

BeaCode: Indoor Navigation Providing Position Related Information

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Visitors attending various exhibitions are forced to deal with different kinds of problems, most of which are directly related to information, information availability, discoverability, quality and quantity. Information about various exhibitions and related exhibits available for visitors have very limited scope. This is the consequence of the ways in which is this information distributed, as well as the media used for the distribution (prints, audio-video recordings, infographics etc.). Prints are restricted by their physical dimensions while audio-video recordings are mostly limited by the time it takes to present the selected set of information. Another problem is the ability of visitors to discover the existence and location of information they are interested in.

Localization of the exhibits and information about them can be very difficult in crowded conditions. These localization problems are mostly caused by bad placement of signs, information tables and other markings in the environment, or by selecting inappropriate formats for these navigation points. The quantity of information presented to the visitor can have a significant impact on his/her overall experience of the exhibition. Not all exhibits are interesting for individual visitors and can be viewed as unwanted and time wasting. This is the reason that information overflow is a big problem.

Many exhibition organizers at the moment do not have effective tools that can be used to collect feedback and other valuable information from exhibit visitors. Information is mostly collected through paper forms or through electronic forms (sent only by a fraction of visitors). Furthermore, the feedback collection process that involves information about the number of attendees at the exhibition or number of attendees at the location of individual exhibits is

complicated (e.g. by tracking through Wi-Fi, which has limited accuracy) – there is not a single solution that is able to provide all of these features in a single, simple and effective package.

Unlike solutions provided by other companies e.g. Infsoft¹ or Meridian², we provide the experience of real time information discovery and sharing, from which benefits both the visitors and exhibition organizers: The application Indoo.rs³ offers only basics about the exhibition without the information about individual exhibits. BeaCode tries to identify individual visitors and their needs and preferences and use this knowledge to present all exhibitions in a new and interesting way - multimedia.

The solution to all these problems is our mobile application BeaCode. The BeaCode app is focused on indoor navigation based on the Bluetooth Low Energy (BLE) Beacon technology. The actual product is a composite of two parts - the mobile application designed for visitors and the administrative web application designed for the organizers. Mobile applications are implemented for both most used mobile platforms - iOS and Android. The web application is based on modern front-end platform – AngularJS.

By utilizing BLE Beacon technology, it is able to pinpoint visitors' location on the map of the exhibition (present in our app), relative to other objects - different exhibits. With this utilization, it is able to navigate the visitor from one exhibit to another, filtering out unwanted stops, minimizing the distance the visitor need to overcome. Based on his/her movement relative to other points of interest around, the application will present entirely different information. This approach of information providing is very dynamic and responsive and can effectively

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¹ <https://www.infsoft.com/>

² <http://meridianapps.com/>

³ <https://indoo.rs>

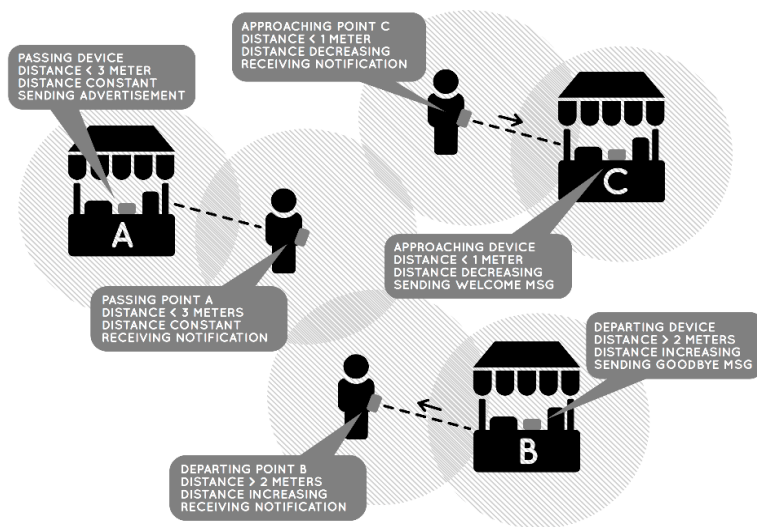


Figure 1 Illustrative situation of three different cases of position related information sharing using beacon enabled devices

bridge the gap between the visitor and the exhibit he/she is interested in. Moreover, this information is fully customized by organizers and provides virtually endless information in many different formats. These Beacode features improve visitor experience without forcing him to scan any code, make photos or type any input to phone. BeaCode automatically shows actual information based on actual time and visitor's location. And this is done with high accuracy thanks to BLE (unlike to Wi-Fi, which have lower accuracy). Thanks to the position context which is constantly updated, our application can provide information not only when the visitor is near the product but also when the user is getting closer or moving away from the product (see Figure 1).

Mobile application provides a dashboard of all exhibitions that are scheduled to take place near the location where the user is located. This dashboard prefers exhibitions that are similar to the preferences of the user and filters out those that do not match these preferences. Preferences are expressed in form of hashtags keywords, and are attached to user profile. Other exhibitions can be searched for by a search engine built into the app that can look for any feature exhibition. All exhibitions are viewed in detail, exposing detail information about the exhibition itself as well as its exhibits. Exhibits can be also viewed in detail, including descriptions and photographs (later videos). In addition, this information is available for the user in advance before the exhibition. The second part of BeaCode is the web administration application designed for organizers. Organizers are able to create new exhibitions, add different exhibits and prepare guidelines for visitors. In the future, the web interface will be also used for statistical evaluation of collected data from past exhibitions including summaries about

the number of attendees at the exhibition and number of attendees at individual exhibits. Published and filled feedback forms will be also viewed here. Organizers are using this valuable information to make their exhibits more effective and more profitable.

The ultimate vision of our product is to create a useful ecosystem for visitors as well as exhibition organizers, crucial for securing a flawless experience for visitors and also the highest possible ratings and profits for exhibition organizers.

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