy signal that can trigger functions in other Bluetooth active devices. While this technology has been around since 2013, it has only seen limited use, mostly restricted to the retail industry. However, this is quickly changing, with many other industries starting to recognize the potential benefits of this new and exciting technology.

Overview

With the amount of media exposure and implementation beacon technology has seen in the past year, it would be reasonable to assume this is a pretty new technology, just bursting on the scene. However, this is simply not the case. Beacon technology, a novel and highly effective indoor positioning system technology, has been around since 2013, when Apple introduced the first itineration of this technology, iBeacon. Slow to catch on, the initial use of iBeacon was limited to Apple retail stores and McDonald's, which used the iBeacons to offer customers special offers when they visit a store.

By 2014, beacon devices could be found in all different shapes and forms, manufactured by different businesses. Now, in 2017, these devices are ubiquitous; found in office lobbies, hotel rooms, trade shows, airports, and yes, still in retail locations as well. Despite this, a large portion of the general public, and even a portion of tech savvy professionals, still do not know what beacon technology is and how it may be leveraged in a variety of environments.

What it does

Beacon technology solves a problem that has plagued smart phone and app developers since the rise of the ubiquitous mobile device. While GPS equipped smartphones are excellent at identifying rough location in an outdoor environment, their location tracking ability is greatly hindered when tracking movement indoors, such as inside of a hospital or retail store. This is because of two factors: the first being the interference of GPS signals indoors. The second limiting factor is the fact that while the accuracy of mobile device GPS modules is adequate for navigating roads and general location, it is simply not accurate enough to positively confirm that someone with a device is in a specific room.

Beacon solves these two limiting factors by placing a small device, the 'beacon', at the desired location. The beacon emits a Bluetooth signal that announces that any device picking it up is within a certain radius of the beacon device. A good demonstrative example of this technology in action can be found in retail, the first business sector to experiment with beacon technology. In a retail store, beacons may be placed near a sales display in the store. The device may be set to ping any Bluetooth receiving device (i.e. a mobile smartphone) that moves within 10 ft. of the sales display. If the receiving Bluetooth device has an app for the store, the beacon signal can serve as a trigger for the app, automatically alerting the customer to the sale and perhaps even offering additional savings through the app.

To aid in the mobility and flexibility of the beacons, this technology utilizes the Bluetooth Low Energy protocol, a significantly more efficient protocol compared to Bluetooth Classic. For short range use. Battery life for an average beacon device used at low power can be measured in years, while higher power, longer ranged settings can stay powered for months off an internal battery supply. This lower energy requirement also allows the device to be passively powered putting a strain on the host device the beacon is plugged into.

Important Notes

- *Beacon technology uses portable, low energy devices to emit a Bluetooth signal*

- *The device itself does nothing, but the signal can act as a trigger for another Bluetooth enabled device, allowing automatic location based triggers*

- *Beacons are ideal for indoor environments where GPS will not work properly.*

Helpful Links

- **Brief overview of beacon technology**

- **Overview of Gatwick Airport's Implementation of Beacon Technology**

How it Can Be Used

While the retail sector was one of the first to use the beacon technology and demonstrate its effectiveness, this is not the only sector where this technology is seeing use. Beacon technology can be used in a variety of different ways for a variety of situations. With modern beacon devices small enough to be used as employee badges, there are two main models for deploying beacon. These two models are mobile beacons, stationary signal receiving devices, and mobile signal receiving devices, stationary beacons. Currently, the latter model, leveraging people's mobile smartphones as mobile signal receivers, has had a monopoly on beacon deployments. This is due to the ease and relative low cost of deployment, relying on the safe bet that any potential user will possess a smartphone device, reducing the cost of deploying the hardware to the beacons themselves.

A current example of this stationary beacon, mobile receiver model can be found in the UK. Gatwick Airport, located in London installed over 2000 beacons as part of a 2.5-billion-pound transformation and modernization plan in May, 2017. These 2000 beacons are being leveraged by an augmented reality app to provide a wayfinding tool for employees. The app will detect the multiple Beacon signals, triangulate a user's location, and display AR arrows in real-time through the user's smartphone camera.

For now, examples of the secondary method, in which the beacon signal is mobile and the receiver is stationary, are only theoretical, but the potential for its use is great. One potential example of its use would be for security purposes. When a secure location that requires careful logging and tracking of visitor traffic receives a visitor, they may be given a beacon ID which continuously broadcasts a unique code associated with the visitor. Each area that requires monitoring will have a stationary receiving device able to pick up Bluetooth signals such as a tablet. When the visitor enters the associated area, the receiving device will pick up their beacon signal and log the visitor ID, arrival time, and exit time. This same theoretical model could be successfully applied to any situation where a large number of users need to be tracked within a limited number of areas – especially if they already have devices capable of receiving Bluetooth signals in these areas.

How NOVAtime is Using Beacon

NOVAtime is excited to be on the forefront of bringing beacon technology to the Workforce Management / Time & Attendance industry. NOVAtime sees the value of beacon in nearly any work place that employs wage earning workers in order to quickly and accurately track employee location and trigger time entry prompts in a seamless manner. NOVAtime has developed an interface between beacon and NOVAtime's existing Native Mobile App, NOVAmobile to facilitate the collection of information. NOVAtime's beacon emitters are USB-style, able to be plugged in internally to any NOVAtime NT7000 Smart Clock Terminal/Kiosk. This deployment provides a tamper-proof home for the beacon emitter, dramatically cutting down the chance that an employee will be able to move or otherwise manipulate the beacon while also removing the need to worry about battery life for the beacon.

The fact that the beacon is integrated with a time clock provides additional benefits as well, allowing users to review schedules, check accruals, and check timecards directly from the time clock. However, with beacon installed, rather than needing to punch in/out from the time clock, employees may simply walk by the time clock on their way to work. The NOVAmobile app will detect the beacon and automatically prompt the employee, asking if they would like to punch
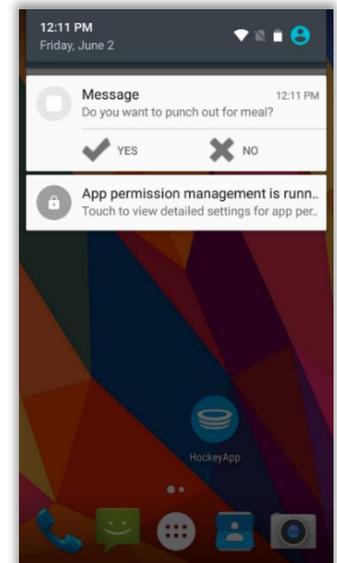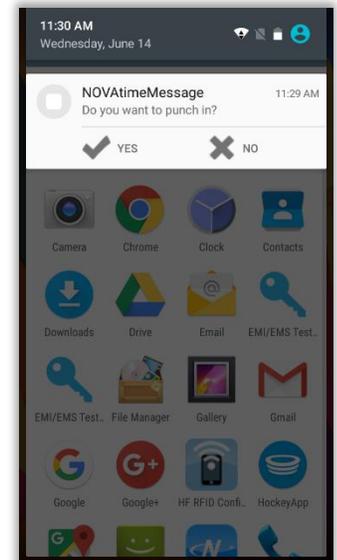
in/out. For a time clock at a business, such as a factory, where hundreds of employees may be clocking in/out at the same time, the addition of beacon technology virtually eliminates the need for an employee queue at the time clock, and allows employees to move freely past the terminal to their job duties.

NOVAtime was able to demonstrate an additional potential workforce management function for beacon at its 2017 Encounters User Conference. At this conference, NOVAtime demonstrated the ability to use beacons for indoor navigation. This feature could be useful for directing new users through a large facility during the onboarding process.

Conclusion

Despite being around since 2013, beacon technology still feels very fresh. While many industries such as retail and travel have begun to embrace it and implement beacons in exciting and innovative ways, we are only seeing the beginning of beacon's virtually unlimited potential. One industry just waiting to be transformed by beacon is the workforce management / time & attendance industry. NOVAtime is excited to be at the forefront of bringing beacon technology to this industry, and plans to continue exploring the potential for this technology.

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NOVAtime Technology, Inc. was established in 1999 and is headquartered in Diamond Bar, California. By applying the most innovative technology and providing best practice services, NOVAtime has become a leader in the Time and Attendance / Workforce Management industry. Over 10,000 organizations have benefitted from the use of NOVAtime solutions, and the world's best-managed companies continue to select NOVAtime as the preferred solution provider. For more information about NOVAtime, please visit www.novatime.com or call 1-877-486-6682.